A6474X350
July 2012

Operation and Maintenance Manual

CM210 Continuous Miner

SAFETY.CAT.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 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

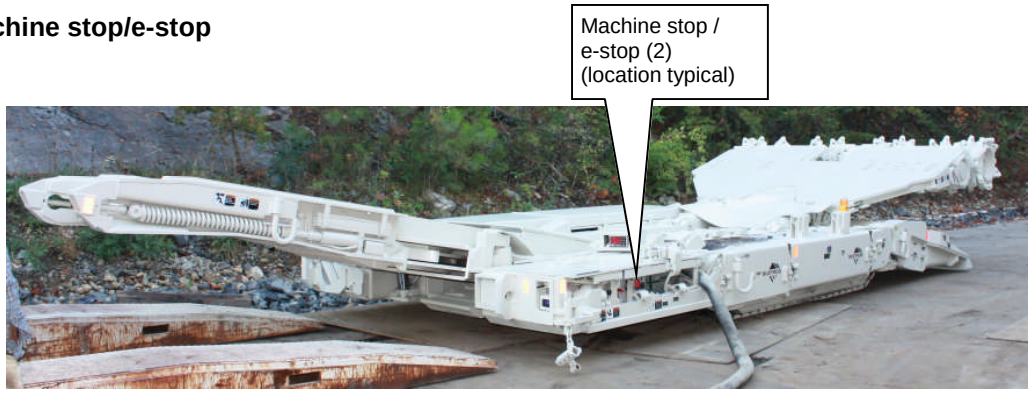
5 Operation

machine stop/e-stop

The Continuous Miner is equipped with an machine stop/e-stop button (Fig. 14) located on the left and right sides of the machine. The machine stop/e-stop button is used to break the control circuit in emergency situations, stopping all motors. Striking with a small amount of force will actuate the machine stop/e-stop.

WARNING!
Be prepared for a sudden stop when the machine stop/e-stop is actuated during normal tramming of the machine.

Fig. 14: Machine stop/e-stop



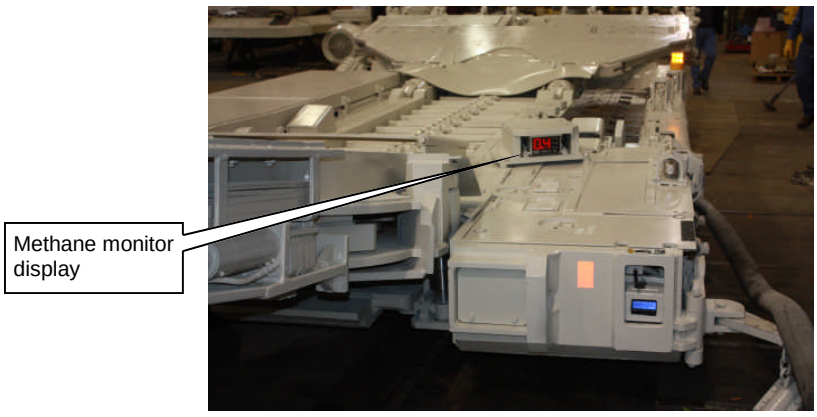
methane monitor

The machine is equipped with a methane monitoring system (Fig. 15) which, when energized, maintains a continuous check on methane gas concentration. This machine has two LED indicator displays which show the percentage of methane gas in larger numerals.

Consult the manufacturer's manual and literature in the parts book for your machine for the setup, operation, and maintenance of the methane monitoring system.

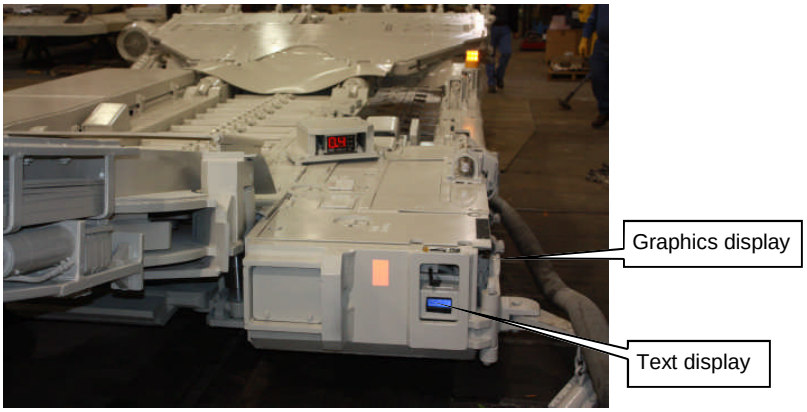
IMPORTANT!
It is the responsibility of the continuous miner owner/operator to know and follow all regulations regarding methane monitoring requirements, including, but not limited to, daily operation, maintenance and testing.

Fig. 15: Methane monitor display



There are two displays located on the machine: a graphics display located at the operator's case and a text display located near the back right hand side of the machine (Fig. 17). Both screens are used to display diagnostic information on the miner.

Fig. 17: Control system display locations (typical)



displays

The graphics display, located on the operator's case, is used to monitor machine operating parameters, for diagnosing error and fault codes, and for input of operating parameters.

The text display, located on the near the back right hand side of the machine, has the same functions as the graphics display. If the control system loses power, the text display will remain powered through the battery back up.

NOTICE!
Information priority is given to the graphics display unless the graphics display becomes unhealthy. The two monitors will not necessarily display the same information at the same time.

There are different screens that can be displayed: production monitoring, function monitoring, diagnostic, motor hours, and fault pages. A system halt message can appear as a pop-up dialog box in the middle of any screen. A message will appear when a critical conditions has occurred that prevents continued operation of the machine in a safe manner. The message box cannot be cleared and it is necessary to recycle power to the control system to restore machine operation.

Normal display pages

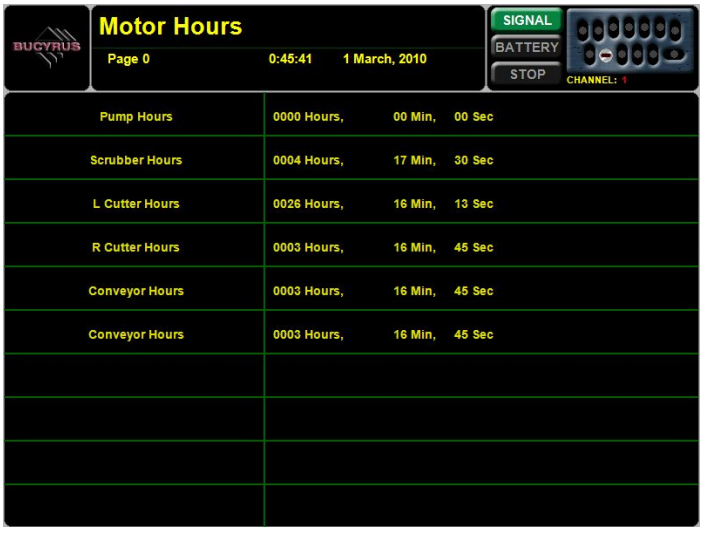
The main diagnostic screen (Fig. 18) is displayed during normal remote control operation of the machine. The screen presents real time diagnostic and performance information.

Hour meters

Selecting hour meters (Fig. 24) from the Main Menu will display runtime for the following motors: pump, fan, left cutter, right cutter, and conveyor. Time is displayed in hours:minutes:seconds format. This runtime only reflects accumulated time since the controller has been installed or since the counter was last reset. The hour meters can be cleared under the Engineering Setup Menu, which is password protected.

IMPORTANT!
The hours meters should only be cleared when a motor is replaced or when the machine controller is installed. To keep an accurate log of a motor's total hours, the information should be recorded anytime data is cleared.

Fig. 24: Hour meters, examples



Shutdown procedure

The Continuous Miner must be properly shutdown before leaving the area or before performing any maintenance or service. Some maintenance or service procedures may require additional steps to insure the safety of the maintenance personnel working on or around the machine and will be listed in the maintenance section of this guide.

- ☞ Back the miner about one foot from the face providing sufficient clearance and shut off the cutter head motors (see Cutter operation in this section).

- ☞ Tram the miner to an area of well supported roof. Park the machine in its designated parking area out of traffic, on flat, solid ground. If it is not possible to park the machine on flat ground, park the machine at a right angle to the slope.

WARNING!
After turning off the power to the machine, never walk away and leave the radio remote turned on. Failure to turn the radio remote off could result in an accident causing serious injury or loss of life.

- ☞ Empty the conveyor and shut it off (see Conveyor operation in this chapter).

- ☞ Lower the cutter head to the floor.

- ☞ Lower the conveyor and gathering head.

- ☞ Press and hold the “PUMP OFF” key. The pump motor should shutdown immediately.

- ☞ Release the “PUMP OFF” key.

- ☞ Turn off the water sprays.

- ☞ Position all levers and controls to Neutral or Off.

- ☞ Shut off the main power supply.

- ☞ Shut off the mine water supply.

- ☞ To maintain smooth level floor conditions, it may be necessary to tram the machine backward approximately 36 in., thus trimming ridges and smoothing the floor. This may or may not be necessary each cut sequence depending on mine conditions.
- ☞ Repeat this procedure to desired depth of cut.
- ☞ Turning crosscuts is accomplished by making a series of partial cuts (sumps) until the machine can be turned to the desired angle.

Relocating the miner

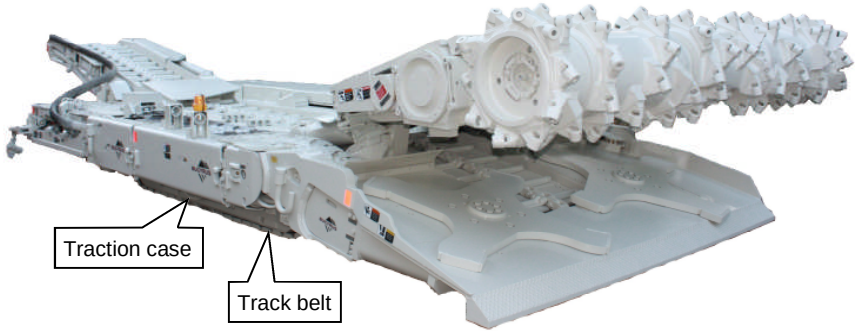
- ☞ Ensure rear stabilizer is raised from the floor.
- ☞ Position cutter boom so as to prevent it from hitting roof, ribs, or floor.
- ☞ Raise gathering head.
- ☞ Lower conveyor boom down and position so it will not hit roof, ribs, floor or any other equipment or obstacles.
- ☞ Ensure that trailing cable out of the path of travel.
- ☞ Ensure there is enough clearance when relocating to avoid damage to machine and ensure operator safety.
- ☞ Be alert to any people, obstacles, or other machines.
- ☞ Know the position of fellow workers.
- ☞ Engage tram in desired direction.

Traction system

The Continuous Miner is trammed by two individually controlled traction systems (Fig. 46). Each traction assembly has an electric motor connected to a tram drive gear case. The gear case encloses a bevel gear that drives a planetary gear. The gear case reduces the rotation speed, increases torque, and provides a right-angle drive to the drive sprocket. The drive sprocket is directly connected to a tram drive planetary gear case. This gear case reduces the rotation speed, increases torque, and drives the track belt. (See the Maintenance section in this chapter for track belt adjustment procedures and Traction assembly maintenance procedures.)

There are three (3) tram speeds: 1st, 2nd, and 3rd. The speeds are selected from the radio remote.

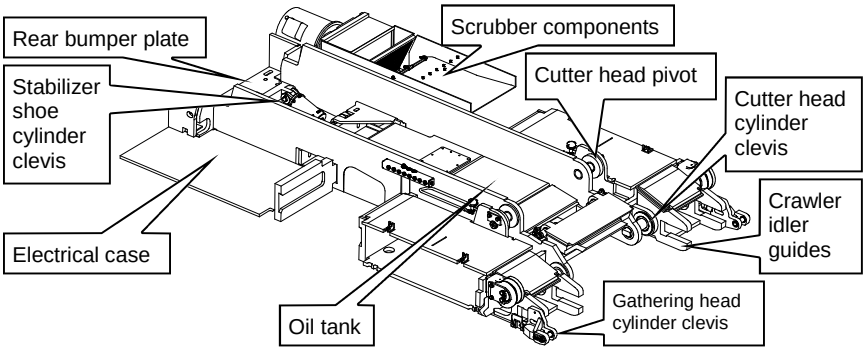
Fig. 46: Traction system



tractor frame/chassis tractor (main frame)

The tractor frame (Fig. 47) is a rectangular structure of high-strength steel weldments that supports major operating assemblies such as the cutter head frame, gathering head frame, conveyor and traction units. It houses supporting assemblies, the crawler and take-up mechanisms and planetary gear cases. It anchors the pivots for the conveyor, the gathering head, and the cutter head frame. The clevises for the hydraulic cylinders actuating these assemblies are also on the main/tractor frame. The frame also provides a platform for electrical and hydraulic control modules, all water controls and plumbing and the optional operator's control compartment. Integral within the frame is the hydraulic reservoir or oil tank.

Fig. 47: Main frame/tractor frame



flow meter — A flow meter (Fig. 55) is a visual device which indicates the volume of fluid passing through it per unit time.

orifice — An orifice (Fig. 55) is a device that restricts flow.

pressure/return manifold — A pressure manifold (Fig. 55) has one inlet port and many outlet ports to supply flow to many circuits. A return manifold has many inlet ports and only one outlet port for flow to return to tank. Note: You can have the same part number for a pressure or return manifold.

pressure gauge — A pressure gauge (Fig. 55) is a visual device used to indicate the pressure in a hydraulic or water circuit.

