Student Manual

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LOADER/BACKHOE SAFETY TRAINING

STUDENT MANUAL

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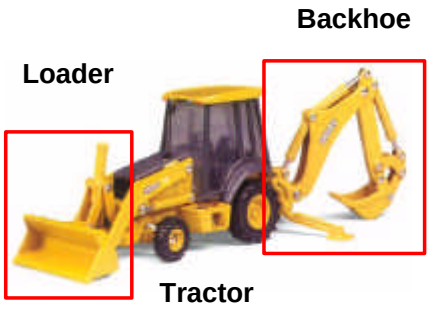
Basic Components



The basic component of the loader/backhoe is the tractor. Most tractors used in loader/backhoes are now designed to be used in conjunction with the loader attachment and the backhoe attachment.

The loader is attached to the front of the tractor and is [illegible] raised and lowered hydraulic cylinders. A bucket is attached [illegible] ha[illegible]ydraulic cylinder for tipping the buck[illegible]ward [illegible]ckw[illegible] [illegible]city [illegible]e bucket varies dependent[illegible]n the siz[illegible] trac[illegible]cke[illegible] be [illegible] wi[illegible]h to increa[illegible] the machine'[illegible]g abili[illegible]

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[illegible]s ar[illegible] [illegible]ch [illegible] of [illegible]ck[illegible] to p[illegible]e stability when the boom is sw[illegible]on[illegible] [illegible]otl[illegible]

Inspecting the Tractor

Check the following:

- **Engine oil & coolant**
- **Hydraulic fluid levels**
- **Glass for dirt & damage**
- **Transmission for smooth operation**
- **Brakes**
- **Safety devices**
- **Seat belt**
- **Tires for condition & inflation**
- **Lights, gauges, horn & alarms**
- **Cab cleanliness**
- **All co ro labels**

Minor injuri e operat ften of ous ing ty glass is mmon dur vating ser fect epl ndow ing supp he mac gr rea em.

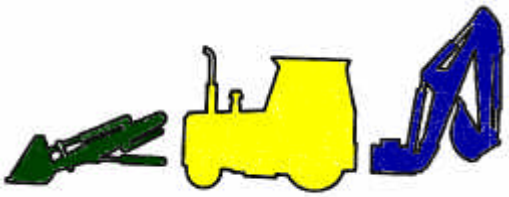
sp ct t E khoe

C ck the following:

- **Damaged stabilizer arms & pads**
- **Bent or damaged hydraulic cylinders**
- **Worn hinge pins & bushings**
- **Damaged & leaking hydraulic lines**
- **Smooth operation through all functions**
- **Damaged or loose teeth on bucket**
- **Worn stick extension slide pads**
- **All welds for cracks**

The operator should check to see that the machine is being properly lubricated. The operator's manual will provide a complete lubrication chart.

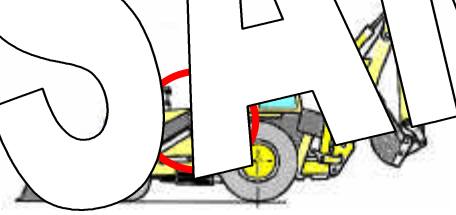
Typical Weight of Components

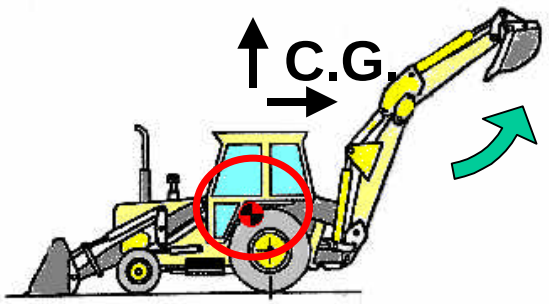


LOADER 2,200 LBS | TRACTOR 6,500 LBS | BACKHOE 4,000 LBS

A typical loader/backhoe found on a job site can weigh from 12,000 to 16,000 pounds. Emphasize how heavy the machine is and because of its size how much potential it has for doing damage when not properly operated.

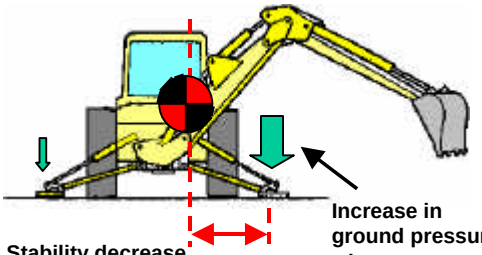
Because of their weight, great care is required when removing or installing a loader and/or a backhoe. Always follow the manufacturer's guidelines and use proper equipment for these components.





