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Operation and Maintenance Manual

CM340 Continuous Miner

Serial Number GEZ00761 (353298), GEZ00762 (355894)

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2 **Your safety**

Safety instructions

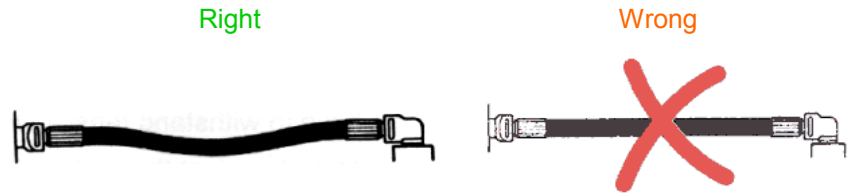
installing hydraulic hoses

Install the hydraulic hoses properly behind the brackets and clamps provided for them.

Always install hydraulic hoses so they:

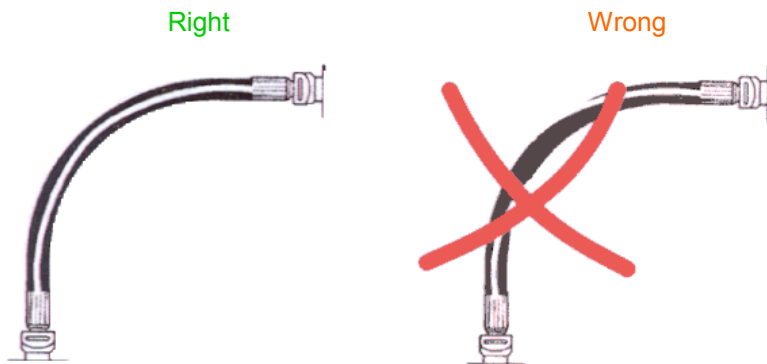
- always have a little slack.

Fig. 1: Installing hydraulic hoses, slack



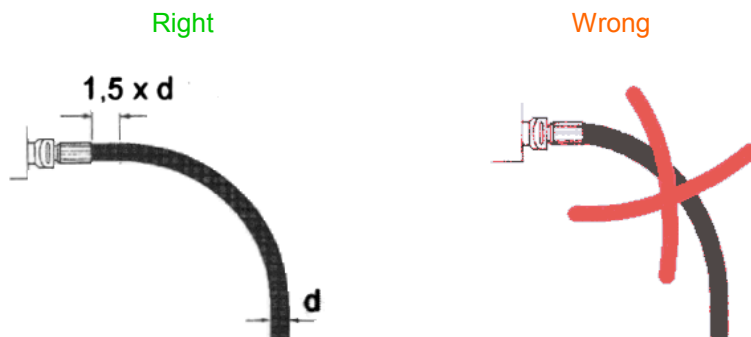
- are not twisted.

Fig. 2: Installing hydraulic hoses, twisting



- are not bent directly behind the connections. (distance min. 1.5 x nominal diameter).

Fig. 3: Installing hydraulic hoses, bending



Installation

Points to observe prior to installation

Who is allowed to carry out installation?

Installation is only allowed to be carried out by personnel having received adequate training to perform this task.

Work on:

- the safety components (pressure relief valves, fire extinguishing equipment etc.)
- the electrical equipment (control units, signaling devices, etc.)
- the hydraulic equipment (cylinders, directional control valves, hoses etc.)

should only be carried out by service engineers or by specially trained personnel.

Which tools are required for installation?

tool box

General tools are required to put the Continuous Miner into service.

Various items of auxiliary equipment and machines may be required at the point of installation.

These include:

- hoists with adequate lifting capacity
- means of attachment with adequate lifting capacity
- unloading dock and crib blocks
- jacks with adequate lifting capacity

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Operation

Operation

Machine control system

A multi-component system is used to control and monitor the functions of the machine. This system consists of the following main components:

- Receiver control unit
- Power supply
- Input/Output (I/O) modules
- Remote control transmitter
- Graphics display

The following information is presented as a general guide to the capabilities and functions of the control system. Before attempting to operate, service, or troubleshoot the continuous miner, training must be completed.

receiver control unit

The receiver control unit is the main control unit of the system. It includes the radio data receiver which is used to receive and decode commands from the remote control transmitter.

power supply

The control system has its own power supply, with the option of having battery backup for the power supply, which provides power to the receiver control and I/O modules.

Input/Output modules

Input/Output modules are used to read data from and/or send commands to the following machine functions:

- Cutter motors (left and right)
- Gathering head motors (left and right)
- Traction motors (left and right)
- Pump motor
- Hydraulic oil level
- Methane monitoring

Based on the parameter settings and the input received from different components, the control systems has the ability to issue error messages, fault messages, and/or shutdown the machine.

Operation

Fault log

The fault log (Fig. 22) allows the user to view the last 100 faults that have occurred since the log was last cleared.

To navigate the fault log page:

- ☞ Press the CONV UP or CONV DOWN key to move the cursor up or down the page.
- ☞ Press SHIFT and CONV UP or CONV DOWN move up or down one page.

It is possible to clear the fault log under the Engineering Setup Menu, which is password protected.



IMPORTANT!

It is not recommended that the fault log be cleared unless the receiver has been replaced. Retaining the faults is very helpful in troubleshooting a problem when a receiver is sent for service. Faults cannot be retrieved once they have been cleared. Use caution and only clear the log if it is absolutely necessary.

Once a fault has been selected, the SHIFT and MENU keys can be used to access more information on the fault (Fig. 23).

