BI016882-03-EN
A6474X331
December 2014

Operation and Maintenance Manual

CM220 AC Continuous Miner

Serial Number GED00782

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.

Overview of safety instructions

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.

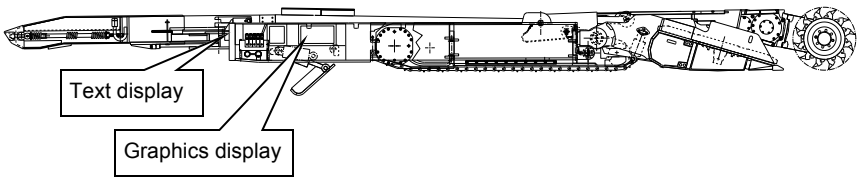
CAUTION!
Be careful not to set fire to any grease or lubricant when heating bearings!

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

4 Installation

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. 16). Both screens are used to display diagnostic information on the miner.

Fig. 16: 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

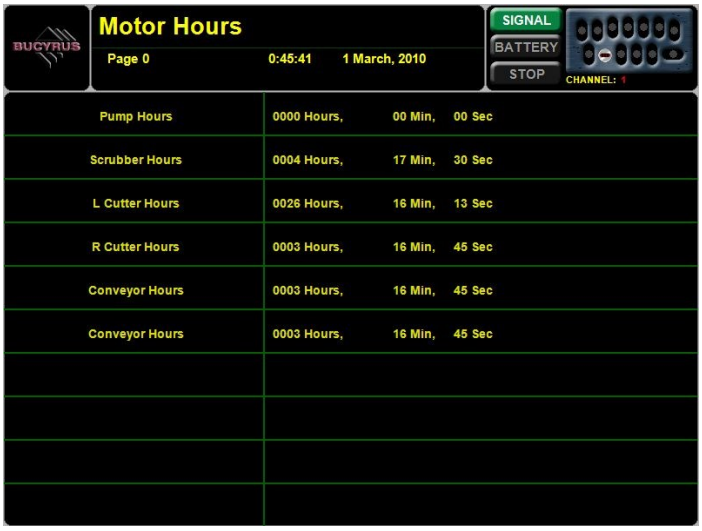
The main diagnostic screen (Fig. 17) is displayed during normal remote control operation of the machine. The screen presents real time diagnostic and performance information.

Hour meters

Selecting hour meters (Fig. 23) 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 receiver 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 receiver is installed. To keep an accurate log of a motor's total hours, the information should be recorded anytime data is cleared.

Fig. 23: 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 transmitter turned on. Failure to turn the transmitter off could result in an accident causing serious injury or loss of life.

Reference Fig. 16.

- ☞ 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.

Stabilizer (stab) cylinder raise/lower in radio remote

The pump motor must be running in order to raise or lower the stabilizer cylinder.

Reference Fig. 16.

- ☞ Press “STAB UP” to raise the stabilizer cylinder. The stabilizer cylinder solenoid remains energized until the key is released.
- ☞ Press “STAB DOWN” to lower the stabilizer cylinder. The stabilizer cylinder down solenoid remains on until the key is released.

See the operation manual for the radio remote that shipped with your machine for options.

Shear up/down in radio remote

The pump motor must be running in order to raise or lower the cutter head.

Reference Fig. 16.

☞ Press “SHEAR UP” to move the cutter head up. The shear up solenoid remains energized until the key is released (unless height limiting is in force).

- ☞ Press “SHEAR DOWN” to move the cutter head down. The shear down solenoid remains energized until the key is released.

See the operation manual for the radio remote that shipped with your machine for options.

Gathering head raise/float in radio remote

The pump motor must be running in order to raise or lower the gathering head.

Reference Fig. 16.

- ☞ Press “PAN UP” to lift the gathering head. The pan up solenoid remains energized until the key is released.
- ☞ Press “PAN FLOAT” to “float” the head down.

See the operation manual for the radio remote that shipped with your machine for options.

Carbide bits and bit blocks

The carbide-tipped cutter bits are mounted into holders called bit blocks (Fig. 37). While a variety of bit and bit block designs are available to meet light, tough, or average mining conditions, all are designed to absorb vibration to maintain cutter efficiency. The conical bits also rotate as they cut to produce a self-sharpening effect. The bits and blocks may be deployed around the drum in different bit lacing patterns to give the best performance under different conditions.

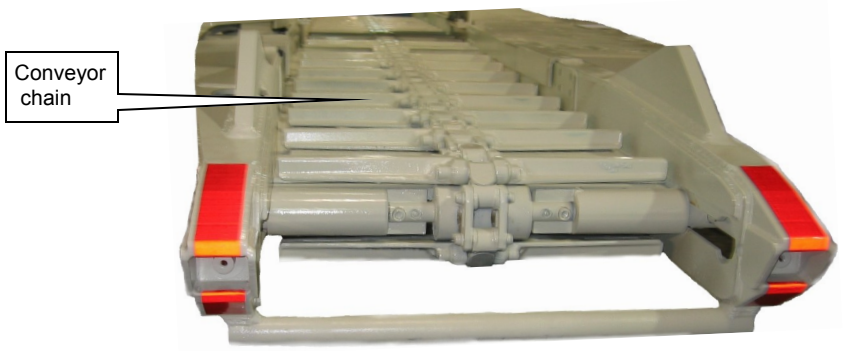
IMPORTANT!
Inspection of the bits and bit blocks before the start of each shift will reduce later problems. Mining with dull, bent or broken bit blocks increases dust and noise levels, as well as putting excessive strain on both cutter and tram drives.

Fig. 37: Cutter bit and bit blocks

Conveyor chain

The miner is equipped with a conveyor chain assembly that runs through the center of the miner and transports the mined material from the gathering head to the rear of the miner for haulage at a high loading rate compatible with the miner's cutting output. The conveyor chain (Fig. 38) is made up of one basic chain assembly which repeats sequentially along the entire chain loop (see Maintenance section in this chapter for Conveyor chain maintenance).

Fig. 38: Conveyor chain



Micron: 1/1000th of a millimeter (0.00003937 inches). The measure used to determine the particle size of contaminants in a fluid system.

Micron rating: The size, in microns, of particles a filter will remove.

PSI (psi): Pounds per square inch (unit of pressure).

