



Operation Manual

Bucyrus - UN-A-HAULER[®]

**Model - CH810B, CH816B,
CH816LB, and CH818**

Doc. No.: A6474X211



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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, e.g. to the support.
environmental acceptability	<p>When working with oils, greases and other chemical substances, observe the safety regulations applicable to the product.</p> <p>Dispose of cleaning rags, etc. which have been soiled with oil, grease or other chemical substances in an environmentally safe manner.</p>
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	<p>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.</p> <p>Never climb onto, or climb out of the machine while it is in motion.</p> <p>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 .</p>
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 to prevent the passengers from being 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.



CAUTION!

Be sure that the battery is properly aligned over the battery latch before moving away from the battery table.

CAUTION!

If the battery is not completely lowered before the UN-A-HAULER® leaves the battery change station, the battery may fall off or hit the roof and be damaged.

WARNING!

The "battery" change control lever 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" change control lever is operated in a low roof area, the battery may be damaged.

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!

Before performing maintenance on the machine, disconnect the electrical power. Either the battery circuit breaker or 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. Also make sure the capacitor discharge module indicates that the capacitors are discharged before working inside the controller. Electrical shock and accidental machine movement can cause serious injuries or even death to you or the maintenance person.

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.

WARNING!

You could be seriously injured or even killed by falling loads. Observe the safe working load limits of lifting or blocking devices and keep a safe distance from suspended loads.

NOTICE!

If any welding is to be done to machine, the circuit breakers must be in the "OFF" position and the batteries disconnected. Failure to do so may cause electrical component damage.



IMPORTANT!

The drive and pump motors do not require periodic lubrication. The pump motor bearings are sealed. The drive motors have one bearing sealed and the other bearing receives lubrication from the gear case oil.

CAUTION!

Do not adjust the hydraulic system pressure to more than the main system setting shown on the hydraulic schematic drawing located in the replacement parts manual for your particular machine.

4 Installation





Operation

This chapter contains important information on the operation and maintenance of the machine. It also includes instructions on the replacement of wear parts.

Read this chapter carefully and thoroughly. In particular, observe the safety instructions in chapter 2 “Your safety”.

How to operate the UN-A-HAULER ®

DANGER!

Incorrect operation endangers yourself and others!

Incorrect operation of the machine is often the cause of very serious accidents!

Operate the unit only when you have been sufficiently trained on the machine and have read and understood this operating manual. Should anything be unclear, please contact your immediate supervisor.

Who is allowed to operate the UN-A-HAULER ®?

The UN-A-HAULER ® is only allowed to be operated by persons with adequate knowledge of the complete machine.

This also includes:

- what safety devices are installed on the machine.
- where these safety devices are located.
- how these safety devices are to be operated.

When can operation be started?

Operation must not be started until the safe condition and proper function of the complete machine has been checked and the daily maintenance operations have been carried out.



“STEERING” control lever

The “STEERING” control lever to the left of the operator (Fig. 18) is used to steer the UN-A-HAULER ®. To steer left while moving forward (right while moving in reverse), pull the steering control lever slowly toward the operator. To turn right while moving forward (left while moving in reverse), push the steering control lever slowly away from the operator.

“EJECTOR” control lever

The "EJECTOR" lever (Fig. 18), operates the ejector blade/false bottom, located in the rear section. The ejector blade/false bottom pushes out everything in its path, emptying the rear section. When the "EJECTOR" lever is pushed by the operator, the ejector blade/false bottom should move toward the rear of the unit (extend). When the "EJECTOR" lever is pulled by the operator, the ejector blade/false bottom should move toward the operator (retract). When the ejector blade/false bottom is not being used, it should be resting in the retracted position.

WARNING!

Before moving the ejector blade/false bottom control lever, verify that no one has any part of his body between the ejector blade/false bottom and the front of the rear (payload) section. Also keep any obstructions from behind the ejector blade/false bottom so it can return completely to the front of the rear (payload) section.

“BATTERY CHANGER” control lever

The "BATTERY CHANGER" lever (Fig. 18) controls the battery changing system, which is made up of two hydraulic cylinders (battery lifting cylinders), one on each side of the battery. When the "BATTERY CHANGER" control lever is pulled by the operator, the battery-lifting cylinders will raise the battery. Pushing the handle away from the operator will lower the battery. On vertical lift battery change systems the battery lift cylinders are equipped with passive hold-down devices to prevent the battery from moving inside the machine. The hold-down pressure is regulated by a relief valve in the system (refer to the Maintenance section of this guide).

CAUTION!

The "BATTERY CHANGER" lever should only be operated at a battery change station. The battery may be damaged if accidentally raised in a low roof area.

WARNING!

The battery cannot be changed if the battery is not level when in the raised position. For more information on how to change the battery see Battery change procedure in this chapter.

WARNING!

Never attempt to disconnect a hydraulic hose from the battery lifting cylinders with the battery in the "UP" position. This would allow the battery to fall and could result in injury.



Battery change procedure (Vertical lift)

Two people are needed to change the battery in the UN-A-HAULER®. Since one person may step into the Hazard Zone, the other person (operating the UN-A-HAULER®) must be very careful and look each time before moving any levers or pedals. Take time now to re-familiarize yourself with the Hazard zone (Fig. 20).

WARNING!

The UN-A-HAULER® is equipped with a passive battery hold-down system. This system keeps the battery resting securely on the frame while the UN-A-HAULER® is in operation. The battery hold-down system requires no operator assistance. However, it is important that the battery be properly aligned over the battery latch.

NOTICE!

The battery table must be placed on level ground and the tires fully inflated (155 psi).

- ☞ Line up the battery end of the machine with an empty battery table (Fig. 23) (see Starting procedure in this chapter).

Fig. 23: Battery change procedure (vertical lift)