Fig 22: Fault log, example

CAT®		Page 0	1:22:51	1 March, 2010	SIGNAL	BATTERY	STOP	CHANNEL: 1
		Event Log						
1	0126 - RECTIFIER COMMS FAIL	START: 0:26:12	1 Mar 2010					
2	0007 - RGHT DRIVE COMMS BAD	START: 0:26:12	1 Mar 2010					
3	0004 - LEFT DRIVE COMMS BAD	START: 0:26:12	1 Mar 2010					
4	0007 - RGHT DRIVE COMMS BAD	START: 0:26:12	1 Mar 2010	END: 0:26:12	1 Mar 2010			
5	0004 - LEFT DRIVE COMMS BAD	START: 0:26:12	1 Mar 2010	END: 0:26:12	1 Mar 2010			
6	0007 - RGHT DRIVE COMMS BAD	START: 0:26:12	1 Mar 2010	END: 0:26:12	1 Mar 2010			
7	0004 - LEFT DRIVE COMMS BAD	START: 0:26:12	1 Mar 2010	END: 0:26:12	1 Mar 2010			
100 Events								

Graphics display

Operation

Starting procedure



WARNING!

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



WARNING!

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



WARNING!

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



WARNING!

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



WARNING!

Before starting the Continuous Miner, make sure that no one is in the red zone (Fig. 26 through Fig. 30).



NOTICE!

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



IMPORTANT!

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



DANGER!

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



WARNING!

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



WARNING!

When operating the blowing system, the operator should stand to the left hand rear of the miner to avoid air flow and debris moving across cutting head and right hand side of the Miner.

Operation

Shear up/down in radio remote

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

- ☞ 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.

- ☞ 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.

Stabilizer (stab) cylinder raise/lower in radio remote

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

- ☞ 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.

Hydraulic

Hydraulic system overview

Hydraulic power for all hydraulically-actuated functions originates with the pump assembly. This includes power for cylinders, hydraulic motors, control valves, and pilot valves.

Fig. 37 gives an overview of hydraulic cylinders located on the CM340 Continuous Miner. Fig. 38 shows the location of other hydraulic components.

This section gives general descriptions of the hydraulic components used on the miner along with typical schematics for hydraulic functions. The schematics in this section are general; always refer to the hydraulic schematic in your parts manual supplied with your machine.

Operation considerations

In order for a hydraulic system to function correctly, it must be properly maintained. Maintenance of the hydraulic system includes:

- maintaining atmospheric pressure in the tank by keeping the breather clean and free of obstructions;
- maintaining a sufficient oil level in the tank;
- maintaining tight, leak-proof pump suction lines to prohibit air being pumped through the system; and
- changing filters and fluids at prescribed intervals.



WARNING!

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

For complete maintenance procedures, see the Maintenance section in this chapter.

Hydraulic

Valves

The hydraulic symbols for the different types of valves are given in Fig. 44.

ball valve	A valve that checks flow by the seating of a ball. Ball valves are typically operated by hand.
check valve	A valve that allows fluid flow in one direction only.
directional control valve	A directional control valve is typically solenoid operated and is used to extend/retract a cylinder.
flow control valve	A valve with a primary function of controlling flow rate.
flow control valve with internal check	A valve with a primary function of controlling flow rate in one direction and allow free flow in opposite direction.
load holding valve (load lock valve) (overcenter valve)	The purpose of the load holding valve is to prevent the accidental lowering of a hydraulic cylinder, whether by sudden or gradual circuit depressurization, either during operation or maintenance. The load holding valve (also called a "load locking valve") may be a pilot-operated check valve, a counterbalance valve, or an overcenter valve.

A load holding valve locks a load in any position without allowing drift. It may provide static overload relief and thermal expansion relief with open-center control valves, as are on the cutter head raise circuit, or be combined with an atmospheric relief, as on the conveyor raise circuit of the miner. Cartridge style valves allow installation directly into the cylinder.

In the event of hydraulic system failure or a deliberate system shutdown (as during maintenance), the absence of pilot pressure to the spring-loaded valve automatically closes off the return line and prevents fluid from leaving the cylinder (and thereby stops the piston from moving). The load holding valve is used on the miner, in conjunction with mechanical blocking, when the cutter head or conveyor must be elevated for extended periods of time so that repairs can be effected beneath.



WARNING!

Do not rely on the load holding valve when working under the cutter head or the conveyor. Always block the conveyor or the cutter head if it must be elevated. Serious injury or death may result from not mechanically blocking the load.

An overcenter valve is merely a counterbalance valve with a pilot override on the relief valve section. The load raises by free oil flow through the bypass check section. With the control valve centered in NEUTRAL, the load is locked (the relief must be set at least 1.3 times higher than the maximum load induced pressure or system pressure).

Hydraulic

The anti-chatter/maintenance valve has three primary functions:

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



DANGER!

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



DANGER!

This load holding valve, like those on the stabilizer cylinders is preset. DO NOT ADJUST IT. If it malfunctions, replace it immediately.



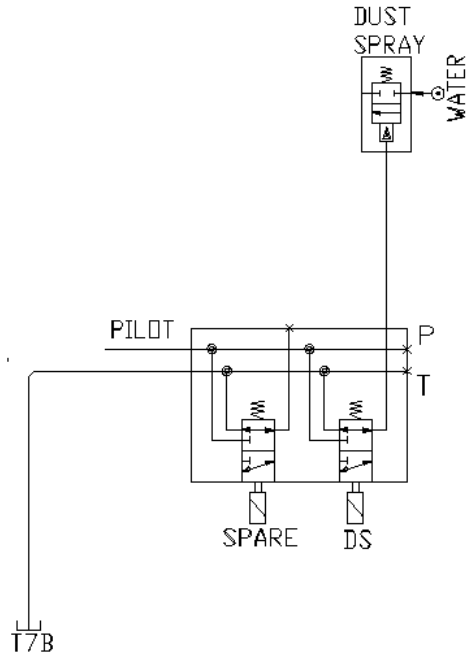
WARNING!