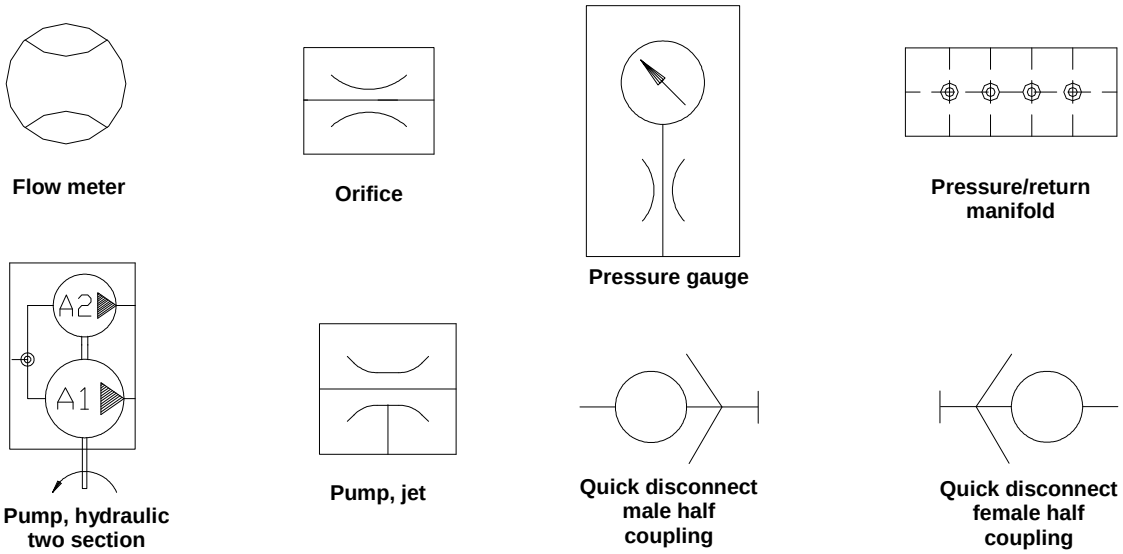
pump — The purpose of a pump (Fig. 55) is to produce flow; it does not produce pressure. Pressure is caused by a resistance to flow. All system components have some resistance to flow. Hydraulic cylinders, which power machine functions, are the major components causing this resistance. Each circuit is protected by a relief valve so that the pressure in the system will not exceed the rating of its components. To ensure that everything works correctly and in proper sequence, relief valve pressure settings closely match the load requirements.

The miner is equipped with a multi-section gear-type fixed displacement hydraulic pump assembly. Each section consists of two closely-meshed gears inside a tightly-fitted housing.

pump, jet (venturi) — The miner may be equipped with optional venturi jet pumps (Fig. 55). These pumps have no moving parts and are made from a metal tube that narrows over its full length. When liquid passes through the narrowing tube, a vacuum is formed according to the “Venturi” principle. This vacuum is used to draw liquid into or out of reservoirs. For more information, reference the detailed circuit descriptions.

quick disconnect female/male coupling — A quick disconnect (Fig. 55) is a coupling which can quickly join or separate lines.

Fig. 55: Hydraulic symbols



Tank Ports

The manufacturer filters the oil system on all new Continuous Miners according to a minimum ISO code 19/17/14 for cleanliness. There is a quick disconnect (w/plug) to hook up a filtering cart and can also be used underground for contamination clean-up of the hydraulic system. Return oil from hydraulic components connect to a return manifold. Oil flows from the return manifold to the oil tank reservoir. The oil tank reservoir includes two oil tank manifolds and two tank breathers.

The schematic shown in Fig. 61 is typical for tank port connections. Always refer to the schematic in your parts book for your machine.

Fig. 61: Tank port connections

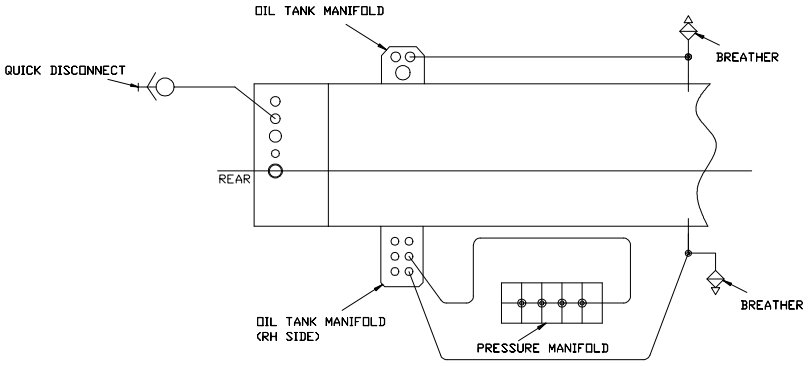
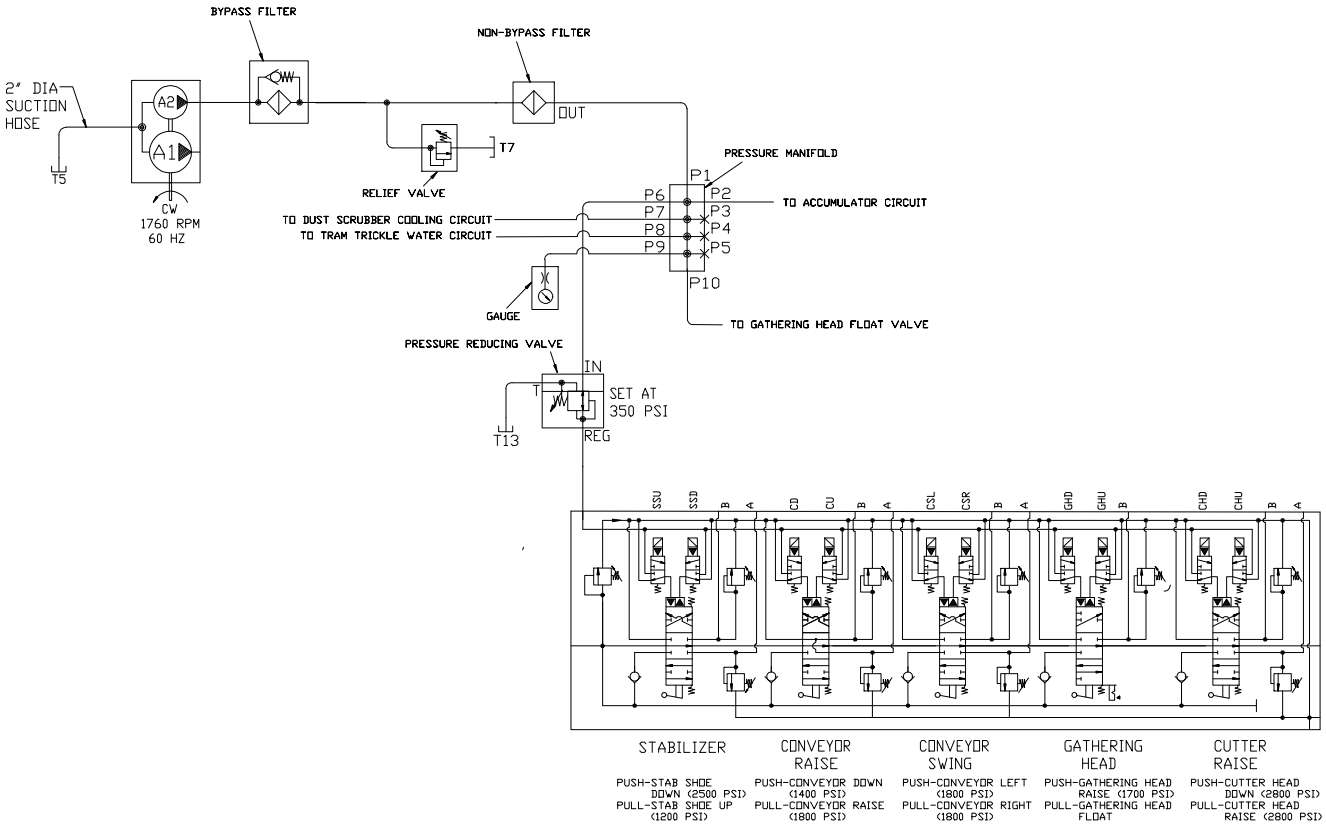


Fig. 67: Reduced (MCV) pilot pressure circuit - radio function main control valve circuit



Scrubber sprays and sump dump circuit

The scrubber spray circuit (Fig. 74) can be operated by manual or remote solenoid control (see Electrical section in this chapter). When the scrubber spray solenoid coil is energized, it shifts a spool, allowing hydraulic oil to flow to the hydraulic pilot operated normally closed water valve. The hydraulic oil shifts a spool, allowing water to pass though it to the scrubber spray circuit. For the hydraulic portion of this circuit, see Fig. 68 in the Hydraulic section of this chapter.

There is a manual ball valve that is used to bypass the pilot operated water valve so that the miner can be operated until maintenance can be performed.

The scrubber sprays automatically turn on when the scrubber motor starts. They cannot be turned on or off from the radio.

There is a flow control valve that controls the cleaning sprays located in the scrubber duct work. The scrubber screen cleaning sprays are controlled by a pressure regulated valve with a gauge and an adjustable flow control valve. The pressure regulator is normally set at 50 psi.

The final portion of this circuit is used to empty the excess water from the scrubber sump box (slurry water). Located in the bottom of the scrubber sump box are a stir spray nozzle, a flow control valve, a jet pump, and a water strainer. The flow control valve is used to control the amount of water stirring, which keeps the water strainer from becoming clogged and keeps the jet pump clean to discharge the slurry water. The pressure regulator valve and gauge are used to operate this circuit, which is normally set at 75 psi.

Fig. 74: Scrubber sprays and sump dump circuit

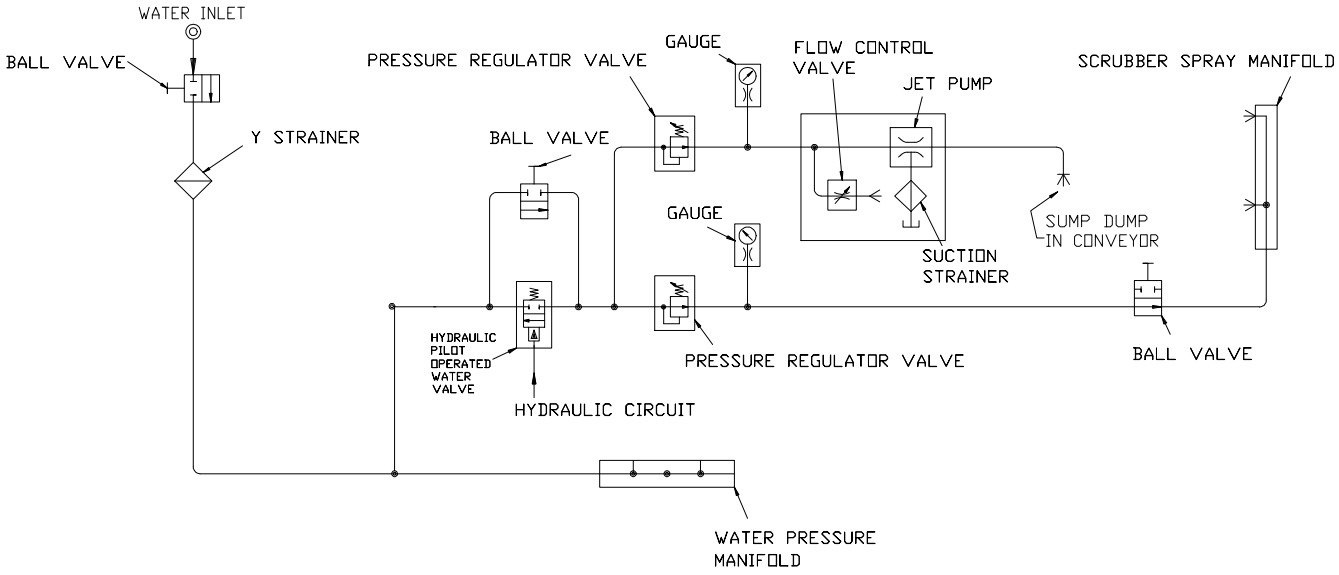
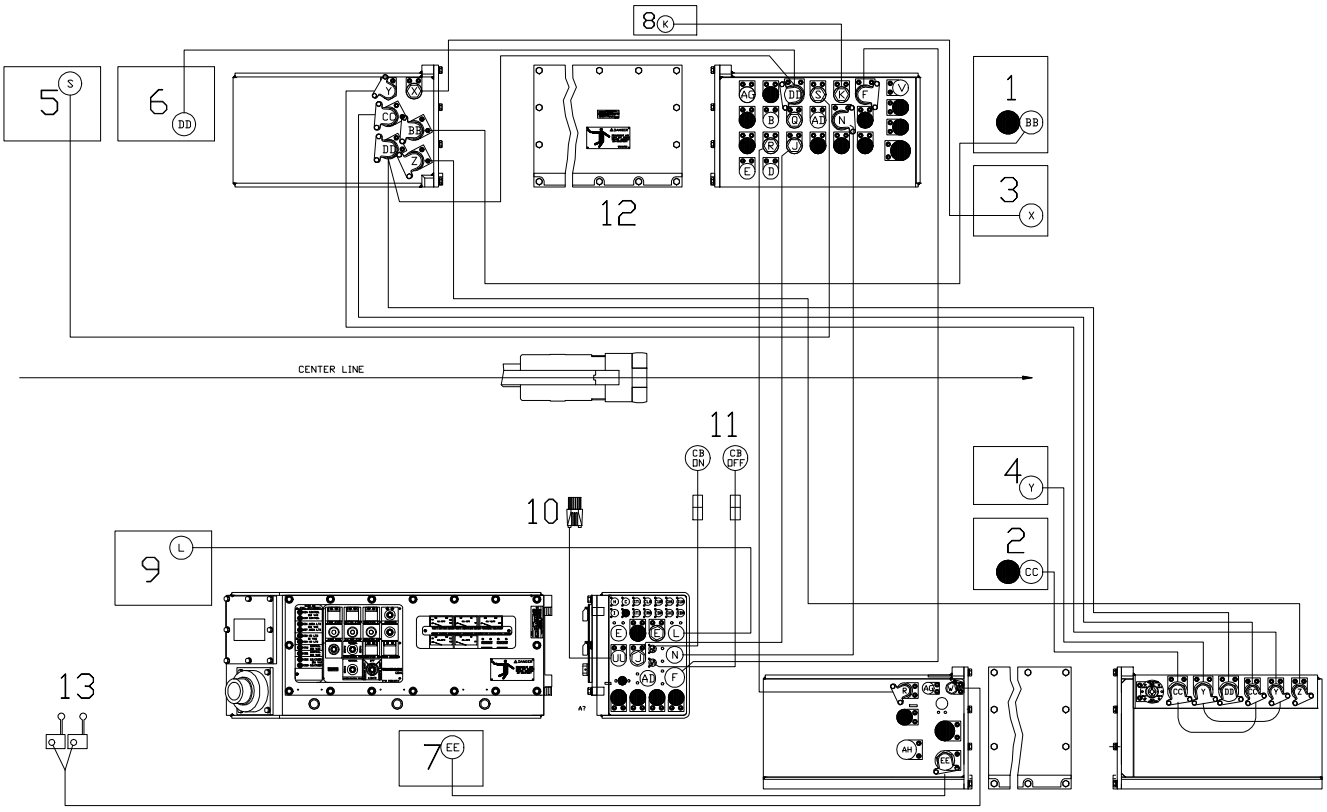


Fig. 81: Electrical component layout



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

battery back-up

The machine controller power supply has an optional battery back-up which provides control power to operate the controller and solenoids for fire suppression, breaker on and off and to reset the power supply and tram breaker. The battery back-up, in conjunction with a hydraulic accumulator, will allow control of those functions from the remote in the event of a power outage.

radio system diagnostics

The radio system has a diagnostic display on the miner in an explosion proof enclosure, which, can be seen at the right rear of the miner. Refer to the separate radio manual that came with your machine for complete use of the diagnostic display.

machine stop/e-stop bypass

The machine stop/e-stop bypass circuit allows the operator, when using radio remote control, to bypass the machine stop/emergency stop palm switch located on the left side of the miner for about 30 seconds. This is useful in cases where the miner has become jammed against a rib causing the normally closed machine stop/e-stop switch to be stuck open. The ESB relay contacts bypass the emergency stop push button.

scrubber fan

The manual start push button for the scrubber fan motor contactor, E, does not have a holding circuit. Therefore, when in manual control the fan motor and the scrubber spray will only operate as long as the push button is held. There is no manual stop push button.

