CARRIER MOUNTED
HYDRAULIC BREAKER

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SAFETY MANUAL

FOR OPERATING AND MAINTENANCE PERSONNEL

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Acknowledgment

We wish to acknowledge the contributions of the members of AEM's Mounted Breaker Bureau to the preparation of this Safety Manual.

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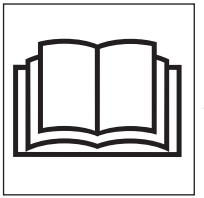
Foreword

This safety manual is intended to point out some of the basic safety situations that may be encountered during the normal operation and maintenance of a carrier mounted hydraulic breaker and to suggest possible ways of dealing with these conditions. This manual is **NOT** a substitute for the hydraulic breaker or carrier manufacturers' operator manual(s).

Additional precautions may be necessary, or some instructions may not apply, depending on equipment, attachments and conditions at the worksite or in the service area. The manufacturer has no direct control over equipment application, operation, inspection or maintenance. Therefore, it is **YOUR** responsibility to use good safety practices in these areas.

The information provided in this manual supplements the specific information about the machine that is contained in the manufacturers' manual(s). Other information that may affect the safe operation of this equipment may be contained on safety signs or in insurance requirements, employer's safety and training programs, safety codes, local, state/provincial and federal laws, rules and regulations.



IMPORTANT! Before you operate the hydraulic breaker or carrier, make sure you have the manufacturers' manual(s). If the manufacturers' manuals are missing, obtain replacement manuals from your employer, equipment dealer or directly from the manufacturer. Keep this safety manual and the manufacturers' manuals with the machine at all times. Read and understand all manuals.

Safety videos are available from some manufacturers. Operators are encouraged to periodically review the safety video.

Safety Alerts

Symbol

This Safety Alert Symbol means: **“ATTENTION! STAY ALERT! YOUR SAFETY IS INVOLVED!”**

The Safety Alert Symbol identifies important safety messages on equipment, safety signs, in manuals or elsewhere. When you see this symbol, be alert to the possibility of death or personal injury. Follow instructions in the safety message.

Reasons Safety is Important to You:

— Accidents disable and kill.

— Accidents cost.

— Accidents can be avoided.

Signal Words

Signal words are distinctive words that will typically be found on safety signs on the machine and other worksite equipment. These words may also be found in this manual and the manufacturer’s manuals. These words are intended to alert the operator to a hazard and the degree of severity of the hazard.

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

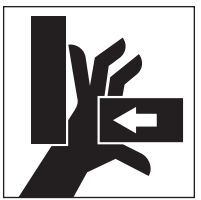
NOTICE indicates a property damage message.

A Word To The User/Operator

It is **YOUR** responsibility to read and understand the safety manual and the manufacturers' manuals before installing or operating this hydraulic breaker. This safety manual takes you step by step through the working day.

Hazard Recognition and Accident Prevention depend upon you being alert, careful and properly trained in the operation, transport, maintenance and storage of this equipment.

Graphics have been provided to help you understand the text.



Remember that **YOU** are the key to safety. Good safety practices not only protect you but also protect the people around you. Study this manual and all of the manufacturers' manuals for this specific machine configuration. Make the manuals a working part of a safety program. Keep in mind that this safety manual is written only for carrier mounted hydraulic breakers.

Contact the manufacturer of your equipment to answer any questions about safe operation that remain after studying the manufacturers' manual(s) and this safety manual.

Practice all other usual and customary safe working precautions and above all:

REMEMBER — SAFETY IS UP TO YOU!

YOU CAN PREVENT DEATH OR SERIOUS INJURY CAUSED BY UNSAFE WORK PRACTICES!

The Carrier Mounted Hydraulic Breaker

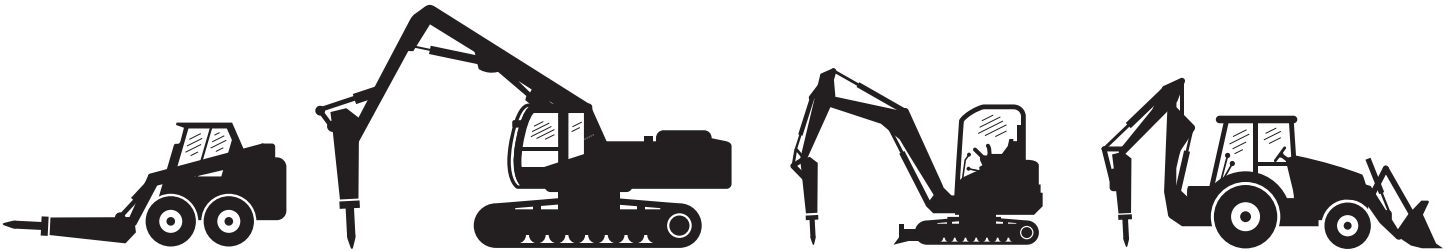
This safety manual covers safe operating practices for carrier mounted hydraulic breakers. Hydraulic breakers may be mounted on many types of carriers or stationary mounts. Pictured are the most common but not the only mounted applications. Remember that safely pairing the hydraulic breaker with a carrier or mount requires the breaker manufacturer's approval.

Contact the manufacturer(s) of your specific equipment to answer any questions about safe operation that remain after reading this manual and the hydraulic breaker and carrier manufacturers' equipment manual(s).

IMPORTANT! This manual covers safe practices for hydraulic breakers mounted on carrier applications approved by the manufacturer. See the manufacturers' manual(s), dealer or contact the manufacturer for application information and restrictions.

Match breaker size to the carrier according to the original manufacturers' specifications. Make sure the carrier has sufficient stability to carry the hydraulic breaker and perform the work intended.

Unauthorized modifications of carrier mounted hydraulic breakers create hazards. Machines should not be modified or altered unless prior written approval is obtained from the manufacturer.



One-Call First

Call Before You Dig
Dial 811 (USA only)

888-258-0808
(USA & Canada)

Call

Before starting any digging project, contact the local One-Call service by dialing 811 (USA only) to have underground utilities located. A One-Call referral number, **1-888-258-0808**, is also available for both USA and Canada.

One-Call will notify participating utility companies that you intend to dig. You must also call any utility companies which do not participate in the One-Call service. Always inspect the jobsite for evidence of unmarked utilities and contact others if necessary.

Plan The Work

Be aware of the lead time for marking in the work area. This time may vary from state to state and county to county. If you do not locate utilities, you may have an accident or suffer injuries, cause service interruptions, damage the environment or experience job delays.

Dig

Most utilities mark their underground facilities using American Public Works Association (APWA) underground color codes. Verify marks before digging.

In the United States, OSHA Standard 29 CFR 1926.651 requires that the estimated location of underground utilities be determined before beginning an excavation. When actual excavation approaches an estimated utility location, the exact location of the underground installation must be determined by a safe, acceptable and dependable method. Other OSHA regulations may also apply to the jobsite.

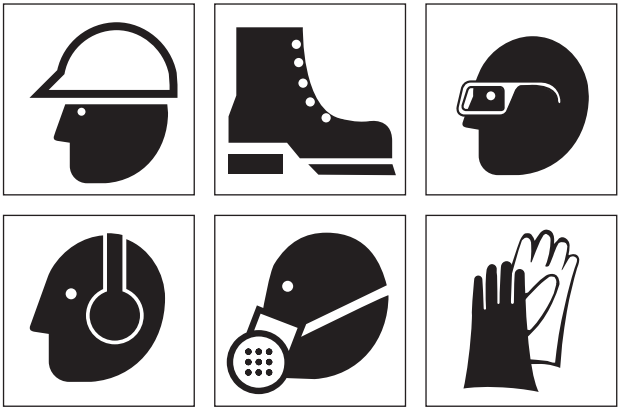
Follow A Safety Program

Protect Yourself

Wear personal protective clothing and Personal Protective Equipment (PPE) issued to you or called for by job conditions.

You may need:
— Hard hat
— Safety boots with non-slip soles
— Safety glasses, goggles or face shield
— Heavy-duty gloves
— Hearing protection
— Reflective clothing
— Wet weather gear
— Respirator or filter mask

Wear whatever is needed—do not take chances.



WARNING! Prevent death or serious injury from entanglement. **Do not wear loose clothing or accessories. Restrain long hair. Stay away from all rotating components when the engine is running.** Contact, wrapping or entanglement with rotating or moving parts could result in death or serious injury.

Follow A Safety Program

Be Alert!

Know where to get assistance. Know the location and how to use a first aid kit and fire extinguisher/fire suppression system.

Be Aware!

Take advantage of training programs offered.

Be Careful!

Human error is caused by many factors: carelessness, fatigue, overload, preoccupation, unfamiliarity of operator with the machine and attachment, drugs, and alcohol to name a few. You can prevent death or serious injury caused by unsafe work practices.

For your safety and the safety of others, encourage fellow workers to act safely.

WARNING! Drugs and alcohol affect an operator's alertness and coordination and the operator's ability to safely operate the equipment which could result in death or serious injury. **Never use drugs or alcohol while operating the mounted hydraulic breaker. Never knowingly allow the operation of equipment when alertness or coordination is impaired.** An operator taking prescription or over-the-counter medication must consult a medical professional regarding any side effects of the medication that would hinder the ability to safely operate this equipment.

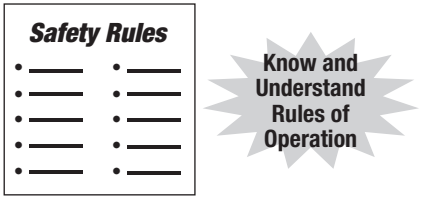
Follow A Safety Program

Know The Rules

Most employers have rules governing operation and maintenance of equipment. Before you start work at a new location, check with your supervisor or the safety coordinator. Ask about the rules you will be expected to obey.

The Occupational Safety and Health Administration (OSHA) enforces federal laws within the United States that apply to safe operation, application and maintenance of equipment on a worksite. It is the employer's responsibility to comply with these laws. An OSHA representative may periodically inspect a worksite to see that these laws are being followed.

There may also be local or state/provincial laws or international regulations that apply to this equipment and its use, along with specific worksite or employer rules. It is important that you know and comply with all applicable laws and rules, including those requiring operator training and certification.



You must be a qualified and authorized operator for safe operation of a carrier mounted hydraulic breaker. You must clearly understand the written instructions supplied by the manufacturer, be trained—including actual operation of the carrier mounted hydraulic breaker—and know the safety rules and regulations for the worksite. It is a good safety practice to point out and explain safety signs and practices and ensure others understand the importance of following these instructions.

