

HT-12/15/16 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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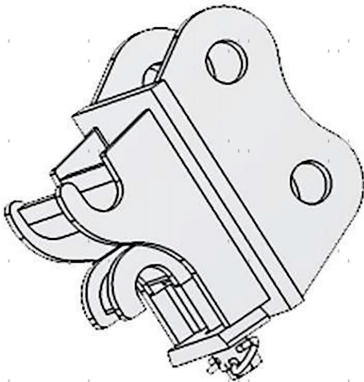
About the Models

All three models are versatile and applicable to farming, landscaping, ditching and fertilization in gardens, vegetable greenhouses, agricultural transformation, indoor demolition, small earthwork, civil engineering, road recovery, basement and indoor construction, concrete breaking, burying of cable, laying of water supply line, garden cultivation, desilting and the likes.

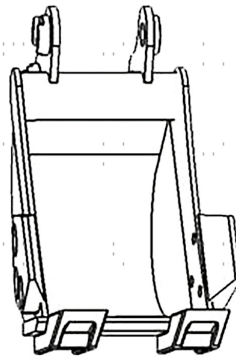
Your excavator is designed for lasting performance, featuring a robust KUBOTA diesel engine or a reliable BRIGGS & STRATTON gasoline engine. With these trusted engines, you can expect durability and consistent power for your operations.

Moreover, the versatility of this excavator extends to its compatibility with a wide range of work equipment. Whether you require a quick hitch, log grapple, ripper, leveling bucket, auger, or narrow bucket, this excavator can be equipped to serve your needs.

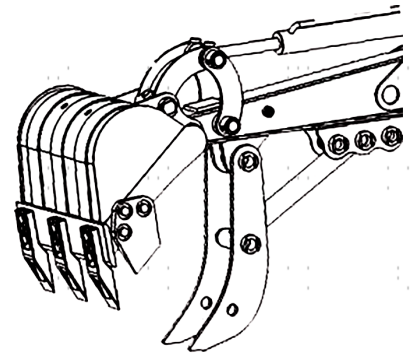
Work Equipment Compatibility



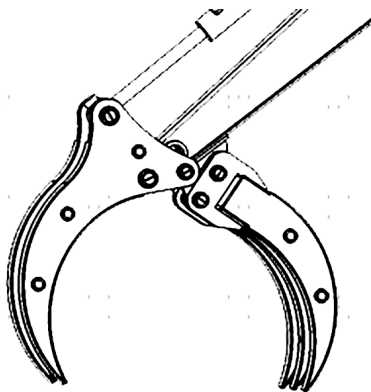
Quick Hitch



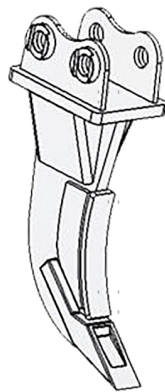
Narrow Bucket



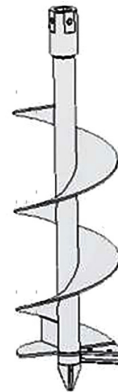
Mechanical Thumb



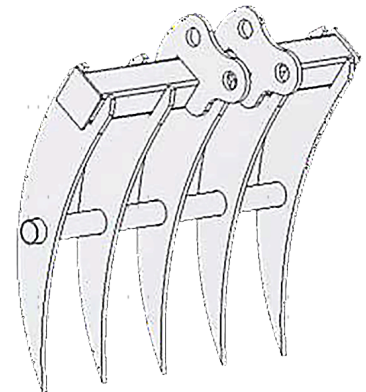
Log Grapple



Ripper



Auger



Rake

Safety Information

General Safety

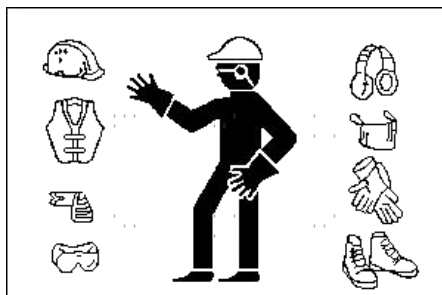
- **ALWAYS** follow federal, state and local laws, codes and regulations concerning the use of construction machinery.
- Read this manual before actually operating the excavator. Familiarize yourself with the instructions that provide crucial information about the specific model's controls, maintenance 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.

Operation Temperature Safety

Warning!

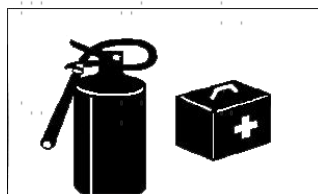
- For proper functioning and expected performance of the excavator, **DO NOT** operate the excavator if the ambient temperature is higher than 113 °F (45°C) or lower than 5°F (–15°C).
Being operated under an ambient temperature higher than 113 °F (45°C) can cause the engine to overheat, compromise your energy efficiency, shorten the service life of the hydraulic system
- If the excavator works under an ambient temperature below 5°F (–15°C), the gaskets and other rubber parts may be frozen hardened, causing early and excessive wear to the excavator.
- Under cold temperatures, the excavator may take some time to warm up before working normally. After starting the engine, let it run idle for a couple of minutes and allow all systems a few minutes to get ready.
- **ONLY** use the rubber track at the temperature between –13 to 131°F (–25 to 55°C)
- If the excavator must work in such conditions, please consult the Customer Service.

Personal Safety

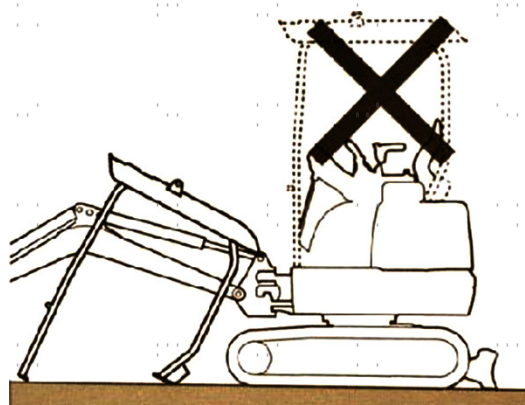


Warning!

- **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 start to build up. Fabrics coated or soaked with grim 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.
- Do not operate with the cover of the cab removed. Make sure the protective barriers, guards, screens, or covers are properly installed and secured before operating the excavator. 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.



Operation Safety

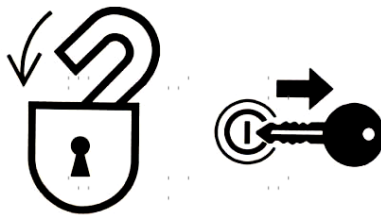
Warning!

General Operation Safety

- Due to the nature of construction work, the use of a signaller or flagman is necessary. Always make sure that you fully understand the gestures and signals used by your signaller 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 drill 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 on your soles 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.



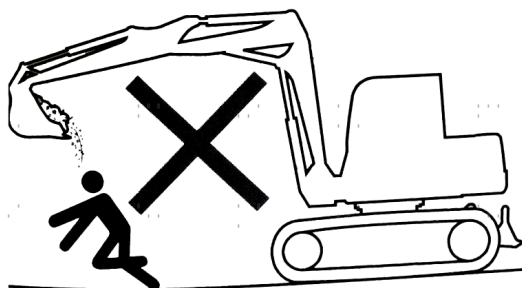
- **ALWAYS** check that the control rod/joystick is set at neutral before starting or stopping the engine.
- Do not enter or exit the excavator by jumping. **ALWAYS** mount the excavator as depicted. **NEVER** attempt to get on and off a moving excavator. **NEVER** use the control rod/joystick as a handle.
- If the excavator must work in such conditions, please consult the Customer Service.



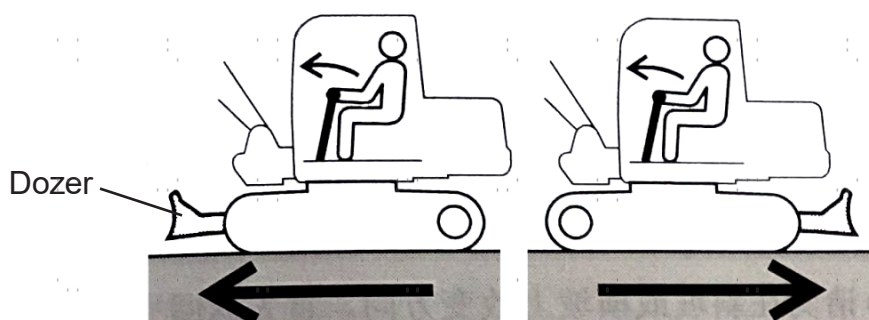
- **NEVER** carry any persons with the excavator.



- **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 bracket over any person. Debris falling off could cause serious injuries or even death.



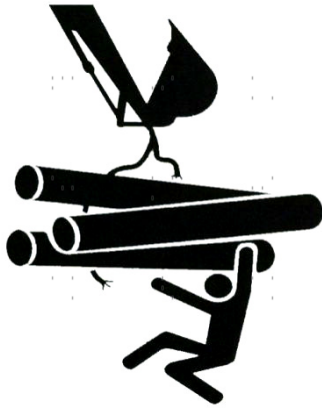
- **ALWAYS** visually check that the dozer is in front of the driver's seat before operating. If the dozer is at the rear of the driver's seat, the controls for turning and traveling will operate in reverse, contrary to the intended direction for the excavator's movement.