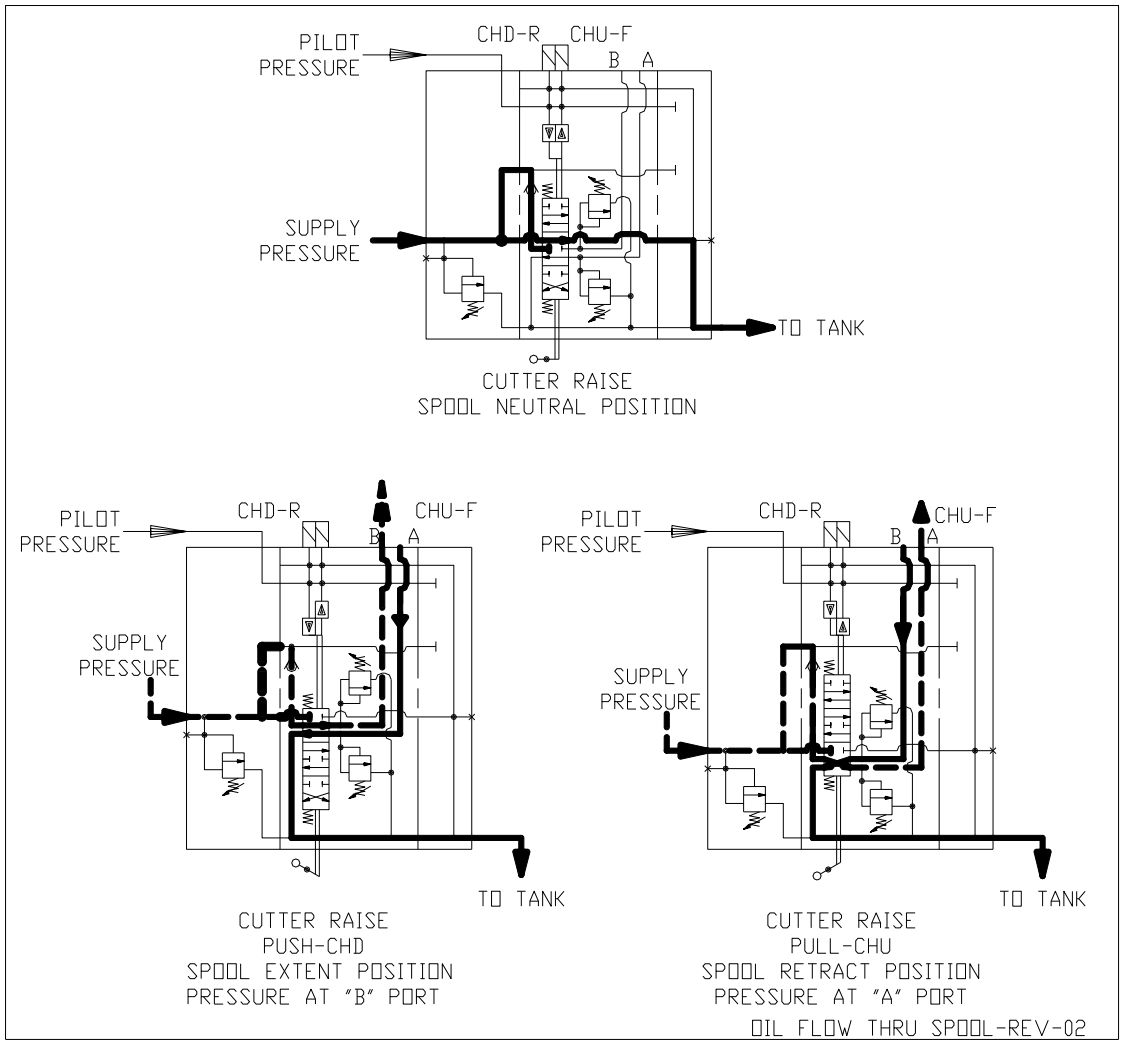
Open center circuit: A circuit in which flow through the system and back to the oil tank reservoir is open in neutral. Example: the main flow-primary pressure circuit.

Viscosity: A measure of the internal friction, or resistance to flow, of a fluid.

Reading a hydraulic schematic

All valves are shown in the neutral position on the hydraulic schematics.

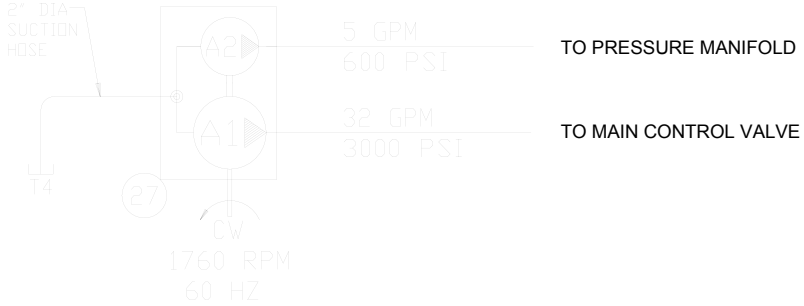
Fig. 46: Oil flow through a spool



Hydraulic pump assembly circuit

Hydraulic power for all of the hydraulically actuated functions originates with the pump assembly (Fig. 52). This pump assembly is made up of single-stage pump with a piggy-back hydraulic pump (2-section tandem pump). The pump outlets are designated A1 (main flow) and A2 (pilot flow). The pump assembly is typically mounted on the left side of the machine frame. Oil is supplied from the oil tank reservoir to the suction side of pump through a 2” suction line.

Fig. 52: Hydraulic pump circuit



Cutter head cylinder circuit

DANGER!
The area under and around the raised cutter head is dangerous. Securely block the head before performing maintenance on or below it. Failure to block the raised cutter head could result in serious injury or even death.

Oil is supplied by hydraulic pump section A1 to the cutter head working section on the main control valve. By manual or remote solenoid control, the spool allows oil to enter the cutter head cylinder circuit. The cutter head cylinder is a double-acting cylinder with load holding cartridge. There are two (2) cutter head cylinders, one on each side of the machine.

There are two (2) port reliefs in the working section of the main control valve. Both port reliefs are set at 2,800 psi. To raise the cutter head (extend cylinders), pull the handle. Oil goes to port “P2” of the anti-chatter/maintenance valve free flowing thru the check valve out of port “P1” and continues to the retract port of the cylinders free flowing thru the check valve of the load holding cartridge to retract the cylinders.