Follow A Safety Program

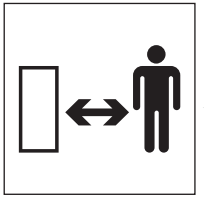
Some Rules You Must Work By

— Know the limitations and operating characteristics of both the carrier and the hydraulic breaker. Match breaker size to the carrier according to the manufacturer's specifications. Make sure the carrier has sufficient stability to carry the hydraulic breaker and perform the work intended.
— Always consult the operator manual(s) for proper guarding for the application. Special glazing or screens may be necessary to protect the operator from thrown objects.
— Always wear the seat belt/operator restraint, if equipped.
— Always have all shields and guards properly installed before operating.
— Inspect the equipment before each use as specified by the manufacturer and your employer.
— Never modify or remove any part of the equipment (except for service—then make sure it is replaced).
— Read and understand all safety signs.
— Know the location of other personnel and machines and make sure they are a safe distance from the mounted hydraulic breaker.

Know Equipment Limitations and Operating Characteristics

Inspect Equipment Daily

Be Aware of Worksite Hazards

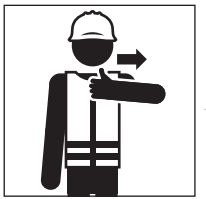


Keep Bystanders Away

Follow A Safety Program

Some Rules You Must Work By (continued)

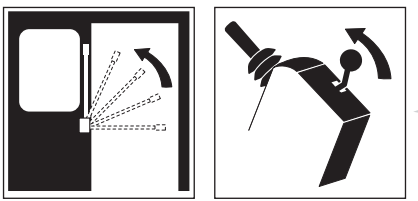
— Know the worksite. Be aware of possible hazards, including utilities, that you may encounter.
— Only use parts and attachments that are approved by the original equipment manufacturer.
— Make sure you understand the rules covering traffic at the worksite. Know what all signs, flags, and markings mean.
— Understand worksite hand, flag, horn, whistle, siren, and bell signals. (See page 61, **Hand Signals**.)
— Know when to use lights, turn signals, flashers, and horns.
— Do not allow riders.
— Never lift or swing a load or attachment over anyone.
— Whenever you leave the machine, lower the attachment to the ground or storage position. Engage the parking brake. Stop the engine. Cycle the hydraulic controls, including auxiliary hydraulic control, to relieve trapped pressure. Engage control lock/gate lock, if equipped, and remove the ignition key. (See page 43, **Machine Shutdown**.)



Understand Worksite Signals

No Riders

Never Lift or Swing a Load or Attachment Over Anyone

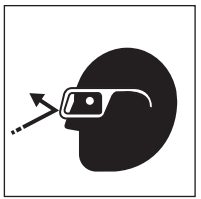


Engage Control Lock

Follow A Safety Program

Know The Equipment

Read and understand the DANGER, WARNING, CAUTION and NOTICE safety signs and other informational signs on the equipment and in the manufacturers' operator manual(s). Ask your supervisor to explain any information you do not understand. Failure to obey safety instructions could result in death or serious injury.



Make sure all the manufacturer's protective structures, guards, shields, screens and panels are in good repair, in place and securely fastened. Damaged, missing or weakened safety components can create a hazardous situation for you as the operator. **Never** remove or modify any safety components on the mounted hydraulic breaker or carrier. Consult the operator manual(s) for proper guarding for the application.

Know the following about the mounted hydraulic breaker:

— How to operate all controls
— The functions of all gauges, lights, dials, switches
— Limitations and operation of the hydraulic mounted breaker including restrictions on slopes and inclines
— Braking and steering characteristics
— Turning radius and clearances

Prepare For Safe Operation

Check And Use All Available Protective And Safety Devices

Keep all protective devices in place and tightly fastened. Make certain all guards, screens or panels, manufacturers' operator manuals, and safety signs are installed on the equipment and legible as supplied by the manufacturer. See that each item is securely in place and in operating condition. Replace missing items.

The machine may be equipped with:

— A seat belt or other type of restraint
— Safety interlock devices
— Control locking device
— Safety signs
— Access and egress system (i.e. handholds, handrails), slip resistant surfaces and protective covers
— Travel alarm/back-up alarm
— Falling object protective structure (FOPS), roll-over protective structure (ROPS) and tip-over protective structure (TOPS)
— Front guard
— Boom, lift arm and stabilizer support devices/locks
— Special glazing, shields, screens or doors—operator protective structure (OPS)—to prevent flying material from entering the operator's compartment.
— Warning lights and devices
— Alternate exits
— Mirrors
— Fire extinguisher/fire suppression system
— First aid kit
— Windshield wipers and washers
— Closed circuit TV (CCTV)

Know which devices are required for protection during operation and use them.

WARNING! NEVER remove or modify safety equipment. Operating a machine without a protective structure (TOPS/ROPS, FOPS or OPS) could result in death or serious injury.

Prepare For Safe Operation

Clean Up

Clean windshields, mirrors, working lights and CCTV (Closed Circuit Television) lights, lens and screen.

Do not clean polycarbonate windows in the hot sun. Polycarbonate glazing should be washed on a regular basis with a mild solution of soap and warm water, using a soft cloth or sponge. Thoroughly rinse with clean water and dry with a chamois or sponge. Do not use abrasive or highly alkaline cleaners or sharp instruments such as razor blades or scrapers that may gouge the surface. Check the operator manual, the manufacturer or dealer for complete instructions.

Clean out the operator's area. Steps and handholds must be clean and functional. Oil, grass, leaves, needles, snow, ice or mud in these areas can cause you to slip and fall.

Clean your boots before getting on the machine.

Dry leaves, needles, branches and twigs build up in tight corners and are highly combustible. Clean this material out daily.

Remove all loose personal items or other objects from the operator's area. Secure these items in a fixed tool box or remove them from the machine. Do not store any flammable material such as ether/cold-start fluid or oily rags in the operator's compartment.

Prepare For Safe Operation

Check The Machine

Before you begin your workday inspect the equipment and have all systems in good operational condition.

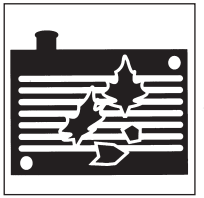
Do not operate the machine until all problems are corrected.

— Perform daily and periodic service procedures as instructed by the equipment manufacturer(s).
— Carefully inspect the machine for any evidence of physical damage, such as cracking, bending or deformation of plates and welds.
— Check for loose, broken or missing parts on the hydraulic breaker, windshield protection (OPS), roll-over protective structure (ROPS) support and brackets, vibration isolators, nuts and bolts.
— Check tires for cuts, bulges and correct inflation, or check condition of tracks.
— Inspect air system lines, valves, drain cocks and other components. See that air pressure is correct and there are no air leaks.
— Check all fluid levels. Fill to the required level with the proper fluid as needed.

Maintain the Equipment

Follow a Checklist

Maintain Proper Tire Pressure



Check the Radiator and Engine

Prepare For Safe Operation

— Inspect all hoses and hose connections for wear, damage and leaks. Make all necessary repairs.
— Check the hydraulic system for leaks and damage. Repair or adjust as needed.

WARNING! Diesel fuel or hydraulic fluid under pressure can penetrate the skin or eyes and could result in death or serious injury. Fluid leaks under pressure may not be visible. **Use a piece of cardboard or wood to find leaks, not your hand. Wear a face shield or safety goggles for eye protection.** If fluid is injected into the skin, it must be removed within a few hours by medical personnel familiar with this type of injury. (See page 54, **Hydraulic System Hazards.**)

— Never start or operate the machine without protective guards and panels in place and cab windows closed.
— Ensure work lights are kept clean (if equipped). Check that all lights work properly.

WARNING! Avoid possible death or serious injury from thrown objects. **Ensure there is adequate windshield protection and/or a windshield of special material, in good condition and in place, to protect the operator during hammer operations.** Refer to the manufacturers' operator manual(s) for instructions.

Inspect Hoses for Wear, Damage and Leaks

High Pressure Fluid Can Inject into the Body

Use Proper Operator Protection

Prepare For Safe Operation

Attachment And Coupler Installation

When changing or installing attachments or quick-coupling devices follow all the hydraulic breaker, carrier and quick-coupler manufacturer's instructions for required installation, maintenance and coupling procedures. Make sure all connectors are securely fastened. Tighten all bolts, nuts and screws to torques recommended. Make sure that dipper and linkage pins are secured, and that pins and pin locks are in place.

Check the attachment coupler and the attachment for wear, broken parts and hydraulic leaks before coupling the attachment to the machine.

When installing or removing the hydraulic breaker from the carrier unit, keep hands and fingers clear of the mounting-pin holes and linkages.

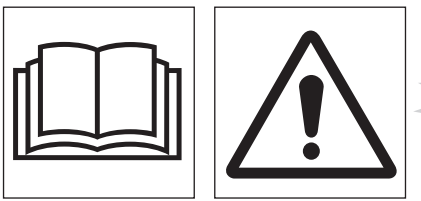
Before operating, ensure that quick-coupler pins or wedges are fully engaged into the attachment and that the coupler is securely engaged and visibly locked to the attachment both mechanically and hydraulically.

WARNING! Avoid possible death or serious injury. **Failure to properly secure the hydraulic breaker attachment to the carrier or quick-coupler can allow the attachment to come off and could result in death or serious injury.**

Drive Metal Pins Safely

Always wear protective goggles or safety glasses and other protective equipment before striking hardened parts. Hammering hardened metal parts such as pins may dislodge chips at a high velocity.

Use a soft hammer or a brass bar between hammer and object to prevent chipping.



Read and Understand Machine Manuals and Signs

Keep Hands and Fingers Clear of Pinch Points

Prepare For Safe Operation

Quick-Coupling Device Safety

It is important to know and understand proper installation, maintenance and operation of the quick-coupler device.

Protect yourself from injury:

— Install and maintain equipment attachments and their operating systems according to manufacturers' instructions.
— Securely latch attachments before work begins.
— Follow the manufacturer's instructions for using positive locks on quick-coupling equipment.
— Make frequent visual inspections of quick-coupling systems—especially after changing attachments.
— Always check for interference limits of the coupler or attachment with the carrier before operating.
— Due to the vibrations and extreme forces, hydraulic breaker operation may increase the need for more frequent inspection and service of a quick-coupling device.

Do not operate the machine if:

— there exists an incompatibility of any of the components.
— there are broken, damaged or badly worn components.
— the lock/secure feature of the quick-coupler is impaired.
— the engaging lever or device is not fully engaged in a lock/secure condition.

A quick-coupler that is not properly locked/secured could result in death or serious injury. **Perform all steps to lock/secure the device.** The steps to confirm that the device is properly locked/secured may include any or all of the following:

— Manually installing a locking pin, actuating a lever or other device.
— Movement of the attached work tool to confirm its engaged lock/secure condition.
— A visual check of the components as instructed by the quick-coupler manufacturer.

