



SKID STEERS

HOSTA Task Sheet 6.1

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

Skid steer loaders are versatile machines. They fit into small spaces, can turn within a tight radius, and are easy to operate. Young farm workers can enjoy much work success with the skid steer loader.

This task sheet discusses the safe use of a skid steer loader. Skid steer loaders are safe to use if the operator works within the machine's limitations. As in all machinery use, the operator must know the machine's proper use, as well as its limitations.

Skid Steer Loader Basics

Hydraulic Power

A skid steer loader is a hydraulic workhorse. A hydrostatic transmission controls forward and reverse direction. Hydrostatic valves control the flow of hydraulic oil to steer the machine by "skidding" it sharply around corners. Hydraulic cylinders raise and lower lift arms and tilt the load bucket. Task Sheet 5.5 serves as a review of hydraulic power.

Hydraulic power is positive power. The machine moves the instant you move the hydraulic control levers or pedals. The skid steer will move forward, reverse, or sideways. The load bucket will lift, roll or tilt. Bumping the control levers can cause the machine to move unintentionally.

Weight and Stability

A skid steer can move heavy loads. Operators of a skid steer may attempt to lift or move more weight than the skid steer is designed to handle. The skid steer's center of gravity is low and between the wheels. A load carried too high raises the center of gravity and increases the risk of a turnover. See Task Sheet 4.12, Tractor Stability, and Task Sheet 4.13, Using the Tractor Safely, as a review of center of gravity.

Machine Hazards

Skid steer loaders function to push, scrape, scoop, lift, and dump materials. Lift arms raise and lower a load bucket near the operator's cab. The load bucket is mounted in front of the operator and can be rolled forward or tilted back within inches of the operator.

Control levers, pedals, and a parking brake are arranged compactly within the operator's space. It is easy to bump these controls. Workers have been crushed between lift arms and the skid steer. Load buckets have dropped onto workers and killed them. Load buckets have rolled back and crushed a worker's legs.

Pinch points, shear points, and crush points exist within close reach of the operator's space. See Task Sheet 3.1, Mechanical Hazards, to review pinch point, shear point, and crush point hazards.



Figure 6.1.a. Skid steers are controlled by hand levers or joy sticks. Push the levers forward to travel forward; pull back to go in reverse. Let go to stop. The levers also steer the machine.

Over 50% of skid loader fatalities are due to crushing by lift arms and load buckets.

Learning Goals

- To safely use a skid steer loader

Related Task Sheets:

Hazard Warning Signs	2.8
Hand Signals	2.9
Mechanical Hazards	3.1
Noise Hazards and Hearing Protection	3.2
Tractor Hazards	4.2
Preventative Maintenance and Pre-Operation Checks	4.6
Starting and Stopping Diesel and Gasoline Engines	4.7
Tractor Stability	4.12
Using the Tractor Safely	4.13
Using Implements With Hydraulic Components	5.5

Use both hands and both feet to control the skid steer's work.

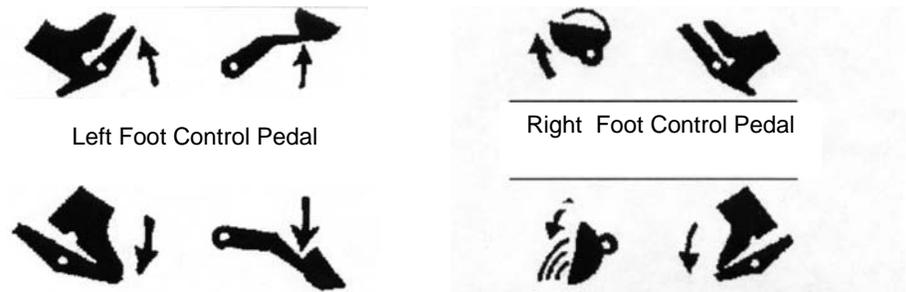


Figure 6.1.b. The hands and feet control the skid steer. Foot controls raise the lift arms (boom) and tilt or roll the bucket. The left heel raises the lift arms. The left toes lowers the lift arms. The right heel rolls the bucket back to load. The right toes tilt the bucket to dump the contents of the bucket. Practice these actions before proceeding to operate the skid steer.