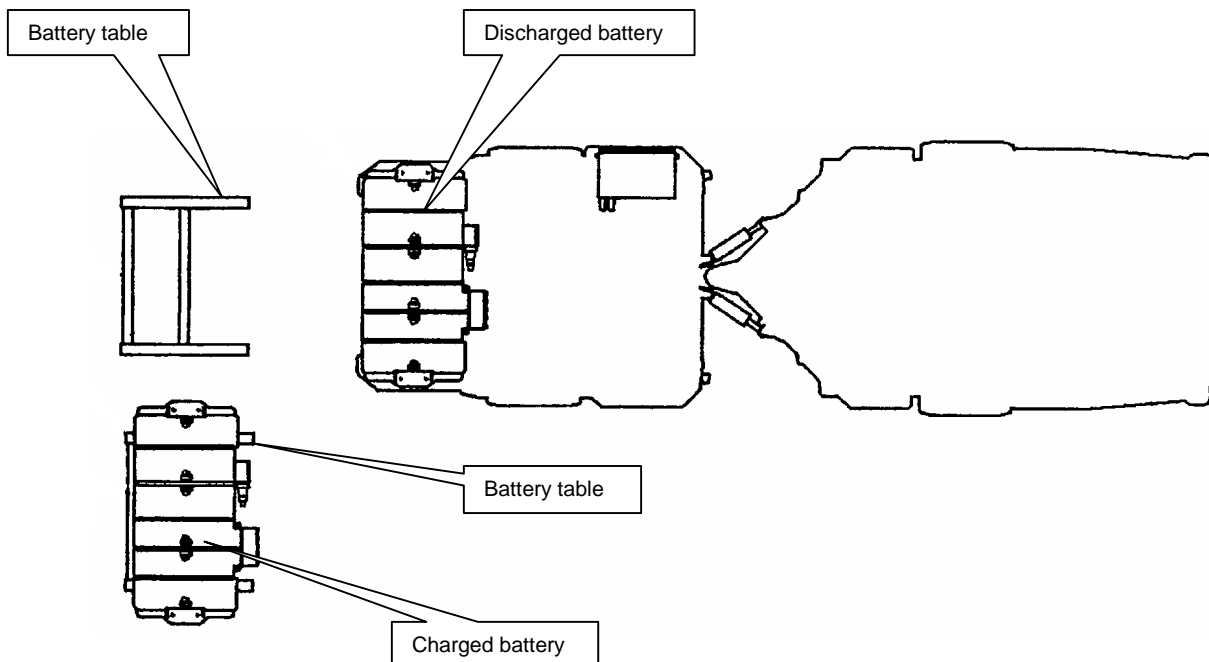
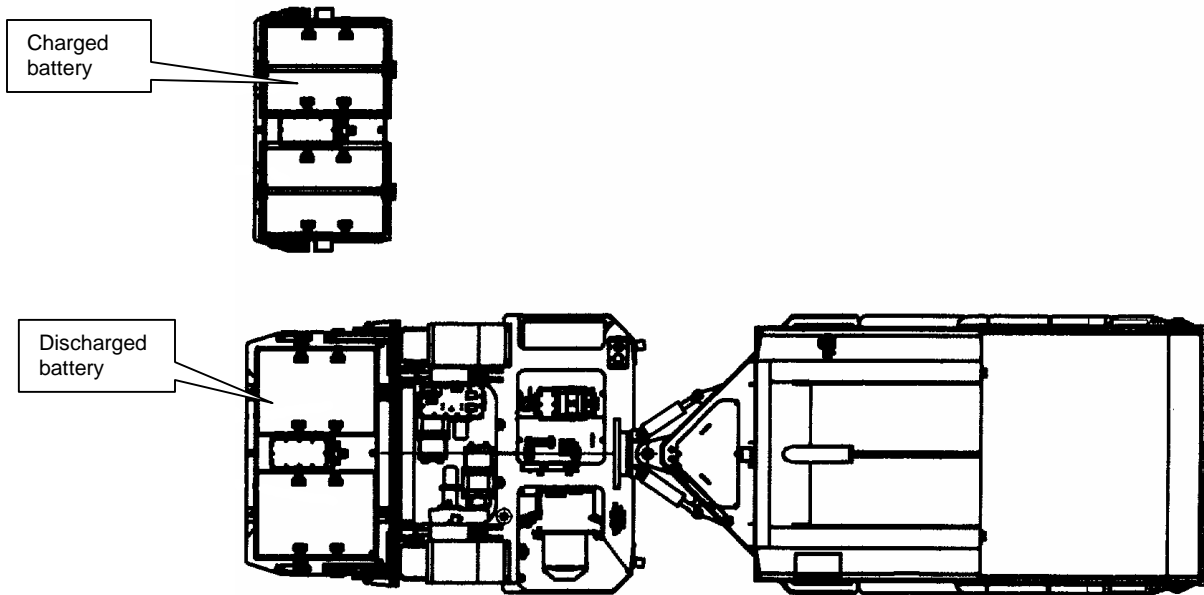


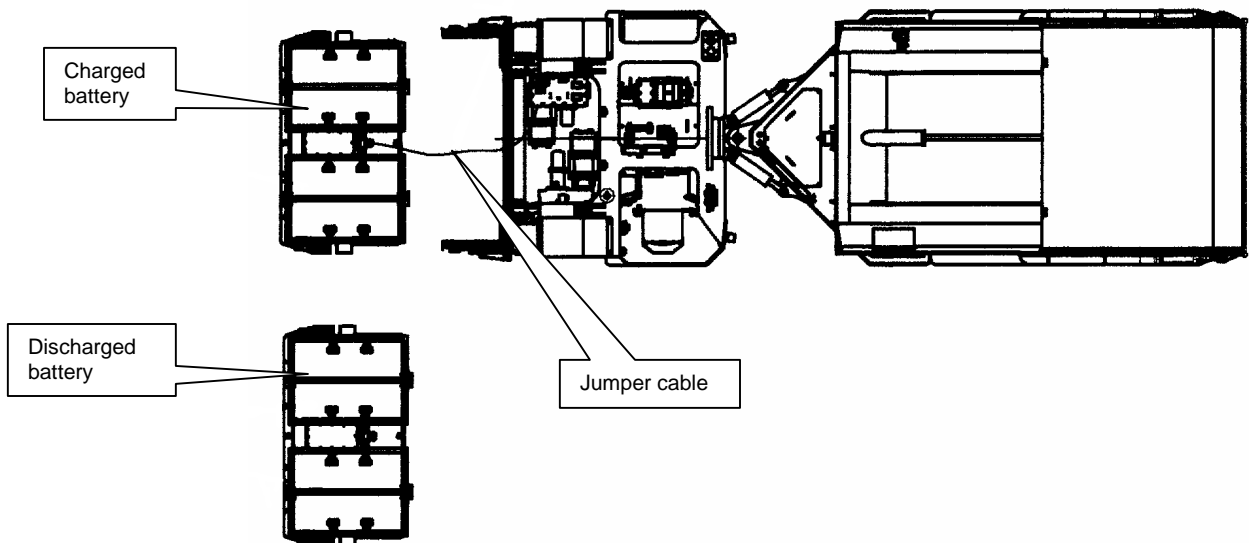


Fig. 37: Battery change procedure (CH818 ground level)



- ☞ Start the UN-A-HAULER ® (see Starting procedure in this chapter). Gently pull away from the discharged battery while the second person holds the jumper cable away from possible damage.
- ☞ Line the UN-A-HAULER ® up with the fully charged battery. Move the machine forward until the lift arms are aligned with the sides of the battery (Fig. 38). Continue moving forward until the lift arms are in correctly aligned under the slots in battery.

Fig. 38: Battery change procedure (CH818 ground level)





Critical torque values

Torque values are expressed in lubricated and dry thread values. Lubricated thread torque values should be used any time the bolt threads are covered with oil, grease, anti-seize or thread-locking compounds. Dry thread torque values should be used when threads are completely clean and dry.

Table 1: Critical torque values

Location	Bolt size	Grade	Dry	Lubricated
Steering cylinder pins			400	240
Tire-Wheel mounting bolts (Front)	3/4-16UNF X2-1/2	Grade 8	420	250
Tire-Wheel mounting bolts (Rear)	3/4-16UNF X2	Grade 8	420	250
Planetary wheel end-to-frame mounting bolts	3/4-NC 3-1/4	Grade 8	380	230
Gear case-to-frame mounting bolts	3/4-NC 2-1/4	Grade 8	380	230
Drive motor-to-gear case mounting bolts	3/4-NC 2-3/4	Grade 5	380	230
Center section (Outer ring) (810 & 816) * See note 1	7/8-NC 9	Grade 8	650	N/A
Center section (Inner ring) (810 & 816) * See note 1	1 1/4 NC 9	Grade 8	1886	

Notes:

- Retorque of these bolts should not be required due to the use of prevailing torque locknuts. If bolts require to be retorqued, new bolts and locknuts must be installed.

Lubricants, fluids and capacities

Table 2: Lubricants, fluids and capacities

Location	Specification	Approximate capacity	Notes
Hydraulic oil	Spec. 100-1	72 Gallons (816 and 818) 65 Gallons (810)	1
Drive sump (Gear case)	Spec. 100-8	4 Gallons Each	2, 3
Multi-Purpose grease	Spec. 100-3	As Required	4

Notes:

- With false bottom/ejector blade completely retracted.
- 4 gallons of oil to completely fill dry system. Actual level should be checked after running unit to fill cooling system. Use dipsticks (one in each drive gear case) to check oil level.
- Drain gear case and wheel end separately. Fill gear case only to proper level on dipstick.
- Pump grease into fitting until old grease can be observed coming out of component.

