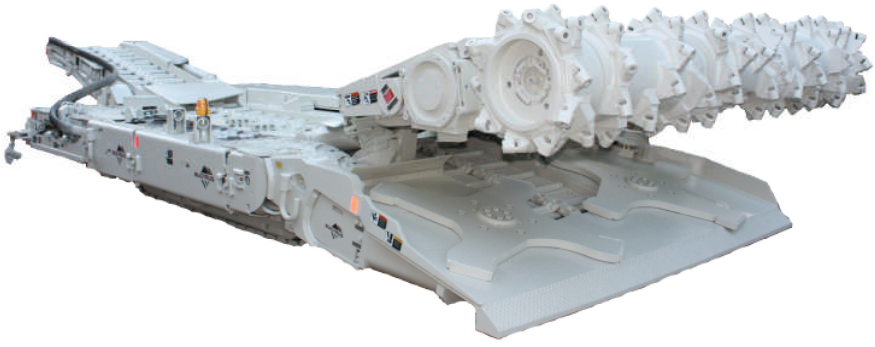
Operation Manual

Bucyrus - Continuous Miner
Model - 25M0
Doc. No.: A6474X332



Bucyrus America, Inc.
2045 West Pike Street
Houston, PA 15342
Telephone: 724-743-1200
Fax: 724-743-1201
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 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

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 (optional) from outside the compartment.

starting procedures

Follow the starting procedure instructions in the operations manual.

red zone

Do not operate any levers, pedals or controls if anyone is in the red zone. (See Red 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 Continuous Miner.

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 (optional)

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.

passengers

Never carry passengers. Passengers may be thrown off the machine 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.

WARNING!
Warn “ALL CLEAR” before starting the conveyor. Failure to do so may result in serious injury or death.

IMPORTANT!
The “CONV ON” key must be released before “SHIFT”. If “SHIFT” is released first, the conveyor motors will shut off.

IMPORTANT!
The “FAN ON” key must be released before “SHIFT”. If “SHIFT” is released first, the fan motor will shut off.

CAUTION!
Always ensure operator safety while operating the machine.

CAUTION!
Always be alert to hazardous conditions and take corrective action as necessary.

IMPORTANT!
Care should be taken not to stall cutters on conveyor during cutting operations. Severe damage to motors and gear boxes could occur if cutters or conveyor are repeatedly stalled.

IMPORTANT!
Tram is limited in the forward direction while the cutters are running with the cutter head feedback circuit. As the cutters begin to cut the material from the face the sump speed will automatically slow the tram down to prevent over sumping the machine.

IMPORTANT!
Inspection of the bits and bit blocks before the start of each shift will reduce later problems. Mining with dull, bent or broken bit blocks increases dust and noise levels, as well as putting excessive strain on both cutter and tram drives.

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

IMPORTANT!
Schematics may vary from one unit to the next. Consult the Bucyrus America, Inc. parts book for the schematic for your machine.

IMPORTANT!
During disassembly of control valves, give particular attention to identification of parts for reassembly. Spools are selectively fitted to valve bodies and must be returned to the same bodies from which they were removed. Spools are NOT interchangeable between valve bodies.

WARNING!
Each stabilizer cylinder is extremely heavy. The next steps will remove the cylinder from its tractor frame mounting. Be prepared to support the weight from its tractor frame mounting. Be prepared to support the weight of the cylinder when it becomes free from the mounting.

IMPORTANT!
To obtain maximum performance, the duocone seals must be installed accurately to insure uniform loading at the mating faces and achieve a stable running position. Misalignment or cocking of seal rings during assembly can produce non-uniform loading and wobbling of the seals in their housings resulting in leakage due to scoring and/or pumping of debris past the toric rings. Improper installation can also result in breakage of the metal seal rings.

NOTICE!
Improper care and installation of duocone seals can result in immediate leakage or reduced service life.

IMPORTANT!
The toric must lie uniformly in the seal with the sealing ring and parallel to the seat face. Be sure that the toric is not twisted and that it rests uniformly against the retaining lip or not deeper in one side of the seat than the other.

IMPORTANT!
Do not get any oil onto the rubber torics!

IMPORTANT!
Even a small piece of lint can hold the faces apart and cause leakage!

IMPORTANT!
A mixture of marking compound and spindle oil is good lube for the gears under light loads for 2-3 revolutions only. Check tooth patterns all round to make sure the pattern/markings are uniform.

CAUTION!
Be careful not to set fire to any grease or lubricant when heating bearings!

IMPORTANT!
Observe all applicable fire and safety regulations when heating bearings!

4 Installation

radio remote control

When operated by a radio (Fig. 16), a portable wireless remote with a unique code feature sends radio commands to a receiver in the switch console via a whip antenna setup. The small whip antennae intercept the radio signals which the receiver translates into electrical commands to various electrical circuits to perform the function selected. These circuits energize solenoids which actuate pilot-valves, switches, or relays controlling a specific mechanical, hydraulic, or electrical function.

There are eight selectable frequencies which permits each operator to activate only his designated miner, allowing several remote-controlled miners to operate in the same area without getting their radio signals crossed. In addition, an improperly decoded radio signal will automatically shutdown the miner.

Always refer to the specific radio remote control operation manual supplied with your specific machine for details and options on the radio remote control.

IMPORTANT!
Refer to the radio remote control operation manual supplied with your machine for information regarding the operation of your specific remote control.

Fig. 16: Radio remote control (typical)

Top view

System Menu

The control system provides information, diagnostic, and setup screens that are grouped together in the system menu (Fig. 26). The system menu is accessed by using the display module and a remote control handset.

To access and navigate the system menu using the radio remote:

☞ Press the SHIFT and MENU key to access the system menu screen.

IMPORTANT!
All functions and motors are shut down and disabled when the system menu is selected.

☞ Press CONV UP or CONV DOWN to move the cursor up and down the list.

☞ Press SHIFT and MENU to select the highlighted item

☞ To leave the menu and return to remote mode, press SHIFT and REMOTE.

Fig. 26: System menu, example

Starting procedure

WARNING!
Failure to read and understand all operating instructions before starting the Continuous Miner could result in serious injury or death to the operator or persons around the machine or cause damage to the machine.

WARNING!
Read all instructions carefully before attempting to start or operate machine.

WARNING!
Understand the functions of all controls before starting the Continuous Miner. Read and follow the instructions on all warning tags on the machine, observe all regulations and safety precautions .

WARNING!
Never operate a Continuous Miner which has been damaged or is not operating properly. Any part of the Continuous Miner which does not function properly can be a hazard. Report it immediately to your supervisor or their designee.

WARNING!
Before starting the Continuous Miner, make sure that no one is in the red zone (Fig. 30 through Fig. 34).

NOTICE!
In extremely cold weather, allow motors and gear cases to idle. This will warm the hydraulic oils and lubricants. Still oils and greases could immobilize the machine.

IMPORTANT!
A pump “growl” means not enough oil is reaching the pumps through the suction lines. Ensure the pump gets primed before continuing operation. Always check the oil level.

DANGER!
Improper position could result in injury or death to the operator by crushing him against the rib or roof supports. It may also cause him to run over the trailing cable or dislodge the roof supports.

WARNING!
Turning on the water sprays prior to cutting prevents the accumulation of dust and the generation of excessive heat which could cause an ignition or explosion.

After reading the previous descriptions and locating each control, the operator is ready to operate the Continuous Miner. An experienced operator should monitor a new operator’s indoctrination to the starting procedure.

Breaker “ON”/”OFF” in radio remote

The control system allows the main circuit breaker on the miner to be turned on and off using the radio remote control console. This normally requires that a battery backup version of the power supply be installed on the machine.

To turn the breaker off:

☞ Press and hold the “SHIFT” and “C.B. OFF” keys together for two (2) seconds. After two (2) seconds, the breaker off solenoid will energize, turning off the machine circuit breaker.

To turn the breaker on:

It is essential that a battery backup version of the control system power supply be installed for this function to be available. Typically, a hydraulic valve provides the mechanical force for the breaker mechanism. To allow this valve to be operated after loss of power, a hydraulic accumulator is charged by the pump motor during normal “powered” operation of the machine. If the hydraulic accumulator is discharged, then it will not be possible for the breaker to be turned on from the radio remote.

☞ Press and hold the “SHIFT” and “C.B. ON” keys together for two (2) seconds. After two (2) seconds, the breaker on solenoid will energize, turning on the machine circuit breaker.

IMPORTANT!
The backup accumulator must maintain a minimum pressure of 500 psi for 12 minutes after the pump has been de-energized.

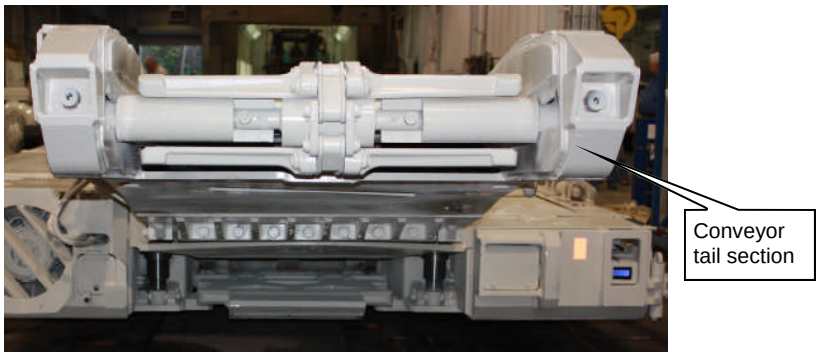
Conveyor tail section

The conveyor tail section (Fig. 43) pivots and has the ability to be raised and/or lowered. The conveyor pivots on the main frame behind and just below the cutter head pivot. Two single acting hydraulic cylinders permit the operator to raise the conveyor discharge end to a maximum height and clearance varying per machine or to lower the discharge end of the conveyor to a specific ground clearance.

A double-acting hydraulic cylinder on the right side of the conveyor permits the discharge end to swing 45 degrees left or right of the conveyor centerline. The range in height and swing of the conveyor with an overhang permits the conveyor to accommodate any haulage vehicle.

Two AC electric motors drive through the gathering head gear cases to a foot shaft sprocket to propel the conveyor chain.

Fig. 43: Conveyor tail section



Gathering head and Continuous loading arms (CLAs)

The gathering head (Fig. 44) loads the material that is mined by the cutter head assembly onto the conveyor for transport to the rear of the machine. The gathering head assembly consists of a gathering pan and two continuous loading arms (CLAs), each driven by a bevel gear case (or pot). Each CLA has 3 to 6 fingers, or blade fan-type rotating assemblies. The CLA's are driven by rotary drive shafts in their respective gear cases. The CLA's gather and force the cut material into the conveyor throat and onto the moving flights.

The AC motors that drive both the conveyor and the gathering head are located on each end of the gathering head assembly. Through each motor lies a specially-constructed torque shaft that extends across the rear of the gathering head frame into a heavy duty input gear case on that side driving the bevel gear input shaft to it.

The input gear cases contain bevel and helical gears that drive each main gear case (pot). These in turn drive the CLAs and the foot shaft at the base of the conveyor. The foot shaft extends across the gathering pan from the right gear case to the left gear case and has a sturdy 4 or 5 tooth sprocket at its center to drive the conveyor chain.

accumulator A bladder accumulator (Fig. 52) is essentially a fluid pressure storage chamber in which the potential energy of a fluid under pressure can be stored against a compressible force of a gas to do useful work. This stored fluid is readily available to perform a given task when called upon by the requirements of the system in which it is used.

breather A breather (Fig. 52) permits air to move in and out of the oil tank reservoir to maintain atmospheric pressure.

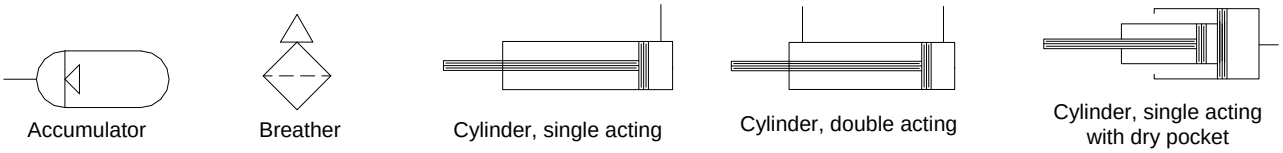
cylinders Cylinders (Fig. 52) are bored and honed steel tubes enclosing a piston connected to a rod that extends out the end of the cylinder. Working surfaces are ground and finely finished with the seals and gaskets incorporated to prevent leakage. Fig. 50 illustrates the location of the hydraulic cylinders on the miner.

