

# **NIOSH**

# **ALERT**

## **Preventing Injuries and Deaths from Skid-Steer Loaders**

DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health



## NOTICE TO READERS

The first edition of this Alert incorrectly referenced several OSHA regulations as applying to skid-steer loaders. This revised edition removes references to those standards. In addition, this revised Alert addresses differences in skid-steer loader design and contains several minor revisions and changes in wording to improve clarity.

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**SAFE • HEALTHIER • PEOPLE™**

## **Preventing Injuries and Deaths from Skid-Steer Loaders**

### **WARNING!**

**Workers who operate or work near skid-steer loaders may be crushed or caught by the machine or its parts.**

If you operate or work near skid-steer loaders, take these steps to protect yourself.

#### 1. Follow safe operating procedures:

- Read and understand all safety and operating procedures outlined in the operators manual, workshop manual, and safety decals.
- Operate the loader only when properly positioned in the operator's compartment—never from the outside.
- Stay seated when operating the loader controls.
- Operate with the seat belt snugly fastened and the restraint bar properly positioned, if one is provided.
- Keep hands, arms, legs, and head inside the operator's compartment while operating the loader.
- Load, unload, and turn on level ground when possible.
- Travel and turn with the bucket in the lowest position possible. Carry the load low.
- Operate on stable surfaces only. Avoid slippery surfaces.

- Do not travel across slopes. Travel straight up or down, with the heavy end of the machine pointed uphill.
- Keep bystanders away from the work area.
- **NEVER** modify or bypass safety devices.
- **NEVER** carry riders.
- Be aware that each machine may operate differently.

#### 2. Enter and exit from the loader safely:

- Enter and exit a loader when the bucket is flat on the ground or when the lift-arm support device is in place.
- When entering a loader, face the seat and keep a three-point contact with handholds and steps.
- **NEVER** use foot or hand controls as steps or handholds.
- Keep all walking and working surfaces clean and clear of debris.
- Before leaving the operator's seat:
  - lower the bucket flat on the ground,
  - set the parking brake,
  - turn off the engine.

3. Maintain the machine in safe operating condition:

- Follow the manufacturer's instructions.
- Keep the foot controls free of mud, ice, snow, and debris.
- Regularly inspect and maintain the following safety devices:
  - Control interlocks
  - Seat belts
  - Restraint bars
  - Side screens
  - Rollover protective structures (ROPS)
  - Falling object protective structures (FOPS)
- **NEVER** modify or bypass safety devices.
- **NEVER** exceed the manufacturer's recommended load capacity.
- If you must perform service under a raised bucket, make sure the lift-arm support device is in place.

## NOTICE TO READERS

The first edition of this Alert incorrectly referenced several OSHA regulations as applying to skid-steer loaders. This revised edition removes references to those standards. In addition, this revised Alert addresses differences in skid-steer loader design and contains several minor revisions and changes in wording to improve clarity.

For additional information, see ***NIOSH Alert: Preventing Injuries and Death from Skid-Steer Loaders*** [DHHS (NIOSH) Publication No. 2011-128 (supersedes 98-117)]. To request single copies of the Alert, contact NIOSH at

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**DEPARTMENT OF HEALTH AND HUMAN SERVICES**  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health



## Prevención de lesiones y muertes causadas por minicargadores

### ¡ADVERTENCIA!

**Los trabajadores que operan o trabajan cerca de minicargadores pueden ser aplastados o quedar atrapados por la máquina o sus partes.**

Si usted opera o trabaja cerca de minicargadores, siga los pasos siguientes para protegerse.

#### 1. Siga los procedimientos de operación segura:

- Lea y entienda todos los procedimientos de seguridad y de operación que se mencionan en el manual para los operadores, en el manual del taller y en las calcomanías de seguridad.
- Opere el cargador sólo cuando usted esté bien ubicado en el compartimiento del operador, y nunca desde afuera.
- Permanezca sentado cuando opere los controles del cargador.
- Trabaje con el cinturón de seguridad bien ajustado y la barra de sujeción en la posición correcta, en caso de que cuente con una.
- Mantenga las manos, los brazos, las piernas y la cabeza dentro del compartimiento del operador mientras opere el cargador.
- Cuando sea posible, cargue, descargue y gire en terrenos nivelados.
- Avance y gire con el cucharón en la posición más baja posible. Lleve la carga a una altura baja.