- **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 the ground vibrates or shakes as your drive over, cease driving and exit the excavator immediately.

Safety Information

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

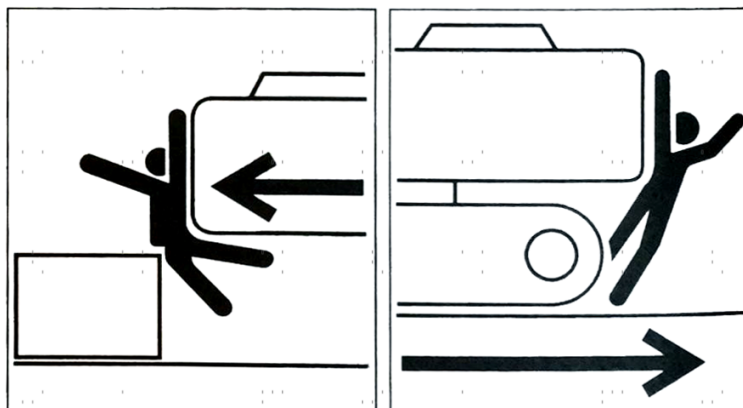


- **ALWAYS** know the locations of obstacles such as ditches, utility lines such as gas, power, and water lines, and things that might fall such as trees, overhead wires or stones on a cliff.

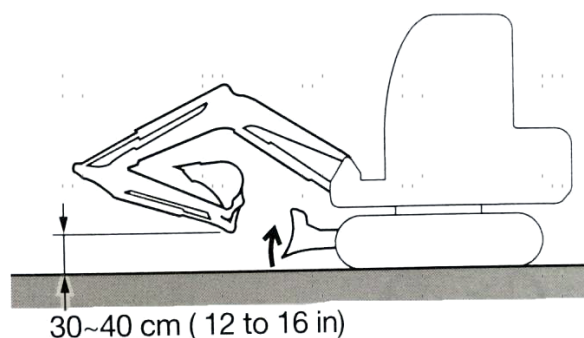


Travel Safety

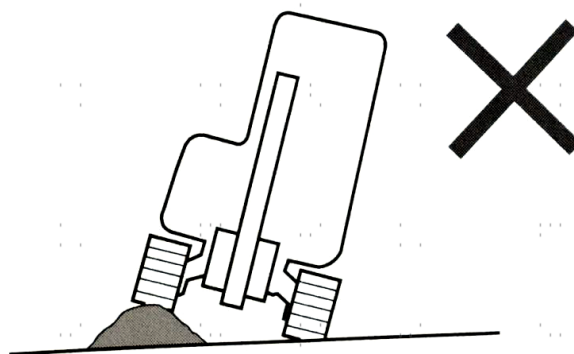
- **ALWAYS** check with the signalman or flag man that there is no person standing within the operating radius of the excavator.



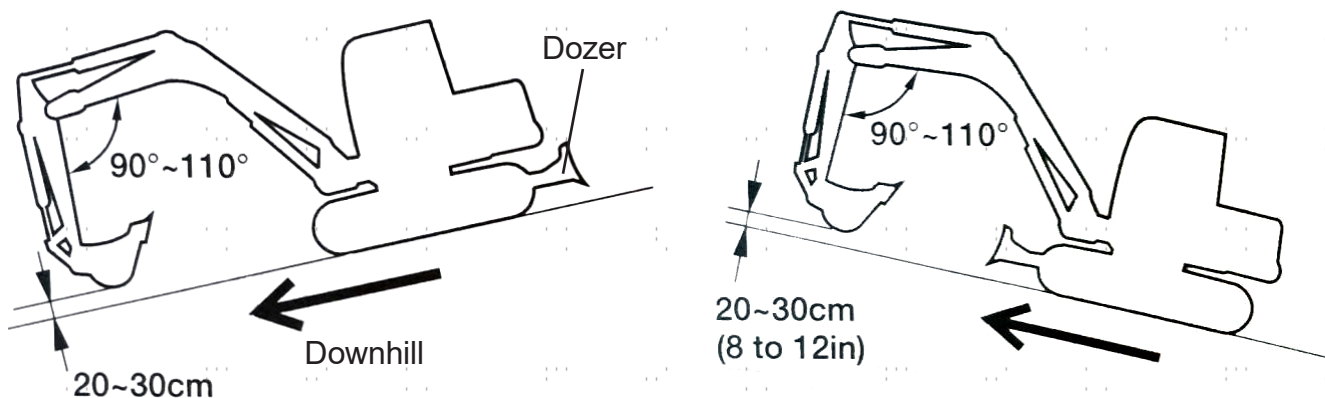
- **ALWAYS** conform that there is no obstruction before the dozer that may topple the excavator while traveling. Raise the dozer as shown above the ground by 30 cm to 40 cm depending on the specific terrain.



- **AVOID** traveling as shown below. If you must, lower the dozer close to the ground and travel slowly. **DO NOT** get onto obstacles that will tilt the excavator to an angle of 10° or higher.

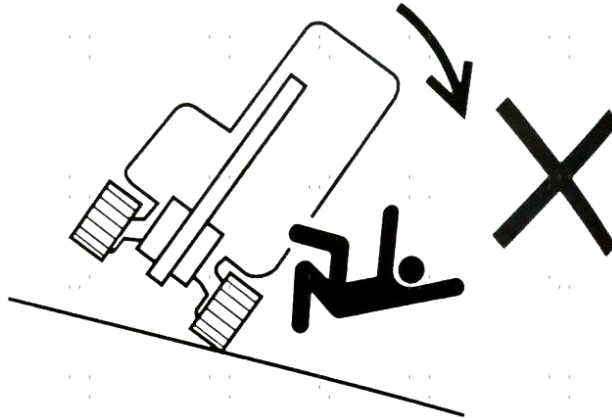


- Maintain a low speed while traversing rough terrain; avoid abrupt starts, stops, or sudden changes in direction. Such actions could lead the working device to come into contact with the ground, jeopardizing the excavator's balance and potentially causing harm to nearby structures.
- Exercise caution when navigating slopes: When moving on slopes or inclines, ensure the excavator's stability is upheld. Refrain from operating 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 dozer is at your back. Adjust the arm and boom in the position as shown and pay close attention to the slope ahead.

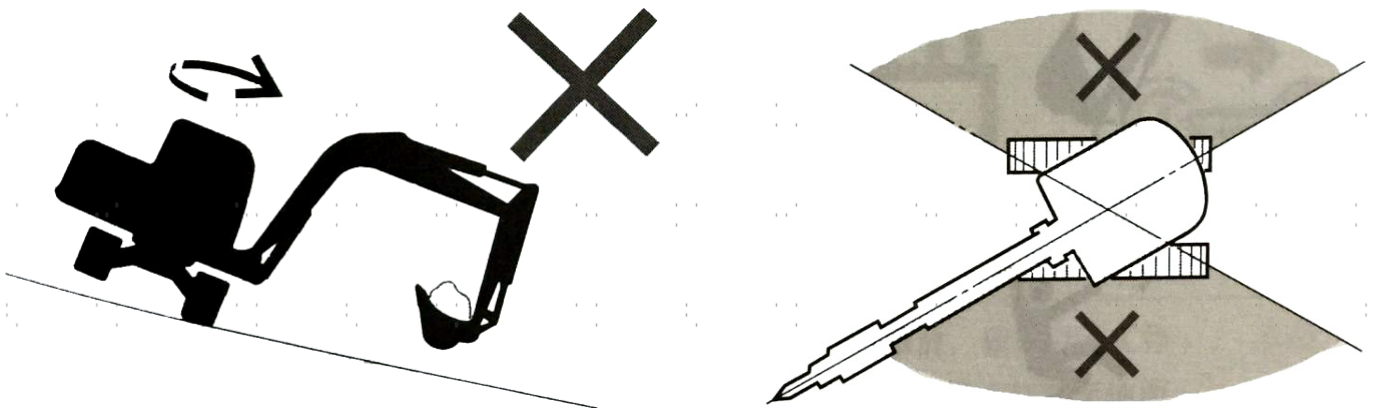


Safety Information

- Before traveling uphill, lower the dozer to 20–30 cm above the ground and ensure the dozer is ahead. Lower the dozer into the ground and shut down the excavator in case of emergency.
- **NEVER** go backwards on slopes. Equipped with crashing hammer, crusher or a long bucket rod, the arm and boom are heavier than the cab. **DO NOT** dig or operate laterally with rod (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.