Operating the Skid Steer Loader

Preventative maintenance

Before using the skid steer, complete a maintenance inspection of the machine. Check the oil level, tire pressure, coolant level, and fuel. See Task Sheet 4.6 to review similar items to check on a tractor.

Entering and exiting the skid steer

Before entering the machine, observe the following points.

- Lift arms and bucket should be completely lowered. Do not reach into the cab from the ground level to move hydraulic levers or pedals to position the lift arms and bucket. Crushing can result.
- The seat and floor should be clear of obstructions. Objects can roll beneath foot control pedals and interfere with the machine's operation.

To enter the skid steer, use the grab

bars (hand holds) and the tread plates mounted on the load bucket. A three-point hold provides the safest footing. The load bucket and machine surfaces can be slippery when wet or muddy. Exit from the machine in the same manner. When seated, lower the restraint bar and/or fasten the seat belt immediately.

Controls

Before using the skid steer, become familiar with the controls. A qualified person should demonstrate how to start and stop the engine, how to move the machine forward and reverse, how to steer the skid steer, and how to raise, lower, and tilt the bucket attachment. It is a good idea to know how to safely change attachments. If an attachment to the skid steer uses hydraulic power, ask for a demonstration of how to engage the remote hydraulic unit.

Skid steer loaders are controlled by hand levers and foot pedals. The beginning operator should

understand the following points:

- *Movement controls:* Grasp the right and left hand control levers; push both levers forward to move forward, or pull the levers rearward to move in reverse. Let go of the levers to stop the movement.
- *Steering controls:* To control the steering direction, push one hand lever forward while pulling the other lever back. Pushing the left lever forward while pulling the right lever back will make the skid steer travel to the right.
- *Lift controls:* Foot pedals control the lift arms and load bucket. The left pedal raises and lowers the lift arms, while the right foot pedal tilts the bucket to dump or rolls the bucket back. See Figure 7.1.b. and page 3 for more details.

Using the Lift Arm and Load Bucket Pedals

Foot pedals on the skid steer are used to control the high lift (boom) work of the skid steer. Toe and heel movements are needed to activate these controls. See Figure 7.1.b. *Note:* Some models use the hand controls to make these movements.

Raising the lift arms (left pedal):

The left pedal raises or lowers the lift arm (boom). Use the left heel to push on the back of the pedal to raise the lift arms and bucket. Use the left toes to push on the front of the pedal to lower the bucket. These movements must be done smoothly. Hard-soled shoes give better feel for the pressure needed on the pedal.

Tilting the bucket (right pedal):

The right pedal controls the load bucket. Use the right heel to push on the back of the pedal to roll the bucket back while loading. Use the right toes to push on the front of the pedal to dump the bucket while unloading.

Skid Steer Safety

Skid steer loaders can work in small areas, but they have similar limitations as does a tractor. Follow these skid steer safety recommendations:

- One seat and one seat belt means one operator. No passengers are permitted on the bucket.
- Lower the safety restraint bar and/or fasten the seat belt every time you enter the machine.
- Be sure area around skid steer is clear of children,

bystanders, pets, and farm animals

- Do not work near overhead utility lines.
- Lower the load bucket for travel.
- Use slower speeds over rough ground
- Do not overload the bucket. Skid steers have a Rated Operating Capacity. Exceeding that capacity with a lifted load will result in forward or sideways tipping of the machine. See Figure 7.1.c.
- When moving up a slope, keep the heaviest weight up the hill. With an empty bucket, back up the hill. With a full bucket, drive forward up the hill. See Figure 7.1.d.
- Avoid crossing steep slopes.
- Avoid ditches and stream banks to prevent overturns.
- Lower the boom and bucket, stop the engine, and set the park brake before dismounting the machine. Do this every time.
- Never stand or lean where lift arms or load bucket movements could crush you.
- Use the lift arm locks (boom locks) to prevent lift arms from dropping downward if repairs must be made to the machine.
- Prevent load rollback by securing loads in the bucket and filling the bucket only to rated levels.
- Do not reach outside of the cab while the skid loader is running. All adjustments and connections of attachments should be made with the engine stopped.