- Opere sólo en superficies estables. Evite las superficies resbalosas.
- No avance de manera transversal sobre terrenos inclinados. Avance en línea recta hacia arriba o hacia abajo con la parte pesada de la máquina apuntando hacia la parte elevada del terreno.
- Mantenga a los espectadores alejados del área de trabajo.
- NUNCA modifique o pase por alto los dispositivos de seguridad.
- NUNCA transporte pasajeros.
- Tenga en cuenta que cada máquina puede operar de manera diferente.

#### 2. Entre y salga del cargador de manera segura:

- Entre y salga del cargador únicamente cuando el cucharón esté descansando sobre el piso o cuando el dispositivo de soporte para el brazo de elevación se encuentre en posición.
- Cuando entre al cargador, colóquese frente al asiento y utilice agarraderas y peldaños para mantener tres puntos de contacto.
- NUNCA utilice los controles de mano o de pie como agarraderas o peldaños.

- Mantenga todas las superficies para caminar y trabajar despejadas y libres de residuos.
  - Antes de abandonar el asiento del operador:
    - baje el cucharón para que descanse sobre el piso,
    - accione el freno de estacionamiento y
    - apague el motor.
3. Mantenga la máquina en condiciones de operación segura:
- Siga las instrucciones del fabricante.
  - Mantenga los controles de pie libres de lodo, hielo, nieve y residuos.
  - Inspeccione y dé mantenimiento con regularidad a los siguientes dispositivos de seguridad:
    - Controles entrelazados
    - Cinturones de seguridad
    - Barras de sujeción
    - Rejillas laterales
    - Estructuras de protección contra volcaduras (ROPS, por sus siglas en inglés)
    - Estructuras de protección contra caída de objetos (FOPS, por sus siglas en inglés)
  - NUNCA modifique o pase por alto los dispositivos de seguridad.
  - NUNCA exceda la capacidad de carga que recomienda el fabricante.
  - Si debe realizar un servicio de reparación debajo de un cucharón alzado, asegúrese de que el dispositivo de soporte para el brazo de elevación se encuentre en posición.

## AVISO A LOS LECTORES

La primera edición de esta Alerta hace referencias incorrectas a varias regulaciones de la OSHA como si se aplicaran a los minicargadores. Esta edición revisada elimina las referencias a esos estándares. Además, esta Alerta revisada se refiere a las diferencias en el diseño de los minicargadores y contiene varias revisiones menores y cambios en la redacción para mejorar la claridad.

Para más información, consulte **la Alerta de NIOSH: Prevención de lesiones y muertes causadas por minicargadores (en inglés)**. [Publicación de No. 2011-128 (reemplaza 98-117) de DHHS (NIOSH)].

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### DEPARTAMENTO DE SALUD Y SERVICIOS HUMANOS

Centros para el Control y la Prevención de Enfermedades  
Instituto Nacional para la Seguridad y Salud Ocupacional



## Preventing Injuries and Deaths from Skid-Steer Loaders

### WARNING!

Workers who operate or work near skid-steer loaders may be crushed or caught by the machine or its parts.

**The National Institute for Occupational Safety and Health (NIOSH) requests assistance in preventing injuries and deaths among workers who operate, service, or work near skid-steer loaders. This type of loader is commonly used in agriculture, construction, and general industry for materials handling and excavating. NIOSH studies in the 1990s suggested that employers, supervisors, and workers may not fully appreciate the potential hazards associated with operating or working near skid-steer loaders and they may not follow safe work procedures for controlling these hazards. This Alert describes six deaths involving skid-steer loaders and recommends methods for preventing similar incidents.**

### BACKGROUND

#### Risk of Injury

Improper operation of skid-steer loaders can put workers at risk of rollover and run-over incidents. These risks are similar to

those associated with other types of mobile construction machinery. However, skid-steer loaders have features that can expose workers to additional injury risks.

Most skid-steer loaders are configured with the operator's seat and controls located between two lift arms and in front of the lift-arm pivot points. The operator enters and exits through the front of the machine by stepping over the lowered lift arm and its attachment, usually a loader bucket (see Figure 1). This front-entry configuration places the operator in the zone of lift-arm movement with the potential of being caught between the machine frame and the lift arm or attachment if controls are inadvertently activated during entry or exit. Side entry skid-steer loaders were introduced into the U.S. market in 1995. This side-entry configuration allows the operator to enter and exit the machine on the side opposite the single lift arm, away from the zone of lift-arm movement.