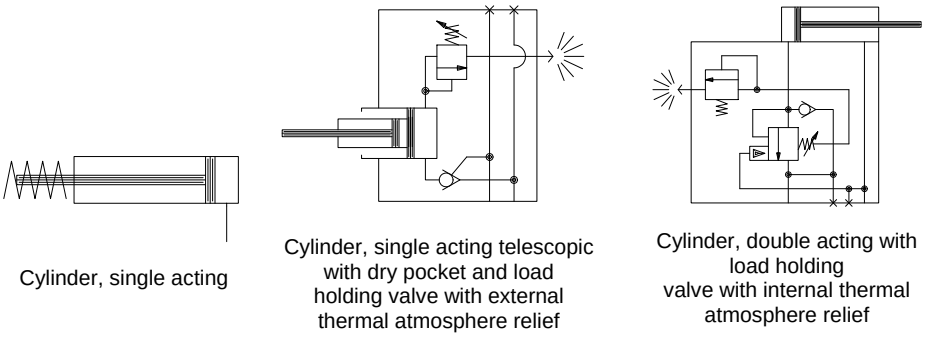
A cylinder with pressure applied in only one direction is a single-acting cylinder (e.g. some elevation functions; the weight of the unit maintains pressure on the return). A double-acting cylinder receives input pressure on each side of the piston alternately.

There are four single-acting cylinders on the miner: the conveyor lift cylinders (2) and the gathering head raise cylinders (2). Optionally, there may be conveyor chain take-up cylinders (2), which are also single acting.

There are normally five different double-acting cylinders on a miner: the cutter head raise cylinders (2), the conveyor swing cylinder, and the stabilizer shoe cylinders (2). There is also an optional second conveyor swing cylinder for attaching haulage.

Fig. 52: Accumulator and cylinder hydraulic symbols



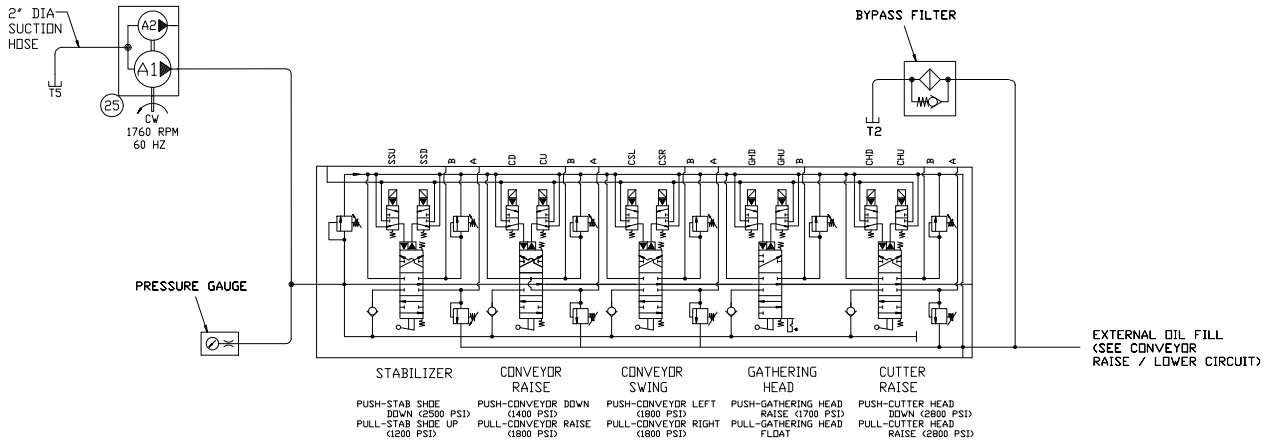


Main flow - primary pressure circuit

The main flow-primary pressure circuit (Fig. 59) is powered by hydraulic pump gear section A1. The A1 gear section is rated at 17gpm at a pressure of 3,000 psi. The system is an open-center circuit and it supplies oil flow to the main control valve. The main control valve operates the cutter head, conveyor raise and swing, gathering head, and stabilizer shoe cylinders along with oil tank fill. After passing through the pump gear section A1, oil enters the main control valve whose relief is set at 3,000 psi. On the return side of the system, oil exits the main control valve. There is a tee to allow external filling of the reservoir (see conveyor raise/lower circuit). Oil enters a 10 micron by-passing return filter before entering the oil reservoir. Once in the reservoir, the oil is forced to flow through and around baffle plates for cooling and de-aerating before re-entering the suction line. Also, located in the reservoir are floor magnets which will trap ferrous metal particles.

The schematic shown in Fig. 58 is a typical primary pressure circuit. Always refer to the schematic in the Bucyrus America, Inc. parts book for your machine.

Fig. 58: Main flow-primary pressure



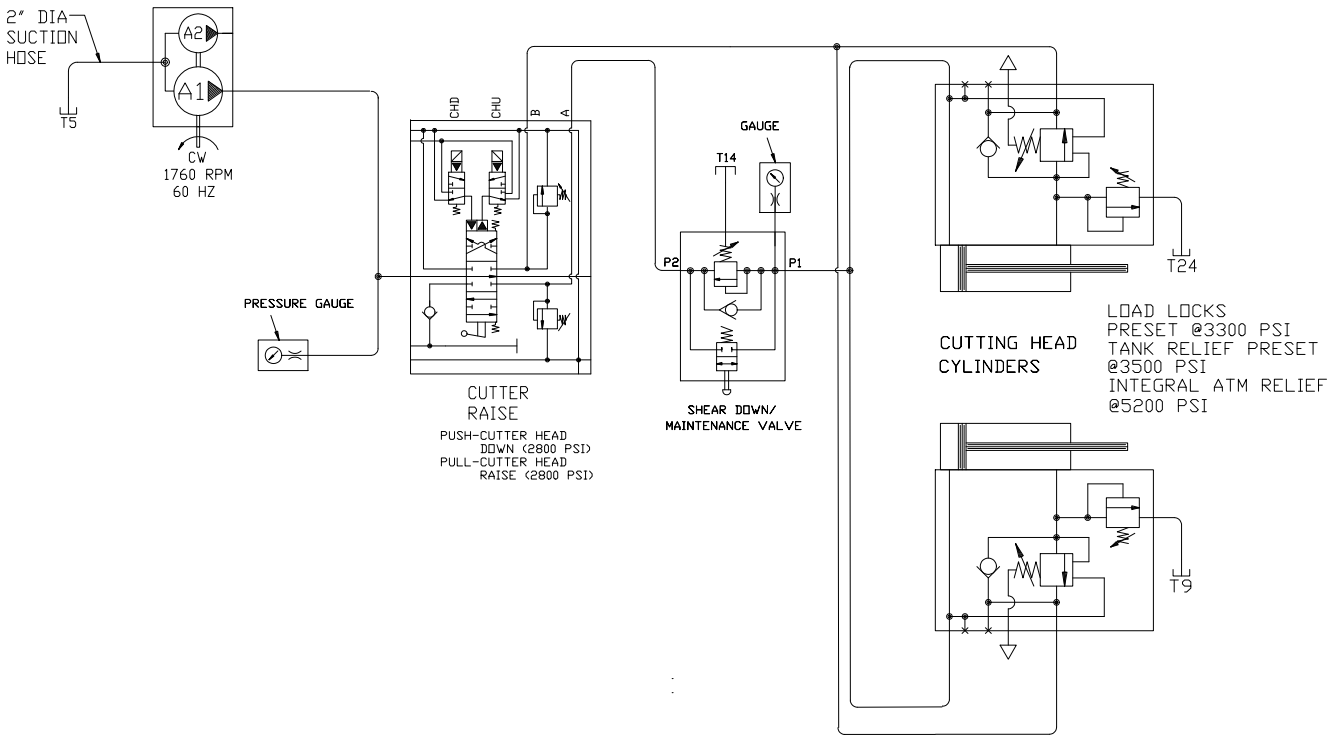
DANGER!
Do not adjust, modify, or remove the load holding cartridge valve mounted in the cutterhead cylinders. It is a safety feature to prevent accidental lowering of the cutter head.

DANGER!
This load holding valve, like those on the stabilizer cylinders is preset. <u>DO NOT ADJUST IT</u>. If it malfunctions, replace it immediately.

WARNING!
You could be seriously injured or killed by falling loads. Block the miner before performing maintenance and always observe the safe working load limits of all lifting and blocking devices.

This schematic shown is Fig. 65 is a typical cutter head cylinder raise circuit. Always refer to the schematic in the Bucyrus America, Inc. parts book for your machine.

Fig. 65: Cutter head raise circuit



Note: Solenoid designations are CHD (cutter head down) and CHU (cutter head up).

Deluge water fire circuit

The deluge fire suppression circuit (Fig. 71) can be operated by manual or remote solenoid control (see Electrical section in this chapter). When the solenoid coil is energized, it shifts a spool, allowing hydraulic oil to travel to a 2-way, 2-position water valve. The hydraulic fluid shifts the spool, allowing the water to pass through it to the deluge fire spray manifolds. The water valve has a detent spool, which keeps the valve open. The 2-way, 2-position valve can be operated manually and is typically mounted on the left hand side of the machine. The valve must be manually reset to reset the fire suppression circuit.

In addition, there is a ball valve used to manually operate the fire suppression circuit typically located on the right rear corner of the machine. The valve must be manually turned off to reset the fire suppression system.

The optional left hand washdown hose water is supplied by the deluge fire suppression system.

The fire suppression circuit must be tested once per shift, minimum (see Maintenance section in this chapter).

For deluge water fire circuit component locations, see Fig. 72.

Fig. 71: Deluge water fire circuit

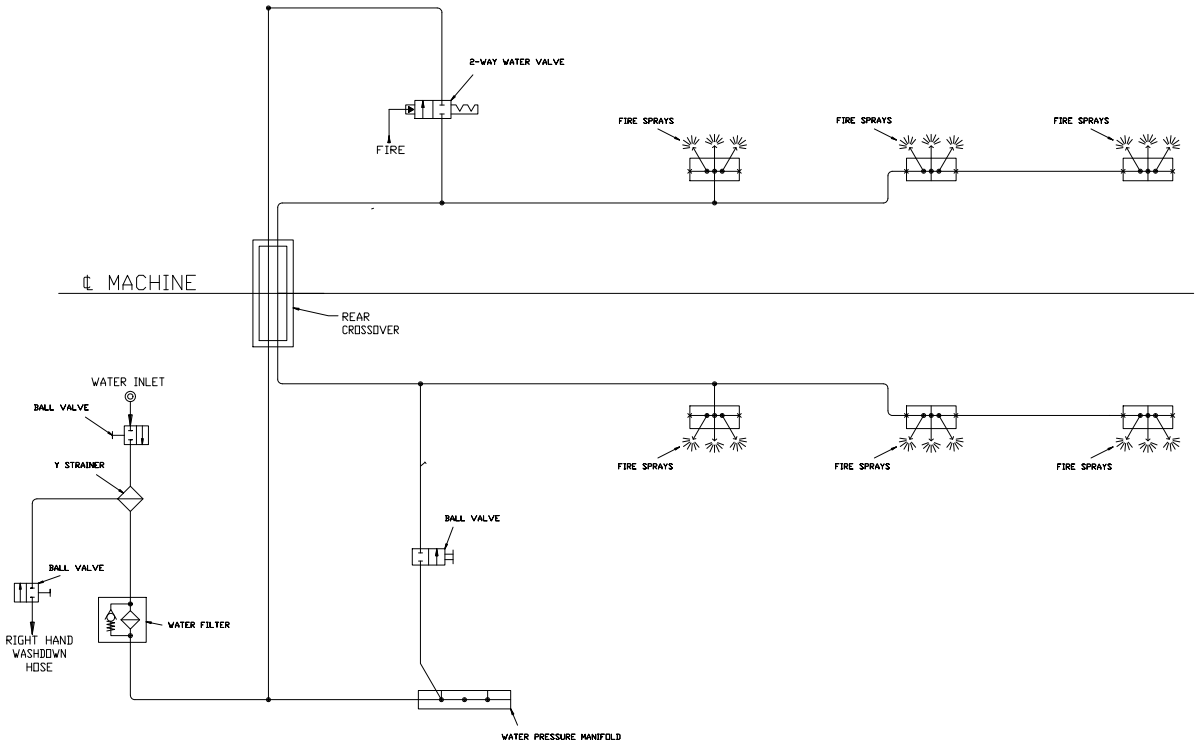
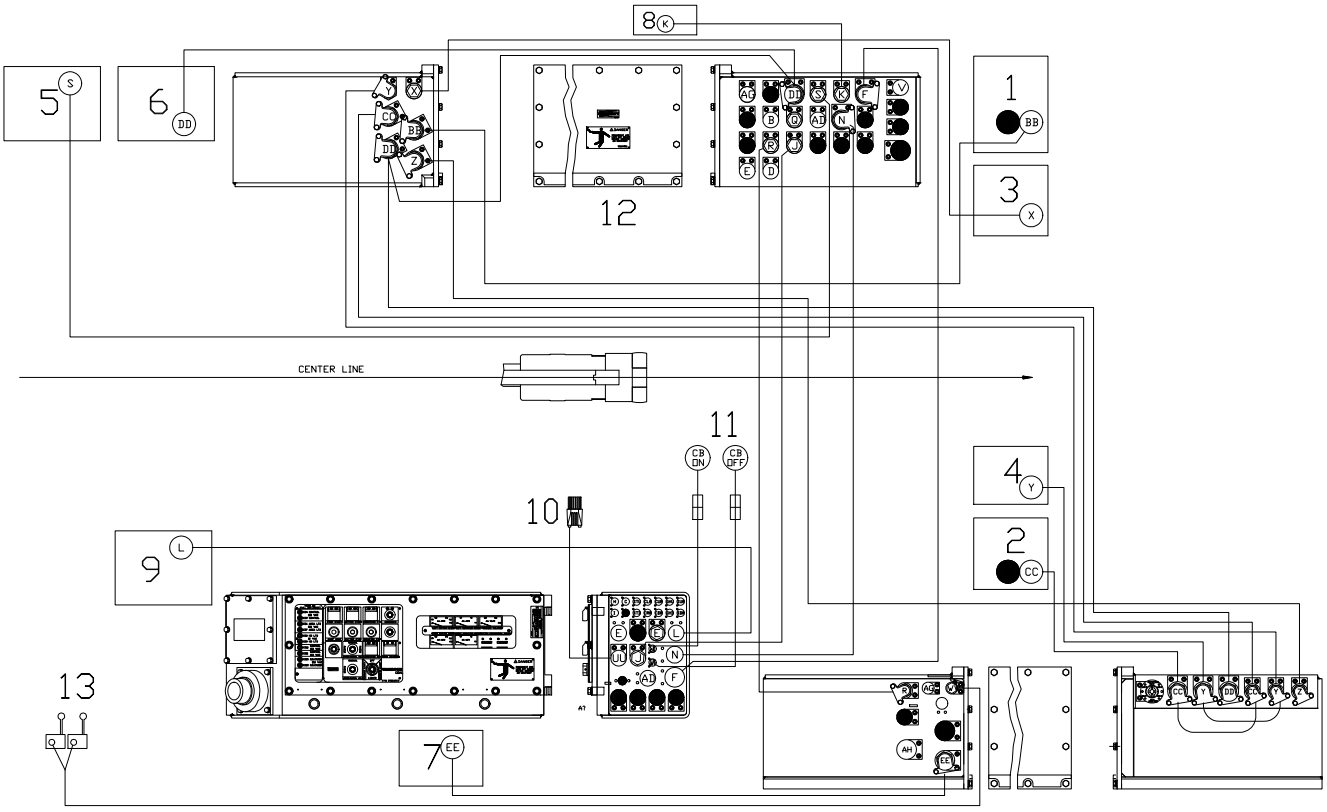