For miners with an operator's pit and canopy, there is a holding circuit for the scrubber fan motor contactor. The fan motor stops, after a short time delay, when the cutter motors are stopped.

tram dead man (optional)

The tram "deadman" switch, also called the foot switch, is a hand-operated push button located at the operator's control panel for miners without an operator's pit. If there is an operator's pit, the tram "deadman" is a foot operated control switch which must be held closed.

Conveyor motor circuit with control

The pump motor must be running before the conveyor motors will start. The conveyor motors can be started in manual by depressing the momentary switch. This completes the circuit across coil conveyor forward (CF) and will start both conveyor motors. There are four (4) overloads in the conveyor circuit. There are two (2) thermal overloads and two (2) instantaneous overloads; one (1) for each motor OL5, 6, 7 and 8 for the control circuit when the conveyor contactor comes in the “CF” interlock closes. This completes the holding circuit. To stop the conveyor motor, depress the momentary conveyor stop switch.

The schematic shown in Fig. 92 is a typical conveyor motor circuit. Always refer to the schematic in your parts book for your machine.

Fig. 92: Conveyor forward and reverse motor circuits with control

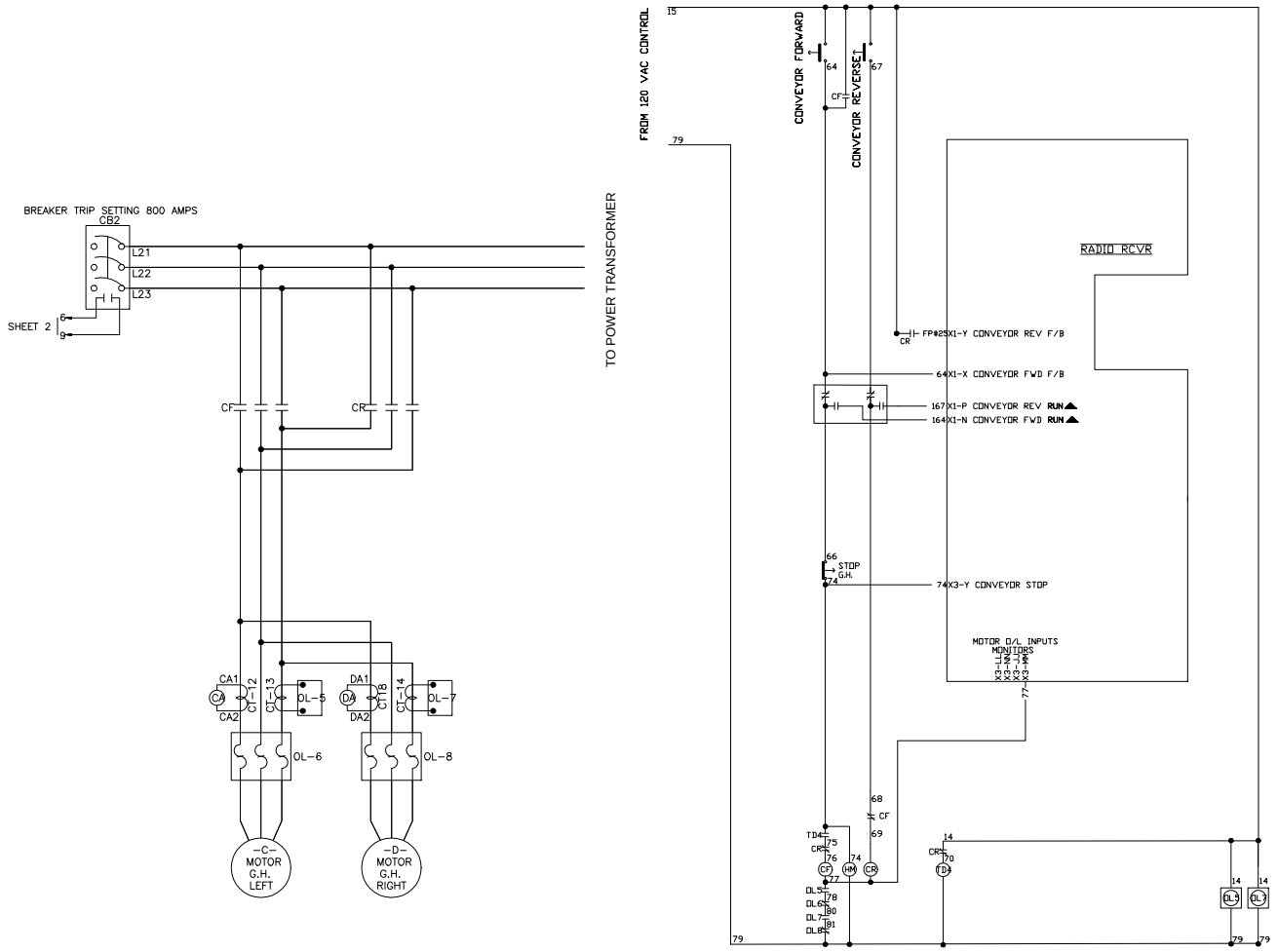
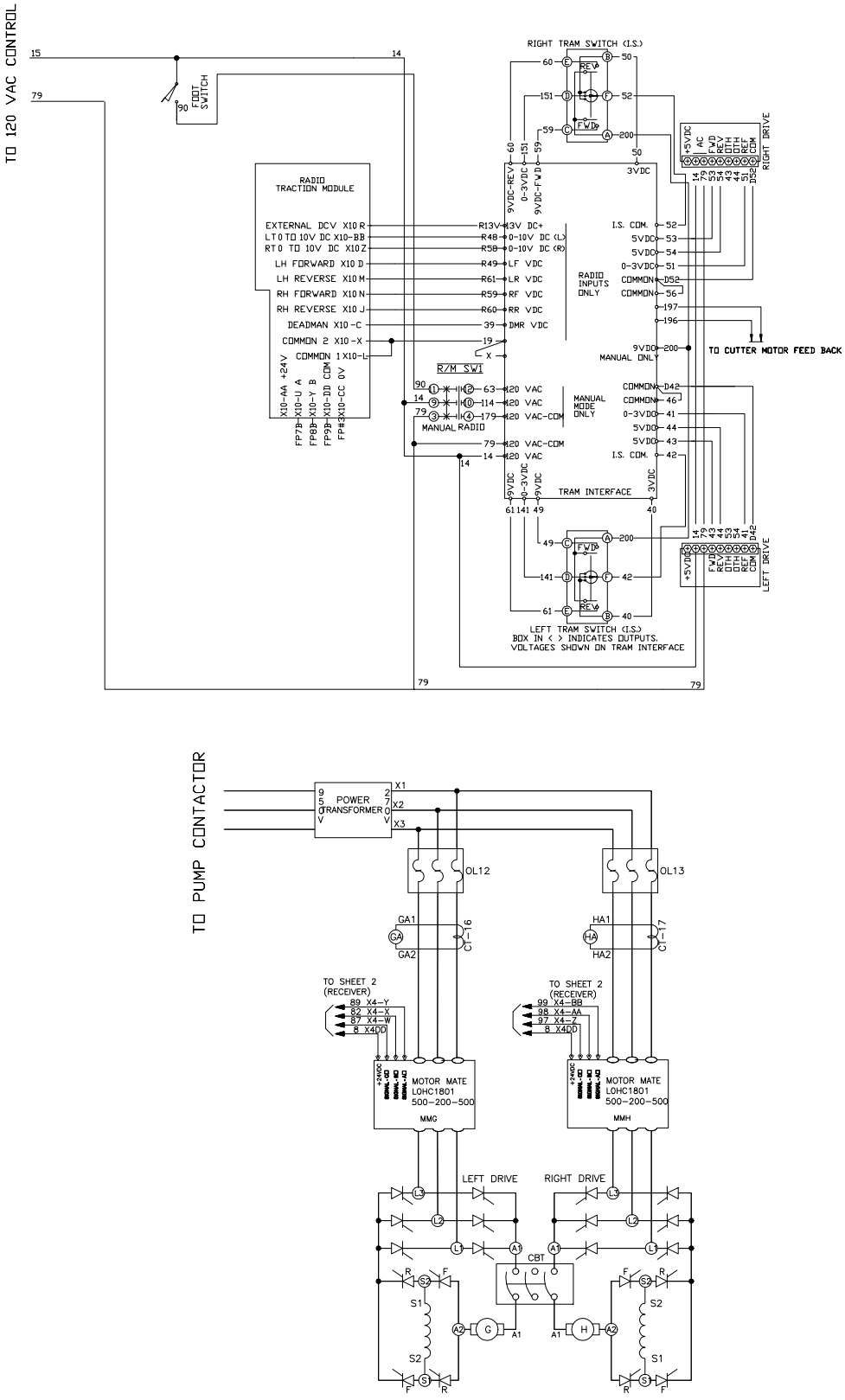


Fig. 101: Power tram circuit

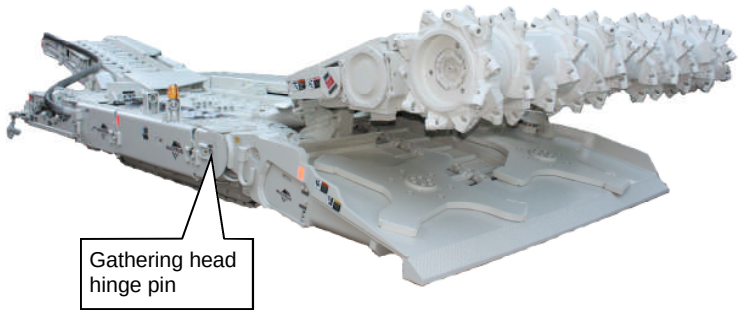


Daily

gathering head hinge pin (right and hand)

Lubricate the left and right gathering head hinge pins through the grease fittings located on the left and right front lubrication blocks (Fig.108). Pump approximately 3 cu. in. (50 cu. cm.) of grease into each fitting.

Fig. 108: Gathering head hinge pin



crawler idler roller (right and left)

Lubricate the left and right crawler idler rollers (Fig. 109) through the grease fittings located on the outside face of the crawler idler roller. Pump approximately 3 cu. in. (50 cu. cm.) of grease into each fitting.

conveyor to tractor frame pin (left and right)

Lubricate the left and right conveyor to tractor frame pin through the grease fittings located on the right and left front lubrication blocks (Fig. 109). Pump approximately 3 cu. in (50 cu. cm) of grease into each fitting.

Fig. 109: Crawler idler roller and conveyor to tractor frame pin lubrication

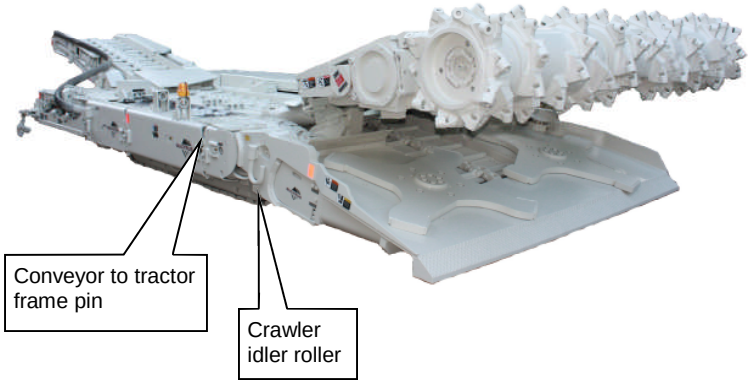
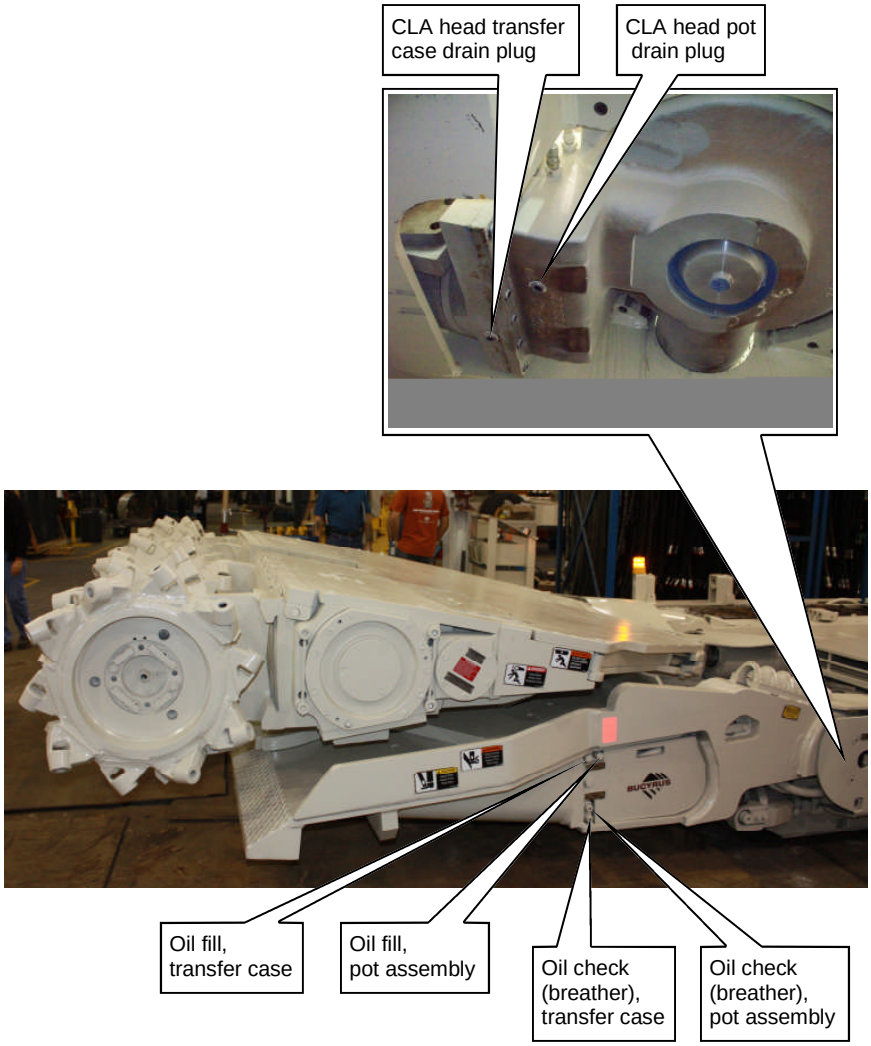


Fig. 124: CLA pot assembly and transfer case



filters and strainers

The following filter elements must be changed as required by the conditions at the mine. Refer to the Hydraulic component location drawing (Fig. 51) in the Hydraulic section of this chapter and the Scrubber and dust-cooling component location drawing (Fig. 71) in the Water section of this chapter for component locations.