However, while performing activities other than entering or exiting the machine, the potential for injury from being caught between the lift-arm attachment and the machine

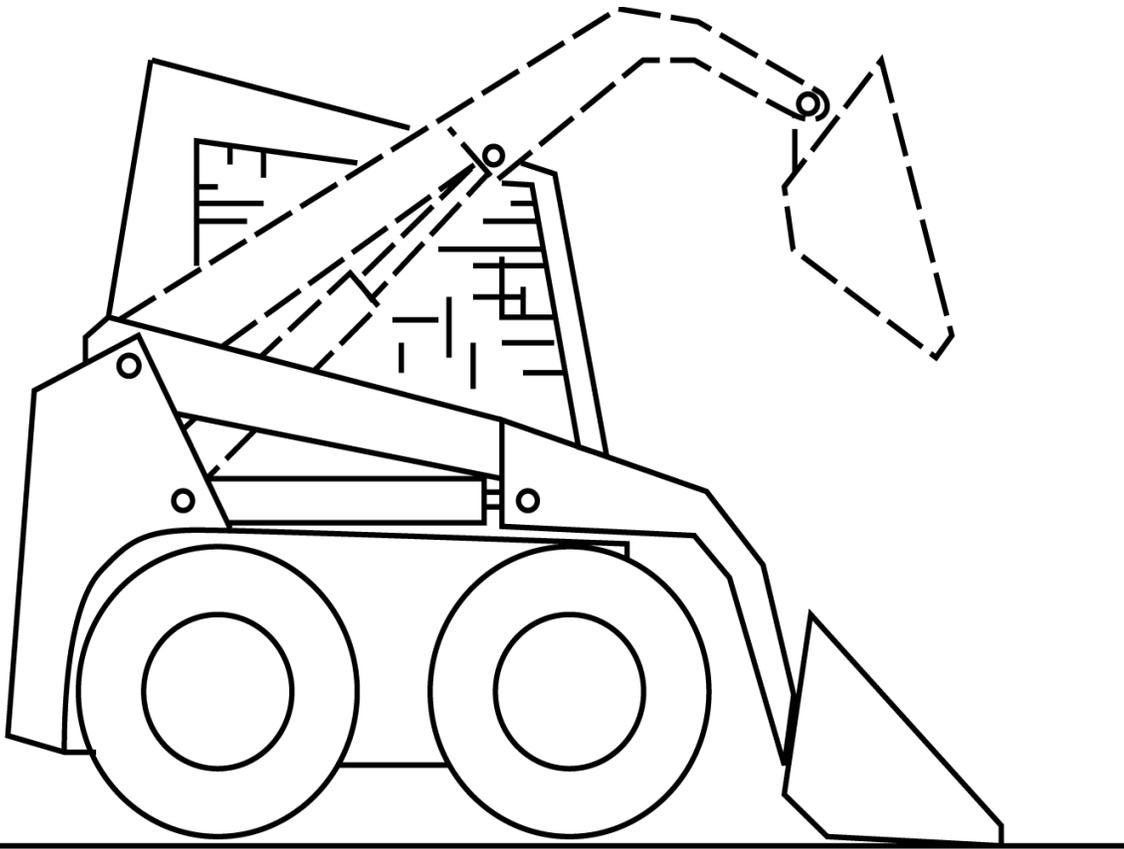


Figure 1

frame is present with either type of machine when safe procedures are not followed. For example, skid-steer loaders are very compact and the operator sits close to the zone of lift-arm movement. Operators can be struck by a lift arm or caught between a lift arm and the machine frame if they lean or reach out of the operator's compartment while the lift arm is moving.

### Current Safeguards

**Control Interlocks**—To prevent unintentional control activation, skid-steer loaders are equipped with interlocked control systems. These interlocked control systems require that a safety device such as a seat belt be secured or restraint bar be properly positioned

before the operational controls can function. This ensures that the operator is safely seated away from the zone of lift-arm movement before the machine can be operated.

**Rollover Protective Structures and Operator Restraints**—Skid-steer loaders are also equipped with rollover protective structures (ROPS) and seat belts to keep the operator inside the machine during rollover incidents. Falling object protective structures (FOPS) are provided to protect the operator from being struck by falling material.