Fig. 80: Electrical component layout



1. Left cutter motor
2. Right cutter motor
3. Left CLA motor
4. Right CLA motor
5. Pump motor
6. Left tram motor
7. Right tram motor
8. Emergency stop
9. Methane monitor display
10. Methane warning light
11. Circuit breaker reset
12. Main controller
13. I.S. tram switch

System overview: radio remote control

radio/manual mode

The miner is radio remote controlled. Manual operation is not allowed for production operation unless the miner has an operator's pit and canopy. Manual operation is for troubleshooting and maintenance, and must be operated under roof support.

The operating controls are available either in radio remote control or in manual control. The control mode is selected by using three switches: SW1, SW2, and the Light Switch.

Switch SW1 sections 1-2 and 5-6 selects 120v power to be connected to either the manual push buttons or to the machine controller. Section 7-8 of SW1 connects +24v power from the machine controller power supply when in "radio". SW1 removes manual control from the tram interface when radio control is selected.

SW2 connects motor control to the manual push buttons and isolates control from the machine controller. In the radio position, SW2 isolates the push buttons and connects motor control to the machine controller.

The Light Switch has three positions: manual, off, and radio. In the radio position, the miner operator can turn the head lights on and off from the radio remote by controlling the HR relay.

radio remote control

The radio remote control system consists of a battery powered portable remote, which, sends UHF radio signals to the miner. The encoded control signals, from the remote, are decoded by the machine controller unit located in the main controller case. The remote has a built-in antenna while the machine controller, located in the explosion proof main controller, has a external antenna.

machine controller, power supply, and module tram case

The machine controller responds to the control signals from the remote and activates the machine functions. The machine controller power supply provides 110 VDC for the solenoids to control the hydraulic valves and 24 VDC for the radio display, and traction module. The traction module provides tram direction and speed radio signals to the tram interface. Machine controller outputs also control the 120 VAC machine circuits.

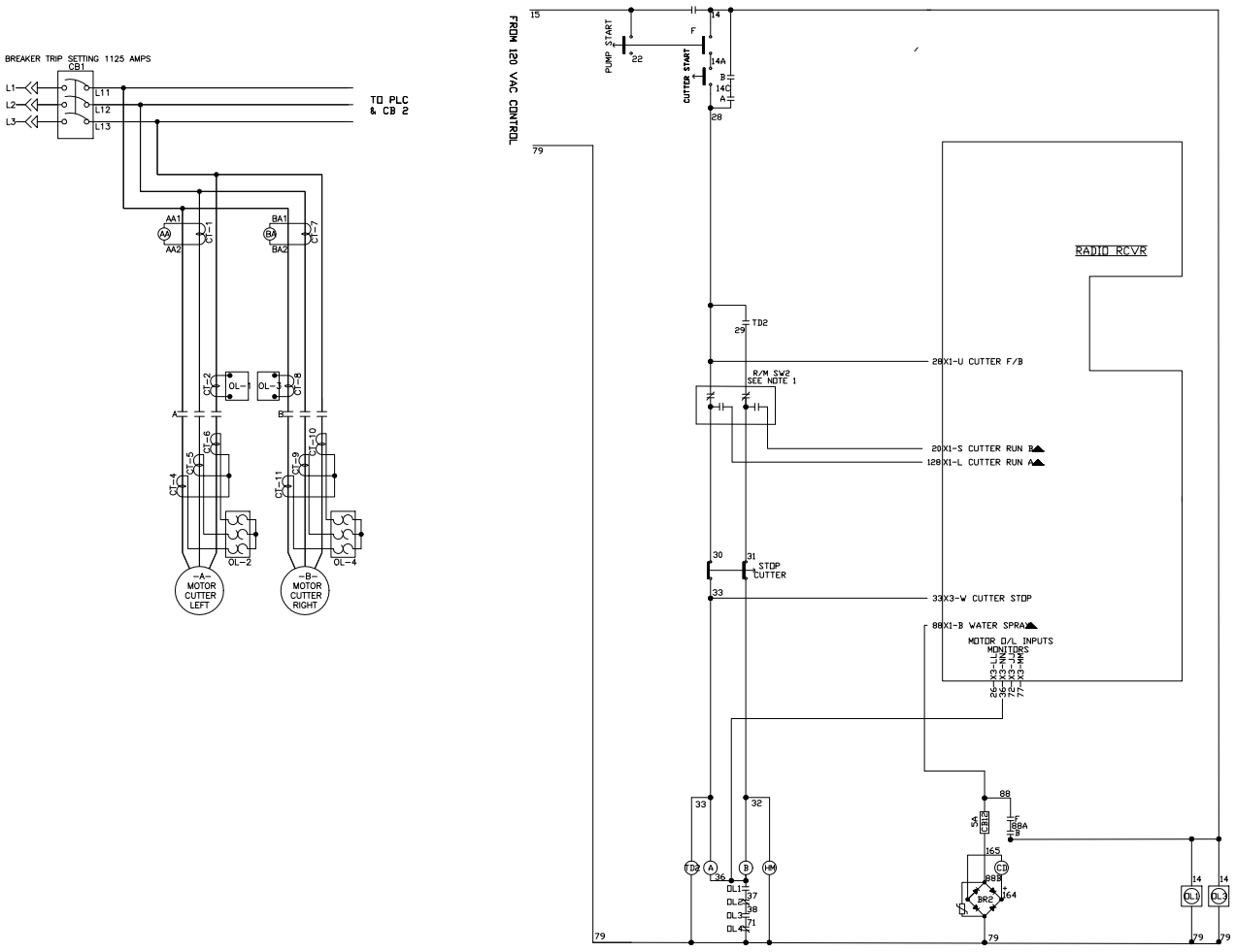
radio system battery

An optional battery back-up to the power supply will provide power to operate the fire suppression solenoid and the breaker on and off.

The radio remote has a rechargeable battery, which has a recharge socket for connection to the out-by battery charger. The complete remote unit is changed out each shift. The remote panel has switches or "keys" for all of the miner functions.

The complete system includes a battery charger which is used to recharge the remote battery. This unit is usually located above ground. Four remote units can be recharged at the same time. A built-in radio receiver and screen will allow the remote to be tested before use underground and to change channels on the remote.

Fig. 91: Cutter motor power circuit



Tramming

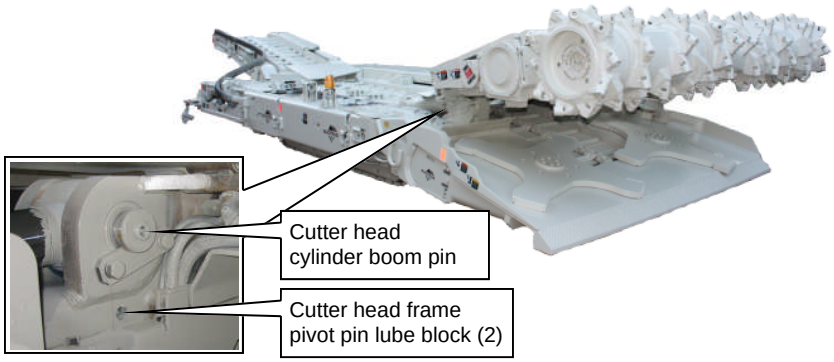
The miner can be trammed manually or via the remote console. Before the tram motors will start, the pump motor must be running. While the cutters are running, reverse speed can be incremented even while the forward tram keys are being pressed.

The schematic shown in Fig. 101 is a typical tram circuit. Always refer to the schematic in the Bucyrus America, Inc. parts book for your machine.

cutter head frame pivot pin (left and right)

Lubricate left and right cutter head frame pivot points through the grease fittings located on the left and right front lubrication blocks (Fig. 105). Pump approximately 3 cu. in. (50 cu. cm) of grease into each fitting.

Fig. 105: Cutter head frame pivot pins



cutter head bits

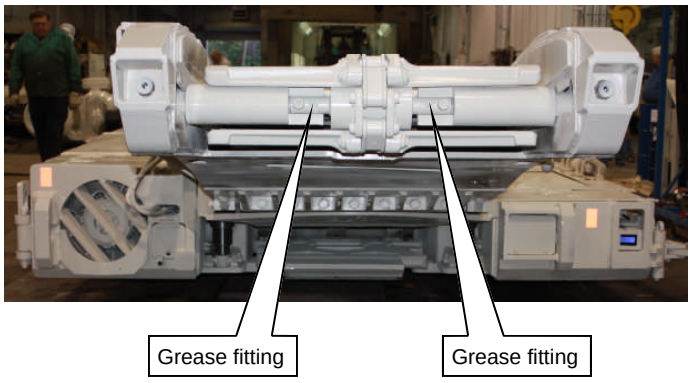
Inspect the cutter head bits to ensure that they will rotate in their holders and for damaged or missing bits (Fig. 106). Replace bits immediately if any are missing or damaged.

Fig. 106: Cutter head bit

conveyor roller

Lubricate the conveyor roller through the two (2) grease fittings located on the shaft (Fig. 107). Pump approximately 3 cu. in. (50 cu. cm.) into each fitting.

Fig. 107: Conveyor take-up shaft lubrication



Monthly

CLA head pot assembly

Change the oil in both CLA head pot assemblies (Fig. 125).

- ☞ Level the miner, raise the gathering head pan, and secure in place.
- ☞ Clean dirt and debris from around the drain plug located under the gear case.
- ☞ Remove the drain plug and allow oil to completely drain from the gear case.
- ☞ Clean and reinstall drain plug.
- ☞ Clean dirt and debris from around the check plug and remove the plug.
- ☞ Clean dirt and debris from around the fill plug and remove the plug.
- ☞ Slowly add oil through the fill plug until oil begins to flow from the check plug hole. Allow sufficient time for the oil to ravel through the gear case when filling.
- ☞ Clean and reinstall the check and fill plugs.

CLA head transfer case

Change the oil in both CLA head transfer cases (Fig. 125).

- ☞ Level the miner, raise the gathering head pan, and secure in place.
- ☞ Clean dirt and debris from around the drain plug located under the gear case.
- ☞ Remove the drain plug and allow oil to completely drain from the gear case.
- ☞ Clean and reinstall drain plug.
- ☞ Clean dirt and debris from around the check plug and remove the plug.
- ☞ Clean dirt and debris from around the fill plug and remove the plug.
- ☞ Slowly add oil through the fill plug until oil begins to flow from the check plug hole. Allow sufficient time for the oil to ravel through the gear case when filling.
- ☞ Clean and reinstall the check and fill plugs.