- pilot filter, by-passing
- pilot filter, non by-passing
- main pressure filter
- return filter
- water filter
- oil filter
- breathers
- y-strainers
- Jet pump strainers

Scrubber cleaning

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

☞ 2. Lower the conveyor assembly until it is level with the floor.

☞ 3. Disconnect the trailing cable to de-energize the miner.

WARNING!
Follow all Federal and mine regulations regarding lockout/tagout procedures. Failure to do so may result in serious injury or death.

☞ 4. Insert the hose in both the right and left hand scrubber air intakes at the front of the miner. Thoroughly flush each scrubber inlet duct.

☞ 5. Clean the crossover duct through the frame of the miner.

☞ 6. Remove any accumulated debris from inside the duct. Insert the hose into the duct and thoroughly flush it with water.

☞ 7. Locate the scrubber rub rail (Fig. 134), which is directly to the rear of the tram case on the fan exhaust side of the miner.

☞ 8. Remove the rub rail pin that secures the scrubber rub rail to the rail adjacent to it. Swing open the scrubber rub rail.

☞ 9. Locate the mist eliminator clean-out cover (Fig. 134).

3. Conveyor raise/lower port relief

   ☞ Activate the conveyor raise circuit to fully raise the conveyor. The main control valve pressure gauge should read 1,800 psi.

   ☞ Activate the conveyor lower circuit to fully lower the conveyor. The main control valve pressure gauge should read 1,400 psi.

   Note: Be sure that the ball valve is closed on the tank oil fill part of this circuit.

4. Conveyor swing port relief

   ☞ Activate the conveyor swing left circuit to fully swing the conveyor to the left. The main control valve pressure gauge should read 1,800 psi.

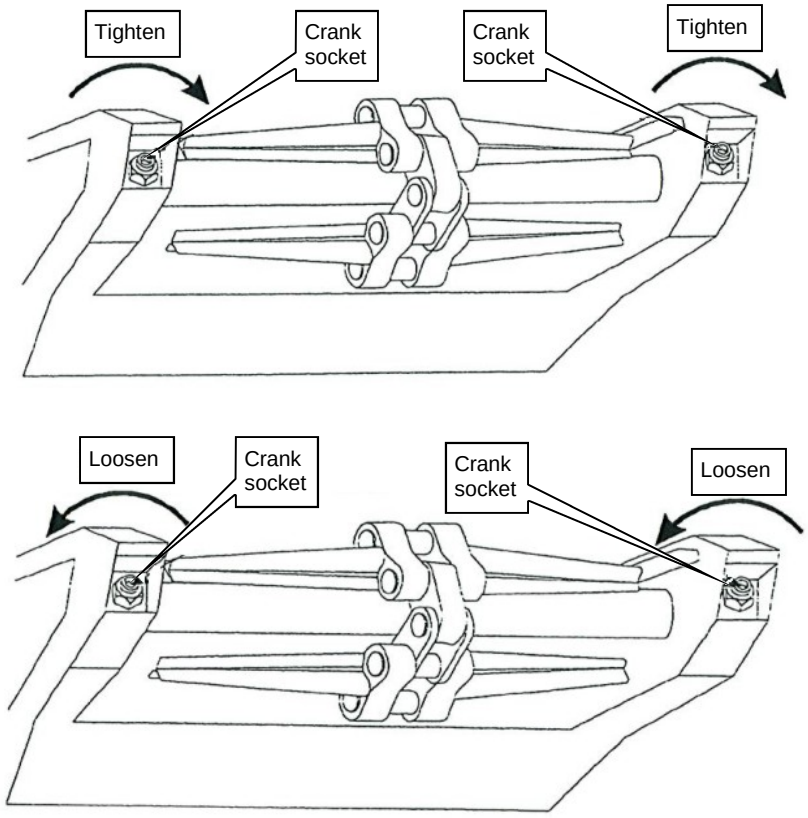
   ☞ Activate the conveyor swing right circuit to fully swing the conveyor to the right. The main control valve pressure gauge should read 1,800 psi.

5. Gathering head port relief

   ☞ Activate the gathering head raise circuit to fully raise the gathering head. The main control valve pressure gauge should read 1,700 psi.

   ☞ If 1,700 psi is not obtainable, check that the relief in the gathering head float valve that is stamped “CR” is set to 1,800 psi (see Gathering head raise/hold/float-lower circuit in the Hydraulic section of this chapter).

Fig. 148: Chain tension adjustment



☞ 8. When the proper chain tension has been reached, tighten the two hex bolts that secure the rod guide to the conveyor's right take-up rod. The take-up rod should be securely clamped between the split block.

☞ 9. Repeat step 6 or 7 if loosening or tightening the conveyor chain.

☞ 10. Connect the trailing cable to energize the miner.

☞ 11. Slowly raise the conveyor tail section and carefully remove the blocking from underneath.

☞ 12. Start the conveyor and CLAs running and observe the chain for proper tension.

☞ 13. When the chain tension is properly adjusted with the conveyor tail straight behind the miner, slowly swing the tail section from left to right behind the miner and check the chain's tension when the tail section is farthest from center (Fig. 149).

Boom pivot pin removal and installation

boom pivot pin removal

To remove the boom pivot pin:

☞ 1. Lower the conveyor tail section until it is level with the floor and gathering head and cutter head until they rest on the floor.

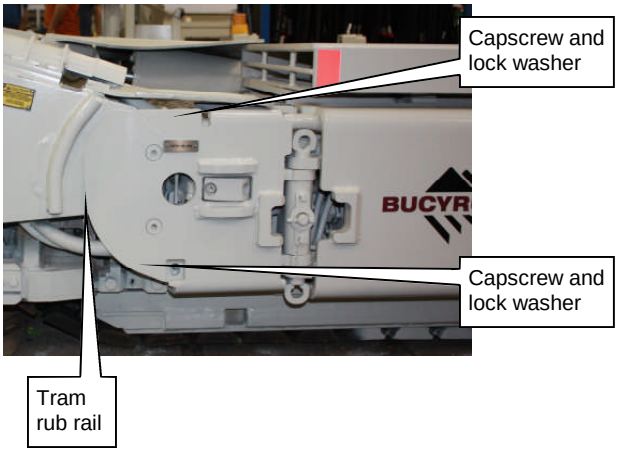
☞ 2. Disconnect the trailing cable to de-energize the miner. Follow all Federal and mine regulations regarding lockout/tagout procedures.

WARNING!
Follow all Federal and mine regulations regarding lockout/tagout procedures. Failure to do so may result in serious injury or death.

☞ 3. Locate the miner's front rub rail and remove the hex head capscrew and lock washer that secures the rub rail to the tractor frame.

☞ 4. Open the front rub rail (Fig. 155).

Fig. 155: Front rub rail



☞ 5. Locate the front idler take-up jack bracket assembly (Fig. 156), which is mounted directly to the rear of the idler shim channel.

☞ 6. Pull the flip pin from the half link to release the take-up jack bracket from the tractor frame.

☞ 7. Lower the end of the bracket until it clears the half link and pull the bracket straight out to remove it from the tractor frame.

IMPORTANT!
Pressure from the cutter boom onto the pivot pin can make its removal very difficult. The shear cylinders can be used to find the boom position that puts the least pressure on the pin.

CAUTION!
When the pivot pin pull point is found, block the cutter boom to prevent it from dropping or moving when the pivot pin is removed.

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

☞ 2. Rotate the cutter head slowly until one of the center drum seams (Fig. 159) appears directly in front and one appears directly in rear of the cutter head.

☞ 3. Lower the cutter head assembly until it touches the floor.

☞ 4. 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.

CAUTION!
Make sure the lifting device is capable of lifting the drum weight. Use care when handling the cutter drum.

DANGER!
Never work under any raised assembly without proper blocking.

☞ 5. Remove the socket head capscrews securing the front seam of the center drum.

☞ 6. Remove the socket head capscrews securing the rear seam of the center drum.

☞ 7. Collect the retaining plates for the center drum's capscrews. Store the retaining plates in a safe place for a center drum reassembly.

☞ 8. Attach chains to the upper half of the center drum. The chains should be capable of supporting the entire weight of the upper half of the center drum.

☞ 9. Using the pry bar and other necessary force, break the seal between the center drum so that the bottom half is free from the top half.

☞ 10. Using an appropriate lifting device, connect the chains on the upper half of the center drum.

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

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

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

☞ 12. Inside the junction box, locate the motor's lug connections.

☞ 13. Match the motor lug connections to the corresponding power cable lugs.

☞ 14. Attach the first motor lug to its corresponding power cable lug by inserting a hex head capscrew through the motor lug, through the power cable lug, through a flat washer, and through a lock washer. Secure the capscrew with a hex nut.

☞ 15. Repeat this step for the other two lugged connections.

☞ 16. When all three connections have been secured, wrap each of the three connections with a layer of rubber tape, then a layer of black tape and then a layer of glass tape.

☞ 17. Replace the junction box O-ring and cover.

☞ 18. Insert the four hex head capscrews and lockwashers to secure the junction box cover and tighten using a socket wrench.

☞ 19. An MSHA certified electrician must inspect all work and check for permissibility.

☞ 20. Replace the top motor cover.

☞ 21. Tighten the hex head capscrews and lock washers to secure the top cover.

☞ 22. Replace the side motor cover.

☞ 23. Install the drum drive shaft and the cutter head drum drive torque limiting clutch (see Drum drive torque limiting clutch removal and installation procedure in this chapter).

☞ 24. Replace the debris guard (optional) under the retaining strap. The holes of the guard and strap should align with the threaded holes in the motor top cover.

☞ 25. Tighten the hex head capscrews and lock washers to secure the debris guard and its retaining strap to the top motor cover.

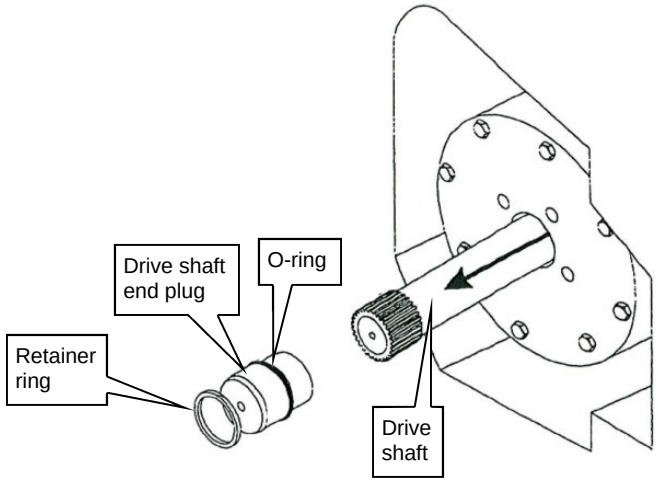
☞ 9. Remove the square-headed pipe plug on the end of the gathering head motor.

☞ 10. Remove the retaining ring that secures the shaft end plug inside the motor housing (Fig. 173).

☞ 11. Using a slide hammer, pull the drive shaft end plug out.

☞ 12. Pull the drive shaft from the motor and store in safe place.

Fig. 173: Drive shaft and end plug removal



☞ 13. Use the adjustable wrench to replace the pipe plug into the end of the motor. Remove water hosing from motor and cap, and move to sides.

☞ 14. Remove the hex head capscrews and lock washers that secure the motor junction box cover.

☞ 15. Remove the cover and its o-ring.

☞ 16. Locate the three taped power connections inside the junction box and strip the tap covering each lug connection.

☞ 17. Tag each connection and remove the hex head capscrew, flat washer, lock washer, and hex head nut that secures each of the power cable lugs.

☞ 18. Remove the socket head capscrews and lock washers that secure the stuffing box's half-moon clamp to the junction box.

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

WARNING!
While the power cable is detached from the motor, the trailing cable should not be reconnected to the miner. Damage to the machine or injury or death to personnel could result.

Gathering head foot shaft removal and installation

gathering head foot shaft removal

To remove the gathering head foot shaft:

☞ 1. Lower the gathering head until it touches the floor.

☞ 2. Position the conveyor tail section directly behind the miner so that it is level with the floor.

☞ 3. 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 blocking devices.

☞ 4. Slowly advance the conveyor chain until a connecting link appears on the gathering head entrance pan.

☞ 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. Loosen tension on the conveyor chain as much as possible (see Conveyor chain adjustment procedure in the Adjustment procedures section of this chapter).

☞ 7. With conveyor chain tension removed, remove the connecting link pins and the connecting link.

☞ 8. 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 gathering head foot shaft.

☞ 9. Remove the hex head capscrews and lock washers that secure the foot shaft cover to the gathering head and remove the foot shaft cover.

☞ 10. Locate the two collars on the foot shaft and remove the hex head capscrews that secure each of the collars to the foot shaft. When the capscrews are removed, the flex lock nuts will fall free from the other side of the collar. Retrieve these nut and hand tighten them onto their capscrews for safe keeping. Remove both collars from the foot shaft.