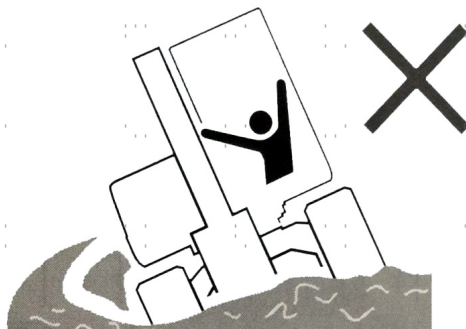


- **NEVER** swing the cab on slopes. The excavator is more susceptible to rolling in the lateral direction compared to the longitudinal direction. When the bucket is bearing a heavy load, exercise caution when executing lateral turns (swings). **NEVER** swing the cab abruptly when the bucket is carrying 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 excavators on snow or ice. Objects situated on the road shoulder or roadside may be concealed beneath the snow, rendering them invisible. This poses a risk of the excavator overturning or colliding with these snow-covered objects. Therefore, exercise caution while operating the excavator in such conditions. 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 you find it necessary to operate in such conditions, it's advisable 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

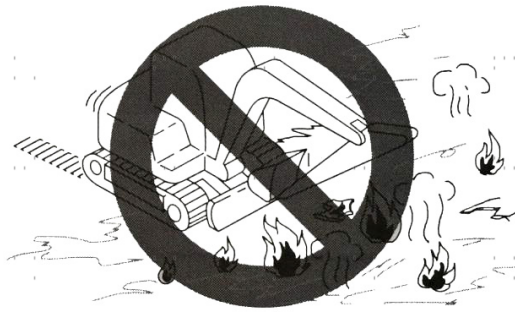


- Navigating across riverbeds or ground with numerous gravels could lead to gravel becoming lodged in the track, potentially causing track damage or derailment. Refrain from utilizing this excavator in marine environments. The salt content may corrode the steel track core.

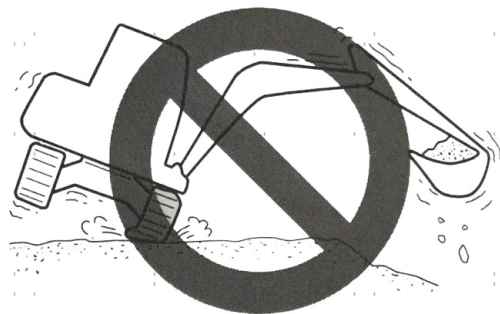


Safety Information

- **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.



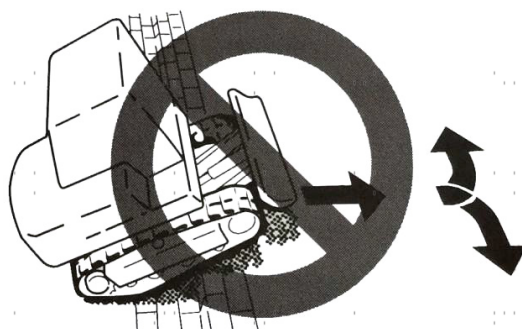
- Due to the rubber composition of the entire track, rubber tracks may not offer the same stability as steel tracks. Exercise caution during lateral turns and swings.



- 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.



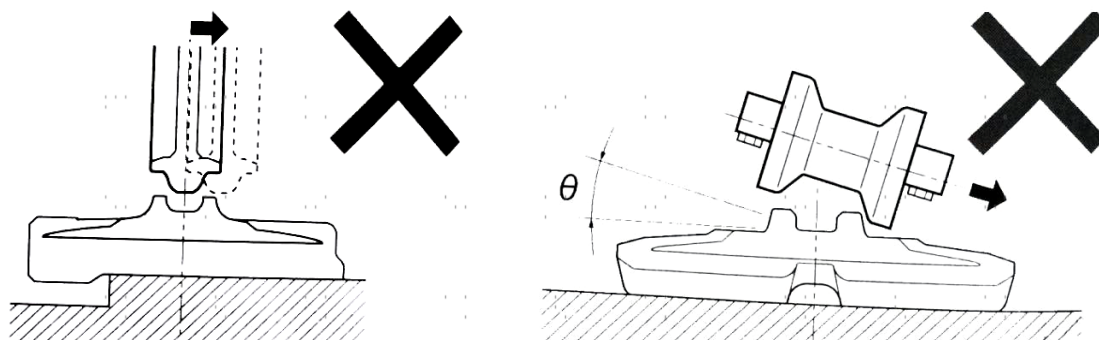
- **DO NOT** change the direction as you start to go up a slope.



- 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° or higher). Travel with both tracks on the flat surface.

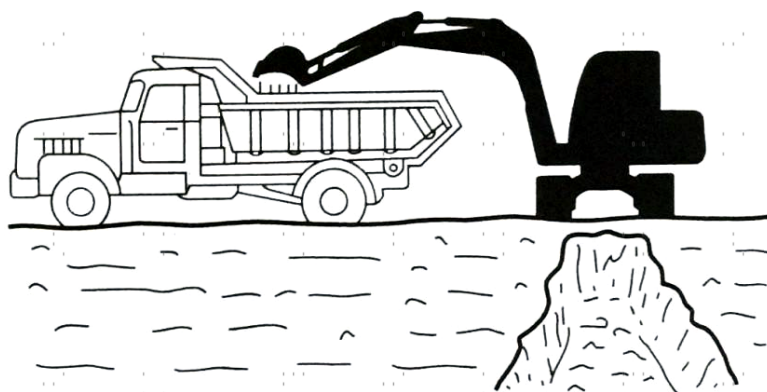


- NEVER** change direction or swing the cab when the track is loose as shown. In such case, if the excavator travels in reverse, the sprockets **WILL** derail from the rubber track. Similarly, if you swing the cab in any direction, the track **WILL** detach.



Load & Unload Safety

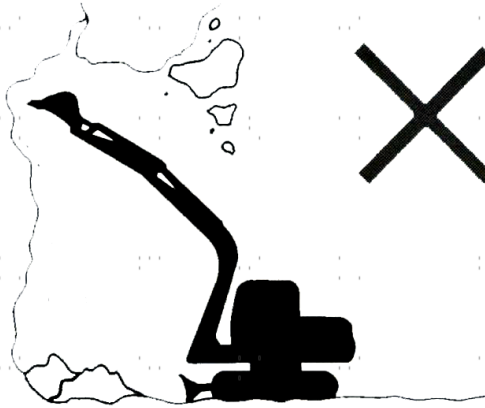
- NEVER** raise the bucket over any persons, not even a driver sitting in the cockpit.
- ALWAYS** ensure the driver's safety when loading. Do not apply load until the driver arrives at a safe place. **ONLY** load/unload from the back of a vehicle.



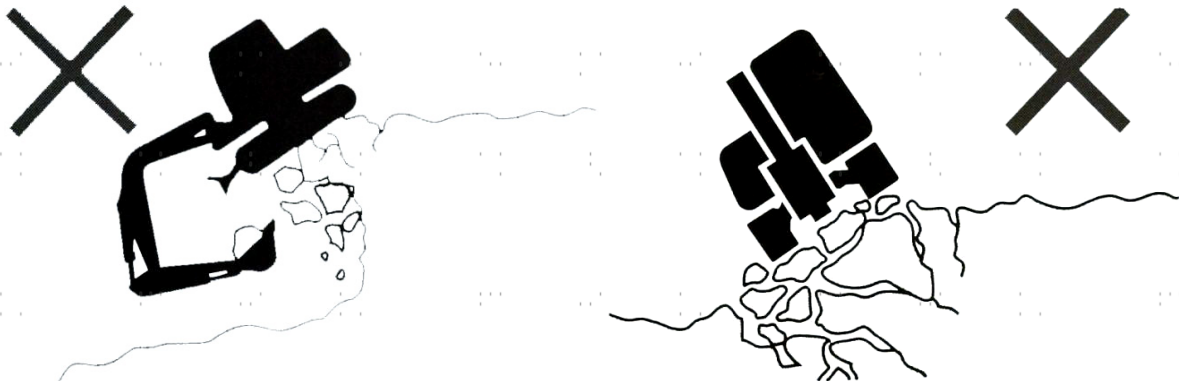
Excavation Safety

- **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.

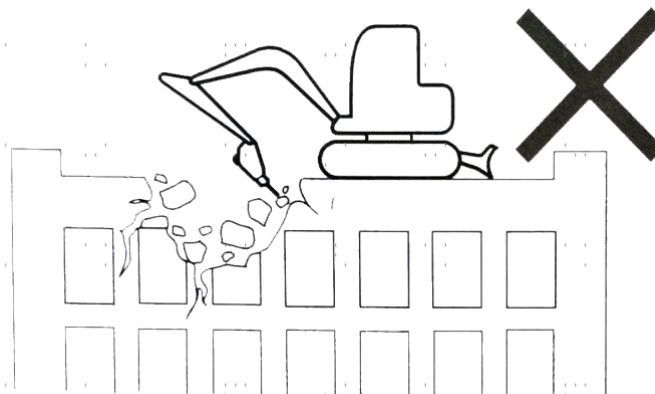
Keep a safe distance between the excavator and the edge of the site. **NEVER** dig the ground in front of the excavator when near an edge.