Safe skid steer loader work requires attention to the machine, the surroundings, and the work being done.



Figure 6.1.c. Skid steer loaders can tip forward if overloaded. This is an important reason to wear the seat belt, as well as understand the skid loader's load limitations.

Some skid steer models use hand controls to raise and lower the lift arms and to tilt the load bucket.

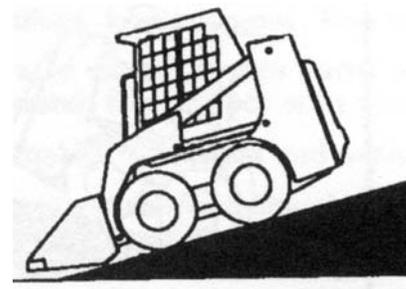


Figure 6.1.d. With no load in the bucket, the safest practice is to back up a steep slope. With a loaded bucket, drive up a steep slope with the bucket lowered.

Safety Activities

1. Use the Internet to visit manufacturers' websites (John Deere, New Holland, Bobcat, etc). Assemble a picture chart of as many skid steer loader attachments as you can find.
2. Set up a skid steer loader course to practice moving the skid steer around and through obstacles. Be sure that one part of the obstacle course involves using the load bucket.
3. With adult supervision and a blind fold (skid steer parked and brakes locked), raise and lower the lift (boom) arms and tilt and roll the bucket as the supervisor commands you. You must be able to use the proper controls to operate the skid steer without errors.
4. Matching. Match the skid steer control position with the resulting action to be expected.

Skid steer control position

- ____ A. Left foot pedal pushed forward with toes
- ____ B. Left foot pedal pushed downward with heel
- ____ C. Right foot pedal pushed forward with toes
- ____ D. Right foot pedal pushed downward with heel
- ____ E. Right hand control lever pushed fully forward,
left hand control lever pulled fully back
- ____ F. Right hand control lever pulled backward,
left hand control lever pulled back

Resulting action to be expected

- 1. Skid steer spins in circles to the left
- 2. Lift arm raises
- 3. Bucket tilts forward to unload
- 4. Bucket rolls back to load
- 5. Lift arm lowers
- 6. Skid steer moves forward
- 7. Skid steer moves in reverse

References

1. Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, 2001, First Edition, John Deere Publishing, Moline, Illinois.
2. www.cdc.gov/niosh/nasd/Click on search by topic/Scroll to Skid Steer.
3. www.cdc.gov/niosh/At search box, type Preventing Injuries and Deaths from Skid Steer Loaders.

Contact Information

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ATVS AND UTILITY VEHICLES

HOSTA Task Sheet 6.2

NATIONAL SAFE TRACTOR AND MACHINERY OPERATION PROGRAM

Introduction

They look like fun. They can go fast. They can travel in the woods. They can kill and injure. What are they? They are ATVs and utility vehicles.

In a recent year, 90,000 injuries and 120 deaths were reported due to use of these fun vehicles. The U.S. Consumer Product Safety Commission reports that 4 of every 10 people treated in hospital emergency rooms are younger than age 16. Why would this be the case?

This task sheet discusses safe use of ATVs and utility vehicles as they are used for work and recreational purposes.

All-Terrain Vehicles

As the name implies, all-terrain vehicles (ATVs) can travel almost anywhere. Rough terrain, steep slopes, rutted mountain roads, and muddy conditions make ATV use appealing. Sportsmen, leisure time enthusiasts, and workers use ATVs. ATVs have become a valuable tool for farm and ranch tasks.

ATVs are designed for work. Other task sheets discuss tractor and skid steer stability. Review Task Sheets 4.12, 4.13, and 7.1. Then consider these ATV design features.