WARNING! A quick-coupler that is disengaged when the attachment is in an unstable position could result in death or serious injury. **When coupling or uncoupling the attachment, place the attachment in a safe position as instructed by the manufacturer.**

Prepare For Safe Operation

Know The Work Area

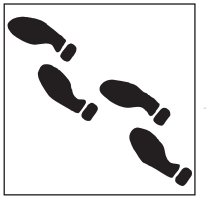
Before you operate the hydraulic breaker, learn as much as possible about the work area. Walk around the worksite and inspect the surfaces you will travel on when using this equipment.

Locate and avoid:

- Holes
- Drop-offs
- Obstacles
- Excavations
- Standing water
- Deep mud
- Wet spots
- Soft soil
- Rough spots
- Slippery surfaces
- Oil spills
- Power lines and apparatus
- Gas lines or apparatus
- Other utilities
- Any conditions which could cause collision, loss of control or tipover
- Steep slopes

Correct unsafe conditions. Avoid operating in problem areas that cannot be corrected.

Check for weak spots when operating on docks, bridges, ramps or floors. Clear away trash and debris. Pick up anything that could puncture a tire.



Walk Around the Worksite

Know Weight Limits

WARNING! Avoid possible injury. The weight of a mounted hydraulic breaker may cause the ground, bridge deck, ramp or floor to give way causing loss of control, fall or tipover. **Know weight limits and stay clear of the edges of excavations or drop-offs.** Failure to know and observe weight limits and use caution could result in death or serious injury.

Prepare For Safe Operation

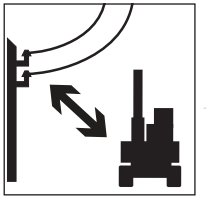
Plan travel routes for inside work in order to see and protect bystanders.

Check for overhead obstructions. Check the clearances of doorways, canopies and overheads. Know exactly how much clearance you have under power and telephone cables.

Maintain minimum approach distance from power lines. If possible, have power to lines disconnected. If this is not possible, request a signal person to guide you while you work around power lines.

When working near power lines, always assume conductors are energized.

DANGER! Avoid electrocution or serious injury. **Do not allow any part of the machine to approach or contact energized power lines or apparatus.** Death or serious injury will result from contact or inadequate clearance to energized power lines or apparatus. (See page 34, **Utilities – Overhead and Underground**.)



Do Not Approach Energized Power Lines

One-Call First

WARNING! Avoid possible injury from contact with buried utilities. **Always contact the local One-Call center and any utility companies that do not subscribe to One-Call before digging.** Failure to locate existing utilities could result in death or serious injury. (See page 7, **One-Call First**.)

When operating near underground services, expose the service by hand-digging or by using soft excavation, such as vacuum excavation when permitted by local utilities.

Prepare For Safe Operation

Rules Of The Road

If the machine is to be driven or transported over the road, refer to the manufacturer's operator manual for instruction.

Make sure clearance flags, lights and warning signs are in place and visible. When required, make sure the "Slow Moving Vehicle" (SMV) emblem is visible to any vehicle approaching from the rear.

While traveling on public roads or streets, obey all local traffic regulations appropriate to the machine use and local classification. Find out if you must use an escort vehicle or roading permit. Place the attachment in the transport position and secure all accessory equipment.

Do not speed. Know stopping distances at a given speed. Always regulate travel speed accordingly. Avoid panic stops and sharp turns. If traffic backs up, pull over and allow other vehicles to pass.

Stop at all railroad crossings and look both ways before proceeding. Never park in traffic areas. If it is necessary to stop at night, pull off the road and set up light or reflectors. When driving at night, use appropriate lights.

Always use hand signals or turn signals when turning. If you are going to transport a machine by truck or trailer, you must cover or remove the SMV emblem. Approach intersections with caution, observe speed and traffic control signs.

Use Caution When Fueling

IMPORTANT! Always use approved fuel containers and/or dispensing equipment.

Fuels are flammable, so observe these practices to reduce the possibility of a serious accident.

— Shut off engine and ignition during refueling.
— Always ground the fuel nozzle against the filler neck to avoid sparks.
— Keep sparks and open flames away from fuel.
— Do not smoke while refueling or when handling fuel containers.
— Do not cut or weld on or near fuel lines, tanks or containers.
— Do not overfill the tank or spill fuel. Clean up spilled fuel immediately.

Start Safely

Mount And Dismount Properly

When you enter or leave the machine:

— Maintain a three-point hand/foot contact with the machine. Three-point contact is defined as using one hand and two feet or two hands and one foot at any single time. Face the machine when either mounting or dismounting.

— Use handholds, handrails, ladders or steps (as provided).

— Orient the upperstructure and undercarriage as required to align the access system.

— Never mount or enter a machine by passing under raised equipment unless the equipment or lift arms/boom are supported by manufacturer-approved support(s).

— Never use control levers or the steering wheel as handholds.

— Never step on foot controls when entering or leaving.

— Clean your boots and wipe your hands before mounting or dismounting.

— Never jump on or off a machine unless specifically instructed by an electrical contact emergency procedure.

— Never attempt to mount or dismount a moving machine.

— Never mount or dismount while carrying tools or objects that prevent three-point contact. Put parts or tools down. Maintaining proper contact, climb and then pick up the object. If necessary, rig a line and bucket or bag to lift items.

Start Safely

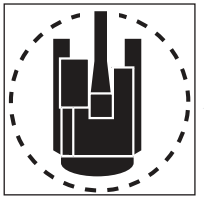
Look Out For Others

Before starting, walk completely around the machine operating area including the machine's tools and attachments. Make sure no one is under it, on it or close to it. Sound the horn, if equipped, and let other workers and bystanders know you are starting the engine. Do not start up until everyone is clear of the operating area.

Starting The Engine

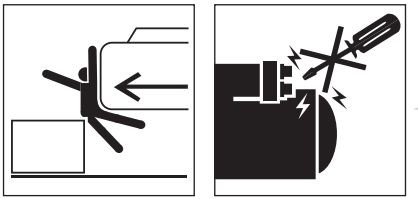
Do not start the engine or move any of the controls if there is a "DO NOT OPERATE" or similar warning tag attached to the start switch or controls. Check with your supervisor.

WARNING! Start the engine only from the manufacturer's recommended operating position. Never attempt to start the engine by shorting across starter terminals or reaching for the key from the ground or outside the cab. The machine could move unexpectedly, causing death or serious injury.



Walk-Around Inspection

Clear Bystanders and Sound Horn



Start Only From Operator's Position

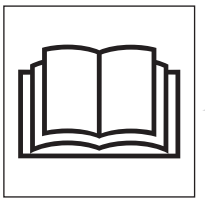
Start Safely

Know the exact starting procedures for this machine. See the manufacturer's manual(s) for starting procedures.

— Sit in the operator's seat and adjust the seat so you can operate all the controls properly.
— Close the cab door and windows.
— Fasten the seat belt, if equipped.
— Familiarize yourself with warning devices, gauges and operating controls.
— Check all controls to be sure they are in correct positions before starting the engine. Consult carrier and hydraulic breaker operator manuals and control labels.
— Clear the area of all persons.
— Ensure the parking brake (if equipped) is engaged and put all controls including those for auxiliary equipment in the neutral/park position.
— Sound the horn, if equipped.
— Start the engine following the instructions in the manufacturer's manual(s).

If it is necessary to run the engine or operate the machine within an enclosed area, be positive there is adequate ventilation.

WARNING! Never operate any type of engine without proper ventilation—exhaust fumes can kill.



Know Starting Procedure, Read Manual

Sit in Operator's Seat, Fasten Seat Belt

Set Brakes, Place All Controls In Neutral

Start Safely

Starting Aids

Do not use ether/cold-start fluid if the engine is equipped with an intake manifold preheater.

Do not carry loose cans of starting fluid on the machine while operating.

If booster cables are used, follow the instructions in the manufacturer's manual(s). The operator must be in the operator's seat when boost starting the engine so that the machine will be under control when the engine starts. Boost starting is a two-person operation.
A battery explosion or a run-away machine could result from improper starting procedures.

Never boost start a frozen battery. (See page 56, **Avoid Explosion**.)

After Starting The Engine

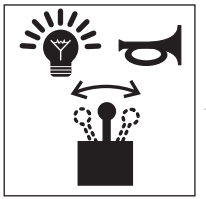
Observe gauges, instruments, and warning lights to ensure that they are functioning and their readings are within the operating range.

Run An Operating Check

Do not use a machine that is not in proper operating condition. It is the **operator's responsibility** to check the condition of all systems, and to run the check in a safe area.

WARNING! Prevent serious injury. **Do not allow anyone to stand within the operating work radius of the carrier mounted hydraulic breaker.** Contact with moving parts of the machine or attachment could cause death or serious injury.

Clear Bystanders



Check Instruments and Controls

Start Safely

Test All Controls

Check all controls to be sure they are in correct positions before starting the engine. Consult carrier and hydraulic breaker operator manuals and control labels.

Make sure the engine is operating correctly. Bring all machine systems up to operating temperature following the manufacturers' recommendations. Operate each machine control to check all functions.

Check for possible interference between the attachment and the cab. Operate carefully to avoid contact between the carrier and the attachment.

Make sure the attachment quick-coupling device (if equipped) is operating properly, fully engaged and visibly locked/secured. (See page 18, **Attachment And Coupler Installation**.)

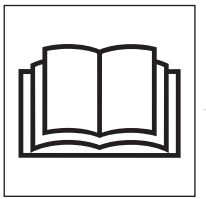
Operate the control(s) to ensure correct operation in forward, neutral, and reverse.

Check braking according to the manufacturer's manual(s). Test steering—right and left—while moving slowly.

WARNING! Prevent possible injury from loss of control. **Be certain you can control speed, direction, braking and hydraulic breaker movement, before operating the machine.**

Remember These Rules

— Stay in the operator's position, with the seat belt fastened. Keep doors and windows closed.
— Understand the machine limitations. Be in control of the machine at all times.
— Assure yourself that the work area is clear of all personnel and other machines. Do not allow riders.
— If a failure that causes loss of control occurs, stop all machine motion as quickly as possible. Shut the machine down and remove the key. Place a **"DO NOT OPERATE"** tag on the controls and correct or report the problem immediately.



Operate Safely

Remember The Other Person

Never allow an untrained or unqualified person to operate this machine. Handled improperly, this machine could cause serious injury or death.

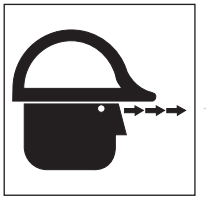
Do not allow anyone within the operating work radius of the mounted hydraulic breaker.