As a backhoe is raised and extended, the center of gravity of the machine rises vertically and moves toward the rear of the machine. This vertical change in the center of gravity affects the machine's lateral or side to side stability. Also, when a backhoe is extended and swung to the side, lateral stability decreases.

Machine Stability

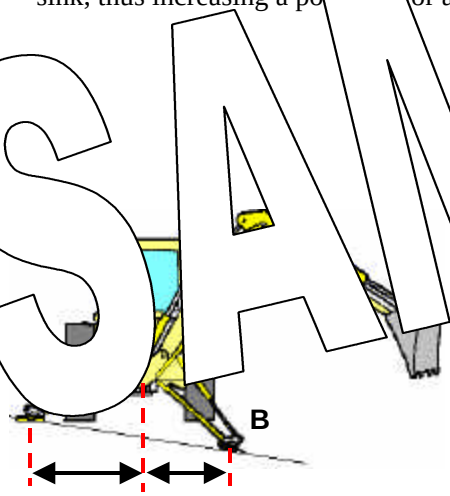


Stability decrease as CG moves closer to stabilizer pad.

Increase in ground pressure when swung over the side.

When a boom is swung to the side, the center of gravity of the whole machine shifts toward the side also. If the bucket is full of material or if a load is suspended from it, the center of gravity shifts even more to the side. If the combined center of gravity of the machine and load moves beyond the stabilizer, the machine will tip over.

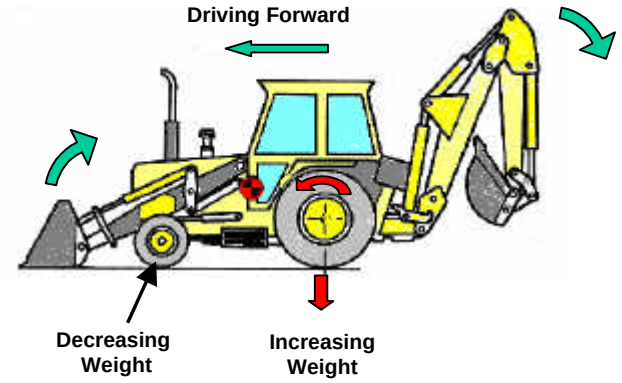
As the bucket is swung to the side, the pressure the stabilizer pad imposes on the ground increases. If that pressure exceeds the shear strength of the ground, the stabilizer will sink, thus increasing a potential for a tip-over.



Stability decrease as stabilizer B is lowered to level the machine.

When leveling the machine on sloping ground, the stabilizer on the downhill side of the loader/backhoe has to rotate farther down to raise that side of the machine. Thus, the horizontal distance from the machine's center of gravity to the downhill stabilizer decreases. Shortening this distance decreases the machine's stability which in turn decreases the amount of weight the machine can safely lift. This condition is at its worst when the bucket is fully swung to the side.

Machine Stability

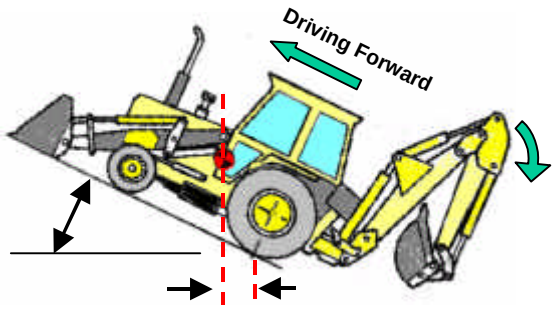


The machine attempts to rotate clockwise as it accelerates.

When <u>Driving Forward,</u> the forward driving torque transfers weight from the front wheels to the rear wheels.

When a loader/backhoe is put into motion, various d ic fo ome into p When forward power is applied to the dri ma attempts t ate in the opposite direction, ckwa w i ine npts to rota backwards de ds on h it is ated hen ach s accelerat forward slo e amou ckw tio ma wh e machine idly acc forwar te of ation urs.

result kward a of eight on the is transferred e wheel h nt veig nsfer depen id achine cce ed. n ch read constant tra d, the rd re hes th d w wa nsferred to the rear wheels re th D g th rio t the weight on the front wheels is bein nsf to the on he steering capacity of the machine decreases. With ess nt e front eels, traction is reduced and therefore the front wheels lose ste the machine.