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

This schematic shown is Fig. 50 is a typical cutter head cylinder circuit. Always refer to the schematic in your parts book for your machine.

Hydraulic

Fig. 55: Dust sprays hydraulic circuit



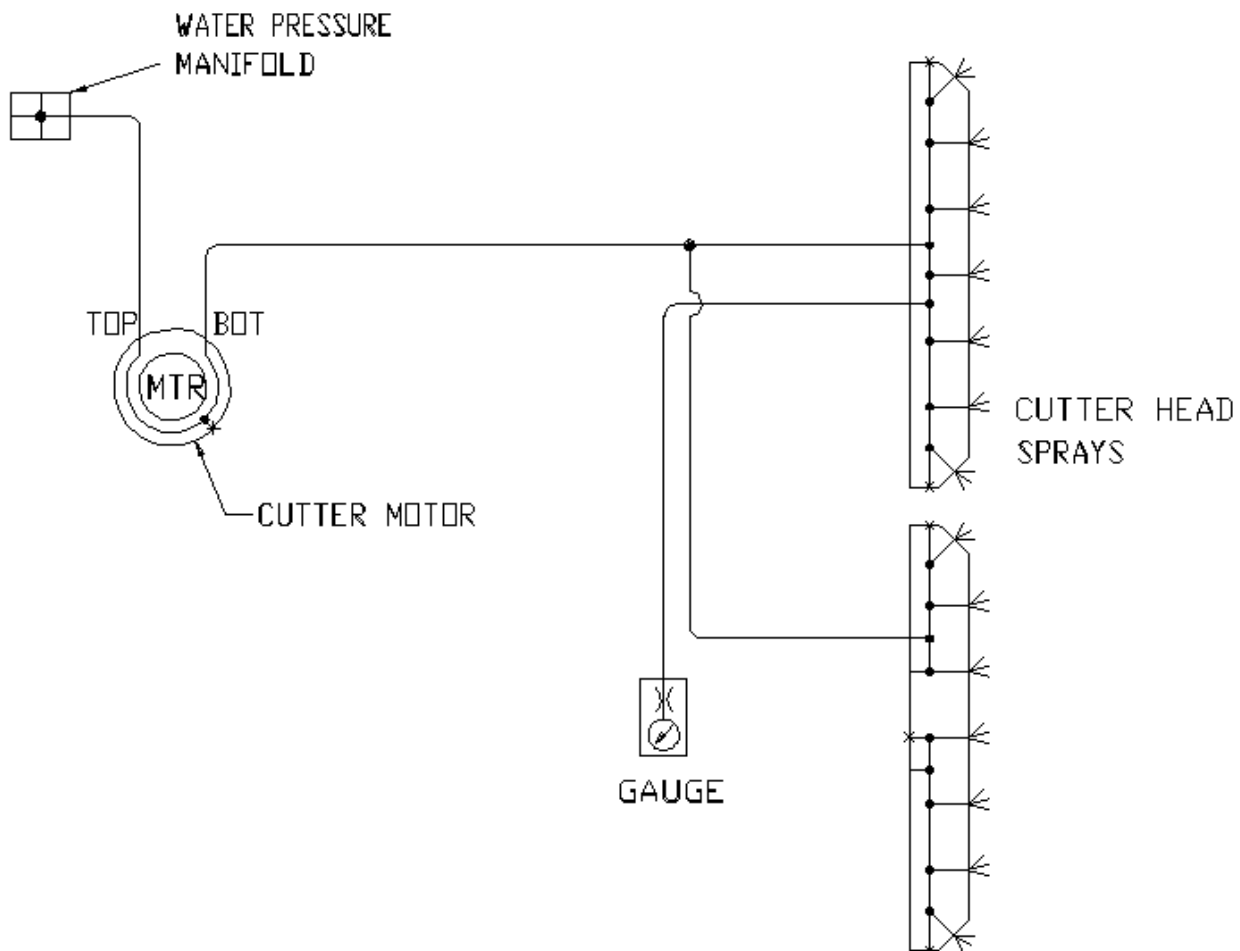
Note: See water circuit in Water section of this chapter.

Left hand cutter head spray cooling circuit

From the secondary dust-cooling pressure manifold, water is supplied to the left hand cutter head spray cooling circuit where it supplies spray/cooling water to the LH cutter head motor and LH cutter head sprays.

The left hand cutter head spray cooling circuit described above is for a typical CM340 series miner. The circuit for your machine may vary depending on your dust plan and unique requirements. Always refer to the schematic in the parts book for your machine.

Fig. 64: Left hand cutter head spray cooling circuit



Electrical

Controller case - rear wall

The rear wall of the controller case (Fig. 72) is accessed by opening the controller cover and then opening the swing panel. Typically mounted on the rear wall are vacuum contactors, motor mates, a control transformer, and a terminal block.



IMPORTANT!

This component location information is typical. Always verify component layout with the information in the parts book for your machine.

vacuum contactor "F"

Vacuum contactor "F" is the contactor for the fan motor.

vacuum contactor "A"

Vacuum contactor "A" is the contactor for the left cutter motor.

vacuum contactor "B"

Vacuum contactor "B" is the contactor for the right cutter motor.

From the vacuum contactors, each leg of the motor is fed to a motor mate. Each motor mate is triple output inductive current transducer. It takes the current from each leg of the motor and reduces it to a 4 to 20mA output that is sent to the control system.

motor mate "CT6"

Motor mate "CT6" is the current transducer for the fan motor.

motor mate "CT1"

Motor mate "CT1" is the current transducer for the left cutter motor.

