Operation and Maintenance Manual

Bucyrus - UN-A-HAULER®
Model - CH816E AC

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Characters and symbols used

The following characters and symbols are used for safety instructions and important information in the operating manual.

Try to memorize the symbols and their meanings.

DANGER!
Points in the text marked with this symbol draw your attention to immediately impending danger. Possible consequences are: very serious injury or even death.

WARNING!
These points contain information on dangerous situations. Possible consequences are: very serious injury or even death.

CAUTION!
This symbol draws attention to dangerous situations. Possible consequences are: light to moderately serious injuries and machine damage.

NOTICE!
Points in the text marked with this symbol draw attention to harmful situations. Possible consequences are: damage to the machine or damage in the immediate vicinity.

IMPORTANT!
Points in the text marked with this symbol contain useful tips and information intended to facilitate work for you. They do not warn about harmful or dangerous situations.

- Items in lists are marked with bullets.
  - Points in sub-lists are marked with a long dash at the start of the line.

☞ Points in text marked in this way describe individual operations. Follow these instructions step by step. They will help you carry out your work faster and more importantly, safer.

Installation and start-up

inclined face

On inclined faces secure all component parts by chains.

environmental acceptability

When working with oils, greases and other chemical substances, observe the safety regulations applicable to the product.

Dispose of cleaning rags, etc. which have been soiled with oil, grease or other chemical substances in an environmentally safe manner.

controls

When starting up machine, do not operate any controls located inside the operator's compartment from outside the compartment.

starting procedures

Follow the starting procedure instructions in chapter 5 of this manual.

hazard zone

Do not operate any levers, pedals or controls if anyone is in the hazard zone. (See Hazard zone in Chapter 5 of this manual)

Operation

training

Operate the machine only if you have a profound knowledge of the control elements and their functions. It is necessary that you have been task trained on the respective UN-A-HAULER ©.

before start-up

Before start-up, ensure that there are no persons or obstructions in your line of travel or in the articulation area when steering the unit.

protective devices

Check that all protective devices are installed on the machine and function properly.

operator's compartment

Clean the operator's compartment at regular intervals. Ensure that the operating symbols are legible in order to avoid any operator errors and resulting accidents.

Never climb onto or out of the machine while it is in motion.

Do not operate the machine with any part of your body outside of the operator's compartment in order to prevent body parts from being crushed between the machine and outside objects .

traveling

Use extreme caution when traveling in close quarters or in congested or blind-travel areas. The warning gong should be sounded to alert personnel of your movement.

passengers

Never carry passengers. Passengers can be thrown off or crushed between the machine and outside objects.

safety rules

Always follow all safety rules of each particular mine when operating the machine.

problems and malfunctions

If problems or malfunctions are encountered while operating the unit, it must be properly shutdown and the problem corrected immediately.

Overview of safety instructions

WARNING!
In the event of an emergency, the UN-A-HAULER ® may also be shutdown by striking the panic strip. When the panic strip is struck, the machine circuit breaker will trip. This disconnects the motors and applies the automatic emergency brake. Be prepared for the sudden stop when the panic strips are struck.

WARNING!
The "BATTERY LIFT/ LOWER" control handle should never be operated except at a battery change station or when it's necessary to adjust the battery's terrain clearance. If the "BATTERY LIFT/ LOWER" control handle is operated in a low roof area, the battery may be damaged.

NOTICE!
The battery needs to be suspended prior to activating the battery lock or battery release handle to reduce stress on the frame, battery lift and batteries.

WARNING!
Never attempt to disconnect a hydraulic hose from the battery lifting cylinders while the battery is in the up position. This could cause the battery to fall and could result in serious injury.

WARNING!
Battery locks must be fully engaged before tramming the machine. If the locks are not engaged, the battery may fall.

WARNING!
Failure to maintain the hydraulic system will result in damage to the hydraulic components, which will result in increased wear and premature failure of said components.

WARNING!
Before performing maintenance on the machine, disconnect the electrical power. The battery circuit breaker and the machine circuit breaker must be in the "OFF" position. If work is to be done inside the electrical controller, the battery should be disconnected. Electrical shock and accidental machine movement can cause serious injuries or even death to you or the maintenance person.

