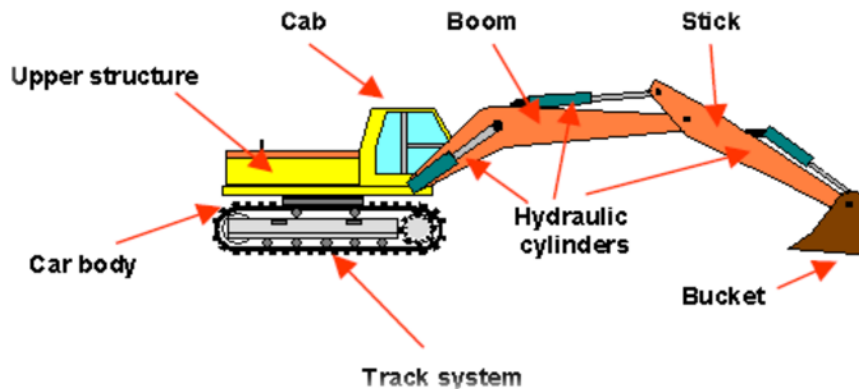


Title of Training	Excavator Safety Training	
Equipment Info.	Make/Type/Size/Model	Kubota U45 Excavator
Material Needed	Operators Manual	Excavation Equipment for Hands-On Training
	Open Area to perform hands-on	Orange cones for obstacle course

Excavator Safety Training

As with all heavy equipment, an operator using an excavator must be aware of his surroundings at all times. He must also follow all safety precautions and protocols established for the site. This is essential for excavator safety and remaining accident free on the work site.

Prior to starting the excavator, a visual inspection should be performed as part of an excavator safety program. This inspection should include testing the horn and audible reverse alarm. It should also include an inspection for loose or broken parts that should be fixed prior to use.

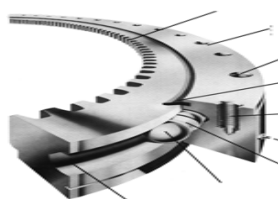


The figure above identifies the typical components of an excavator. Some excavator may have additional attachments used to perform specific tasks. The excavator should be inspected by the operator prior to being used. The following list of items should be included in the pre-shift check.

- All safety devices: Horns, lights, guards and shields, fire extinguish, glass and wipers.
- Engine and hydraulic fluid levels
- Boom, stick, and bucket
- Hydraulic leak
- All controls for proper function
- A more thorough inspection should be conducted on a periodic basis typically; this is on a monthly basis, but depending on the amount of time the machine is being used and under what conditions more or less frequent inspections may be necessary. The inspection check list shown
- on the slide is an aid in conducting the thorough inspection. The operator’s manual should be consulted to identify any additional inspection requirements.

FRAME & ROTATION BEARING

The frame of the excavator needs to be inspected for cracked welds and loose bolts. This will require crawling under the machine to perform this inspection. Often because of wet or muddy conditions, these inspections are overlooked. As the machine gets older, the potential for failed welds or fasteners increases. An illustration of a typical rotation bearing is shown in the slide. One half of the bearing is attached to the frame and the other half is attached to the upper structure. The only thing holding the two halves of the bearing together are



the ball bearings. When digging and lifting with the excavator, this bearing experiences tremendous loads and therefore needs to be lubricated regularly. Excessive bearing wear can be detected by first observing the relative location of the two bearing halves with each other with the bucket off the ground.



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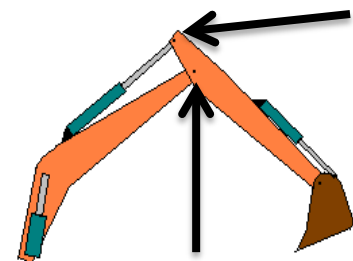
- Next, place the bucket on the ground and slightly lift the tracks off the ground with the boom. Again, observe the relative location of the two bearing halves. If the bearing halves separate more than .060 of an inch, the manufacture should be consulted to determine the amount of allowable play.
- Inspect the drive sprocket for worn or cracked teeth. A broken tooth on the sprocket will cause excessive wear to the pad sockets. Check the drive seals for leaks • The front idler needs to be checked for wear and flat spots. Depending on the type of material the excavator has been working in, the perimeter of the idler can be chipped or nicked which can result in wear to the pad sockets.
- At the beginning of every shift the level of all fluids should be checked. Depending on the condition of the engine, it may be necessary to check fluids throughout the shift. Check belts for proper tension and wear. A broken belt can result in a project being shut down for several hours.
- Check radiator and other hoses for cracks.
- The engine compartment, especially the radiator, can become very dirty. Frequent cleaning may be necessary to kept dirt from building up in the radiator and on the engine itself. Excessive dirt can cause the engine to run hotter than normal which will reduce its life.