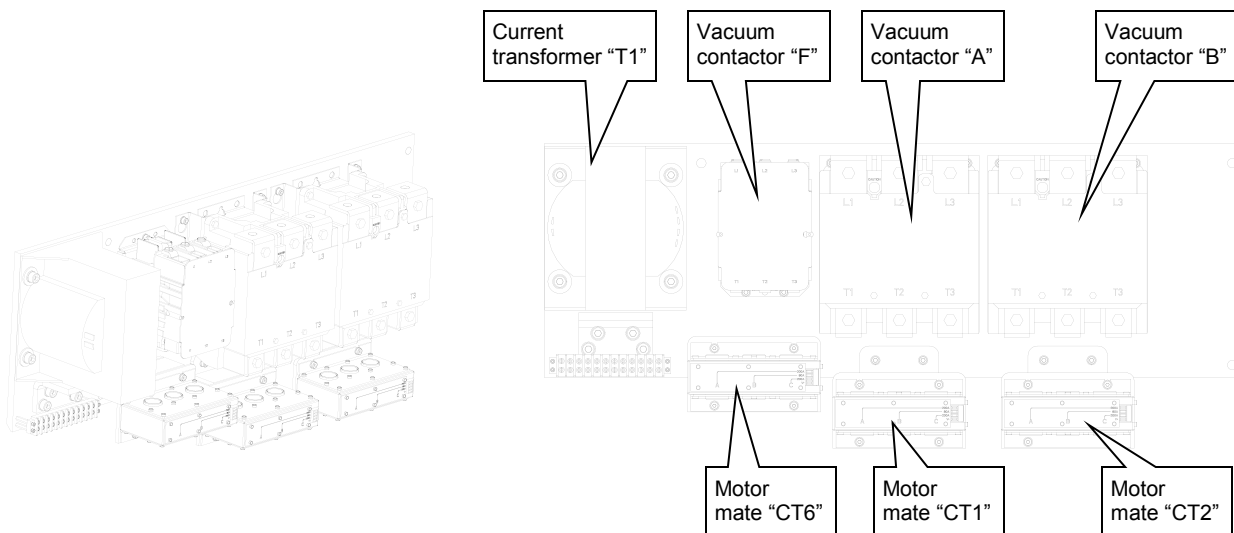
motor mate "CT2"

Motor mate "CT2" is the current transducer for the right cutter motor.

current transformer "T1"

Transformer "T1" is a current transformer which converts the incoming 1140V to 120VAC and 12VAC.

Fig. 72: Controller case rear wall



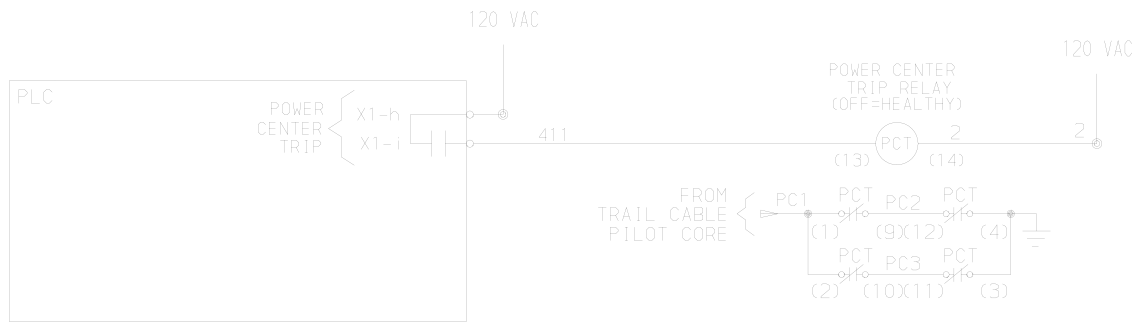
Electrical

Control of the power center trip relay, "PCT"

The power supply module contains a special relay for controlling the external pilot relay (outby machine stop relay). The processor module can send a control message to the power supply at any time to drive the pilot relay output and trip the main power supply to the machine.

The schematic shown in Fig. 79 is typical. Always refer to the schematic in the parts book for your machine.

Fig. 79: Power center trip relay control circuit



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Maintenance

- Only work on the miner in an area where the roof is properly supported.
- Block any and all elevated assemblies before working under them. Make sure that the blocking can support the weight of the assembly without slipping or failing.
- Relieve all hydraulic pressures and position the levers and controls in Neutral or Off.
- Test the controls to ensure that the unit will not move.



WARNING!

Do not move any hydraulic control lever unless you are certain that everyone is completely clear of any machine movement. Accidental machine movement can cause serious injuries or even death to you or the maintenance person.

- Test the air for methane before and during any maintenance or repair work.
- Do not perform maintenance on a circuit while there is a load resting on the hydraulic cylinder. Booms must be securely blocked with the boom in the raised position if maintenance is to be performed.



WARNING!

Never disconnect a hydraulic hose if the circuit is pressurized or if there is a load on the circuit. If a hose is disconnected while the circuit is pressurized or a load is on the circuit, the load will fall causing damage to the machine or serious injury or death to you or other workers.



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.