WARNING!
If any welding is to be done to the machine, all circuit breakers must be off and the battery must be disconnected. Failure to do so may cause electrical component damage.

WARNING!
Do not move any hydraulic control lever unless you are certain that everyone is completely clear of any machine movement. Accidental machine movement can cause serious injuries or even death to you or the maintenance person.

Before transport

temperatures below freezing

Before transporting the equipment at temperatures below freezing, all hydraulic components operated with emulsion (HFAE or HFAS) must be completely drained and then filled with a corrosion inhibitor/frost-proofing fluid.

Transport of equipment at temperatures between -6° F and -40° F (-21° C and -40° C) is only permissible when certain measures were taken to meet these conditions at the design and manufacture stages. Nevertheless, the individual parts and devices of this equipment must not be subjected to sudden impact loads at such low temperatures and may only be loaded statically or quasi-statically.

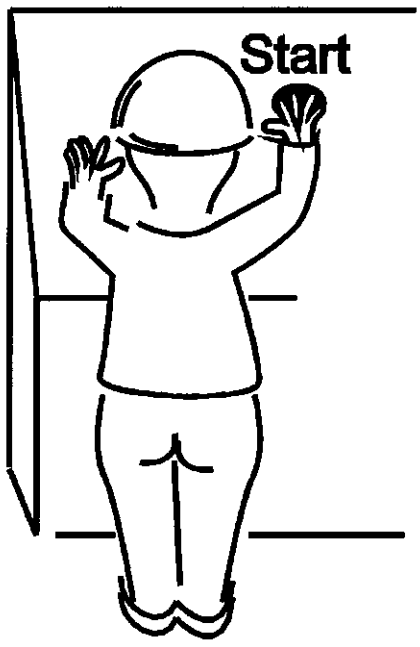
During transport of this equipment with floor-mounted vehicles at such low temperatures, measures must also be taken to ensure that the parts and devices are not subjected to sudden impact loads. At very low temperatures and on poor roads, the transport vehicle speed must therefore be limited to a maximum of 15 mph (25 kph) for truck transport.

electronic components

Electrical and electronic components must be removed for overseas transport or prolonged storage outdoors unless these components or the complete equipment is protected against harmful environmental influences by a suitable packaging.

The electrical cables remain in the equipment. They must be carefully protected against transport damage and soiling of the connections.

5 Operation



'EMERGENCY STOP"

The "EMERGENCY STOP" button (Fig. 14) is located to the left of the operator in the operator's compartment. Striking the "EMERGENCY STOP" with a small amount of force will open the machine circuit breaker, shutting down the machine. Before the machine can be re-started, the circuit breaker must be reset.

"COUNTER"

The payload "COUNTER" button (Fig. 14) is located to the left of the operator in the operator's compartment. To count payloads, press the "COUNTER" button after each load. To clear the count, press and hold the button for five (5) seconds.