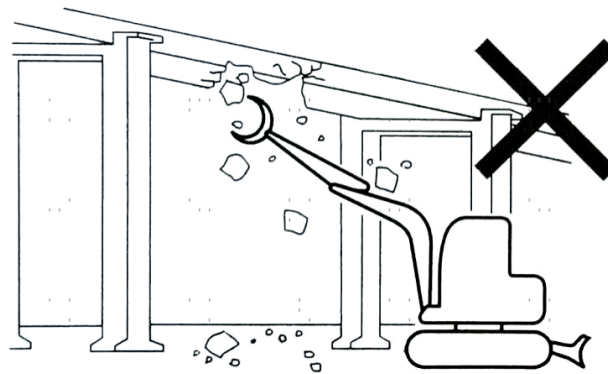
- Refrain from disassembling components underneath the excavator. The unstable ground could result in the excavator tipping over. Before undertaking any operation atop a building or other structure, thoroughly assess their strength and structural integrity. In the event of a collapse, it could lead to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



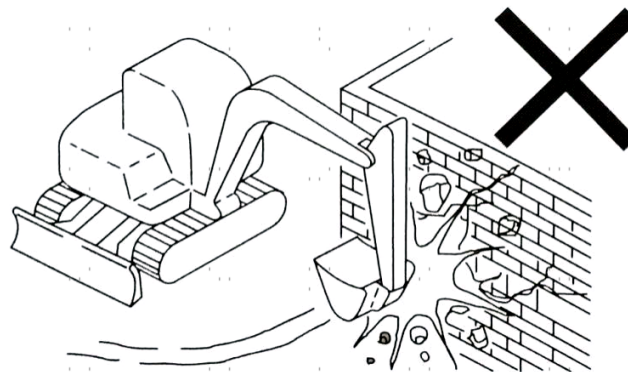
- Avoid disassembling from elevated positions. This practice poses a risk of objects falling and buildings collapsing, potentially causing severe injuries or significant destruction.



- **NEVER** disassemble from under a bridge or similar structures. This 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.

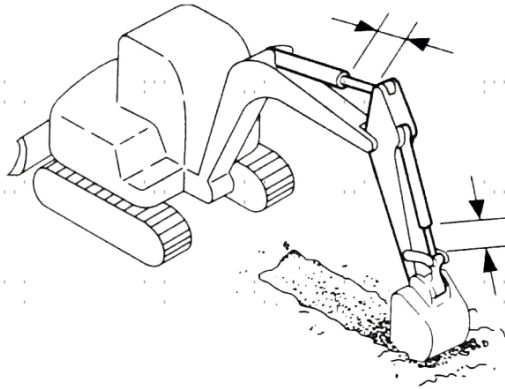


Hoisting Safety

- 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.
- This excavator lacks protective equipment to shield the operator from airborne debris. Hence, refrain from using this excavator in hazardous locations where the operator is susceptible to being struck by flying debris.

Hydraulic Cylinders Safety

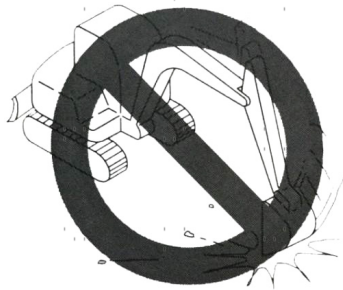
- **DO NOT** extend the hydraulic cylinders to their extreme lengths.



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



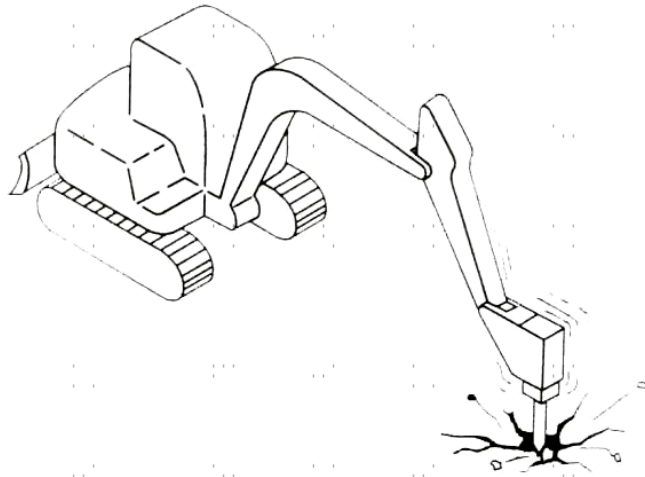
- **AVOID** forcefully striking the bucket against the ground. This **WILL** damage the boom and arm cylinders, along with other crucial connections.



- **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.



- 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.



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

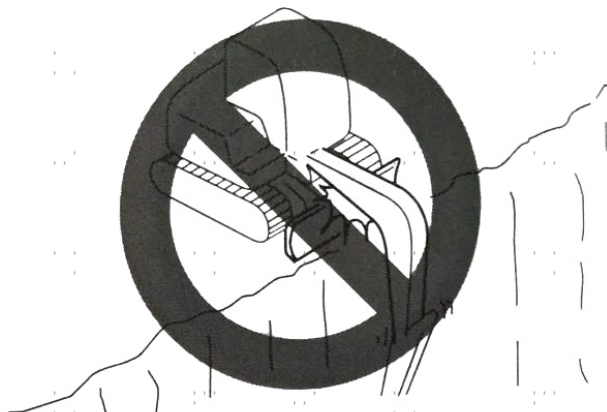


- Pay attention to the position of your dozer's control rod when digging. Make sure the dozer doesn't drop accidentally.



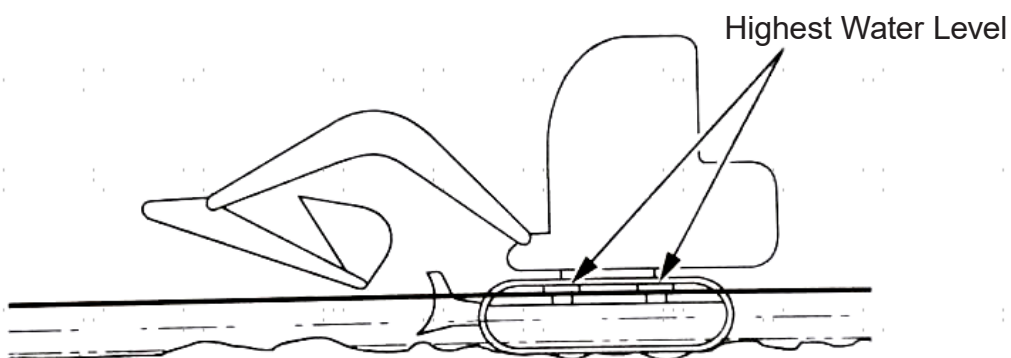
Safety Information

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



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 cannot compromise the safe operation of the excavator and your personal safety. Drive through at a stable slow speed.



Mud Escaping

One-Track Entrapment

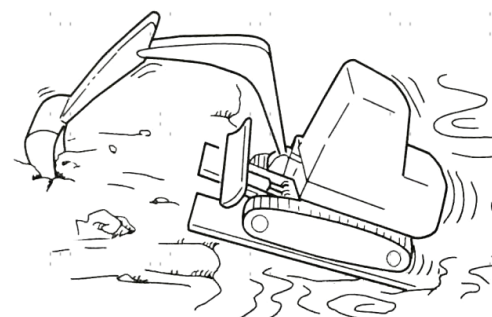
Follow the steps below to escape mud entrapment.

1. Check if only one of the tracks is trapped. If so proceed to the next step. If not, see the below for both tracks' entrapment.
2. Set angle between the arm and boom to somewhere between 90° and 110°.
3. Retract the bucket, lay its bottom against sturdy ground, and raise the bucket to raise the whole excavator up.
4. Lay a piece of sturdy plank beneath the raised track. Raise the bucket and travel out of the entrapment.



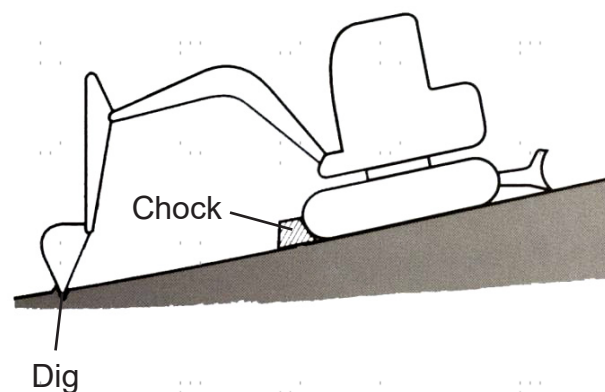
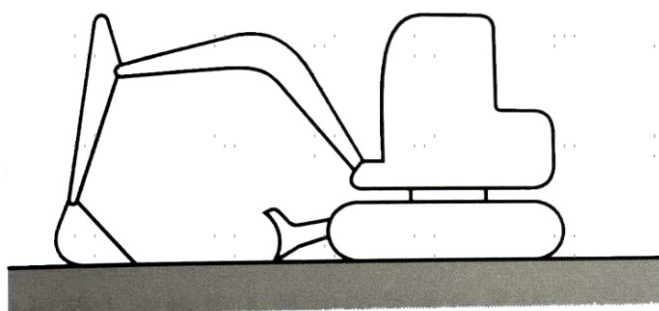
Two-Track Entrapment

1. Repeat steps 1–3 in One-Track Entrapment.
 2. Lay two sturdy planks or similar shaped objects under the lifted tracks, being sure the planks are inserted to the end of the tracks.
 3. Use the bucket as leverage point while travel out the entrapment.
- **DO NOT** walk or operate the excavator at the following locations:



Parking Safety

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



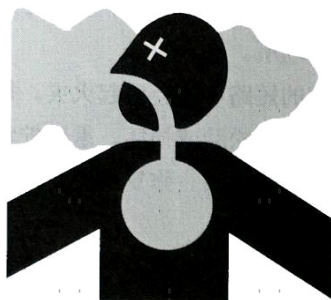
Worksite Safety

Danger!