WARNING! Prevent possible injury from fall or runover. The mounted hydraulic breaker is a one-person machine. **NEVER PERMIT RIDERS.**

Always look around before you move the machine or attachment.

Stop operation immediately if anyone approaches the machine.

No Smoking and No Open Flames



Look Before Moving the Machine or Attachment

Clear Bystanders From Area

Operate Safely

Traveling On The Worksite

Know and understand the worksite traffic flow patterns and obey signalmen, road signs and flagmen.

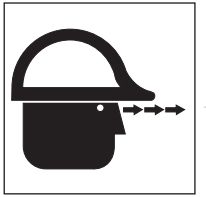
Know the maximum height and width of the machine. Do not obstruct your vision when traveling. Always look in the direction of travel.

When moving the machine, watch that enough clearance is available on both sides and above the boom and cab. Be especially careful to allow extra clearance on uneven ground.

Check for hazards or obstructions before entering an underpass or other area with restricted clearance. Check height and side clearances.

Make sure all surfaces will support the weight of the machine.

Do not cross ditches, creeks or wet draws without an adequate fill or bridge crossing.



Always Look in Direction of Travel

Know Weight Limits and Clearances

Operate Safely

Traveling On The Worksite (continued)

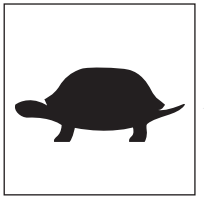
Match travel speed to the traffic, weather and ground conditions. Take it slow and easy when traveling through congested areas. Travel cautiously over rough or slippery ground and on slopes. Reduce speed when travelling over a rise.

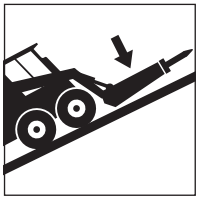
Always give the right-of-way to loaded machines. Maintain a safe distance from other machines.

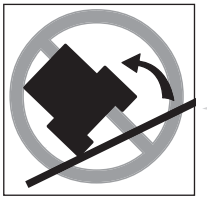
If you encounter a blind corner, stop and sound the horn. Proceed with caution.

Select low gear (operating range) before traveling up or down a grade. Do not speed. Use service brakes to control speed if necessary.

Avoid steep or slippery slopes or unstable surfaces. If it is necessary to travel or operate on a slope, follow manufacturer's specific instructions. When operating on a slope, keep the attachment low and as close to the machine as possible. Proceed with extreme caution. Do not drive **ACROSS** a steep slope under any circumstances. Drive straight up and down a slope.







Avoid turning on an incline. If it is necessary, use extreme caution and make the turn **WIDE and SLOW** with the attachment low and as close to the machine as possible.

Operate at speeds slow enough so you have complete control at all times.

Operate Safely

Watch Out For Hazards

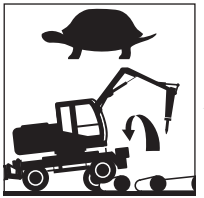
Avoid traveling over obstacles (logs, tree stumps, rough terrain, ditches) whenever possible. If you must cross an obstacle, do so with extreme caution.

WARNING! If the machine begins to tip, roll or slide, stay in the machine with the seat belt securely fastened. Trying to escape from a tipping or rolling machine could result in death or serious injury.

If the machine ever becomes unstable and starts to tip, or roll over:

— Immediately and rapidly lower the attachment.
— Steer downhill if on an incline.
— Brace both feet on the floor and push back into the seat.
— Stay with the machine.
— Keep seat belt/operator restraint securely fastened.
— Hold on firmly and lean away from the point of impact.

Know and follow manufacturer's instructions for proper operation of alternate/emergency exits.



Travel Slowly Over Rough, Hazardous Terrain

Fasten Seat Belt – Stay In Operator's Seat

Operate Safely

Safety Precautions

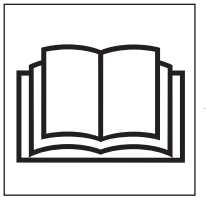
Choose an area with firm level ground for operation.

Before operating the mounted hydraulic breaker, engage the parking brake. Shift the transmission controls to neutral, lower the stabilizers (if so equipped), and level the machine as much as possible. If equipped with a leveling device, level the upperstructure as much as possible. Always make sure that you follow the manufacturer's recommendations before you operate.

Never reach into the machine and attempt to operate the controls from outside the cab.

Before starting operations, set up safety barriers to the sides and rear area of the swing pattern to prevent anyone from walking into the working area.

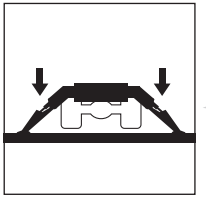
If the machine is equipped with stabilizers, follow the manufacturer's operator manual for instructions on proper use of stabilizers and restrictions on operating without stabilizers. Clear all personnel from area before raising or lowering stabilizers.



Read and Understand Manuals Before Operating

Read and Understand Machine Signs

Clear Bystanders From Area



Lower Stabilizers Before Operating

Operate Safely

Make sure that you are aware of personnel or machines that may be hidden behind piles or stacks of material or in blind spots on the worksite.

WARNING! Prevent possible death or serious injury. **Do not allow others within the safety zone.** Death or serious injury can result from contact with moving parts of the machine or attachment.

WARNING! Prevent possible death or serious injury. **Never lift, move or swing the attachment over any one or any occupied machine cab.**

Warn others by sounding the horn, if equipped, before starting operations or first moving the machine.

Always make sure you follow all of the manufacturers' recommendations and work site rules before you start operating the mounted hydraulic breaker.

Hand Signals

A legible chart depicting and explaining the system of hand signals used should be conspicuously posted.

Do not begin operation until signals are clearly understood. The operator shall respond to operating signals only from the appointed signal person, but shall obey a stop signal at any time from anyone. A designated signal person, fully qualified by training or experience, shall be provided when the point of operation is not in full and direct view of the operator, unless an effective signaling or control device is provided for safe direction of the operator.

The signal person must be in a well-lighted area to be clearly and directly visible to the operator during nighttime operations.

Know Hand Signals – Take Signals from One Person Only

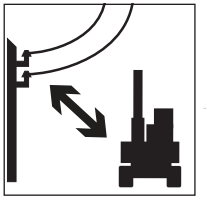
Operate Safely

Utilities – Overhead And Underground

DANGER! Electrocution or serious injury will result from CONTACTING or APPROACHING power lines or apparatus. Maintain Minimum Approach Distance. (See chart.)

DANGER! Death or serious injury will result from touching or being near a machine that is in contact with or near an energized electrical source. **Never approach power lines with any part of the machine or attachment unless all local, state/provincial and federal (OSHA) required safety precautions have been taken.** Use extreme caution because high voltage sources can arc without contact.

REQUIRED CLEARANCE FOR NORMAL VOLTAGE IN OPERATION NEAR HIGH VOLTAGE POWER LINES		
Normal Voltage, kV (Phase to Phase)	Minimum Approach Distance [Note (1)] ft	(m)
to 50	10	(3.05)
Over 50 to 200	15	(4.6)
Over 200 to 350	20	(6.1)
Over 350 to 500	25	(7.62)
Over 500 to 750	35	(10.67)
Over 750 to 1,000	45	(13.72)
NOTE: (1) Environmental conditions such as fog, smoke, or precipitation may require increased clearances.		



Check overhead clearances. If possible, have power to the lines de-energized and visibly grounded. If not possible, request a signal person for guidance to maintain at least a Minimum Approach Distance. (See chart.)

If machine or attachment contacts an energized line, stay in the machine and attempt to break contact. Warn others to stay away from the machine. If the machine catches fire and you are forced to leave, jump clear of the machine with both feet together and hop away. **DO NOT** touch machine and ground at the same time. Do not walk or run.

Operate Safely

Locate All Underground Utilities

Confirm that One-Call has been contacted. Confirm that any utilities not subscribing to One-Call have been contacted. Confirm that the site has been marked or cleared. (See page 7, **One-Call First**.)

Obtain all information pertaining to the locate request, including the One-Call confirmation code or ticket number. If the facility owner has provided a locate sketch, obtain a copy. Review any engineering drawings provided by utilities. This information should be retained.

Personally verify One-Call utility marks. There are variations in all states.

Take a copy of the locate sketch to the job site. Confirm all of the locates. Review the site for signs of unmarked utilities. These signs may include pedestals, pole risers, meters, trench lines, manhole covers, sewer drain outlets, etc. Review not only the immediate area, but also the perimeter of the area for utility markers.

Additionally, the area should be swept by an experienced operator using a device to locate utilities and large metal objects such as tanks and pipes.

Any inconsistencies with line locations or any inaccurate locates must be resolved.

When gas lines are present on the site, do not smoke or do anything to cause a spark in the vicinity of a gas line.

Make plans to restrict access by bystanders—with cones and tape, barriers, warning signs, fences, etc.—until the job is complete.

Make certain that you are in compliance with all local, state/provincial, national and other requirements and regulations, including those regarding open excavations, or “potholes.” These regulations may include requirements for covers, fencing, barrier tape marking, barricades, shoring and sloping of trenches, confined space permits and other items.

Operate Safely

In Cold Weather

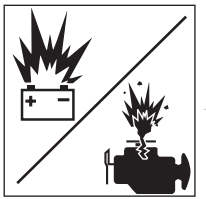
IMPORTANT! Consult the carrier and the hydraulic breaker manufacturers' operator manual(s) for the proper cold weather procedures.

— Start the carrier engine according to the guidelines found in the manufacturer's operator manual.
— Allow the carrier hydraulic oil to preheat to the manufacturer's recommendation before operating the hydraulic breaker.
— Place the breaker tool perpendicular to the material to be broken.
— Be careful to avoid impact (shock) loading.
— Tools can shatter in below 0°F or -18°C operation. The tools (working steel) must be warmed.
— In severe cold weather, do not touch any parts of the equipment with exposed flesh. Flesh will freeze to the metal and cause severe injury.

Do not store loose cold weather starting aid containers or flammable materials on the carrier. Keep all such materials away from heat, sparks or open flame. Do not puncture or burn containers. They can explode.

Heater fuel containers should be handled in the manner prescribed by the supplier. (See page 26, **Starting Aids**.)

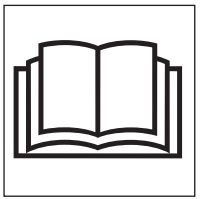
Pre-heat Tools in Extreme Cold Weather



Follow Manufacturers' Cold Weather Procedures

Operate Safely

Remember:



Read and Understand Manuals Before Operating

Read and Understand Machine Signs

- Always read and understand the manufacturers' manual(s) and machine safety signs before operating.
- Always know where to get assistance in case of an emergency.
- Always check for utilities before digging.
- Always avoid distractions such as cell phones, headphones, reading and eating.
- Always ensure the attachment is properly installed. (See page 18, **Attachment and Coupler Installation**.)