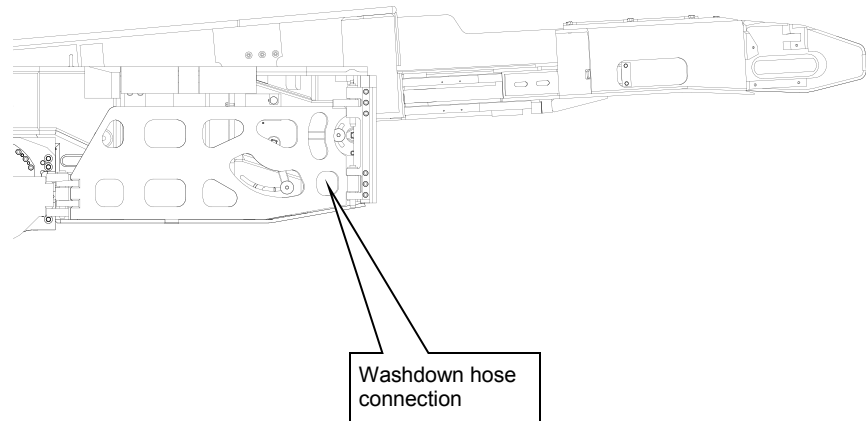
- Do not perform maintenance in a congested area. This could endanger the maintenance person or others in the vicinity.
- Whenever a potential problem is uncovered during a periodic maintenance check, it is imperative that it be corrected immediately by a qualified maintenance technician.
- Cleanliness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

Maintenance

Washdown hose connection location

The location of the washdown hose connection is noted below (Fig. 93).

Fig. 93: Washdown hose location

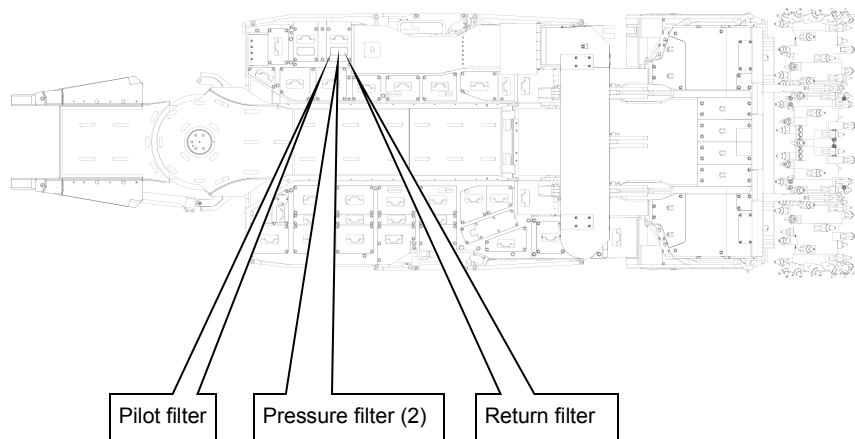


Maintenance

Weekly

pressure filters	Change the two pressure filter elements (Fig. 110). If the elements are extremely dirty, a more frequent change interval may be required.
return filter	Change the return filter element (Fig. 110). If the element is extremely dirty, a more frequent change interval may be required.
pilot filter	Change the pilot circuit primary filter element (Fig. 110). If the element is extremely dirty, a more frequent change interval may be required.

Fig. 110: Filters

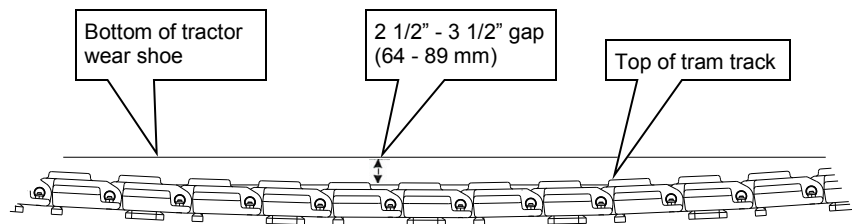


crawler track tension Check the crawler tracks for proper tension. If adjustment is necessary, see the Crawler track adjustment procedure.

To check the track for proper tension:

- ☞ Raise the complete crawler assembly off of the ground and securely block under the machine. The machine must be securely supported off the ground.
- ☞ Chain sag should be 2-1/2 inches (64 mm) to 3-1/2 inches (89 mm) at the center of the crawler (Fig. 111).

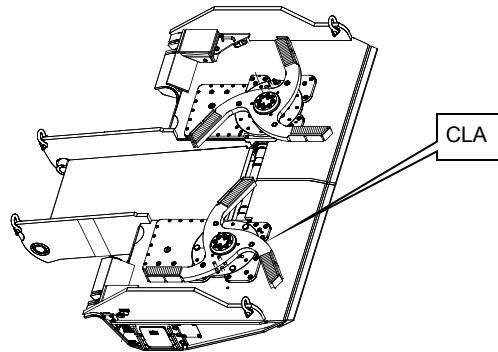
Fig. 111: Crawler track tension measurement



Maintenance

CLAs Inspect the CLAs (Fig. 118) for damage. If a CLA needs replaced, see CLA removal and installation procedure in this chapter.

Fig. 118: CLAs



Oil sampling plan

This plan contains specific instructions to be followed in order to correctly collect gear case lubricant samples, and preparation of the samples for laboratory analysis. Adherence to these instructions will insure that all oil sample analysis reports give an accurate picture of the oils condition as well as wear trends of gears, bearings, etc. Accurate reporting and analysis of oil samples will prove extremely beneficial providing a tool to allow planning of scheduled down-time and prevention of costly equipment breakdown.

Preparation prior to sample collection

For each machine to be sampled, you will need a supply of sample collection bottles and identification labels (Fig. 119) sufficient to sample each identified gear case (every sixty shifts).

One sample bottle and collection hose is required for each gear case to be sampled. Label each container with the identifying name of the gear case (crawler gear case, left or cutter head gear case, right front, etc.).

Collection of oil samples



NOTICE!

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

Each oil sample should be taken while the oil is at normal operating temperature. If the machine has not been operating just prior to sampling, run the machine until oil temperature reaches approximate normal operating temperature. Shutdown the machine and allow 2 - 3 minutes for the oil to drain back and stabilize it's level.



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.