- **ALWAYS** free your worksite of any sparks or flame. The fuel, lubricating oil, grease, and anti-freeze 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.



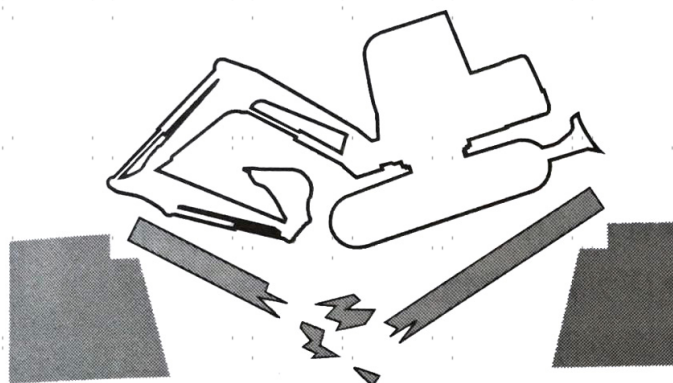
- Some construction materials may contain asbestos. Exercise **EXTREME** care and discretion when dealing with the material. Make sure all the personnel involved wear either a half-face or full-face respirator paired with a **NIOSH-rated N100, R100**, or the more common P100 filter.

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.

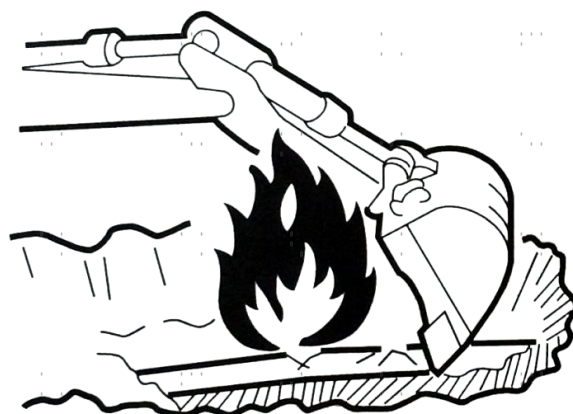
- **DO NOT** put any body part of your body into any moving parts of the excavator. The clearance may change when the excavator moves. Train the ground personnel about this, evacuate your worksite of any bystanders, and enclose your worksite with barriers or hurdles before operation.



- **ALWAYS** inspect the terrain and the ground in the worksite before operation. Inspect the building structure for indoor operation, being sure the structure can bear the operating mass, 2403 lb. (1090) kg, of the excavator. When walking on a structure like a bridge, make sure the structure can bear the operating mass, 2403 lb. (1090) kg, 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 the ground vibrates or shakes as your 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.

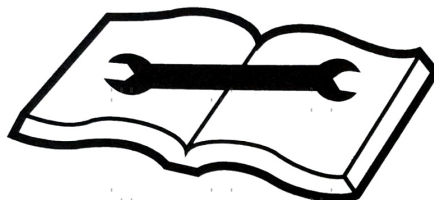


Oil Safety

- **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.
- Forbid smoking in the worksite.
- **IMMEDIATELY** clean the fuel or lubricating oil overflows.
- **AWLAYS** wait till the engine has cooled before refueling. Always fill the fuel tank in a well-ventilated location. Refuel carefully and clean overflows or splashed **IMMEDIATELY**.
- 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.

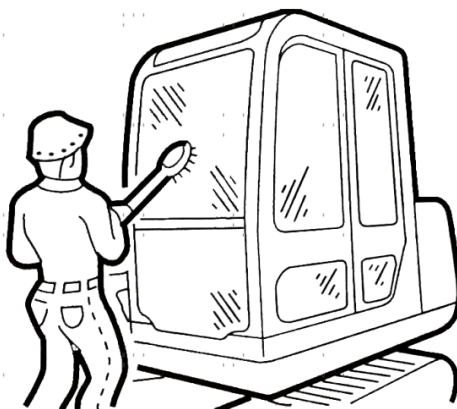
Maintenance Safety

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

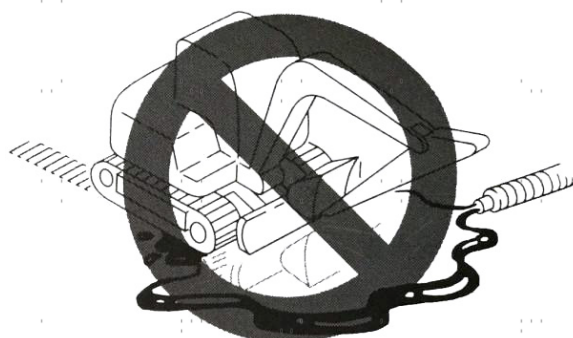


- **ONLY** replace damaged parts with identical ones. If such parts can't be procured locally, contact the Customer Service.
- **DO NOT** modify the excavator. Unauthorized retrofitting of the excavator may cause injury or even death, for which the manufacturer and importer of the excavator will not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

- **ALWAYS** keep the excavator clean, especially parts that the driver steps on or holds on to. Wipe grim, grease, dirt, snow or ice off of them 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.



Safety Information

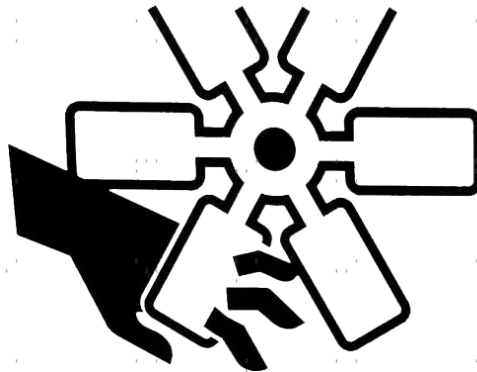
- **ONLY** explosion-proof lamps when examining fuel, lubricating oil, coolant, or battery electrolyte. Failure to do so could lead to severe injuries or fatalities caused by an explosion.



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



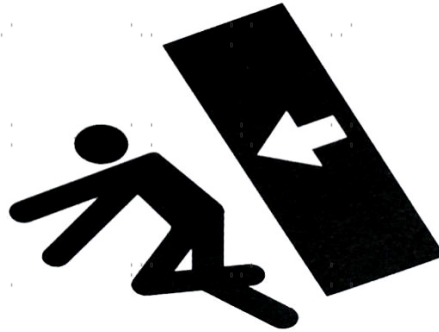
- **ALWAYS** be mindful of the rotating and moving parts. **NEVER** drop or insert any objects into a fan or fan belt, which could tear the objects into pieces and send them flying.



- **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.


