

# Mini Crawler Excavator

## User Manual



Read Carefully Before Use  
Keep for Future Reference

# Preface

Congratulations on your new mini excavator!

Welcome to the user manual for the mini excavator. We are thrilled to provide you with a comprehensive guidance on operating and maintaining this powerful and versatile machine. Whether you're a seasoned professional or a newcomer to the world of construction and excavation, this manual is designed to be your reliable companion throughout your journey with the mini excavator.

Within these pages, you'll find detailed instructions, safety guidelines, and valuable tips to ensure that you operate the mini excavator efficiently, effectively, and most importantly, safely. Our aim is to empower you with the knowledge and confidence needed to harness the full potential of this equipment while prioritizing the well-being of both yourself and those around you. From assembling and starting up the mini excavator to executing complex digging and lifting tasks, we've covered every aspect to make your experience seamless. Additionally, you'll discover insights into routine maintenance procedures that will keep your mini excavator in prime condition, prolonging its lifespan and optimizing its performance.

Safety is paramount, and we emphasize the importance of adhering to the provided guidelines. This manual includes clear explanations of safety protocols, operational best practices, and hazard mitigation techniques. By prioritizing safety, you're not only protecting yourself but also creating a secure environment for your team and job site.

Remember, this manual is not just a technical document; it's a guide tailored to your needs. We encourage you to familiarize yourself with its content, explore its sections, and refer back to it whenever needed. Our commitment is to empower you with the knowledge necessary to make the most of your mini excavator, elevating your capabilities and contributing to successful projects.

Thank you for choosing our mini excavator. Your journey starts here, and we're excited to embark on it together. Let's dig in!

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# 1. About the Machine

Your excavator is designed for lasting performance, featuring a reliable BRIGGS & STRATTON gasoline engine. With this trusted engine, you can expect durability and consistent power for your operations.

## 2. Safety Information

### 2.1 General Safety Information

- **ALWAYS** follow federal, state and local laws, codes and regulations concerning the use of construction machinery.
- Read this manual before actually operating the excavator. Familiarize yourself with the instructions that provide crucial information about the specific model's controls, maintenance requirements, and safety precautions.
- **ONLY** guarantee or allow persons with holistic knowledge of the safe operation of an excavator to operate, inspect or maintain the excavator.
- Strictly follow all the precautions and safety information as mentioned in this manual when operating, inspecting and maintaining the excavator.
- **DO NOT** operate, inspect or maintain the excavator when your faculties or judgement are impaired by alcohol, drugs, medicines and fatigue or lack of sleep. **NEVER** allow any persons under such conditions to operate, inspect or maintain this heavy machinery.
- Operating heavy equipment requires your full attention. Avoid distractions and remain focused on the task at hand.
- **IMMEDIATELY** cease use and contact Customer Service if the excavator shows any sign of anomalies or malfunctions, say noise, vibration, odor, leakage, error alarm, etc. **NEVER** attempt to resume using the excavator if the issues remain unsolved.

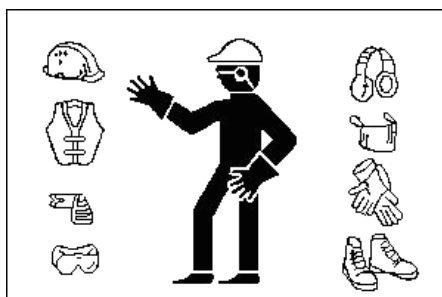
### 2.2 Operation Temperature Safety

#### Warning

- For proper functioning and expected performance of the excavator, **DO NOT** operate the excavator if the ambient temperature is higher than 113 °F (45°C) or lower than 5°F (–15°C).
- Being operated in an ambient temperature exceeding 113 °F (45°C) may lead to several issues:
  - a. Components such as circuit boards and sensors are easily affected by high temperature, causing the excavator to fail to operate normally.
  - b. Operators operating excavators in extremely high temperatures for extended periods of time are susceptible to health issues such as heat stress, dehydration and heat stroke, which can affect work efficiency and safety.
  - c. As temperature rises, the viscosity of hydraulic oil decreases, which may cause pipe leakage and system instability, thereby affecting the functioning of the excavator.
- If the excavator works under an ambient temperature below 5°F (–15°C):
  - a. The gaskets and other rubber parts may be frozen and hardened, causing early and excessive wear to the excavator.
  - b. Hydraulic oil with high viscosity means slowed oil flow in the hydraulic circulation, thus abating the operating efficiency of the hydraulic system.
  - c. Hydraulic system components, such as pumps and valves, are more susceptible to damage or failure at extreme cold temperatures.
  - d. At extremely low temperatures, the increased viscosity of the engine oil and main pump oil may cause the engine and hydraulic pump to suffer more wear when starting. This may elongate the machine's warm-up and delay normal operation.

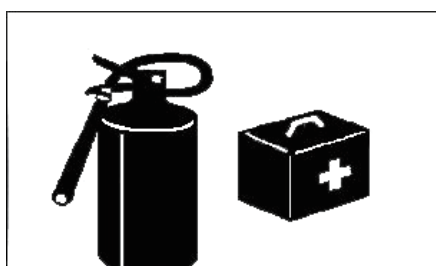
- **ONLY** use the rubber track at the temperature between  $-13$  to  $131^{\circ}\text{F}$  ( $-25$  to  $55^{\circ}\text{C}$ ).
- If the excavator must work in such conditions, please consult the Customer Service.

## 2.3 Personal Safety



### Warning

- **DO NOT** wear loose clothes or accessories that may get caught into the moving parts of your excavator in operation. Wear clothes that are oil-repellent. Replace them if grim or grease starts to build up. Fabrics coated or soaked with grime can burn in proximity to heated machinery.
- **ALWAYS** use personal protective equipment (PPE) suitable to your task. Always wear ANSI and OSHA-approved eye, breathing, and hand protection while using this product. Nonslip and steel-toe footwear is also highly recommended. Other equipment such as ear, head, and body protection may also be necessary depending on your work, work environment, and other equipment.
- **ALWAYS** keep a fire extinguisher and first-aid kit at an easily accessible place.



- Familiarize yourself with the protocols for using the first-aid kit and operating the fire extinguisher.
- Ensure that you provide training to other individuals who will be operating the excavator. This ensures that everyone is prepared to handle potential emergencies effectively.
- Display the contact details of the nearest Emergency Room (ER) prominently in the operator's area. Make sure that all personnel operating the excavator are well-informed about this information.
- Make sure the protective barriers, guards, screens, or covers are properly installed and secured before operating the excavator in a potentially dangerous situation. Do not remove any safety devices except when inspecting and servicing the excavator. Always check that the safety devices are in good condition before operating.

## 2.4 Operation Safety

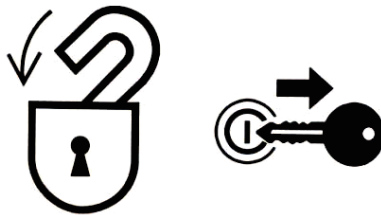
### 2.4.1 General Operation Safety

#### Warning

- Due to the nature of construction work, the use of a signalman or flagman is necessary. Always make sure that you fully understand the gestures and signals used by your signalman or flagman and so do all the persons involved in the work. If at any time such a way of communication fails, use an intercom communication.



- Prior to commencing any operations, run a comprehensive rehearsal to ensure that every participant comprehends, can effectively respond to, and proficiently practice both the designated signals and emergency protocols.
- Clean the soles of your shoes of any dirt, grease, or gravel before going into the cab. Operating the excavator pedal with dirt and grease on the soles may result in uncontrollable throttle or accidental falling from the cab.
- **NEVER** place any plastic or glass bottle in the cab, which could catch on fire.
- **ALWAYS** lower your working device to the ground and shut the engine down before leaving the driver's seat. Store the key(s) in a designated place inaccessible to unauthorized use.



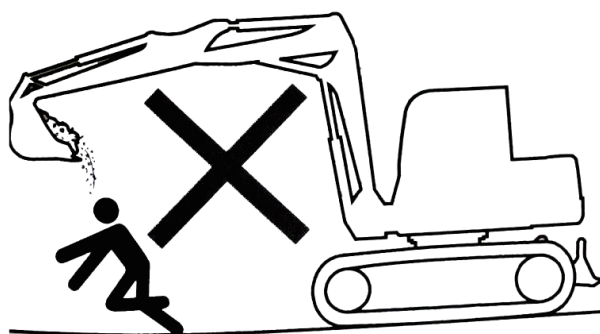
- **ALWAYS** check that the control rod/joystick is set at neutral before starting or stopping the engine.
- **DO NOT** enter or exit the excavator by jumping. **ALWAYS** mount the excavator as depicted. **NEVER** attempt to get on and off a moving excavator. **NEVER** use the control rod/joystick as a handle.



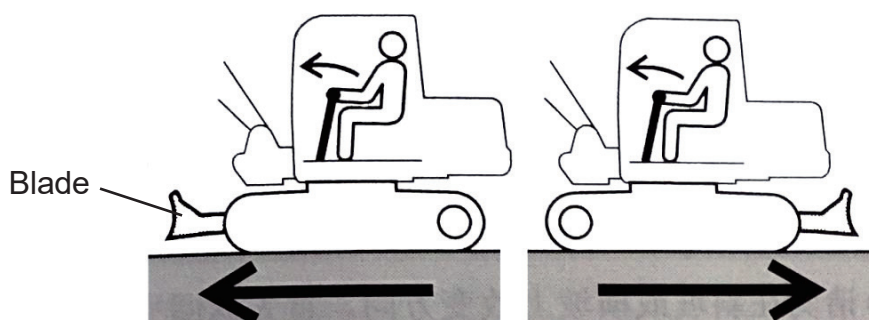
- **NEVER** carry any persons with the excavator.



- **ALWAYS** circle around the excavator to check for any anomalies before getting into the cab and operating.
- **ONLY** start the excavator when no one is within its operation radiuses.
- **NEVER** start the engine if you see a “**DO NOT OPERATE**” warning label or similar signs in the driver’s cab, on the control rod, or the start switch.
- **NEVER** move the bucket over any person. Debris falling off could cause serious injuries or even death.



- **ALWAYS** visually check that the bucket is in front of the driver's seat before operating. If the blade is at the rear of the driver's seat, the controls for turning and traveling will operate in reverse, contrary to the intended direction for the excavator's movement.



- **DO NOT** operate on soft or damp soil ground, on which this excavator may tilt or fall over. **DO NOT** operate on unstable ground. If must, it's recommended to seek professional guidance or assistance beforehand. If the ground vibrates or shakes as you drive over, cease driving and exit the excavator **IMMEDIATELY**.

- This excavator is designed for digging, bulldozing, and ditching. It has no compatible apparatus for hoisting. Consult professional advice before operating this excavator for that purpose.

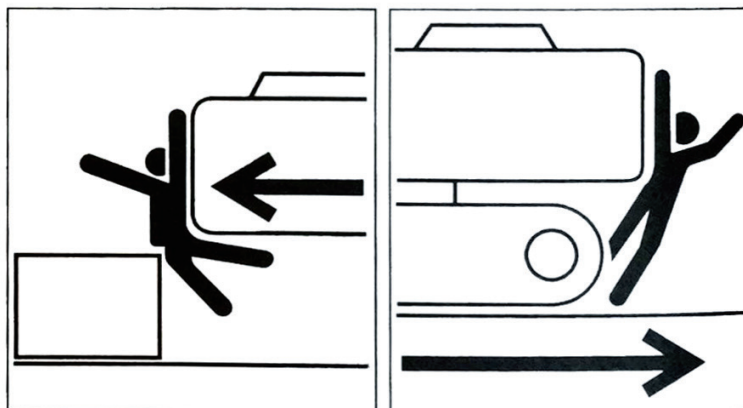


- **ALWAYS** know the locations of obstacles such as ditches, utility lines such as gas, power, and water lines, and things that might fall such as trees, overhead wires, or stones on a cliff.

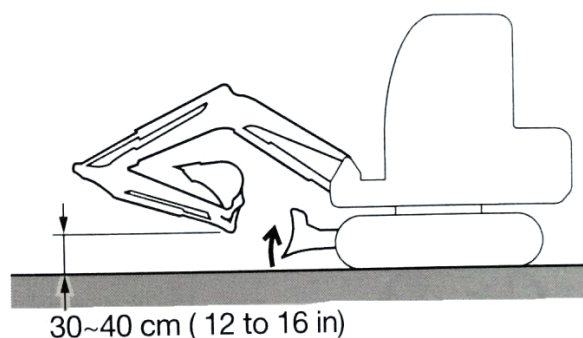


### 2.4.2 Travel Safety

- **ALWAYS** check with the signalman or flagman that no person is standing within the operating radius of the excavator.

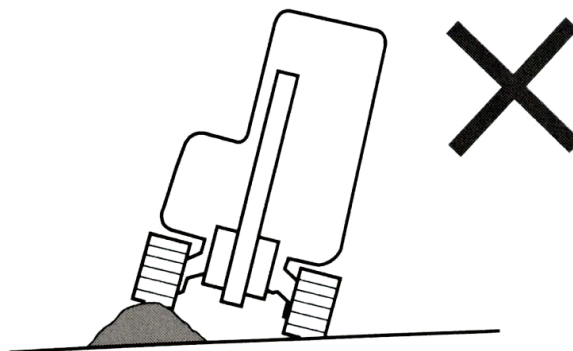


- **ALWAYS** confirm that there is no obstruction before the blade that may topple the excavator while traveling. Raise the bucket as shown above the ground 16 in. (40 cm) depending on the specific terrain.



- **AVOID** traveling as shown below.

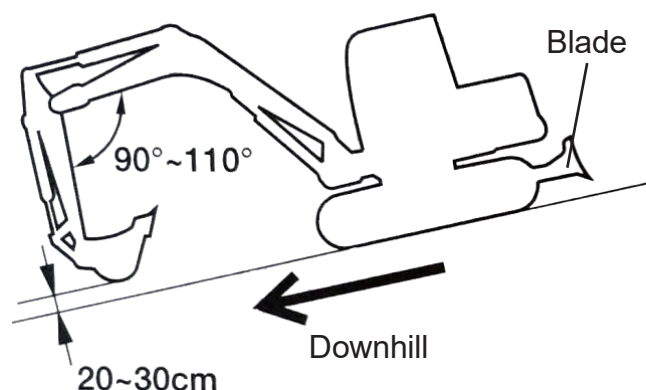
If you must, lower the blade close to the ground and travel slowly. **DO NOT** get onto obstacles that will tilt the excavator to an angle of 10° or higher.



- Maintain a low speed while traversing rough terrain; **AVOID** abrupt starts, stops, or sudden changes in direction. Such actions could lead the working device to come into contact with the ground, jeopardizing the excavator's balance and potentially causing harm to nearby structures.
- Exercise caution and ensure the excavator's stability is upheld if you must travel on slopes or inclines.

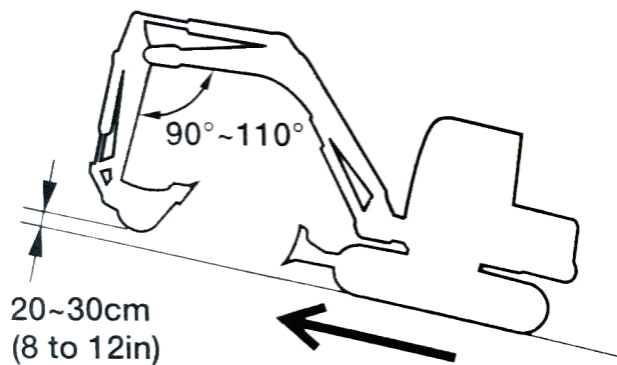
**DO NOT** travel on excessively steep slopes where the excavator's stability is compromised (maximum angle: 30°, lateral tilt: 10°). Be aware that the excavator's stability can vary depending on the specific work conditions, potentially falling below the mentioned values.