Tram motor removal and installation

tram motor removal

To remove the tram motor:

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

☞ 2. Lower the gathering head and cutter head assemblies until they touch the floor.

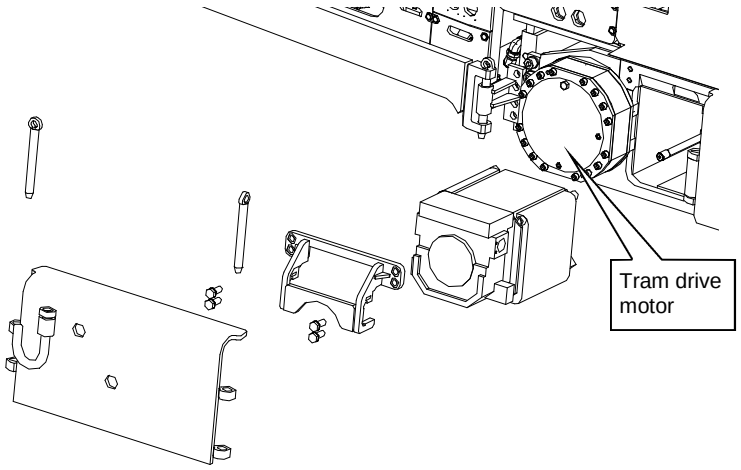
☞ 3. Disconnect the trailing cable to de-energize the miner. Follow all Federal and mine regulations for lockout/tagout.

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.

☞ 4. Remove the two rub ail pins that secure the tram rub rail to the two rub rail sections adjacent to it.

☞ 5. Remove the tram rub rail to expose the tram gear case and locate the tram drive motor inside the gear case (Fig. 188).

Fig. 188: Tram drive motor location



☞ 6. Remove the hex head capscrews and hi-collar lock washers that secure the input shaft access cover to the motor housing. Note that the cooling water hose support clamp is secured by one of the capscrews.

☞ 7. Remove the input shaft access cover and its o-ring.

☞ 8. Remove the retaining ring that secures the shaft plug in position.

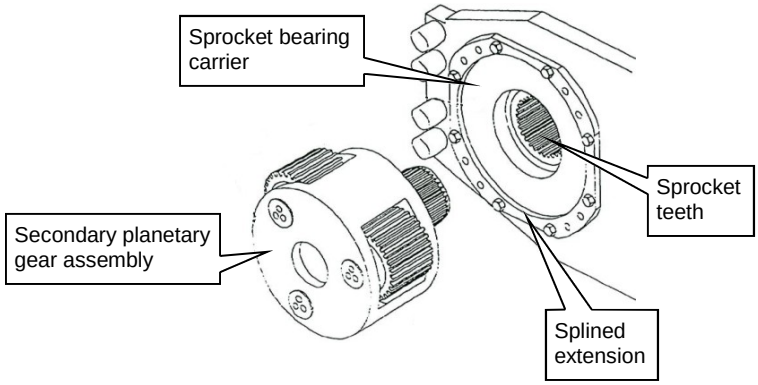
☞ 9. Remove the shaft plug with o-ring that secures the input shaft in the motor (Fig. 189).

secondary planetary gear removal

To install the tram secondary planetary gear:

☞ 1. Carefully insert the secondary planetary gear assembly into the sprocket bearing carrier (Fig. 196), ensuring that the splined extension of the planetary carrier seats securely in the interior teeth of the sprocket.

Fig. 196: Planetary carrier installation



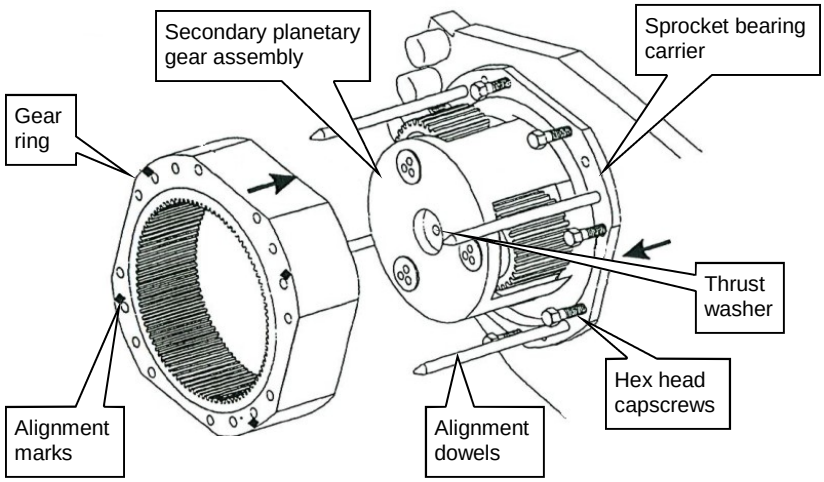
☞ 2. Slide the secondary tram drive shaft through the secondary planetary gear assembly and into the tram drive sprocket and reach gear set (the drive shaft end without the threaded hole should be inserted first). The shaft may require some adjustment so that the end fits into the reach gears.

☞ 3. Insert four alignment dowels into the holes in the sprocket bearing carrier not blocked by the eight hex head capscrews (Fig. 197).

☞ 4. To facilitate gear ring insertion, mark the mounting holes of the secondary planetary gear ring that corresponds to the holes in which the dowels were placed.

☞ 5. Remove the eight hex head capscrews that secure the sprocket bearing carrier to the tram.

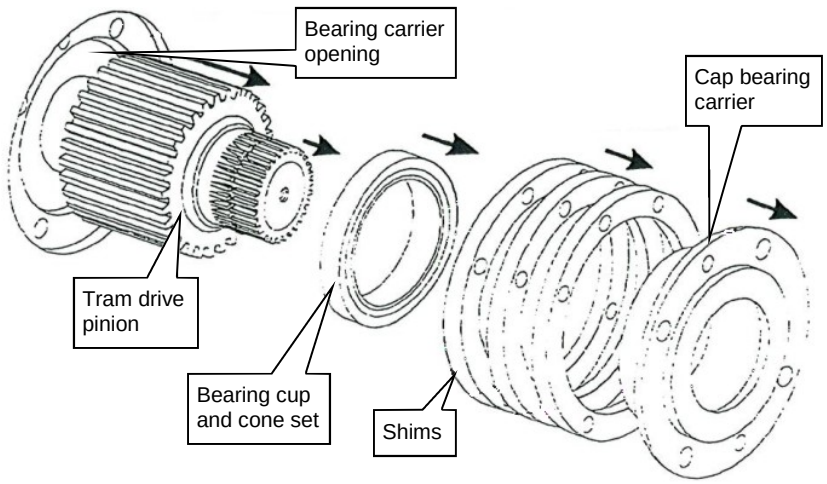
Fig. 197: Gear ring installation



☞ 20. Remove the three steel shims and the bearing found under the shims (Fig. 203).

☞ 21. Carefully pull the tram drive pinion out of the reach gear case through the cap bearing carrier opening.

Fig. 203: Tram drive pinion removal



☞ 22. Cut and remove the wire securing the idler shaft capscrews in position.

☞ 23. Remove the drilled hex head capscrews that secure the idler shaft cap to the tram case and remove the idler shaft and three steel shims located under the cap.

☞ 24. Carefully slide the idler shaft out of the reach gear case through the idler shaft cap opening.

☞ 25. Remove the idler reach gear through the top opening of the reach gear case (Fig. 204).

☞ 26. Remove the bearing cup and cone sets from the center indentions of the idler reach gear.

tram sprocket installation

To install the tram sprocket:

☞ 1. The manufacturer recommends ordering a pre-assembled sprocket. If you choose to order a pre-assembled sprocket, go directly to step 16. Consult your service representative to order a pre-assembled sprocket.

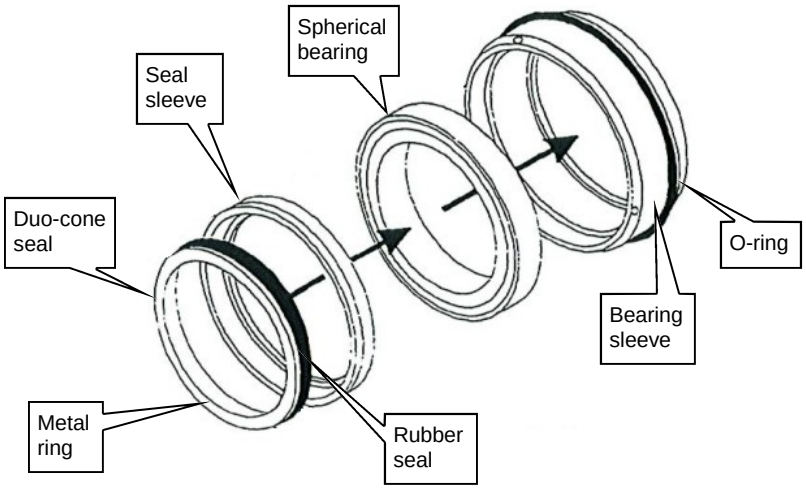
☞ 2. Install a spherical bearing into one of the bearing sleeves (Fig. 215).

☞ 3. Install the o-ring into the outside channel of the bearing sleeve.

IMPORTANT!
When the bearing sleeve is inserted into position, the o-ring forms a seal between the sleeve and the piece that holds it.

☞ 4. Install a Duo-Cone seal into the seal sleeve (see Duo-cone seal installation notes in this chapter). The rubber side of the seal should face toward the sleeve; the metal ring of the seal should face outward.

Fig. 215: Bearing/seal sleeve assembly



☞ 5. Insert the seal sleeve into the bearing sleeve.

☞ 6. Insert and tighten the three set screw into the bearing sleeve to secure the seal sleeve in the bearing sleeve.

☞ 7. Insert the bearing/seal sleeve assembly into position at the rear of the sprocket bay of the tram case.

☞ 8. Install the two Duo-Cone seals into the channel in each end of the sprocket. The rubber side of the seals should face into the sprocket channel; the metal rings of the Duo-Cone seals should face outward.

☞ 9. Insert the end of the sprocket into the seal sleeve so that it seats into the spherical bearing. Push the sprocket until the metal rings of the Duo-Cone seals are securely against each other.

☞ 10. Install the other spherical bearing into the remaining bearing sleeve.

☞ 8. Remove the hose fittings from the pump and store in a safe place.

☞ 9. Remove all hex head capscrews and lockwashers that secure the pump assembly to the motor assembly and save for re-installation.

☞ 10. Carefully remove the pump assembly by sliding it out of the pump motor.

When located behind the operator's case:

☞ 4. Locate the rub rail directly behind the tram case on the operator's side of the miner. Remove the two rub rail pins that secure the rub rail to the two rub rail sections adjacent to it and remove the rub rail.

☞ 5. Locate the hydraulic pump and motor assembly.

☞ 6. Using the adjustable wrench, disconnect the inlet hose from the pump. Plug the hose end to keep it clean.

☞ 7. Using the adjustable wrench, disconnect the pilot and valve hoses from the pump fittings. Plug the hose ends to keep them clean.

☞ 17. Locate the bearing pin that secures the stabilizer cylinder to its tractor frame mounting.

☞ 18. Remove the two cotter pins that secure the bearing pin inside the stabilizer cylinder's piston bearing and tractor frame mounting.

☞ 19. Slide the washers off both ends of the pin and Remove the pin from the cylinder's piston end bearing and tractor frame mounting. The cylinder is now free and can be removed.

seal test

After the entire unit is reassembled, it may be a good practice to test the seals. A vacuum test is more sensitive than a pressure test and can be performed during a vacuum fill operation.

- ☞ Carefully fill the compartment to the correct fluid level.
- ☞ Slowly rotate the assembly several revolutions to seat the seals.
- ☞ A vacuum test will catch severe seal damage such as broken seal rings or cut torics that may be damaged in the last phases of assembly. The torics are not designed to seal air. Some leakage can be expected using such a procedure.

Fig. 234:Installation issues

Toric sliding on retainer ramp.

Toric caught on housing retainer lip.

Toric sliding on seal ramp.

installation process

With the lower half of the rubber toric seal still wet, use the installation tool to position the seal ring and the rubber toric squarely against the housing (Fig. 234). For smaller diameter seals, use sudden and even pressure to push the rubber toric under the retaining lip of the housing.

For larger diameter seals which will not press in with sudden and even pressure, it is acceptable to work the toric past the retaining lip by starting on one side and tapping the opposite side of the installation tool with a rubber mallet until it is engaged past the retaining lip of the housing.

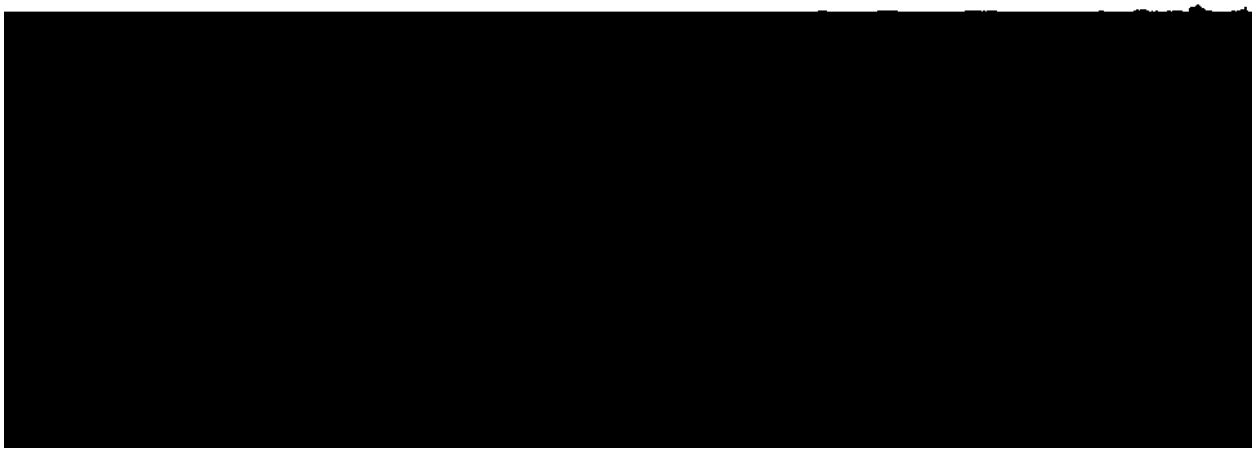
Check the assembled height (height “A”, Fig. 235) in at least four places, 90° apart, using a caliper, tool makers' rule or any other calibrated measuring device. The difference in height around the ring must not be more than 1mm. If small adjustments are necessary, do not push or pull directly on the seal ring. Use the installation tool to push down and your fingers to pull up uniformly on the rubber toric and seal ring.