**Side Screens**—Metal or glass side screens integrated with the ROPS prevent the operator from leaning or reaching out of the operator's compartment and coming into contact with a moving lift arm. Side screens may

also protect operators from being injured by debris or objects entering the operator's compartment.

## Fatality Data

Several databases identify work-related fatalities in the United States:

- NTOF\*—NIOSH National Traumatic Occupational Fatalities Surveillance System
- FACE—NIOSH Fatality Assessment and Control Evaluation Program
- CFOI—Census of Fatal Occupational Injuries of the Bureau of Labor Statistics

The following summary describes the data on fatalities involving skid-steer loaders in these databases for varying time periods extending from 1980 to 1997.

**NTOF**—During the period 1980–1992, the NTOF Surveillance System used death certificate data to identify 54 work-related fatalities involving skid-steer loaders [NIOSH 1997b].

Types of incidents	Number of fatalities
Pinning between the bucket and frame or between the lift arm and frame	25 (46%)
Crushing, for which no further information was provided	15
Rollovers	11
Pinning between the loader and another object	2
Runover	1

An additional 65 fatalities were attributed to pinning between the loader bucket and frame or between a loader lift arm and frame but

\*Data from NTOF is no longer being collected.

no loader type was identified. Some of these fatalities may have involved skid-steer loaders. The NTOF data probably underestimate the number of fatalities involving skid-steer loaders, because death certificates do not identify all work-related fatalities [Russell and Conroy 1991; Stout and Bell 1991].

**FACE**—During the period 1992–1997, the NIOSH FACE Program identified 37 work-related fatalities involving skid-steer loaders.

Types of incidents	Number of fatalities
Pinning between the bucket and frame or between a lift arm and frame	29 (78%)
Rollovers	6
Other/unknown	2

The 29 fatalities involving pinning between the bucket and frame or between a lift arm and frame resulted from the following activities:

Types of activities	Number of fatalities
Working or standing under a raised lift arm or attachment without proper support device	10
Leaning out of the operator's compartment into the path of the moving lift arm	8
Entering or exiting the operator's compartment	5
Unknown	6

**CFOI**—During the period 1992–94, the CFOI identified 20 work-related fatalities involving skid-steer loaders. Of these 20 fatalities, 14 (70%) involved pinning between the loader bucket and frame or between a lift arm and frame.

## STANDARDS AND REGULATIONS

### OSHA Regulations

The current Occupational Safety and Health Administration (OSHA) regulations for the construction industry (29 CFR<sup>†</sup> 1926) do not specifically address skid-steer loaders. The regulations do, however, require employers to protect workers from hazards associated with operating and maintaining mobile machines.

### SAE International Standard

SAE International has developed a Surface Vehicle Standard that addresses skid-steer loader safety: J1388 [SAE 2008]. This document contains design guidelines that address such hazards as machine rollovers and being caught between a lift arm and frame, or the attachment and frame. To conform to this standard, manufacturers must adhere to the following:

- Provide warnings, operator instructions, and service procedures.
- Equip machines with seat belts.
- Provide a means to protect the operator from the hazard of a lift arm lowering when entering and exiting the machine.
- Provide handholds and steps to facilitate entry and exit from the loader.
- Provide ROPS/FOPS with side screens.
- Provide two access openings, one for emergency exit.
- Provide safety signs and instructions to warn users of the potential hazards during normal operation and servicing.

<sup>†</sup>Code of Federal Regulations. See CFR in references.

## CASE REPORTS

The cases presented here were investigated by the FACE Program between 1992 and 1997.

### Case 1— Bypassed Interlocked Control System

On February 7, 1995, a 37-year-old male farmer died after he was struck by the bucket of a front-entry skid-steer loader. The incident occurred after the farmer had used the loader for chores and parked it in an open garage without cleaning accumulated mud, snow, and manure from the foot-operated lift-arm and bucket controls. When the farmer shut down and exited the machine, he stepped on the lift-arm control pedal, moving it to the “raise” position. The debris under the pedal then froze, locking the control pedal in that position. After about an hour, the farmer returned, entered the loader, and started the engine. The lift arm rose until the bucket contacted the header over the open garage door. The farmer shut down the machine, dismounted, knelt on the ground in front of the machine under the raised bucket, and began cleaning the frozen pedals with a pry bar. While cleaning the control pedals, he moved the lift-arm foot pedal control to the “lower” position. The lift arm lowered, pinning the farmer between the bucket and frame of the machine. The farmer was discovered by his wife, who immediately climbed into the machine, started the engine, and attempted to raise the bucket. But the controls had frozen again, and she was unable to activate the lift-arm control pedal. A farm employee tried unsuccessfully to raise the bucket with a jack. The farmer was eventually freed by the local fire department. Resuscitation efforts began at the

scene and continued during transport to a local hospital, but they were unsuccessful [University of Iowa 1995].