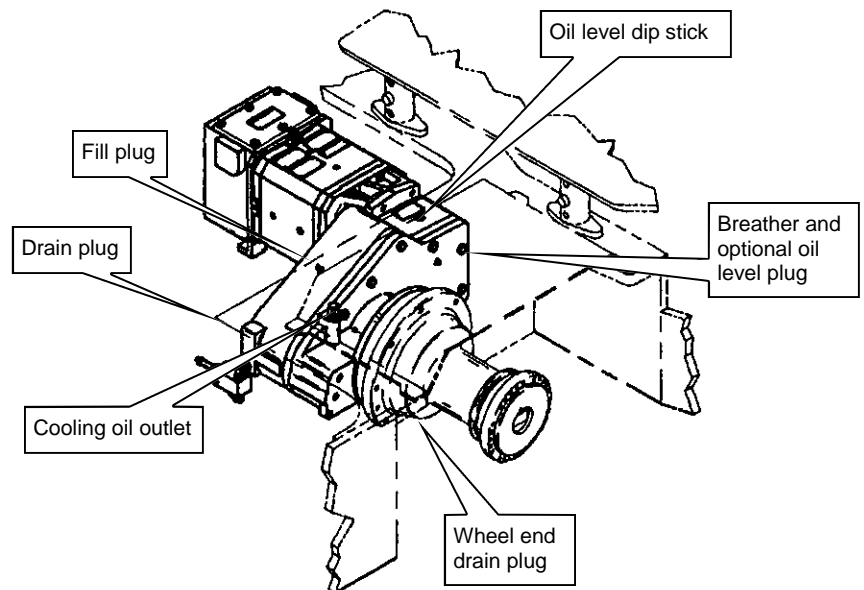


gear cases and planetary wheel ends

Change the oil in both gear cases and planetary wheel ends after the first week of service (Fig. 60).

- ☞ Remove the drain plug (or hose connection if equipped with rear tractive assist) from the gear case and from the planetary wheel end and allow the oil to completely drain.
- ☞ Replace the drain plugs and refill with oil to full level on dipstick or until oil begins to flow from check/level plug.

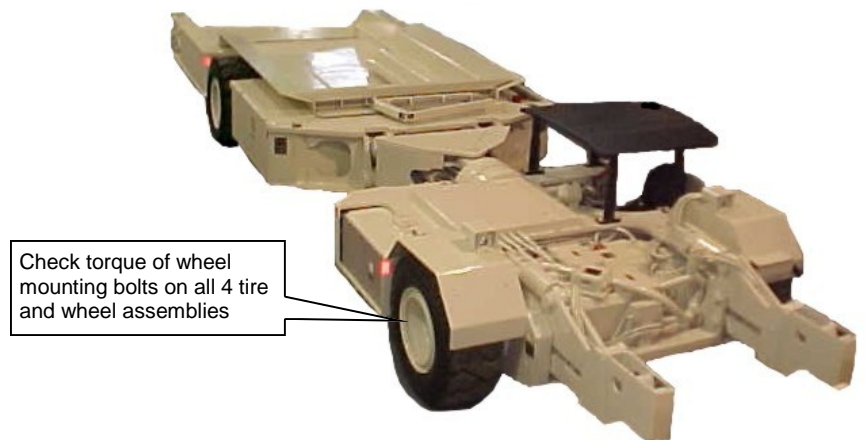
Fig. 60: Gear case and planetary wheel end lubrication



wheel mounting bolts

Check the wheel mounting bolts (Fig. 61). The mounting bolts should be torqued to 300 ft-lbs on the Model 810 and to 380 ft-lbs on Models 816 and 818. Use Loctite 242 on wheel mounting bolts.

Fig. 61: Wheel mounting bolts

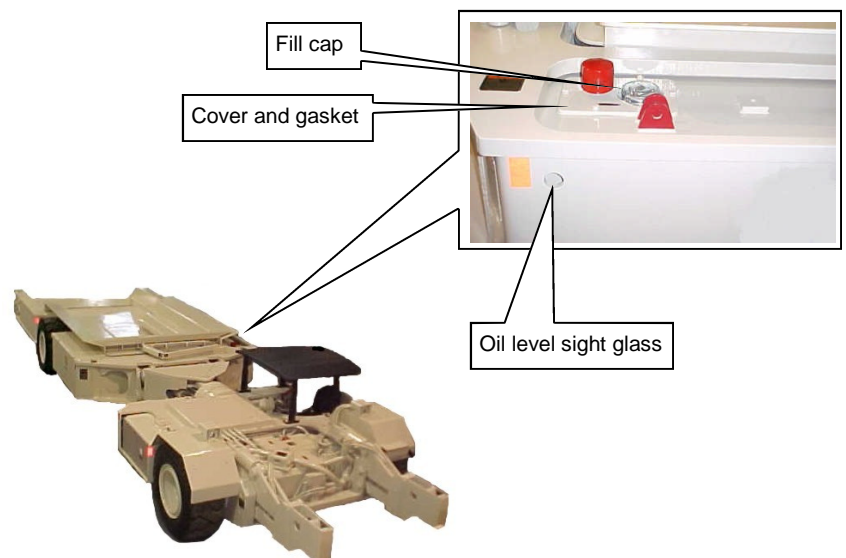


**hydraulic oil suction strainer**

Clean or replace the hydraulic suction strainer inside the hydraulic oil tank (Fig. 74).

- ☞ Remove the drain plug from the hydraulic oil tank to allow the oil to drain.
- ☞ Remove the oil tank cover and gasket.
- ☞ Reach through opening in tank and unscrew strainer from fitting.
- ☞ Replace the strainer with a new one or thoroughly clean the old one with kerosene and a soft brush. Dry the cleaned strainer with air before replacing in the tank.
- ☞ Replace the strainer in the tank and tighten hand-tight.
- ☞ Inspect cover gasket for damage and replace if necessary.
- ☞ Replace cover and gasket,
- ☞ Install drain plug.
- ☞ Refill tank to proper level with hydraulic oil (Spec. 100-1).
- ☞ Purge hydraulic system of air.

Fig. 74: Hydraulic oil suction strainer maintenance





Brake cooling circuit relief pressure adjustment

To adjust the steering relief pressure proceed as follows (Fig. 84).

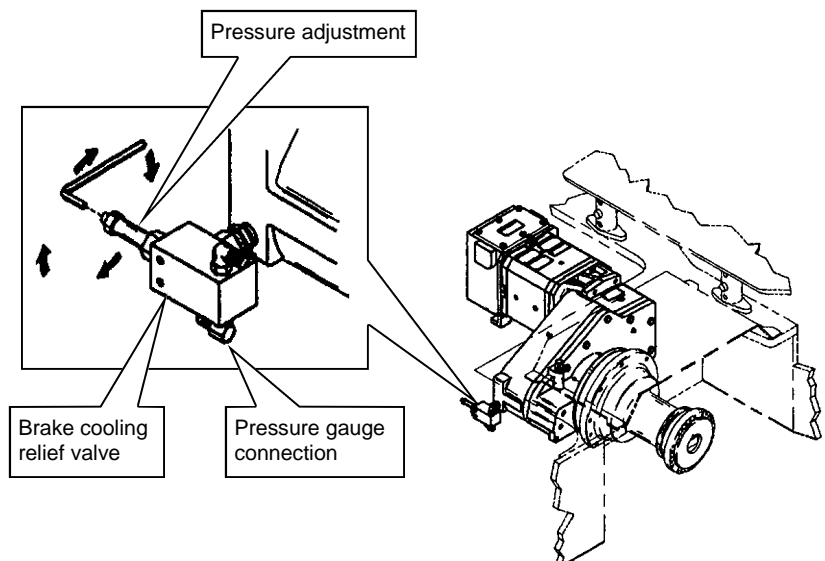
- ☞ Raise and securely block the machine off the ground so that all four (4) wheels are free to rotate.