Operate Only from Operator's Position – Fasten Seat Belt

Raised Equipment Must Be Supported

- Always operate the carrier from the manufacturer's recommended operator's position. Fasten seat belt.
- Always look in the direction of travel, even when traveling in reverse.
- Always keep away from lift arms/boom or other raised equipment. Equipment left in the raised position **must be supported** by approved support device(s).

Operate Safely

Remember (continued):

— Always make sure the work area is clear of other machines and personnel. Warn others in area before starting. **Never** lift, swing or move an attachment over anyone.

— Always stay in control of the machine. Do not jerk controls. Travel and turn slowly and smoothly. Travel and turn with attachment lowered and in the travel position. Keep heavy end uphill. Never drive over drop-offs.

— **Never permit riders.** Never use an attachment as an elevated work platform.

— Never enter or place any part of your body in the "pinch" areas of a machine unless the equipment has been shut down using the specific instructions in the manufacturers' operator manual(s).

— Never modify the equipment. Use only attachments approved by the manufacturer.

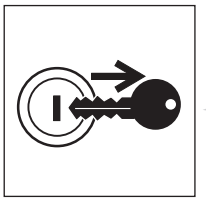
— Never exceed the rated operating capacity of either the hydraulic breaker or the carrier. Be aware of changed weight distribution when operating with heavy attachments.

— Never operate the hydraulic breaker in an atmosphere with explosive dust, explosive gas or where exhaust can contact flammable material.

— Never leave the hydraulic breaker unattended without lowering the attachment flat on the ground and safely shutting down the machine and attachment. (See page 43, **Machine Shutdown**.)

Do Not Lift or Swing an Attachment Over Anyone

Stay Away from Machine Pinch Areas



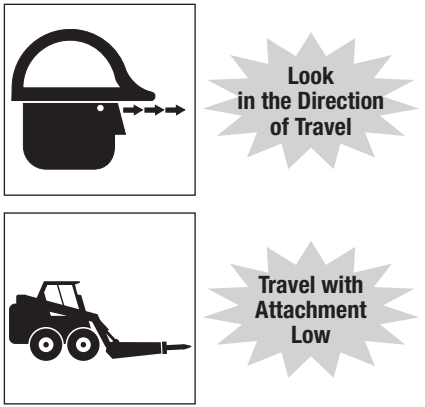
Shut Down Unattended Equipment

Operate Safely

Traveling With Heavy Attachments

Be aware that heavy attachments such as hydraulic breakers change the weight distribution of the machine. Use extra care when loading/unloading, traveling and turning.

Hydraulic breakers require that lift arms/boom and therefore the mass of the attachment be raised during operation. Return the attachment to the travel position, keeping the mass of the attachment low while traveling.



Watch Out For Hazardous Working Conditions

Be alert for hazards. Know where you are at all times. Watch for branches, cables and doorways. Watch for unstable soil.

Slides or cave-ins are a hazard when excavating or performing hydraulic breaker operations. Check the condition of the soil or the material to be removed. Shore and brace to prevent slides or cave-ins whenever necessary, especially:

— When hammering adjacent to trenches and back filled areas.
— When soil conditions are not good.
— Where excavations are subject to the vibrations from the hydraulic breaker, railroads, highway traffic or other machinery.

Operate Safely

Watch Out For Hazardous Working Conditions (continued)

Keep machine well back from the edge of an excavation. Avoid undercutting the machine. If necessary, provide adequate shoring to prevent the machine from falling into the excavation.

Avoid operating the machine close to an overhang, deep ditch or hole. If the machine should get close to a tipping condition or drop-off, STOP and get off the machine after applying the parking brake…plan any corrective moves carefully before proceeding. Reversal is often the best move.

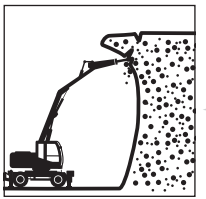
When working in a pit or along a high wall, be particularly alert for the possibility of a cave-in. If a cave-in appears possible, remove the uppermost material first or take other appropriate precautions.

Check for overhead obstacles that could be dangerous. **Look up as well as down.**

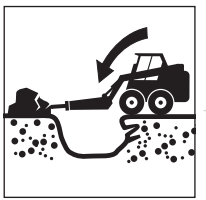
Move the machine away from a bank or high wall before shutting down.

When using a mounted breaker on supported structures such as buildings and bridges, make certain the carrier weight and hydraulic breaker action will not cause the structure to be damaged or to collapse.

If necessary when working under hazardous conditions, use a second person to warn of dangers. Make certain they do not get too close to the operation.



Never Undercut a High Bank



Use Care Near Excavations

Use a Signal Person

Operate Safely

Use Breakers For Their Intended Purpose Only

Do not use the mounted hydraulic breaker under water without consulting with the manufacturer and authorized to do so by written authorization expressed by the manufacturer.

Do not drop the hydraulic breaker rapidly on an object. Remember, the hydraulic breaker is heavier than an empty bucket (attachment) and will move faster than expected.

Do not use the hydraulic breaker or the brackets to move or lift large objects. This practice results in excessive side loading to the carrier front end equipment.

Avoid operating the hydraulic breaker with hydraulic cylinders at the end of the stroke. Continuous operation with boom and/or handle cylinders fully retracted or extended can damage the hydraulic cylinders.

Do not use the hydraulic breaker tool to pry. Prying can cause damage to the breaker and the tool.

Do not raise the carrier off the ground by applying excess down pressure to the hydraulic breaker. Apply proper down pressure.

Do not overheat the tool by operating in one spot too long (more than 30 seconds). Operate the hydraulic breaker perpendicular to the material being broken.

Avoid Silica Dust

Cutting or drilling concrete or rock containing quartz may result in exposure to silica dust. **Do not exceed Permissible Exposure Limits (PEL) to silica dust as determined by OSHA or other job site Rules and Regulations.** Use a respirator, water spray or other means to control dust. Silica dust can cause lung disease and is known to cause cancer.

Operate Safely

Towing

Use extreme caution as some machines may not be towed. Refer to the manufacturer's manual(s) for specific towing instructions.

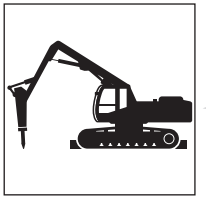
WARNING! Prevent possible injury from unexpected machine movement. **Block the machine to prevent movement before releasing the brakes.** Sudden unexpected movement of the machine could result in serious injury or death.

WARNING! Prevent possible injury from a runaway machine. **Ensure that the towing linkage is properly connected, adequate for the purpose, and that steering and braking are fully controlled. Ensure that the towing machine(s) are large enough to control the towed machine.**

Never straddle a tow line or stand near a tow line under tension.

Parking

Park the machine in a designated area or out of traffic—preferably on level ground. If you must park on a slope or incline, engage the parking brake, lower the attachment to the ground with slight down pressure, engage the gate/control lock. If on a slope, block the tires or tracks. (See page 43, **Machine Shutdown**.)



Block Machine Before Releasing Brake

Prevent Runover – Control Machine

If freezing conditions are expected, wheels or tracks should be first cleared of mud and dirt and the machine parked on planks or suitable debris.

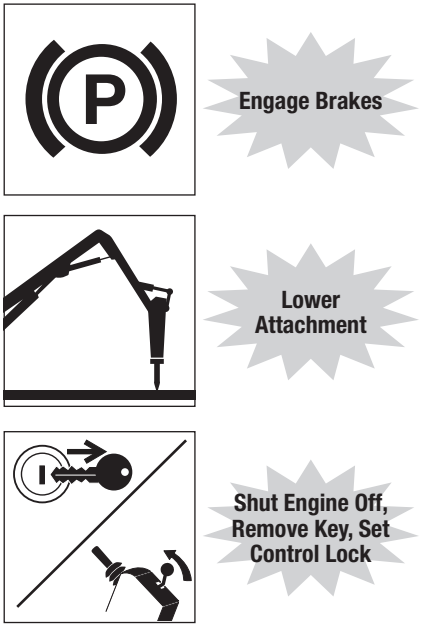
Public roads are not suitable for parking. If a machine is disabled or you must park on a public road, barricade and mark the machine according to local and worksite regulations.

Shut Down Safely

Machine Shutdown

Properly shutting down the mounted hydraulic breaker can help prevent accidents from occurring when the machine is left unattended. Shut down the equipment following the specific procedures in the manufacturers' operator manual. These procedures will normally include:

— Stop the machine.
— Make sure the area around the machine is clear of personnel.
— If required, swing the machine to align the upper-structure with the undercarriage.
— Shift controls to neutral/park including auxiliary hydraulic controls.
— Engage parking brake, if equipped.
— Lower the attachment to the ground or a secure position.
— Idle engine for short cool-down period.
— Stop engine.
— Cycle all hydraulic controls to relieve system pressure.
— Engage the gate lock or control locking device.
— Remove ignition key.
— Shut off main power disconnect switch if equipped.
— Dismount maintaining three-point contact with the access system.
— If on a slope or incline, block tracks or tires.



Shut Down Safely

Machine Shutdown (continued)

— Check for and clean out trash build-up especially in the engine compartment, battery box, around exhaust components, in confined spaces, under the machine, and around rotating components.
— Lock the cab and install anti-vandalism covers and closures, if equipped.

Safe Dismounting

Never dismount from moving equipment. Observe proper shutdown practices before dismounting. Check for slippery steps and handholds.

Dismount carefully using three-point contact facing the machine. Three-point contact is defined as using one hand and two feet or two hands and one foot at any single time. Keep hands and feet away from the controls. Never jump off the machine. (See page 23, **Mount And Dismount Properly**.)

Prevent Fire – Clean Up, Observe Machine After Shutdown

Use Three-Point Contact

Load And Unload The Machine Safely

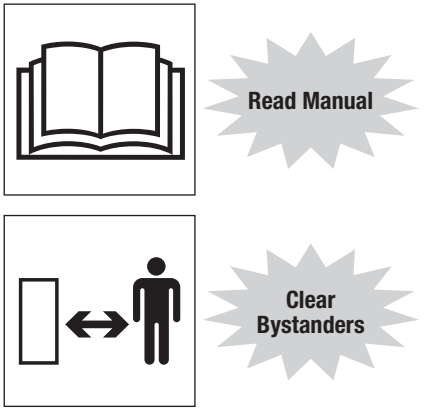
Loading And Unloading For Transport

All machines are not loaded in the same way, and the procedures given in the manufacturer's manual(s) should always be followed.