NOTICE!
If the gear case is scheduled for oil drain and refill, obtain the oil sample prior to the oil change.

IMPORTANT!
Always collect oil samples using a siphon pump. Do not remove the drain plug and collect oil by allowing it to run out into the bottle.

hydraulic oil

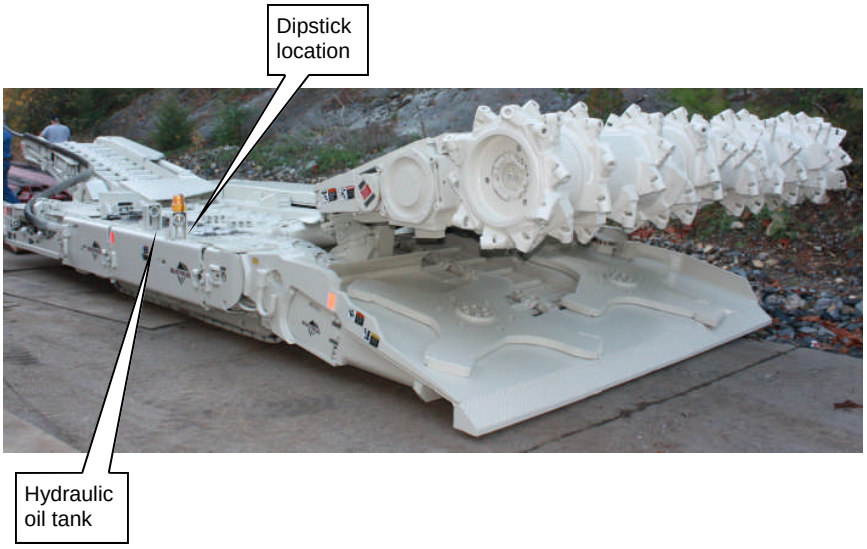
Change the oil in the hydraulic oil tank (Fig. 134).

- ☞ Clean all dirt and debris from around the fill cap and the drain plug.
- ☞ Remove the drain plug and allow the oil tank to completely drain.
- ☞ Clean and remove the drain plug.
- ☞ Manually add oil until the fill pump picks it up.

WARNING!
The hydraulic oil fill pump will be damaged if it is run dry.

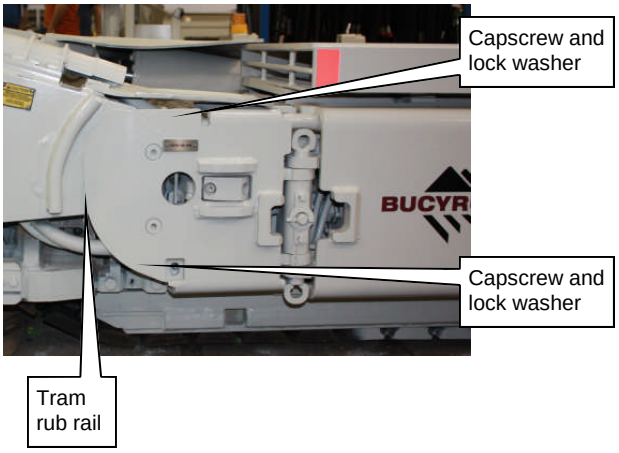
- ☞ Fill the tank with oil using the power fill pump until the oil level reaches the full level as indicated on the dipstick. To activate the power fill:
  - ☞ Engage the conveyor down function.
  - ☞ Open the ball valve.
- ☞ After filling, start the machine and engage all cylinders for the full length of travel (full extend and retract) in order to purge the hydraulic system of air.
- ☞ Recheck the oil level on the dipstick. Add more oil as needed.

Fig. 134: Hydraulic oil tank



☞ 10. Remove the hex head capscrews and lock washers that secure the front rub rail to the tractor frame (Fig. 136) and open the front rub rail cover.

Fig. 136: Rub rail removal



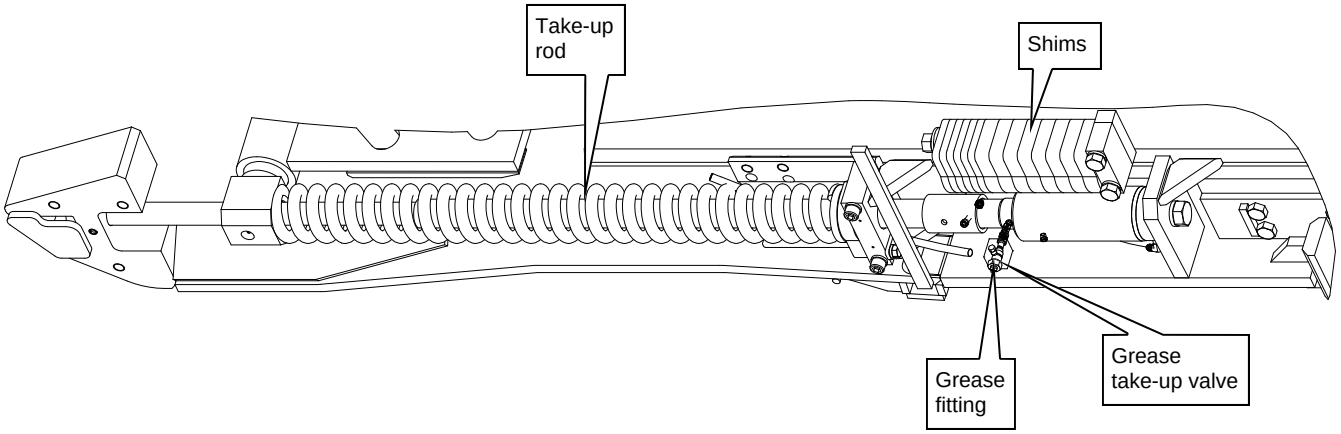
☞ 11. Remove the cover plate to allow access to the idler assembly.

☞ 12. Locate the front idler take-up jack grease fitting and attach the grease gun to the fitting.

☞ 13. If the tram track tension is too tight, readjust the idler position using the following steps:

- Pump grease into the take-up jack to extend the cylinder and remove pusher plate pressure on the idler shims.
- Remove one or more idler adjustment shims from the idler slide channel.
- Open the pressure release valve for the front idler take-up jack and allow the jack to contract. The pusher plate will slide backwards until it is stopped by the remaining idler shims.
- Pump grease into the idler take-up jack to extend the cylinder, move the idler assembly forward and tighten the tram track until it is at the correct tension. The tram track is at the proper tension when it hangs 2 1/2” to 3 1/2” from the bottom wear shoes when the tractor frame is blocked off the floor.

Fig. 145: Chain tension adjustment - grease take-up



☞ 6. Once proper chain tension is achieved open the grease take-up valve and allow pressure to bleed from the cylinder. Repeat for the other side.

☞ 7. Check for proper adjustment

☞ Connect electrical power to the miner.

☞ Slowly raise the conveyor tail section and remove the blocking.

☞ Start the conveyor / gathering head and observe the chain for proper tension. The conveyor chain should rise about 2” or less above the gathering head’s foot shaft sprocket as the chain emerges from under the conveyor pan. Check that there is no contact between the CLAs and the chain flights.

☞ Slowly swing the conveyor tail section from left to right behind the miner and check the chain tension. The chain tension de creases when the tail section moves away from center.

boom pivot pin installation

To install the boom pivot pin:

☞ 1. Position the boom pivot pin so that the end with the two flats (the end without the adapter) is inserted first. The single flat of the pin's opposite end must face the four retaining plate holes.

IMPORTANT!
On the back of the tractor frame clevis there is a welded strap that keeps the boom pivot pin from rotating. One of the flats of the boom pivot pin must parallel this strap or the pin cannot be completely inserted.

☞ 2. Use the hammer to insert the boom pivot pin through the aligned tractor frame clevis and boom pivot bushings.

IMPORTANT!
If it is extremely difficult to insert the boom pivot pin through the aligned tractor frame clevis and boom pivot bushings, extend or contract the shear cylinders to improve the alignment between the clevis and boom.

CAUTION!
Use extreme caution when adjusting the clevis and boom alignment with the shear cylinders.

☞ 3. Replace the support block over the four threaded holes in the tractor frame.

☞ 4. Place the retaining plate onto the support block. The end of the retaining plate L-extension should be positioned against the flat of the boom pivot pin.

☞ 5. Insert and tighten the hex head capscrews lockwashers to secure the boom pivot pin retaining plate to the tractor frame.

End cutter drum

end cutter drum removal

To remove the end cutter drum:

☞ 1. Lower the gathering head completely until it touches the floor. Lower the conveyor tail assembly until it is level with the floor.

☞ 2. Raise the cutter head assembly to its highest position. Place blocking underneath the cutter head assembly and lower the cutter head assembly onto the blocking.

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

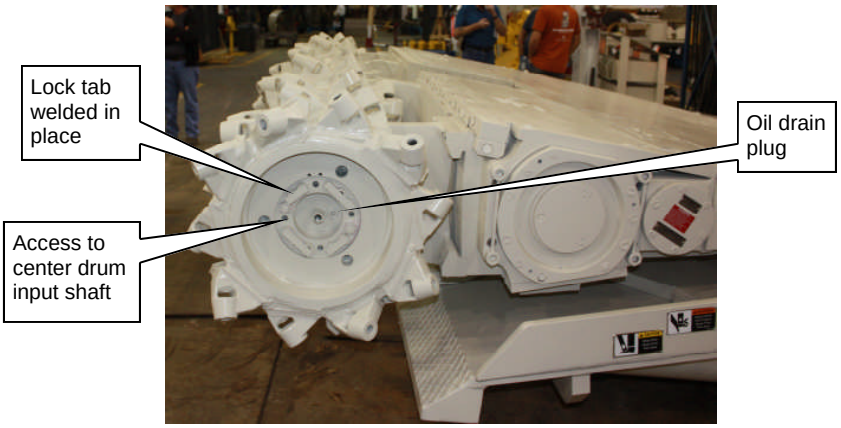
☞ 3. Disconnect the trailing cable to de-energize the miner. Follow all Federal and mine lockout/tagout regulations.

WARNING!
Follow all Federal and mine lockout/tagout regulations and procedures. Failure to do so could result in machine damage or serious injury or death to personnel.

☞ 4. Drain the gear case oil before removing the drums.

☞ 5. Remove the lock tabs tack welded to the capscrews using a cutting torch.

Fig. 156: Lock tabs tack welded to capscrews



☞ 6. Remove the long capscrews and nuts on the two alignment dowels which secure the end drum to the cutter drum drive assembly.

☞ 7. Remove plug and center drum input shaft.

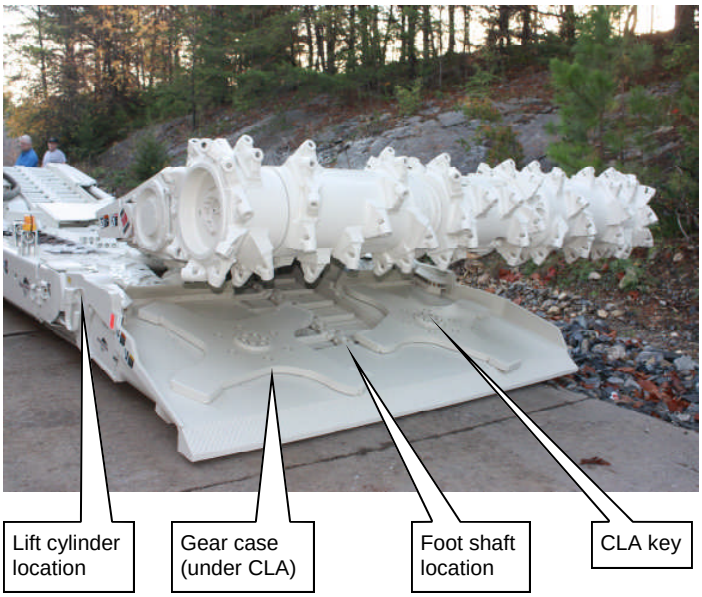
☞ 8. Remove the drum by sliding it off the hub.

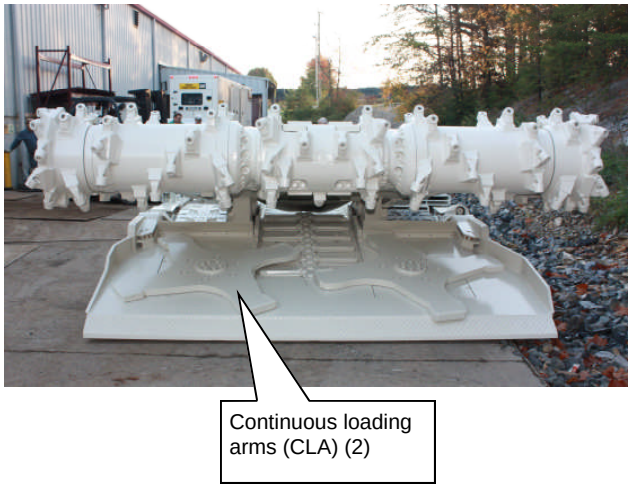
☞ 9. Remove the drum alignment key (Fig. 157) and store for re-installation.