To lower the cutter head (retract cylinders), push the handle. Oil goes to the extension port of the cylinders and also pilots open the load holding cartridge allowing oil to exit the retract ports on the cylinders. The oil continues to the anti-chatter/maintenance valve block where it passes through a counterbalance valve which is set to relieve at 1,200 psi, then through the main control valve and a 10-micron bypassing return filter into the oil tank.

shear down/maintenance valve (anti-chatter)

The shear down/anti chatter manifold has three primary functions:

1. It provides back pressure against the shear cylinder pistons when shearing down to prevent the machine form climbing the face (raising the machine off of the ground).

2. It provides back pressure against the shear cylinder pistons when lowering the cutter head without shearing. This allows for a smooth downward motion without allowing the load for the cutter head to run uncontrollably.

3. It allows for bypassing of the counterbalance valve to eliminate the back pressure against the shear cylinder pistons. This provides the maximum pressure differential between the two sides of the shear cylinders which allows the machine to be raised off the ground (jack-knifed). To jack-knife the miner, the stabilizer shoe is first lowered and then the cutter head is lowered with the bypass opened. At this point, the machine can be inspected, adjustments can be made to the crawler tracks.

4. This counterbalance valve is set at 1,200 psi.

Continuous Miner water system overview

Water is supplied to the continuous miner for the following purposes:

- deluge water fire protection
- cooling water for motors, transformers, etc.
- cooling water for dust suppression
- air cleaning via the scrubber system
- washdown hoses

The water supplied by the mine must meet the following requirements:

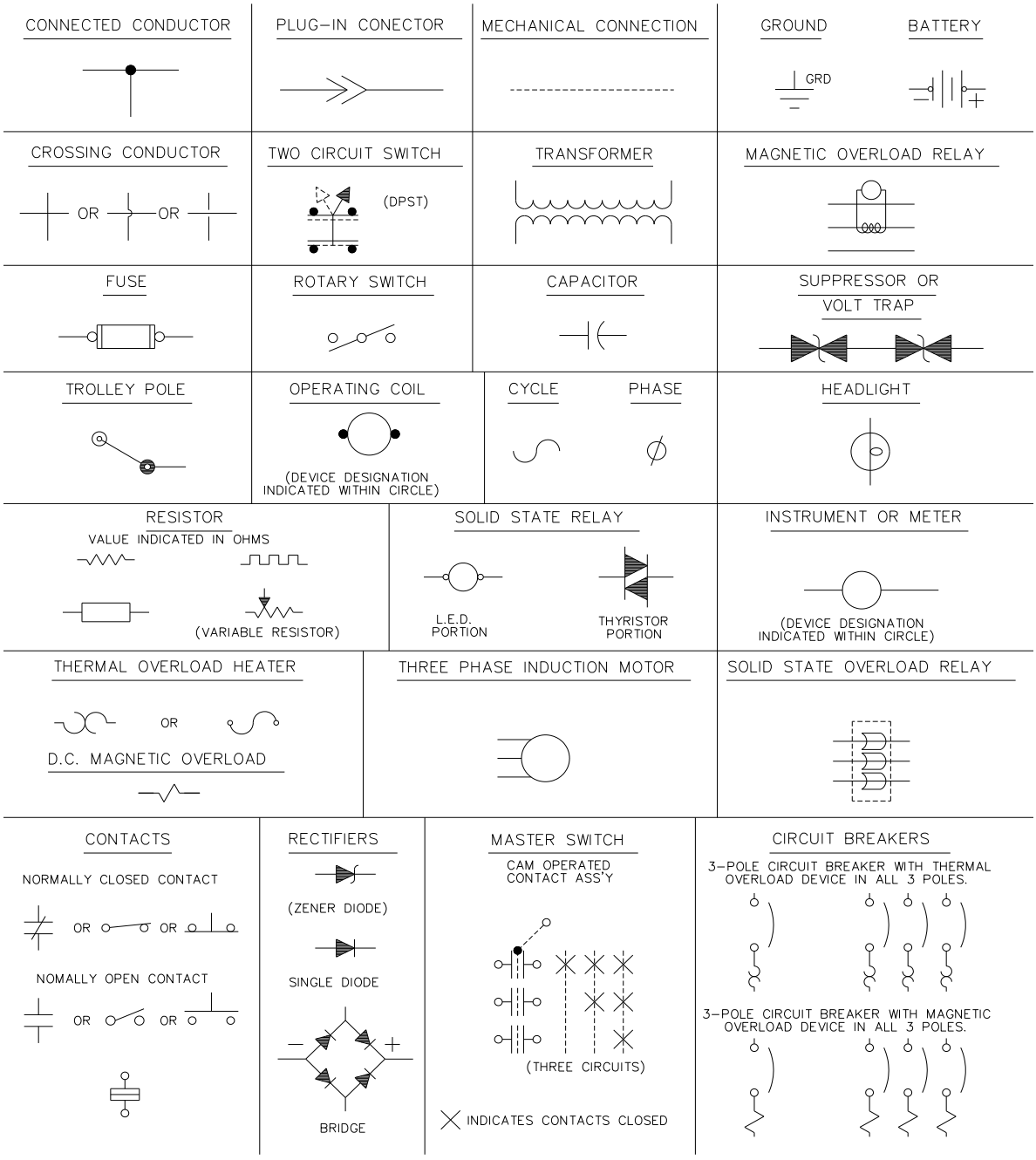
- flow rate of 10 gpm minimum for cooling
- total flow rate: based on customer dust plan
- pressure of 250 psi (dynamic) minimum, 500 psi maximum

The manufacturer offers straight, left hand, right hand, or bi-directional cutter head spray manifolds. This section describes bi-direction sprays.

The schematics in this section are for reference only. Always refer to the schematic in the parts book for your machine.

Related components share the same designation and when tracing a particular circuit, it may be helpful to think of the flow of electricity as being similar to the flow of water through a hose. When a set of contacts are open, the current cannot flow across them, and when contacts are closed, the current can flow. When three (3) lines are connected in a tee, the current will flow in whatever direction that it can. Like water or hydraulic fluid, an electrical current will also tend to follow the path of least resistance through a circuit. Finally, for a circuit to work, the electrical current must make a complete loop, similar to hydraulic fluid going through a circuit and returning to a tank.