- stability
- suspension

- drive lines
- power and speed

Stability: A four-wheel ATV is more stable than a three-wheel ATV. Heavy loads, steep slopes, and “popping the clutch” can cause the ATV to roll or flip backward. Overturns occur with operator actions that change the center of gravity.

Note: Three-wheeler sales have been banned for several years.

Suspension: ATV suspension systems vary with the machine. Less expensive models may use only balloon tires for suspension. These ATVs can bounce and pitch sideways at high speeds. More expensive models use coil springs and shock absorbers to improve traction and steering control.

Drive lines: ATV drive mechanisms vary greatly. Several combinations of clutches, driveshafts, and differential locks are used. Higher speeds and sharp turns can increase the risk of side overturns if the drive wheels are locked together for traction.

Power and Speed: ATV engines vary in size from 100 cc to 700 cc. Transmission gear ratios vary also. Some ATVs can travel over 50 mph. High-speed operation of the ATV increases the risk of loss of control and rollovers.

Remember, ATVs are not toys. They are powerful machines.



Figure 6.2. a. A four-wheeler, or ATV, can be used for many purposes. Respect the ATV for the powerful machine it is.

It is good advice to dispose of a three-wheeler ATV. They turn over easily.

Learning Goals

- To safely use ATVs and utility vehicles for work and recreational purposes

Related Task Sheets:

Injuries Involving Youth	2.1
Age-Appropriate Tasks	2.4
Mechanical Hazards	3.1
Tractor Hazards	4.2
Tractor Stability	4.12
Using the Tractor Safely	4.13
Skid Steers	7.1

Injury from
ATV use most
often occurs
because of:

- A) extra
passengers
- B) excessive
speed
- C) road travel



Figure 6.2.b. ATV use as a farm tool calls for strength to control the machine, skill to move and direct the machine, and maturity to understand the consequences of unsafe ATV use. An adult supervisor should work with you to help you learn how to work safely with an ATV.

ATV Operation and Safety

Safety training for ATV use is the first step in being a qualified ATV operator. Local ATV dealers, ATV clubs, and safety professionals from Cooperative Extension and farm organizations may offer safe ATV operation programs. The Specialty Vehicle Institute of America (SVIA) provides training as well. Visit them on the Internet at www.svia.org. At a minimum, use the operator's manual and the safety signs on the ATV to help educate yourself before using the machine.

Here are some guidelines for safe ATV use:

- Manufacturers recommend that ATVs with engine sizes greater than 70cc be sold only for children 12 and older and that ATVs with engines greater than 90cc be sold only for individuals 16 and older. The child's strength, skills, and

maturity determine readiness to operate an ATV.

- Carrying passengers increases the risk of overturn injury and death. A second person changes the center of gravity of the machine and the machine's steering ability.
- Know the machine's limitations. Operating on steep terrain, pulling heavy loads, excessive speed, and "wheelie" type starts can result in ATV turnover.
- Wear a full-face shield helmet. The helmet should fit snugly and securely. It should be labeled with the American National Standards Institute (ANSI) Z90.1 label.
- If a face shield is not part of the helmet, wear goggles or a separate face shield, especially at high speeds or in wooded terrain. The protective lens should carry the ANSI Z78.1

label.

- Over-the-ankle shoes with sturdy heels and soles are necessary.
- Gloves and long sleeves are needed for specific jobs.
- Use lights, reflectors, and highly visible flags to increase the ATV's visibility.
- Avoid public roads. Paved and unpaved roads are designed for truck and automotive traffic. ATVs are designed for off-road use. Increased risk for rollovers of ATVs on road surfaces has been shown.
- Check your state's vehicle code for use of the ATV as an agricultural machine. Use of the ATV for agricultural purposes and only incidental road travel may be permitted in your state.

Utility Vehicles

Utility vehicles are similar to golf carts except they are fitted with cargo boxes to carry work material. The utility vehicle can have four, five, or six wheels depending upon its use. The UV weighs about 1,000 pounds and can carry several hundred pounds of cargo. The machine can be diesel, gasoline, electric, or hydrogen fuel cell powered.