Gathering head assembly

The gathering head assembly (Fig. 164) consists of the gathering pan, the continuous loading arms (CLAs), lift cylinders, and drive motors.

Fig. 164: Gathering head assembly





gathering head assembly removal

To remove the gathering head assembly

☞ 1. Lower the conveyor tail section until it is level with the floor. Lower the gathering head until it rests on the floor. Place blocking under the rear of the gathering head to stabilize its position during and after removal of the pivot pins and disconnection of the lift cylinders.

☞ 2. Raise the cutter head to its highest point and place blocking underneath it. Lower the cutter head onto the blocking.

WARNING!
You could be seriously injured or killed by falling loads. Observe the safe working load limits of blocking devices.

☞ 3. Disconnect the trailing cable to de-energize the miner. Follow all Federal and mine regulations for lockout/tagout.

WARNING!
Follow all federal and mine lockout/tagout regulations. Failure to do so could result in machine damage or serious injury or death to personnel.

☞ 18. Remove the pipe plug from the end of the motor (Fig. 170).

☞ 19. Slide the drive shaft through the gathering head motor and into the gathering head gear case (the drive shaft end without the threaded hole should be inserted first). The shaft may require some adjustment so that its end fits into the gear case.

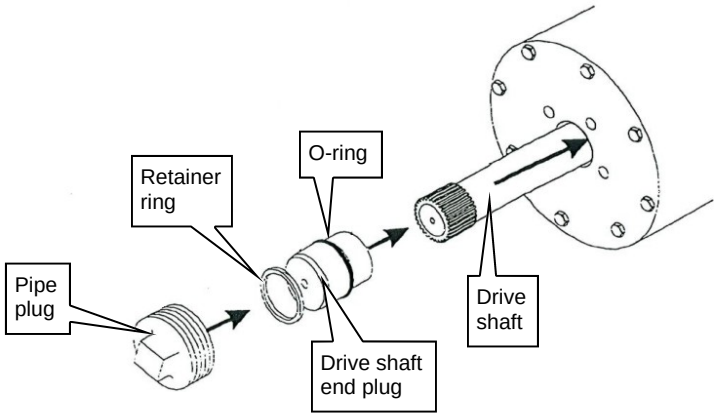
☞ 20. Install the o-ring into the channel on the shaft end plug.

☞ 21. Insert the drive shaft end plug into position in the center of the motor.

☞ 22. Insert the retaining ring to secure the shaft end plug inside the motor housing.

☞ 23. Replace the pipe plug into the end of the motor.

Fig. 170: Drive shaft installation



☞ 24. Reconnect water hosing.

☞ 25. Replace the gathering head motor side access cover. Secure the cover to the gathering head by inserting and tightening the hex head capscrews.

☞ 26. Replace the upper deck cover and secure to the gathering head by inserting and tightening the hex head capscrews.

☞ 27. If removed, install the CLA over the motor (see CLA removal and installation procedure in this chapter).

Gathering head lift cylinder removal and installation

gathering head lift cylinder removal

To remove a gathering head lift cylinder:

☞ 1. Lower the conveyor tail section so that it is level with the floor.

☞ 2. Completely raise the cutter head and gathering head assemblies.

☞ 3. Place blocking under the cutter head and gathering head assemblies and lower the assemblies onto the blocking.

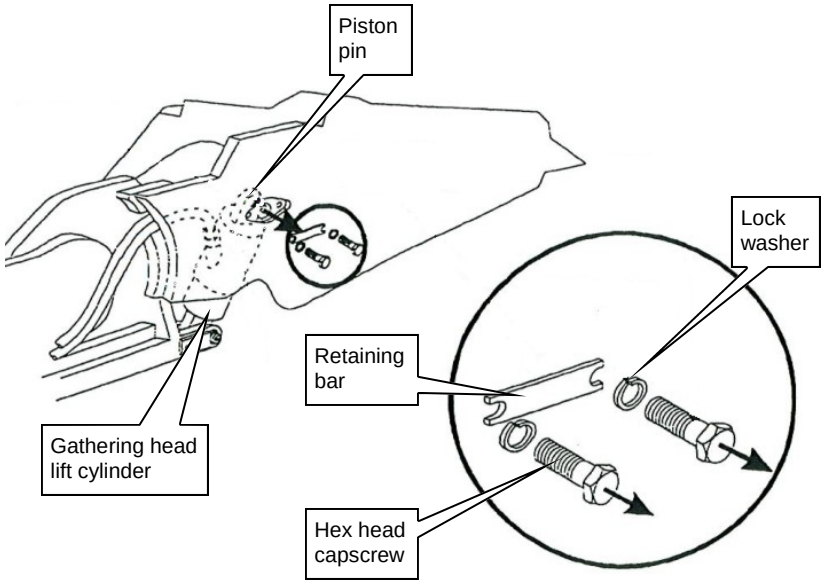
WARNING!
You can be seriously injured or killed by falling loads. Observe the safe working load limits of all blocking devices.

☞ 4. Disconnect the trailing cable to de-energize the miner. Follow all Federal and mine regulations for lockout/tagout.

WARNING!
Follow all federal and mine lockout/tagout regulations. Failure to do so could result in machine damage or serious injury or death to personnel.

☞ 5. Remove the hex head capscrews and lock washers that secure the lift cylinder piston pin retaining bar to the gathering head side panel and then remove the retaining bar (Fig. 178).

Fig. 178: Gather head lift cylinder piston pin retaining bar



☞ 3. Remove the socket head capscrews and hi-collar lock washers that secure the hand hole cover to the motor housing.

☞ 4. Remove the hand hole cover and its o-ring.

☞ 5. Insert the four lugs of the power cable (with gland and stuffing box already installed) into the tram motor's junction box.

☞ 6. Replace the stuffing box's half-moon clamp in its channel to secure the stuffing box in the junction box.

☞ 7. Tighten the socket head capscrews to secure the clamp to the junction box.

☞ 8. Match the power cable lugs to the corresponding terminal strip posts and secure each lug to the corresponding post with a flat washer, lock washer, and hex nut.

☞ 9. Replace the motor hand hole cover and o-ring, and secure it with socket head capscrews and hi-collar lockwashers.

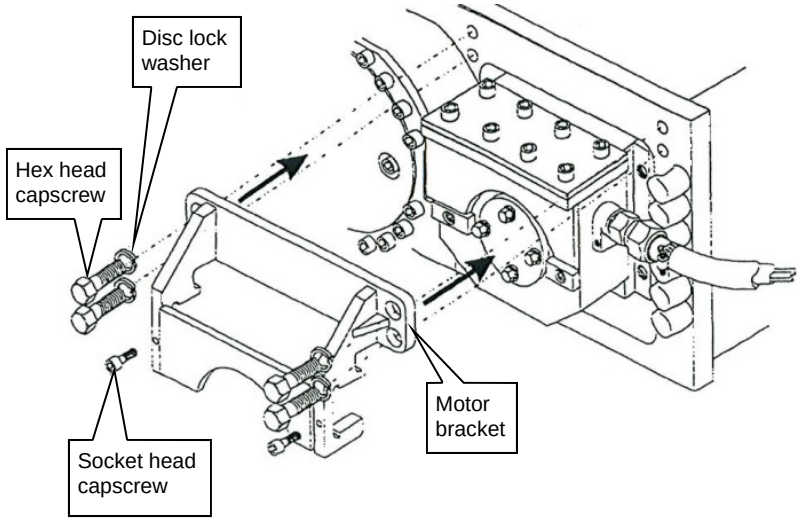
☞ 10. Carefully slide the tram motor into position in the tram case. The end of the motor must be completely flush against the primary planetary adapter plate.

☞ 11. Position the tram motor bracket (Fig. 186) against the motor. The lower half of the bracket must be flush against the motor and upper bracket must be flush against the tram case. Reposition the tram motor until the bracket can be properly positioned.

☞ 12. Insert and tighten the socket head capscrews to secure the tram motor bracket to the tram motor.

☞ 13. Insert and tighten the hex head capscrews and disc lock washers to secure the tram motor bracket to the tram case.

Fig. 186: Motor bracket installation



Tram case removal and installation

tram case removal

To remove the tram case:

☞ 1. Lower the conveyor tail section until it is level with the floor.

☞ 2. Raise the gathering head and cutter head and place a small stack of blocking under these two assemblies.

WARNING!
You could be seriously injured or killed by falling loads. Observe the safe working load limits of all blocking devices.

☞ 3. Lower the gathering head and cutter head onto the blocking so that the front end of the miner lifts off the floor.

☞ 4. Extend the stabilizer completely so that the rear end of the miner lifts off of the floor.

☞ 5. Place blocking in multiple locations under the miner tram track. When the miner is lowered, the tram track should be secured between the blocking and the tractor frame.

WARNING!
You could be seriously injured or killed by falling loads. Observe the safe working load limits of all blocking devices.

☞ 6. Raise the stabilizer and the gathering head and cutter head assemblies so the weight of the miner rests on the blocking.

☞ 7. Disconnect the trailing cable to de-energize the miner. Follow all Federal and mine regulations for lockout/tagout.

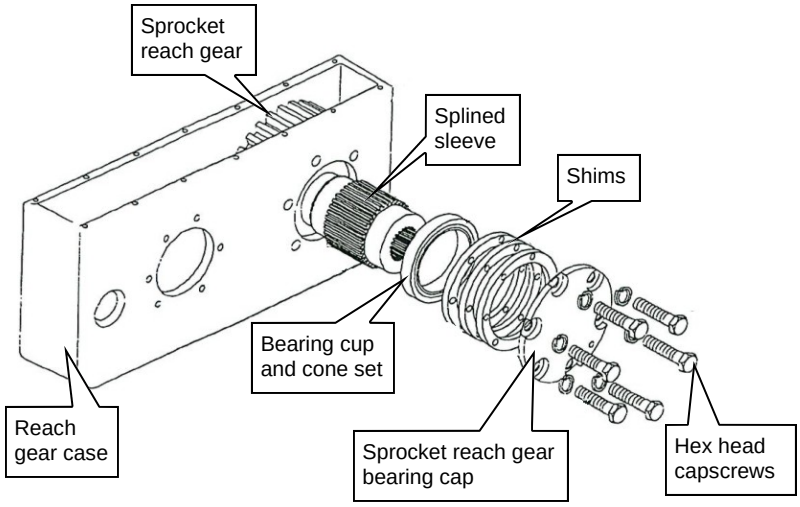
WARNING!
Follow all federal and mine lockout/tagout regulations. Failure to do so could result in machine damage or serious injury or death to personnel.

☞ 8. Remove the two rub rail pins that secure the tram rub rail to the two rub rail sections adjacent to it and remove the tram rub rail to expose the tram case.

☞ 9. Remove the hex head capscrew and lock washer that secure the front rub rail to the tractor frame and open the front rub rail cover.

☞ 10. Attach the grease gun to the front idler take-up cylinder fitting (Fig. 194) and pump grease into the take-up cylinder to extend the cylinder and remove pusher plate pressure on the idler shims.

Fig. 203: Splined sleeve and bearing cap installation



☞ 8. Insert two cup and cone bearing sets into the central cut-outs on either side of the idler reach gear (Fig. 204). The cone side of the bearing sets should face out of the gear on both sides.

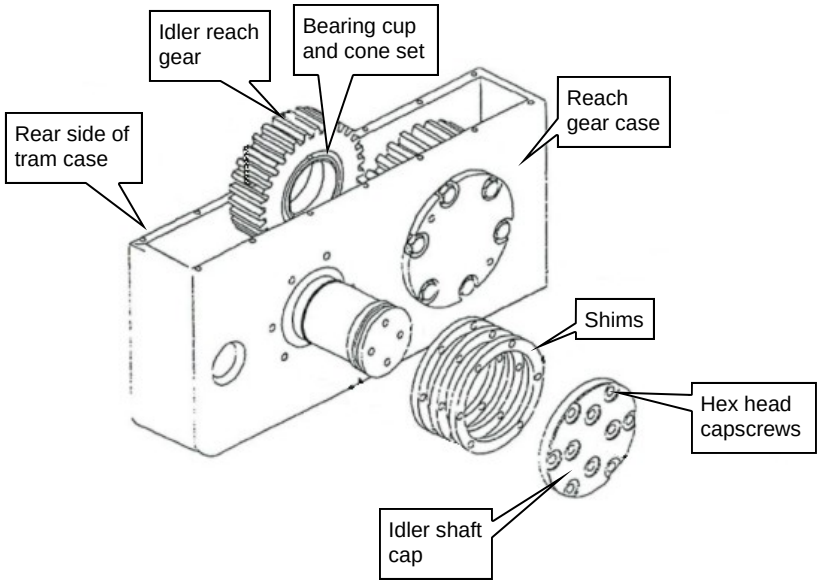
☞ 9. Insert the idler reach gear through the top opening of the reach gear case and position it against the sprocket reach gear, ensuring that the gear teeth securely mesh.