Although several factors contributed to the injury, two factors were critical:

1. The interlocked control system for the lift-arm control had been bypassed by someone jamming a glove into the safety interlock linkage connected to the seat belt, so that the controls did not lock when the seat belt was not in use.
2. The low overhead clearance inside the garage prevented the lift arm from raising high enough to allow use of the lift-arm support pins located near the top of the ROPS.

### **Case 2—Improper Exit, Removal of ROPS**

On October 29, 1993, a 26-year-old male hog farmer was fatally injured when he was caught between the frame of a skid-steer loader and a lift-arm hydraulic cylinder. The farmer was working alone, using the loader to pile manure in one corner of a hog containment building. The loader's ROPS had been removed to permit operation under the 6- to 6½-foot high ceiling of the building, and the lift-arm support device (on one of the lift cylinders) could only be used when the lift arm was almost fully raised. The loader stalled in front of and facing a manure pile with the bucket partially raised, blocking the farmer from dismounting through the front of the machine. As he attempted to climb out over the side of the machine, he unintentionally hit the lift-arm control lever, causing the lift arm to drop and crush him against the frame. A family member called 9-1-1, and first responders released the farmer using a large front-end loader and chain. The farmer was transported to a hospital where he was

pronounced dead as a result of a crush injury to his chest [Minnesota Department of Health 1994].

### **Case 3—Unsupported Bucket, Bypassed Restraint Bar Interlock**

On March 4, 1994, a 24-year-old male landscape worker died from injuries sustained while cleaning snow from the control pedals of a skid-steer loader. Using the loader and a pickup truck equipped with a snow plow, the worker and a coworker were to clear snow from the parking lot and walkways of a condominium complex. Upon arrival at the job-site the morning of the incident, the worker borrowed a snow brush/scrapper from his coworker to clear snow from the loader. The loader was equipped with control interlocks connected to a restraint bar, which had to be lowered in front of the operator before the engine could be started or the foot-operated lift-arm and bucket controls operated. The worker started the machine, raised the lift arm, and then dismounted. He either wriggled under or climbed over the restraint bar, or lowered it after he exited the seat. When the coworker plowing snow with the pickup truck made a pass through the area, he observed the worker standing under the raised bucket, leaning into the operator's compartment. When he returned for a second pass, the coworker saw the worker pinned between the bucket and frame. While cleaning the snow from the foot well of the operator's compartment, the worker had activated the lift-arm control pedal. The bucket lowered and crushed the worker against the frame of the machine. The emergency medical service responded minutes later and freed the worker. He was transported to a regional hospital where he was pronounced dead from blunt chest trauma. Although the equipment manufacturer provided a lift-arm

support device for this machine, it was not available at the jobsite at the time of the incident [Massachusetts Department of Public Health 1994].

### **Case 4—Working Near Raised Bucket**

On July 16, 1992, a 16-year-old male landscape worker died as a result of traumatic injuries from being struck by the bucket of a skid-steer loader. The worker and two coworkers were removing a fence that surrounded a housing development drainage pond. The fence had been hung on 1- by 2-inch wooden stakes near the bottom of the pond's bank, which had a 20% slope. The loader was being used to pull up the stakes, because overgrowth around the pond made it difficult to remove them by hand. The operator of the loader positioned it about midway from the top of the bank, facing down the slope with the bucket lowered. The worker and a coworker stood near the bottom of the bank and wound the fence around the loader bucket. The operator pulled the stake by raising the bucket. He then moved the machine to the next stake and lowered the bucket to repeat the process. As the operator was raising the bucket to pull the third stake, the loader tipped forward. To stabilize the machine, the operator lowered the bucket. At the same time, the worker who had been standing in front of and to the side of the loader, slipped and fell underneath the bucket. The bucket struck him in the chest and he died shortly thereafter from traumatic chest injuries [Minnesota Department of Health 1992].