- Before traveling downhill, swing the cab 180° so that the blade is at your back to keep balance. Adjust the arm and boom in the position as shown and pay close attention to the slope ahead.

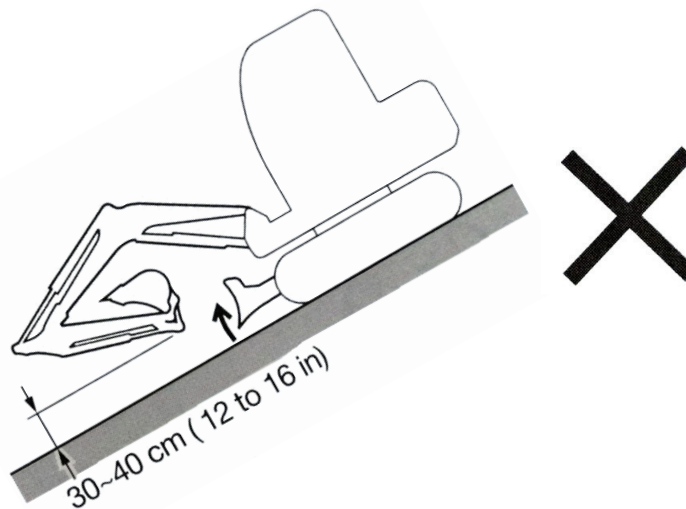


## Safety Information

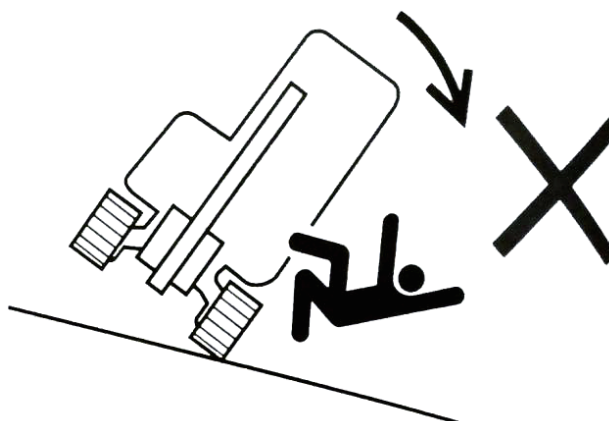
- Before traveling uphill, lower the bucket to 20–30 cm above the ground and ensure the blade is ahead. Lower the bucket onto the ground and shut down the excavator in case of emergency.



- NEVER** go backward on slopes. Equipped with a crashing hammer, crusher, or a long bucket rod, the arm and boom are heavier than the cab. DO NOT dig or operate laterally with the boom toward the downhill direction.



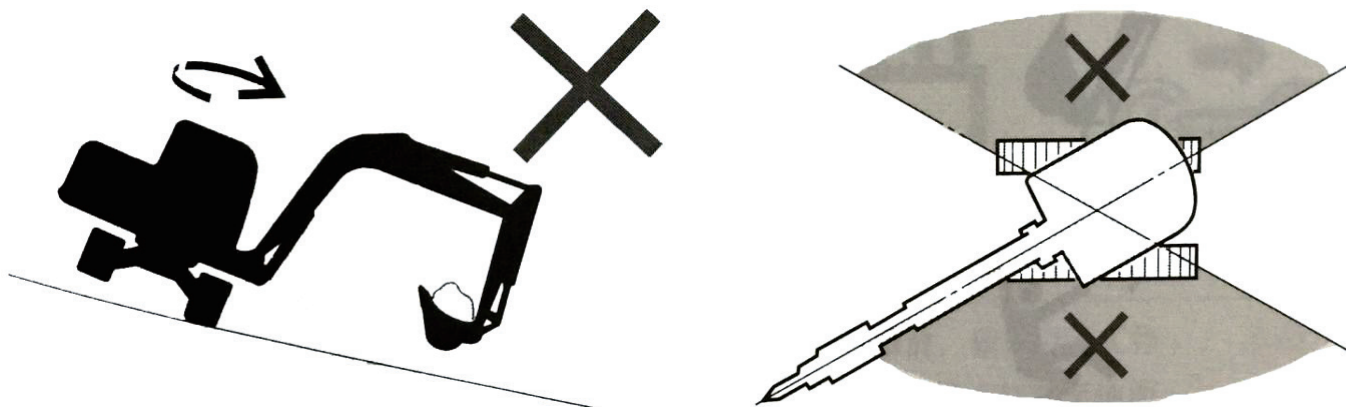
- AVOID** altering your direction while on a slope or a cross slope. Instead, navigate back to level ground before selecting a new path. This approach helps maintain stability and safety during directional changes.



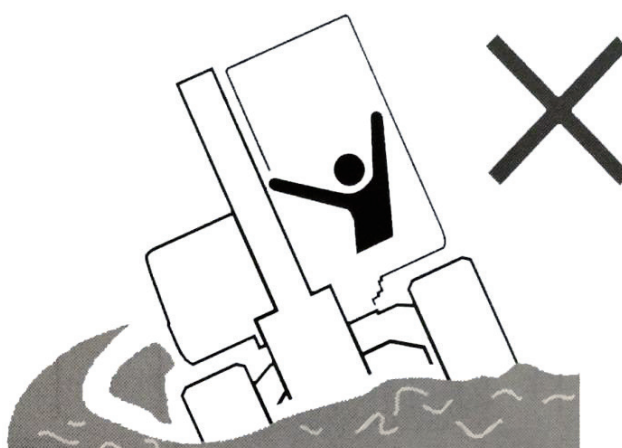


- **NEVER** swing the cab on slopes. The excavator is more susceptible to rolling in the lateral direction compared to the longitudinal direction.

When the bucket is bearing a heavy load, exercise caution when executing lateral turns (swings). **NEVER** swing the cab abruptly when the bucket is carrying a heavy load even on level ground.



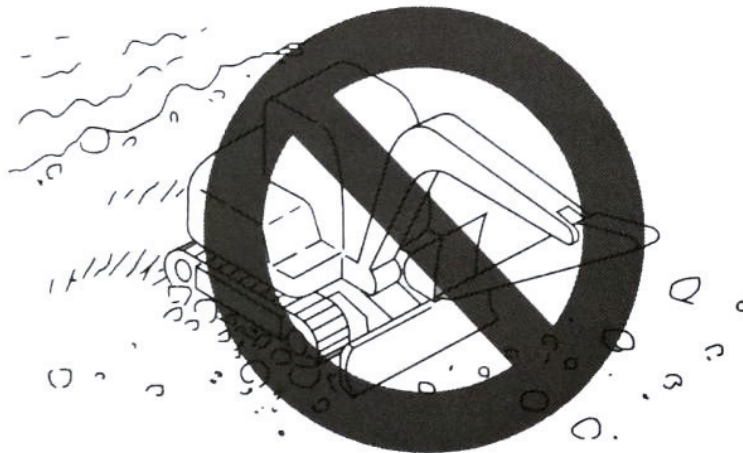
- While moving across gentle slopes covered with grass, leaves, or on wet metal plates or frozen ground, be cautious of potential slipping hazards. Ensure that the excavator is not positioned sideways on the slope to prevent any unintended slipping incidents.
- **EXERCISE EXTREME** caution when operating the excavator on snow or ice. Objects situated on the road shoulder or roadside may be concealed beneath the snow, which poses a risk of the excavator overturning or colliding with these snow-covered objects. Consult professional advice on operating an excavator under extreme weather conditions.
- Steer clear of entering areas with soft ground, as the excavator's weight may induce tilting, leading to the risk of collapse or sinking. If must, it's recommended to seek professional guidance or assistance beforehand.



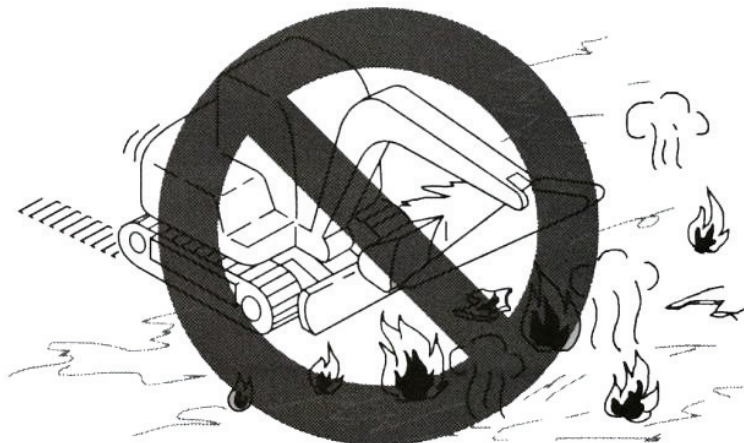
- **ALWAYS AVOID** walking and turning on gravel, highly uneven hard rock, steel beams, scrap iron, or near the edge of a plate can result in damage to the rubber track.



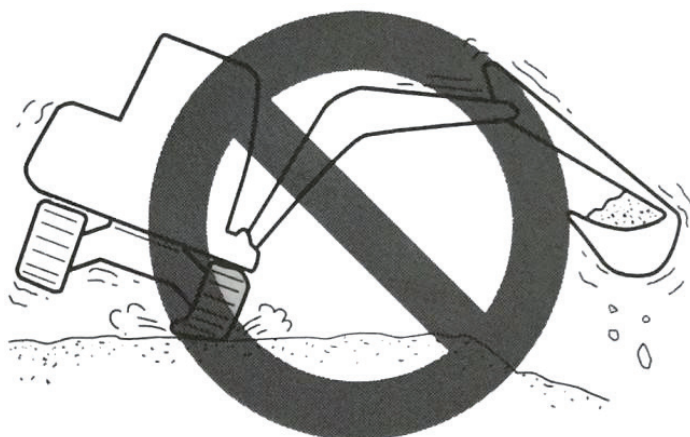
- Navigating across riverbeds or ground with numerous gravels could lead to gravel becoming lodged in the track, potentially causing track damage or derailment. Refrain from utilizing this excavator in marine environments. The salt content may corrode the steel parts of the excavator.



- **DO NOT** travel on newly paved asphalt roads or other similarly heated surfaces, as this **WILL** compromise the service life of the rubber track. **NEVER** travel with the rubber track removed for better traction, as this **WILL** shorten the service life of the sprockets.



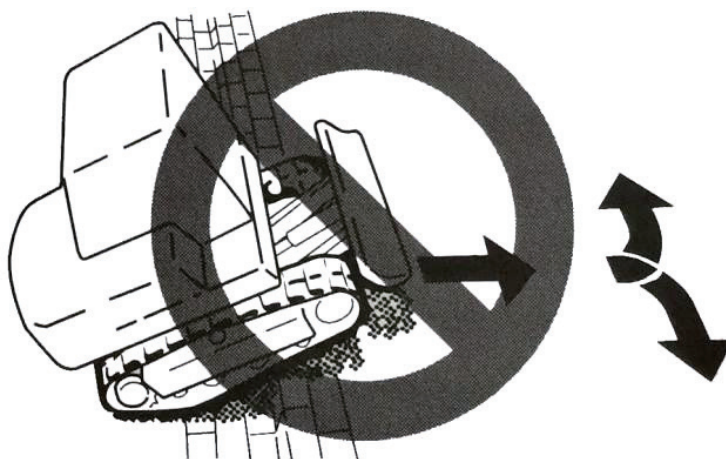
- Due to the rubber composition of the entire track, rubber tracks may not offer the same stability as steel tracks. Exercise caution during lateral turns and swings.



- When the vehicle encounters obstacles like pebbles, rocks, or other substantial steps (20 cm or higher), ascend at a perpendicular angle without changing direction on the steps.



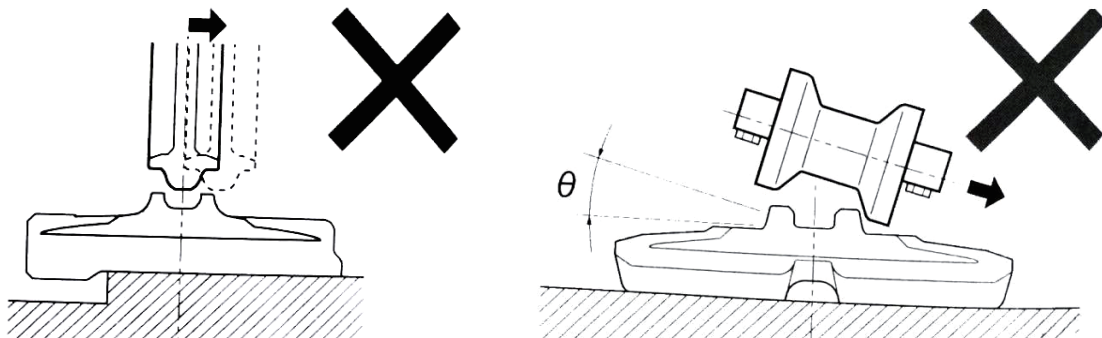
- **DO NOT** change the direction as you start to go up a slope.



- Refrain from positioning one track on a slope or protruding surface while the other track is on a flat area (where the excavator inclines at an angle of  $10^\circ$  or higher). Travel with both tracks on the flat surface.

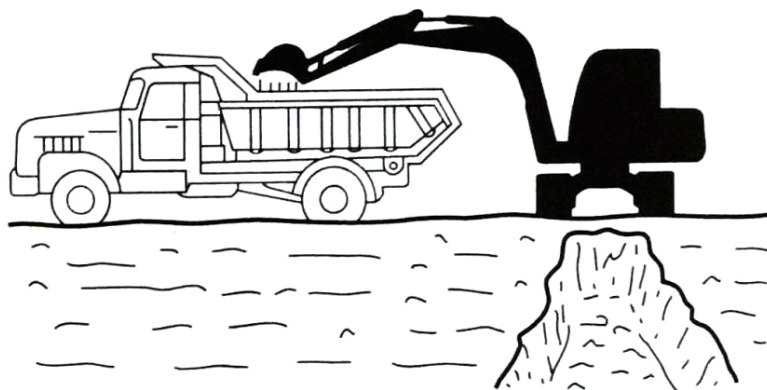


- NEVER** change direction or swing the cab when the track is loose as shown. In such case, if the excavator travels in reverse, the sprockets **WILL** derail from the rubber track. Similarly, if you swing the cab in any direction, the track **WILL** detach.



### 2.4.3 Load & Unload Safety

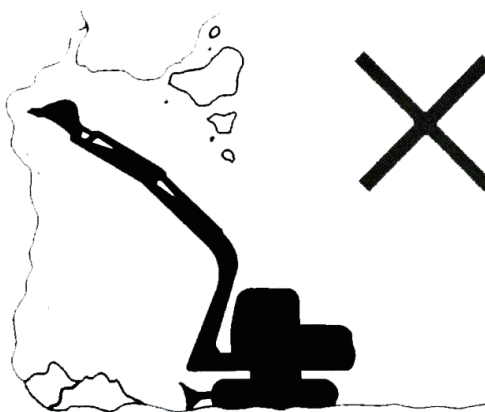
- NEVER** raise the bucket over any person, not even a driver sitting in the cockpit.
- ALWAYS** ensure the driver's safety when loading. **DO NOT** apply load until the driver arrives at a safe place. **ONLY** load/unload from the back of a vehicle.