DANGER!

You could be seriously injured or even killed by falling loads. Observe the safe working load of the lifting and blocking devices and keep a safe distance away from suspended loads.

- ☞ Remove the hose fittings from the top of the relief valve.
- ☞ With a gauge and suitable fittings, install the gauge onto the relief valve where the hose was disconnected.
- ☞ Start the machine, release the automatic brakes and slowly depress the accelerator pedal.
- ☞ As the drive wheels begin to turn, read the pressure indicated by the gauge. The pressure should be 50 psi. If the pressure is not 50 psi, continue to next step.
- ☞ Remove the cap that covers the pressure adjustment screw.
- ☞ Using an allen wrench, turn the screw until the correct pressure of 50 psi is indicated on the pressure gauge.
- ☞ Replace the cap on the relief valve.
- ☞ Remove the gauge and replace the hose in the relief valve.

Fig. 84: Brake cooling circuit relief pressure adjustment





Tailgate sequence valve adjustment (P/N LUP02119)

To adjust the tailgate sequence valve proceed as follows (Fig. 88 and 89).

WARNING!

Before moving the “EJECTOR” control lever, always check to make sure no one has any part of their body between the ejector blade/false bottom and the front of the rear (payload) section.



IMPORTANT!

Remember that counterbalance cartridges adjust opposite of relief cartridges. Turning the stem clockwise will reduce pressure.

The cartridges on the sequence valve are identified with numbers stenciled on the valve body beside the location of the respective cartridge.

- ☞ Ensure that the “SYSTEM PRESSURE” is set as specified on the hydraulic schematic supplied with your machine before beginning this procedure.

Extend cycle

Cartridges #3 and #4 should be minimized (Turn adjustment stem out in a counter-clockwise direction), prior to operating the Extend Cycle. These two cartridges control the sequential operation of the extend function and should prevent any movement of the false bottom or ejector, until the tailgate is fully open. Cartridge #3 controls oil flow to the false bottom cylinders extend ports and Cartridge #4 controls oil flow to the ejector extend port. If adjustment is required, proceed as follows:

- ☞ If the false bottom or ejector cylinders are extending while the tailgate is being opened, increase the setting of Cartridge #3 first, in full turn increments (Turn adjustment stem in clockwise), to inhibit any movement of the false bottom and ejector cylinders until the tailgate is fully opened. Once this is achieved, you may optimize the cartridge setting by decreasing the adjustment (Counter-clockwise direction) in fractional increments (e.g. 1/2hf; 1/4tr; 1/8th turns) to insure that the transition between functions is as smooth as possible. At this point, you may have to increase the adjustment of Cartridge #4 in like fashion to insure that the false bottom reaches full extension before the ejector will move. Again, you should optimize the cartridge setting for the ejector control to insure that the transition between functions is as smooth as possible.



IMPORTANT!

Insure that all the jam nuts have been locked down securely before returning the machine to service, to insure that the cartridge settings will be maintained.



Drive motor/ gear case removal and replacement

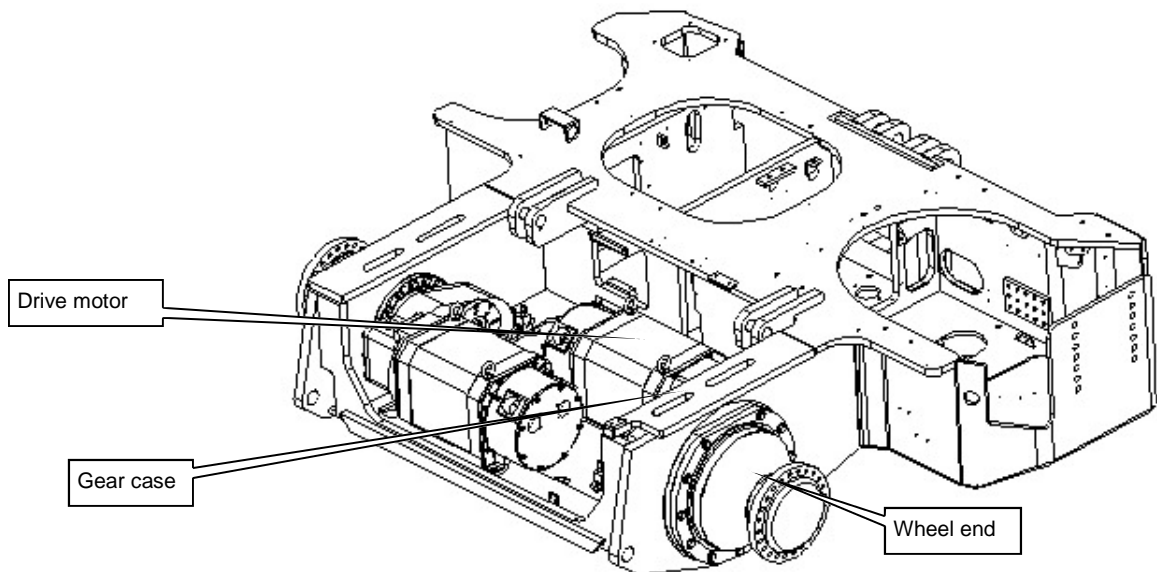
WARNING!

Power must be removed by unplugging the battery plug before servicing the motors.

drive motor removal

- ☞ Disconnect the power cables to the motor. Unpack the motor gland and completely remove the wiring and conduit from the motor.
- ☞ Attach a crane or hoist, capable of lifting the motor, to the eyebolt (Fig. 92) on top of the motor and take up any slack in hoist chain.
- ☞ Remove the four bolts that attach the motor to the gear case. Access holes are provided in the frame to the bottom motor bolts. Cover the reducer opening to prevent foreign matter from entering the gear case.
- ☞ Lift the motor out of the unit.

Fig. 92: Drive assembly component removal



drive motor replacement

- ☞ Verify that motor pinion gear is installed.
- ☞ Clean all mating surfaces (motor and gear case.)
- ☞ Lower motor into unit and align bolt holes.
- ☞ Bolt motor onto gear reducer turning pinion gear as necessary to align gears.



False bottom/ejector cylinder replacement

WARNING!

Because you will be working in between the false bottom and the front of the rear (payload) section, you must completely shutdown the unit (see shutdown procedure) and disconnect the battery plug to prevent accidental movement of the false bottom.

to remove false bottom

The ejector blade/false bottom assembly is operated by three hydraulic cylinders - one on the ejector blade and two on the false bottom.

- ☞ Extend false bottom to within 152 mm to 304 mm from the end of the machine (by hand if necessary).
- ☞ Shutdown the machine.
- ☞ Remove false bottom cylinder covers.
- ☞ Remove bolts (4 each) from false bottom cylinder clevis (2) located in outer end of false bottom.
- ☞ Start-up machine and fully extend false bottom cylinders. (Note: Be sure all persons are away from the false bottom before start-up). The cylinders will push out the clevises out from the false bottom exposing the pins.
- ☞ Shutdown the machine.
- ☞ Remove pins from rod end clevis that are now exposed.
- ☞ Start up machine and retract false bottom cylinders.
- ☞ Shutdown machine.
- ☞ Remove cylinder end pins and remove false bottom cylinders.

NOTICE!

A "port-a-power" unit can be used to press the cylinder end pins out from the false bottom cylinders by inserting the unit between the rear section frame and the pin.



PRECAUTIONS:

WARNING!

Do not install or remove tire/wheel assemblies from a machine without proper training.

WARNING!

Check wheel components periodically for cracks or broken parts. Replace all cracked, badly worn, damaged or severely rusted components. When in doubt replace.