Fig. 72: Standard electrical symbols



Methane monitor circuit

The methane monitor detects methane gas when the continuous miner is powered up. Before any motor or function occurs, the methane monitor checks for methane gas. If the methane level is below the preset value, the methane monitor relay will close. The methane monitor is powered from the control transformer.

The schematic shown in Fig. 75 is a typical methane monitor circuit. Always refer to the schematic in the parts book for your machine.

Fig. 75: Methane monitor circuit

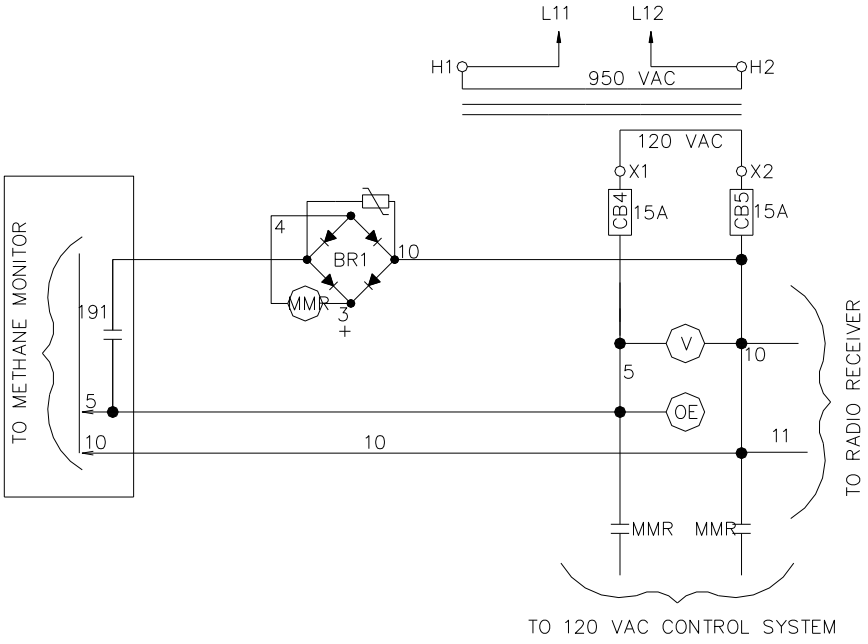
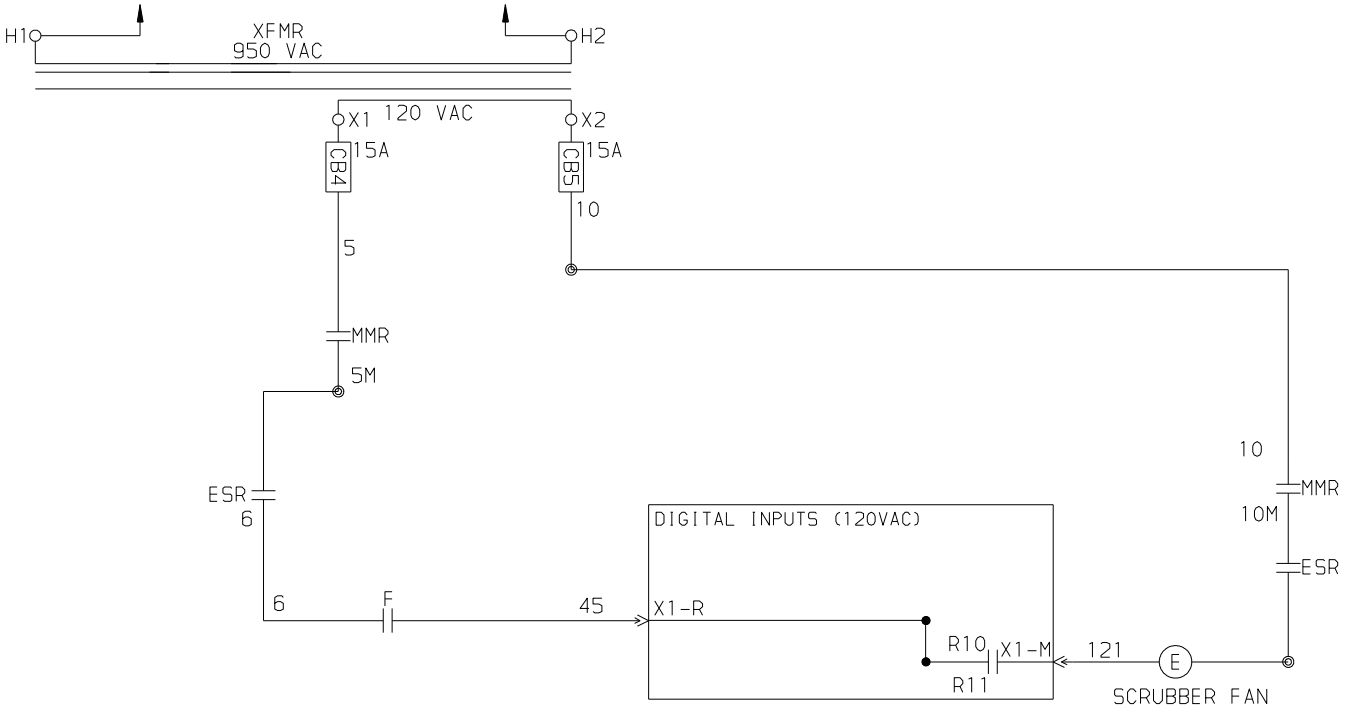


Fig. 81: Scrubber motor circuit with control (cont.)



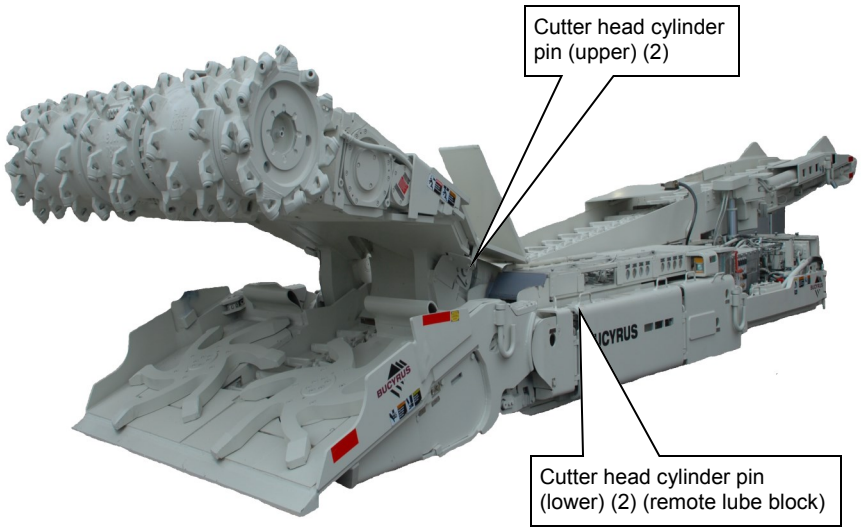
Specific lubrication and maintenance procedures

Every shift

cutter head lift cylinder pins

Lubricate the right and left cylinder pins (upper and lower) through the grease fittings and remote lube block located on each cylinder (Fig. 85). Pump approximately 3 cu. in. (50 cu. cm.) into each fitting.