The rubber toric can twist if it is not wet all around during installation or if there are burrs or fins on the retaining lip of the housing. Twists, misalignment, and bulges of the toric will result in seal failure. If correct installation is not obvious, remove the seal from the housing and repeat the process.

The rubber torics must never slip on the ramps of either the seal ring or the housing. To prevent slippage, allow adequate evaporation time for the lubricant before proceeding with further assembly. Once correctly in place, the rubber toric must roll on the ramp only.

Fig. 239: Examples of worn gear teeth

Shock loading **Improper type of lubricant**



Bent or broken teeth **Contaminated lubricant**

The ability to recognize trouble indicators in a specific system is usually acquired with experience. the gaining of this experience can be greatly enhanced by developing a logical sequence for determining the cause of a hydraulic problem and implementing the proper remedy.

Refer to the general troubleshooting charts in this section that illustrate the logical sequence for shutdown, troubleshooting, and restarting the machine. The charts cover:

- general safety procedure for shutting down the machine
- troubleshooting excessive noise
- troubleshooting excessive heat
- troubleshooting incorrect flow
- troubleshooting incorrect pressure
- troubleshooting faulty movement/operation
- general restart checklist and procedure

This general information is intended to enhance the understanding of basic hydraulic principles which will lead to the development of a logical troubleshooting procedure. Specific troubleshooting checklists for each hydraulic circuit are given directly after the very important section entitled “Contaminants in hydraulic systems”.

Contaminants in hydraulic systems

SYSTEM CONTAMINATION is the primary cause of hydraulic component failure! Cleanliness must be a high priority when servicing the hydraulic system. Even very small particles can damage system components by scoring valves, clogging orifices, and wearing seals prematurely. It is not the intent of this operation manual to outline a contamination control program but some of the most effective steps that have been identified in successful programs are given below:

1. Ensure that bulk oils are at acceptable cleanliness levels.

   Areas where customers have made improvements in the past include:

   - implement ISO Cleanliness Code standards for bulk hydraulic oils
   - evaluate bulk oil shipments for cleanliness by conducting particle counts and maintain records
   - minimize drum usage by utilizing tote tanks and five gallon pails
   - utilize plastic versus steel storage tanks, if possible

Table 7: Flow chart V for troubleshooting faulty operation

No Movement		Slow Movement		Erratic Movement		Excessive Speed or Movement	
Cause	**Remedy**	**Cause**	**Remedy**	**Cause**	**Remedy**	**Cause**	**Remedy**
No flow or pressure	See Table 5	Low flow	See Table 5	Erratic pressure	See Table 6	Excessive flow	See Table 5
Limit or sequence device (mechanical, electrical, or hydraulic) inoperative or misadjusted	E	Fluid viscosity too high	A	Air in fluid	See Table 3	Feedback transducer malfunctioning	E
Mechanical bind	B	Insufficient control pressure for valves	See Table 6	No lubrication of machine ways or linkage	G		
No command signal to valve or amplifier	F	No lubrication of machine ways or linkage	G	Erratic command signal	F	Overriding work load	H
Inoperative or misadjusted valve amplifier	C	Misadjusted or malfunctioning valve amplifier	C	Misadjusted or malfunctioning valve amplifier	C		
Inoperative solenoid or proportional valve	E	Sticking valve	D				
worn or damaged cylinder or motor	E	Worn or damaged cylinder or motor	E	Sticking valve	D		
		Pilot filter clogged	See Table 5	Worn or damaged cylinder or motor	E		

Remedies

A. ☞ check fluid temperature

☞ check system fluid viscosity; change if necessary

B. ☞ locate bind and repair

C. ☞ adjust, repair, or replace part

D. ☞ clean and adjust or replace part

☞ check condition of system fluid and filters

E. ☞ overhaul or replace part

F. ☞ repair command console or interconnecting wires

G. ☞ lubricated

H. ☞ adjust, repair, or replace counterbalance valve

6 Technical data

Approved lubricants

Table 24: Extreme pressure gear oil, SAE 90 (Spec. 100-6)

	Supplier	Brand name
1	Amoco Oil Company	Amoco Premagear EP 320
2	Gulf Oil	EP Lubricant HD 320
3	Mobil Oil Corporation	Mobil Gear 632
4	Chevron U.S.A.	Chevron Gear Compound EP ISO 320
5	Sun Oil Company	Sunep 320
6	Unocal 76	Extra Duty NL Gear Lube 6EP
7	Shell Oil Company	Omala 75
8	Century (Fuchs)	Hulbest EP-6
9	Texaco Lubricants Company	Meropa 320
10	Exxon	Spartan EP 320
11	Pennzoil	Super Maxol EP 220 Gear Lube
12	Lubricating Engineers	605 Almasol Vari-Purpose Gear Lubricant
13	Conoco Inc.	Gear Oil 320
14	Hydrotex	932 Industrial Gear Lube
15	Phillips	Philube All Purpose Gear Oil 85W-90
16	Atlantic Richfield	Pennant NL S-1000
17	Cities Service	Citgo EP Compound 110
18	Pennzoil	Pen Gear #320
19	Miner Oil	Gear Oil EP220
20	Texaco, Lubricants Company	Texaco Multigear EP 80W-90

A6474X408
February 2012

Troubleshooting Guide

Super Simpson Control System Fault Codes

A6474X408 (Revision D)

Table 2, continued: Error messages

Fault number	Possible cause	Checks to carry out
0026 **LEFT TRAM MOTOR MATE FAILURE PHASE C** Phase C from motor mate is not healthy (healthy is between 4 mA and 20mA)	– Loss of 24VDC supply to the motor mate – One or more signal lines have gone open circuit – One or more signal lines have been shorted – Motor mate is faulty – Super Simpson is faulty (interface to the Motor Mate)	– Check 24 VDC supply wiring is OK (+24 VDC line is provided by output pin X4-DD) – Check that each signal line is not open or short circuit – Replace the motor mate – Replace the Super Simpson
0027 **RIGHT TRAM MOTOR MATE FAILURE PHASE A** Phase A from motor mate is not healthy (healthy is between 4 mA and 20mA)	– Loss of 24VDC supply to the motor mate – One or more signal lines have gone open circuit – One or more signal lines have been shorted – Motor mate is faulty – Super Simpson is faulty (interface to the Motor Mate)	– Check 24 VDC supply wiring is OK (+24 VDC line is provided by output pin X4-DD) – Check that each signal line is not open or short circuit – Replace the motor mate – Replace the Super Simpson
0028 **RIGHT TRAM MOTOR MATE FAILURE PHASE B** Phase B from motor mate is not healthy (healthy is between 4 mA and 20mA)	– Loss of 24VDC supply to the motor mate – One or more signal lines have gone open circuit – One or more signal lines have been shorted – Motor mate is faulty – Super Simpson is faulty (interface to the Motor Mate)	– Check 24 VDC supply wiring is OK (+24 VDC line is provided by output pin X4-DD) – Check that each signal line is not open or short circuit – Replace the motor mate – Replace the Super Simpson
0029 **RIGHT TRAM MOTOR MATE FAILURE PHASE C** Phase C from motor mate is not healthy (healthy is between 4 mA and 20mA)	– Loss of 24VDC supply to the motor mate – One or more signal lines have gone open circuit – One or more signal lines have been shorted – Motor mate is faulty – Super Simpson is faulty (interface to the Motor Mate)	– Check 24 VDC supply wiring is OK (+24 VDC line is provided by output pin X4-DD) – Check that each signal line is not open or short circuit – Replace the motor mate – Replace the Super Simpson

Table 2, continued: Error messages

Fault number	Possible cause	Checks to carry out
0083 **PUMP MOTOR RTD THERMAL WARNING** Thermistor reported temperature is above 140C but less than 150C	– Motor temperature is as reported by system – Measure RTD resistance and compare to chart – RTD failure (DO NOT MEGGAR) – Cable damage – Thermistor module failure (LOLH09) – Motor failure	– Check condition of wiring to RTD circuit and measure RTD resistance and compare to chart. Note: Check connections in motor cable junction boxes – Connect spare RTD circuit in motor terminal enclosure – Replace thermistor module (LOLH09) – Replace motor – Check pilot cores in motor supply cable. If pilot cores are damaged, replace cable
0084 **LEFT CUTTER MOTOR RTD THERMAL WARNING** Thermistor reported temperature is above 140C/165C but less than 150C/175C	– Motor temperature is as reported by system – Measure RTD resistance and compare to chart – RTD failure (DO NOT MEGGAR) – Cable damage – Thermistor module failure (LOLH09) – Motor failure	– Check condition of wiring to RTD circuit and measure RTD resistance and compare to chart. Note: Check connections in motor cable junction boxes – Connect spare RTD circuit in motor terminal enclosure – Replace thermistor module (LOLH09) – Replace motor – Check pilot cores in motor supply cable. If pilot cores are damaged, replace cable
0085 **RIGHT CUTTER MOTOR RTD THERMAL WARNING** Thermistor reported temperature is above 140C/165C but less than 150C/175C	– Motor temperature is as reported by system – Measure RTD resistance and compare to chart – RTD failure (DO NOT MEGGAR) – Cable damage – Thermistor module failure (LOLH09) – Motor failure	– Check condition of wiring to RTD circuit and measure RTD resistance and compare to chart. Note: Check connections in motor cable junction boxes – Connect spare RTD circuit in motor terminal enclosure – Replace thermistor module (LOLH09) – Replace motor – Check pilot cores in motor supply cable. If pilot cores are damaged, replace cable

Table 2, continued: Error messages

Fault number	Possible cause	Checks to carry out
0146 **STAB: SLICE SAFETY POWER SWITCH FAIL** The fail safe power switch is dysfunctional and unable to cut power to the driver circuitry	– Initialization error – Internal component failure	– Cycle 24VDC to the unit – Replace the slice
0147 **STAB: SLICE SPOOL POSITION SENSOR FAIL** The output from the hall effect sensor is outside of the expected range	– Broken wire inside the slice top – Internal component failure	– Cycle 24VDC to unit – Replace the slice
0148 **STAB: SLICE SOL A RESISTANCE LOW** Solenoid resistance measured below 14 ohms	– Coil is faulty – Wire is broken inside slice – Internal component failure	– Cycle 24VDC to the unit – Replace the coils – Replace the slice
0149 **STAB: SLICE SOL A RESISTANCE HIGH** Solenoid resistance measured above 37 ohms	– Coil is faulty – Wire is making poor contact to coil – Internal component failure	– Cycle 24VDC to the unit – Replace the coils – Replace the slice
0150 **STAB: SLICE SOL B RESISTANCE LOW** Solenoid resistance measured below 14 ohms	– Coil is faulty – Wire is broken inside slice – Internal component failure	– Cycle 24VDC to the unit – Replace the coils – Replace the slice
0151 **STAB: SLICE SOL B RESISTANCE HIGH** Solenoid measured above 37 ohms	– Coil is faulty – Wire is making poor contact to coil – Internal component failure	– Cycle 24VDC to the unit – Replace the coils – Replace the slice
0152 **STAB: SLICE SUPPLY UNDER VOLTAGE** Supply voltage has dipped below 10VDC	– Power supply failure – Blown fuse on 24VDC bus – System running heavy load on backup supply output	– Check primary supply and connections – Check fuses on 24VDC bus
0153 **STAB: SLICE SUPPLY OVERVOLTAGE** Slice voltage has risen above 35VDC	– Power supply failure – Short circuit/bad connection to 24VDC bus	– Check primary supply and connections – Check secondary supply output and connections – Verify high voltage reading with hand held meter

Table 2, continued: Error messages

Fault number	Possible cause	Checks to carry out
0225 **SCRUB: SLICE SUPPLY OVER VOLTAGE** slice voltage has risen above 35VDC	– Power supply failure – Short circuit/bad connection onto 24VDC bus	– Check primary supply and connections – Check secondary supply output and connections – Verify high voltage reading with hand held meter
0226 **SCRUB: SLICE UNDER TEMPERATURE** Slice has reported a temperature below -40C	– Internal component failure	– Cycle 24VDC to unit – Replace unit
0227 **SCRUB: SLICE OVER TEMPERATURE** Slice has reported a temperature above +85C	– Internal component failure	– Cycle 24VDC to unit – Replace unit
0228 **SCRUB: SLICE COMMUNICATION TIMEOUT** The slice has not received a command packet for 250 msec	– Internal component failure – Broken connection to CAN bus	– Cycle 24VDC to unit – Check CAN bus connections/cables – Replace the unit
0229 **24VDC BUS UNDER 20VDC** L0GP power supply reports that bus voltage dropped below 20VDC	– Primary supply failed – Blown fuse or diode on 24VDC bus – Machine under heavy load with low input voltage	– Check primary supply and connections – Test fuses and diode on 24VDC bus – Verify machine input voltage level
0230 **24VDC BUS ABOVE 28VDC** L0GP power supply reports that bus voltage rose above 28VDC	– Primary supply failed – Short circuit on 24VDC bus – Machine input voltage level is high	– Check primary supply and connections – Test fuses and diode on 24VDC bus – Verify machine input voltage level
0231 **RADIO SWITCH TIMEOUT** A radio remote switch has been held for at least 15 seconds. 30 seconds for shearing	– Operator is holding lever – A switch has become stuck	– Verify that operator releases switches within 15 seconds – Check for obstructions that would hold switch in active position – Replace the radio remote
0232 **SHEAR: SLICE SPOOL NOT CENTERED** No hydraulic command is active and the spool has not returned to center position	– Internal component failure – Valve has remained open due to pressure from the valve bank	– Check the pilot and system pressure – Cycle the 24VDC to the unit – Replace the unit