WARNING!

Do not, under any circumstances, attempt to rework, weld, heat or braze any wheel components that are cracked, broken or damaged. Replace such components with new OEM parts of the correct size and type.

WARNING!

Mixing wheel parts of different design or from a variety of sources is potentially dangerous.

WARNING!

Replace broken studs and each unbroken stud next to the broken one.

WARNING!

Replace all damaged wheel studs or bolts.



Components of the CH816LB UN-A-HAULER ®

Technical data sheet

general	Overall length:	approx. 38' 4"
	Overall width tractor (extended deck option):	approx. 11' 2"
	Overall width trailer:	approx. 10' 8"
	Wheelbase:	approx. 19' 3"
	Weight (empty less battery):	approx. 54,300 lbs
	Weight (w/64-SS100-25 battery):	approx. 71,480 lbs
	Design gross vehicle weight:	approx. 107,480 lbs
	Component load capacity (max.):	approx. 36,000 lbs
	Cubic feet capacity (max. payload—calculated)	
	(w/no sideboards or tailgate) (heaped):	approx. 565 ft ³
	(struck):	approx. 365 ft ³
	Ground clearance (with 38" tires):	approx. 9.5"
	Canopy height (min) (with 38" tires):	approx. 42.5"
	Trailer height (with 38" tires):	approx. 42.5"
	Frame height (with 38" tires):	approx. 35.5"
performance	Turning radius:	
	(machine is designed to make a 90° turn in a 16.5' entry)	
	Steering articulation:	110° total
	Tram speed:	
	(speed will vary depending gear box ratios):	approx: 0-5 mph
	Discharge time:	approx: 25-30 seconds
Terrain compensation articulation:	approx: (+) 10° approx: (-) 10°	



Table 13: Extreme pressure gear oils (Spec. 100-2)

	Supplier	Brand name
1	Amoco Oil Company	Amoco Permagear EP 460
2	Gulf oil	EP Lubricant HD 460
3	Mobil Oil Corporation	Mobil Gear 634 Mobil Gear 636
4	Chevron U.S.A.	Chevron Gear Compound EP ISO 460
5	Sun Oil Company	Sunep 460
6	Unocal 76	Extra Duty NL Gear Lube 7 EP Extra Duty NL Gear Lube 8 EP
7	Shell Oil company	Shell Omala 680
8	Century Lubricating Oils, Inc.	Hulbest EP-7 Powergear 460
9	Texaco Lubricants Company	Meropa 680
10	Exxon	Spartan EP 460
11	Pennzoil	Super Maxol EP 460 Gear Lube Super Maxol EP 460 Gear Lube
12	Lubricating Engineers	608 Almosal Vari-Purpose Gear Lubricant
13	Conoco Inc.	Gear oil 460
14	Hydrotex	933 Industrial Gear Lubricant
15	Phillips	All Purpose Gear Oil 85W-90 5EP
16	Miners Oil	Gear Oil EP460



For your information

Our service

If you need to order spare parts or if technical problems occur, please contact our after-sales service personnel or contact us direct.

Service address

Beckley, WV

200 George Street, Suite 4
Beckley, WV 25801
Phone: (304) 256-5927
Fax: (304) 256-5928

Craig, CO

400 Mack Lane
Craig, CO 81625
Phone: (970) 824-3249
Fax: (970) 824-8851

Duffield, VA

P.O. Box 847
6808 Fraley Avenue
Duffield, VA 24244
Phone: (276) 431-7000
Fax: (276) 431-2464

Houston, PA

2045 West Pike Street
Houston, PA 15342
Phone: (724) 743-1200
Fax: (724) 743-1201

Carrier Mills, IL

9580 State Route 13 West
Carrier Mills, IL 62917
Phone: (618) 982-9000
Fax: (618) 982-9912

Oak Hill, WV

P.O. Box 60
843 Lochgelly Road
Oak Hill, WV 25901
Phone: (304) 469-3302
Fax: (304) 465-0450

Paonia, CO

P.O. Box 566
719 Second Street
Paonia, CO 81428
Phone: (970) 527-3151
Fax: (970) 527-6846

Washington, PA

255 Berry Road
Washington, PA 15301
Phone: (724) 743-1200
Fax: (724) 228-2177

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IMPORTANT!

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■ 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.



Personal precautions

- Have someone within range of your voice or close enough to come to your aid when you work near a battery.
- Have plenty of fresh water and soap nearby in case the battery electrolyte contacts skin, clothing, or eyes.
- Wear complete eye protection and clothing protection. Avoid touching eyes while working near a battery.
- If the battery electrolyte contacts skin or clothing, wash immediately with soap and water. If the electrolyte enters the eye, immediately flood the eye with running cold water for at least ten (10) minutes and get medical attention immediately.
- Never smoke or allow a spark or flame in vicinity of a battery.
- Avoid dropping metal tools onto a battery. It might spark or short circuit the battery or other electric parts that could cause an explosion.
- Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a battery. A battery can produce a short circuit current high enough to weld a ring or the like to metal, causing a severe burn.
- Never charge a frozen battery.

Preparing to charge precautions

- If it is necessary to remove the battery connections, always remove the grounded terminal from the battery first. Make sure all loads are disconnected and unit is off, so as not to cause an arc.
- Be sure the area around the battery is well ventilated while the battery is being charged.
- When cleaning battery terminals, be careful to keep corrosion from coming in contact with the eyes.
- Study all the battery manufacturer's specific precautions, such as: do not remove cell caps while charging, recommended rates of charge, and maintenance procedures.



Storage and transport

This chapter contains important information on the correct storage and transport of the battery charger.

Observance of the instructions and tips will increase the service life and availability of the battery charger. You will also be able to carry out the transport work quicker and more safely. Careful attention to the points in this chapter will help you to simplify your day-to-day work.

Storage

corrosion protection

Components coated with temporary corrosion inhibitor are protected for approximately six months.

Storage of the machine and spare parts

no direct exposure to sunlight

Store the equipment indoors or cover with a tarpaulin to protect against direct exposure to sunlight. Store the electrical equipment, electronic components, and spare parts of rubber or plastic only in closed rooms at temperatures of 60° F (15° C) to 77° F (25°C).

dirt and moisture

Protect the equipment and all spare parts stored outdoors against moisture and dirt, e.g. using tarpaulins.

short-term storage

During short-term storage (approximately 4 weeks) of equipment outdoors, but at temperatures above freezing, electrical components need not be removed. Such components must be particularly protected against excessive temperatures, dirt, and moisture.

long-term storage

If the equipment is to be stored more than six months, the equipment must be stored in a well ventilated, dry room. Do not store outdoors.

random sample inspection

After a storage period of approximately two years, a random sample inspection must be performed to determine whether the measures taken and the method of storage has prevented damage.

On request, the inspection can be carried out by Bucyrus America, Inc.



Ratings and specifications

Output Ratings

- DC voltage The Bucyrus Series Mine Chargers are factory set to finish at approximately 2.5 volts/per cell for lead acid batteries. the chargers are available in 32 cell (64 volt) or 64 cell (128 volt) output.
- Output current Output currents are given in Table 2.

Table 2: Output current

Charger Model	AC Current Draw (approx) 3-phase 480VAC/575VAC	Battery Ampere-Hour Charging Capacity	Output Rating (amps)
5	26 - 22	495	90
6	32 - 27	550 - 680	110
8	41 - 34	750 - 850	140
10	52 - 44	1000 - 1050	180
12	61 - 51	1200 - 1210	210
14	70 - 59	1375 - 1500	240
16	82 - 71	1600 - 2000	280

- Regulation The charge rate is dependent on the state of charge of the battery. automatic AC line voltage compensation regulates the DC output and maintains the charging curve.