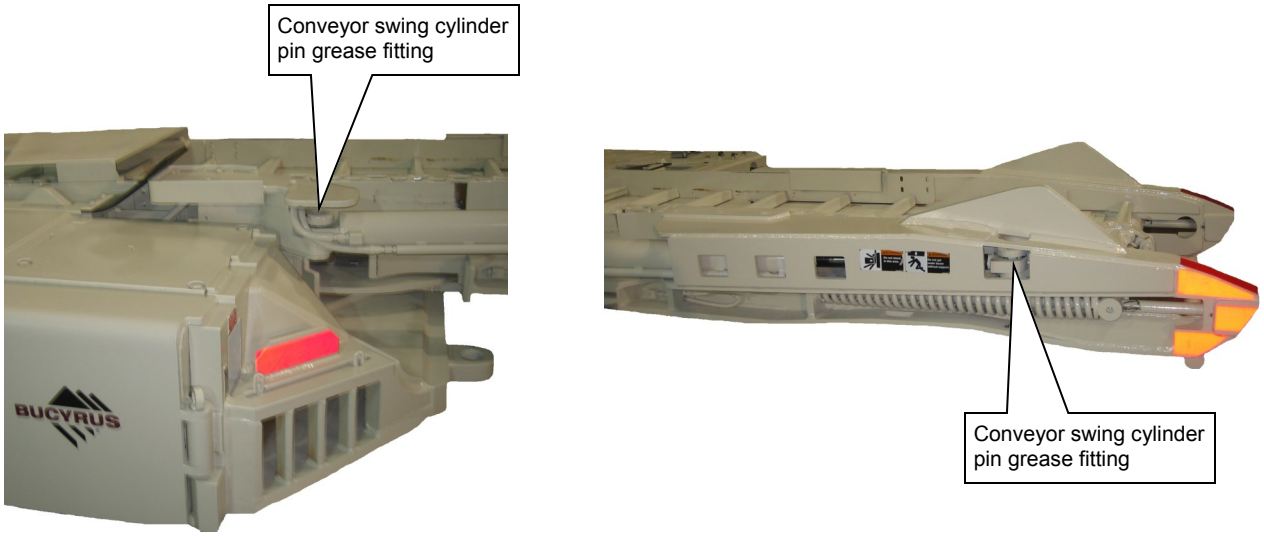
Fig. 85: Cutter head cylinder pin location



conveyor swing cylinder pin (front and rear)

Lubricate the front and rear conveyor swing cylinder pins through the grease fittings located on each end of the cylinder (Fig. 86). Pump approximately 3 cu. in. (50 cu. cm.) into each fitting.

Fig. 86: Conveyor swing cylinder pin lubrication



Monthly

CLA head pot assembly

Change the oil in both CLA head pot assemblies (Fig. 140).

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

CLA head transfer case

Change the oil in both CLA head transfer cases (Fig. 140).

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

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

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

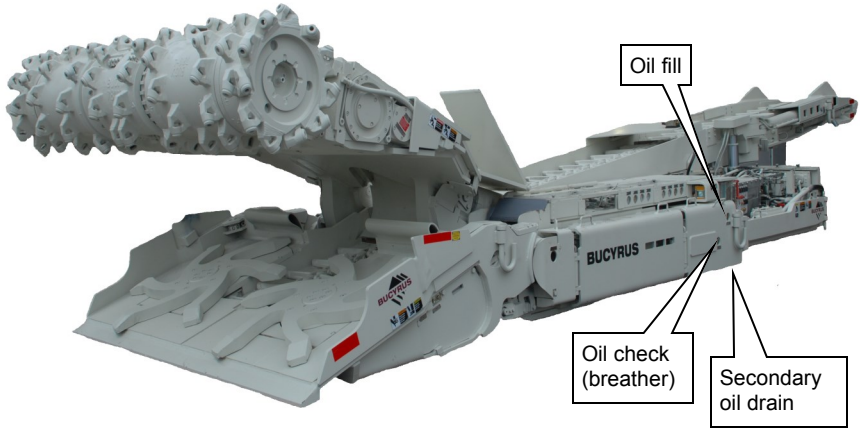
Every six months

tram gear cases

Change the oil in both tram gear cases (Fig. 114).

- ☞ Remove the two drain plugs and allow oil to completely drain from the gear case. One drain plug is located under the check and fill plugs, and one drain plug is underneath the reach gears.
- ☞ Clean and reinstall the drain plugs.
- ☞ Remove the fill plug located on top of the gear case.
- ☞ Add oil through the fill plug hole until oil is visible in the sight glass. When filling, allow sufficient time for the oil to travel throughout the gear case.

Fig. 114: Tram gear case



Tram track adjustment

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

☞ 2. Raise the gathering head and cutter head and block both assemblies following standard blocking procedures.

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

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

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

☞ 5. Securely block under the machine. The machine must be securely supported off the ground with the tram track free to turn.

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

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

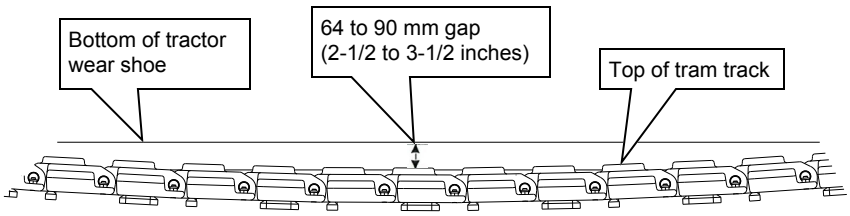
☞ 7. Disconnect the trailing cable to de-energize the miner. Follow all Federal and mine lockout/tagout regulations.