Some precautions apply to all machines:

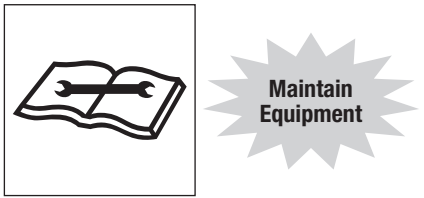
— Know the correct loading and unloading procedures for the machine.
— Place transport vehicle on a firm, level surface.
— Block transport vehicle so it cannot move.
— Use ramps of adequate size and strength, low angle, and proper height.
— Keep trailer bed and ramps clear of mud, oil, ice, snow, leaves and other debris.
— Center the upperstructure over the front end of the machine undercarraige and engage the swing brake and/or the swing lock, if equipped.
— Select low gear (operating range).
— Keep everyone clear of the area.
— Cover or remove any SMV (Slow Moving Vehicle) emblem.
— Secure the cab, attachment, and accessories in transport position.
— Chain and block machine securely for transport.

Measure the transport height and width of the loaded machine to avoid overhead and width obstructions. Make sure clearance flags, all lights and warning signs are in place and visible.



Perform Maintenance Safely

Maintain Equipment



Be sure to maintain equipment according to the manufacturer's instructions. Regularly check the operation of the protective and safety devices.

Do not perform any work on a hydraulic breaker or carrier unless you are authorized and qualified to do so.

If you have been authorized to do maintenance, **read the operator and service manuals.** Study the instructions; check the lubrication charts; examine all the instruction messages on the equipment. Maintenance can be hazardous unless performed properly. Be sure you have the necessary skill, information, correct tools and equipment to do the job correctly.

IMPORTANT! Do not modify equipment or add components not approved by the manufacturer. Use parts, lubricants and service techniques recommended by the manufacturer.

IMPORTANT! This manual covers safe practices for hydraulic breakers mounted on carrier applications approved by the manufacturer. See the manufacturers' manual(s) or dealer for application information and restrictions.

Match breaker size to the machine (carrier) according to the original manufacturer's specifications. Make sure the carrier vehicle has sufficient stability to carry the hydraulic breaker and perform the work intended.

Unauthorized modifications of carrier mounted hydraulic breakers create hazards. Machines should not be modified or altered unless prior written approval is obtained from the manufacturer.

Perform Maintenance Safely

Hydraulic Breaker Maintenance

When installing or removing the breaker from the carrier unit, keep hands and fingers clear of the mounting pin holes and linkages.

Refer to the manufacturers' operator and maintenance manuals for the proper required attachment procedures. (See page 18, **Attachment and Coupler Installation**.)

When changing the tool, exercise great care. The weight of some tools require the use of suitable lifting equipment.

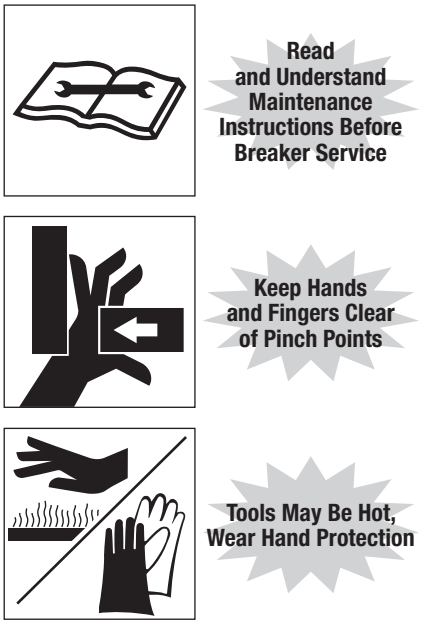
CAUTION! Avoid possible injury. **The tool and breaker may be oil coated and hot. Take extra care when handling these parts.**

When handling or servicing the breaker, use proper lifting equipment, slings and tools as recommended by the hydraulic breaker manufacturer's operating and maintenance instruction.

Never use the hydraulic breaker as a lifting device.

Tool Lubrication – When servicing the hydraulic breaker, refer to the manufacturer's recommendations.

Storage – Follow manufacturers' manual(s) for proper storage recommendations.



Perform Maintenance Safely

Breaker Charging

The manufacturer's recommended maximum permissible nitrogen pressure in the breaker **must not** be exceeded.

WARNING! Avoid possible death or serious injury. **Always refer to and check your hydraulic breaker manufacturer's service and operator manuals for detailed instructions and precautions before charging and/or discharging gas chambers and/or accumulators on hydraulic breakers.**

Stay clear of the tool point while charging. Fully extend the tool while charging the hydraulic breaker.

Use only nitrogen gas when charging the breaker.

Store and handle nitrogen gas per OSHA, State and Local regulations.

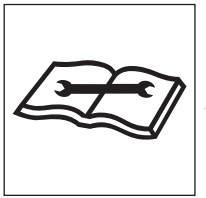
Breaker Disassembly

WARNING! Avoid possible death or serious injury. **Discharge all gas chambers, accumulators and internal hydraulic pressure before hydraulic breaker disassembly.** Consult the machine manufacturers' instruction manual(s) for the correct procedure to relieve residual pressure in the hydraulic system.

Quick Disconnects

Quick-disconnects are usually hot after the machine has been in operation.

Do not disconnect quick-disconnects with the system pressurized. Consult the carrier manufacturer's instructions for the correct procedure to relieve residual pressure in the hydraulic system. If quick-disconnects are used, use only compatible and properly matched coupling halves of proper size.



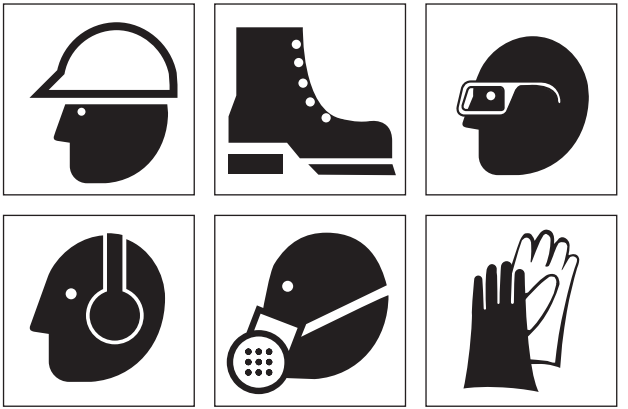
Read and Understand Maintenance Instructions Before Breaker Service

Discharge All Gas Chambers, Accumulators and Breaker Hydraulic Pressure Before Disassembly

Perform Maintenance Safely

Protect Yourself

Wear personal protective clothing and Personal Protective Equipment (PPE) issued to you or called for by job conditions.



You may need:
— Hard hat
— Safety boots with non-slip soles
— Safety glasses, goggles or face shield
— Apron and protective gloves
— Hearing protection
— Welding helmet or goggles
— Respirator or filter mask

Wear whatever is needed—do not take chances.

WARNING! Prevent death or serious injury from entanglement. **Do not wear loose clothing or accessories. Restrain long hair. Stay away from all rotating components when the engine is running.** Contact, wrapping or entanglement with rotating or moving parts could result in death or serious injury.

Perform Maintenance Safely

Protect Yourself (continued)

Wear a rubber apron and rubber gloves when working with corrosives. Wear gloves and safety shoes when handling wooden blocks or sharp-edged metal.

Always use safety glasses, goggles or a face shield. They provide eye protection from fluids under pressure, while grinding and servicing batteries. Protection is also needed from flying debris, liquids and loose material produced by equipment, tools and pressurized air/water.

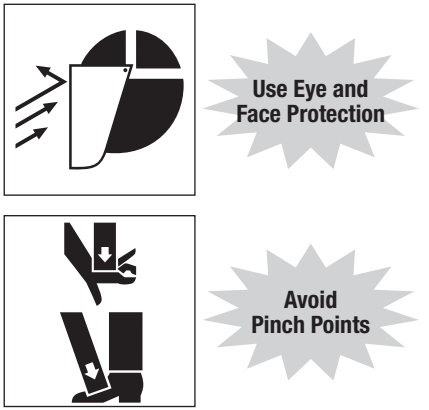
Wear a face shield when you disassemble spring-loaded components or work with battery acids. Wear a welding helmet or goggles with a shaded filter when you weld or cut with a torch.

Do not sand, grind, flame-cut, braze or weld without a NIOSH-approved respirator or appropriate ventilation. If welding is required on this machine, refer to the manufacturer's manuals or consult the equipment dealer for proper procedures.

WARNING! Prevent death or serious injury from entanglement. **Do not wear loose clothing or accessories. Stay away from all rotating components when the engine is running.** Contact, wrapping or entanglement with rotating or moving parts could result in death or serious injury.

Keep pockets free of all objects that could fall out—and drop into machinery.

Handle tools and heavy parts sensibly—with regard for yourself and other persons. Lower items—do not drop them.



Perform Maintenance Safely

Prepare The Work Area

— Position the mounted hydraulic breaker in a level area out of the way of other working equipment.
— Make sure there is adequate light, ventilation and clearance.
— Remove oil, grease or water to eliminate any slippery surfaces.
— Clean around the area to be serviced to minimize contamination.

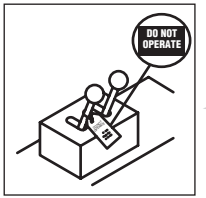
Prepare The Machine

— Attach a “DO NOT OPERATE” warning tag to the control levers and remove the ignition key if the carrier should not be started.
— Install the approved support device(s) when working under or near raised components. Remove attachment before raising lift arms/boom and before installing support device(s).

WARNING! Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause unsupported equipment to drop. **Do not go under equipment when raised unless supported by an approved support device(s).** Death or serious injury could result from falling components.

— Remove only guards or covers that provide access to the area being serviced. Replace all guards and covers when work is complete.

Clean Slippery Surfaces



Use Warning Tags

Use Approved Support Device

Perform Maintenance Safely

Use Proper Ventilation

If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

WARNING! Prevent possible injury. **Never work on machinery with the engine running unless instructed by the manufacturer's manuals for specific service.**

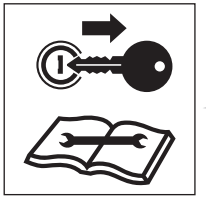
WARNING! Never operate any type of engine without proper ventilation—EXHAUST FUMES CAN KILL.

Use Jacks And Hoists Carefully

If you must work beneath raised equipment, always use wood – **not concrete** – blocks, jack-stands or other rigid and stable supports. When using jacks or hoists always be sure they are adequately supported.

WARNING! Prevent possible death or serious injury. **Never use concrete blocks for supports.** They can collapse under even light loads.

Make sure the hoists or jacks you use are in good repair. Never use jacks with cracked, bent, or twisted parts. Never use frayed, twisted or pinched cables. Never use bent or distorted hooks.



