A6474X268
August 2012

Operation and Maintenance Manual

Face Haulage

FH110 (CH810C)
FH120 (CH816C)
FH120 (CH816CL)

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.

Installation and start-up

inclined face

On inclined faces secure all component parts by chains, e.g. to the support.

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 machine.

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 climb 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 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.

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 (e.g. CV 50).

Transport of equipment at temperatures between -6° F (-21° C) and 40° F (-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

battery hold down

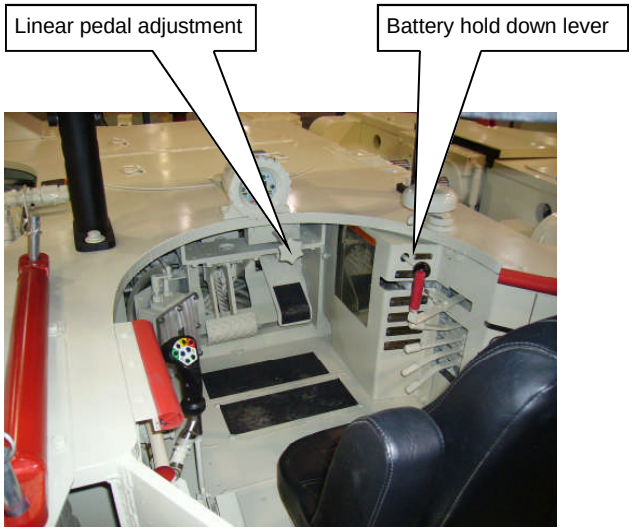
The battery hold down (Fig. 17), available on Models CH816C and CH816CL, is located directly in front of the operator's seat. It is used to secure the battery in position during tramming operations. To engage the hold down, push the handle away from the operator and to unlock, pull the handle towards the operator.

WARNING!
Always make sure the battery hold down is engaged after each battery change and disengaged prior to changing batteries. The batteries may be damaged if left unsecured during tramming operations.

linear pedal adjustment

The linear pedal adjustment (Fig. 17), available on Model CH816C, is located directly in front of the operator's seat. It is used to adjust the position of the pedals. See adjustment procedure in this chapter.

Fig. 17: Battery hold down lever and linear pedal adjustment lever location



Shutdown procedure

Tram the machine to its designated parking place.

Stop the machine by releasing the speed-switch foot pedal and depressing the foot brake pedal. When the speed-switch foot pedal is released, the tram (traveling) motors will stop. Applying the foot brake will stop forward (or reverse) motion. The hydraulic pump's electric motor will still be running, making a whining sound.

WARNING!
Always check before moving the ejector blade and false bottom control lever 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.

1. Pull the ejector blade/false bottom control lever toward the operator to move the ejector blade/false bottom to the front of the rear (payload) section. There should be no obstructions behind the ejector blade/false bottom.

Note: Refer to Fig. 21 for illustration of control handle.

2. Before leaving the operator’s compartment, press J3” to turn “OFF” the machine.

3. Turn “OFF” the machine circuit breaker.

4. Turn “OFF” battery circuit breaker and/or disconnect switch (if equipped) before leaving the machine area.

5. Connect the steering lockout device (Fig. 22):

    - remove the steering lockout device from its storage lugs
    - remove the hitch pin from the end farthest from the center section
    - adjust turnbuckle until holes line up between the turnbuckle lug and the front section lug
    - insert the hitch pin into the front section lug through the turnbuckle

WARNING!
Never enter the articulation area while the machine is running. Completely shutdown the machine as outlined before connecting the steering lockout device. Failure to observe this precaution may result in injury or death.

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:

1. 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) 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:

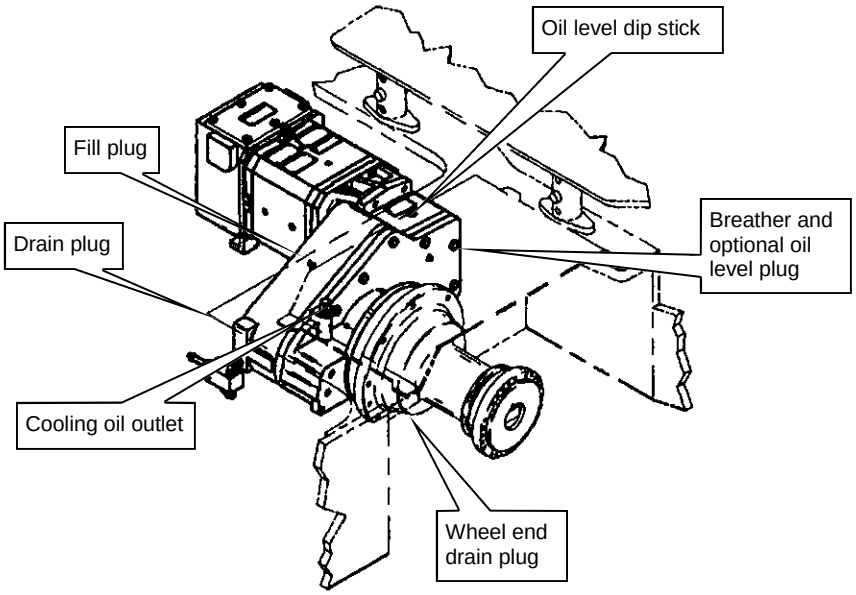
1. With false bottom/ejector blade completely retracted.
2. 4 gallons of oil to completely fill dry system. Actual level should be checked after running unit to fill cooling system. Use dipsticks (one in each drive gear case) to check oil level.
3. Drain gear case and wheel end separately. Fill gear case only to proper level on dipstick.
4. 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. 42).