Input Ratings

- AC voltage Taps are provided for various three phase AC input voltages with an AC input voltage range of $\pm 10\%$ of nominal. (For PA model chargers, see Fig. 5 for details.) (For all non-PA models, see Fig. 5 for details.)
- Input frequency range The input frequency range is 57 to 63 Hz (60 Hz nominal).

Electrical specifications

Refer to Table 2 for typical electrical specifications.



Start-up procedure

(Reference Fig. 4)

- ☞ With the AC input connected to the charger, turn the “ON/OFF” switch to the “ON” position.
- ☞ Connect the battery to the charger. After a 20 second delay, which assures proper battery connection, the input contactor will close. The battery charger will start to charge and the “ON CHARGE” light will turn on. This completes the “Auto start” sequence. (With the optional Ground Integrity circuit (PA models), the green start button must also be pushed in.)

The display will read, OUTPUT AMPS, push the select switch down once and the display will read DC VOLTAGE, a second push the display will read AMP/HOURS RETURNED and a third push the display will read ELAPSED TIME. Push the select switch UP and the unit will equalize the battery.

- ☞ When the 80% charge point is reached in the charge cycle, the “80% COMPLETE” light will flash. There will be an additional three (3) hours (6 hours in the equalize mode) of charge after this point is reached.
- ☞ When the charge cycle is completed, the charge 80% COMPLETE” light will turn on solid and the “ON CHARGE” light will turn on. The display will also alternate at one second intervals between the ‘AMP HOURS’, “CHARGE TIME”, and “COOLING TIME”. The “COOLING TIME” is the time since the charge cycle completed and is indicated in hours and minutes. When showing the ‘CHARGE TIME’, the “AMP HOURS” light will be off and the elapsed time light will be on. When showing the “COOLING TIME”, the “AMP HOURS” light will be on and the elapsed time light will be on.
- ☞ If for some reason the AC input voltage fails, the battery charger will turn off. During this interval, the time register in the auto timer is held at the present count. When the AC has returned to normal, the charge cycle resumes where it left off. (EXCEPTION: With the optional Ground Integrity circuit (PA models), the green start button must be pushed in.)

CAUTION!

Turn the “ON/OFF” switch to the “OFF” position when disconnecting the battery during the charge cycle to prevent arcing at the DC connector. Failure to comply with the above will result in damage to the battery and charger connectors.



Troubleshooting procedures

The following section lists possible problems that may be encountered with the battery charger and can aid in locating and correcting these problems.

CAUTION!

Hazardous AC and DC voltages are present within the battery charger's cabinet.

equipment

The only equipment required is a multimeter (volt-ohm meter).

General inspection

On servicing new equipment, before setting up any complicated testing, give the unit a general inspection. Check the following:

- ☞ Check the DC output cables, connections, battery type, and number of battery cells with the rectifier rating.
- ☞ Check the unit specifications with the customer order.
- ☞ Check the input connections, input voltage, and AC line breaker size.
- ☞ Check for shipping damage, loose connections, broken wires, etc.
- ☞ Certain failures can be caused by defective batteries and customer loads; make sure batteries and loads are free from defects.
- ☞ Check all safety switches.

NOTICE!

If the problem is found to be located in the printed circuit boards, the board should be replaced. No attempt should be made to repair circuit boards in the field.

Service information

Have the following information available when calling for troubleshooting assistance:

- Equipment model number and serial number.
- The actual AC input voltage.
- The DC output voltage with and without the battery.
- Result of the check of AC input fuse and DC output fuse.
- The actual DC output current and voltage when measured with the battery connected to the rectifier.



Part number: 622971
Model: BUC-8D
Output: Dual
Voltage/HZ: 480/575Volt/60 HZ
Battery size: 750 AH thru 850 AH
PA kit: No
AC 110 VAC outlets: Yes

Part number: 342512
Model: BUC-10D
Output: Dual
Voltage/HZ: 480/575Volt/60 HZ
Battery size: 900 AH thru 1020 AH
PA kit: No
AC 110 VAC outlets: No

Part number: 607184
Model: BUC-10d
Output: Single
Voltage/HZ: Dual
Battery size: 900 AH thru 1020 AH
PA kit: Yes
AC 110 VAC outlets: No

Part number: 222485
Model: BUC-12D
Output: Dual
Voltage/HZ: 480/575Volt/60 HZ
Battery size: 1100 AH thru 1200 AH
PA kit: No
AC 110 VAC outlets: No

Part number: 340131
Model: BUC-12D
Output: Dual
Voltage/HZ: 480/575Volt/60 HZ
Battery size: 1100 AH thru 1200 AH
PA kit: Yes
AC 110 VAC outlets: No



DANGER

ONLY TRAINED AND/OR AUTHORIZED PERSONNEL SHOULD PERFORM MAINTENANCE ON THE CONTROLLER.

FAILURE TO ADHERE TO DANGERS, WARNINGS AND CAUTIONS, NOTED IN THIS MANUAL, COULD RESULT IN SERIOUS INJURY OR DEATH.

FAILURE TO MAINTAIN THIS CONTROLLER IN STRICT ADHERENCE TO THESE INSTRUCTIONS AND WARNINGS IN THIS MANUAL COULD VOID THE WARRANTY.

There is an LED on the logic card which serves as an indicator of the status of the controller. The following diagnostics shall apply:

- **LED on** Controller operational
- **LED off** Power-up fault – check display or calibrator. If all is blank, then replace logic.
- **1 Flash** **Personality CRC EEPROM Error.**
Using the hand-held calibrator, change a password to any number then recycle power – should clear, otherwise replace logic.
- **2 Flash** **Procedure FAULT**
FS1 closed before power on ,2 Directional Fault or Current imbalance fault. Recycle through NEUTRAL to clear.
- **3 Flash** **IGBT permanently low (IGBT Short Circuit FAULT).**
This includes IGBT short circuit or IGBT open circuit. This fault shuts down all modes. Recycle through NEUTRAL to clear.
- **4 Flash** **Motor neither low nor high (Breaker Open FAULT).**
This includes breaker open circuit or IGBT open circuit. This fault shuts down all modes. Recycle through NEUTRAL to clear.
- **5 Flash** **Motor permanently high.**
This includes breaker welded. This fault shuts down all modes. Recycle “KEY” to clear.
- **6 Flash** **Faulty TRACTION accelerator.**
This includes the accelerator greater than 15% at power on and wire-off. If wire-off occurs during active function then the motor speed will set to zero. This fault auto-clears.
- **7 Flash** **Battery voltage FAULT.**
This includes battery below a predetermined value. Recycle through NEUTRAL to clear.
- **8 Flash** **Thermal cut-back (Over-Temperature FAULT).**
This includes Heatsink temperature above 95° centigrade.



NOTICE

AS TEMPERATURE RISES ABOVE 95° CENTIGRADE, THE CONTROLLER WILL LIMIT THE CURRENT TO 300 AMPS REGARDLESS OF DEMAND.