Remove Key and Read Maintenance Manual

Ventilate Work Area

Use Proper Support for Raised Equipment

Perform Maintenance Safely

Common Maintenance Safety Practices

Fire Prevention

IMPORTANT! Always use approved fuel containers and/or dispensing equipment.

Fuels are flammable, so observe these practices to reduce the possibility of a serious accident.

— Shut off engine and ignition during refueling.
— Always ground the fuel nozzle against the filler neck to avoid sparks.
— Keep sparks and open flames away from fuel.
— Do not smoke while refueling or when handling fuel containers.
— Do not cut or weld on or near fuel lines, tanks or containers.
— Do not overfill the tank or spill fuel. Clean up spilled fuel immediately.
— Store dangerous fluids in a suitable place and in approved containers which are clearly marked.
— Never smoke in areas where flammable fluids are used or stored.
— Use proper nonflammable cleaning solvents. Follow solvent manufacturer's instructions for use.
— Always remove all flammable material in the vicinity of welding and/or burning operations.

Engine Coolant Hazards

Liquid cooling systems build up pressure as the engine gets hot, so **use extreme caution before** removing the radiator cap. Be sure to:

— Stop the engine and wait for the system to cool.
— Wear protective clothing and safety glasses.
— Turn the radiator cap slowly to the first stop to allow the pressure to escape before removing the cap completely.

No Smoking and No Open Flames

Remove Radiator Cap Slowly

Perform Maintenance Safely

Hydraulic System Hazards

The hydraulic system is under pressure whenever the engine is running and may hold pressure even after the engine is shut off. Cycle all hydraulic controls including the auxiliary hydraulic control after the engine is shut down. Relieve trapped pressure in the lines after the attachments are shut down and resting on the ground.

During inspection of the hydraulic system:

— Wait for fluid to cool before disconnecting the lines or opening the filler cap. Hot hydraulic fluid can cause SEVERE BURNS.

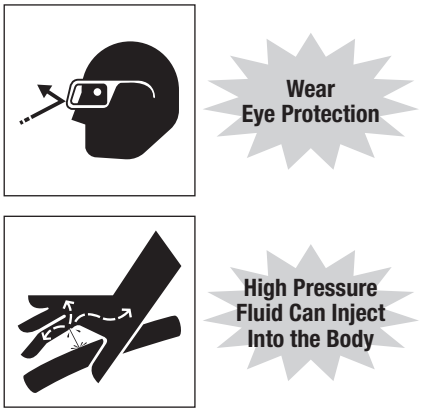
— **Do not** use your hand to check for leaks. Instead, use a piece of cardboard or paper to search for leaks.

— Wear appropriate eye protection. Hydraulic fluid can cause permanent eye injury.

WARNING! Diesel fuel or hydraulic fluid under pressure can penetrate the skin or eyes and could cause death or serious injury, including blindness. Fluid leaks under pressure may not be visible. **Use a piece of cardboard or wood to find leaks, not your hand. Wear a face shield or safety goggles for eye protection.** If fluid is injected into the skin, it must be removed within a few hours by medical personnel familiar with this type of injury.

When venting or filling the hydraulic system, loosen the filler cap slowly and remove it gradually.

Never reset any relief valve in the hydraulic system to a pressure higher or lower than recommended by the manufacturer.



Perform Maintenance Safely

Electrical System Hazards

Before working on the electrical system, disconnect the battery cable(s).

— Remove the battery negative (-) cable(s) first.
— When reconnecting the battery, connect the battery negative (-) cable(s) last.

The liquid in batteries is called “electrolyte.” Electrolyte contains sulfuric acid, which is a POISON and can cause SEVERE CHEMICAL BURNS.

Avoid Injury

— Wear a face shield to prevent contact with your eyes.
— Wear chemical-resistant gloves and clothing to keep electrolyte off your skin and regular clothing.

WARNING! Electrolyte will damage eyes or skin on contact. **Always wear a face shield to avoid electrolyte in eyes.** If electrolyte contacts eyes, flush immediately with clean water and get medical attention. **Wear rubber gloves and protective clothing to keep electrolyte off skin.** If electrolyte contacts exposed skin or clothing, wash off immediately with clean water.

If electrolyte is ingested, seek MEDICAL ATTENTION IMMEDIATELY. NEVER give fluids that would induce vomiting.

Perform Maintenance Safely

Avoid Explosion

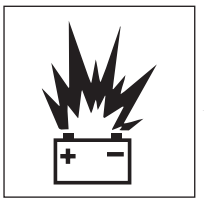
WARNING! Avoid possible serious injury from explosion. Lead-acid batteries produce extremely explosive gases especially when being charged. **Keep arcs, sparks, flames and lighted tobacco away.**

— **Do not** smoke near batteries.
— Keep arcs, sparks and open flames away from batteries.
— Provide adequate ventilation.

Never check the battery by placing a metal object across the battery posts — the resulting spark could cause an explosion.

WARNING! Avoid possible serious injury from battery explosion. **Do not charge a battery or boost start the engine if the battery is frozen.** Warm to 60°F (15.5°C) or the battery may explode and could cause serious injury.

Safety rules during battery boost starting:
— Follow the instructions for proper “battery boost starting” as specified in the manufacturer’s manual.
— Be sure the vehicles are not touching.
— Observe the polarity of the batteries and connections.
— Make the final cable connection to the engine or the furthest ground point away from the battery. Never make the final connection at the starter or dead battery—sparks may ignite the explosive gases present at the battery.
— When disconnecting cables after jump starting, remove the cables in reverse order of connection (e.g., final connection first).



Avoid Sparks and Open Flames Near Batteries

For Boost Starting Observe Polarity and Make Final Connection at Ground Point

Perform Maintenance Safely

Tire, Wheel And Track Maintenance

Check tires and wheels or tracks daily because the stability of the carrier can be dramatically affected by tire pressure or damage to tires, wheels or tracks.

Check tracks, rollers and idlers for:
- — Damaged or worn tracks.
- — Correct tension according to manufacturer's instructions.
- — Proper lubrication – track rollers and idlers. Refer to the manufacturer's manuals.

Track Adjustment

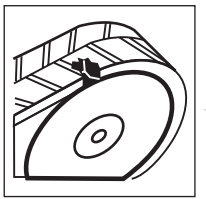
Track tension is important for good performance, reducing excessive track wear and preventing the tracks from coming off. Track and roller wear varies with the working conditions and soil conditions. Special tools and procedures may be needed to check or adjust track tension. Removing and installing tracks also requires following proper servicing procedures.

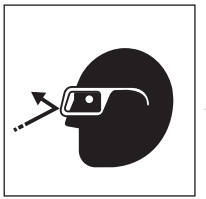
WARNING! Track tensioning systems have compressed springs or pressurized fluid (oil or grease). Improperly releasing track tension forces can cause death or serious injury. **Always follow the manufacturer's warnings and instructions for track adjustment and other maintenance and servicing procedures.**

Drive Metal Pins Safely

Always wear protective goggles or safety glasses and other protective equipment before striking hardened parts. Hammering hardened metal parts such as pins may dislodge chips at a high velocity.

Use a soft hammer or a brass bar between hammer and object to prevent chipping.



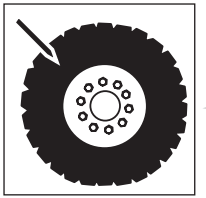


Perform Maintenance Safely

Tire, Wheel And Track Maintenance (continued)

Check tires for:
— Correct pressure.
— Cuts and bulges.
— Nails or other punctures.
— Uneven or excessive wear.
— Condition of valve stems and caps.

Check wheels for:
— Damage to the rims.
— Missing or loose lug nuts or bolts.
— Misalignment.



Check Tires and Wheels for Damage

Maintain Proper Tire Pressure

Perform Maintenance Safely

Tire, Wheel And Track Maintenance

WARNING! Explosive separation of a tire and/or rim parts could cause death or serious injury. **Always follow the manufacturer's maintenance and service recommendations or contact the tire supplier.**

Do not inflate the tires above the recommended pressure. Be sure to replace tire ballast if equipped. See manufacturer's specifications for ballast requirements.

Keep wheel lug nuts tightened to manufacturer's recommendations.

A rise in tire pressure during operation is normal, and should NOT be reduced.

When adding air to a tire, do so from a distance. Use a long hose with self-attaching chuck. Always stand behind tread when adjusting tire pressure.

Do not inflate tires with flammable gases or from systems using an alcohol injector.

Never cut or weld on a wheel with an inflated tire mounted on it.

WARNING! Explosive separation of a tire and/or rim parts can cause serious injury or death. **Always use a safety cage or cable restraints when inflating a repaired tire.** Inflate the tire from a distance, using a long hose with self-attaching chuck. Stand behind the tread; keep the area to the side of the tire clear of other people.

All tire service should be performed by a qualified tire service center or by an authorized service person who has been properly trained in the procedures and use of safety equipment designed for tire servicing.

WARNING! The types of wheels and tires usually found on this equipment require special care when servicing to prevent death or serious injury.

Perform Maintenance Safely

Important Factors To Remember:

— **Never** overinflate a tire—it could explode.
— Punctures that could have allowed the ballast in a tire to leak out must be repaired and the tire refilled with ballast (if required) before the carrier is put back into operation.
— **Never** reinflate a tire that has been run flat or seriously underinflated without removing the tire from the wheel. Have the tire and rim closely inspected for damage before remounting.
— Clean the area around all wheel lug nuts or bolts and periodically check the torque per the manufacturer's specifications until the torque value stabilizes, then check at regularly scheduled intervals.
— **Never** weld on a wheel or rim.
— Check that the tire size and wheel are correctly matched.
— When replacing the tires, ensure the tires are of the appropriate rating specified by the manufacturer.

Complete Service and Repairs Before Machine is Released

Tighten all bolts, fittings, and connections to torques specified by the manufacturer.

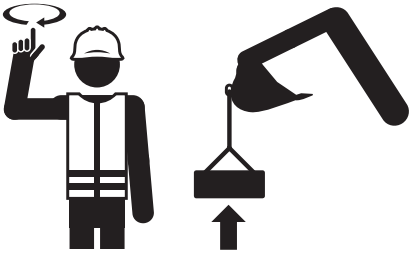
Install all guards, covers, and shields after servicing. Replace or repair any damaged ones. Refill and recharge pressure systems only with manufacturer-approved or recommended fluids.

Start the engine and check for leaks. (See page 54, **Hydraulic System Hazards**.) Operate all controls to make sure the machine is functioning properly. Test the machine if necessary. After testing, shut down and check the work you performed. Are there any missing cotter pins, washers, locknuts, etc.? Recheck all fluid levels before releasing the carrier mounted hydraulic breaker for operation.