CAB

- The operator’s cab needs to be kept clean of dirt, grease and objects which could interfere with the safe operation of the machine. It is recommended that basic housekeeping items be kept on the machine to facilitate keeping it clean. The glass in the machine needs to free of cracks that would impair the vision of the operator. Clean the glass regularly to increase visibility and to avoid reflection in sunlight. The windshield wipers need to work and the blade should be replaced periodically to avoid streaking.
- All controls need to be properly labeled with their function and direction of motion. Test each control before starting work to confirm they are in proper working order.
- The cab should have a fire extinguisher that has a current inspection label.

BOOM AND STICK

- Inspect the boom and stick for dents and bends. Significant dents need to be evaluated by a competent individual to determine if the structural strength has been compromised. This is especially critical when the excavator is being used for lifting. All welded joints need to be inspected for cracks.
- The hinge joints need to be greased regularly according to the manufacturer’s recommendations.
- After greasing, excessive grease should be wiped away with a rag. Keeping these components free of excessive grease will reduce the buildup of grit which can accelerate wear. Check the hydraulic hoses at the hinge points for wear



BUCKET-INSPECTION & MAINTAINANCE

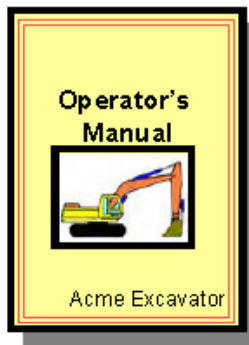
Inspect the bucket for cracked welds, particularly where the hinge gussets are attached.

- Inspect bucket hinge pins and linkages for excessive wear, missing keeper pins and other damage.
- Make sure the pins or bolts used to attach the teeth to the bucket are in place and not excessively worn. Also, evaluate the wear on the teeth for planning the next change out.
- If the excavator is fitted with a thumb, inspect the hinge pin and associated linkages for wear and damage.
- The frequency of greasing the bucket hinge pins is dependent on weather conditions and the type of material being excavated. In sandy or powdery material it may be necessary to grease these components two to three times a shift. The fine material will have a tendency to work their way into the hinges and accelerate wear.
- Frequent greasing will keep pushing this material out. Buckets that will be digging below water need frequent greasing to keep it fresh. At the end of



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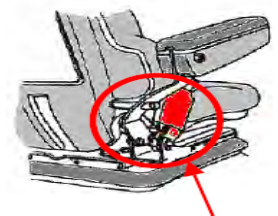
the shift where the machine will sit overnight, grease all these area again to prevent corrosion. After greasing, exercise the bucket to distribute the grease.

OPERATOR'S MANUAL

- The operator's manual is required to be on the machine or readily available to the operator. Being kept in the job shack or back in the office does not meet this requirement.
- The operator is also responsible for having read and understood the manual. It is the Brieser Construction Co. responsibility to ensure the operator has read the manual before allowing him to operate the machine.
- The manual contains important information about the operation and maintenance of the excavator. Though very similar, not all excavators are the same, particularly with respect to maintenance. The manual will contain operating information and load capacity charts that must be used when the machine is utilized for lifting.

SEAT BELTS

- Seat belts are a safety device and as such must be kept in operating condition. Worn or damage belts need to be replaced.
- When moving the machine over rough terrain or on steep slopes, the seat belt will help keep the operator in the seat allowing him to maintain control of the machine.
- Some manufactures recommend replacing the whole seat belt assembly every three years regardless of appearance.



Inspected Each Day

CLIMBING ON AND OFF THE MACHINE

- One of the prime causes of ankle and back injuries to operators is the improper method to climbing on and off the excavator. The standard three point method is recommended. This method is simply keeping two feet and a hand or two hands and foot in contact with the machine while moving the remaining hand or foot. Enter and exit the machine while facing it. This will allow the operator to use all the handrails provided. Avoid jumping from the machine.
- Cleaning footwear of excessive mud or grease will help prevent slipping.

OPERATOR RESPONSIBILITIES

The operator of an excavator is responsible for safe operation of the machine and the safety of those working in the vicinity of it.