Specifications

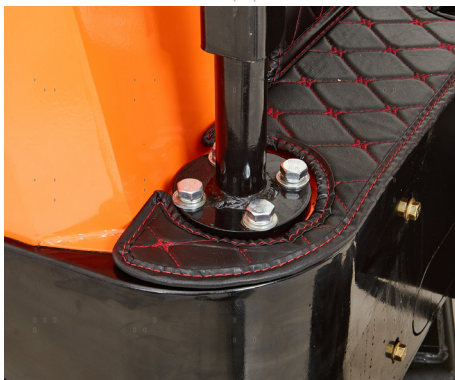
Model		HT12		HT15		HT16	
Engine	Model	BRIGGS & STRATTON 25T2		KUBOTA D722		BRIGGS & STRATTON 3864	
	Rated Power	13.5 hp		13.8 hp		23 hp	
	Rated Speed	3060 rpm		2600 rpm		3600 rpm	
	Rated Torque	21 ft lb. / 28.5 Nm @ 3060 rpm		33.19 ft lb. / 45 Nm @ 2600 rpm		35 ft lb. / 47.5 Nm @ 3060 rpm	
	Replacement	25.6 in ³	420 cm ³	43.9 in ³	719 cm ³	38.3 in ³	627 cm ³
	Oil	37.2 fl oz	1.1 L	105 fl oz	3.8 L	57.5 fl oz	1.7 L
		10-30W		10-40W		10-30W	
Fuel Tank Volume		1.74 gal.	6.6 L	2.58 gal.	9.74 L	2.12 gal.	8 L
Max. Traveling Speed		3km/h		3km/h		3km/h	
Fuel Consumption		0.26 gal/h	1 L/h	0.26 gal/h	1 L/h	0.4 gal/h	1.5 L/h
Fuel Type		#90 or over		Diesel		#90 or over	
Main Pump	Model	PGP5106SLP		PGP5106SLP		PGP5144MHHR1K	
	Rated Pressure	2610.28 psi	18 MPa	2610.28 psi	18 MPa	2610.28 psi	18 MPa
	Max. Pressure	3626.43 psi	25 MPa	3626.43 psi	25 MPa	3626.43 psi	25 MPa
	Nominal Flow	0.2 fl oz/r	6 ml/r	0.2 fl oz/r	6 ml/r	0.2 fl oz/r	6 ml/r
	Hydraulic Oil	AW 46		AW 46		AW 46	
	Oil Flow	4.76 gal/min	18 L/min	4.76 gal/min	18 L/min	6.6 gal/min	25 L/min
Slewing Speed		11 rpm		11 rpm		11 rpm	
Hydraulic Tank Volume		3.9 gal.	14.7 L	3.4 gal.	12.7 L	3.4 gal.	12.7 L
Travel Motor Model		BM6-310		BM6-310		BM6-310	
Track Width		7.1 in.	180 mm	7.1 in.	180 mm	7.1 in.	180 mm
Supporting Wheel No.		2		2		2	
Overall Track Length		48.5 in.	1230 mm	48.5 in.	1230 mm	48.5 in.	1230 mm
Platform Ground Clearance		16.2 in.	410 mm	16.2 in.	410 mm	16.2 in.	410 mm
Min. Clearance		3.8 in.	98 mm	3.8 in.	98 mm	3.8 in.	98 mm
Min. Swing Radius		59.3 in.	1505 mm	62.2 in.	1580 mm	61.5 in.	1560 mm
Bucket Volume		0.88 ft ³	0.025 m ³	0.88 ft ³	0.025 m ³	0.88 ft ³	0.025 m ³
Bucket Width		15.7 in.	400 mm	15.7 in.	400 mm	15.7 in.	400 mm
Overall Height		7.5 ft.	2270	7.4 ft.	2240	7.3 ft.	2200
Max. Bucket Digging Force		2586 lbf	11.5 KN	2697.9 lbf	12 KN	3261.96 lbf	14.5 KN
Max. Passenger Capacity		264.5 lb.	120 kg	264.5 lb.	120 kg	264.5 lb.	120 kg
Max. Digging Depth		73 in.	1855 mm	68.9 in.	1750 mm	70.6 in.	1795 mm
Max. Vertical Digging Depth		65.1 in.	1655 mm	61 in.	1550 mm	62.8 in.	1595 mm
Maximum Dumping Height		63 in.	1605 mm	62.6 in.	1590 mm	59.2 in.	1505 mm
Max. Digging Radius		123.2 in.	3130 mm	120 in.	3050 mm	114.2 in.	2900 mm
Dozer Height		12.6 in.	320 mm	12.6 in.	320 mm	12.2 in.	310 mm
Max. Dozer Depth		7.8 in.	200 mm	7.8 in.	200 mm	10.6 in.	270 mm
Max Slope Grade		30°		30°		30°	
Weight		2116 lb.	960 kg	2425 lb.	1100 kg	2866 lb.	1300 kg

Assembly

Installing the Cover


1. Use at least 3 people to unpack the package. Check that the excavator is intact and free of any damage. The cover and its frame of your excavator should arrive uninstalled.
2. Remove the bolts located around the four corners of the driver's seat. There should be 4 on each of the front right and left corners and 1 on each rear left and right corners.
3. Have two people lift the cover and its frame to where it should be installed. Align the holes on the frame base with the ones on the excavator.
4. Tighten the bolts.

 **WARNING! NEVER** operate the excavator with its cover removed.

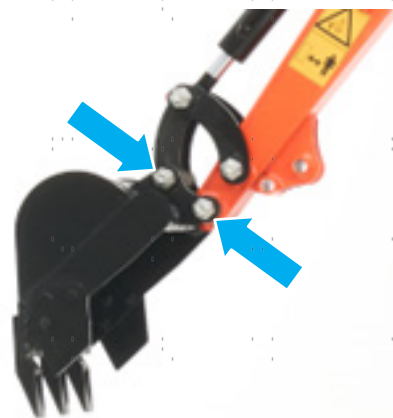


Changing the Work Equipment

1. Your excavator should arrive with the bucket uninstalled.

 The bucket is fastened to the arm through two bolts and nuts. Installation and removal of the bolts requires strength and care. Always wear protection and exercise care. Use at least two people to handle the bucket.

2. Ensure the machine is parked on level ground. Lower the bucket's flat surface onto the ground to prevent bucket movement post pin removal.
3. Remove the two nuts at the upfront as shown. Remove the bolts and keep them where they won't be compromised by metal debris or sand grains.



4. Have two people carry the work equipment to be installed and align it with the two holes on the arm.
5. Replace the bolts and tighten the nuts.

Operation

Starting the Engine

1. Circle around the excavator, checking for any anomalies, informing the coworkers of the imminent task, and telling the signalman/flagman to stand by.
2. Enter the cab in the way as depicted. Sit on the driver's seat, checking that there's 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 and buckle up. Check all control rods/joysticks are in neutral position. If not, reset them to neutral.



4. Locate the red power switch, which can be found on your left near the seat. The exact location of the switch may vary depending on the specific model of your excavator. Turn while pulling the switch in the direction as indicated by the label around the switch.
5. Insert your ignition key and turn it in the direction as indicated.



WARNING! NEVER start or operate the excavator from a place other than the driver's seat.

Headlights

1. Locate the headlights button. It should look as shown. Press it on and off to check that the headlights light up and shutoff.



The headlights may not be bright enough for all working conditions. Use additional illumination when needed. Remember to turn off the lights when you stop the engine.



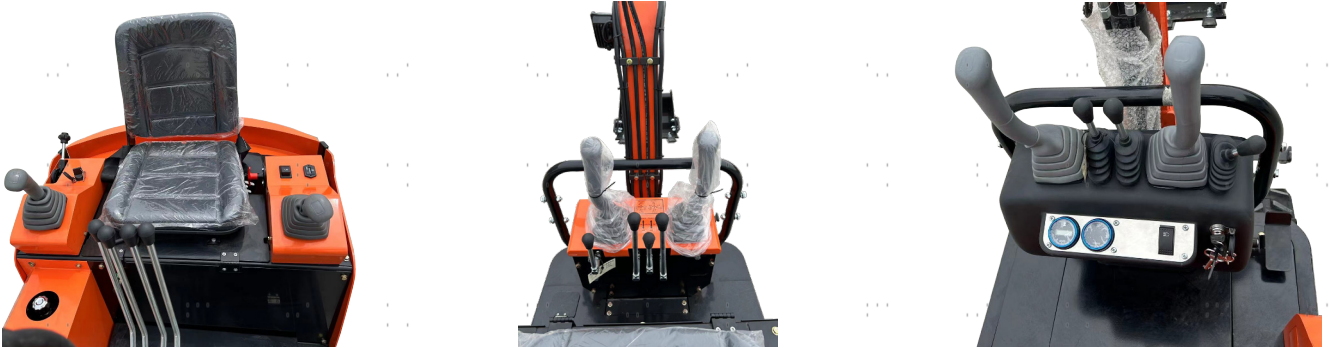
Excavation Timer

- There is an excavation timer located on the control panel or near the throttle lever or the headlights button depending on your model. The timer works automatically soon as you start the engine, recording the total working hours of the whole system. Be aware that the timer is not resettable and it keeps increasing.



Forward & Backward Travel & Steering

1. After running the routine safety checks and starting the engine following the protocols stated in Starting the Engine, wait for a couple of minutes for the engine and hydraulic oil to warm up.
2. Compare the control rods/ joysticks of your cab against the three figures below.



3. If the layout of your control rods matches Figure 1, the two adjacent rods in the middle control the travel. Pushing them together away from you moves your excavator forward. Pulling them towards you moves your excavator backward. Pushing or pulling either of the two travel rods moves only one of the tracks. 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.



Caution! When mobile, **NEVER** push one rod while pulling the other, which **WILL** topple the excavator.

4. If the layout of your control rods matches Figure 2, the two second-longest rods around the shortest rod control the travel. Pushing them together away from you moves your excavator forward. Pulling them towards you moves your excavator backward. Pushing or pulling either of the two travel rods moves only one of the tracks. 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.



Caution! When mobile, **NEVER** push one rod while pulling the other, which **WILL** topple the excavator.

5. If the layout of your control rods matches Figure 3, the two adjacent rods in the middle control the travel. Pushing them together away from you moves your excavator forward. Pulling them towards you moves your excavator backward. Pushing or pulling either of the two travel rods moves only one of the tracks. 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.



Caution! When mobile, **NEVER** push one rod while pulling the other, which **WILL** topple the excavator.



Figure 1



Figure 2



Figure 3

- To move faster, use the lever throttle. Repeat the normal steps for starting up. Locate the lever throttle, which should look as shown. Hold its end, hold down the button located atop, and push the lever away from you. This will increase the output power of the engine.