- ☞ 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.

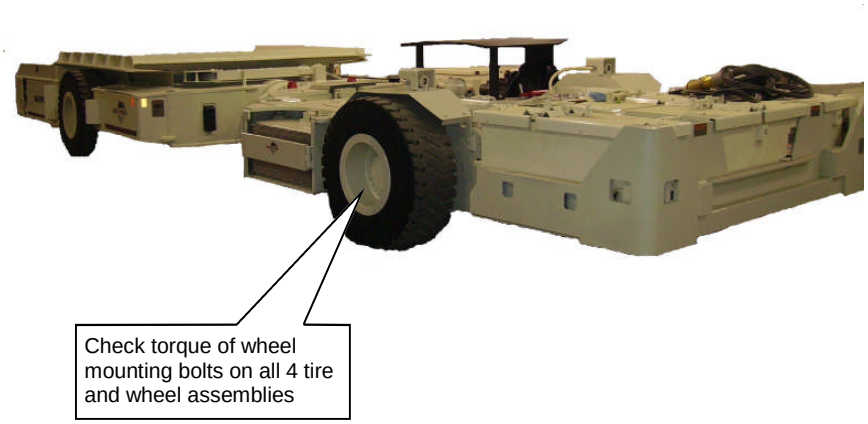
Fig. 42: Gear case and planetary wheel end lubrication



wheel mounting bolts

Check the wheel mounting bolts (Fig. 43). The mounting bolts should be torqued to 300 ft-lbs on Models CH810C, CH816CL and to 380 ft-lbs on Model CH816C. Use Loctite 242 on wheel mounting bolts.

Fig. 43: Wheel mounting bolts

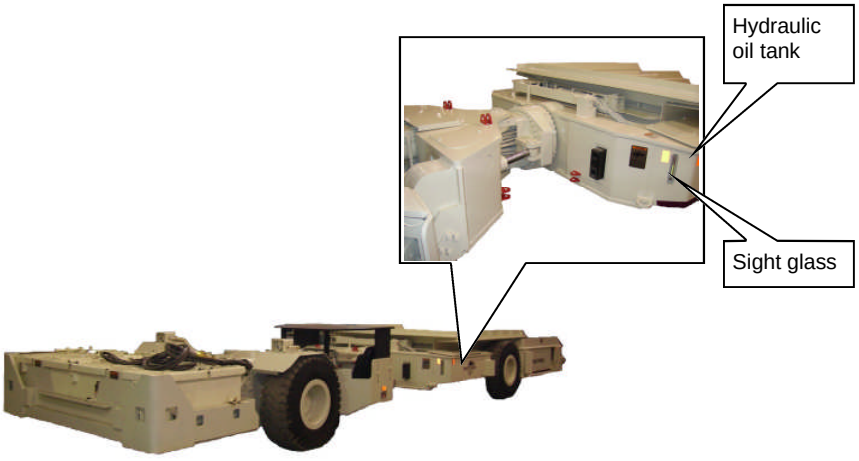


hydraulic oil suction strainer

Clean or replace the hydraulic suction strainer inside the hydraulic oil tank (Fig. 56).

- ☞ 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. 56: Hydraulic oil suction strainer maintenance



Brake cooling circuit relief pressure adjustment

To adjust the steering relief pressure proceed as follows (Fig. 65).

☞ 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.

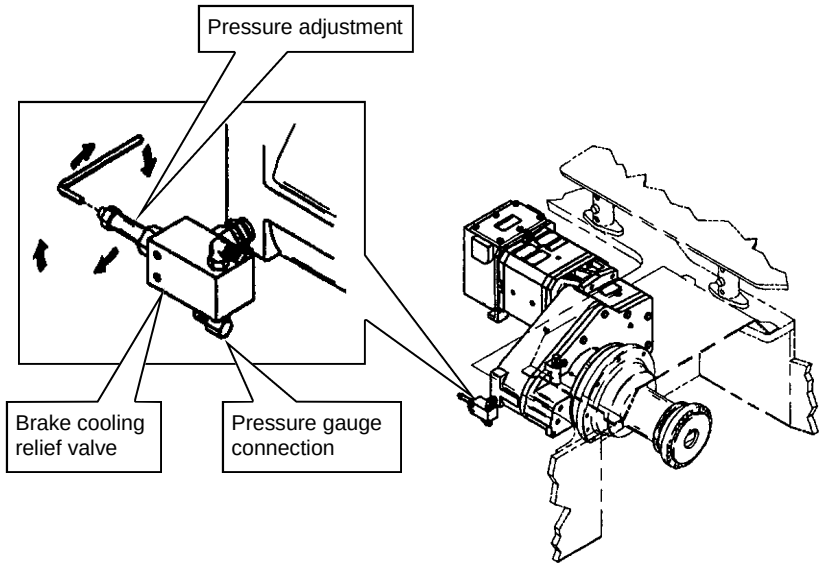
☞ Remove the cap that covers the pressure adjustment screw.