Maintenance

gear case breathers

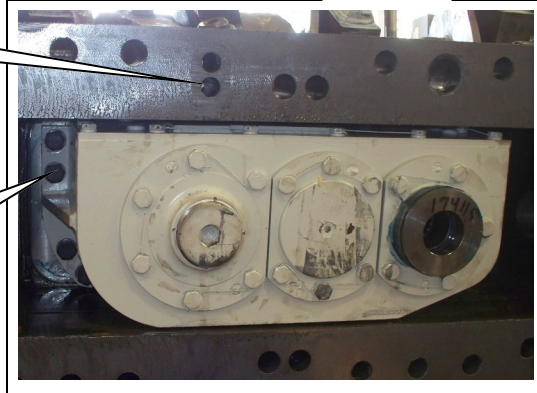
Change the breathers on the main and input cutter gear cases, the CLA head pot and transfer gear cases, and the tram gear cases (Fig. 126).

Fig. 126: Gear case breather locations

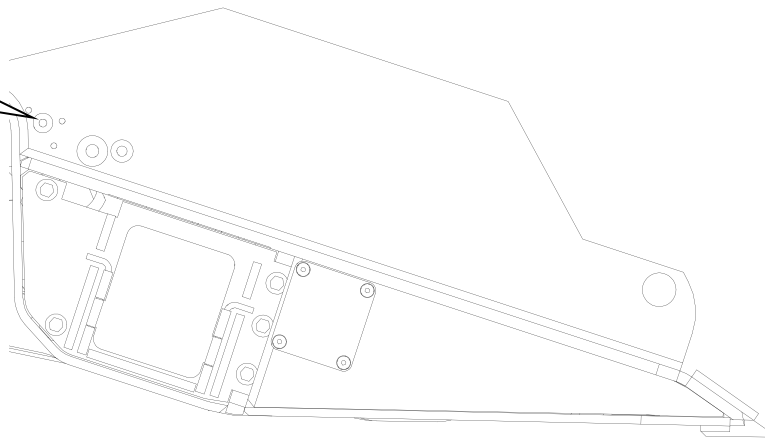


Main cutter head gear case breather

Input cutter gear case breather



Main gathering head gear case breather



CLA head pot and transfer case breathers

Adjustment procedures

14. If the tram track is too loose, readjust the idler position using the following steps:
- Pump grease into the idler take-up jack to extend the cylinder, move the idler assembly forward and tighten the tram track until it is at the correct location. The tram track is at the proper tension when it hangs 64 to 89 mm (2-1/2 to 3-1/2 inches) from the bottom wear shoes when the tractor frame is blocked off the floor.
 - Insert shims (Fig. 128) into the idler slide channel until the space between the tractor frame and the pusher plate is filled.
 - Open the pressure release fitting for the front idler take-up jack and allow the cylinder to contract. The idler adjustment shims will keep the idler stationary and the track tensioned.
 - Evaluate the resulting track tension and repeat these steps until the track reaches proper tension.



CAUTION!

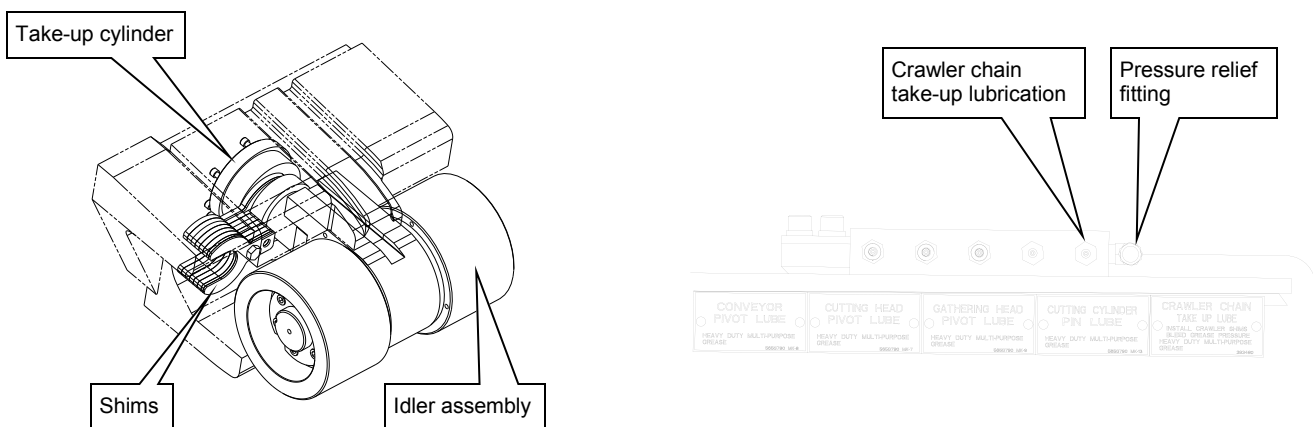
Shims must be inserted completely into the idler slide channel. A shim that is not correctly seated on the idler slide channel's inside surface provides uneven support that can cause idler slant. A slanted idler can cause uneven wear and stress on the tram track and can cause improper operation of or damage to the tram system.



IMPORTANT!

Check that the shims are correctly seated on the idler slide channel's inside surface by looking at the channel's inside surface from the opposite side of the miner through the space between the gathering head and the idler assembly.

Fig. 128: Tram track adjustment



Replacement of wear parts

Instructions on the replacement of wear parts

It is essential that wear parts be replaced before reaching the lowest wear limit. To ensure that this happens, wear parts must be inspected at regular intervals.



CAUTION!