☞ 10. Insert the idler shaft through the bearing sets in the idler reach gear until it is positioned against the tractor frame.

☞ 11. Replace the three steel shims over the idler shaft.

☞ 12. Replace the idler shaft cap.

Fig. 204: Idler reach gear and idler shaft installation



Tram track front idler removal and installation

tram track front idler removal

To remove the tram track front idler:

☞ 1. Raise the gathering head and cutter head assemblies to their highest points and place blocking underneath. Lower the assemblies onto the blocking. The gathering head and cutter head must be blocked high enough to allow the idler assembly to be removed from the tractor frame's idler slide channel.

WARNING!
You can be seriously injured or killed by falling loads. Observe the safe working load limits of all blocking devices.

☞ 2. Disconnect the trailing cable to de-energize the miner. Follow all Federal and mine regulations for lockout/tagout.

WARNING!
Follow all federal and mine lockout/tagout regulations. Failure to do so could result in machine damage or serious injury or death to personnel.

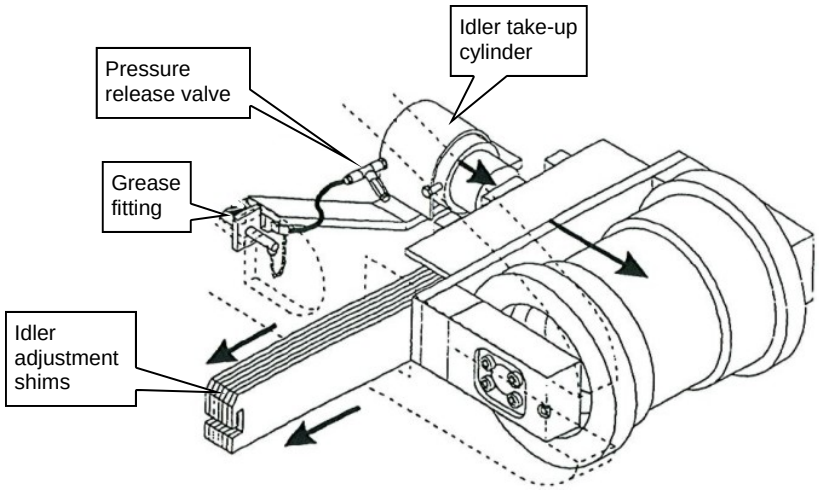
☞ 3. Remove the hex head capscrew and lock washer that secure the front rub rail to the tractor frame and open the front rub rail cover.

☞ 4. Attach the grease gun to the front idler take-up cylinder fitting (Fig. 211) and pump grease into the take-up cylinder to extend the cylinder and remove pusher plate pressure on the idler shims.

☞ 5. Remove all the idler adjustment shims and store the shims in a safe place.

☞ 6. Open the pressure release valve for the front idler take-up jack and allow the cylinder to contract.

Fig. 211: Idler take-up cylinder



☞ 7. Tag, disconnect, and cap the two cooling water hoses from the cooling water fittings on the pump motor.

☞ 8. Remove the cooling water fittings from the top left and right surface of the pump motor and store in a safe place.

☞ 9. Remove the cover and its o-ring from the motor's junction box by removing four hex head capscrews and lockwashers.

☞ 10. Locate the three taped power connections inside the junction box.

☞ 11. Strip off the three layers of tape covering each of the three lug connections inside the junction box.

☞ 12. Tag the three lugs to facilitate reconnection during motor installation.

☞ 13. Remove the hex head capscrew, flat washer, lockwasher, and hex head nut that secures the three power cable lugs to the three motor lugs.

☞ 14. Remove the two socket head capscrews and lockwashers that secure the stuffing box's half-moon clamp to the junction box.

☞ 15. Remove the clamp and slide the stuffing box out of the junction box. The power cable should be completely disconnected from the motor.

☞ 16. To prevent damage to the power cable lugs and gland assembly, cover the power cable and secure it to the miner in a safe location.

☞ 17. To protect the motor's electrical connections, replace the motor junction box cover and secure it using four hex head capscrews and lockwashers.

WARNING!
The hydraulic pump motor is now detached from the tractor frame and can be removed. The hydraulic pump motor is extremely heavy. Prepare to support its weight before removing it from the tractor frame.

☞ 18. Carefully slide the hydraulic pump motor out of the tractor frame.

Tail roller removal

Reference Fig. 225:

☞ 1. Lower the gathering head and cutter head assemblies until they rest on the floor.

☞ 2. Slowly advance the conveyor chain until a connecting link moves onto the conveyor tail section slide pan.

☞ 3. Using the procedure outlined in Chain Tension, Loosen tension on the conveyor chain as much as possible (see Conveyor chain adjustment procedure I n this chapter).

☞ 4. Lower the conveyor tail section onto blocking so it is level with the floor.

WARNING!
You could be seriously injured or killed by falling loads. Observe the safe working load limits of all blocking devices.

☞ 5. Disconnect the trailing cable to de-energize the miner. Follow all Federal and mine regulations for lockout/tagout.

WARNING!
Follow all federal and mine lockout/tagout regulations. Failure to do so could result in machine damage or serious injury or death to personnel.

☞ 6. With conveyor chain tension removed, remove the retaining rings, or “T” pins, from the connecting link.

☞ 7. Remove the connecting link and its strap. The conveyor chain should now be separated. Move the two pieces of the conveyor chain out of the way to allow for easier removal of the conveyor tail roller assembly.

☞ 8. Remove the socket head capscrews that secure the tail roller assembly to the slide pan.

☞ 9. Remove the tail roller assembly from its location in the slide pan.

bearing assembly

Bearing cones and cups can be assembled in many ways. Smaller bearings can be pressed onto shaft or into housings. Bearing cones can be heated and shrunk onto shafts. Cups can be frozen and contracted to slip into housings easier. Proper bearing operation hinges upon correct mounting. With any method used, a number of factors should be considered.

Mount in a relatively clean environment. Dirt and debris affect internal clearances and fits. Dust can keep two mating surfaces from being tight, causing out-of -round bores. Dirt on a shaft contact area can cause seal wear. Debris mixing with gear oil forms a lapping compound that wears the bearing. Keep the bearing in its container until ready to mount it.

- Do not drop or roughly handle the bearings.
- Do not subject bearings to sudden, large temperature changes. This could cause condensation onto the bearing surfaces.
- Do not handle the bearings more than necessary. Finger prints can be a starting point for rust.
- When installing, be sure the cone or cup is solidly seated against its shoulder. After the part has been pressed, shrunk, or cooled on, check with a thickness gauge to make sure it is properly seated.
- Be sure the bearing being installed is Original Equipment Manufacturer (OEM) . This ensures that an exact duplicate is put on. Bearings and shafts are designed for each other, and changes can cause failure, loss of warranty, and extended downtime.
- Be sure the bearing fit is not too loose or too tight. A loose bearing will creep, slip and cause it to overheat and be subjected to abrasive wear on the bore or shaft.
- On a tight bearing, the inner ring of the cup will be stretched to where there is no room for the rollers or balls to revolve freely.
- The bearing should be supported properly and pressure should be applied to the correct ring of the bearing.

There are generally three basic methods to mounting bearings: cold mounting, temperature mounting, and hydraulic mounting.

Bearings up to 4" (102 mm) in diameter can be cold mounted, using a sleeve and a hammer or press. Soft-metal hammers, while less likely to cause damage, have a tendency to chip and send metal flying into the bearing.

The end faces of a driving sleeve should be flat, parallel, and free of burrs. The bearing seating on the shaft and in the housing should be lightly smeared with thin oil.

Component substitution

IMPORTANT!
Anti-seizing compounds may be used with this type of locknut. Washers are not normally required here, but if assembly does, include them as they are needed due to high stress torque.

When parts need changed, OEM equipment is recommended. This includes less obvious components such as hydraulic hoses, couplings, and valves, as well as the more obvious ones such as relays, gears, and torque shafts.

WARNING!
Components not meeting specifications can fail, cause serious injury, and damage equipment.

WARNING!
Do not substitute materials or compounds not complying with OEM. Use of non-OEM supplies may void warranties.

IMPORTANT!
When performing maintenance on the machine, remember that fabrication, installation, modifications or adjustments must be according to OEM specifications.

Table 4: Flow chart II for troubleshooting excessive heat

Pump Heated		Motor Heated		Relief Valve Heated		Fluid Heated	
Cause	**Remedy**	**Cause**	**Remedy**	**Cause**	**Remedy**	**Cause**	**Remedy**
Fluid heated	See Fluid Heated	Fluid heated	See Fluid Heated	Fluid heated	See Fluid Heated	System pressure too high	D
Cavitation	A	Relief valve set too high	D	Valve setting incorrect	D	Unloading valve set too high	D
Air in fluid	B	Excessive load	C	Worn or damaged valve	E	Fluid dirty or low supply	F
Relief valve set too high	D	Worn or damaged motor	E			Incorrect fluid viscosity	F
Excessive load	C						
Worn or damaged pump	E					Worn pump, valve motor, cylinder, or other component	E

Remedies

A. Any or all of the following:

- ☞ replace dirty filters
- ☞ clean clogged inlet line
- ☞ clean reservoir breather vent
- ☞ change system fluid
- ☞ change to proper pump drive motor speed

B. Any or all of the following:

- ☞ tighten leaky inlet connections
- ☞ fill reservoir to proper levels: with few exceptions, all return lines should be below fluid level in the reservoir
- ☞ bleed air from system
- ☞ replace pump shaft seal; also replace shaft if worn at seal journal

C. All of the following:

- ☞ align unit
- ☞ check condition of seals, bearings, and coupling
- ☞ locate and correct mechanical binding
- ☞ check for workload in excess of circuit design

D. ☞ install and/or adjust pressure gauge; keep at least 125 psi difference between valve settings

E. ☞ overhaul or replace defective parts

F. ☞ change filters

- ☞ check system fluid viscosity; change if necessary
- ☞ fill reservoir to proper level

Table 11 (continued): Electrical system troubleshooting

Trouble, symptom or cause	Probable cause	Test, check and/or remedy
both cutter head motors do not start	☞ Three phase power not present at contactors.	☞ Check three phase input to contactors.
	☞ Pump not running.	☞ Start pump.
	☞ Failed control relay contacts.	☞ Check contacts
	☞ Cutter head motor start and stop switches, conveyor start switch, or pump start switch not working properly.	☞ Check for faulty switches.
	☞ Overload relay.	☞ Check overload relays.
	☞ Failed left cutter head motor contactor.	☞ Check contactor coil. Verify that contacts are free to move.
left cutter head motor starts but right cutter head motor does not	☞ Auxillary contacts not closing.	☞ Check contactor auxillary contacts and wiring.
	☞ Time delay malfunction.	☞ Check coil and timed closed contacts and wiring.
	☞ Failed vaccuum starter.	☞ Check contactor coil and contact tips and wiring.
both cutter head motors start but stop when pump start and cutter head start switches are released	☞ Problem with auxillary contacts.	☞ Check right cutter head motor contactor auxillary contacts and associated wiring.
	☞ Overcurrent relays.	☞ Check overcurrent relays.