☞ 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. 65: Brake cooling circuit relief pressure adjustment



Tailgate sequence valve adjustment (P/N LUP02119)

To adjust the tailgate sequence valve proceed as follows (Fig. 69 and 70).

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.

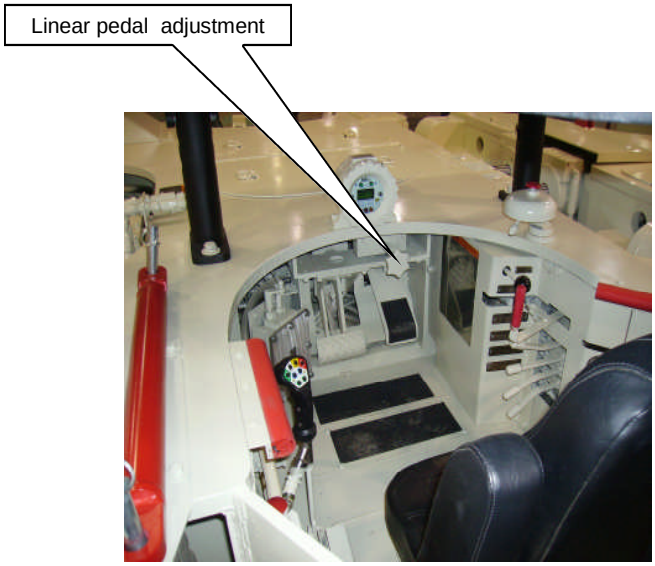
Linear pedal adjustment (if equipped)

To adjust the linear position of the pedals proceed as follows (Fig. 73).

☞ Turn the handle counterclockwise to move the pedals away from the operator.

☞ Turn the handle clockwise to move the pedals toward the operator.

Fig. 73: Linear pedal adjustment



Alternate gear case and planetary wheel end shim procedure number 3 (shimming procedure does not apply to Fairfield gearbox)

The purpose of the shim procedure is to set the axial end play between the gear case spacer (bronze) and the planet carrier/ wheel end from 0.005” to 0.030” (loose).

NOTICE!
The following procedure is an alternate, easier procedure that can be used instead of Procedure 1 or 2.

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.

☞ 1. To determine the correct number of shims required to fill the gap between the wheel end mounting surface and the brass sleeve: use a straight edge across the wheel end mounting surface on the wheel well plate on the machine tractor frame. Add the correct number of shims to fill gap between sleeve and appropriate straight edge being used.

☞ 2. Each shim is 0.025” thick. For example, if gap is 0.125” total, this will require five shims to fill this gap. Once you have determined the correct number of shims to fill gap, then remove the shims from the pinion shaft. Make certain during the process of determining the proper number of shims that the straight edge is resting against the mounting surface as you shim it outward. Do not have any gaps between the mounting surface and the straight edge during this process and make sure the sleeve is pushed back into the reducer until there is no slack present.

☞ 3. After removing the shims, record measurement. For example 0.125”, equates to five shims total as shown in the example above.

☞ 4. Document the measurement that is stamped on the mounting face of the wheel end. For example, a measurement of 0.083” could be a typical measurement.

☞ 5. Subtract stamped wheel end measurement from the total number of shims recorded from the above process. establishing the gap to be filled. For example 0.083” subtracted from 0.125” equals 0.042”. This means one shim needs to be added behind the sleeve. This will leave a clearance of 0.017”. Proper clearance of 0.005” to 0.030” must be maintained .

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.

Technical data

This chapter contains the most important technical data on the machine. Further data can be found in the spare parts lists. At the end of this chapter you will find information on the bolt tightening torques, HFA fluids, greases, etc. Read this chapter through carefully and pay particular attention in particular to the safety instructions.

The technical data listed in this chapter is for stock machines only. Customer specials may not be listed.