Table 3, continued: Fault messages

Fault number	Possible cause	Checks to carry out
0331 **LOST CONVEYOR FWD CURRENT** While the conveyor was running, current feedback was lost. The control system assumed that the contactor had opened and shut down the conveyor motors.	– Wire X1-N broken – Contactor faulty – Motor mate faulty – Machine controller faulty	– Check that contactor closes – Check motor mate feedback versus hand held meter – Replace motor mate – Replace Super Simpson
0332 **LOST CONVEYOR REV CURRENT** While the conveyor was running, current feedback was lost. The control system assumed that the contactor had opened and shut down the conveyor motors.	– Wire X1-P broken – Contactor faulty – Motor mate faulty – Machine controller faulty	– Check that contactor closes – Check motor mate feedback versus hand held meter – Replace motor mate – Replace Super Simpson
0333 **LEFT CONVEYOR MOTOR MATE FAULTY** At least one of the three signal lines from the motor mate is faulty, while the conveyor was running or an attempt was made to start the conveyor. Each signal line must read between 4mA and 20mA to be normal. If any of the lines is not in this range then this fault will occur. The conveyor motors were shut down.	– Wires to the motor mate are broken or shorted – There is no 24VDC supply to the motor mate – Motor mate faulty – Machine controller (or inputs to machine controller) faulty	– Check 24VDC supply to motor mate – Check wire connection from motor mate to Super Simpson – Replace motor mate – Replace Super Simpson
0334 **LEFT CONVEYOR NO LOAD CURRENT** While the conveyor was running, the currents detected in the conveyor motor were very small. It is possible that no load is connected to the left conveyor motor or that there is a mechanical failure of the motor itself or motor gear box. The conveyor motors were shut down.	– No load connected to motor shaft – Mechanical failure of the conveyor shaft – Mechanical failure of the conveyor gear box	– Check proper functionality of conveyor motor – Verify motor mate feedback against hand held meter – Replace motor mate – Replace Super Simpson
0335 **LEFT CONVEYOR MOTOR PHASE LOSS** While the conveyor was running, at last one of the phase currents went to 0 amperes for unknown reasons. It is possible that the motor lead is not connected from the motor. It is also possible that the motor itself has a serious internal failure. The conveyor motors were shut down.	– Motor power conductor is broken – Serious motor failure – Motor mate is faulty – Machine controller is faulty (inputs from motor mate)	– Check proper functionality of conveyor motor – Verify motor mate feedback against hand held meter – Replace motor mate – Replace Super Simpson

Table 3, continued: Fault messages

Fault number	Possible cause	Checks to carry out
0388 **MAIN AC SUPPLY LOST** While the machine was running, the main AC power supply was lost. All machine functions have been shut down and machine is now in battery back-up.	– There is no 110VAC on pin X1-a – Circuit breaker has opened – The transformer is faulty – The machine controller is faulty	– Check that high voltage is arriving to transformer – Check that 120VAC is arriving to X1-a – Replace Super Simpson
0389 **METHANE MONITOR STATUS WIRE-PUMP SHUTDOWN** While the machine was running, the methane monitor status wire (X1-D) has broken.	– There is no 120VAC on pin X1-D – Machine controller is faulty	– Check 120VAC supply to X1-D – Replace Super Simpson
0390 **RIGHT E-STOP STATUS WIRE** While the machine was running, the right e-stop status wire (X1-V) broke.	– There is no 110VAC on pin X1-V – The machine controller is faulty	– Check 110VAC to X1-V – Replace Super Simpson
0391 **ILLEGAL LEFT CUTTER CURRENT** While the cutter motor should have been off, current feedback was detected. The control system assumed the contactor had closed illegally and removed power from the machine by activating the out-by e-stop relay.	– Contactor was unable to open – Motor mate is faulty – The machine controller is faulty	– Check that contactor is closed – Check wiring to contactor for 120VAC – Verify motor mate feedback – Replace motor mate – Replace Super Simpson
0392 **ILLEGAL RIGHT CUTTER CURRENT** While the cutter motor should have been off, current feedback was detected. The control system assumed the contactor had closed illegally and removed power from the machine by activating the out-by e-stop relay.	– Contactor was unable to open – Motor mate is faulty – The machine controller is faulty	– Check that contactor is closed – Check wiring to contactor for 120VAC – Verify motor mate feedback – Replace motor mate – Replace Super Simpson
0393 **LOST LEFT CUTTER CURRENT** While cutter was running, current feedback was lost. The control system assumed that the contactor had opened and shut down the cutter motor.	– Wire X1-L has broken – The contactor is faulty – The motor mate is faulty – The machine controller is faulty	– Check 120VAC on X1-L and X1-R – Check motor mate feedback with hand held meter – Replace motor mate – Replace Super Simpson

Table 3, continued: Fault messages

Fault number	Possible cause	Checks to carry out
0449 **LEFT VFD THERMOSTAT TRIP** While tram was enabled, the VFD reported a thermostat trip (code 35).	– Tram load is too high – Low coolant flow	– Resume tramming at low speed – Increase coolant flow
0450 **LEFT VFD MOTOR OVERSPEED** While tram was enabled, the VFD reported an overspeed condition (code 38).	– Noise in the encoder – Incorrect inverter settings – Machine is being trammed downhill or dragged	– Check motor connections – Check motor setup
0451 **LEFT VFD PHASE LOSS** While tram was enabled, the VFD reported a phase loss condition (code 43).	– Motor phase disconnected – Motor current is very low – Inverter output phase is very low	– Check all motor terminals – Reset the fault – Replace the inverter
0452 **LEFT VFD CAN COMMUNICATIONS FAILURE** While tram was enabled, the VFD reported a CAN communications loss (code 44).	– CAN wire broken – Noise on CAN line – No control power to inverter – Drive faulty	– Check CAN link – Check CAN link connections – Restore 120VAC control power – Replace the inverter
0453 **RIGHT INVERTER COMMS FAILURE** While the pump was running, the system lost communication with the inverter.	– Communication wires between the machine controller and thermistor module are broken or shorted – There is no 120VAC power supply or 24 VDC power supply to the drive – The traction drive unit is faulty – Machine controller faulty	– Check the integrity of the daisy chain cable and its internal wires – Check that all modules are properly connected to the daisy chain cable – Check the 24VDC supply to module – Replace the module
0454 **RIGHT VFD UNDERVOLTAGE** While tram was enabled, the VFD reported an undervoltage condition (code 02).	– Bus voltage below 750VDC – Rectifier voltage too low – Faulty DC voltage measurement circuit	– Increase DC supply – Check voltage bus connections – Replace rectifier unit – Replace drive
0455 **RIGHT VFD HEATSINK TRIP** While tram was enabled, the VFD reported heatsink temperature as above safe operating level (code 04).	– Low coolant flow – Poor drive base contact with enclosure	– Restore water flow – Install drive with recommended layer of thermal paste

Table 3, continued: Fault messages

Fault number	Possible cause	Checks to carry out
0519 **LIGHTS EARTH LEAKAGE** While a motor was running, the earth leakage input is inactive or 0V indicating that there is a ground fault on the lighting circuit.	– Light circuit is faulty – Wire is broken – Super Simpson malfunction	– Verify 120VAC to Super Simpson machine controller – Examine the earth leakage relay and radio remote connections – Replace the Super Simpson
0520 **WATER FLOW CUTTER TRIP** While the cutter was running, the water flow input is inactive or 0V indicating that the water flow has decreased or stopped.	– Water supply has been lost – Wire is broken – Super Simpson malfunction	– Verify 120VAC to Super Simpson machine controller – Check water supply – Replace the Super Simpson
0521 **WATER FLOW PUMP TRIP** While the cutter was running, the water flow input is inactive or 0V indicating that the water flow has decreased or stopped.	– Water supply has been lost – Wire is broken – Super Simpson malfunction	– Verify 120VAC to Super Simpson machine controller – Check water supply – Replace the Super Simpson
0522 **WATER PRESSURE CUTTER TRIP** While the cutter was running, the water flow input is inactive or 0V indicating that the water flow has decreased or stopped.	– Water supply has been lost or pump has failed – Wire is broken – Super Simpson malfunction	– Verify 120VAC to Super Simpson machine controller – Check water supply – Replace the Super Simpson
0523 **WATER PRESSURE PUMP TRIP** While the cutter was running, the water flow input is inactive or 0V indicating that the water flow has decreased or stopped.	– Water supply has been lost or pump has failed – Wire is broken – Super Simpson malfunction	– Verify 120VAC to Super Simpson machine controller – Check water supply – Replace the Super Simpson
0524 **SUPPLY EARTH LEAKAGE** The supply leakage input is inactive or 0V indicating that there is a ground fault on the main transformer.	– Main transformer is faulty – Wire is broken – Super Simpson malfunction	– Verify 120VAC to Super Simpson machine controller – Examine the earth leakage relay and the radio remote connections – Replace the Super Simpson
0525 **MACHINE SHUT OFF DUE TO INACTIVITY** The machine inactivity timeout expired and the pilot circuit was tripped.	– The machine was sitting idle	– Verify the inactivity timer setting

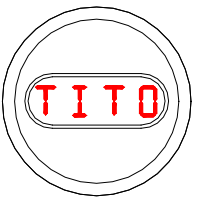
(3) Safety Notice

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

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 and company management and should encompass any relevant state and federal regulations and/or guidelines where applicable.

TITO Remote Console Diagnostic Messages

O model handset feature a built diagnostic screen on the radio remote console that provides the operator with useful diagnostic messages. Note that these messages are only available on TITO model remote handsets. Earlier model handsets do not feature diagnostic display.

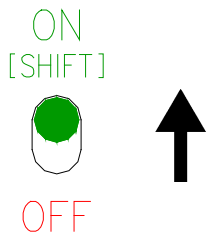


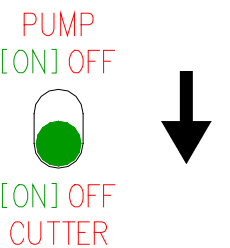
UHF1, UHF2, UHF3, UHF4 UHF5, UHF6 UHF7, UHF8	erating on Frequency 1
	Power is ON and a switch on the console is currently pressed.
	Powering down whilst issuing PUMP OFF
	Radio Stop Activated
	The RC's angle of inclination is beyond 45 relative to horizontal. The STOP command is issued continuously until the unit is righted. (Must be enabled using setup mode)
LOW (Flashing)	internal battery is low with and expected remaining operating time of approximately 30
	Indicating possible service requirements, a fault condition has been detected.

Remote Console Cutter Motors Control

the Cutter Motors

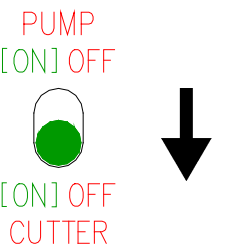
Ensure that the pump motor is first running normally.
Press [SHIFT] and wait ¼ second
Press CUTTER [ON] while [SHIFT] is also pressed.
Keep the keys asserted for a few moments.
After a few moments the cutter motors
Release CUTTER [ON] first. This is important. If [SHIFT] is released first the cutters are shutdown
Then release [SHIFT].
Cutter motors should continue to run normally.





Stopping the Cutter Motors

Cutters are running normally.
Press and hold CUTTER OFF.
The Cutter Motors should shut down immediately.
Release CUTTER OFF.



While the keys are held, the diagnostic display on the miner will show a “countdown timer”. The timer counts the 5 second period that the keys must be held in order for the bypass function to become enabled.

second delay has the system will enter the E STOP BYPASS mode. The keys can then be released. The screen will then show that the bypass is active and feature another countdown timer. In this case the timer counts down the 30 second window for which the bypass will remain active.

second window has expired, the bypass will again be disabled. The bypass mode can be activated again by pressing and keys again for 5 seconds.

To Return to REMOTE MODE

You can leave the menu system and return to the REMOTE MODE at any time by pressing keys together on the remote control handset.

Moving Around in the System Menu

The remote control console is used to move around in the system select different options and perform different diagnostic Whether utilizing the “Lil Blue” display or the new Graphics display, all functionality remains the same.

Moving the Cursor:

to move the cursor to

esired option.

Selecting an Option:

When the cursor is next to the desired option, press to select that option.

To exit the System Menu:

at any time.

(14) Main Menu Option 7 Tradesman Setup Menu

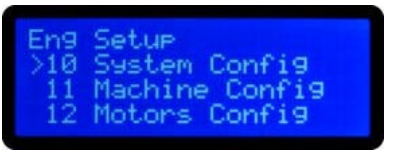
he Tradesman Setup Menu consists of 6 options that are accessible the tradesman, engineering, or OEM

Tradesman Option 1 Solenoid Self Test

use Solenoid Self Test function aids in troubleshooting solenoid coils. When selected, test begins automatically. T s each solenoid coil and determines if short circuit or open circuit

The system looks at one solenoid at a time. First the solenoid is activated, and then the current is measured and displayed

Engineering Option 10 System Configuration



This option allows the engineer to enter the System Configuration Menu where many of the system parameters can be reviewed and

NOTE: Once a parameter is changed you must press to save the updated If you do not do this your changes will not be saved.

The System Configuration Menu consists of nine options.

This option determines if the control system should monitor the oil level switch or not. If this parameter is set to NO the control system will ignore indications from the oil level switch.

Wet Start Timer This parameter determines how lo operator must wait to start the cutter head after the water spray has

Wet Stop Timer This parameter determines how long the water spray will remain on after the cutter head has been stopped. Once the time expires the water spray will automatically shut off.

) Digital Inputs to Configure Radio Control Frequency

on control system on the machine provides t digital inputs that allow the radio frequency to be selected. These digital inputs are designed to accept 24VDC inputs (i.e. 24VDC applied to the input activates that input). The digital inputs enter the Simpson RCS on pins X2 respectively.

These inputs can be configured as follows to provide up to nt control frequencies:

	Digital Input	Digital Input	Digital Input
	Not Connected	Not Connected	Not Connected
		Not Connected	Not Connected
	Not Connected		Not Connected
	Not Connected	Not Connected	
		Not Connected	
	Not Connected		

When the machine power is turned on the control system looks at these inputs to determine which radio control frequency is to be used.

	signal lines have been Motor Mate is faulty 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
	LOW MACHINE VOLTAGE
	Explanation
	Machine voltage reading has fallen below operational level.
	Possible Causes
	Transducer has failed. Bad connection between machine and power center.
	to Cary Out
	Check transducer wiring. 2. Verify voltage supply to transducer 3. Check connection with power center.
Fault Number	Fault Name
	HIGH MACHINE VOLTAGE
	Explanation
	Machine voltage reading is above acceptable level.
	Possible Causes
	Transducer has failed. Bad connection between machine and power center.
	Checks to Carv Out
	Check transducer wiring. 2. Verify voltage supply to transducer 3. Check connection with power center.
Fault Number	Fault Name
	NO SOLENOID VOLTAGE
	Explanation
	Solenoid board is reporting loss of input
	Possible Causes
	Broken wire for 110VDC input. Internal failure on solenoid board

Fault Number	Fault Name
	FAN MOTOR OVER TEMPERATURE
	Explanation
	Motor thermistor is reading over allowed operating temperature.
	Possible Causes
	Motor is damaged. Motor Thermistor is faulty. Thermistor module is faulty
	Checks to Carv Out
	1. Check thermistor circuit resistance and verify that thermistor module is correctly reporting that value. 2. Check if thermistor reading is rapidly fluctuating, if so thermistor is damaged or there is noise in the circuit. Replace Thermistor module.
Fault Number	
	LEFT TRAM MOTOR OVERLOAD
	Explanation
	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
	Verify actual operating current. Check that motor mate is reporting actual operating current. 3. Replace pump motor, motor mate, or super simpson.
Fault Number	**Fault Name**
	RIGHT TRAM MOTOR
	Explanation

	s are damaged replace cable.