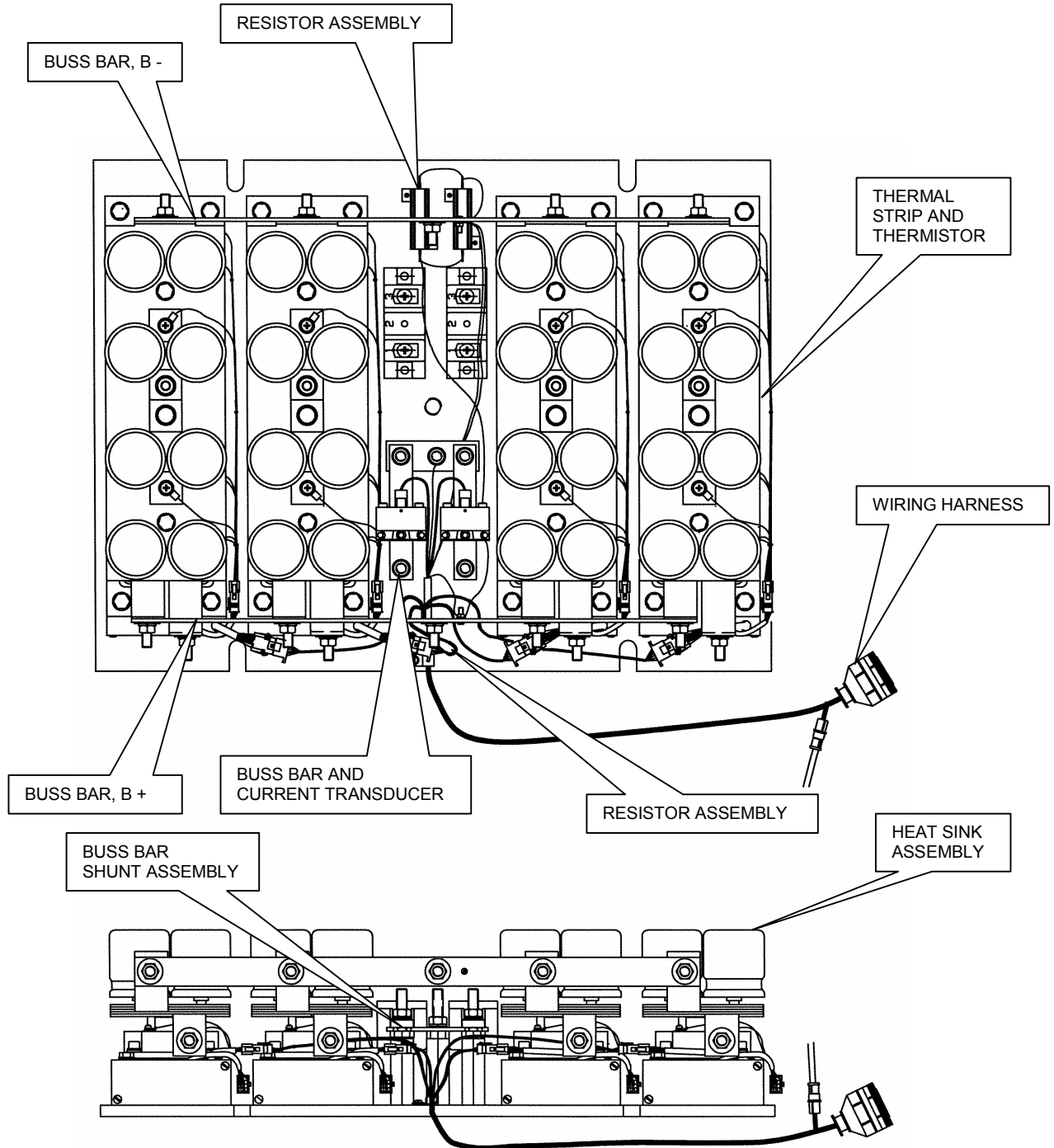
- **9 Flash** **UVR coil over-current FAULT (Coil short circuit FAULT).**
Cleared with “KEY” recycled.
- **10 Flash** **Brake on FAULT**
Will trip Directional and FS1 are energized without releasing brake. Recycle through NEUTRAL to clear.
- **15 Flash** **Current Transducer FAULT.**
Occurs when current output is read during power-up or if no current is read during drive above 50% demand. “KEY” recycle to clear.

Traction BDI Display

Display Name	Range / Notes	Security Level Displayed	Security Level Adjustable
% CHANGE LEFT	0 - 100%	ENGINEERING	ENGINEERING
BDI CELLS	35 - 80 (64)	ENGINEERING	ENGINEERING
RESET CELL LEVEL	1.85V - 2.50V (2.04V)	SERVICE ADVANCED ENGINEERING	SERVICE ADVANCED ENGINEERING
EMPTY CELL LEVEL	1.00V - 1.99V (1.70V)	SERVICE ADVANCED ENGINEERING	SERVICE ADVANCED ENGINEERING
WARNING LEVEL	0% - 90% (20%)	SERVICE ADVANCED ENGINEERING	SERVICE ADVANCED ENGINEERING
CUTOUT LEVEL	0% - 90% (0%)	ENGINEERING	ENGINEERING
BATTERY CALLIBRATION VOLTAGE	1.00V - 10.0V (5-VOLTS)	ENGINEERING	ENGINEERING
BDI SAMPLE TIMER	1.0 - 255 SECONDS 2.0 (20 SECONDS)	ENGINEERING	ENGINEERING
DISPLAY WORKING	OK	ADVANCED ENGINEERING	ADVANCED ENGINEERING
DISPLAY STATUS	LOCK / ROTATE (ROTATE)	ALL	ALL
SELECT DASHBOARD DISPLAY STATUS	0 - 4 (BATTERY VOLTAGE, PUMP CURRENT AND MOTOR CURRENT) BATTERY VOLTAGE (1)	ALL	ALL
DISPLAY CONTRAST	0 - 127 1 (33)	ALL	ALL

IGBT Dual Motor Panel

FIGURE 16



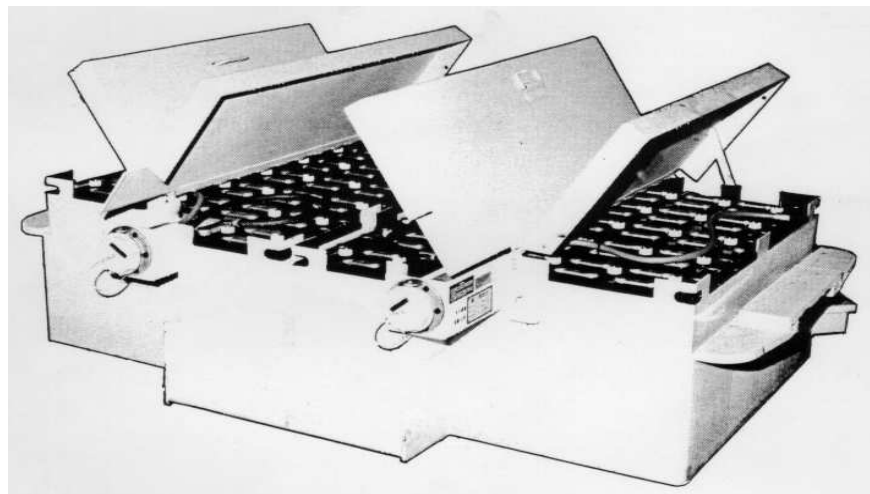


Installation, Use, Maintenance, and Repair

Bucyrus

Model - Mine Power Storage Batteries

Doc. No. A6474X26



Bucyrus America, Inc.

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Pulaski, VA 24301

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Internet: www.bucyrus.com



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 battery 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.



Maintenance and repair

Be sure to observe the prescribed maintenance and inspection intervals.

Inform the supervisory personnel and the face crew of any maintenance and repair operations. Give them information on the intended operations and the anticipated duration.

securing

Secure your working area over a wide range, in order to avoid endangering other persons.

Disconnect the battery from the machine to prevent unauthorized and unintentional restarting.

Protect your work area against falling rocks.

replacing components

Disconnect the battery from machine to prevent from restarting before replacing any defective components.

Pass defective components removed on for servicing without delay in order to prevent these parts being reinstalled elsewhere.

original parts

Use only spare parts which satisfy the specified technical requirements. This is only ensured with original Bucyrus America, Inc. spare parts. Please refer to the spare parts lists for the order numbers.

lifting

For raising the battery use only:

- crib blocks with adequate load-holding capacity.
- hoists, jacks or cranes with adequate load-carrying capacity.

maintenance, repair

Only persons who have and can demonstrate a special knowledge of electrics are allowed to work on the electrical system.