Components of the CH810C

Technical data sheet

general	Overall length:	approx. 38’ 4”
	Overall width tractor (extended deck option):	approx. 11’ 1”
	Overall width w/ 10.00 dual tires on tractor and 14.50XR15 tires on trailer:	approx. 11’ 3”
	Overall width trailer:	approx. 10’ 8”
	Wheelbase:	approx. 19’ 9”
	Weight (empty less battery):	approx. 52,900 lbs
	Weight (w/ 64-SS100-25 battery):	approx. 71,000 lbs
	Weight (w/ 64-SS85-25 battery):	approx. 69,500 lbs
	Design gross vehicle weight:	approx. 91,000 lbs
	Material capacity (max.):	approx. 20,000 lbs
	Component load capacity (max.):	approx. 24,000 lbs
	Cubic feet capacity (max. payload—calculated)	
	(w/no sideboards or tailgate) (heaped):	approx. 436 cu ft
	(struck):	approx. 221 cu ft
	Ground clearance (w/ 10.00R15 dual tires on tractor and 14.50XR15 tires on trailer):	approx. 8”
	Ground clearance (w/ 400/80R15 tires):	approx. 10”
	Min. canopy height (w/ 10.00R15 dual tires on tractor and 14.50XR15 tires on trailer):	approx. 40”
	Min. canopy height (w/ 400/80R15 tires):	approx. 41
	Trailer height (w/ 10.00R15 dual tires on tractor and 14.50XR15 tires on trailer):	approx. 38”
	Trailer height (w/ 400/80R15 tires):	approx. 41”
	Trailer frame height (w/ 10.00R15 dual tires on tractor and 14.50XR15 tires on trailer):	approx. 36”
	Trailer frame height (w/ 400/80R15 tires):	approx. 39”
performance	Inside turning radius:	approx. 11’ 6
	Outside turning radius:	approx. 24’ 4”
	Minimum entry width:	approx. 15’ 6”
	Steering articulation:	120° total
	Tram speed:	
	(speed will vary depending gear box ratios):	approx: 0-5 mph
	Discharge time:	approx: 30 seconds
	Terrain compensation articulation:	approx: (+) 15°
		approx: (-) 10°

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.

7 For your information

About this manual

This chapter provides important information making it easier for you to use this manual. You will also be given information on the structure of the manual and the symbols and characters used.

Before starting to work

applicable operating manual

Take care to ensure that the operating manual available to you is applicable for the type of equipment or machine used.

machine type

This operating manual is intended for:

BUC - Models 5, 6, 8, 10, 12, 14, and 16 Battery Chargers
Serial No.: N/A

and is only permitted to be used for equipment of this type.

new operation manual

The operating manual must be accessible at all times to all persons working on or with the machine. It should, if possible, always be available at the place of operation.

Send for a new operation manual immediately if the present manual is no longer complete or has become illegible.

Who is this operating manual intended for?

This operating manual is intended for those persons who work with or on the battery charger.
.
Every person working on the face or in the intersection between face and entry or in the entry must read this operating manual.

This includes persons who:

- are in charge of transport
- prepare the rise heading
- perform assembly / disassembly work
- operate the battery charger
- eliminate faults
- perform daily routine work on the face or in the entry
- perform maintenance work
- perform repair work

supervisory personnel who:

- initiate and/or
- supervise the activities just indicated.

Safety instructions

General rules

general

Always work with full concentration.

Familiarize yourself with your working environment.

noise emissions

Always wear your personal protective equipment. This also includes ear protectors as the noise emitted by other equipment in the area may at times exceed 85 db(A).

Inform your colleagues of:

- your exact location,
- the work you are performing, and
- the time that you will probably require.

safety equipment

Start the battery charger only when it is in a good and safe operating condition and all protective devices, e.g. EMERGENCY STOP devices, covers, etc. are correctly installed.

Observe the acoustic and optical start-up warnings of the machine.

symbol plates

Observe the symbol plates on the machine.

emergency stop

Press the “EMERGENCY STOP” switch immediately in the event of fault or irregularities in operation. Report any peculiarity to your superior so that necessary measures can be taken immediately.

lock-out

Lock-out and disconnect the power system while performing:

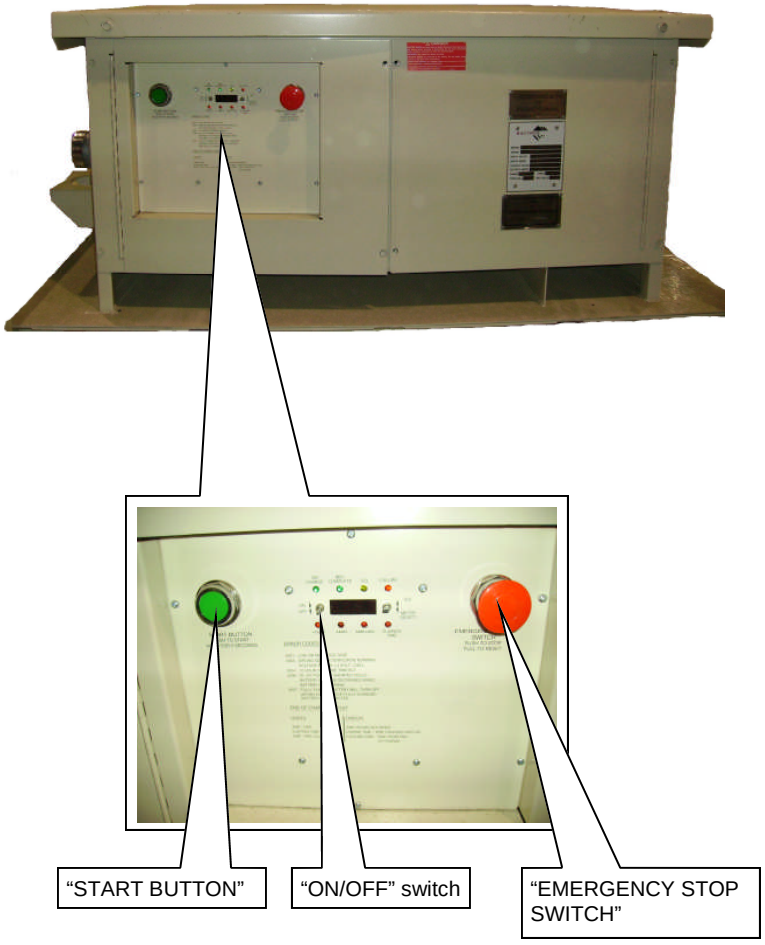
- maintenance work,
- inspection work, and
- repair work.

cordon off working area

Cordon off your working area widely for the unit.

3 Storage and transport

Fig. 1: Safety features of the battery charger



Operation

This chapter contains important information on the operation and maintenance of the battery charger. Read this chapter carefully and thoroughly. In particular, observe the safety instructions in Chapter 2 “Your safety”.

How to operate the battery charger

DANGER!
Incorrect operation endangers yourself and others!
Incorrect operation of the battery charger 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 battery charger?

The battery charger is only allowed to be operated by persons with adequate knowledge of the complete unit.

This also includes:

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

When can charging be started?

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

Instructions on the maintenance

Maintenance at regular intervals increases operational safety and prolongs the service life of the battery charger. 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 unit as a whole, it is recommended that a general maintenance plan be developed. For example, compile a checklist using this operation manual.
- Inadequate maintenance can result in battery charger damage, which leads to considerable cost.
- Use only suitable and approved tools for maintenance work.
- Use only original spare parts when replacing components.
- All electrical work must be supervised and inspected by a certified electrician.
- Anyone performing maintenance on this unit must be trained to operate it and must be familiar with this guide.

Before maintenance

Please observe the following:

- Shutdown the unit.
- Disconnect the electrical power. The power should be disconnected at the main power source.

WARNING!
Before performing maintenance on the battery charger, disconnect the electrical power. Electrical shock can cause serious injury or even death to you or the maintenance person.

- Do not perform maintenance in a congested area. This could endanger the maintenance person or others in the vicinity.
- Whenever a potential problem is uncovered during a periodic maintenance check, it is imperative that it be corrected immediately by a qualified maintenance technician.
- Cleanliness can not be overemphasized as the essential ingredient of a good maintenance program. Battery chargers should be kept as free as possible of dirt and debris which could impede performance and cause premature failure.

Part number:	**242167**
Model:	BUC-10S
Output:	Single
Voltage/HZ:	480/575Volt/60 HZ
Battery size:	900 AH thru 1020 AH
PA kit:	No
AC 110 VAC outlets:	No

Part number:	**334134**
Model:	BUC-10S
Output:	Single
Voltage/HZ:	480/575Volt/60 HZ
Battery size:	900 AH thru 1020 AH
PA kit:	No
AC 110 VAC outlets:	Yes

Part number:	**247630**
Model:	BUC-10S
Output:	Single
Voltage/HZ:	480/575Volt/60 HZ
Battery size:	900 AH thru 1020 AH
PA kit:	Yes
AC 110 VAC outlets:	No

Part number:	**216848**
Model:	BUC-12S
Output:	Single
Voltage/HZ:	480/575Volt/60 HZ
Battery size:	1100 AH thru 1200 AH
PA kit:	No
AC 110 VAC outlets:	No

Part number:	**334133**
Model:	BUC-12S
Output:	Single
Voltage/HZ:	480/575Volt/60 HZ
Battery size:	1100 AH thru 1200 AH
PA kit:	No
AC 110 VAC outlets:	Yes

Table of contents

1. About this manual

2. Your safety

3. Operation

Your safety

This chapter provides vital information for your safety. Pay special attention to this chapter. The safety instructions and rules of procedure will help you to avoid hazardous situations and to perform the necessary work as safely as possible.

state of the art

This machine has been manufactured in accordance with the state of the art and generally recognized safety standards and regulations. You and others can, nevertheless, be exposed to dangerous situations e.g. as a result of environmental influences, machine damage, or operator errors.

Do not make any alterations or modifications which could impair the safety of the machine. All modifications and changes must be approved by the original equipment manufacturer.

Use only original spare parts. Note that the use of parts from other manufacturers will void the guarantees.

In addition to this operating manual be sure to also observe the respective legal provisions and regulations in your country.