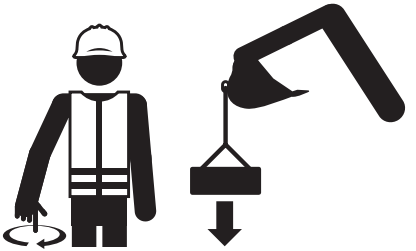
All parts should be inspected during repair and replaced if worn, cracked or damaged. Excessively worn or damaged parts can fail and cause injury or death.

Replace any damaged or illegible machine or safety signs.

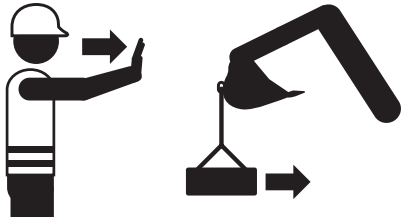
Hand Signals



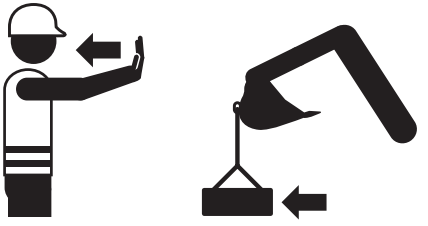
RAISE LOAD VERTICALLY.
With either forearm vertical, forefinger pointing up, move hand in small horizontal circle.



LOWER LOAD VERTICALLY.
With either arm extended downward, forefinger pointing down, move hand in small horizontal circle.

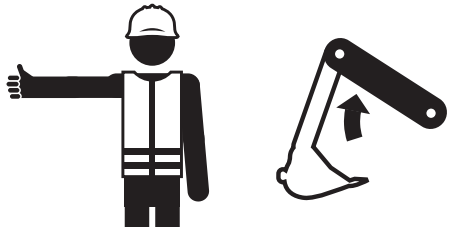


MOVE LOAD IN HORIZONTALLY.
With either arm extended, hand raised and open toward direction of movement, move hand in direction of required movement.

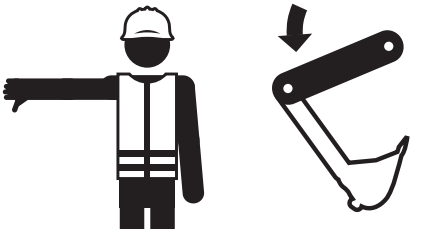


MOVE LOAD OUT HORIZONTALLY.
With either arm extended, hand raised and open toward direction of movement, move hand in direction of required movement.

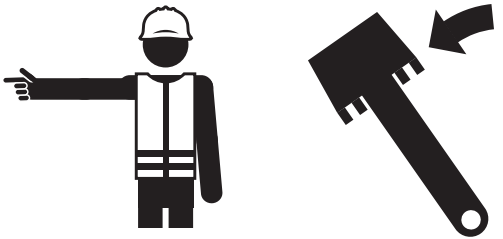
Hand Signals



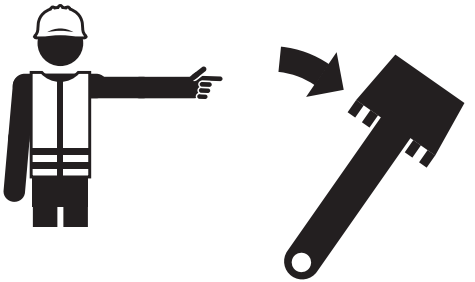
RAISE BOOM.
With either arm extended horizontally, fingers closed, point thumb upward.



LOWER BOOM.
With either arm extended horizontally, fingers closed, point thumb downward.

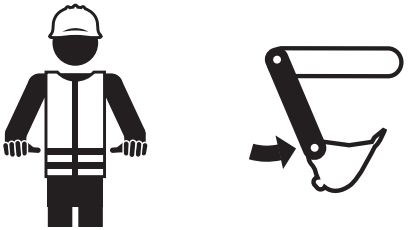


SWING.
With either arm extended horizontally, point with forefinger to direction of swing rotation.



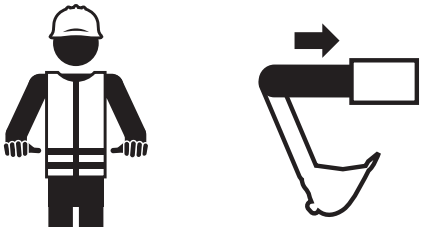
SWING.
With either arm extended horizontally, point with forefinger to direction of swing rotation.

Hand Signals

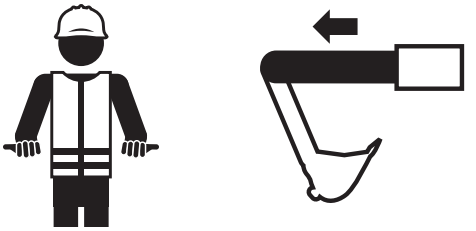


ARM/DIPPERSTICK INWARD.
With both hands clenched, point thumbs inward.

ARM/DIPPERSTICK OUTWARD.
With both hands clenched, point thumbs outward.

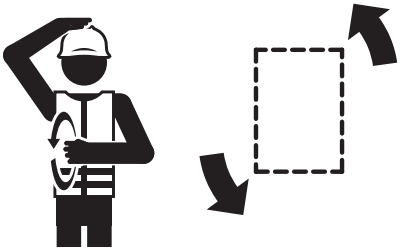


RETRACT TELESCOPIC BOOM.
With both hands clenched, point thumbs inward.

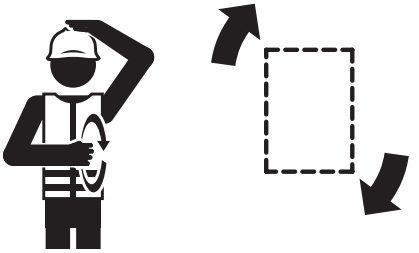


EXTEND TELESCOPIC BOOM.
With both hands clenched, point thumbs outward.

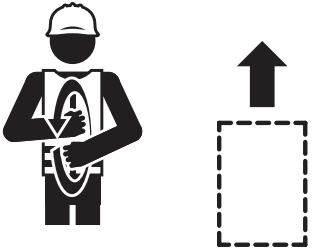
Hand Signals



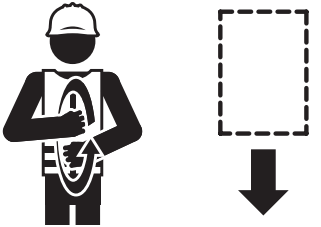
COUNTER ROTATE. Place hand on head indicating side of reverse track or wheel rotation. Move other hand in vertical circle indicating forward rotation of other track or wheel.



COUNTER ROTATE. Place hand on head indicating side of reverse track or wheel rotation. Move other hand in vertical circle indicating forward rotation of other track or wheel.

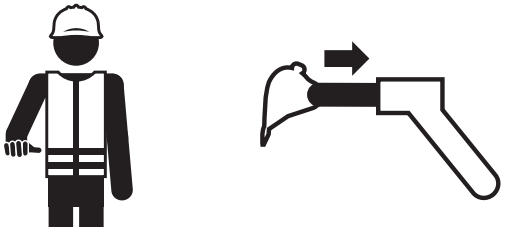


TRAVEL.
Move fists in vertical circle about each other in direction of track or wheel position.

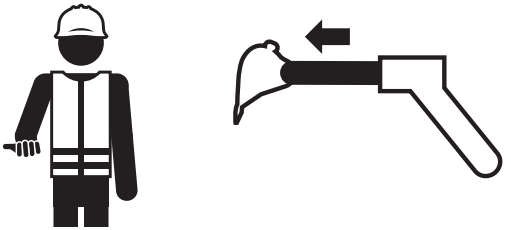


TRAVEL.
Move fists in vertical circle about each other in direction of track or wheel position.

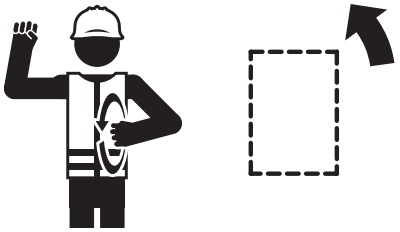
Hand Signals



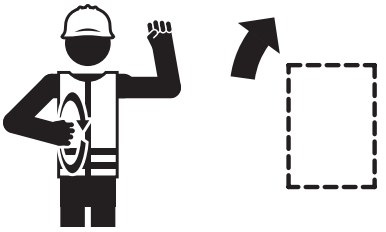
RETRACT TELESCOPIC ARM/DIPPERSTICK.
With either arm outstretched horizontally in front of body, close fingers and point thumb in direction of required movement.



EXTEND TELESCOPIC ARM/DIPPERSTICK.
With either arm outstretched horizontally in front of body, close fingers and point thumb in direction of required movement.

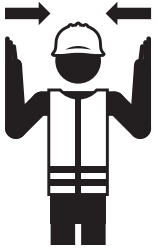


TURN.
Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.



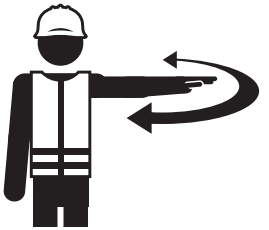
TURN.
Raise forearm with closed fist indicating inside of turn. Move other fist in vertical circle indicating direction of track or wheel rotation.

Hand Signals

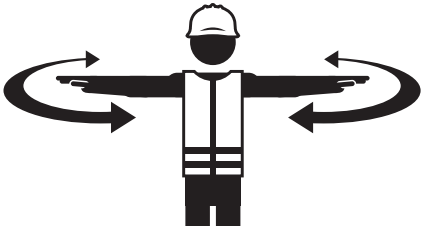


THIS FAR TO GO. With hands raised and open inward, move hands laterally, indicating distance to go.

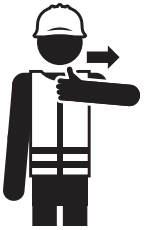
MOVE SLOWLY.
Place one hand motionless in front of hand giving motion signal. (Raise load slowly as shown.)



STOP.
With either arm extended laterally, hand open downward, move arm back and forth.



EMERGENCY STOP.
With both arms extended laterally, hands open downward, move arms back and forth.



STOP ENGINE.
Draw thumb or forefinger across throat.

Final Word to the User

You have just finished reading the AEM Carrier Mounted Hydraulic Breaker Safety Manual. It is impossible for this manual to cover every safety situation that you may encounter on a daily basis. Knowledge of these safety precautions and your application to the basic rules of safety will help to build good judgment in all situations. Our objective is to help you develop, establish and maintain good safety habits to make operating a Carrier Mounted Hydraulic Breaker easier and safer for you.

Many pictorials in this safety manual can be downloaded at http://pictorials.aem.org.

For additional publications, visit our website at www.safetymaterials.org.

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