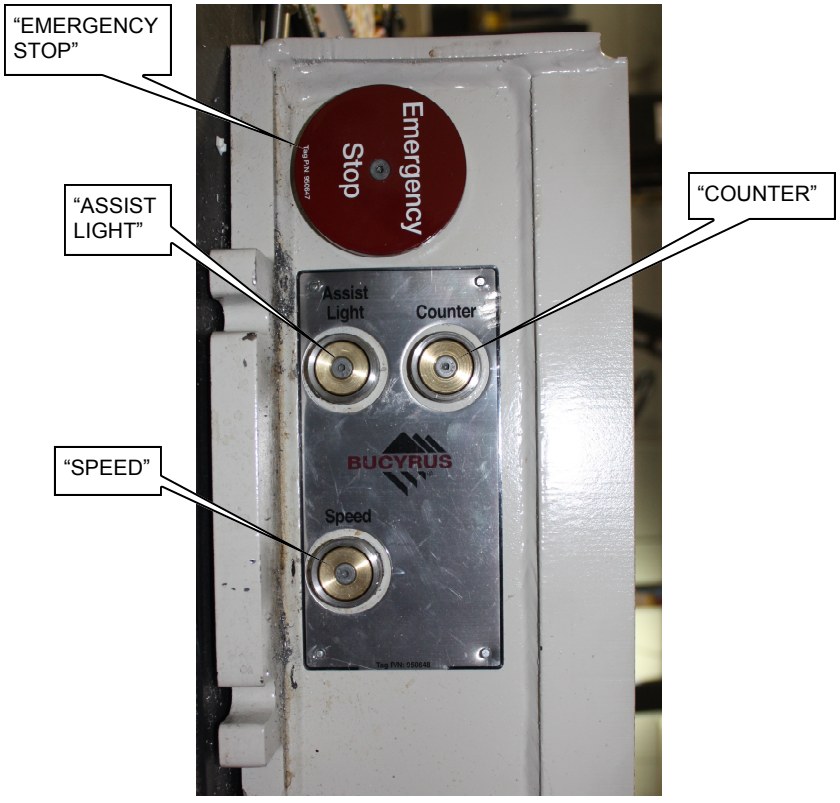
"SPEED"

The "SPEED" button (Fig. 14) is used to change tram speed from low to high or high to low.

"ASSIST LIGHT"

The "ASSIST LIGHT" button (Fig. 14) is used to turn the operator compartment light on and off.

Fig. 14: "EMERGENCY STOP", "ASSIST LIGHT", "COUNTER", and "SPEED" buttons

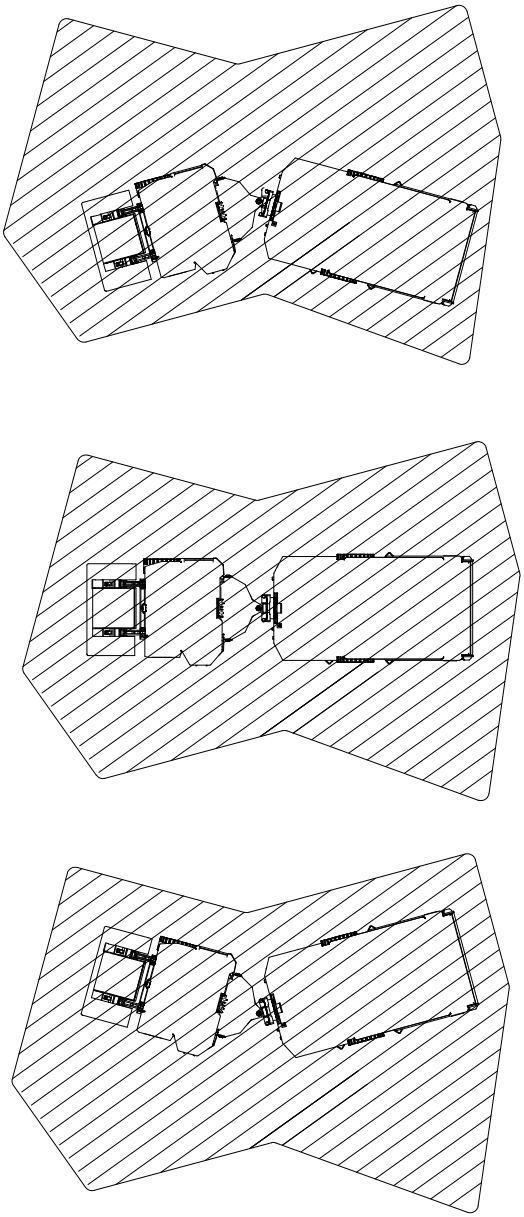


Hazard zone

The hazard zone exists unless:

- ☞ The battery plug is disconnected from the battery, OR;
- ☞ The machine circuit breaker is in the “OFF” or “TRIPPED” position, OR;
- ☞ The battery circuit breaker is in the “OFF” or “TRIPPED” position.

Fig. 22: Hazard zone



☞ After the battery is fully lowered, shutdown the machine (see Shutdown procedure in this chapter).