Observe the safety and accident prevention regulations:

- of the mine,
- of the mine inspector, and
- of the mining supervisory authorities.

Personnel

Repair

As a fundamental rule, repair work may only be carried out by personnel who have been adequately trained for these particular requirements.

Electrical repair work may only be carried out by Service Engineers or by specially qualified personnel of the mine. All electrical work is to be done by qualified persons, in accordance with all MSHA, Federal, State, and Local regulations.

Except where allowed by MSHA, Federal, State, and Local regulations, before conducting electrical work on this machine:

- the machine circuit breaker shall be turned off.
- the battery circuit breaker shall be turned off.
- the battery plug shall be disengaged/removed, and tagged out.

Since the windings of the motor are inductive, the current in the motor cannot change quickly. When the IGBT switch is closed, the current builds up slowly and when the switch opens, the inductance wants to keep the current flowing. For this reason, the "flywheel" diode is provided. Fig. 3 and 4 illustrate the current paths with the switch closed in both forward (Fig. 3) and reverse (Fig. 4) modes.

Fig. 3: Flywheel diode motor current (forward mode)

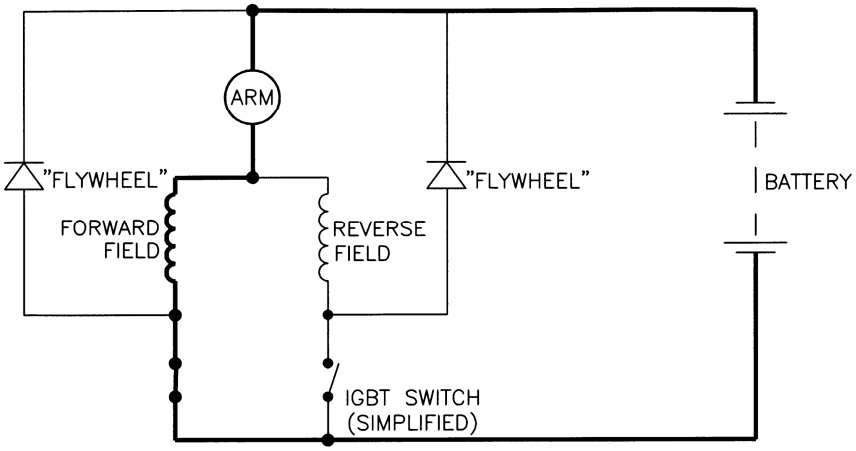
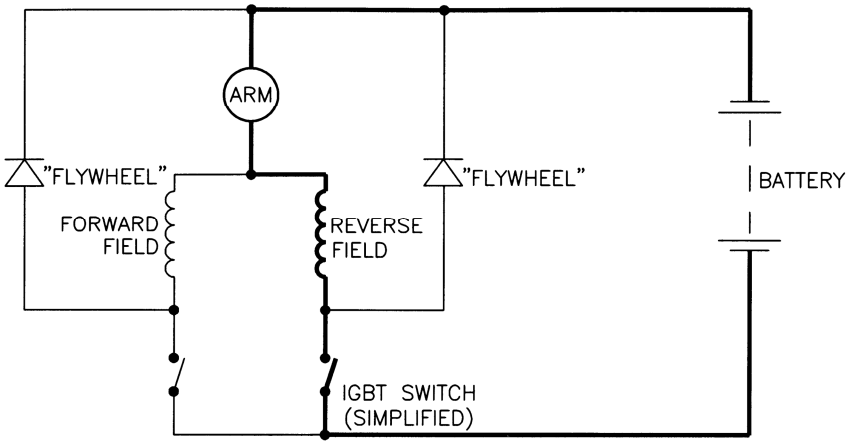


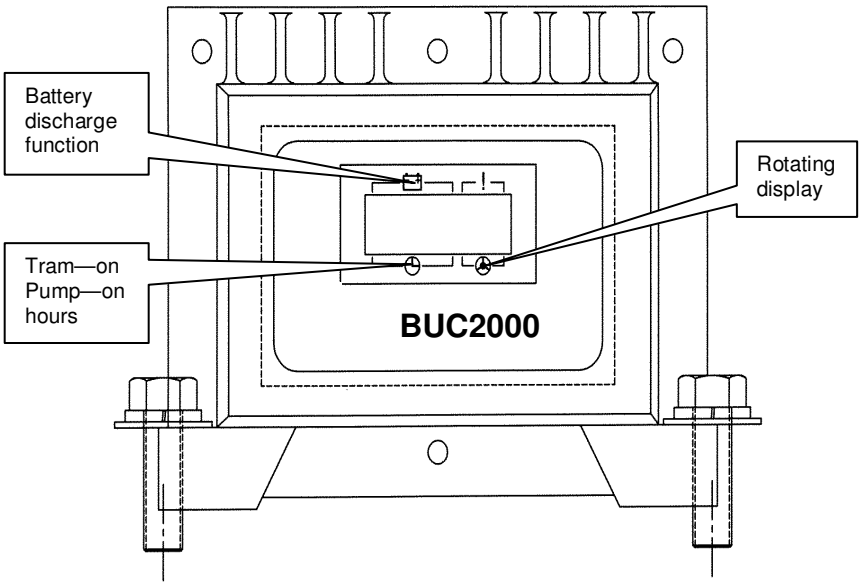
Fig. 4: Flywheel diode motor current (reverse mode)