Approved lubricants

Table 19: Anti-wear hydraulic oil (Spec 100-1)

	Supplier	Brand name
1	Amoco Oil Company	Amoco AW Oil No.68
2	Gulf Oil	Harmony 68 AW
3	Mobil Oil Corporation	Mobil DTE-16
4	Chevron U.S.A.	Chevron Hydraulic Oil Aw ISO 68
5	Sun Oil Company	Sunvis 868
6	Unocal 76	Unax AW 68
7	Shell Oil Company	Shell Hydraulic Oil #33
8	Century (Fuchs)	Hydraulic AW 68
9	Atlantic Richfield Company	Duro AW S-315 Oil
10	Texaco Lubricants Company	Texaco Rando Oil HD 68
11	Exxon	Nuto 68
12	Pennzoil	Pennzbell AW 68 Hydraulic Oil
13	Standard Oil Company Standard Oil Co. of Ohio Boron Oil Company BP Oil Inc.	 Industron 54 Industron 53 Energol HLP-C68
14	Lubricating Engineers	6120 Monolec Hydraulic Oil
15	Conoco Inc.	Super Hydraulic oil 68
16	Hydrotex	Systems 5K 68
17	Phillips	Maginus A Oils 81350
18	Miners Oil	Hydraulic Oil 68AW

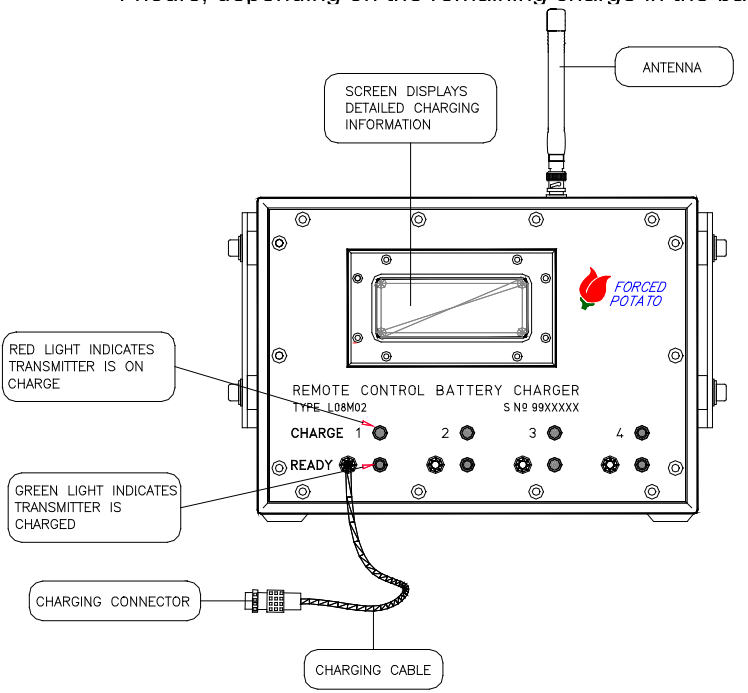
(4) System Information

System Name	Super Simpson RCS (Bucyrus 25M Miner Version)
Last S/W Rev.*	September
Receiver Part	Forced Potato P/N: L0Q60101 Bucyrus

For exact details on machine wiring configuration please consult the electrical schematic that pertains to your particular miner.

Charging the Remote Control Console (TITO)

The TITO remote console contains an internal battery that allows up to 20 hours of continuous operation. The internal battery can be re charged using the Battery Charger. Recharge times for the unit are 4 hours; depending on the remaining charge in the battery.

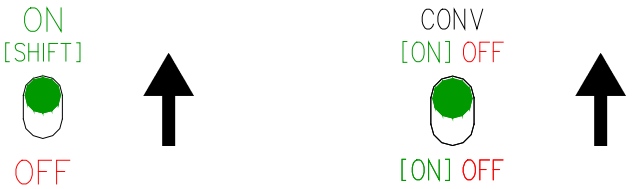


Plug one of the 4 Charging Cables into the Transmitter.
Red and Green Lights will flash for a few moments.
Charger will begin charging.
While charging is in progress, the red light will be on
When charging is complete the green light will come on
During charging, the screen shows how long each transmitter has been on charge.

Remote Console Conveyor Motors Control

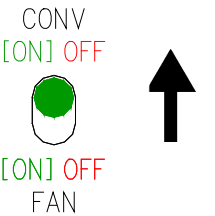
Starting the Conveyor Motors in

Ensure that the pump motor is first running normally.
Press [SHIFT] and wait ¼ second
Press CONV [ON] while [SHIFT] is also pressed.
After a few moments the conveyor will start in forward.
Release CONV [ON] first. Then release [SHIFT].
Cutter motors should continue to run normally.



Stopping the Conveyor Motors

Conveyor is running in forward
Press and hold CONV OFF.
The Conveyor Motors should shut down immediately.



Running the Conveyor Motors in Reverse (Momentary Only)

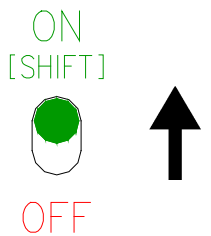
Ensure that the pump motor is first running normally.
Press [SHIFT] and wait ¼ second
Press [CONV REV] while [SHIFT] is also pressed.
After a few moments the conveyor will start in reverse.
The Conveyor will remain running in reverse until the [CONV REV] key or the [SHIFT] key is released.

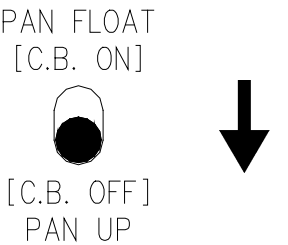
Remote Console Breaker On and Off

The control system allows the main circuit breaker on the miner to be turned on and off using the radio remote control console. This ly requires that a battery backup version of power supply be installed on the machine.

To turn off the breaker:

Press and hold the keys together for a 2

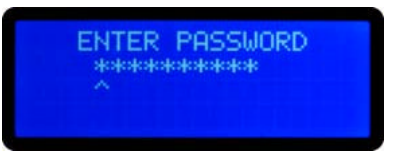




After 2 seconds, the breaker off solenoid e (turning off the machine circuit breaker)

System Menu Pages and Options

Main Menu is composed of 9 Options 7, 8 and 9 open password protected menus as indicated below.

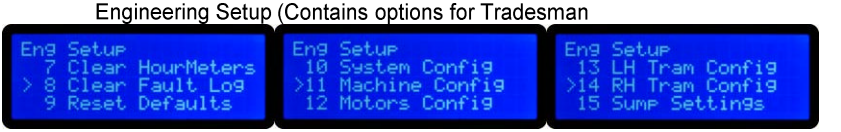


Selecting these options will require a password. Do not give the password to unauthorized personnel.

and SHEAR switches, enter the password and press the shift key

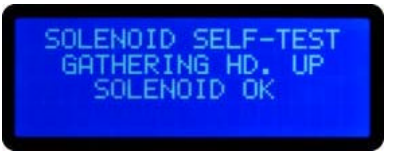
Tradesman Setup

Engineering Setup (Contains options for Tradesman



Allows for advanced settings available only to factory personnel. This option will not be covered in this manual.

If the system finds that the coil is normal, it displays SOLENOID OK n moves on to the



If the system believes that a solenoid coil is open circuit, it will pause the test at that solenoid and display SOLENOID OPEN. The number **LEFT TRAM REVERSE**) must be pressed to continue the test.

If the system finds a solenoid coil that is short circuit, it pauses the test and displays the SOLENOID SHORT message for the solenoid. The **LEFT TRAM REVERSE**) must be pressed to continue

The system will continue testing until all solenoids have been checked. Each time a fault is detected the system will pause until prompted to continue. After all solenoids have been checked the system will automatically return to the Menu.

L0LH09 Installed This option determines if the control system should monitor thermistor inputs. The L0LH09 is a thermistor module that takes inputs from the PT100 thermistors. If the thermistor module is installed and PT100 monitoring is desired this should be set

Option 5, 6, 7, 8 and 9 PT100 inputs allow the engineer to enable or disable individual PT100 monitoring. If the parameter is set to NO for a particular PT100 the input from that motor will be ignored. Use caution with this setting because the PT100 helps the control system prevent motor over temperature.

7) Fault System

The following is a complete list of all error messages in the control

Fault Number	Fault Name
	SOL BOARD COMMS FAIL
	Explanation
	There was either an internal failure or a communications failure of the
	Possible Causes
	f 485 bus wiring to the board failure of the solenoid board
	Checks to Carv Out
	1. Replace the Super Simpson receiver
Fault Number	**Fault Name**
	RELAY BOARD COMMS FAIL
	Explanation
	There was either an internal failure or a communications failure of the relay board.
	Possible Causes
	f 485 bus wiring to the board failure of the solenoid board
	Checks to Carv Out
	1. Replace the Super Simpson receiver
Fault Number	**Fault Name**
	THERMISTOR MODULE FAILURE
	Explanation
	There was either an internal failure or a communications failure of the

Fault Number	Fault Name
	RIGHT CUTTER MOTORMATE FAILURE PHASE A
	Explanation
	Phase A from motor mate is not healthy (healthy is between 4 mA and 20 mA)
	Possible Causes
	24VDC supply to the motor mate more signal lines have gone open signal lines have been Motor Mate is faulty Super Simpson is faulty (interface to the Motor Mate)
	Checks to Carv Out
	Check 24 VDC supply wiring is OK (+24 VDC line is provided by output pin X4 2. Check that each signal line is not open or short circuit 3. Replace the Motor Mate 4. Replace the Super Simpson
Fault Number	**Fault Name**
	RIGHT CUTTER MOTORMATE FAILURE PHASE B
	Explanation
	from motor mate is not healthy (healthy is between 4 mA and 20 mA)
	Possible Causes
	24VDC supply to the motor mate One or more signal lines have gone open signal lines have been Motor Mate is faulty is faulty (interface to the Motor Mate)

	Checks to Carv Out
	Check 110VDC supply to solenoid 2. Check 110VDC being generated from power supply. 3. Replace the Super Simpson
Fault Number	**Fault Name**
	SOLENOID UNDERVOLTAGE
	Explanation
	Solenoid board is reporting loss of input
	Possible Causes
	Broken wire for 110VDC Internal failure on solenoid board
	Checks to Carv Out
	Check 110VDC supply to solenoid 2. Check 110VDC being generated from power supply. 3. Replace the Super Simpson

	The motor has been operator at a current level above the recommended FLA
	Possible Causes
	The motor is faulty. Motor Mate is Faulty. Super Simpson is Faulty.
	Checks to Carv Out
	1 Verify actual operating current Check that motor mate is reporting operating current. 3. Replace pump motor, motor mate, or super simpson.
Fault Number	**Fault Name**
	METHANE SENSOR FAULT
	Explanation
	S800 methane sensor is reporting an
	Possible Causes
	Sensor is faulty
	Checks to Cary
	1. Verify fault report on methane sensor 2. Replace methane sensor
Fault Number	**Fault Name**
	Explanation
	Possible Causes
	Checks to Carv Out
Fault Number	**Fault Name**
	OPERATOR CASE E
	Explanation
	Operator Side E Stop detected as being

Fault Number	Fault Name
	TEMPERATURE WARNING
	Explanation
	Thermistor reported temperature is within ten degrees of trip temperature.
	Possible Causes
	RTD circuit is above 150 Measure RTD resistance and compare to RTD failure (DO NOT Cable damage Thermistor Module Failure (L0LH09)
	Checks to Carv Out
	1.Check condition of wiring to RTD circuit and measure RTD stance and compare Note: Check connections Motor cable junction boxes. 2.Connect spare RTD circui terminal enclosure. 3. Replace Thermistor Module (L0LH09) .Check pilot cores in motor supply cable. s are damaged replace cable.
Fault Number	**Fault Name**
	PUMP PT100 SHORT CIRCUIT
	Explanation
	PT100 resistance detected as less than 60
	Possible Causes
	PT100 wiring has been short circuited Thermistor Module Failure (L0LH09)
	Checks to Carv Out
	1. Check motor.

Fault Number	Fault Name
	LEFT TRAM MOTORMATE FAILURE PHASE(B)
	Explanation
	from motor mate is not healthv (healthy is between 4 mA and 20 mA)
	Possible Causes
	24VDC supply to the motor mate One or more signal lines have gone open signal lines have been Motor Mate is faulty Super Simpson is faulty (interface to the Motor Mate)
	Checks to Carv Out
	Check 24 VDC supply wiring is OK (+24 VDC line is provided by output pin X4 2. Check that each signal line is not open or short circuit 3. Replace the Motor Mate 4. Replace the Super Simpson
Fault Number	**Fault Name**
	LEFT TRAM MOTORMATE FAILURE PHASE(C)
	Explanation
	from motor mate is not healthv (healthy is between 4 mA and 20 mA)
	Possible Causes
	24VDC supply to the motor mate One or more signal lines have gone open signal lines have been Motor Mate is faulty is faulty (interface to the Motor Mate)

Fault Number	Fault Name
	LH VFD OVERVOLTAGE TRIP
	Explanation
	VFD is reporting and overvoltage trip.
	Possible Causes
	Drive voltage is above 1200V brake resistor thermal cutout unit is faulty
	Checks to Carv Out
	1. Verify drive DC bus input voltage 2. replace brake unit
Fault Number	**Fault Name**
	LH VFD MOTOR RTD TRIP
	Explanation
	VFD is reporting motor RTD has reached trip temperature
	Possible Causes
	motor load too high Internal Drive Fault
	Checks to Carv Out
	1. Check proper motor operation 2. Check RTD wiring and circuit resistance 3. Check Drive settings
Fault Number	**Fault Name**
	LH VFD MOTOR TSTAT TRIP
	Explanation
	VFD is reporting motor thermostat input
	Possible Causes
	motor load is too high thermostat is faulty internal drive fault
	Checks to Carv Out