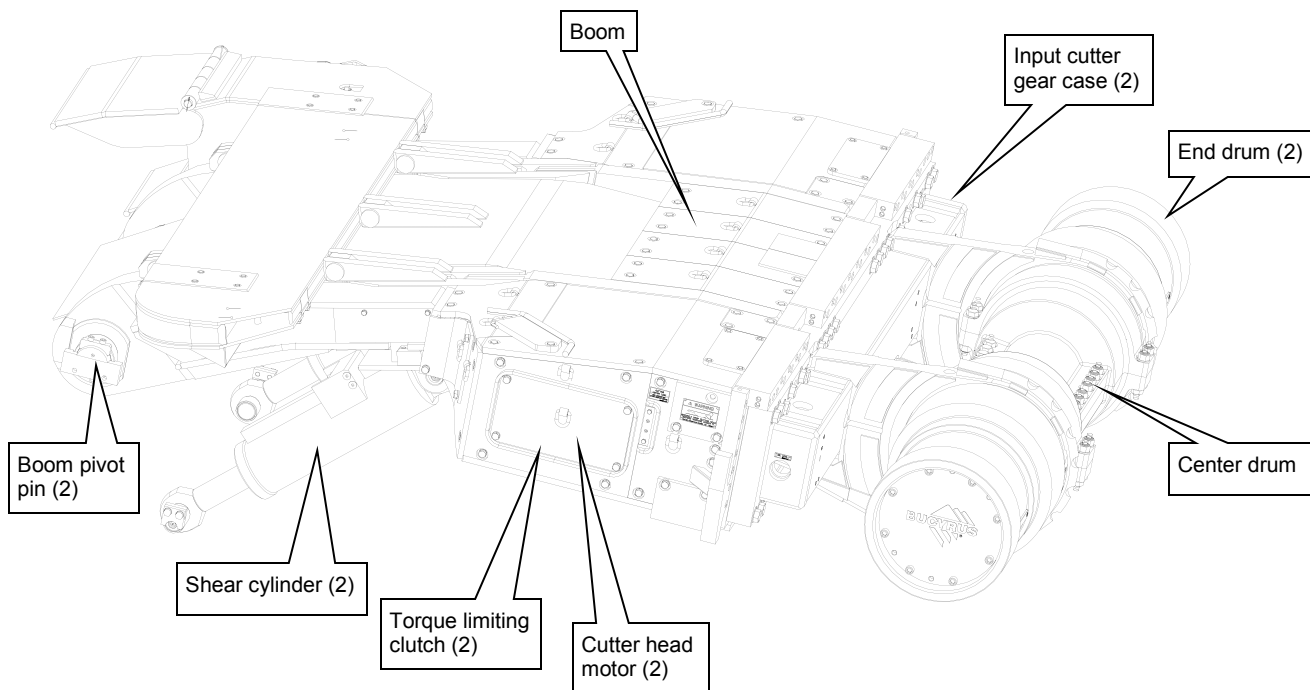
Disassembly and assembly procedures listed in this section are specialized and, as such, should only be performed by qualified personnel.

Cutter head (boom) assembly

The cutter head assembly (Fig. 134) is powered by two AC electric motors mounted on each side of the cutting head support frame. Each motor drives through a torque limiting clutch to an input gear case, which in turn drives a common shaft, allowing the two drive motors to share the cutting load. Each input gear case is removable as a separate unit from the main cutting head gear case. The cutting head is attached to the main frame at a heavy-duty pivot. Two hydraulic cylinders raise and lower the cutting head.

The cutter head assembly can be removed as an assembly or as individual components.

Fig. 134: Cutter head assembly



Replacement of wear parts

end drum installation

To install an end drum (Fig. 138)

- ☞ Verify that power is disconnected and that the trailing cable is properly locked and tagged out. Follow all applicable lockout/tagout procedures.



WARNING!

Failure to follow all applicable lockout/tagout rules and regulations may result in severe injury, death or machine damage.

- ☞ Attach a lifting device to the end drum.



WARNING!

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

- ☞ Using the match marks made when the end drum was removed, align the end drum and the cutting head hub.
- ☞ Install the two (2) spacers and the two (2) keys.
- ☞ Install the two (2) key retainer plates and secure to the drum using the twelve (12) socket head capscrews.
- ☞ Install the eighteen (18) socket head cap screws to secure the wedge block assembly and the drum to the cutting head hub and torque appropriately.
- ☞ Coat the threads of the eight socket head cap screws with Loctite 242 (blue) and install the eight socket head cap screws to secure the end cap. Torque appropriately.