Optional dashboard display features (See Fig. 9)

- a battery discharge indicator
- an hour meter displaying tram-on hours
- an hour meter displaying pump-on hours
- a rotating display showing:
  - battery voltage
  - pump motor current
  - diagnostic fault status, when applicable. Rotating display will lock on one of the following fault messages: (See Fault Message Chart)

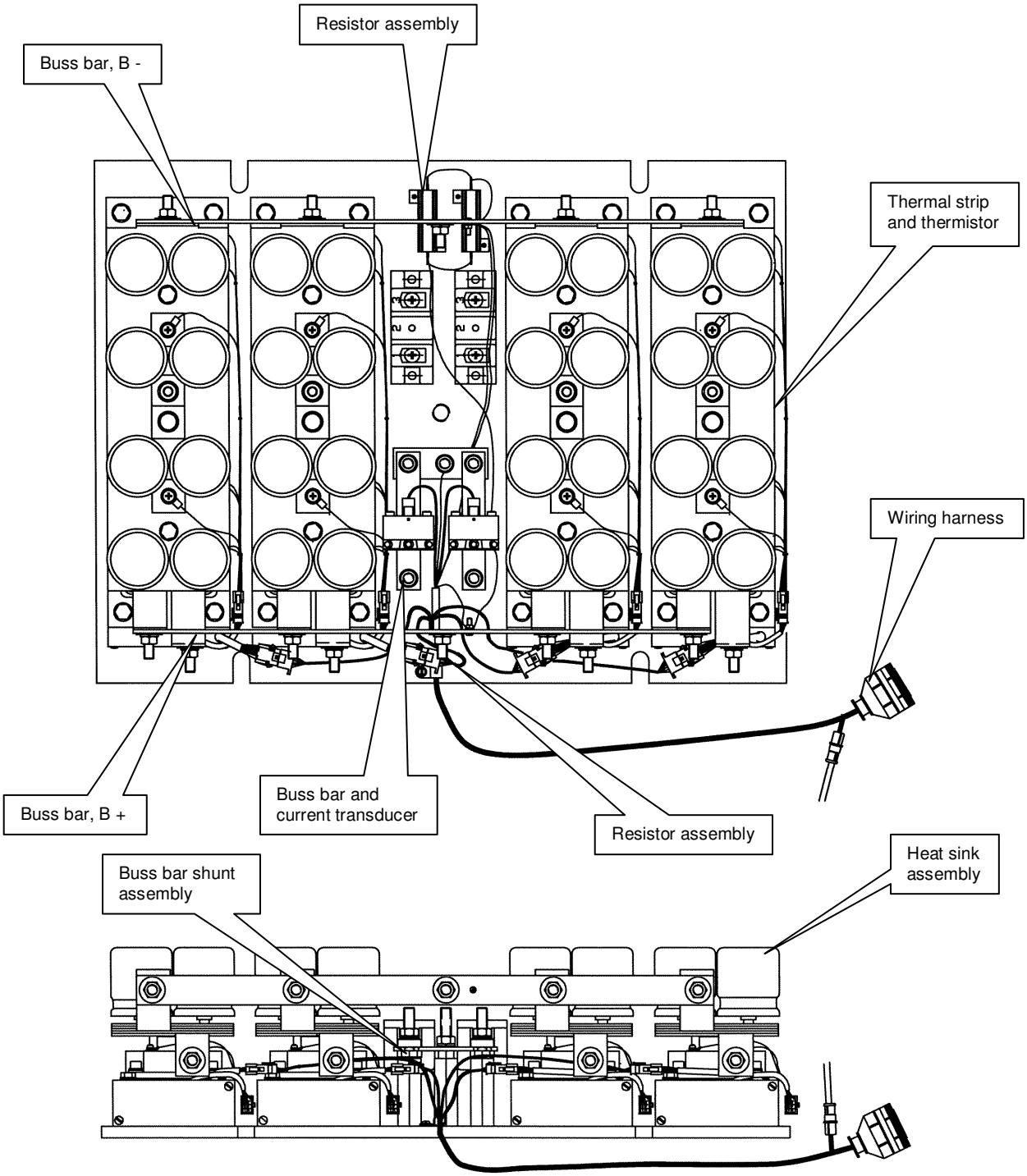
Fig. 9: Optional dashboard display



IMPORTANT!
The display hours will be different than the hours stored in the logic (as read on the hand held) if the logic card has been replaced. The display holds its hour count and, if the logic is replaced, will retain its original hour count. the display and logic card hour meters are independent from each other. the hours are not resettable.