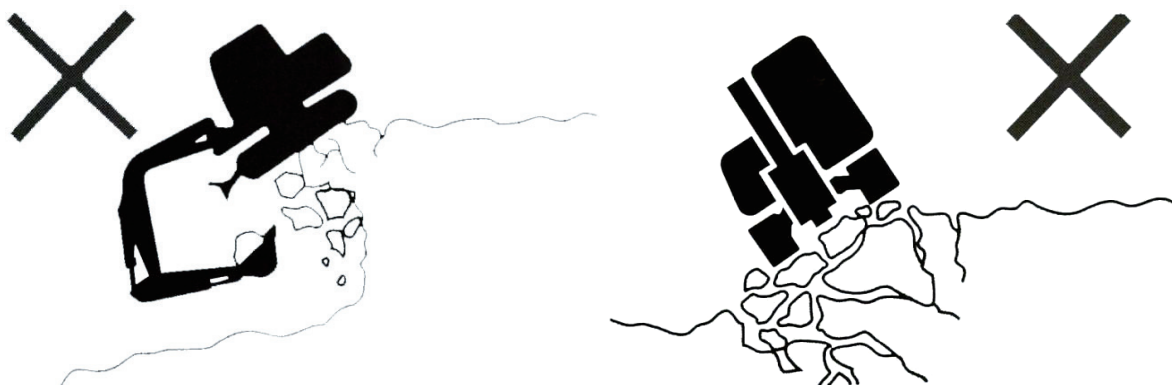


### 2.4.4 Excavation Safety

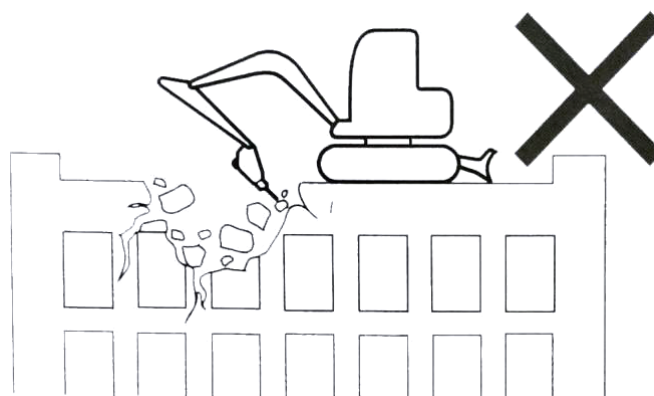
- **NEVER** excavate at the base of steep embankments, as this can trigger ground subsidence and pose significant risks. Refrain from operating the excavator in areas prone to falling rocks or debris, as this presents a hazardous environment.
- Keep a safe distance between the excavator and the edge of the site. **NEVER** dig the ground in front of the excavator when near an edge.



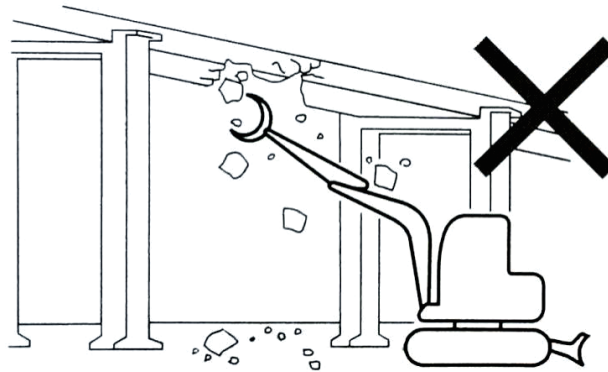
- Refrain from disassembling components underneath the excavator. The unstable ground could result in the excavator tipping over. Before undertaking any operation atop a building or other structure, thoroughly assess their strength and structural integrity. In the event of a collapse, it could lead to substantial damage or complete destruction.



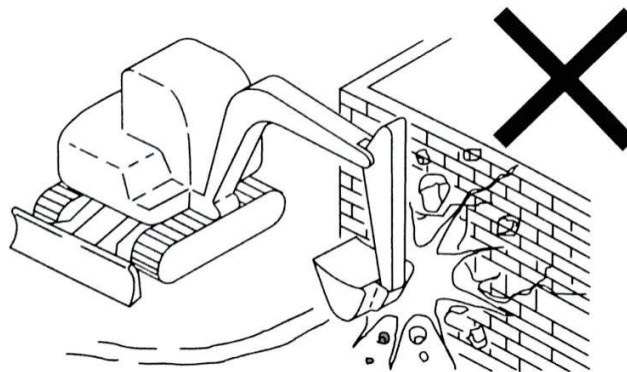
- Avoid disassembling from elevated positions. This practice poses a risk of objects falling and buildings collapsing, potentially causing severe injuries or significant destruction.



- **NEVER** disassemble from under a bridge or similar structures, which risks getting crushed by brutal force, causing severe injuries, death, or significant destruction.



- **NEVER** use the boom and arm to swing and smash against structures for demolition purposes. This action can propel heavy debris forcefully, leading to substantial property damage, severe personal injuries, or even loss of life.

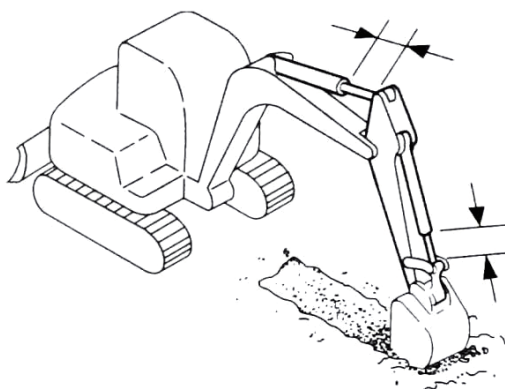


### **2.4.5 Hoisting Safety**

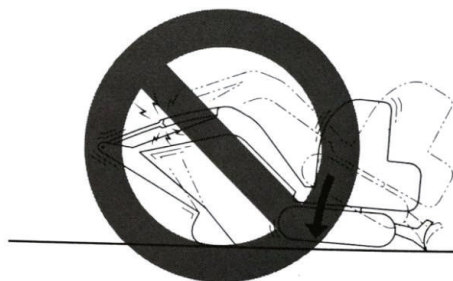
- All rated lifting capacities are determined under the assumption of stable and level ground conditions. For secure lifting, users must incorporate appropriate safety margins when encountering specialized work conditions, such as soft or uneven terrain, non-horizontal surfaces, lateral loads, sudden or dynamic loads, hazardous environments, and personnel experience. Prior to operating the excavator, operators and other personnel must be well-acquainted with the operation manual and adhere strictly to the equipment's safety operation procedures.
- If the chain or hoisting device isn't properly connected, the bucket linkage or hoisting device might fail, leading to severe injury or even fatalities.
- While using the excavator as a crane, abstain from attempting to extract stumps from the ground, as the load on the excavator becomes uncertain under such circumstances.
- It is strictly prohibited for anyone to be positioned above, below, or near the object being lifted, or within the vicinity of the working area. Exercise vigilance regarding airborne debris.

## 2.4.6 Hydraulic Cylinders Safety

- **DO NOT** extend the hydraulic cylinders to their extreme lengths.



- **NEVER** raise the whole excavator by lowering the bucket. This full load of the excavator and the cab **WILL** damage the bucket cylinder. **NEVER** use the bucket for digging.



- **AVOID** forcefully striking the bucket against the ground. This **WILL** damage the boom and arm cylinder, along with other crucial connections.

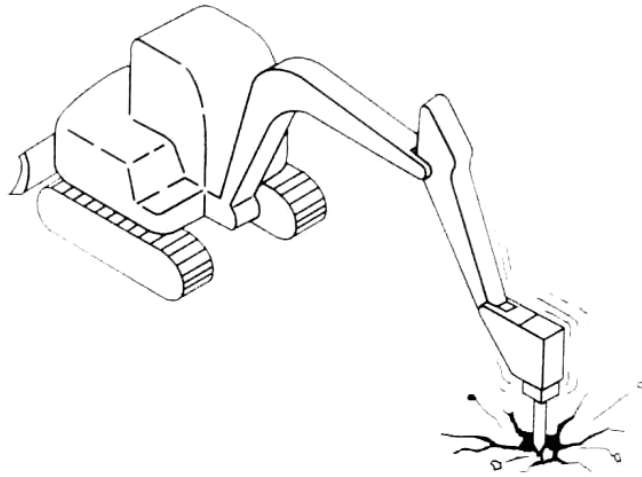


- **DO NOT** use the boom and arm to support the full weight of the excavator, as this **WILL** damage the hydraulic systems as well as pose hazard to the operator and other personnel.



## Safety Information

- When dealing with hard rock, employ a crushing hammer (not included) to break the rock into smaller fragments. This approach safeguards the excavator from potential damage and proves to be a more cost-effective way.



- Striking rocks with the bucket can lead to damage of both the bucket and its cylinder. Take caution when retracting the bucket.

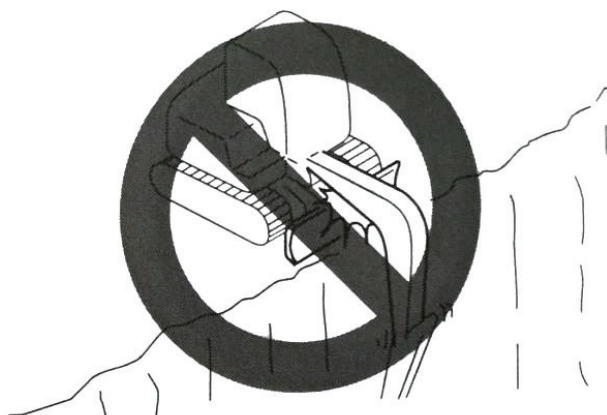


- Pay attention to the position of your bucket's control rod when digging. Make sure the bucket doesn't drop accidentally.



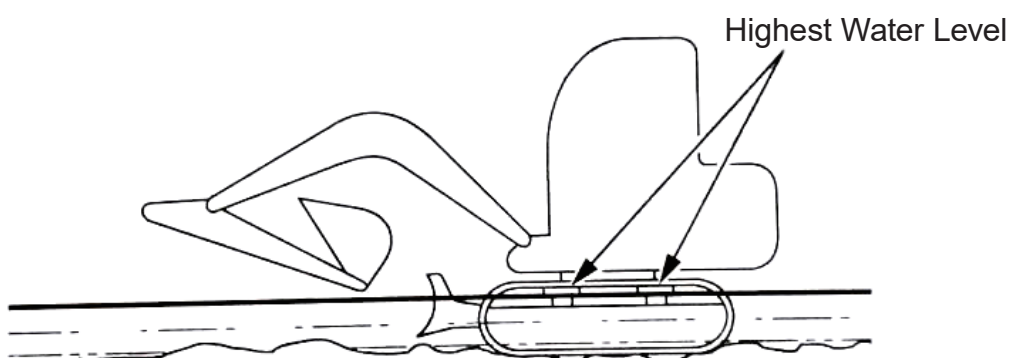


- When engaged in deep digging with the blade positioned at the front, exercise caution to prevent any collision between the boom, bucket, and the bucket. Swing the cab so the bucket is at the rear. Exercise caution as you dig, being careful not to carry too heavy a load.

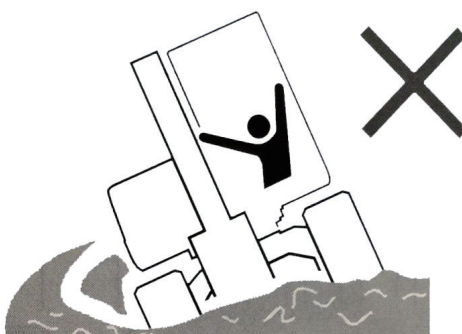


### **2.4.7 Water Safety**

- NEVER** submerge the cab in water. This will immerse the radiator and burn it. If you must operate in water, make sure the water doesn't cover the whole track. Apply sufficient lubricating oil for those parts that have been operated underwater when on land.



- ONLY** wade into water whose depth you know. **DO NOT** compromise the safe operation of the excavator and your personal safety. Drive through at a stable slow speed.



## 2.4.8 Mud Escaping

Follow the steps below to escape mud entrapment.

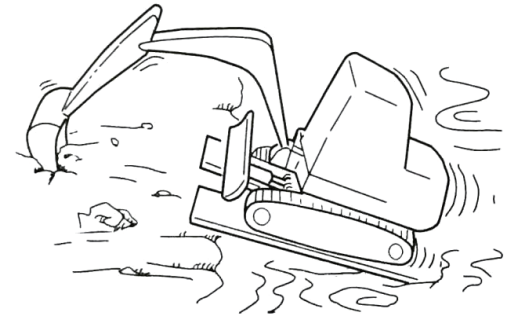
### One-Track Entrapment

1. Set the angle between the arm and boom to somewhere between  $90^{\circ}$  and  $110^{\circ}$ .
2. Retract the bucket, lay its bottom against sturdy ground, and lower down the bucket to raise the whole excavator.
3. Lay a piece of sturdy plank under the raised track, making sure the plank has been inserted into the end of the track.
4. Raise the bucket and travel out of the entrapment.



### Two-Track Entrapment

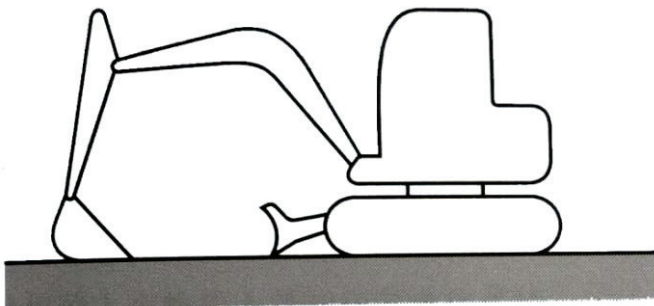
1. Repeat steps 1–3 in One-Track Entrapment.
2. Lay two pieces of sturdy planks or similar-shaped objects under the raised tracks, making sure the planks are inserted into the end of the tracks.
3. Use the bucket as a leverage point and travel out the entrapment.



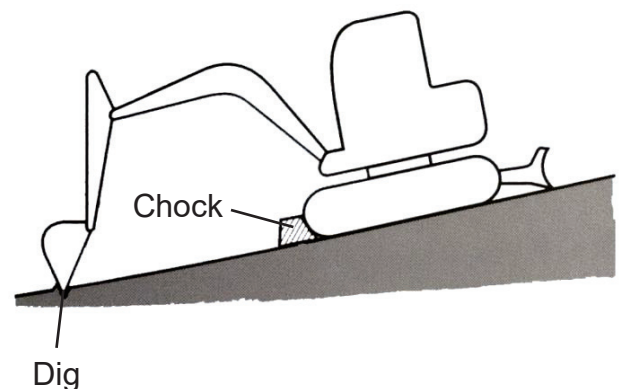
## 2.4.9 Parking Safety

- Park the excavator on a flat, solid, and safe ground if possible. If such a parking surface is unavailable, make sure you park it as shown on the right.

On a flat, solid, and safe ground



On a slope



## 2.4.10 Worksite Safety

### Danger

- **ALWAYS** free your worksite of any sparks or flame. The fuel, lubricating oil, grease, and antifreeze inside the excavator are flammable. Keep the welding and soldering devices away from the excavator.
- **ALWAYS** forbid smoking at and around your worksite.
- **NEVER** use your cellphone or any other similar device when filling the fuel or lubricating oil.
- Keep your worksite well-lit at all times. Use additional illumination when necessary. **DO NOT** operate the excavator if you don't have a clear vision.



- Keep your worksite well-ventilated. **NEVER** operate your excavator in a closed area with poor ventilation. If you must and natural ventilation is impossible, install a ventilation fan and lengthen the exhaust pipe to make sure the fume doesn't get denser inside the closed worksite.