### **Case 5—Improper Backing Procedure, Nonuse of Seat belt**

On September 20, 1996, a 43-year-old landscape worker died after he backed a skid-steer

loader over a 6-foot concrete retaining wall. At the time of the incident, the operator was spreading topsoil to prepare for grass seeding. He performed the task by driving toward the wall with a fresh load of topsoil in the bucket, depositing the soil near the wall, and then backing up dragging the loader bucket to spread the soil evenly. He had made numerous passes in this manner, back-dragging the bucket from the wall and up the slope. However, as he approached the edge of the work area after depositing the topsoil on his last pass before the incident, he turned the loader around and backed toward the wall dragging the bucket on the ground. The left rear tire of the machine went over the wall, followed by the right rear tire. The machine struck the ground, rear end first, coming to rest on its left side. The operator, who was not wearing the seat belt, remained inside the cab but came out of the operator's seat. He was knocked unconscious, with his head and chest wedged between the seat and the side screen. Several coworkers heard the impact and came immediately to the operator's aid. However, emergency personnel were unable to find a pulse, and the operator was pronounced dead at the scene by the medical examiner. The cause of death was asphyxiation due to occlusion of the airway [Missouri Department of Health 1996].

### **Case 6—Removed Side Screens**

On July 6, 1997, a 25-year-old male worker for a tree-trimming service was fatally injured when he was caught by the descending lift arm of an operating skid-steer loader. At the time of the incident, he was using the loader to pick up brush and stumps in a residential area. The side screens on the machine had been removed. Following a lunch break, the operator resumed operating the loader to gather yard debris and deposit it

into a dump truck. As he was loading a log into the truck, he leaned out of the operator's compartment, placing his head in the path of the lift arm. The lift arm moved down, either when the operator unintentionally stepped on the foot-operated lift control pedal or when hydraulic pressure was lost because of a ruptured hydraulic line. A passing homeowner noticed hydraulic fluid spraying from the machine and alerted one of the operator's coworkers, who found the operator sitting in the operator's seat with his head crushed by the lift arm. The cause of death was recorded as a crushed cranium due to a heavy equipment accident. Emergency personnel at the scene noted that the main pivot pin connecting the left lift arm to the frame was missing. Investigators concluded that the pin might have disengaged while the lift arm was down in the "carry" position, resulting in dislocation of the lift arm and rupture of the hydraulic line [NIOSH 1997a].

## CONCLUSIONS

These fatal incidents suggest that employers and workers may not fully appreciate the potential hazards associated with operating or working near skid-steer loaders, the need to follow safe work procedures, and the consequences of bypassing interlocks and other safety features.

## RECOMMENDATIONS

NIOSH recommends that employers and workers comply with OSHA regulations, maintain equipment in accordance with manufacturer's guidelines, and take the following measures to prevent injury when operating or working near skid-steer loaders:

- Always use and maintain the following safety devices provided by manufacturers:
  - Lift-arm support devices
  - Control interlocks
  - Seat belts
  - ROPS/FOPS
  - Side screens
- Follow safe operating procedures.
- Follow safe mounting and dismounting procedures.
- Follow proper maintenance procedures.
- Train workers to read and follow the manufacturer's procedures for operating and servicing skid-steer loaders [AEM 2006].

The following subsections discuss these recommendations in detail.

### Using and Maintaining Safety Devices Provided by Manufacturers

Regularly inspect and maintain all safety devices provided by manufacturers.

**Lift-arm support**—Use the lift-arm support device provided by or recommended by the manufacturer any time it is necessary to work or move around the machine with the lift arm in a raised position. Machines now being manufactured have either pin-type support devices (which can be operated from inside the operator's cab) or strut-type support devices (which may also be operated from inside the cab or may require the help of a coworker). If the machine is not equipped with a lift-arm support device or it is damaged, contact the equipment dealer or manufacturer's representative for help in determining proper support procedures or for replacement parts. Never use concrete

blocks or simple metal angle irons because they can shift or collapse under even light loads.

**Interlocked controls**—Regularly inspect and maintain interlocked controls in proper operating condition. These systems require the operator to be properly positioned and restrained before the loader can be used. Never bypass interlocked controls. Make sure that the seat belt is always securely fastened around the operator when the loader is in operation. Always use the restraint bar if one is provided. Although workers and employers may perceive safety features such as interlocked controls and seat belts as obstacles to efficient machine operation, bypassing these devices increases their risk of serious injury and death.