Several factors can affect an operator's ability to stay focused on operating their machine.

- **Fatigue & Hunger:** Fatigue can result from working too many hours, lack of sleep, hunger or monotonous, repetitive work. When an operator shows signs of fatigue, they should be relieved to get rest or exercise to refresh their alertness.
- **Weather:** Some excavators are open to the elements. An operator needs to dress appropriately for the weather to prevent stress on their body.
- **Emotional Level:** Operators under emotional stress may not be able to stay focused. It may be necessary at times to remove such an operator from a machine until emotional equilibrium is restored.
- **Physical Health:** Operators suffering from health problems affecting their machine operating ability should not be allowed on a machine. Even workers taking cold medicine may have their alertness compromised.



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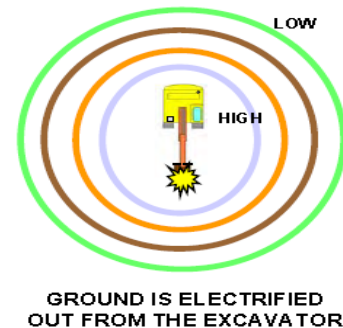
- **Working Conditions:** Some worksites that have many activities occurring simultaneously can distract an operator. Operators must be able to block out such distractions while operating a machine.
- **Other People:** People should not attempt to talk to or in any way distract an operator who is operating a machine. Wait until they are finished with an operation before approaching or talking to the individual.

DANGER AREA

Before excavating work begins, access to the worksite by unauthorized persons needs to be controlled. Barriers of cones, barrels or other structures can establish the work area perimeter. Caution tape, barricade safety fencing or other well-marked material should be placed between the vertical barriers to prevent people from accidentally entering the work area.

POWER LINE CONTACT

1. When the excavator comes in contact with a live power line, the whole machine becomes electrified. Due to the different current paths that the electricity can follow, parts of the machine could be at different voltages. If the operator touches different parts of the machine, his body could create a current path which could result in electrocution.
2. The ground around the excavator can also become electrified. The voltage in the soil nearest the machine will be greater than that further away from it. When moving away from the excavator, individuals should shuffle to avoid creating a current path from one foot to the other.
3. The operator should remain with the excavator if at all possible until the power company indicates it is safe to leave the machine. This is because the excavator components could be at different voltages and touching parts of the machine could result in being electrocuted.
4. No one should be allowed to approach the excavator or to touch it. If the operator is Unconscious, no attempt should be made to rescue him until the power company indicates it is safe to do so.
5. If the operator must leave the excavator due to fire, he should move slowly to the edge of the cab without touching it and carefully jump to the ground. Once on the ground, he should shuffle away from the machine.



EXCAVATING

Before starting to excavate, assess the situation:

Before beginning work, the operator and those working with him should take a moment to assess the site to plan how the work will progress. An assessment of soil conditions is important to ensure that the excavator will be stable throughout the project. When excavating a large site, taking time to plan out the excavation process can save time and money. Things to consider are:

- Will the spoil be placed along the excavation or need to be removed?
- If material is to be moved away from the excavation by truck, what type will be used and how will they access the site for loading?
- To check the depth and grade of an excavation, will the grade checker be required to enter the excavation and can it be done safely?

Besides excavating, the excavator is often used to perform other tasks at the job site. If the machine will be used for lifting, the type and size of the lift load needs to be considered to ensure the excavator is adequate

- Is the work site on a slope?
- What other work will be taking place in the area of the excavation?
- If compaction is required, how will it be done?
- Will the excavator be required to place objects in the excavation?

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Call Before You Dig!

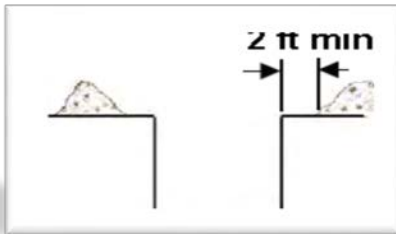
- Excavating in an area where utilities are present always a challenge and can be deadly. Before starting an excavation of any type, it is important to determine if there are any
- underground utilities in the area. Planning the site work will allow time for the utility providers to send out representatives to locate and mark their underground utility.
- Most areas have a One-Call number which will contact local utilities companies of your location. Representatives from these companies will come to your work site and mark the location of these utilities. Contact one of your local utility companies or search the Internet for the 1-800 number.

AVOID UNDERCUTTING!