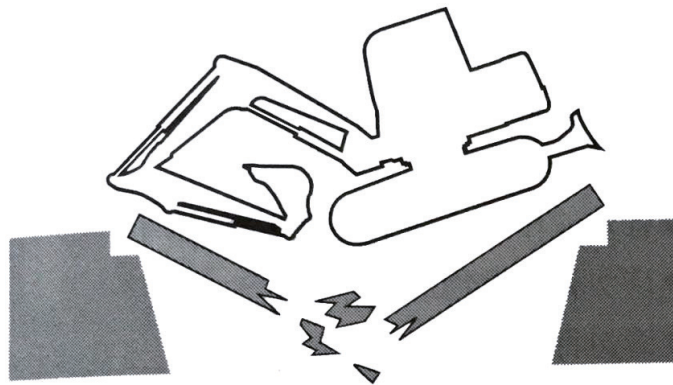
- Some construction materials may contain asbestos. Exercise **EXTREME** care and discretion when dealing with the material. Make sure all the personnel involved wear either a half-face or full-face respirator paired with a **NIOSH-rated N100, R100**, or the more common P100 filter.

Do not use compressed air to clean your worksite. **DO NOT** polish or grind materials containing asbestos. If working indoors and there is asbestos dust, require all the personnel involved to wear the respirator mentioned above and install a ventilation system with polymer filter before actually working on material containing asbestos. Limit access to the worksite to authorized personnel and follow the national and local codes and regulations concerning the disposal and handling of asbestos.

- **DO NOT** put any body part of your body into any moving parts of the excavator. The clearance may change when the excavator moves. Train the ground personnel about this, evacuate your worksite of any bystanders, and enclose your worksite with barriers or hurdles before operation.



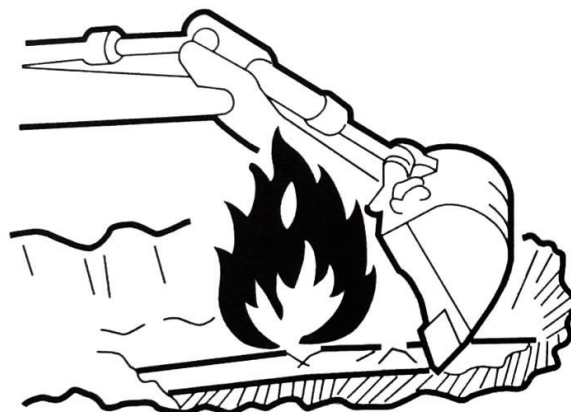
- **ALWAYS** inspect the terrain and the ground in the worksite before operation. Either for indoor or outdoor operation (on a bridge for example), inspect the building structure to make sure the structure can bear the operating mass of the excavator.



- **DO NOT** operate on soft or damp soil ground, on which this excavator may tilt or fall over. **DO NOT** operate on unstable ground.

If must, it's recommended to seek professional guidance or assistance beforehand. If the ground vibrates or shakes as you drive over, cease driving and exit the excavator immediately.

- **ALWAYS** know the locations of obstacles such as ditches, utility lines such as gas, power, water lines, and things that might fall such as trees, overhead wires or stones on a cliff.

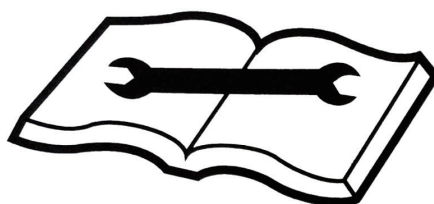


### 2.4.11 Oil Safety

- **DO NOT** remove the fuel tank cap or fill the fuel while the engine is running or still hot. When filling oil, watch out not to splash the oil onto the excavator's hot surfaces or electronic components.
- **NEVER** smoke in the worksite.
- **IMMEDIATELY** clean the fuel or lubricating oil overspills.
- Avoid filling the fuel tank to its maximum capacity; leave room for oil expansion. Immediately address any fuel spillage. Ensure the fuel tank is securely fastened. If the tank cover is absent, replace it with an identical one. Refrain from using unauthorized tank covers that lack proper ventilation, as they could lead to internal pressure buildup.
- For a better engine performance and longer service life, consistently use clean and high-quality fuel. In cold weather conditions, opt for diesel oil that can function efficiently at temperatures at least 12°C lower than the anticipated minimum outdoor temperature to prevent freezing.
- Select diesel oil with a cetane value of 45 or higher. In cold regions or areas at high altitudes, opt for fuel with a higher cetane value.
- Ensure that the fuel used contains sulfur content below 0.05–0.0015%. In the United States or Canada, employ ultra-low sulfur fuel. The use of high-sulfur fuel may result in acid corrosion of the engine cylinder.
- Avoid the use of kerosene. Refrain from mixing kerosene, used lubricating oil, residual fuel, or other additives with diesel oil. Poor-quality fuel can undermine engine performance or cause damage.
- It is not recommended to use fuel additives, as some additives may degrade engine performance. Additionally, metals like zinc, sodium, magnesium, silicon, and aluminum should be limited to one part per million (1 ppm) mass or less. When utilizing bio-diesel, adhere to safety guidelines. Warranty provisions from the engine manufacturer may become void if the excavator does not meet the required standard or if deteriorated bio-diesel is used.

## 2.5 Maintenance Safety

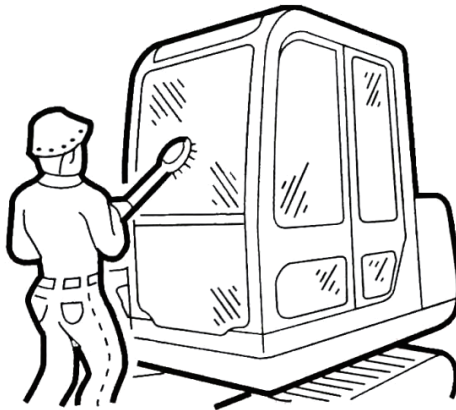
- **ONLY** have this excavator maintained and serviced by a certified mechanist following the specific maintenance cycles stated in this manual.



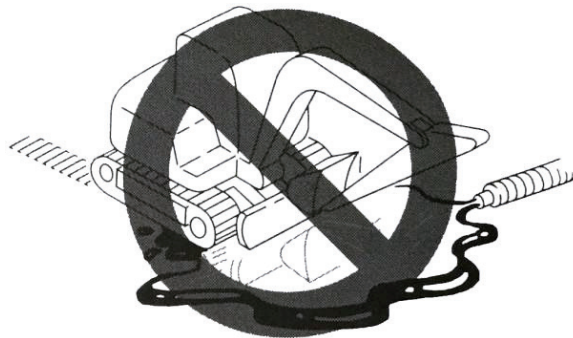
- **ONLY** replace damaged parts with identical ones. If such parts can't be procured locally, contact Customer Service.
- **DO NOT** modify the excavator. Unauthorized retrofitting of the excavator may cause injury or even death, for which the manufacturer and importer of the excavator will not be held liable.
- **ALWAYS** check that the labels and signages are legible. If damaged, replace them with identical ones.

## Safety Information

- **ALWAYS** keep the excavator clean, especially parts that the driver steps on or holds on to. Wipe grime, grease, dirt, snow, or ice off to prevent accidental falling.
- **ALWAYS** check the inlets and outlets of the engine for any obstructions.



- Prevent fuel, lubricating oil, salt, or chemical solvents from coming into contact with the track. These substances can corrode the welding seams of the track steel core, leading to rust or detachment. Should any of these substances adhere to the track, promptly rinse it off with water.



- **ALWAYS** mark the excavator with a “**DO NOT OPERATE**” sign if any malfunction arises. Hang the sign on a prominent location, preferably on the joysticks.





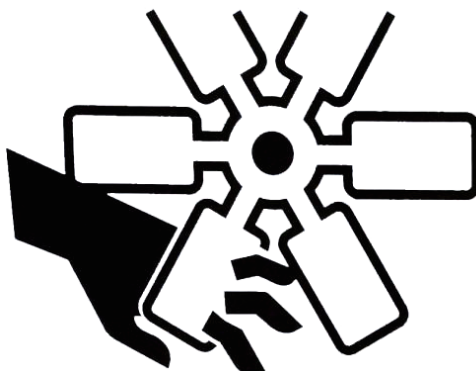
- **ONLY** use explosion-proof lamps when examining fuel, lubricating oil, coolant, or battery electrolyte. Failure to do so could lead to severe injuries or fatalities caused by an explosion.



- **NEVER** use damaged tools, tools with poor performance, or tools with other purposes to service this excavator.



- **ALWAYS** be mindful of the rotating and moving parts. **NEVER** drop or insert any objects into a fan or fan belt, which could tear the objects into pieces and send them flying.



- **ALWAYS** lower all the movable working equipment onto the ground or at the lowest position before maintenance or repair under the excavator.



- **ALWAYS** make sure to immobilize the tracks using chocks before performing any work beneath the raised excavator or equipment. Always use a sturdy and stable support such as a wooden block or jack to ensure secure fixation. Do not engage in any work under the excavator or the working device if the equipment isn't stably fixed.
- **ALWAYS** secure the hood before servicing under it.



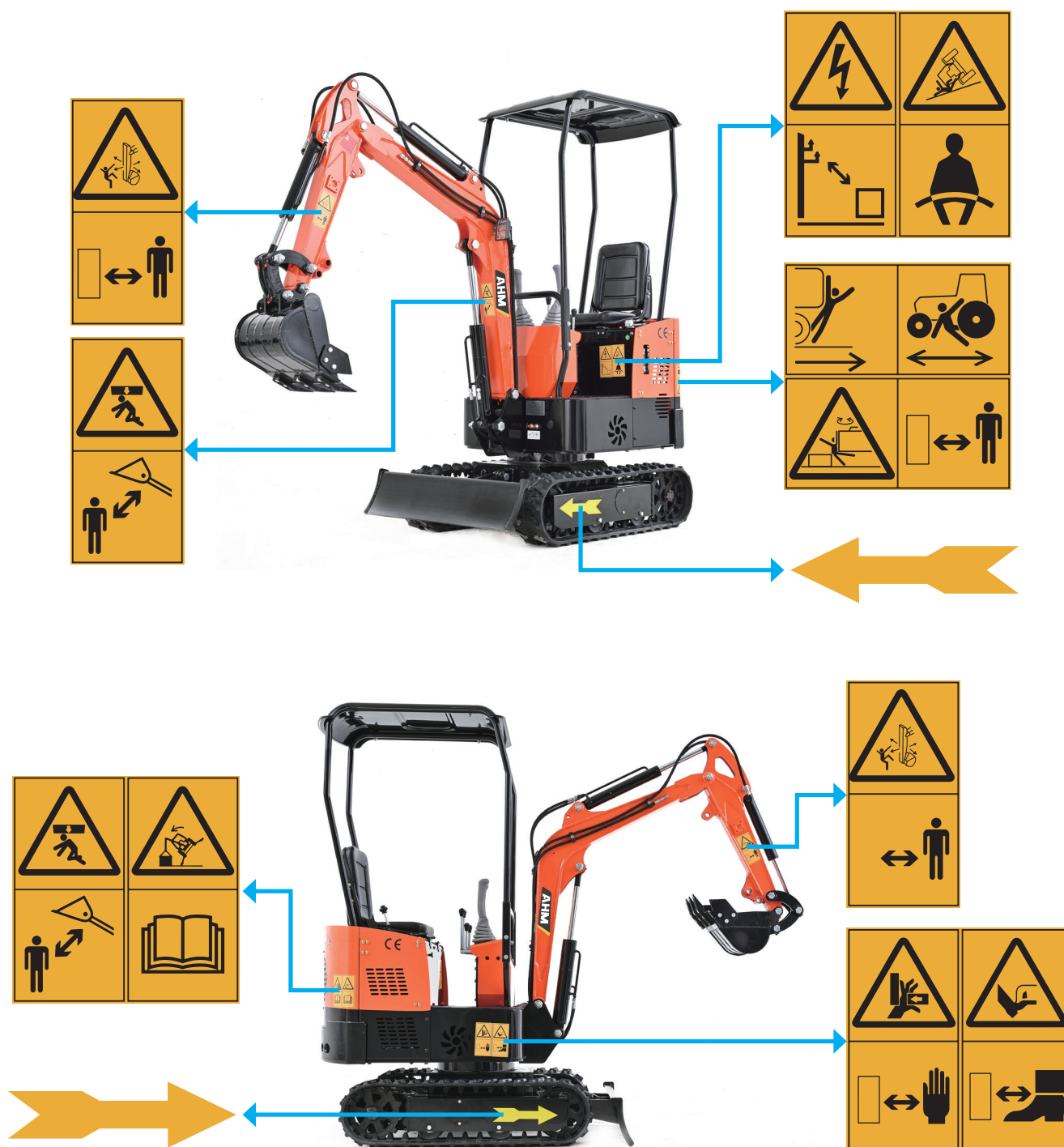
- When handling heavy objects or accessories during removal or installation, ensure they are placed in a secure and stable location. Restrict unauthorized individuals from accessing the area where such items are stored.
- Refrain from lubricating or mechanically adjusting the excavator when the engine is active even though the excavator is not operating. If maintenance must be carried out, use at least two operators. One should be seated in the driver's seat, prepared to promptly shut down the engine if required. The one in the driver's seat should never touch the control rods/joysticks. The other person performing maintenance should stay clear of moving parts.
- The salt, potassium chloride, ammonium sulfate, potassium sulfate, and lime superphosphate can damage the track. If any such substances stick to the track, clean immediately with water.
- If the excavator will not be used for a prolonged period (three months or longer), disassemble the rubber tracks and store them away from direct sunlight or rain. Or completely cover them with water-repellent canvas.



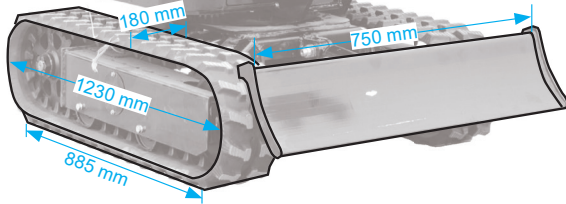
## 2.6 Hand Signals

When operating the machine, never attempt to carry out tasks calling for fine control or working in areas where visibility is poor or impaired without seeking the assistance of a signalman. Make perfectly sure that you and the signalman understand the signals to be used.