Figure 4

! **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.

Basic Excavation

- Follow the normal safety protocols and start the engine. Steer the excavator to where the digging is expected to be carried out, being sure the surface you are driving on is strong enough to handle the operating mass of your excavator.
- Refer to the figure below for a basic understanding of the excavation control rods/joysticks.

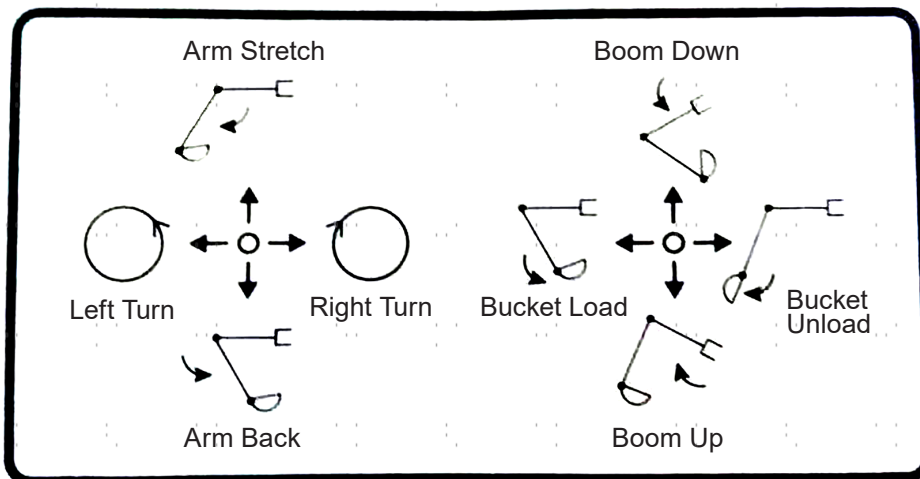


Figure 5

- Locate and identify the grey long rods. The one on your left controls the dipper (aka arm, stick, or crowd) cylinder. Pushing it forward raises the dipper (aka arm, stick, or crowd). Pulling it toward you retracts the dipper (aka arm, stick, or crowd).
- Pushing it to your left controls the cab to turn left while pushing it to your right controls the cab to turn right.

The joystick on your right controls the boom and bucket cylinder. Pushing it forward retracts the boom. Pulling it toward you raises the boom.

To control the bucket, push the right joystick left or right. Pushing it to your left controls the bucket to excavate or load. Pushing it to your right controls the bucket to dump or unload.



Figure 6

! For better results on hard ground, angle the dipper (aka arm, stick, or crowd) cylinder roughly perpendicular to the dipper and bucket 30° to the ground so that you exert the largest excavating force. For soft ground, angle the bucket 60° to the ground.



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.



Figure 7

Basic Bulldozing

- Locate the control rod for bulldozing, which should be the leftmost of the four adjacent control rods if the layout of your cab matches **Figure 8**.
- Pulling it toward you raises the dozer while pushing away lowers the dozer.



Figure 8

- If the layout of your control rods matches **Figure 9**, the shortest rod in the middle controls your dozer.
- Pulling it toward you raises the dozer while pushing it away lowers the dozer.

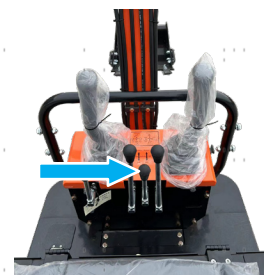


Figure 9

- If the layout of your control rods matches **Figure 10**, the rightmost rod in controls your dozer.
- Pulling it toward you raises the dozer while pushing it away lowers the dozer.



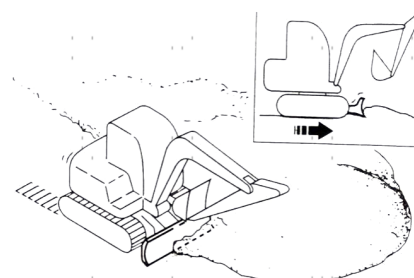
ALWAYS make sure the rods are at neutral before power up the whole system.



Figure 10

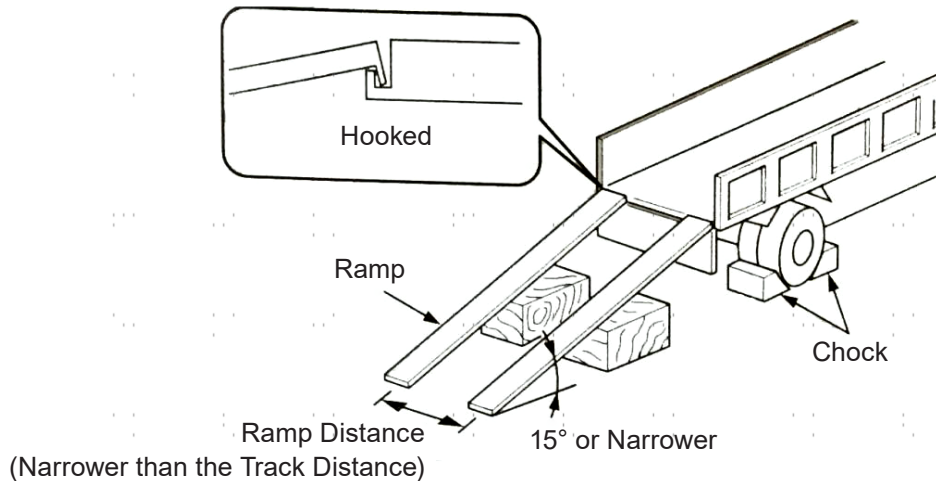
Leveling




- Position the dozer working device in proximity to the excavator.
- Gradually push the soil from the side of the mound.
- 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 dozer.



Transportation

1. Select a sturdy, level ground area at a safe distance from the roadside.
2. Securely fasten two ramps with adequate strength and dimensions to the truck bed. The incline angle must not exceed 15°. If the ramp is too steep, utilize a support pillar or block underneath them. Make certain that the ramps are wide enough for full contact with both tracks. Refer to the picture below for the truck and ramp preparation.



-  Do not employ the working device 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.
3. 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.
 4. Stop when the whole excavator is inside the truck bed. Cut the engine, ensure all control rods/ joysticks are at neutral. Remove the keys.
 5. Use chocks to immobilize the tracks and prevent movement. Secure the machine to the truck using a cable or chain if possible. Lock the trunk doors and lids if any.

Maintenance

Referring to the excavation timer located on the control panel or near the throttle lever or the headlights button depending on your model, maintain your excavator according to the schedules below.



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

Greasing, Replacement & Periodical Check Schedule

No.	Item	Interval (h)							
		100	250	500	1000	1500	2000	2500	4000
1	Greasing of Slewing Bearing		★						
2	Greasing of Slewing Bearing Gears	★							
3	Changing Engine Oil	●	▲	★					
4	Change 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 the Bucket								
11	Connection of Bucket								
12	Remove the Traveling Handle								
13	Replace the seat belt								
14	Track Defection Check			★					
15	Tensioner Maintenance			★		★			

Note:

★: Routine maintenance Interval

▲: Maintenance interval of engine oil

△: Changing interval of hydraulic oil depends on the oil type.

☆: Under the dusty environment, shorten the maintenance interval.

Work Equipment Pins Lubrication

Parts		Qty.	Interval (h)						
			10	50	100	250	500	1000	2000
Pivots	Boom Base Pivot								
	Boom Base Cylinder Pivot	10	★						
	Bucket and Connecting Rod Pivots								
	Others	6	★						
Slewing	Slewing Bearing	2				★			
	Slewing Bearing External Meshing Gear	1						★	

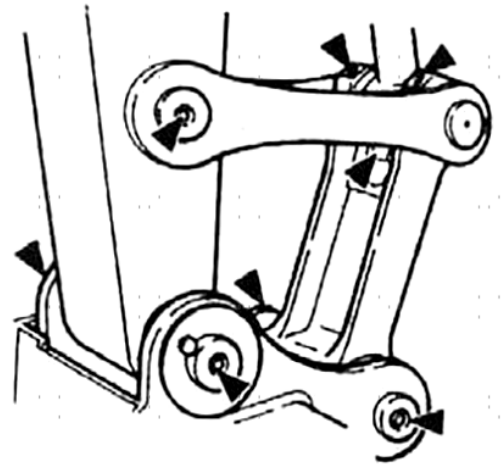
Note:

Using lithium grease is recommended.

★: Routine Maintenance interval

Locations of Work Equipment Pins

- Pivot between bucket and connecting rod



- Pivot at base of boom

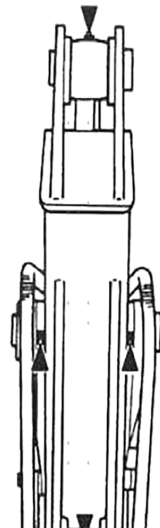


- Pivot at base of boom cylinder



- Others

Pivot between boom and arm; pivot of arm cylinder plunger; pivot at base of bucket cylinder.