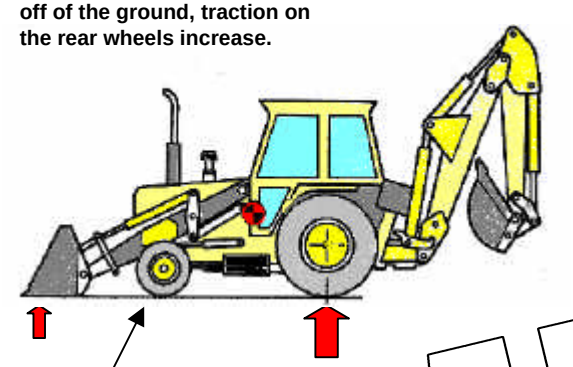
Center of Gravity moves closer to the rear wheels as the machine's angle of climb increases.

When a loader/backhoe moves up an inclined slope, the horizontal distance between the machine's center of gravity and the rear wheels decreases. This change results in the machine becoming less stable in the rearward direction. The previous slide showed how the stability of the machine is affected when it is accelerated in the forward direction. When these two effects are combined, the machine's rearward stability is greatly reduced.

To maximize the stability of a machine in this situation, keep the backhoe retracted up to the rear of the machine and accelerate as slowly as possible.

Machine Stability

When the loader bucket is used to raise the front wheels off of the ground, traction on the rear wheels increase.



On occasion it may be desirable when backing up to increase traction on the rear wheels. By lowering the loader bucket to the ground and raising the front wheels slightly, a certain amount of weight can be transferred to the rear wheels. When doing this m the bucket should be tilte forward to ent the rea e fro ging into t und.

For Safe Operation

- ☐ Never Take Anything For Granted
- ☐ Face the Machine When Climbing on and off
- ☐ Keep The Machine Clean
- ☐ Clean Mud And Grease From Shoes
- ☐ Avoid Loose Clothing And Jewelry
- ☐ Wear Protective Equipment
- ☐ Never Operate Machine Without Protective Guards
- ☐ Always Check Height, Width, and Weight Restrictions
- ☐ Keep all Safety Devices in Place and Working Order
- ☐ Plan Ahead
- ☐ Learn Beforehand About the Work Are

The above is a list ... whi... ct th... ety ... der... hoe operat... The me... ach ... ould ... iscu... and... s members invite... l additi... s t... . I... npar... licies regard... peratio... n... now... me to... uss those also.

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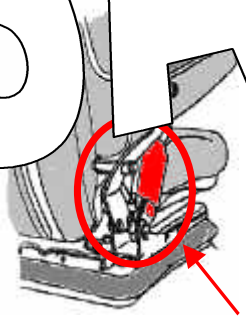
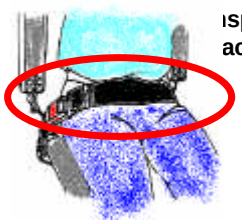




ıspected ach Day

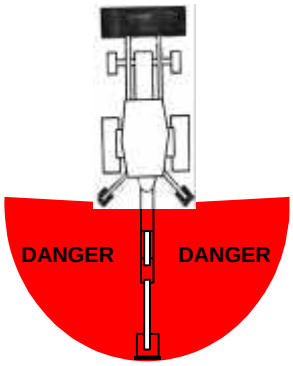
- **Must Be Worn When Operating The Machine**

Loader/backhoes are equipped with seat belts and which should be worn at all times. On rough terrain, a seal belt will keep the operator in his seat allowing him to maintain control of the machine. In the event of a rollover, a seat belt will keep the operator within the confines of the rollover structure.

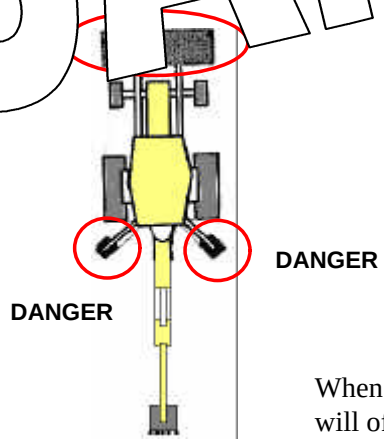
Before operating the machine each day, a operator is to inspect the seat belt for damage and proper operation.

Danger Area

When the backhoe of a loader/backhoe is in operation, no one should enter the full swing area of the backhoe. The operator's vision of this area is not always clear and anyone entering may not be seen by the operator.



WARNING
STAY OUT OF THE SWING AREA



WARNING
STAY CLEAR OF MOVING STABILIZERS AND BUCKET

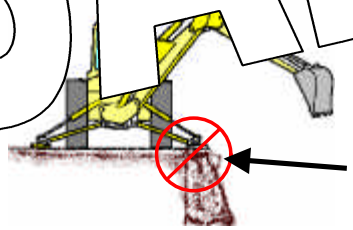
When a backhoe is being used for excavating, the machine will often move around the ground. Workers standing close to the stabilizers or the loader bucket could be injured when the machine bounces.