## 2.7 Safety Labels



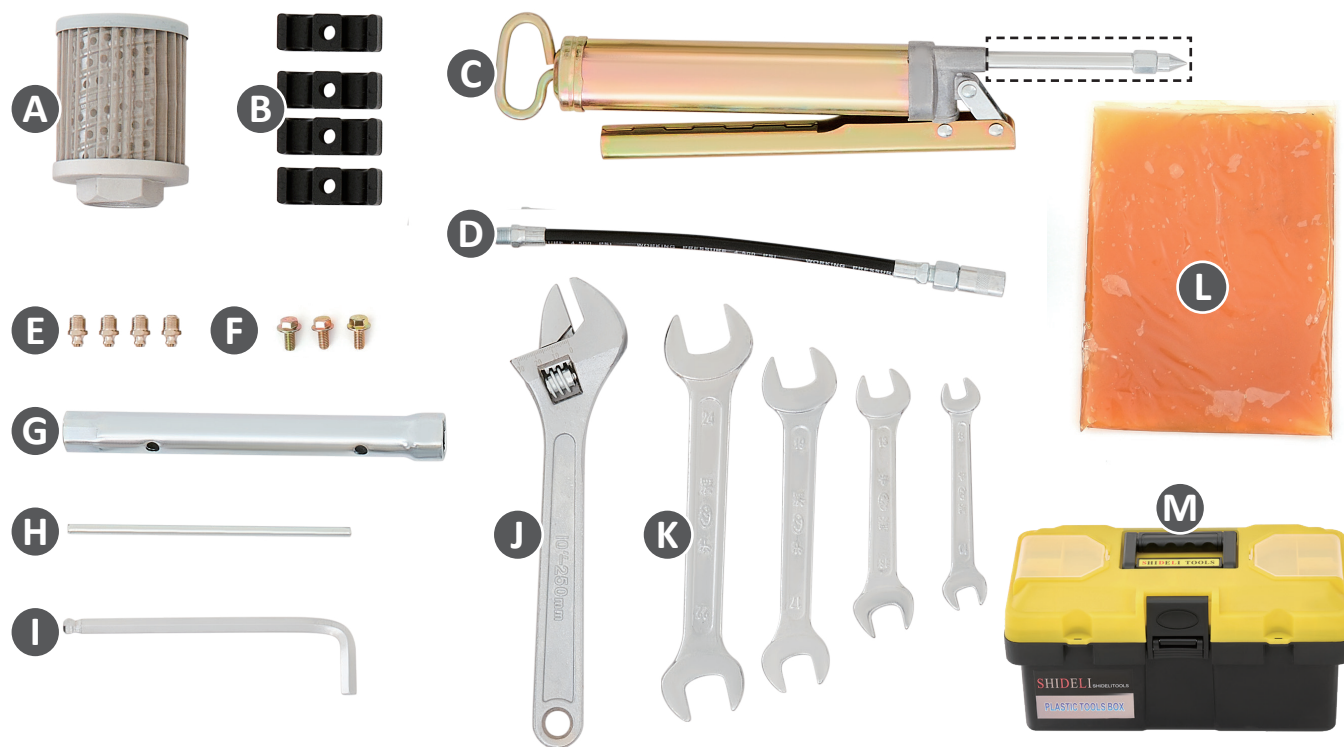
# 3. Specifications

<b>Model</b>		<b>AX-12B</b>	
<b>Engine</b>	<b>Model</b>	BRIGGS & STRATTON 25T2	
	<b>Rated Power</b>	13.5 hp	
	<b>Rated Speed</b>	3060 rpm	
	<b>Rated Torque</b>	21 ft lbs @ 3060 rpm	28.5 N·m @ 3060 rpm
	<b>Displacement</b>	25.6 in³	420 cm³
	<b>Oil</b>	<b>Capacity</b>	37.2 fl oz
		<b>Oil Type</b>	10W-30
<b>Fuel Tank</b>	<b>Weight</b>	68.34 lb.	31 kg
	<b>Volume</b>	1.74 gal.	6.6 L
	<b>Fuel Consumption</b>	0.26 gal/h	1 L/h
	<b>Fuel Type</b>	#90 or over	
<b>Main Pump</b>	<b>Rated Pressure</b>	2611 psi	18 MPa
	<b>Max. Pressure</b>	3626 psi	25 MPa
<b>Hydraulic Oil Tank</b>	<b>Volume</b>	3.3 gal.	12.7 L
	<b>Hydraulic Oil Type</b>	AW 46	
	<b>Hydraulic Oil Nominal Flow Rate</b>	0.2 fl oz	6 ml/r
<b>Battery</b>		12 V 45 Ah	
<b>Bucket</b>	<b>Volume</b>	0.88 ft³	0.025 m³
	<b>Dimensions (Width×Height×Depth)</b>	15.75×12.6×7.87 (in.)	400×320×200 (mm)
	<b>Max. Load</b>	264.6 lb.	120 kg
<b>Track</b>	<b>Material</b>	Rubber	
	<b>Supporting Wheel No.</b>	2	
	<b>Width</b>	7.1 in.	180 mm
	<b>Distance between Tracks</b>	29.5 in.	750 mm
	<b>Ground Track Length</b>	34.8 in.	885 mm
	<b>Max. Track Length</b>	48.5 in.	1230 mm
			
<b>Slew Bearing Ground Clearance</b>		16.2 in.	410 mm
<b>Min. Ground Clearance</b>		3.86 in.	98 mm
<b>Slew Performance</b>	<b>Slew Speed</b>	11 rpm	
	<b>Min. Slew Radius</b>	59.3 in.	1505 mm
<b>Travel Performance</b>	<b>Max. Speed</b>	1.8 mph	3 km/h
	<b>Max Slope Grade</b>	30°	
<b>Bucket Digging/ Dumping Performance</b>	<b>Max. Digging Force</b>	2585 lbf	11.5 kN
	<b>Max. Digging Depth</b>	68.9 in.	1750 mm
	<b>Max. Vertical Digging Depth</b>	61.02 in.	1550 mm
	<b>Max. Digging Height</b>	94.49 in.	2400 mm
	<b>Max. Digging Radius</b>	120.1 in.	3050 mm
	<b>Maximum Dumping Height</b>	62.6 in.	1590 mm
<b>Dimensions</b>		117.32×37.01×89.37 (in.)	2980×940×2270 (mm)
<b>Operating Mass</b>		2138 lb.	970 kg
<b>Net Weight</b>		1874 lb.	850 kg

## 4. Product Diagram



# 5. Package List



Item	Name	Qty.
A	Hydraulic Oil-Pickup Filter Element	1
B	Pipe Clamps	4
C	Grease Gun	1
D	Flexible Hose Nozzle	1
E	Grease Fittings	4
F	Nuts	3
G	Socket	1
H	Socket Lever	1
I	Hex Wrench	1
J	Adjustable Wrench	1
K	Wrenches of 22-24mm, 17-19 mm, 13-15 mm, and 8-10 mm	4
L	Lubricating Grease	1
M	Tool Box	1

# 6. Operation

## 6.1 Starting the Engine

### Warning

- *Before starting the engine, make sure the area surrounding the machine is clear of all persons before starting the engine. Failure to comply could result in death or serious injury.*
- *Before starting the engine, circle around the excavator, check for any anomalies, inform the coworkers of the imminent task, and tell the signalman/flagman to stand by.*
- **NEVER** operate the engine in a closed building or area. Gasoline exhaust contains dangerous compounds. Proper ventilation is required under all circumstances. Failure to comply could result in death or serious injury.
- **NEVER** start or operate the excavator from a place other than the driver's seat.
- *Be sure the surface you are driving on is strong enough to handle the operating mass of your excavator.*

1. Enter the cab in the way as depicted.



2. Sit on the driver's seat and check that there are no obstructions on the dashboard or around the joysticks. If you see any signs indicating the excavator is out of order, exit the cab.



3. Fasten the seat belt securely.

The seat belt can help ensure your safety if it is properly used and maintained. Never wear a seat belt loosely or with slack in the belt system. Never wear the belt if it is twisted or pinched between the seat structures. Failure to comply could result in death or serious injury.

4. Check that all control rods/joysticks are in neutral position. If not, reset them to neutral.



5. Locate the red power switch, which can be found on your left near the seat, and turn while pulling the switch in the direction indicated by the label around the switch.



6. Insert your ignition key and turn it clockwise.
7. Wait for a couple of minutes for the engine and hydraulic oil to warm up.

**Note:** A proper warm-up procedure ensures proper and safe usage of the machine, the best machine performance, and fuel efficiency.

## 6.2 Using the Headlights

1. Locate the headlights button. It should look as shown.
2. Press it to turn them on.
3. Press it again to turn them off when they are not needed.

### **Warning**

Remember to turn them off after shutting the engine.

**Note:** The headlights may not be bright enough for all working conditions. Use additional illumination when needed.



## 6.3 Using the Excavation Timer

The excavation timer is located beside the throttle lever.

It works automatically as soon as the power is turned on, recording the total working hours of the whole system.

The timer is not resettable and it keeps increasing.



## 6.4 Forward & Backward Traveling & Steering



1. Make sure that your excavator has started and warmed up as stated in §6.1 **Starting the Engine** on Page 36.
2. (Optional) If you want to travel faster, use the lever throttle to increase the output power of the engine. Hold down the lever throttle button located atop, and push the lever away from you.

### **Warning**

**ONLY** adjust the throttle right after starting up the engine. **NEVER** do this when the excavator is mobile, as you should be focused on the work at hand.



3. Use the two second-longest rods around the shortest rod to control the travel.

- To move your excavator forward, push them together away from you.
- To move your excavator backward, pull them towards you.
- To move only one of the tracks, push or pull either of the two travel rods.
- To turn left while traveling, push the right rod of the travel rods while releasing the left one.
- To turn right while traveling, push the left rod of the travel rods while releasing the right one.



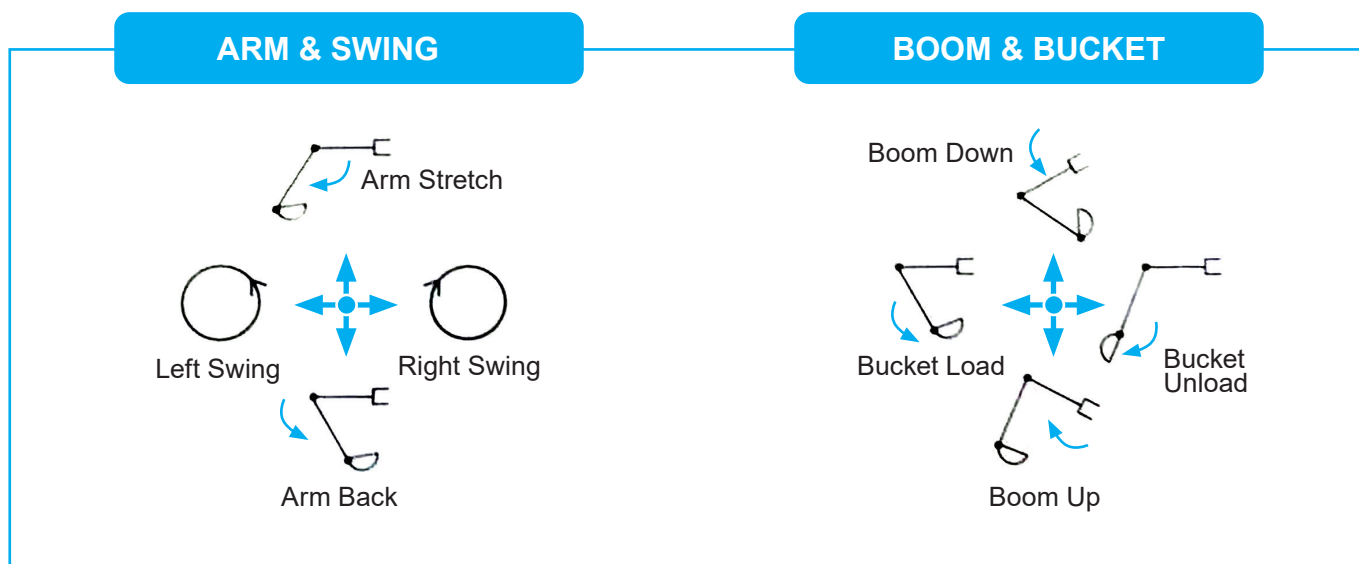
### **Warning**

When the excavator is traveling, **NEVER** push one rod while pulling the other, which **WILL** topple the excavator.

## 6.5 Basic Excavating



1. Make sure that your excavator has started and warmed up as stated in **§6.1 Starting the Engine** on Page 36.
2. Steer the excavator to where the digging is expected to be carried out.
3. Start excavating with the two joysticks.



The left joystick controls the arm and swing:

- To raise the arm (aka dipper, stick, or crowd), push it forward.
- To retract the arm, pull it toward you.
- To swing the cab left, push it to your left.
- To swing the cab right, push it to your right.





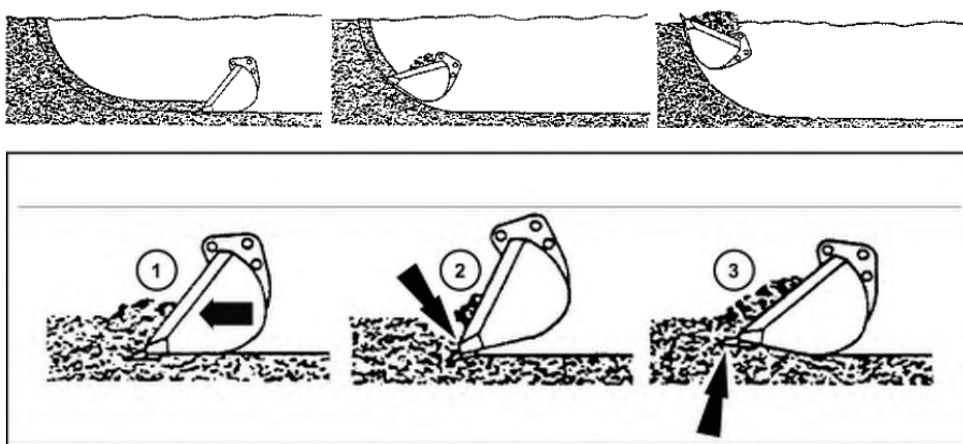
The right joystick controls the boom and bucket:

- To lower the boom, push it forward.
- To raise the boom, pull it toward you.
- To load the bucket, push it left.
- To unload the bucket, push it right.



### Warning

- *For better results on hard ground, angle the arm cylinder roughly perpendicular to the arm and bucket 30° to the ground so that you exert the largest excavating force. For soft ground, angle the bucket 60° to the ground.*



SMIL13CEX2694EB 3

1. Correct
2. Incorrect. The bucket will dig in and cause a stall.
3. Incorrect. The bucket is pushed upwards. This will also increase the cycle time.

- *Achieving a seamless mastery of excavation demands consistent practice, honed skills, and proficient handling of the excavator. Prior to actual operation, engage in practice sessions at an open area that is robust enough to support the excavator's movement safely and devoid of any onlookers. For optimal outcomes, consider seeking guidance from an experienced excavator owner or enrolling in professional training.*

## 6.6 Basic Bulldozing

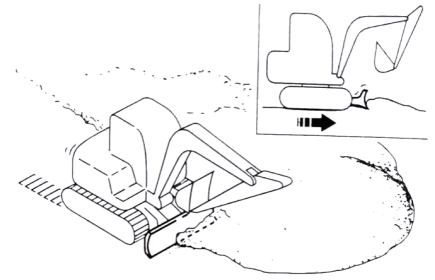
1. Make sure that your excavator has started and warmed up as stated in **§6.1 Starting the Engine** on Page 36.
2. Steer the excavator to where the bulldozing is expected to be carried out.
3. Start bulldozing with the shortest rod in the middle which controls your bucket.
  - To raise the bucket, pull it toward you.
  - To lower the bucket, push it away.



## 6.7 Leveling

1. Make sure that your excavator has started and warmed up as stated in **§6.1 Starting the Engine** on Page 36.
2. Steer the excavator to where the digging is expected to be carried out.
3. Position the bucket in proximity to the excavator.
4. Gradually push the soil from the side of the mound.
5. As the mound reduces in height, shift the topsoil from the peak.

If the load places excessive strain on the machine, adjust by raising or lowering the bucket.



## 6.8 Transportation

### Warning

- **DO NOT** employ the attachment for loading or unloading the excavator, as this could result in rolling or falling.
- Ensure the truck and loading surface are clean, devoid of oil, sand, ice, snow, or any foreign materials to prevent the excavator from sliding. Clear the tracks.

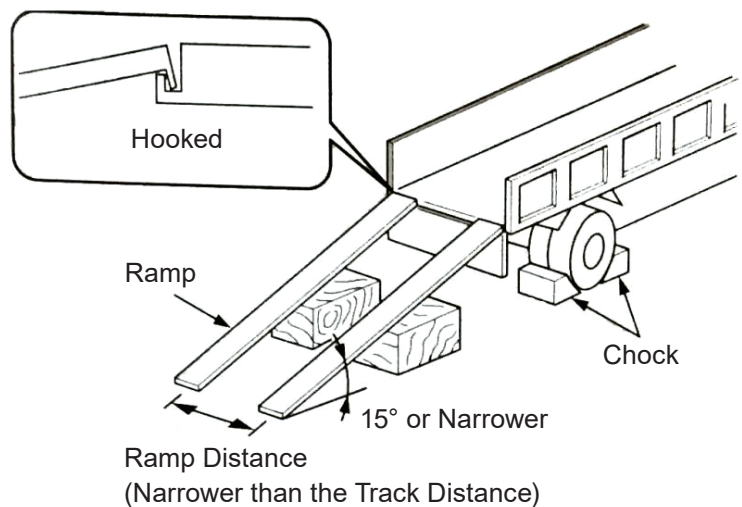
1. Select a sturdy, level ground area at a safe distance from the roadside.
2. Place a warning sign near the transportation area to alert passing pedestrians and vehicles.