☞ After shutting down the machine, disconnect the discharged battery (reference Fig. 26):

- Unlock and remove the padlocks at the battery connector.
- Grasp the threaded lock ring and rotate it counterclockwise (CCW) until the threads are disengaged and it is free to slide away from the locking lug; the lock ring is designed to move freely but to not come off the plug.
- Grasp the plug and pull it out until the plug is completely disconnected from the receptacle; the plug is made to fit very tightly inside the battery receptacle and-should not be driven out of the receptacle, dropped, or handled roughly; if the plug (or receptacle) is damaged, it will not fit together properly.
- Install the cap which is secured to the receptacle on the battery by a small chain; this cap is placed over the threaded receptacle and rotated in a clockwise (CW) direction until hand tight and until a padlock will fit into the locking lug; the padlocks all use the same key.

☞ Connect the jumper cable (Fig. 29):

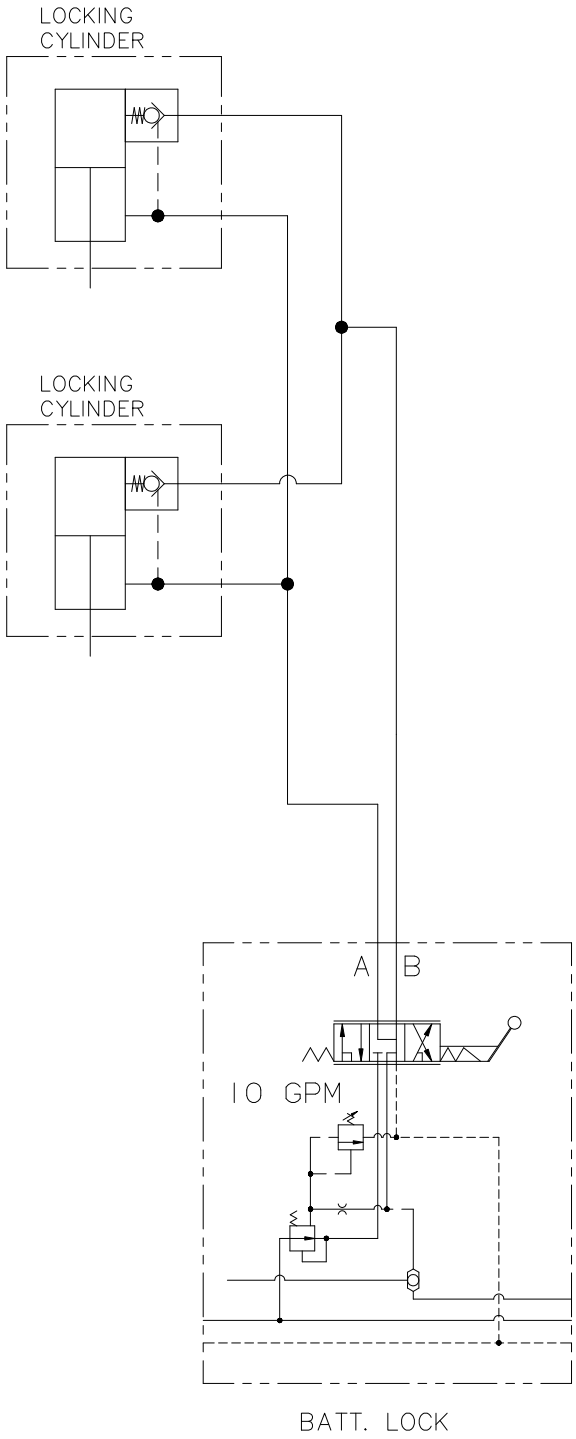
- Connect the receptacle end of the jumper cable to the plug coming out of the connection box on the machine.
- Connect the plug end of the jumper cable to the fully charged battery.
- Secure the jumper cable connections by using the threaded lock rings. These lock rings must be hand tight but do not have to be padlocked.
- One person should hold the jumper cable so it will not be damaged or be run over when the machine is moved.

battery lock

The battery lock working section is limited to 10 gpm and controls two battery tray locking cylinders equipped with load holding check valves.