IGBT panels

Fig. 16: IGBT dual motor panel components

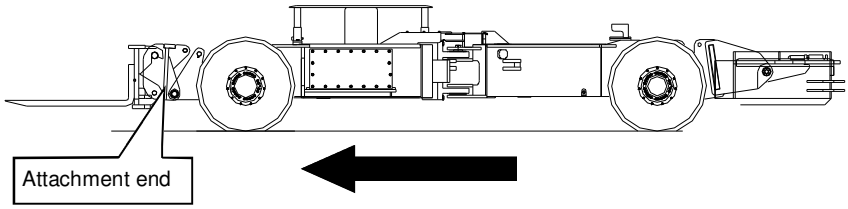


Vehicle direction of travel

Fig. 27 shows the direction of travel for typical vehicles. The forward direction for both scoops and shield haulers is in the direction of the bucket (or other attachment (ex. lifting forks)). The forward direction for a coal hauler is in the direction of the batteries.

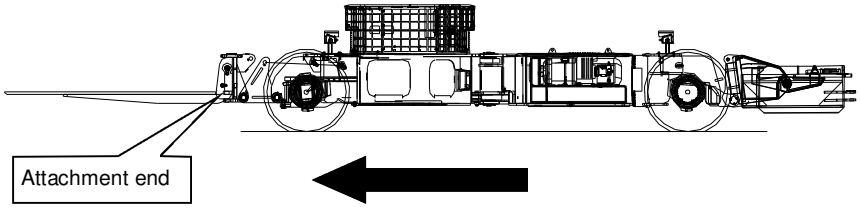
Fig. 27: Vehicle direction

Scoop



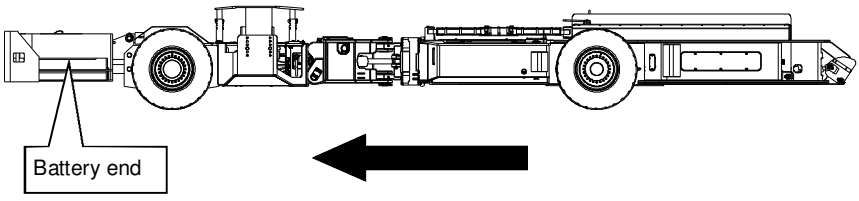
Forward direction of travel

Roof Support Carrier



Forward direction of travel

Face Haulage



Forward direction of travel

Schematics

NOTICE!
For replacement parts and machine wiring diagrams, please refer to your spare parts manual.

A6474X26
February 2012

Installation, Use Maintenance and Repair Manual

Mine Power Storage Batteries

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 from being reinstalled elsewhere.

original parts

Use only spare parts which satisfy the specified technical requirements. This is only ensured with original 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 charging area is well ventilated (clear of fumes). Hydrogen gas 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 followed by an eight hour cooling, or rest, period. 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 for a conventional lead acid battery and 1.320 - 1.330 for high gravity lead acid battery products.. 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 immediately 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 recommendation for battery replacement water quality, Table 5, lists the maximum allowable impurities..

Table 5: Recommendations for battery replacement water quality

Impurity	Maximum Concentration (ppm)
Total Solids	350
Fixed Solids	200
Chlorides as Cl	25
Nitrates as NO_2	10
Nitrates as NO_3	10
Iron as Fe	4
Organic and Volatiles	150 ppm
Ammonia (NH_4)	5
Manganese	0.07
Calcium and Magnesium	

NOTICE!
A minimum of one quart of water is required. Consult your sales representative if water analysis is required.

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, (3) age and condition of the battery, and (4) changes in work demand.

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 antimonial lead. The rate of self-discharge is temperature-related and increases significantly as temperatures rise. Table 7 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 7: 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.

Tightening torques

IMPORTANT!
Due to the application of fasteners being subject to great stresses and heavy or extreme vibration, it is imperative that all bolts be applied with an adequate amount of torque. For this reason this list of recommended torque settings for different types and sizes of fasteners used has been compiled.
The tightening torques stated in the spare parts lists have to be observed, as well, for installation and maintenance.

Set screws

Table 7: Set screws (Socket long-lok)

Nominal diameter	Recommended torque setting
#6	6 in-lbs
#8	9 in-lbs
#10	13 in-lbs
¼”	30 in-lbs
5/16”	5 ft-lbs
3/8”	8 ft-lbs
7/16”	11 ft-lbs
½”	16.7 ft-lbs

Table 8: Set screws (Socket standard steel)

Nominal diameter	Recommended torque setting
#6	9 in-lbs
#8	16 in-lbs
#10	30 in-lbs
¼”	6 ft-lbs
5/16”	12 ft-lbs
3/8”	18 ft-lbs
7/16”	29 ft-lbs
½”	43 ft-lbs
5/8”	100 ft-lbs
¾”	146 ft-lbs
7/8”	199 ft-lbs
1”	262 ft-lbs