Lubricating the Slew Bearing.

Lubricate the slewing bearing every 250 hours.

1. Position the excavator on level ground. Lower the bucket to the ground.
2. Allow the engine to idle at low speed for 5 minutes. Switch the ignition **OFF** and remove the key.
3. While the upper structure remains stationary, apply grease to the two grease nipples.
4. Initiate the engine to raise the bucket clear of the ground. Rotate the upper structure by 45 degrees (1/8 cycle).
5. Lower the bucket to the ground.
6. Lower the bucket onto the ground Turn off the engine.



Using lithium grease is recommended.

Lubricating the Meshing Gear of Slew Bearing.

1. Lower the bucket onto the ground. Turn off the engine.
2. Position the machine on level ground. Lower the bucket to the ground. Allow the engine to idle at low speed for 5 minutes.
3. Switch the ignition **OFF** and remove the key.
4. Ensure the grease is stored on the top of the external meshing gear of the slewing bearing, free from any contamination. If necessary, add approximately 0.5kg of grease. Any contaminated grease should be replaced with fresh grease.



Using lithium grease is recommended.



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									★

Note:

★: Routine Maintenance Interval

Checking the Hydraulic Cylinder



Caution! Hang a “DO NOT OPERATE” sign on the joystick to prevent accidental machine activation during inspection.



For your safety and 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 and stop the engine. Lower the bucket to the ground and turn off the engine.
2. Allow sufficient time for the hydraulic system to cool down completely to avoid exposure to hot and pressurized components.




Caution! The hydraulic system will remain hot after working. Wait for it to completely cool before handling it.

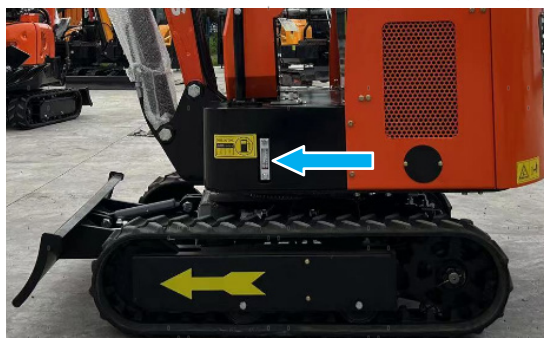
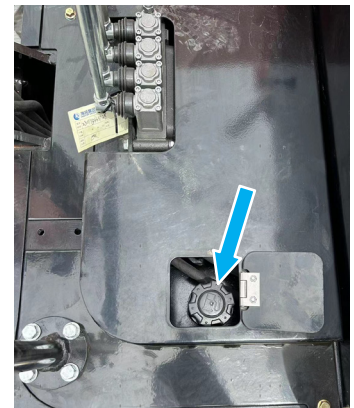
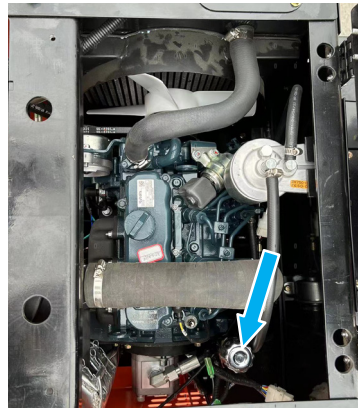
3. Bleed air completely from the hydraulic oil reservoir.
4. Visually inspect the hydraulic cylinder for any signs of leakage, such as oil spots, drips, or accumulated oil around seals and connections. Examine the cylinder's exterior surface for dents, scratches, or any damage that could affect its performance. Check the rod and piston for signs of wear, corrosion, or scoring. Run your fingers along their surfaces to detect irregularities. Gently inspect the rod seals and wiper seals for cracks, tears, or deterioration.
5. If the cylinder requires disassembly for a more thorough inspection, contact Customer Service. If any issues are detected or if the cylinder's performance is compromised, contact Customer Service.
6. Reassemble any components that were disassembled.
7. If everything is in order, remove any safety measures, start the machine, and test the hydraulic cylinder's functionality through controlled movements.

8. If you encounter any abnormal behavior or suspect an issue during testing, immediately turn off the engine and seek professional assistance.
9. Keep a detailed record of the inspection, including findings and actions taken, for future reference and maintenance tracking.


Daily Check of 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 until it rests on the ground.
3. Allow the engine to idle at low speed for 5 minutes. Turn off the engine and remove the ignition key.
4. Check the hydraulic oil level in the tank by referring to hydraulic oil meter. If the level is low, proceed with the steps to refill.
5. Locate your hydraulic oil cap and meter by referring to the pictures below.



6. Infuse the recommended hydraulic oil and check the meter. Replace the cap when the level rises to as stated.

 **Warning!** The hydraulic oil tank is pressurized. Before adding oil, carefully loosen the cap to release pressure slowly. Failure to do so may result in oil spraying out and causing potential hazards. Always exercise caution when working with pressurized systems.

Replacing the Hydraulic Oil Suction Filter Element



Caution! Do not proceed until the hydraulic oil cools down, as it may be very hot.

1. Park the machine on a level surface. Fully retract the arm cylinder and extend the bucket cylinder to position the machine. Lower the bucket to the ground. Allow 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. Gradually open the hydraulic oil cap to release pressure. Loosen and remove the 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. Before adding oil, carefully loosen the cap to release pressure slowly. Failure to do so may result in oil spraying out and causing potential hazards. Always exercise caution when working with pressurized systems.

4. Extract the oil-pickup filter and the levers. Thoroughly clean the filter and the inside of the hydraulic tank.
5. Utilize an oil-pickup pump to extract any remaining oil residue from the tank's bottom.
6. Position the filter and levers to ensure the filter is securely attached to the outlet. Clean and reinstall the drain plug at the tank's bottom.
7. Add oil until the level is between the markers on the oil meter.

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.



Warning! Leaked hydraulic oil and lubricant may pose a fire hazard or cause personal injury.

1. Park the excavator on level ground. Lower the bucket to 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 Page ?? 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.
8. Securely attach the oil-pickup filter element cap, ensuring the filter and levers are correctly positioned, then tighten the bolts to 49 Nm.
9. Important: Starting the engine without hydraulic oil may damage the hydraulic pump.
10. Tighten the oil tank cap.

11. With the engine idling at low speed, gradually operate the lever for 15 minutes to purge air from the hydraulic system.
12. Fully retract the arm cylinder and extend the bucket cylinder to position the machine. Lower the bucket to the ground. Turn off the engine. Remove the ignition key. Check the hydraulic oil level in the tank and add more if necessary.

Checking the Battery

For a longer battery life, turn off the headlights when not needed. Avoid igniting multiple times at a time.

If you find it hard to start the engine, replace the battery with an identical one.

Checking the Bucket Teeth

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



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

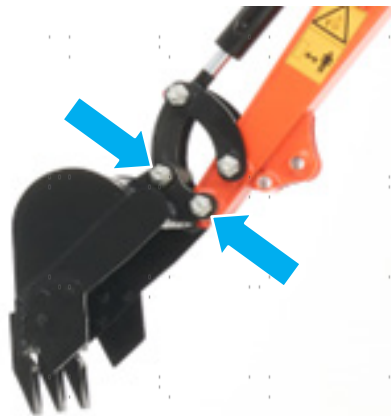
Changing the Work Equipment

1. Your excavator should arrive with the bucket uninstalled.



The bucket is fastened to the arm through two bolts and nuts. Installation and removal of the bolts requires strength and care. Always wear protection and exercise care. Use at least two people to handle the bucket.

2. Ensure the machine is parked on level ground. Lower the bucket's flat surface onto the ground to prevent bucket movement post pin removal.
3. Remove the two nuts at the upfront as shown. Remove the bolts and keep them where they won't be compromised by metal debris or sand grains.



4. Have two people carry the work equipment to be installed and align it with the two holes on the arm.
5. Replace the bolts and tighten the nuts.

Checking the Bolts and Nuts Tightening Torque

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



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

Metric Bolts and Nuts			
Thread Dimensions	Standard Torque (Nm)	Thread Dimensions	Standard Torque (Nm)
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 (Nm)			
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 Slewing Bearing		570±60	

Miscellaneous Checking Schedule

Parts	Quantity	Interval (h)								
		10	50	100	250	500	1000	2000	4000	
Bucket Teeth Check		★								
Changing the Bucket	—	If needed								
Adjust the Bucket Connecting Rod	1	If needed								
Replacing Traveling Lever	2	If needed								
Check and Replacing the Fuse	1	★	Every 3 years							
Check the Track for Defection	2					★				
Maintaining the Tensioner	2						★			
Check the Fuel Injection Timing	—	If needed								
Measure the Engine Compression Pressure	—					■				
Check the Starter & the A/C Generator	—					■				
Check the Bolts and Nuts Torque	—		◆		★					

Note:

- ★: Maintenance interval under normal conditions
- ◆: Maintenance needed at the first inspection
- : Contact Customer Service.

Contact Us

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

For a .pdf copy of the latest version of these instructions, use the appropriate app on your smartphone to scan the QR code to the right.