Fault Number	Fault Name
	RECTIFIER SHORT CIRCUIT
	Explanation
	Rectifier has reported a short circuit fault
	Possible Causes
	Terminal to Terminal wiring fault condition
	Checks to Carv Out
	1.Replace Rectifier 2. Replace Motor
Fault Number	Fault Name
	RECTIFIER IGBT OVER TEMPERATURE
	Explanation
	Rectifier is reporting IGBT over temperature state.
	Possible Causes
	internal rectifier failure
	Checks to Carv Out
	verify moto loading Replace rectifier

Fault Number	Fault Name
	RIGHT TRAM PT100 SHORT
	Explanation
	PT100 resistance detected as less than 60
	Possible Causes
	PT100 wiring has been short circuited Thermistor Module Failure (L0LH09)
	Checks to Carv Out
	1. Check motor. Check condition of wiring to RTD circuit 3. Replace Thermistor Module (L0LH09)
Fault Number	**Fault Name**
	RIGHT TRAM PT100 OPEN
	Explanation
	PT100 resistance detected as greater than 200 ohms
	Possible Causes
	PT100 wiring has been damaged Thermistor Module Failure (L0LH09)
	Checks to Carv Out
	1. Check motor. Check condition of wiring to RTD circuit and measure RTD resi 3. Replace Thermistor Module (L0LH09)
Fault Number	**Fault Name**
	RIGHT TRAM MOTOR TEMPERATURE WARNING
	Explanation
	The motor temperature has been detected within ten degrees of the trip temperature

	120VAC ACTIVE voltage was detected at the output of the internal conveyor forward run relay (Output X1 voltage energized the conveyor n circuit illegally. The Out Stop was tripped to prevent the conveyor motor from starting
	Possible Causes
	120VAC ACTIVE has shorted to the X1 output (Conveyor Forward Run Circuit) The internal conveyor forward run relay N Output) is faulty (closed illegally). Receiver needs to be replaced. Receiver is faulty.
	Checks to Carv Out
	wiring between relay output and forward conveyor contactor that 120VAC is coming from Super Simpson Replace Super Simpson

Fault Number	Fault Name
	RIGHT TRACTION DRIVE COMMS
	Explanation
	The receiver is not able to communicate e right traction The traction is disabled and cannot be started
	Possible Causes
	Communication wires between the receiver and thermistor module are broken or There is no 120VAC power supply or 24VDC power supply to the drive The traction drive unit is Receiver is faulty.
	Checks to Carv Out
	1. Check the integrity of the daisy chai cable and its internal wires 2. Check all modules are properly ected to the daisy chain cable the 24VDC supply to module. ace the module.
Fault Number	**Fault Name**
	RIGHT TRACTION DRIVE WRONG SOFTWARE VERSION
	Explanation
	The software that is installed in the wrong version. The version that is installed cannot be used with this control The traction is disabled and cannot be started
	Possible Causes
	Wrong software version installed in the
	Checks to Carv Out
	Replace the drive.
Fault Number	**Fault Name**

	Checks to Cary
	1. Verify proper functionality of the motor. Check motor mate reading versus hand 3. Replace motor mate 4. Replace Super Simpson
Fault Number	**Fault Name**
	PUMP MOTOR PHASE
	Explanation
	While the pump motor was significant difference in the pump phase currents was detected. Normally all three phase currents for a motor sh approximately equal. The pump motor was
	Possible Causes
	Motor power conductor is broken Serious motor failure Pump Motor Mate is faulty Receiver is faulty (inputs from motor mate)
	Checks to Carv Out
	1. Verify proper functionality of the motor. Check motor mate reading versus hand 3. Replace motor mate 4. Replace Super Simpson

Fault Number	Fault Name
	LEFT CUTTER MOTOR THERMAL OVERLOAD
	Explanation
	The left cutter motor current was too high for too long a period. This can cause overheating and possible damage to the motor. The cutter motors were shutdown and are prevented from starting for several minutes to prevent left cutter motor
	Possible Causes
	Heavy cutting loads are c overloading of the Failure of gearbox that is overloading or jamming the motor shaft Serious failure of the left cutter motor
	Checks to Carv Out
	1. Check proper functionality of cutter 2. Verify motor mate feedback against hand held meter. Replace motor 4. Replace Super Simpson
Fault Number	**Fault Name**
	LEFT CUTTER MOTOR OVER TEMPERATURE
	Explanation
	The temperature of the motor windings in the left cutter motor is over the safe temperature threshold. Cutters are This fault is onlv available if a thermistor module is installed in the
	Possible Causes
	Cooling system of the left cutter motor is impeded by debris or other factors, preventing adequat

Fault Number	Fault Name
	LEFT CONVEYOR NO LOAD
	Explanation
	While the conveyor was running, t currents detected in the conveyor were very small. It is possible that no load is connected to the left conveyor mechanical failure of the or motor gearbox. The motors were shutdown.
	Possible Causes
	No load connected to motor shaft Mechanical failure of the conveyor Mechanical failure of the
	Checks to Carv Out
	1. Check proper functionality of conveyor 2. Verify motor mate feedback against hand held meter. Replace motor mate. 4. Replace Super
Fault Number	**Fault Name**
	LEFT CONVEYOR MOTOR PHASE LOSS
	Explanation
	While the conveyor was running, at least one of the phase currents went to Amperes for unknown reasons. possible that the motor lead is not connected from the motor. It is also possible that the motor itself has internal failure. The convevor
	Possible Causes
	Motor power conductor is broken Serious motor failure Motor Mate is faulty Receiver is faulty (inputs from motor

Fault Number	Fault Name
	Explanation
	Possible Causes
	Checks to Carv Out
Fault Number	**Fault Name**
	FAN MOTOR MATE FAULTY
	Explanation
	At least one of the three signal lines from r mate is faultv. while the fan running or an attempt was Each signal line must read between 4mA and 20 mA to be normal. If any of the lines is not in this ran this fault will occur. The fan motor was
	Possible Causes
	Wires to the Motor Mate are broken or There is no 24VDC supply to the Motor The Motor Mate is faulty Receiver (or inputs to receiver) faulty
	Checks to Carv Out
	Check 24VDC supply to motor mate. **Check wire connection from motor mate to Super Simpson** **Replace Super Simpson**
Fault Number	**Fault Name**
	FAN NO LOAD CURRENT
	Explanation
	was running, t detected in the motor were very small. It is

Fault Number	Fault Name
	LEFT CUTTER MULTIPLE INSTANT OVERLOADS
	Explanation
	motor was running the current measured in the motor instantaneous overload threshold cutter was shutdown. This has happened multiple times and the motor now requires a longer cool down period before restart.
	Possible Causes
	gearbox that is overloading or jamming the Overload of the hydraulic system that is excessive mechanical loading of Serious failure of the
	Checks to Carv Out
	Verify proper functionality of motor. 2. Verify motor mate feedback versus hand 3. Replace motor mate 4. Replace Super Simpson
Fault Number	**Fault Name**
	RIGHT CUTTER MULTIPLE INSTANT OVERLOADS
	Explanation
	motor was running the current measured in the motor exceeded the instantaneous overload threshold cutter was shutdown. This has happened multiple times and the motor now requires a longer cool down period before restart.
	Possible Causes
	gearbox that is overloading or jamming the Overload of the hydraulic system that is excessive mechanical loading of

Fault Number	Fault Name
	REAR METHANE SENSOR
	Explanation
	The methane sensor is reporting that serial communication errors.
	Possible Causes
	The sensor has suffered an internal failure
	Checks to Carv Out
	1. Replace methane sensor.
Fault Number	**Fault Name**
	PUMP MOTOR OVER TEMPERATURE WARNING
	Explanation
	The pump motor has nearly reached its maximum operating temperature
	Possible Causes
	The motor has a cooling problem The motor has a serious failure The motor thermistor is faultv The thermistor module has failed
	Checks to Carv Out
	1. Check proper coolant level 2. Check resistance reading from thermistor module versus hand held meter 3. Replace thermistor module
Fault Number	**Fault Name**
	LEFT CUTTER MOTOR OVER TEMPERATURE WARNING
	Explanation
	motor has nearly maximum operating temperature
	Possible Causes
	The motor has a cooling problem

	RESERVED FOR FUTURE USE
	Possible Causes
	Checks to Carv Out

	The traction interface is faultv The left drive is faulty
	Checks to Carv Out
	1. Replace the traction module 2. Replace the interface box. 3. Replace the drive.
Fault Number	**Fault Name**
	DEADMAN SWITCH OPEN
	Explanation
	The traction module has detected a deadman switch open condition.
	Possible Causes
	The traction module is faultv. Deadman switch is open.
	Checks to Carv Out
	1. Check deadman switch wiring 2. Replace tractions module.
Fault Number	**Fault Name**
	DEADMAN SWITCH FROZEN
	Explanation
	The traction module has detected a deadman switch frozen condition
	Possible Causes
	The traction module is faultv. Deadman switch is shorted..
	Checks to Carv Out
	1. Check deadman switch 2. Replace tractions module.
Fault Number	**Fault Name**
	TRACTION MODULE COMMS
	Explanation
	A communications error has occurred between the receiver and the traction
	Possible Causes
	The communication wires are broken

	Possible Causes
	No 110VAC supplied from receiver to Contactor failed to close motor mate is faulty
	Checks to Carv Out
	Check wiring from receiver to contactor Verify that contactor is closing and three Verify motor mate feedback with hand Replace motor mate.

Fault Number	Fault Name
	NO RIGHT CONVEYOR START
	Explanation
	No current was detected by motor mate during start of motor (1 second timeout)
	No 110VAC supplied from receiver to Contactor failed to close motor mate is faulty
	Checks to Carv Out
	Check wiring from receiver to contactor Verify that contactor is closing and three phase is supplied Verify motor mate feedback with hand held Replace motor mate.

	Check 110VAC from contactor auxillary Check continuity from contactor to receiver Replace Super Simpson

Fault Number	Fault Name
	CB2 OPEN DURING FORWARD CONVEYOR START
	Explanation
	Circuit Breaker was detected as open during motor start
	Possible Causes
	Breaker tripped Auxillary contact failure Receiver Failure
	Checks to Carv Out
	Check 110VAC from contactor auxillary Check continuity from contactor to receiver Replace Super Simpson
	Fault Name
	CB2 OPEN DURING REVERSE CONVEYOR START
	Explanation
	Circuit Breaker was detected as open during motor start
	Possible Causes
	Breaker tripped Auxillary contact failure Receiver Failure
	Checks to Carv Out
	Check 110VAC from contactor auxillary Check continuity from contactor to receiver

Fault Number	Fault Name
	RIGHT VFD PHASE LOSS
	Explanation
	The inverter has detected a phase loss
	Possible Causes
	Motor phase disconnected Motor current is very low Inverter output phase is very low
	Checks to Carv Out
	Check all motor terminals Reset the fault Replace the inverter.
Fault Number	**Fault Name**
	RIGHT VFD CAN COMMUNICATIONS FAILURE
	Explanation
	The inverter has detected a CAN communications loss
	Possible Causes
	CAN wire broken Noise on CAN line No control power to inverter
	Checks to Carv Out
	Connect CAN link Check CAN link connections Restore 120VAC control power Replace the inverter
Fault Number	
	RECTIFIER UNDERVOLTAGE
	Explanation
	The rectifier has detected and undervoltage condition
	Possible Causes
	Supply below 460V CAN Inhibit Active

Fault Number	Fault Name
	LEFT RMS UNPLANNED
	Explanation
	Possible Causes
	Checks to Carv Out
Fault Number	Fault Name
	LEFT RMS EMERGENCY TRAM
	Explanation
	Possible Causes
	Checks to Carv Out
Fault Number	Fault Name
	LEFT RMS NOT IN READY
	Explanation
	Drive is not reporting ready state during
	Possible Causes
	Checks to Carv Out
	If problem persists replace the drive.
Fault Number	Fault Name
	RIGHT RMS LOW LINE
	Explanation
	Possible Causes
	Checks to Carv Out

Simpson Receiver Control Unit 19 Pin Burndy Female		
	Supply Output 24V+	
	Aux. Supply Output 0V	
	Supply Input 24V+	
	Data Logging (Methane) RS485	
	Data Logging (Methane) RS485	
	Data Logging (Methane) RS485	
	External Slaves RS485	
	External Slaves RS485	
	External Slaves RS485	
	Frequency Selection #1	
	Frequency Selection #2	
	Frequency Selection #3	

Safety Notice

The advent of remote control has afforded the operator a notable improvement in personal safety. However, the potential for injury or fatality still exists when operating heavy machinery remotely.

Thus, it is *expressly* important that the operator observe safe work practice when operating a remote control mining machine. This will be defined by mine management and should encompass MSHA recommendations where applicable.

1. Radio Channel

There are 8 selectable channels available to the end-user. This allows the mine to support multiple machines.

2. Radio Timeout

The RC supports a timeout that automatically powers the unit down if there is no switch activity after a defined period of time. A selectable range of between 2 and 60 minutes can be chosen.