	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 the Motor Mate 4. Replace the Super Simpson

Fault Number	Fault Name
	LH VFD INSTANT OVERLOAD
	Explanation
	VFD is reporting instant overload status
	Possible Causes
	Motor current exceeding current limit trip Internal Drive failure
	Checks to Carv Out
	motor current readings 2. Replace motor or VFD

	Possible Causes
	1. Low Coolant Flow 2.Poor Thermal Contact with Rectifier Base and Enclosure
	Checks to Carv Out
	1.Check Coolant flow 2.Check proper installation of Rectifier

Fault Number	**Fault Name**
	RECTIFIER UNDERVOLTAGE
	Explanation
	The Rectifier has reported low input
	Possible Causes
	1.Voltage below 750V 2.Rectifier has faultv DC Bus
	Checks to Carv Out
	1.Verify machine voltage and Rectifier unit 2.Replace rectifier.
Fault Number	**Fault Name**
	RECTIFIER HEATSINK TRIP
	Explanation
	Rectifier has reported heatsink temperature trip
	Possible Causes
	1. Low Coolant Flow 2 Poor Thermal Contact with Rectifier Base and Enclosure
	Checks to Carv Out
	1.Check Coolant flow and level. 2.Check proper installation of rectifier.

	2.Connect spare RTD circui terminal enclosure. 3. Replace Thermistor Module (L0LH09) .Check pilot cores in motor supply cable. If pilot cores are damaged replace cable.

Fault Number	Fault Name
	LEFT TRAM MOTOR TEMPERATURE
	Explanation
	Thermistor module reported motor temperature is above trip temperature.
	Possible Causes
	RTD circuit is above 150 Measure RTD resistance and compare to RTD failure (DO NOT Thermistor Module Failure (L0LH09)
	Checks to Carv Out
	1.Check condition of wiring to RTD circuit and measure RTD resistance 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. If pilot cores are damaged replace cable.

	The internal left cutter run relay (X1 Output) is faulty (closed illegally). Receiver needs to be replaced. Receiver (or input to receiver) is faulty
	Checks to Carv Out
	wiring between relay output and left cutter contactor that 120VAC is coming from Super Simpson Replace Super Simpson
Fault Number	**Fault Name**
	VOLTAGE ON RIGHT CUTTER RUN CIRCUIT
	Explanation
	When the cutters should be off, 120VAC ACTIVE voltage was detected at the output of the internal right cutter run relay (Output receiver). This voltage ed the right illegally. The Out Stop was tripped to prevent the right cutter motor from starting
	Possible Causes
	120VAC ACTIVE has shorted to the X1 output (Right Cutter Run Circuit) The internal right cutter run relay (X1 faulty (closed illegally). Receiver needs to be replaced. Receiver is faulty.
	Checks to Carv Out
	wiring between relay output and right cutter contactor that 120VAC is coming from Super Simpson Replace Super Simpson
Fault Number	**Fault Name**
	ILLEGAL VOLTAGE ON CONVEYOR FWD RUN CIRCUIT
	Explanation
	When the conveyor forward should be off,

Fault Number	Fault Name
	T TRACTION MOTOR NO
	Explanation
	When the left tram motor was activated, no current was detected in the motor. It is possible that the motor is not connected. The traction was shutdown.
	Possible Causes
	Motor power conductor is broken A fuse in the motor power connection has Left tram motor is faulty The left traction drive is faulty.
	Checks to Carv Out
	Verify current level with hand held meter Verify state of tram motor 3. Replace the the drive.

Fault Number	Fault Name
	PUMP NO LOAD CURRENT
	Explanation
	While the pump was running, the currents detected in the pump motor were very small. It is possible that no load is connected to the pump motor or that there is a mechanical failure of the pump the pump gearbox. The pump motor was
	Possible Causes
	No load connected to motor shaft Mechanical failure of the pump Mechanical failure of the pump gearbox train from motor to pump) Motormate faulty
	Checks to Carv Out
	the state of the motor and proper functionality. Check motor mate reading against hand Replace Motor Mate. Replace Super Simpson.
Fault Number	**Fault Name**
	PUMP MOTOR PHASE LOSS
	Explanation
	While the pump was running, at least one of the phase currents went to 0 Amperes unknown reasons. It is possible that the motor lead is not connected from the motor. It is also possible that the motor a serious internal failure. pump motor was shutdown.
	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. Check proper functionality of cutter 2. Verify motor mate feedback against hand held meter. Replace motor mate. 4. Replace Super Simpson
Fault Number	**Fault Name**
	LEFT CUTTER MOTOR INSTANTANEOUS OVERLOAD
	Explanation
	While the cutter motors were running the current measured in the left cutter motor exceeded the instantaneous overload threshold. The left cutter motors were
	Possible Causes
	Failure of gearbox that is overloading or jamming the motor shaft Heavy cutting loads are c overloading of the motor Serious failure of the left cutter motor
	Checks to Carv Out
	1. Check proper functionality of cutter Verify motor mate feedback against hand held meter. Replace motor mate. 4. Replace Super Simpson

	Possible Causes
	Checks to Carv Out
	Fault Name
	Explanation
	Possible Causes
	Checks to Carv Out
Fault Number	**Fault Name**
	LEFT CONVEYOR MOTOR MATE
	Explanation
	At least one of the three signal lines from faulty, while the was running or an attempt was made to start the conveyor. Each signal line must read between 4mA and 20 mA to be normal. If any of the lines is not in this ge then this fault will occur. The conveyor motors were shutdown.
	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 to Super Simpson** **Replace motor mate** **Replace Super Simpson**

	W of the receiver The internal fan run relay (X1 M Output) is faulty. Receiver needs to be replaced Receiver is faulty
	Checks to Carv Out
	1. Check 120VAC supply at X1 2. Check connection of X1 Verify output of 120VAC at X1 4. Replace Super Simpson
Fault Number	**Fault Name**
	Explanation
	Possible Causes
	Checks to Carv Out

	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. Verify motor mate feedback versus hand 3. Replace motor mate 4. Replace Super Simpson
Fault Number	**Fault Name**
	RIGHT CONVEYOR MULTIPLE INSTANT OVERLOADS
	Explanation
	While the conveyor motor was running the current measured in the motor exceeded the instantaneous overload threshold conveyor was shutdown. happened multiple times and the motor now requires a longer cool down period
	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. Verify motor mate feedback versus hand 3. Replace motor mate 4. Replace Super Simpson

Fault Number	Fault Name
	REAR METHANE SENSOR
	Explanation
	The methane sensor is reporting a low supply voltage level.
	Possible Causes
	The sensor has suffered an internal failure
	Checks to Carv Out
	1. Replace methane sensor.
Fault Number	**Fault Name**
	REAR METHANE SENSOR
	Explanation
	The methane sensor is reporting an EEPROM verification
	Possible Causes
	The sensor has suffered an internal failure
	Checks to Carv Out
	1. Replace methane sensor.
Fault Number	**Fault Name**
	REAR METHANE SENSOR
	Explanation
	The methane sensor is reporting that it to complete setup.
	Possible Causes
	The sensor has suffered an internal failure
	Checks to Carv Out
	1. Replace methane sensor.

	off, current feedback was detected. The control system assumed the contactor had closed illegally and removed power from the machine by activating the out
	Possible Causes
	LCUT CONTACT SHORT 2.MOTORMATE FAULTY 3.RECEIVER FAULTY
	Checks to Carv Out
	1. Check that contactor is closed 2. Check wiring to contactor for 120VAC 3. Verify motor mate feedback 4. Replace motor mate. 5. Replace Super Simpson.
Fault Number	**Fault Name**
	ILLEGAL RIGHT CUTTER
	Explanation
	While the cutter motor should have been off, current feedback was detected. The control system assumed the contactor had closed illegally and removed power from the machine by activating the out
	Possible Causes
	RCUT CONTACT SHORT 2.MOTORMATE FAULTY 3.RECEIVER FAULTY
	Checks to Carv Out
	1. Check that contactor is closed 2. Check wiring to contactor for 120VAC 3. Verify motor mate feedback 4. Replace motor mate. 5. Replace Super
Fault Number	**Fault Name**
	Explanation

Fault Number	Fault Name
	RIGHT TRACTION FROZEN
	Explanation
	traction module has detected an
	Possible Causes
	The traction module is faultv 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
Fault Number	**Fault Name**
	TRACTION OPEN
	Explanation
	The traction module has detected an
	Possible Causes
	The traction module is faultv 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**
	RIGHT TRACTION OPEN
	Explanation
	The traction module has detected an
	Possible Causes
	The traction module is faultv

	No current was detected by motor mate during start of motor (1 second timeout)
	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 Verify that contactor is closing and three phase is supplied Verify motor mate feedback with hand Replace motor mate.
Fault Number	**Fault Name**
	NO RIGHT CUTTER START
	Explanation
	No current was detected by motor during start of motor (1 second timeout)
	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 phase is supplied Verify motor mate feedback with hand Replace motor mate.
Fault Number	**Fault Name**
	NO LEFT CONVEYOR START
	Explanation
	No current was detected by motor mate during start of motor (1 second timeout)

	detected during motor operation
	Possible Causes
	Auxillary contact is faulty Receiver is Faulty
	Checks to Carv Out
	Verify 110VAC from pump auxillary contact Check wire continuity from contact to Replace Super Simpson
Fault Number	**Fault Name**
	CB2 OPEN AT LEFT CUTTER MOTOR START
	Explanation
	Circuit Breaker was detected as 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 Number	**Fault Name**
	CB2 OPEN AT RIGHT CUTTER MOTOR START
	Explanation
	Circuit Breaker was detected as open during motor start
	Possible Causes
	Breaker tripped Auxillary contact failure Receiver Failure
	Checks to Cary

	The inverter has detected a thermostat trip
	Possible Causes
	Tram load is too high Low coolant flow
	Checks to Carv Out
	Resume tramming at low speed Increase coolant flow
	Fault Name
	RIGHT VFD MOTOR OVERSPEED
	Explanation
	The inverter has detected an overspeed
	Possible Causes
	Noise on the encoder Incorrect inverter settings Machine is being trammed down hill or
	Checks to Carv Out
	Check motor connections Check motor setup

Fault Number	Fault Name
	LEFT RMS OVERSPEED
	Explanation
	Possible Causes
	Checks to Cary
Fault Number	Fault Name
	LEFT RMS PHASE SYNC LOSS
	Explanation
	Possible Causes
	Checks to Carv Out
Fault Number	Fault Name
	LEFT RMS LOST THREE PHASE
	Explanation
	Possible Causes
	Checks to Carv Out

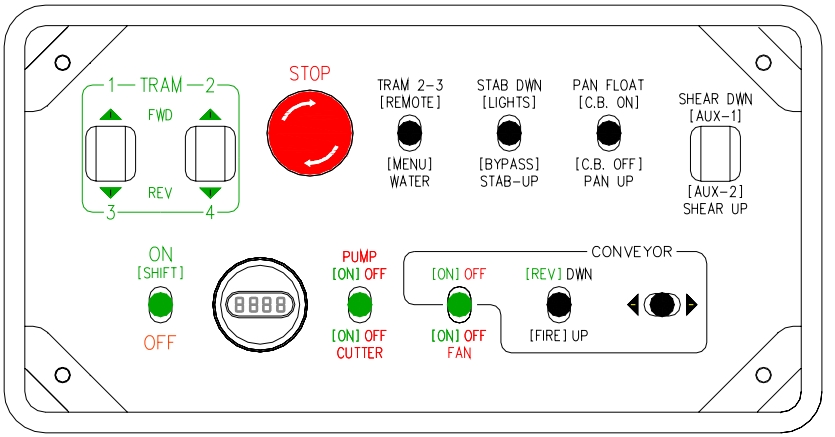
Fault Number	Fault Name
	LEFT RMS LOST CAN COMMUNICATIONS
	Explanation
	Possible Causes
	Checks to Carv Out

) Control System Pin Outs

Simpson Receiver Control Unit 35 Pin Burndy Female		
	AUX #1 Relay Output	
	AUX #2 Relay Output	
	Head Lights Output	
	Conveyor Forward Run Output	
	Conveyor Reverse Run Output	
	Pump External Overload	
	Main Supply Status	
	Used as MOR Output Only	
	tion External Overload	
	Ext Circuit Monitoring	
	Ext Circuit Monitoring	
	Circuit Monitoring	

Introduction

The Type L0KN Remote Console (RC) is a self-contained battery powered remote control that has been specifically designed to provide a safer, more efficient means of operating mining machinery.



Notice

This manual includes information specific to the following part:

Part#	**Description**
L0KN5602	Bucyrus UHF

If this manual does not correspond to your equipment's part number, please contact Forced Potato Inc. immediately to obtain a copy of the correct publication.

To obtain service of your TITO L0KN56 model remote control handset please contact your local Bucyrus representative or service center.

To enter characters, use the following keys:

To change a character:
Assert **CONVEYOR UP** or **CONVEYOR DOWN**

To change cursor position:
Assert **CONVEYOR ►** or **CONVEYOR ◄**

To check the password:
Assert **ON [SHIFT]**

After entering the password, assert **ON [SHIFT]** to gain access to the System Menu.

Options

There are five menu options available to the end user. To navigate the system menu, see the following:

To change the menu option:
Assert **CONVEYOR ►** or **CONVEYOR◄**

To engage or leave the menu option:
Assert **ON [SHIFT]**

To change the option value:
Assert **CONVEYOR UP** or **CONVEYOR DOWN**