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.

☞ 8. Double check the tractor frame support blocking now that the weight of the tractor frame is completely upon it.

☞ 9. Evaluate the tram track for proper tension (Fig. 116). The tram track is at the proper tension when it hangs approximately 2 1/2” to 3 1/2” from the bottom wear shoes when the tractor frame is blocked off the floor. Using this evaluation, determine whether step 13, 14, or 15 provides the appropriate sub-procedure to correct improper track tension.

Fig. 116: Tram track adjustment



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

☞ 4. Disconnect the power cables and water hoses from the cutter motors (see Cutter motor removal procedure in this chapter). Be sure to tape up the power cables since electrical power will be connected to the miner.

☞ 5. Disconnect the water hoses to the dust suppression sprays.

☞ 6. Remove the 2 boom pivot pins (see Boom pivot pin removal procedure in this chapter - note that there are two different procedures; one for straight pins and one for tapered (McSweeney) pins).

☞ 7. Connect electrical power to the miner.

☞ 8. Extend the shear cylinders to push the boom pivots out of their tractor frame clevises.

☞ 9. Block the boom and shear cylinders to keep them stationary during their pin removal.

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

☞ 10. Disconnect power to the miner. Follow all applicable Federal and mine regulations regarding lockout/tagout procedures.

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

☞ 11. Remove the shear cylinder boom clevis pins (see Shear cylinder removal procedure in this chapter).

☞ 12. Connect electrical power to the miner.

☞ 13. Retract the shear cylinders to pull their bearings free from the boom clevises.

☞ 14. Disconnect power to the miner. Follow all applicable Federal and mine regulations regarding lockout/tagout procedures.

☞ 15. Raise the rear of the boom assembly until it is above the top edge of the gathering head backboard.

☞ 16. Slowly tram the mine backwards until the cutter boom pivot points clear the front of the gathering head.

☞ 12. Use the chain falls to lift the upper half of the center drum off the cutter head assembly. The cutter head and the lower half of the center drum should remain on the floor.

WARNING!
Serious injury or death can result from falling loads. Observe the safe working load limits of lifting devices and keep a safe distance from suspended loads.

☞ 13. Connect trailing cable energize the miner.

☞ 14. Slowly raise the cutter head assembly until it is completely clear of the lower half of the center drum.

☞ 15. Slowly tram the miner backwards away from the suspended upper half and the resting lower half of the center until the cutter head assembly is completely clear of both of these pieces.

To install the center cutter drum (Fig. 131):

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

center cutter drum installation

☞ 1. Slowly lower the cutter head assembly into the bottom half of the center drum. The bottom drum drive keys should fit into the interior of the lower half of the center drum.

WARNING!
Stand clear of the cutter head assembly and the unsecured upper half of the center drum while lowering it.

☞ 2. Using the chain falls, slowly lower the upper half of the center drum onto the cutter head assembly. The top drum drive keys should fit into the underside interior of the upper half of the center drum.

☞ 3. Disconnect the chains that supported the upper half of the center drum from the chain falls.

☞ 4. Remove the chains from the upper half of the center drum.

drum drive gear case installation

To install the drum drive gear case:

☞ 1. Securely block the gear case so that the miner's boom can be trammed forward into position behind it.

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

☞ 2. Install the gear case's two alignment keys.

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

☞ 4. Slowly tram the miner in forward toward the blocked gear case.

WARNING!
Use extreme caution when tramming the miner forward to position the boom face against the gear case.

☞ 5. 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. Failure to do so could result in machine damage or serious injury or death to personnel.

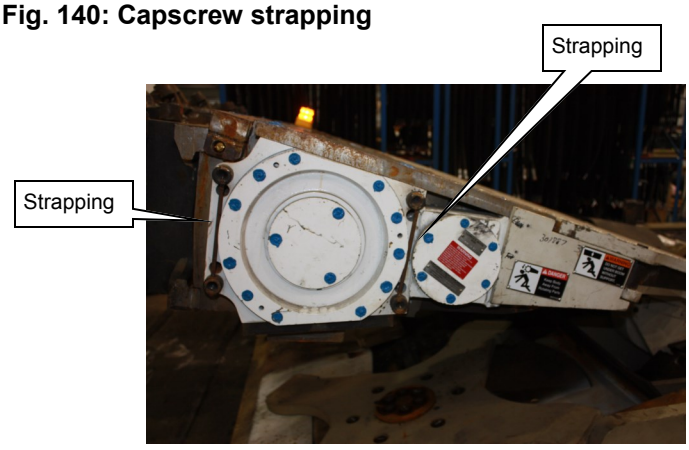
☞ 6. Install the cutter motor.

☞ 7. Install the hex head capscrews into the cutter drum drive gear case mounting brace and into the threaded holes in the cutter boom face.

☞ 8. Using a torque wrench with 20 to 1 multiplier, tighten all twenty-one hex head capscrews to 1,900 ft-lb.

☞ 9. Install the strapping (Fig. 140) onto the capscrews securing the gear case to the boom.

Fig. 140: Capscrew strapping



☞ 10. Install the cutter motor power leads, hosing, water spray manifolds and covers.

☞ 11. Install the cutter drums.

☞ 3. Position the motor against the gear case adapter plate and align the four attachment bolt holes on the gear case side of the motor with the four holes on the corners of the adapter plate.

☞ 4. Apply Loctite 242 (blue) to the four socket head capscrews.

☞ 5. Insert and tighten the socket head capscrews to secure the motor to the gear case adapter plate.

☞ 6. Using an adjustable wrench, insert the two motor cooling water fittings into the gathering head drive motor's cooling water ports, which are located on the gear case end of the motor.

☞ 7. Attach the two motor cooling water hoses (with elbow and adapter) to the fitting.

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

☞ 9. Remove the cover and its o-ring.

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

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

☞ 12. Insert and tighten the two socket head capscrews and lock washers to secure clamp to the junction box.

☞ 13. Locate the motor's lug connections inside the junction box and 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 power cable lug, through the motor lug, through a flat washer, and through a lock washer. Secure the capscrew with a hex nut.

☞ 15. Repeat this step with the other two power cable and motor 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 electrical (black) tape, and finally a layer of glass tape.