Like other farm machines, the utility vehicle is made for work purposes. Hauling feed, mulch materials, and supplies makes it a convenient transport for small jobs. Like an ATV, the utility vehicle is a tool and not a toy.

Safe operation of the utility vehicle requires the same safe work habits as used with tractors, skid steer loaders, and ATVs.

Safe Utility Vehicle Use

Use the operator's manual and safety signs/decals found on the machine to learn how the utility vehicle operates and what safety practices to observe. A successful operator becomes familiar with a machine before attempting to use it. Ask a qualified operator to show you what to do if no training materials can be found.

The following safety practices should be followed in operating a utility vehicle:

- Some manufacturer's specifications suggest that no operator younger than age 16 should be permitted to operate

a utility vehicle.

- With increased amounts of cargo, the utility vehicle's center of gravity is raised. Risk of an overturn increases. Drive slowly and turn smoothly.
- To prevent overturns, secure the load from shifting sideways.
- Avoid driving on steep slopes. It is safer to drive uphill or downhill rather than across a slope. Avoid sharp turns to prevent overturns. Drive to the top or bottom of a slope to make a turn. When approaching a downhill slope, reduce speed before you reach the slope. This will help reduce wear on the brakes.
- Reduce speed over rough terrain to prevent the utility vehicle from bouncing. Operator and riders have been thrown from utility vehicles.
- A second rider should occupy the passenger seat. Do not permit extra riders to ride in the cargo box. Use the handholds. If the utility vehicle has a roll-bar, buckle the seat belt.
- Do not drive near ditches or embankments. Remember if the ditch is 6 feet deep, stay back from the edge by at least 6 feet.
- Use your tractor, skid steer loader, and ATV knowledge to safely operate a utility vehicle.

As with all machinery, use the device as it was designed. Utility vehicles are tools, not toys.



Figure 6.2.c. A utility vehicle is versatile. It can do the smaller jobs that a pick-up truck may be unsuited to do. Remember that the utility vehicle has limitations. Overloading, shifting loads, and sharp braking can cause turnovers.

Utility vehicles can overturn at high speeds and while making sharp turns.

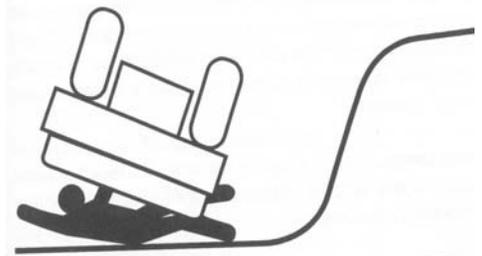


Figure 6.2.d. Avoid steep banks. Utility vehicles can easily overturn. The driver must know the machine and the work area to reduce potential risk of injury. *Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.*

Safety Activities

1. Use the Internet website www.atvsafety.org to solve crossword puzzles or to play word search games related to all-terrain vehicle (ATV) safety.
2. Visit the John Deere website, www.JohnDeere.com, or the Bobcat website, www.bobcat.com, to learn about all-terrain vehicle (ATV) specifications for weight, payload, and engine size.
3. Collect newspaper, magazine, or Internet news articles about ATV and utility vehicle injuries and deaths. Create a poster presentation to display at a local ATV or utility vehicle dealership.
4. What does the designation “100cc engine” represent? Using the math formula for volume of a cylinder (ask your teacher), calculate the diameter and height of the cylinder that would represent a 100cc engine cylinder. Use a sheet of paper to construct the cylinder. Answer the same question for a 500cc engine cylinder.

References

1. Safety Management for Landscapers, Grounds-Care Businesses, and Golf Courses, John Deere Publishing, 2001. Illustrations reproduced by permission. All rights reserved.
2. www.cdc.gov/nasd/ Search the National Ag Safety Database site by topic for ATV information.
3. www.atvsafety.org/Search site for interactive quizzes, word searches, and puzzles.
4. www.svia.org/Search the Specialty Vehicle Institute of America site for ATV information.

Contact Information

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