3. Securely fasten two ramps with adequate strength and dimensions to the truck bed.

The incline angle must not exceed 15°. If the ramps are too steep, utilize a support pillar or block underneath them.

Make sure that the ramps are wide enough for full contact with both tracks.

Refer to the picture for the truck and ramp preparation.



4. Steer the excavator to travel slowly onto the ramps, being sure the tracks are fully on the ramp.

### Danger

**DO NOT** change direction when on the ramps. Travel slowly and steadily.

5. Stop when the whole excavator is inside the truck bed.
6. Cut the engine, and ensure all control rods/ joysticks are at neutral.
7. Remove the keys.
8. Use chocks to immobilize the tracks and prevent movement. Secure the machine to the truck using a cable or chain if possible.
9. Lock the trunk doors and lids if any.

# 7. Maintenance

## Warning

*Do not perform any maintenance and/or repairs not authorized in this manual. Always observe and follow all safety precautions.*

Referring to the excavation timer located near the throttle lever, maintain your excavator according to the schedules in this chapter.



## 7.1 Checks before Maintenance

Always do the following before performing any maintenance to the machine to ensure your safety:

- Read and understand **§2 Safety Information** on Page 4 before proceeding with any inspection or maintenance procedures.
- Do not perform any maintenance unless authorized in this chapter for this machine.
- Avoid working on the machine while the engine is running unless required to do so in the procedure. If the engine must remain running during a procedure, always have a person in the cab who can correctly operate the machine and who is in clear contact with you at all times.
- Contact Customer Service if you are unable to perform the procedures listed in this manual or if additional procedures are required.
- Always use the proper tools when performing any maintenance procedures.

## 7.2 Checks After Maintenance

Always do the following after performing any maintenance to the machine:

- Ensure all steps listed in this manual have been followed.
- If necessary, have a coworker inspect your work for correct and proper completion.
- Check for leaks in the system you have maintained.
- Be sure no abnormal sounds are coming from the engine or hydraulic system.
- Check for any loose or abnormal movement in the system you have maintained.
- Check for any overheating in the system you have maintained.

After performing maintenance or repairs to the machine, always take time to inventory your tools, parts used, and nuts and bolts to be sure none of these items were left on or inside the machine.

## 7.3 General Maintenance Schedule

NO.	Item	Qty.	Interval (h)	
			10	50
1	Engine Oil Level	1	★	
2	Hydraulic Oil Level	1	★	
3	Fuel Level	1		★
4	Oil-Water Separator	1		★
5	Fuel Pipe Check	----	★	
6	Work Equipment Pivots	----	★	
7	Hydraulic Hose & Pipelines	----	★	
8	Bucket Teeth	4		★
9	Seat Belt	1	★	
10	Bolts and Nuts Torque	----		●

**Note:**

★: Routine Maintenance Interval

●: Maintenance Prior to Initial Use

## 7.4 Greasing, Replacement & Periodical Check Schedule

No.	Item	Interval (h)							
		100	250	500	1000	1500	2000	2500	4000
1	Greasing of Swing Bearing		★						
2	Greasing of Swing Bearing Gears	★							
3	Changing Engine Oil	●	▲	★					
4	Changing Hydraulic Oil					△	★	△	
5	Changing Hydraulic Oil Suction Filter Elements				★				
6	Fuel Pipe Crack/Bent Check		★						
7	Changing of Oil-Water Separator			★					
8	Fuel Hose Leakage/Crack Check		★						
9	Fuel Hose Leakage/Crack Check		★						
10	Changing of Bucket								
11	Connection of Bucket								
12	Removal of the Traveling Handle								
13	Replacement of the Seat Belt								
14	Track Deflection Check			★					
15	Tensioner Maintenance			★			★		

**Note:**

★: Routine maintenance interval

▲: Maintenance interval of engine oil

△: In situations where crushing conditions are frequent, halve the replacement intervals for hydraulic oil and filters.

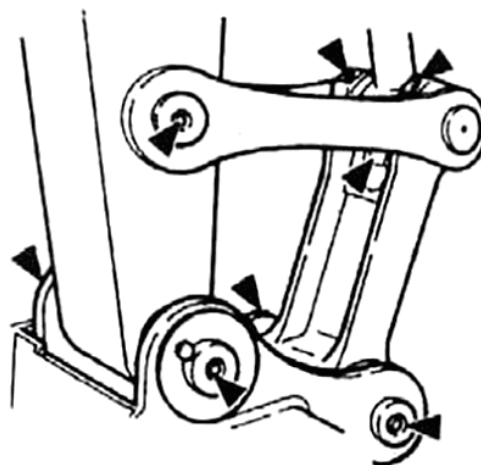
☆: Under dusty environments, shorten the maintenance interval.

## 7.5 Work Equipment Pins Lubrication Schedule

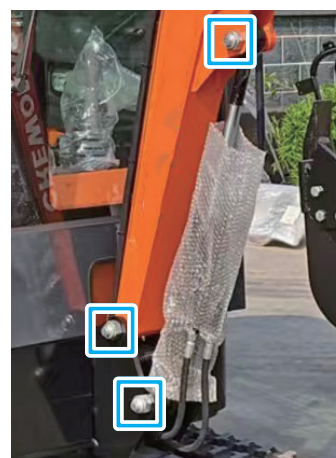
Parts		Qty.	Interval (h)						
			50	100	250	500	1000	2000	2000
Pivots	Boom Base Pivot	10	★						
	Boom Base Cylinder Pivot								
	Bucket and Connecting Rod Pivots								
	Others	6	★						
Swing	Swing Bearing	2				★			
	Swing Bearing External Meshing Gear	1					★		
<b>Note:</b> Using lithium grease is recommended. ★: Routine Maintenance interval									

### 7.5.1 Locating the Work Equipment Pins

- Pivots between the bucket and connecting rods



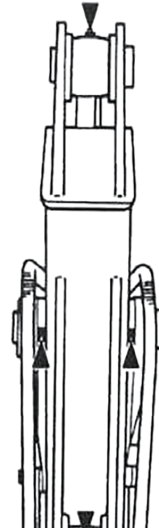
- Pivots at the base of the boom



- Pivots at the base of the boom cylinder



- Others
  - Pivot between the boom and arm;
  - Pivot of the arm cylinder;
  - Plunger;
  - Pivot at the base of the bucket cylinder



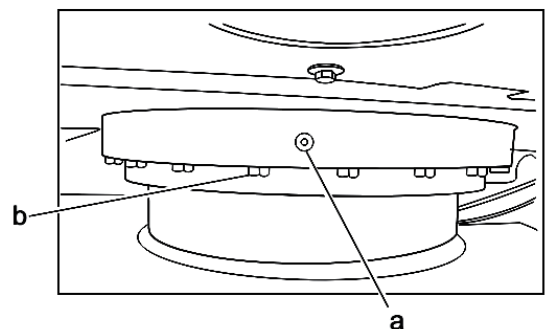
### **7.5.2 Lubricating the Slew Bearing**

#### **Warning**

- *Prevent possible injury from unexpected machine movement if controls are moved by another person. Lubricating the swing bearing gear and rotating the upper structure must be done by one person.*
- *Ensure that this procedure is followed exactly. Failure to do so could result in death or injury.*

Lubricate the swing bearing every 250 hours. Using lithium grease is recommended.

1. Position the excavator on level ground.
2. Lower the bucket onto the ground. Wait for the engine to idle at low speed for 5 minutes.
3. Shut down the engine by switching the ignition OFF, and remove the key.
4. With the upper structure remaining stationary, pump lubricating grease at fittings (a) on the slew bearing until the grease seeps out of seal (b).
5. Start the engine and lift the bucket off the ground.
6. Rotate the upper structure 90° and repeat steps 2-6 until a full 360° rotation of lubrication has been made.
7. Lower the bucket onto the ground.
8. Turn off the engine.





## 7.5.3 Engine Maintenance

Refer to the engine's manual for engine maintenance.

### Greasing, Replacement & Periodical Check Schedule

Item	Qty.	Interval (h)								
		10	50	100	250	500	1000	1500	2500	4000
Oil Level Check	1	★								
Drain Pipe Cleaning	1				★					
Replacing	16.5L/ 4.4 gal.								★	
Suction Filter Elements Replacing	1						★			
Hose& Pipeline Check					★					
				★						
Change the hose	39									★
<b>Note:</b> ★: Routine Maintenance Interval										

## 7.6 Hydraulic System

### 7.6.1 Checking the Hydraulic Cylinder

#### Warning

- Hang a “**DO NOT OPERATE**” sign on the joystick to prevent accidental machine activation during inspection.
- For your safety and a longer service life of the hydraulic cylinders, it is recommended that you have them checked and serviced by a certified mechanist.

1. Park the excavator on a level and stable surface. Lower the bucket onto the ground and turn off the engine.
2. Wait for sufficient time for the hydraulic system to cool down completely to avoid exposure to hot and pressurized components.
3. Bleed air completely from the hydraulic oil reservoir.
4. Visually check the hydraulic cylinder for any signs of leakage, such as oil spots, drips, or accumulated oil around seals and connections.

Check the cylinder's exterior surface for dents, scratches, or any damage that could affect its performance.



5. Check the rod and piston for signs of wear, corrosion, or scoring. Run your fingers along their surfaces to detect irregularities.  
Gently check the rod seals and wiper seals for cracks, tears, or deterioration. If the cylinder requires disassembly for a more thorough inspection, contact Customer Service.
6. Execute one of the following depending on your checking result:
  - If everything is in order:
    - a. Reassemble any components that were disassembled.
    - b. Remove any safety measures.
    - c. Test the hydraulic cylinder's functionality through controlled movements.
  - If you encounter any abnormal behavior or suspect an issue during testing:
    - a. Immediately turn off the engine.
    - b. Contact Customer Service.
    - c. Reassemble any components that were disassembled.
7. Keep a detailed record of the inspection, including findings and actions taken, for future reference and maintenance tracking.

### 7.6.2 Checking the Hydraulic Oil Level

#### **Warning**

***NEVER*** start the engine with no hydraulic oil.

1. Ensure the machine is parked on level ground.
2. Fully retract the arm cylinder and extend the bucket cylinder outward to position the machine. Lower the bucket onto the ground.
3. Wait for the engine to idle at low speed for 5 minutes.
4. Turn off the engine and remove the ignition key.
5. Check the hydraulic oil level gauge.

The normal level should range between 1/2 and 2/3 of the tank. If the hydraulic oil falls below 1/2, refill it. For instructions, see **§7.6.3 Refilling the Hydraulic Oil** on Page 41.



### **7.6.3 Refilling the Hydraulic Oil**

1. Carefully open the oil cap while releasing the pressure slowly.

#### **⚠ Warning**

*The hydraulic oil tank is pressurized. Failure to do so may result in oil spraying out and causing potential hazards. Always exercise caution when working with pressurized systems.*

2. Infuse the right type of hydraulic oil until 2/3 of the tank by checking the hydraulic oil level gauge.
3. Replace the cap.



### **7.6.4 Replacing the Hydraulic Oil Suction Filter Element**

#### **⚠ Warning**

**DO NOT** proceed until the hydraulic oil cools down, as it may be very hot.

1. Park the machine on a level surface. Wait for the engine to idle at low speed for 5 minutes. Turn off the engine and remove the ignition key.
2. Locate the hydraulic oil cap. Clean the top of the hydraulic oil reservoir to prevent dirt from entering the system.
3. Carefully open the oil cap to release pressure. Loosen and remove the hydraulic oil-pickup filter element cap. Loosen and remove the drain plug at the bottom of the hydraulic oil tank to drain the oil.

#### **⚠ Warning**

*The hydraulic oil tank is pressurized. Failure to do so may result in oil spraying out and causing potential hazards. Always exercise caution when working with pressurized systems.*

4. Remove the hydraulic oil-pickup filter and the levers.
5. Thoroughly clean the filter and the inside of the hydraulic tank. Utilize an hydraulic oil-pickup pump to extract any remaining oil residue from the tank's bottom.
6. Position the filter and levers back, and attach the hydraulic oil-pickup filter element cap, tightening the bolts to 49 N·m.

#### **⚠ Warning**

*Starting the engine without hydraulic oil may damage the hydraulic pump.*

7. Clean and reinstall the drain plug at the tank's bottom.
8. Add oil. For instructions, see **§Refilling the Hydraulic Oil** on Page 41.
9. Tighten the oil tank cap.

### 7.6.5 Checking Hoses & Pipelines

#### Warning

- *Any sprayed fluid can penetrate your skin, resulting in serious injury. Always use a paperboard to check for leakage. Furthermore, exercise extreme caution to keep your hands and body away from pressurized oil. In the event of an accident, seek immediate medical attention from a doctor experienced in treating trauma. Any fluid that penetrates the skin must be removed within a few hours to prevent complications like gangrene.*
  - *Leaked hydraulic oil and lubricant may pose a fire hazard or cause personal injury.*
1. Park the excavator on level ground. Lower the bucket onto the ground. Set all control rods to neutral and shut off. Remove the ignition key.
  2. Check the whole machine for any missing parts, loose pipe clamps, twisted hoses, pipelines, or hoses rubbing against each other. If any abnormalities are detected, refer to for replacement or tightening instructions.
  3. Thoroughly tighten, repair, or replace any loose, damaged, or missing pipe clamps, hoses, pipes, oil coolers, and flange bolts. Do not bend or subject any pressure pipelines to impacts. Never install bent or damaged hoses or pipelines.

## 7.7 Checking the Battery

- For a longer battery life, turn off the headlights when not needed.
- For a longer battery life, the single ignition time should not exceed 10 seconds, and there should be a minimum interval of 60 seconds between two ignitions.

If the machine fails to ignite three times in a row, stop igniting and proceed with troubleshooting.

- If you find it hard to start the engine, replace the battery with an identical one (12 V, 45 Ah).

## 7.8 Checking the Bucket Teeth

Check if the bucket teeth are worn or loosened daily. Replace them with a new bucket if they have become shorter than 5.2 inch (130 mm).

#### Warning

*Exercise extreme care when changing the teeth. Wear goggles or safety protections.*

For more information on the bucket, see **§Specifications**.

## 7.9 Checking the Bolts and Nuts Tightening Torque

Check the torques of bolts and nuts at the initial 50 hrs. or prior to initial use and then every 250 h. Tighten them to the set torque if needed. Replace the damaged with identical ones. For required torques, see the table below.