The schematic shown in Fig. 38 is for reference only. Always consult the schematic in the Bucyrus parts book for your machine.

Fig. 38: Battery lock circuit



Instructions on the maintenance

Maintenance at regular intervals increases the operational safety and prolongs the service life of the machine. In particular, observe the safety instructions in chapter 2 “Your safety”.

Important notes

Please observe the following:

- In order to avoid individual components not being serviced or being only inadequately serviced during maintenance work on the machine as a whole, we recommend that a general maintenance plan be drawn up. You can, for example, draw up a checklist using this operation manual and the manuals of the other components.
- Inadequate maintenance can result in machine damage which leads to considerable costs.
- Use only suitable and approved tools for maintenance work.
- Use only original Bucyrus America, Inc. spare parts when replacing components.
- All electrical work must be supervised and inspected by a certified electrician.
- Anyone performing maintenance on this equipment must be trained to operate it and be familiar with this Bucyrus America, Inc. guide.

Before maintenance

Please observe the following:

- Shutdown the machine on level ground.
- Disconnect the electrical power. The battery circuit breaker and the machine circuit breaker must be in the "OFF" position. If work is to be done inside the electrical controller, the battery should be disconnected.

WARNING!
Before performing maintenance on the machine, disconnect the electrical power. The battery circuit breaker and the machine circuit breaker must be in the "OFF" position. If work is to be done inside the electrical controller, the battery should be disconnected. Electrical shock and accidental machine movement can cause serious injuries or even death to you or the maintenance person.

WARNING!
If any welding is to be done to the machine, all circuit breakers must be off and the battery must be disconnected. Failure to do so may cause electrical component damage.

fasteners (nuts, bolts and screws)

Loose fasteners will cause premature wear and failure to machine and components. Visually inspect for loose fasteners and tighten as required.

Electrical cables, conduits and glands

Visually inspect all electrical cables, conduits and glands for signs of wear or damage.

hydraulic hoses and connections

Visually inspect all hydraulic hoses and connections for signs of wear, damage or leakage.

tires

Visually inspect all tires for signs of wear or damage.

headlights

Turn on headlights and visually inspect for bulbs that need replaced or signs of damage.

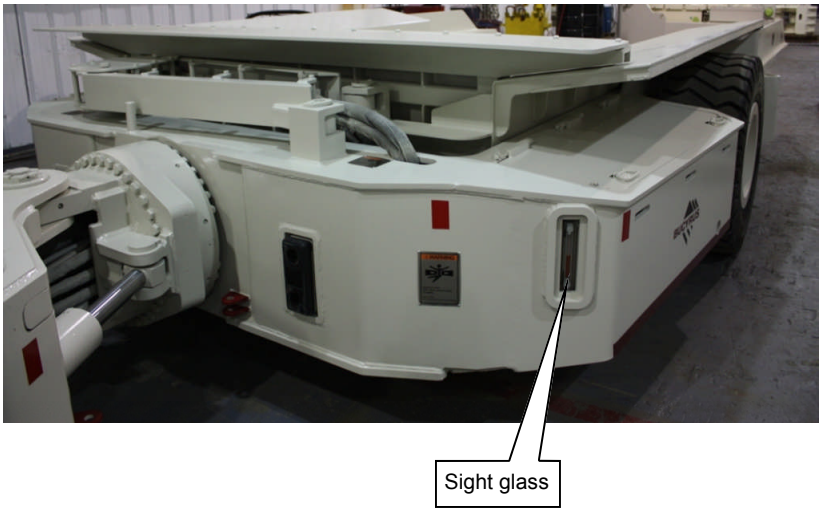
reflectors and warning plates

Visually inspect the condition and readability of all warning tags, labels and reflectors for signs of wear or damage. Replace any found missing or damaged.

hydraulic oil level

Check the hydraulic oil level by looking at the sight glass located on the oil tank (Fig. 54). If the oil level is low, add oil through the power fill hose located on the right of the tank until oil is visible in the sight glass.

Fig. 54: Hydraulic oil level



gear cases and planetary wheel ends

Change the oil in both gear cases and planetary wheel ends (Fig. 68).