Avoid, whenever possible, servicing, cleaning or examining the battery in congested areas.

Always replace damaged or lost decals and metal instruction plates.

Disconnect the battery when working with the electrical system, or when welding on the unit, to prevent electrical shock.

Be sure the battery area is well ventilated (clear of fumes) when it is necessary to connect battery charger. Fumes from the battery could ignite from a spark and explode.

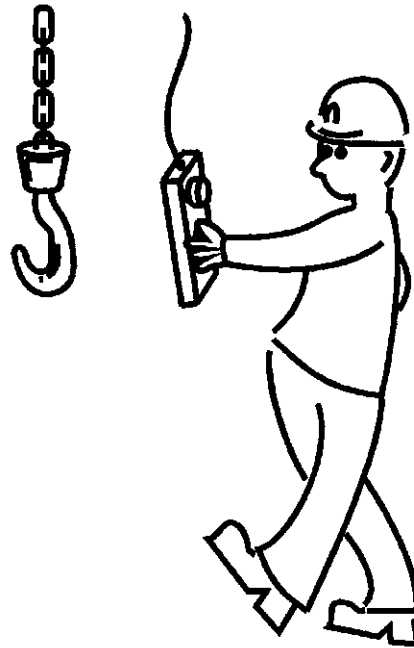
Always follow all safety procedures of each particular mine when performing maintenance.

It is important that any procedure not specifically recommended in this guide be thoroughly evaluated from the standpoint of safety before it is implemented.

Some illustrations in this manual show guards or cover panels removed for purposes of clarity. Never operate battery without guards or cover panels in place.

3

Storage and transport



5 Operation





Principles of operation

Fundamentals of cycling

A cycle is a discharge followed by a charge. During the charge, the electrical energy supplied by the charger causes an electromechanical reaction within the battery. This restores the active materials to a fully charged condition.

fully charged cell or battery

The positive and negative plates (electrodes) are separated from each other and immersed in electrolyte. In the fully charged condition, the active material of the positive plate is lead dioxide and that of the negative plate is sponge lead. The electrolyte is a solution of sulfuric acid and water that normally varies in a specific gravity from 1.280 to 1.295. The combination produces a voltage of approximately 2 volts on open circuit. This voltage potential results from the fundamental characteristic of a storage battery which dictates that when two electrodes of dissimilar metals are immersed in suitable electrolyte, and a circuit is closed between the two, electrons begin to flow. A fully charged cell should normally have an on-charge voltage of from 2.45 to 2.70 volts when charging at the finish rate.

discharging cell or battery

While a battery is being discharged or used, lead dioxide and sponge lead combine with sulfuric acid to form lead sulfate within both plates. This action causes the specific gravity of the electrolyte to decrease. As the discharge progresses, individual cell and battery voltages decline, generally in direct proportion to the rate of discharge.

discharged cell or battery

As the depth of discharge increases, more sulfuric acid is removed from the electrolyte, causing the specific gravity to decrease, possibly below 1.100 as it approaches the specific gravity of water. Almost all of the active material of both positive and negative plates is converted to lead sulfate, and an effective electromechanical reaction is no longer possible. At this point, the battery has reached its discharge limit.

charging cell or battery

The charging action begins when the terminals of the battery are connected to an external source of direct current. The electromechanical reaction is reversed and the positive plates, negative plates, and electrolyte start returning to their original charged condition. Charging causes the battery voltage to rise as active materials are restored. A cell being charged may have a voltage of from 2.12 to 2.70 volts depending upon charging rate and time.

general

Storage batteries do not actually store electrical energy; instead, they accept the electrical energy delivered to them during charging and convert it into chemical energy. During discharging, this chemical energy is reconverted into electrical energy to be used as needed.

To obtain the best performance and life from a mine power storage battery, the battery should usually be charged after each shift of use or whenever the specific gravity of the electrolyte falls below 1.240. It is very important that proper ventilation be provided during charging to make certain that the hydrogen gas, given off toward the end of the charging process is dissipated and that individual cell electrolyte temperatures, during normal operations, do not exceed 110° F.



Weekly

adding water

A certain amount of water loss in cells is normal and it should be replaced with "pure" tap water or distilled water. In some geographical areas, tap water may contain chemicals or other impurities harmful to batteries. The NEMA recommendation for battery replacement water, Table 4, lists the maximum allowable impurities measured in parts per million (ppm).

Table 4: NEMA recommendations for battery replacement water

Total Solids	350 PPM
Chlorides as Cl	25 PPM
Nitrates as NO 3	10 PPM
Iron as Fe	4 PPM

Notice!

Bucyrus America, Inc. provides water analysis service. A minimum of one quart of water is required. Consult your Bucyrus America, Inc. sales representative.

Check the height of the electrolyte at least weekly and if water is needed, add just enough to bring the electrolyte to proper level. Do not overfill. Water should only be added to batteries while the batteries are on charge and gassing, or as soon after recharge as possible.

Add water often enough to prevent the electrolyte level from dropping below the perforated separator protector. Ideally, a watering schedule should be established. This schedule should assure adequate watering while taking into consideration those factors which control water consumption, such as (1) frequency of charging, (2) water storage capacity of the specific cell type, and (3) age and condition of the battery.

battery top

Remove dirt or electrolyte accumulation from the tops of the cells. Wash weekly with clean water. Using a solution of baking soda and water (one pound of baking soda to one gallon of water), neutralize any acid which may be collected at cell or battery terminals to keep them free from corrosion.

Use the solution until all fizzing stops. Work the solution under the connectors. To remove all traces of soda solution and loose dirt, rinse the battery down with clear water from a low pressure hose. Whenever the battery top is being cleaned or rinsed, vent caps must be tightly in place.

CAUTION!

Vent caps must be tightly in place when the battery top is being cleaned or rinsed. Loose or open vent caps will allow contamination into the battery cell.



Excessive self-discharge correction

While a storage battery is in a charged state, a local electrochemical reaction takes place within the cells, which causes very gradual discharging. This reaction is known as self-discharge. A small amount is quite normal in mine power batteries where grids are made from anti-monial lead. The rate of self-discharge is temperature-related and increases significantly as temperatures rise. Table 6 shows the relationship between temperature and loss of specific gravity. The normal rate at 77° F to 80° F is a loss in specific gravity of about one point (.001) per day. This becomes of concern only when a wet battery is to be stored for weeks at a time. It can be ignored as a factor in normal battery operation.

It is possible, however, particularly during the latter stages of a battery's life, for the rate of discharge to become much greater and even limit the battery's duty cycle. Excessive self-discharge may be caused by defective separators or plates which have become shorted at the edges. Edge shorting is usually caused by loss of positive active material which can fill the sediment well or build up on the top or sides of the plates and eventually bridge the space between the positives and negatives. If a shorted condition seems likely, the element should be pulled for examination and the defective separator replaced, shorts cleared, or cells replaced. Usually, if the sediment well is full, salvage is impractical.

Table 6: Temperature effect on battery self-discharge

Temperature (°F)	Loss of Specific Gravity per Day
120	0.004
100	0.003
80	0.001
50	0.0005

Test discharge

A capacity test is sometimes desirable to determine a battery's actual discharge capability as compared to its 6-hour rated capacity.

This can be a significant diagnostic tool when equipment does not operate as expected and it can help determine when the battery should be replaced. When a battery consistently delivers less than 80% of its rated ampere-hour capacity, either some cells are substandard or the battery has reached the end of its useful life and should be replaced.

A test discharge is performed by discharging a fully charged battery at a fixed rate under carefully controlled test conditions.

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