### Warning

**ONLY** use a torque wrench to check the torques of bolts and nuts.

Metric Bolts and Nuts			
Thread Dimensions	Standard Torque (N·m)	Thread Dimensions	Standard Torque (N·m)
M6	12±3	M14	160±30
M8	28±7	M16	240±40
M10	55±10	M20	460±60
M12	100±20	M30	1600±200
Main Components Torques (N·m)			
Thread Dimensions		Recommended Torque	
M16 Bolts Fixing the Traveling Motor		252±39.2	
M16 Bolts Fixing the Sprocket		252±39.2	
M20 Bolts Fixing the Swing Bearing		570±60	

## 7.10 Miscellaneous Checking Schedule

Parts	Quantity	Interval (h)							
		10	50	100	250	500	1000	2000	4000
Bucket Teeth Check		★							
Changing the Bucket	—	If needed							
Adjusting the Bucket Connecting Rod	1	If needed							
Replacing Traveling Lever	2	If needed							
Checking and Replacing the Fuse	1	★	Every 3 years						
Checking the Track for Deflection	2					★			
Maintaining the Tensioner	2						★		
Checking the Fuel Injection Timing	—	If needed							
Measuring the Engine Compression Pressure	—						■		
Checking the Starter & the A/C Generator	—						■		
Checking the Bolts and Nuts Torque	—		◆		★				
<b>Note:</b> ★: Maintenance interval under normal conditions ◆: Maintenance needed at the first inspection ■: Contact Customer Service.									

# 8. Troubleshooting

## 8.1 Mechanism System

Problems	Possible Causes	Possible Solutions
Noisy structural components	The loose fasteners make noise.	Inspect and tighten the fasteners.
	Aggravated abrasion between bucket and end face of bucket rod	Adjust the clearance to less than 1 millimeter.
Bucket teeth have dropped during operation.	Deformed spring and weakened elasticity of bucket tooth pin	Change the bucket tooth pin.
	Unmatched bucket tooth pin and seat	
The crawler has tangled up.	Loose crawler	Tighten the crawler.
	The driving wheel moves fast in front on rugged road.	The guide wheel shall move slowly in front on rugged road.

## 8.2 Hydraulic System

Problems	Possible Causes	Possible Solutions
The whole excavator does not move.	Low oil level of hydraulic oil tank that the main pump sucks no oil	Add enough hydraulic oil.
	Oil filter is blocked.	Change the filter and clean the system.
	Engine coupling is damaged (such as plastic plate, elastic plate).	Change
	The main pump is damaged.	Change or repair the main pump.
	The servo system pressure is low or zero.	Adjust to regular pressure. If it fails to increase the pressure of servo overflow valve, disassemble to wash; if the spring is fatigue, add a washer or change the spring.
	The safety valve is set at low pressure or stuck.	Adjust to regular pressure. If it fails to increase the pressure, disassemble and wash. If the spring is fatigued, ass a washer or change the spring.
	Oil suction pipe of main pump explodes or comes off.	Change with a new one.



Problems	Possible Causes	Possible Solutions
The unilateral crawler fails to move.	The main pump supplying fuel to unilateral crawler is damaged.	Change
	The main valve rod is stuck and the spring is broken.	Repair or change
	Traveling motor is damaged.	Change
	The upper and lower chambers of swivel joint are connected.	Change the oil seal or clean the assembly.
	Fuel pipe of traveling system explodes.	Change
The whole excavator moves slowly or is powerless.	Less oil in hydraulic oil tank	Add enough hydraulic oil.
	Low engine rpm	Adjust engine rpm.
	Low system safety valve pressure	Adjust to specified pressure
	Serious leak inside the main pump	Change or repair the pump.
	The traveling motor, rotation motor and cylinder are worn of different degree, which causes internal leak.	Change or repair the worn parts.
	The aged sealing components, worn hydraulic elements, degraded oil of old excavator cause the operation speed becomes powerless along with the increase of temperature.	Change hydraulic oil, change sealing components of the whole machine, adjust the fit clearance and pressure of hydraulic components.
	The blocked engine filter causes serious decrease of loaded rpm and even flames out.	Change the element.
	The blocked hydraulic filter accelerates abrasion of pump, motor, and valve and leads to internal leak.	Clean and change the element according to the maintenance schedule.
	Serious between main valve rod and valve hole causes serious internal leak.	Repair the valve rod.

Problems	Possible Causes	Possible Solutions
The right and left traveling systems do not move (no other abnormalities).	Central rotation connector is damaged.	Change the oil seal and change the groove if it is damaged.
	The high-pressure chamber and low-pressure chamber of traveling operation valve is connected.	Change
	Serious leak inside the traveling operation valve	Change
	Low overloaded pressure of traveling valve of main valve or the valve rod is stuck.	Adjust and grind
	The left and right traveling reducers fail.	Repair
	The left and right traveling motors fail.	Repair
	The oil pipe explodes.	Change
Deviation during traveling (no other abnormalities)	Wrong adjustment of variable point of main valve or serious internal leak of a pump	Adjust or repair
	Internal or external spring of one traveling valve core of main valve is damaged or tightened.	Change
	The traveling motor leaks inside due to abrasion.	Repair or change
	The sealing component of central rotation connector is aged and damaged.	Change the sealing component.
	The left and right crawlers are of different tightening.	Adjust
Boom (bucket rod and bucket) move to one direction only.	Main valve core is stuck or valve rod spring breaks.	Repair or change
Boom (bucket rod and bucket) does not move.	Boom valve rod is stuck or of low overloaded pressure.	Repair
	Fuel supply pipe leaks, detached, O ring damaged or pipe fitting is loose.	Change the damaged component.
	Sandstone in main valve or the low-pressure chamber is connected to the high-pressure chamber.	Change

Problems	Possible Causes	Possible Solutions
Boom (bucket rod and bucket) drops too quick or the cylinder drops at a certain height even it is not operated due to dead weight.	Low overloaded valve pressure	Adjust
	Serious internal leak of cylinder	Change the sealing component, repair the inner wall or groove of cylinder or change the cylinder.
	Loose oil pipe fitting, damaged O ring	Change
Boom (bucket rod and bucket) works powerlessly	Serious internal leak of multi-way valve or sandstone inside it	Change
	Low overloaded pressure	Adjust
	Serious internal leak of oil cylinder	Change the oil seal.
	The main valve is disabled due to internal leak.	Repair or change
Boom (bucket rod and bucket) moves even it is not operated.	Multi-way valve core is stuck or serious internal leak.	Grind or change
	Multi-way valve rod spring breaks.	Change
	Leak of working cylinder, or the working device drops due to dead weight	Change the oil seal
	Low pressure of overload overflow valve or the spring breaks	Adjust to specified pressure. Change the spring if it is broken.
Hot hydraulic oil	Wrong grade of hydraulic oil for excavator	Change the hydraulic oil.
	Hydraulic oil cooler surface is polluted by oil and dirt, which blocks the air hole.	Wash
	Low oil level of hydraulic oil tank	Add enough hydraulic oil.
	The hydraulic components such as motor, main valve and oil cylinder or sealing components are seriously worn and cause internal leak, which increases the oil temperature. Traveling rotation and working device are delayed and powerless. The hot temperature degrades the hydraulic oil. The safety valve is of poor air tightness, which leads to overflow.	Change the elements in time.

Problems	Possible Causes	Possible Solutions
No action of rotation (no other abnormalities)	Hydraulic oil pipe breaks.	Change
	Rotary valve rod on main valve is stuck.	Repair
	Rotary motor is damaged	Repair or change
	The rotation support is damaged.	Change
Indifferent left and right rotation speed (no other abnormalities)	The right and left rotation of multi-way valve is of different overloaded pressure.	Adjust
	Rotation valve rod of multi-way valve is slightly stuck.	Adjust or move the valve rod to free it from being stuck.
Delayed or powered rotation (no other abnormalities)	Serious external leak of hydraulic oil pipe	Change pipe fitting and sealing components.
	Low overloaded pressure for rotation of multi-way valve	Adjust
	Serious internal leak of rotary motor	Repair or change
	The high-pressure and low-pressure chambers of multi-way valve are connected, sand hole on valve body due to casting, which causes one-way action or linked actions.	Change
The rotation mechanism moves even it is operated.	Main valve rod spring breaks.	Change
The excavator makes abnormal noise and shakes during operation.	Low oil level of hydraulic oil tank	Add oil.
	The oil contains too much moisture and air.	Change
	Safety valve of multi-way valve makes noise	Adjust
	Damaged coupling	Change
	Vibration caused by loose pipe clamp	Adjust
	Blocked filter	Change
	Air exists in oil suction hose	Release the air.
	Uneven engine rpm	Adjust
	The bearing of working device is not lubricated or scraped.	Apply lubrication oil or change the shaft or sleeve.

Problems	Possible Causes	Possible Solutions
Powerless oil cylinder or oil leak	Damaged sealing components	Change the sealing components.
	A groove is found on the piston rod due to abrasion or detachment of chromium coating of piston rod, which causes oil leak.	Coat, paint, repair or change
	The air in the cylinder causes shaking noise during operation.	Release the air.

## 8.3 Electrical Control System

Problems	Possible Causes	Standard Value in Regular Condition and Reference Value of Fault Diagnosis		
The engine fails to start.	Low battery	Battery Voltage	Color of Charge State Densimeter	
		Above 12 V	Green (if it is white, change the battery)	
	Fuse F1 and F11 failure	In case the fuse is burnt, the GND fail may happen. If he monitoring indicator on the monitor panel is not illuminated, inspect the circuit between battery and specified fuse.		
	Engine ignition switch fault	Ignition Switch	Position	Resistance
		Between 30 and 17	OFF	1MΩ
			Start	Below 1Ω
	Starter relay K3 fault	Pin		Resistance
		85–86		200–400(Ω)
		87–30		Above 1MΩ
		87a–30		Below 1Ω
	Security lock switch fault (open circuit inside)	Security Lock Switch	Lock Rod	Resistance
		Between 105 and GND	Unlocked	1MΩ
			Locked	Below 1Ω
	Start motor fault (open circuit or short circuit inside)	Engine or Start Motor	Engine Start Switch	Voltage
		PS; terminal B and GND	Start	20–30 (V)
Input of engine start, terminal C and GND		20–30 (V)		

Problems	Possible Causes	Standard Value in Regular Condition and Reference Value of Fault Diagnosis		
The engine fails to start.	Alternator fault	<b>Voltage</b>		
		Below 1 V		
	Disconnected wire harness (disconnect from connector or poor contact)	<b>Resistance</b>		
		Below 1Ω		
	Poor GND of wire harness (contact with earth circuit)	<b>Resistance</b>		
		Above 1MΩ		
	Short circuit of wire harness (contact with 24 V circuit)	<b>Voltage</b>		
		Below 1 V		
Engine flames out during operation.	Disconnected wire harness (disconnect from connector or poor contact)	Between CN-12T ② and CN-132F ⑥	Resistance	Below 1Ω
	Poor GND of wire harness (contact with earth circuit)	Between CN-12T ② and CN-132F ⑥	Resistance	Above 1MΩ

## 8.4 Diesel Engine

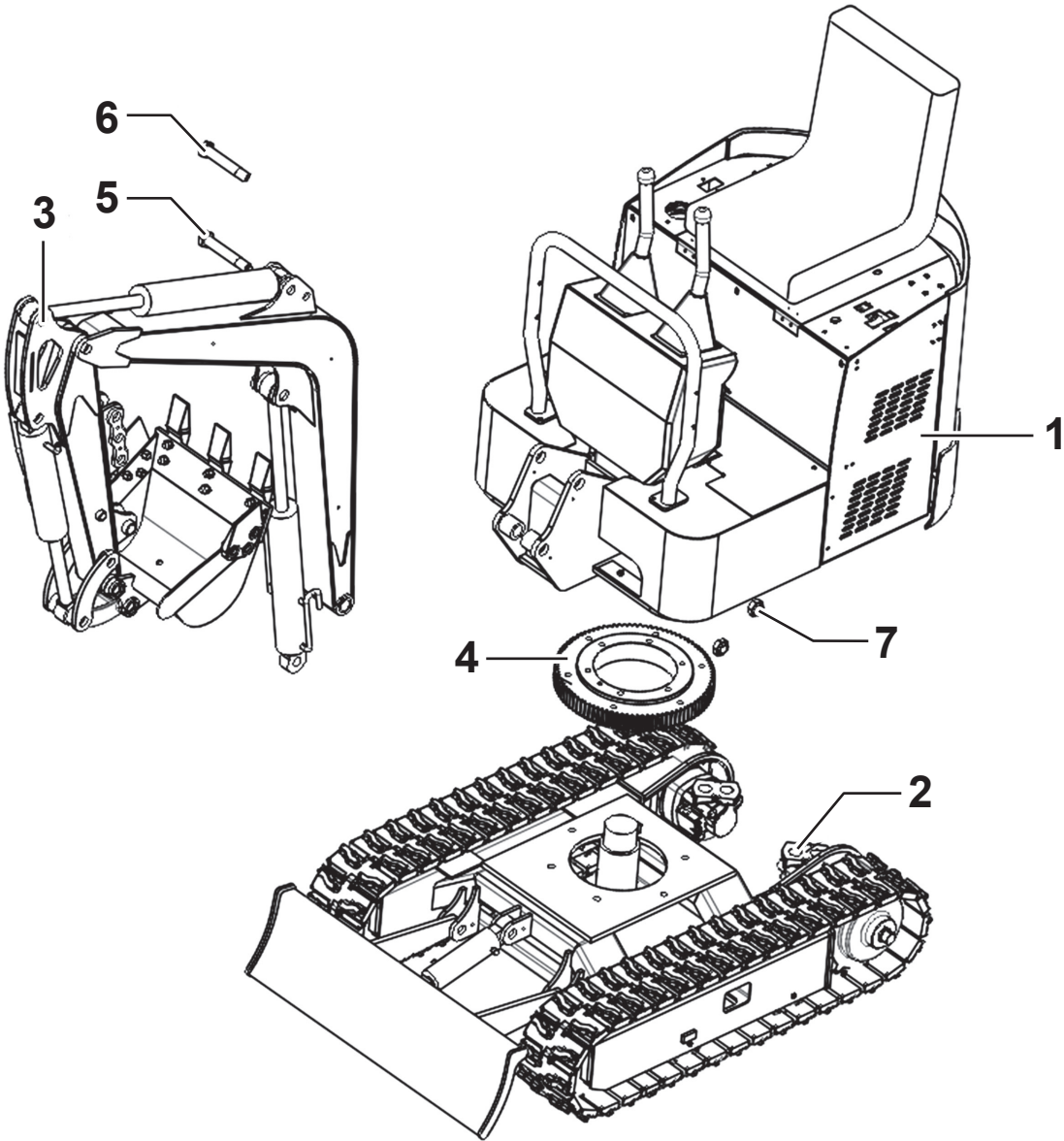
Problems	Possible Causes	Possible Solutions
When starting the engine, the starter drives the engine but the engine fails to be started.	Low battery	Change the battery pack or connect to another battery pack in parallel to start the engine.
	Battery terminal is rusted or loose.	Clean the battery terminal and tighten the PS wire clip to contact the PS wire with battery terminal reliably.
	Battery earth wire is rusted or loose or poor GND of engine.	Clean the battery earth wire terminal to ensure reliable GND; ensure reliable GND of engine.
	Starter relay armature fails to disengage.	Repair or change starter relay.
	Ignition switch fault or starter fault	Inspect and repair ignition switch and inspect and repair the starter.