☞ Remove the drain plug (or hose connection if equipped with rear tractive assist) from the gear case and planetary wheel end (common drain plug) and allow the oil to completely drain .

☞ Replace the drain plugs and refill with oil (Spec. 100-17) to full level on dipstick or until oil begins to flow from check/level plug.

Fig. 68: Gear case and planetary wheel end lubrication

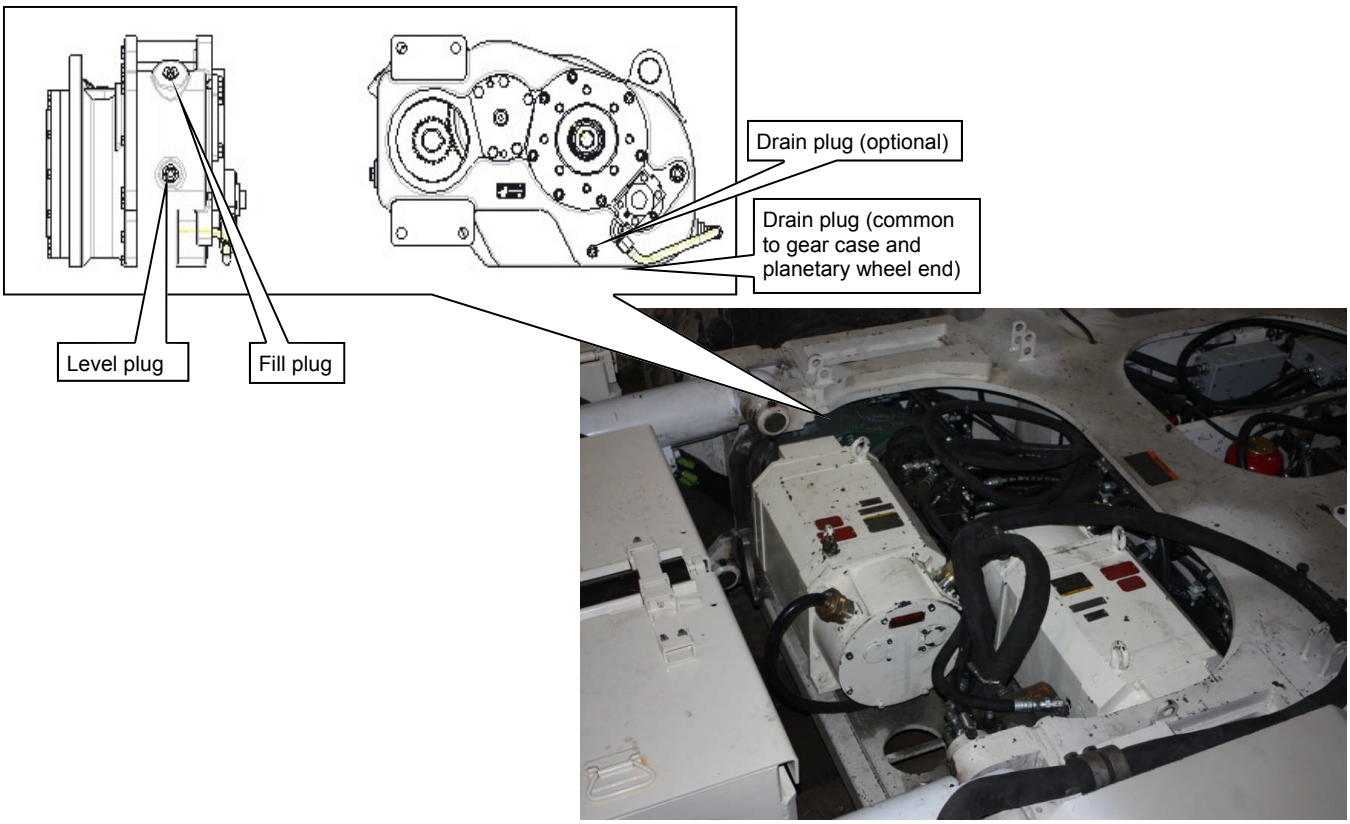


Fig. 73: Main relief valve access

Battery lift, steering, articulation, and tail gate cylinder valve adjustments

The battery lift, steering, articulation, and tail gate cylinders are equipped with load holding counterbalance valves and/or external induced load cross port reliefs. These valves are factory preset and should not be field adjusted.