☞ 17. Replace the junction box o-ring and junction box cover and secure the cover with hex head capscrews and lock washers to secure the junction box cover.

☞ 10. Reattach the two ends of the conveyor chain by replacing the connecting link. Secure the link.

☞ 11. Tighten the conveyor chain to the proper tension (see Conveyor chain adjustment procedure in the Adjustment procedure section of this chapter).

IMPORTANT!
Improper conveyor chain tension can lead to excessive wear, mechanical problems, and miner downtime. Always keep the conveyor chain at proper tension.

Tram primary planetary gear removal and installation

primary planetary gear removal

To remove the primary planetary gear:

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

☞ 5. Remove the tram motor (see Tram motor removal and installation procedure in this chapter).

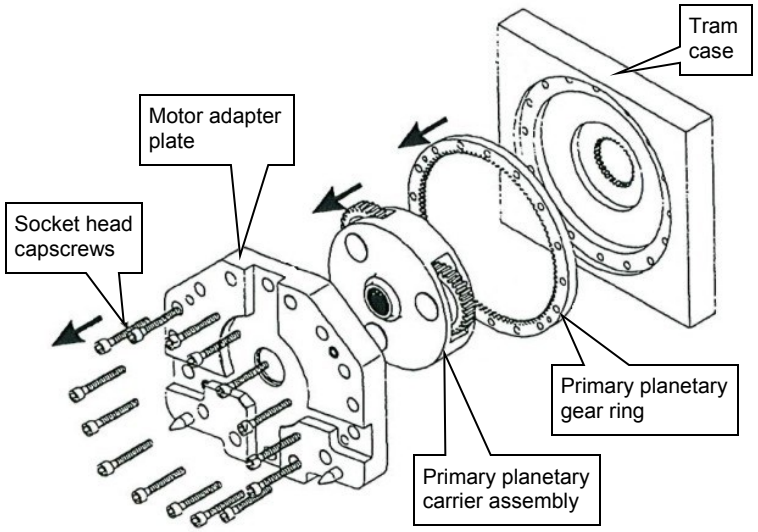
☞ 6. Remove the socket head capscrews that secure the motor adapter plate to the primary gear ring (and also secure the primary planetary carrier assembly to the tram case) (Fig. 164).

☞ 7. Remove the motor adapter plate from the tram case.

☞ 8. Carefully slide the primary planetary carrier assembly out of the primary gear ring and remove the assembly from the tram case.

☞ 9. Carefully slide the primary gear ring out of the tram case.

Fig. 164: Tram primary gear removal



☞ 15. Attach guide wires to the end of the tram track that passes through the tram case.

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

☞ 17. Use the tram motor to slowly rotate the sprocket so that the end of the tram track that passes through the case is pulled up through the case and rolls off the sprocket.

☞ 18. 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.

☞ 19. Pull on the tram track from the front of the miner (near the idler) so that the free end of the tram track is pulled clear of the tram case exit opening.

☞ 20. Remove the tram motor (see Tram motor removal and installation procedure in this chapter).

☞ 21. Remove the bolts and washers from the sprocket and motor sides of the tram case.

☞ 22. Place a stack of blocking in front of the tram case onto which the case can be removed.

WARNING!
The next step removes the tram case from the tractor frame. The tram case (with sprocket and reach gears) is extremely heavy. Be prepared to support the tram case before removing it from the tractor frame.

WARNING!
Ensure that the electrical cables and cooling water hoses for the tram motor are free from the tram cases before attempting to remove the tram case from the tractor frame.

☞ 23. Carefully slide the tram case out from the tractor frame and onto the blocking.

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

☞ 24. Pull the tram track guide wires out of the tram case exit opening and secure the wires to the tractor frame.

IMPORTANT!
The re-installation procedure for the tram case includes re-installation of the primary and secondary planetary gears and the tram motor, and reconnection of the tram track.

☞ 32. Replace the tram rub rail between the two adjacent rub rails and secure it with the two rub rail pins.

☞ 33. Reconnect the trailing cable to energize the miner.

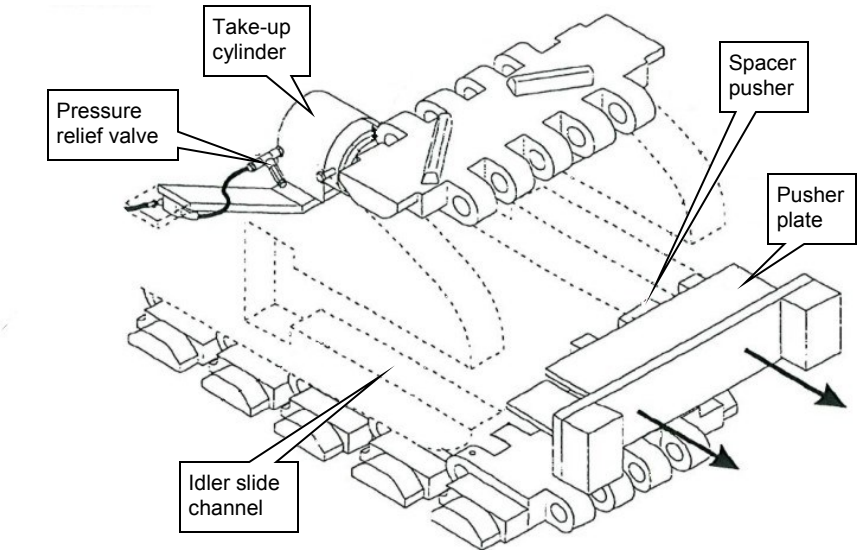
☞ 34. Raise the tractor frame by lowering the stabilizer and the gathering head and cutter head assemblies.

☞ 35. Carefully remove the support blocking from under the tractor frame.

☞ 36. Lower the tractor frame onto the floor by raising the stabilizer and the gathering head and cutter head assemblies.

☞ 11. Slide the pusher plate and the spacer pusher out of the idler slide channel to inspect for damage (Fig. 191).