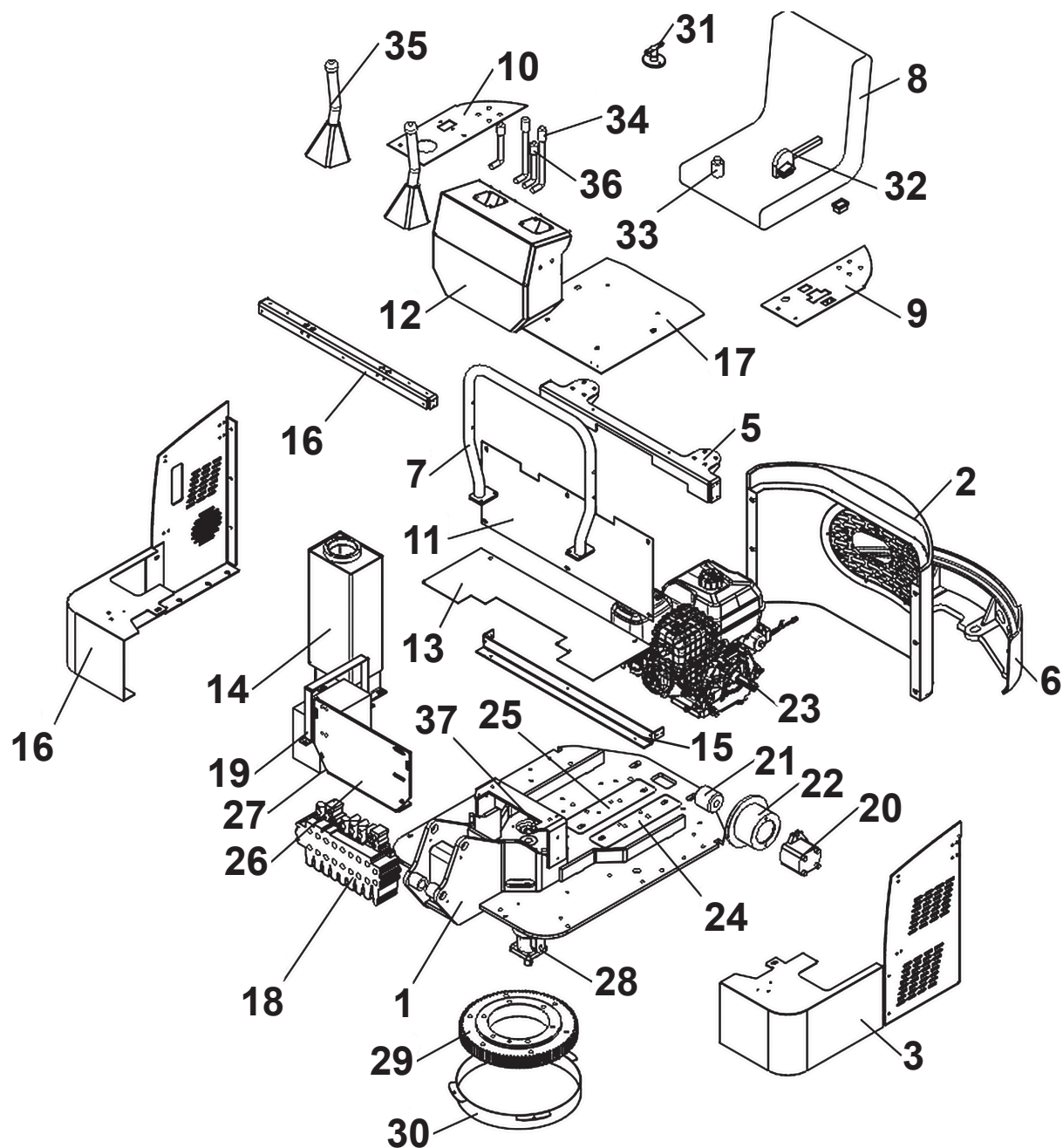
Problems	Possible Causes	Possible Solutions
When starting the engine, the starter runs at acceptable rpm; however, it fails to start the engine.	Fuel tank is empty.	Fill the fuel tank with standard fuel, start the engine, and run the engine to deliver the fuel to carburetor.
	Fuel supply system channel fault.	Inspect pipeline of fuel supply system, fuel filter, and fuel pump; change blocked and damaged assembly if necessary to ensure unobstructed fuel supply.
	Air, water, or foreign matter exist in fuel system, which block the system.	Release air in fuel system. If the engine cannot be started due to air blockage, decrease the temperature properly.
	Fuel pump fault	Inspect the fuel pump. Only when the fuel pump works well can the fuel supply be unobstructed. Fuel supply seldom fails and air blockage and water blockage seldom happen when the fuel supply of fuel pump is large.
	Engine fault	Inspect and repair the engine. Only when the engine works well can the start-up fail never or seldom happen.
Starter runs at correct rpm and drives the engine; however, it is hard to start the engine.	Fuel filter is blocked.	Inspect and change the fuel filter.
	Fuel pump fault	Inspect and adjust the fuel pump.
	Air filter is blocked.	Inspect and change the air filter element.
	Leak of fuel tube	Inspect the fuel tube and oil channel to ensure unblocked oil supply.
	Starter fault	Inspect the starter and start control device for reliable operation.
	Improper start operation	Start the engine in correct ways.
	Wrong fuel grade	Add fuel of correct grade and discharge the water in fuel in the low part of fuel tank if necessary.
	Engine fault	Repair the engine.

Problems	Possible Causes	Possible Solutions
<ul style="list-style-type: none"> <li>• Turn the ignition switch to ON, the starter does not work.</li> <li>• The driving gears of starter do not engage.</li> <li>• The driving gears of starter fail to disengage.</li> <li>• Low engine rpm and uneven engine rpm.</li> </ul>	The battery is not fully charged.	Check if the battery is fully charged; if not, charge it; change the battery if necessary.
	Terminals of battery are loose.	Connect the battery terminal and connector.
	Battery earth wire is loose.	Repair the battery earth wire.
	Start circuit is disabled.	Inspect the start circuit and ensure the terminal of starter shall be live.
	Electromagnetic relay armature is adherent.	Inspect starter electromagnetic relay to eliminate fault of electromagnetic relay; it shall obvious to hear the sound making by the relay when it sucks and separates.
	Starter fault	Inspect and repair the starter.
	Driving gear of starter is stuck by engine flywheel gear ring.	Start again to engage the starter driving gear and engine flywheel gear.
	Driving gear of starter adheres to the bearing.	Inspect the bearing on the end of starting shaft of starter.
	The starter fails to drive the engine.	Change the starter if necessary.
	Engine fault	Repair the engine to ensure sound operation of engine.

# 9. BOM of Vehicle Parts

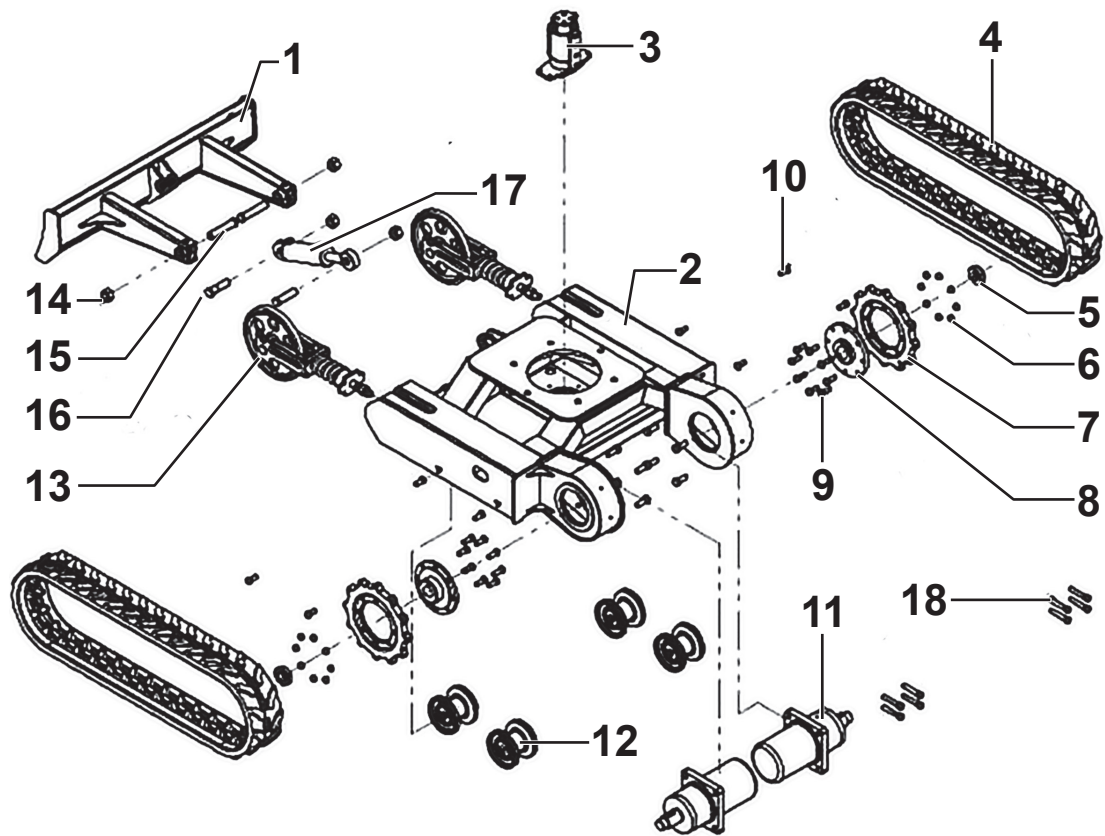


Exploded Drawing of Excavator Assembly			
S/N	Name	Qty.	Remark
1	Upper Frame Assembly	1	
2	Lower Frame Assembly	1	
3	Front Work Equipment Assembly	1	
4	Slewing Bearing Assembly	1	
5	Connecting Shaft between Boom and Upper Frame	1	
6	Connecting Shaft between Boom and Upper Frame	1	
7	Pivot Sleeve	2	



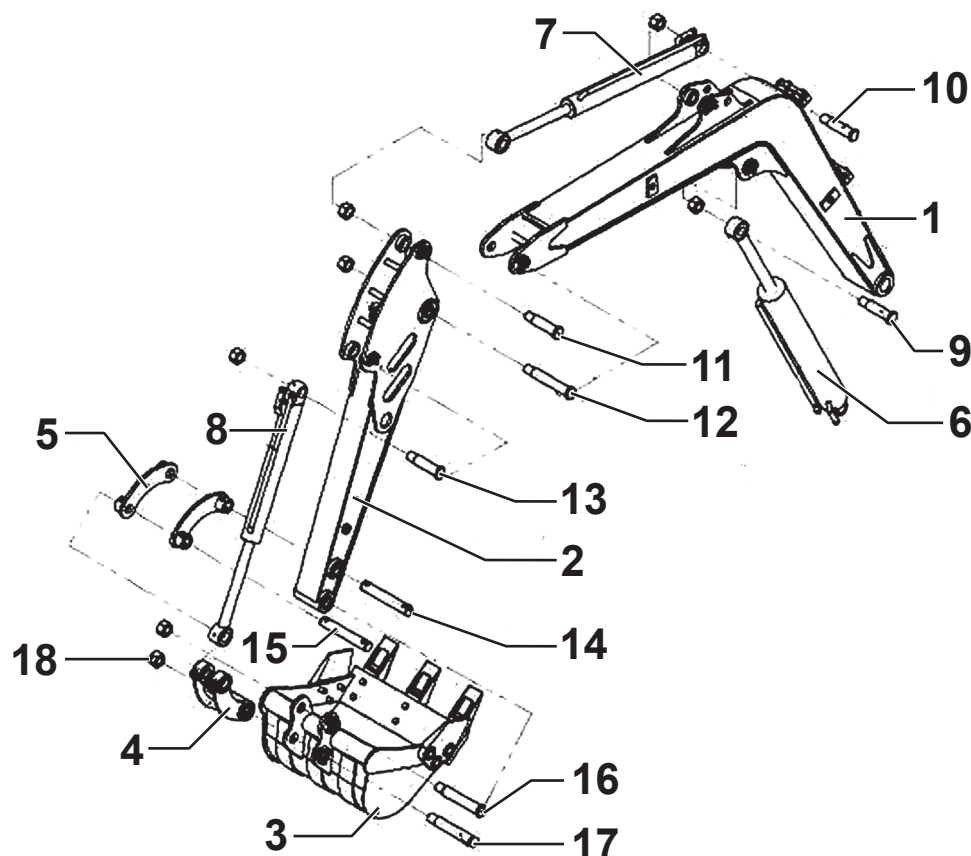
1 Upper Frame Assembly				
S/N	Part No.	Part Name	Qty.	Remark
1	1.1	Welded Upper Frame	1	
2	1.2	Covers of Rear Housing	1	
3	1.3	Covers of Left Housing	1	
4	1.4	Covers of Right Housing	1	
5	1.5	Welded inside Support Frame	1	
6	1.6	Rear Counterweight Plate	1 set	
7	1.7	Handrail	1	
8	1.8	The Seat	1	

1 Upper Frame Assembly				
S/N	Part No.	Part Name	Qty.	Remark
9	1.9	Left- Upper Cover	1	
10	1.10	Right - Upper Cover	1	
11	1.11	L- Shaped Covers	1	
12	1.12	Console	1	
13	1.13	Pedal	1	
14	1.14	Hydraulic Oil Tank	1	
15	1.15	The Front of the Bracket A	1	
16	1.16	The Front of the Bracket B	1	
17	1.17	The Seat Plate	1	
18	1.18	Multi-way Valve	1	
19	1.19	Battery Platen	1	
20	1.20	Master Cylinder	1	
21	1.21	Coupler	1	
22	1.22	Pump Disc	1	
23	1.23	Engine	1	
24	1.24	Rear Bracket Base of Engine	1	
25	1.25	Front Bracket Base of Engine	1	
26	1.26	Main Valve Holder	1	
27	1.27	Battery	1	
28	1.28	Rotary Motor	1	
29	1.29	Slewing Bearing	1	
30	1.30	Dust Cover	1	
31	1.31	Main Power Switch	1	
32	1.32	Manual Accelerator	1	
33	1.33	Key Starter	1	
34	1.34	Traveling Handle	2	
35	1.35	Work Handle	2	
36	1.36	Front Shovel Handle	1	
37	1.37	Slewing Joint Pallet	1	



2 Lower Frame Assembly				
S/N	Part No.	Part Name	Quantity	Remark
1	2.1	Welded Dozer Shovel	1	
2	2.2	Welded Lower Frame	1	
3	2.3	Slewing Joint	1	
4	2.4	Rubber Crawler	2	
5	2.5	Lock Nut	2	
6	2.6	Sprocket Nuts	16	
7	2.7	Drive Wheel	2	
8	2.8	Connecting Disc	2	
9	2.9	Sprocket Bolts	16	
10	2.10	Bolts Fixing the Track Roller	8	
11	2.11	Traveling Motor	2	
12	2.12	Track Roller	4	
13	2.13	Idler Assembly	2	
14	2.14	Pivot Nuts	4	
15	2.15	Connecting Shaft of Dozer Shovel	2	
16	2.16	Connecting Shaft of Cylinder	2	
17	2.17	Cylinder of Dozer Shovel	1	
18	2.18	Bolts Fixing Idler Assembly	8	





3 Front Work Equipment				
S/N	Part No.	Part Name	Qty.	Remark
1	3.1	Boom	1	
2	3.2	Arm	1	
3	3.3	Bucket	1	
4	3.4	Connecting Rod	1	
5	3.5	Push Rod	1	
6	3.6	Boom Cylinder	1	
7	3.7	Arm Cylinder	1	
8	3.8	Bucket Cylinder	1	
9	3.9	Medium Shaft of Boom	1	
10	3.10	Rear Shaft of Arm Cylinder	1	
11	3.11	Front Shaft of Arm Cylinder	1	
12	3.12	Front Shaft of Boom	1	
13	3.13	Rear Shaft of Bucket Cylinder	1	
14	3.14	Medium Shaft of Arm	1	
15	3.15	Front Shaft of Bucket Cylinder	1	
16	3.16	Front Shaft of Arm	1	
17	3.17	Connecting Shaft between Bucket and Connecting Rod	1	
18	3.18	Shaft Locker Sleeve	7	

# Contact Us

Thank you for choosing our products! If you have any questions or comments, contact us at **help@cs-supportpro.com** and we'll resolve your issue ASAP!

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