Brake System

Accumulator

The brake system is powered by oil stored in an accumulator pre-charged to 1,000 psi.

To check the gas pre-charge:

- With the machine off, drain the hydraulic side of the accumulator via the drain valve located on the accumulator/tank manifold (Fig. 80).
- Turn the accumulator dump valve counterclockwise to relieve accumulator hydraulic pressure. After pressure is relieved, turn valve clockwise to fully close.
- Check the nitrogen pre-charge using a gas check device. Fill with dry nitrogen or drain as necessary.

Pressure reducing valve

The hydraulic oil to the accumulator is controlled by a pressure reducing valve located in the accumulator/tank manifold (Fig. 80) located in the center hydraulic compartment.

To adjust the pressure reducing valve:

Note: adjusting the pressure reducing valve is a two person task. One person must remain in the operator's compartment to read the pressure on the "ACCUMULATOR" gauge and to shut down the machine if required.

- Start the machine (see Start up procedure in this chapter).
- Read the pressure on the "ACCUMULATOR" gauge in the operator's compartment. The gauge should read 1,400 psi.
- If adjustment is required:
  - Loosen the hex jam nut that holds the adjustment stem in place.
  - Turn the adjustment stem **clockwise** (in) to **increase** the pressure or **counterclockwise** (out) to **decrease** the pressure until the "ACCUMULATOR" pressure gauge reads 1,400 psi.
  - Holding the adjustment stem in place, tighten the jam nut to secure.
  - Once the jam nut is secure, recheck the pressure setting to ensure the adjustment stem was not turned while tightening the jam nut.

Gear case and brake module removal and installation

WARNING!
Failure to observe the following procedures may result in bodily injury.

NOTICE!
Replace the brake spring assembly each time the disc pack is replaced.

WARNING!
Failure of a re-used brake spring shall reduce the brake effectiveness.

WARNING!
The retainer plate is under spring force. Remove hydraulic pressure before disassembly. Set the parking brake.

brake spring removal

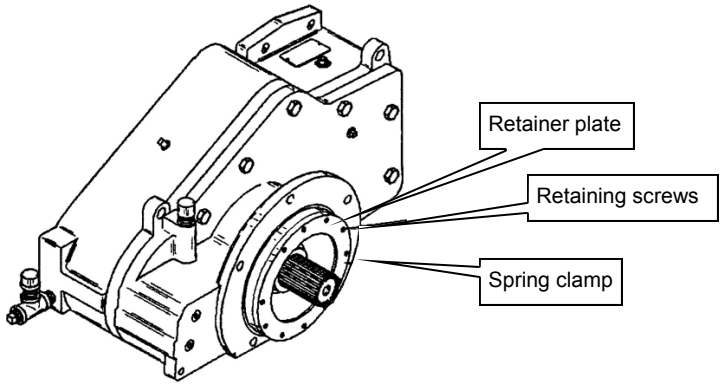
Disassembly procedure for removal of brake springs:

- ☞ Loosen the retaining screws (Fig. 87) by consecutively rotating the screws two turns counterclockwise. Continue this procedure until the brake spring pressure has been released.
- ☞ When the retaining screws have been rotated sufficiently to release spring pressure, the screws can be completely backed out by hand.
- ☞ Remove the bolts from the spring clamp.

WARNING!
The retainer plate is under spring force. Remove hydraulic pressure before disassembly. Set the parking brake.

- ☞ Remove the spring clamp.
- ☞ Remove the brake spring.