Fig. 191: Pusher plate removal



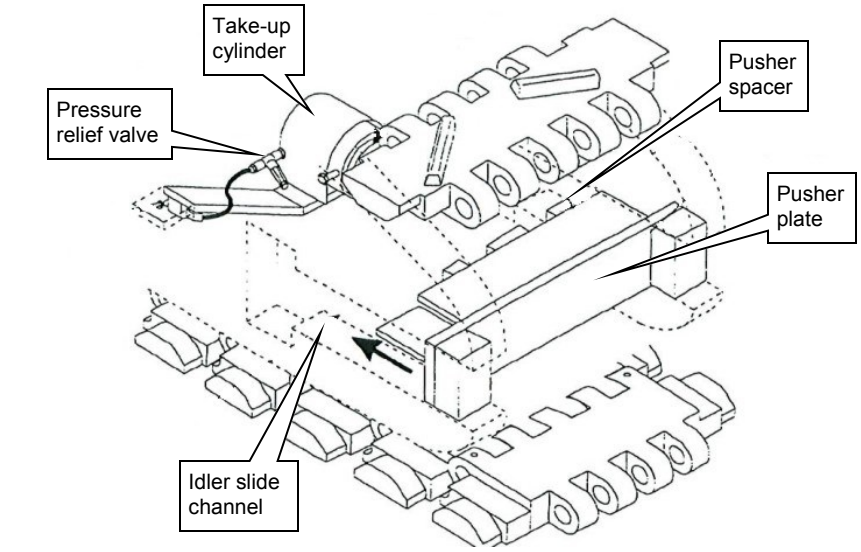
tram track front idler installation

To install the tram track front idler:

☞ 1. Insert the pusher spacer (Fig. 192) into the tractor frame's idler slide channel so that it rests on the slide block support and is positioned against the take-up jack.

☞ 2. Ensuring that the channel guides face away from the take-up jack, insert the pusher plate into the idler slide channel until it touches the pusher spacer.

Fig. 192: Pusher plate installation



Scrubber fan/motor removal

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

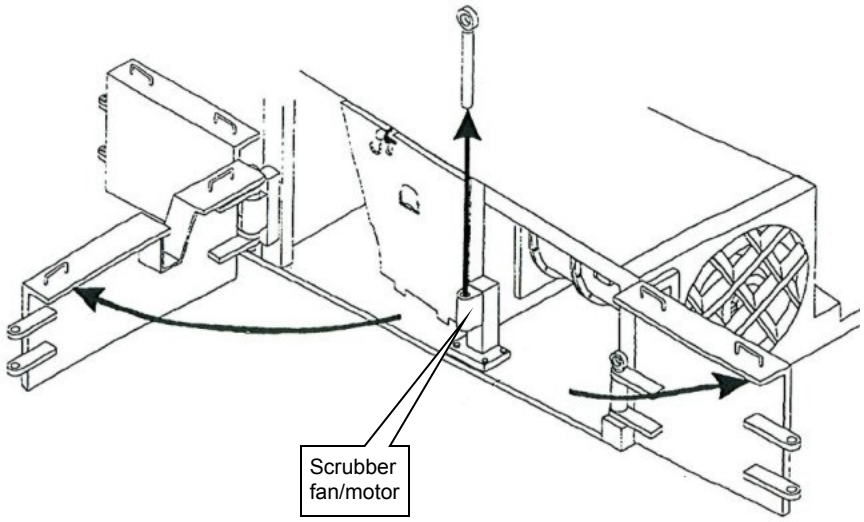
☞ 2. Lower the gathering head and cutter head assemblies until they rest on the floor.

☞ 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. Locate the rub rail on the fan exhaust side at the rear of the miner (Fig. 199) and remove the pin that secures the rear rub rail to the rail adjacent to it. Open both rub rails.

Fig. 199: Scrubber fan/motor location



☞ 5. Remove the four capscrews and lockwashers that secure the rub rail hinge post to the tractor frame and remove the post.

☞ 6. Locate the scrubber fan motor junction box and remove the four hex head capscrews and lockwashers that secure the junction box cover. Remove the cover and o-ring.

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

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

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

general loosening procedure

Jackbolts should be loosened with care. For longer bolts and studs, this procedure is even more important. Loosening can be accomplished quickly, but do not rush to completely loosen individual jackbolts. Remember that the intent is to slowly release the preload force. All jackbolts should be loosened uniformly, and usually there is no need to remove any jackbolt from the tensioner body during loosening.

☞ 1. Turn the first jackbolt counter-clockwise until it feels loose (no more than one half turn). The idea is just to unload each jackbolt, not to completely loosen it.

☞ 2. Move in a circular pattern to the next jackbolt and repeat Step 1.

☞ 3. Continue repeating until all jackbolts have been unloaded.

☞ 4. By the time you get back to the first jackbolt, it will be tight again. Repeat the process moving in a circular pattern.

☞ 5. Usually after two or three passes, the tensioner can be spun off the bolt or stud by hand. Long bolts or studs that stretch more may require extra passes.

☞ 6. Before reusing any tensioner, the jackbolts should be removed in the appropriate manner. The body and jackbolts should be cleaned and re-lubricated with SUPERBOLT approved lubricant to ensure proper jackbolt torque verses preload performance upon reinstallation.

Superbolt lubricants

The torque-preload relationship of Superbolt tensioners depends on the tension body and jackbolt materials, heat treatment, plating, lubricants and many other factors. Superbolt engineers have performed extensive tests to determine the best lubricants for the various materials utilized by Superbolt, Inc. Two custom lubricants, JL-G and JL-M, are offered by Superbolt, Inc.

- JL-G is a lubricant paste made from selected flaky graphite and prime mineral oil. It has a relatively uniform friction factor of 0.130 under widely varying conditions. JL-G is used in the assembly of most SUPERBOLT products.

- A number of commercially available graphite - or nickel - based lubricant compounds such as Fel-Pro C102 or Fel-Pro N5000 can be used for re-lubrication in the field. Copper bearing com pounds have not performed well as jackbolt lubricants.

JL-M is a lubricant paste made from molybdenum-disulfide powder and pure mineral oil. It has a friction factor of 0.045 to 0.070.

Tests have shown that when jackbolts are tightened the first time, the friction of JL-M is approximately 0.070. Each subsequent tightening reduces the friction factor lower until at the fourth tightening it levels out at approximately 0.050.

General safety procedure for shutting down machine

When shutting down the machine for maintenance:

- ☞ lower or mechanically secure (block) all suspended loads
- ☞ exhaust any pressure locked in the system
- ☞ drain down all accumulators
- ☞ isolate the electrical control system
- ☞ isolate the electrical power supply

Follow all procedures listed in the Shutdown procedure in this chapter.