Excavating Hazards

Before excavating, determine the location of all underground utilities and other buried hazards.

Before any excavating work begins, the location and type of buried hazard needs to be determined. Utility companies [illegible] the location their buried service lines [illegible] may be necessary to contact various agencies [illegible] useful to obtain the service [illegible] buried objects. When the excavation [illegible] should be done to avoid [illegible]

Excavating Hazards

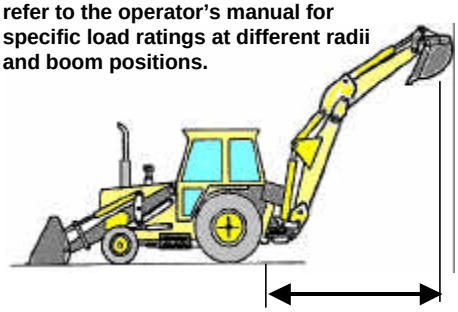


Avoid setting stabilizer close to the edge of the trench.

The stabilizers of a backhoe need to be set far enough from the edge of a trench to avoid a cave-in. Avoid placing the stabilizers closer than two feet from the edge. Depending on soil structure, this may not be sufficient. Remember, when the backhoe is swung to the side, the ground pressure from the stabilizer pad increases. The amount of pressure is depends on the weight being swung to the side. When setting up the backhoe near a trench, confer with the on site 'designated competent individual' responsible for establishing safety requirements for trenching to determine how close the machine can be to the trench edge. The rule of thumb for setup on unstable soils is: The distance the stabilizer is from the trench edge is equal to the depth of the trench.

Lifting Loads

When lifting a load with the backhoe, refer to the operator's manual for specific load ratings at different radii and boom positions.



LIFT POINT RADIUS

The operator's manual for each machine will include a section on lifting with the backhoe. This section includes information on lifting capacity for various radii of operation and where and how the loads are attached to the backhoe.

The term 'radius' refers to the horizontal distance from the swing hinge pin to the point on the bucket where load is attached.

L Ca cit Ch

E CHA

ift Poi	Ra
Backho ig k, Sta d	
5.9 ft	8 lbs
ft	51 s
5 f	10 s
1 ft	3520 lbs
15.4 ft	3058 lbs
Backhoe Swung to Side, Standard Stick	
5.9 ft	7370 lbs
9.8 ft	3861 lbs
12.5 ft	2915 lbs
14.1 ft	2442 lbs
15.4 ft	2145 lbs

30% reduction in capacity

above load t i
esentative o art
d in most operator manuals.

The chart is divided into two sections: One for a lift made straight over the back of the machine, and one for lifts made with the boom swung to the side. Notice how the capacity for lifts made at the same radius decreases as the backhoe is swung to the side. Maximum capacity lifts made over the rear of the machine can, if swung to the side, tip the machine over. Machines with extendable sticks have additional load charts for the stick retracted and extended.

Controlling Worksite Access

Before excavating work begins, access to the worksite by unauthorized persons needs to be controlled. Barriers of cone, 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.

Worksites need to have proper barrier/barricades to prevent unauthori- personnel and ve- fro- -ing the area

Spe- -l -ta- -n- -nts

When using special attachments, operating instructions need to be included with the operator's manual.

Several types of backhoe attachments are currently available which extend the backhoe's versatility. Before using these devices, the operator should read and thoroughly understand how to use them.

When changing attachments, make sure all pins and pin locks are securely in place. Some attachments require additional hydraulic hoses to be strung from the tractor to the attachment. All hoses need to be securely attached to the backhoe to prevent damage during operations.

Transporting The Machine

Loading and unloading the machine should be by and experienced opera
Tie down chains need to be attached to the machine as to cause dam
and prevent the machine from moving in all dir ns.

When preparing to tr port a /ba the rator's man to identify any spe ings one st ba es a boom swin ng pin ds t age lso oor nsport lock need ngaged

Whe the m t r tru ailer, make are b ed ean o y or ra o prevent th slipp ff W dr e er/ oe up a stee eme fron d c ma e w light. Therefore, cel ked e f wh on deck. Once the machine is po ng, er oader bucket as necessary and chain the ch o the tra t vehicle. Avoid running the tie-down chains over dra ylinders and/or other parts that could be damaged. Tie-down chains should be installed in a cross configuration, both side to side and fore to aft.

When unloading the machine, make sure all tie-down chains are removed and the transport vehicle wheels blocked. Carefully descend the ramps, keeping the loader bucket high enough to clear the deck.