Fig. 87: Brake pack removal



Another mounting arrangement is based on holding a very close pilot fit where the tolerance between the wheel and hub is very tight, requiring a clamp-load force to hold the wheel securely in place. If the wheel studs or bolts are allowed to loosen, the load will be transmitted to them, resulting in sheared studs or bolts.

problem areas

Periodic wheel inspection is critical to the life cycle of a tire/wheel assembly. A fractured wheel, broken bolt pattern and missing or broken wheel studs are all contributors to tire/wheel failures. Problems in these areas occur as the result of repeated cyclical loading as the tire/wheel unit rotates during machine travel. Haulage vehicles loaded unevenly, downhill hauls with high speed turns, or operating a vehicle with one tire of a dual assembly damaged or flat are some examples of conditions that produce damaging high stresses in wheel assemblies. Also, the effects of corroding or poorly fitted mating parts can produce surface irregularities that result in cracks and ultimate failure of a wheel.

A most common problem with tire/wheel installations is the incorrect tightening of wheel bolts or studs. Threaded fasteners perform there function of holding things together better when torque control is used in their tightening. Using an accurate torque wrench correctly is the best and most practical way of securing fasteners, Although torque value charts are available as a reference guide to proper tightening, OEM specifications should always be followed when tightening fasteners. However, proper torque values are of little benefit if certain other factors are not considered.

wheel mounting tips

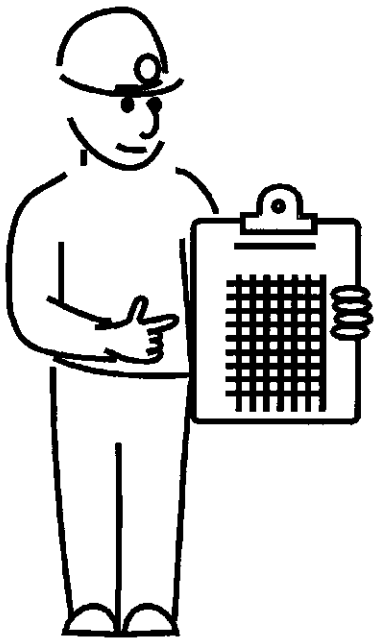
All fasteners should be examined before use. Any fastener that is worn, bent or has damaged threads should be replaced. Fastener threads should also be lightly coated with a protective substance, such as residual oils, wax or Loctite, because any oxidation or rust will upset the torque-to-tension relationship.

Mating surface conditions should also be considered. The tightening surface under the bolt or nut should be carefully inspected. A fastener, when tightened against a softer material, will gall under these conditions, and much of the applied torque may be lost through head friction. It is very important when using higher strength fasteners to have a smooth, even surface under the bolt head. In some cases, hard flat washers and most lockwashers will provide a good tightening surface.

An other area of concern is cleanliness. All mating surfaces should be free of rust, dirt, oil, paint, etc. Also no paint of any kind should exist between a fastener and wheel disc surface. Any form of contamination between these surfaces will most likely lead to serious wheel problems.

WARNING!
When torquing any wheel bolt pattern, always torque in a triangular pattern.

6 Technical data



Permissible media

Lubrication fluids and greases

NOTICE!
Use only lubrication fluids and greases approved by Bucyrus America, Inc.! These fluids and greases have been tested at Bucyrus America, Inc. and guarantee reliable operation of the mechanical and hydraulic functions of the machine.

IMPORTANT!
The lubrication fluids and greases listed in the same table can be mixed. Other products may only be used if the supplier can guarantee that they are equivalent.
Differently composed fluids and greases must not be mixed as this may change the consistency, i.e. the mixture can become thinner so that the lubrication effect is not sufficient. It may also be dangerous to use lubricating greases and fluids having the same specification base but different origins.
In case of doubt, the manufacturer of the lubrication to be used should be contacted as to the compatibility of the lubrication in question.

IMPORTANT!
Bucyrus America, Inc. expressly point out that the approval of the listed products relates only to the pure technical use in our mechanical and hydraulic systems. The responsibility for the constituents used in the hydraulic concentrates lies solely with the respective manufacturer.

IMPORTANT!
Be sure to use the manufacturer's instructions for use.

NOTICE!
When performing maintenance on the machine, all used oil and lubricants should be disposed of per your local EPA standards.