- When excavating, the operator must always be alert to where the machine is in relationship to the edge of the excavation.
- Even if no undercut is made, the edge of the excavation may not be strong enough to support the weight of the machine.



GENERAL TRENCH PRECAUTIONS



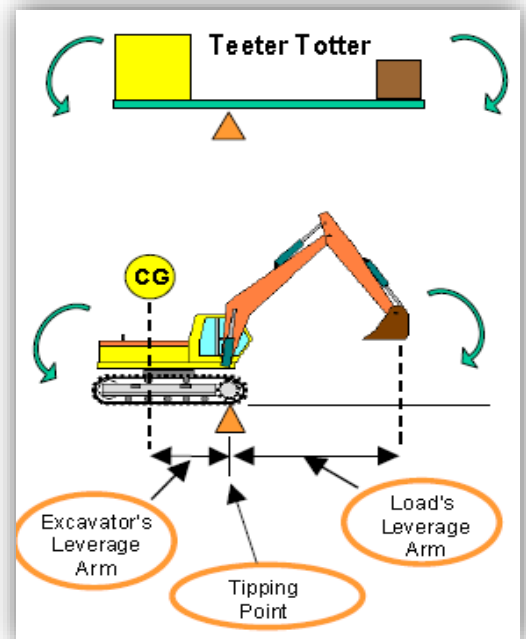
Material excavated from a trench should be placed a minimum of two feet from the edge of the trench. This distance may need to be greater depending on soil type. The slope of the spoil pile should be flat enough to prevent material from sliding into the trench.

Also note in the above picture that there are workers in the trench without having adequate shielding or shoring in place.

EXCAVATOR STABILITY

For riders on a teeter totter to be in balance, the leverage created by one rider has to equal that of the other rider. The leverage of each rider is the result of the rider's weight times his distance from the tipping point. If one rider is heavier than the other, then he will have to be closer to the tipping point than the other rider.

For an excavator, the tipping point is the point of the tracks which is under the boom. This could be at the end of the tracks or at the side of the tracks. The excavator's leverage is the weight of that part that is behind the tipping point times the distance from the tipping point to its center of gravity. This leverage is basically fixed. The load's leverage is the weight of the load and that portion of the boom, stick and bucket plus the load attached to the bucket. The load's leverage is not fixed. When the boom and Excavator's stick extends the load away from the machine, the load's leverage increases due to its increased leverage arm. Based on the dimensions of the excavator's tracks, the machine typically will have more lifting capacity over the ends of the tracks than over the side.



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BRIESER TRAINING REQUIREMENTS:

- Local 150 operators are considered competent to run large equipment assuming they have demonstrated knowledge of safe operation. Teamsters are considered competent to load and unload equipment for transport.
- Testing: Operators are to be tested in accordance with Brieser Construction requirements.



The operator must demonstrate, at a minimum, knowledge of the following operations:

Operators having previous experience operating the excavator need only demonstrate the competency skills listed below in order to complete evaluation.

To complete the in school practical lab requirement for the excavator the learner must be able to demonstrate the following practical skills:

- Demonstrate the safe operation of equipment including observation of surroundings.
- Perform pre-start checks, start-up/shutdown procedures and monitor performance of the equipment.
- Perform daily maintenance tasks.

Perform basic moves with equipment including:

- Move forward, stop, back up, stop (flat elevation).
- Apply park brake, lock out transmission.
- Shift transmission.
- Raise and lower boom (making sure to observe for wires).
- Extend and retract stick.
- Curl and dump bucket.
- Swing left and right.
- Lower bucket to the ground for lock out procedures.
- Identify that you must call before you dig (Check for underground utilities).
- Excavate simple trench 10 ft. long by 2 ft. deep. Keep trench straight. Place materials from dig no less than (2') from edge of dig area.
- Backfill trench using the materials taken from the excavated site.
- Use bucket to flatten and compress the dig site.
- Shows ability to split functions to operate tracks and digging functions simultaneously i.e. pulling up steep grades, clearing obstacles, push up turns, etc

Important Notice

This Safety Training Topic (STT) does not necessarily cover all possible hazards associated with this equipment and should be used in conjunction with equipment manual. It is designed as a guide to be used to compliment training in the field at Brieser Construction and as a reminder to users prior to equipment use.

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EMPLOYEE NAME (Print or Type)	EMPLOYEE SIGNATURE	TRADE	JOB TITLE
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