**Seat belts**—Make sure that the seat belt is secured around the operator whenever the operator is in the seat. The seat belt protects the operator in several ways. In the event of a rollover, the seat belt restrains the operator within the protective envelope of the ROPS. The seat belt can also protect the operator from falling out or being jostled into the operating zone of the lift arm and bucket. If the seat belt is part of the interlocked control system, it protects workers from being caught and crushed between the lift arm and frame.

**Field modification kits**—If side screens, interlocks, ROPS/FOPS, and seat belts are not on the machine, contact the equipment dealer or manufacturer’s representative about the availability of field modification kits or replacement parts.

## Operating Safely

If you are an employer, make sure that your workers understand all the manufacturer’s

warnings and instructions before they operate a skid-steer loader. Train workers to use the following safe operating procedures:

- Read and understand all safety and operating procedures outlined in the operator’s manual, service manual, and safety decals.
- Operate the loader only when properly positioned in the operator’s compartment—never from the outside.
- Stay seated when operating the loader controls.
- Operate with the seat belt snugly fastened and the restraint bar properly positioned, if one is provided.
- Keep hands, arms, legs, and head inside the operator’s compartment while operating the loader.
- Plan to load, unload, and turn on level ground, when possible.
- Travel and turn with the bucket in the lowest position possible. Carry the load low.
- Never exceed the manufacturer’s recommended load capacity for the machine.
- Operate on stable surfaces only. Avoid slippery surfaces.
- Avoid traveling across slopes—travel straight up or down slopes with the heavy end of the machine pointed up hill.
- Always look in the direction of travel.
- Keep bystanders away from the work area.
- **NEVER** modify or bypass safety devices.
- Never carry riders.
- Be aware that each machine may operate differently.

## Entering and Exiting the Loader Safely

- Enter and exit when the bucket or other attachment is flat on the ground or when the lift-arm support device is in place. Use the lift-arm support device supplied or recommended by the manufacturer.
- When entering the loader, face the seat and keep a three-point contact with handholds and steps.
- Never use foot or hand controls as steps or handholds.
- Keep all walking and working surfaces clean and clear of debris.
- Before leaving the operator's seat,
  - lower the bucket or other attachment flat on the ground,
  - set the parking brake,
  - turn off the engine.
- If unable to exit through the primary opening for entering the machine, use the emergency exit located at the back of the operator's compartment or as specified by the manufacturer.

## Maintaining the Loader in Safe Operating Condition

- Follow the manufacturer's instructions for maintaining the loader.
- Keep the foot controls and the operator's compartment free of mud, ice, snow, and debris.
- Regularly inspect and maintain the following safety devices:
  - Control interlocks
  - Seat belts
  - Restraint bars

- Side screens
- Rollover protective structures (ROPS)
- Falling object protective structures (FOPS)

*NEVER* modify or bypass safety devices.

- Before servicing the loader,
  - lower the bucket or other attachment flat on the ground,
  - set the parking brake,
  - turn off the engine,
  - remove the key from the switch.
- If the machine cannot be serviced with the bucket on the ground, remove the bucket or attachment and use the lift-arm support device recommended or provided by the manufacturer. If the machine is not equipped with a lift-arm support device or it is damaged, contact the equipment dealer or manufacturer's representative for help in selecting a proper support device or for replacement parts.
- Never work on the machine with the engine running unless directed to do so by the operator's manual. Follow the manufacturer's safety recommendations to complete the task. If the adjustments require that the engine be in operation, use an additional person and work as a 2-person team with a trained operator properly positioned in the operator's station who can effectively communicate with the worker making the adjustment.

## Training

Train operators and workers who operate and service skid-steer loaders to read and follow the manufacturer's operating and service procedures in the operator's manuals and service manuals and on the loader's safety

signs. For help with such training, contact the equipment manufacturer or check the manufacturer's Web site for availability of training resources. Obtain manuals, instructional videos, and operator or service training courses from the equipment dealer or manufacturer.

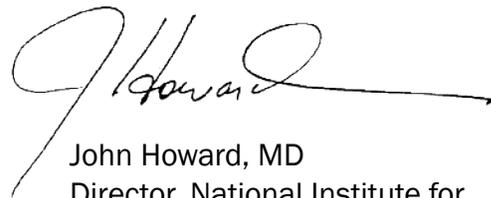
## ACKNOWLEDGMENTS

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John Howard, MD  
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