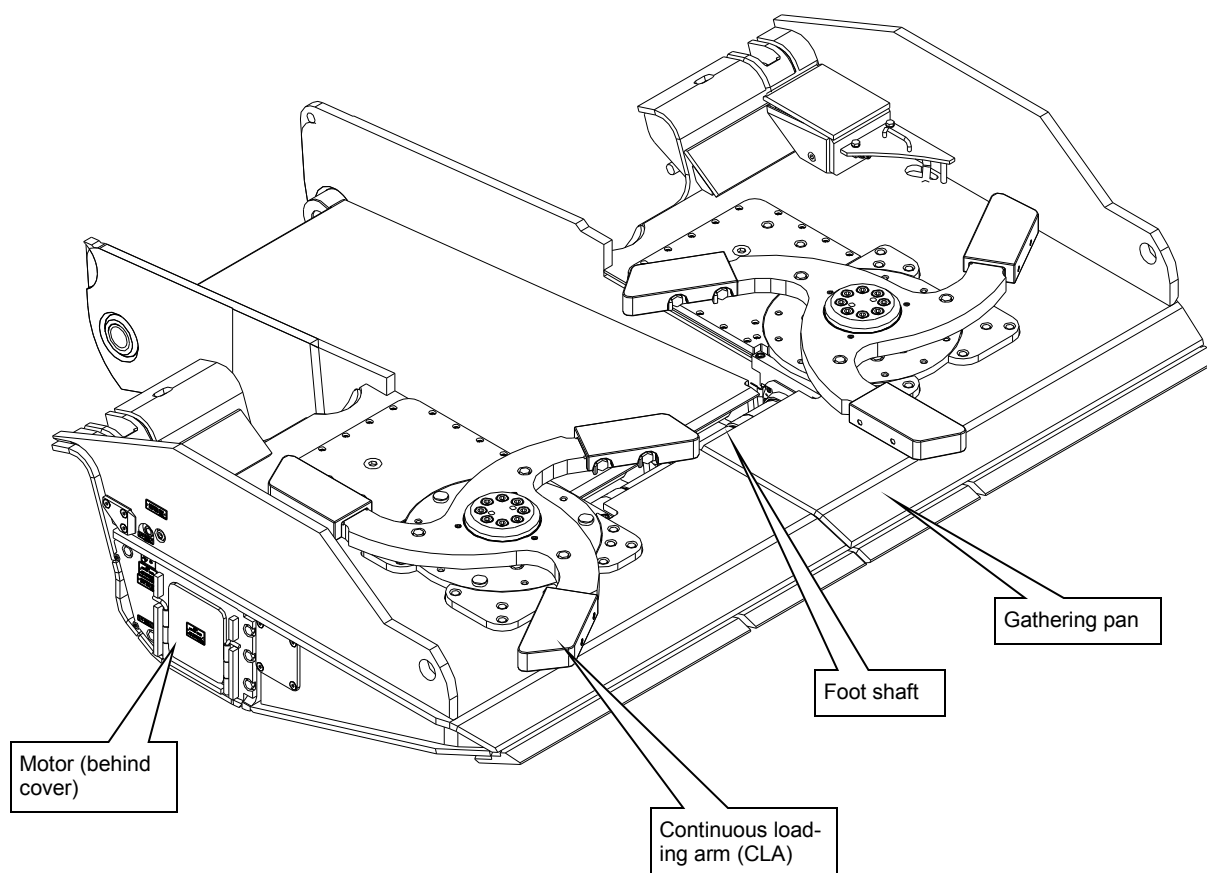
Replacement of wear parts

Gathering head assembly

The gathering head assembly (Fig. 142) consists of the gathering pan, the continuous loading arms (CLAs), lift cylinders, and two drive motors connected to an input gear case through a torque shaft.

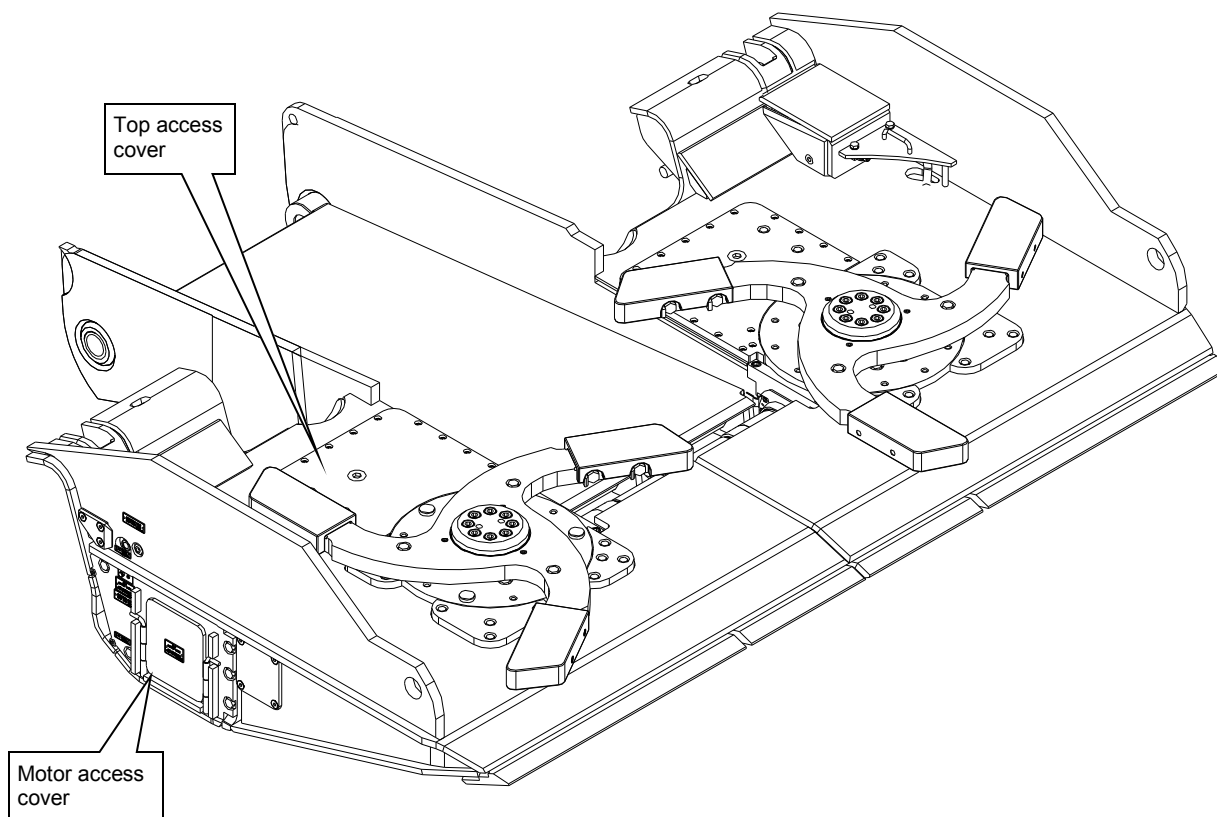
The gathering head can be removed as an assembly or as individual components.

Fig. 142: Gathering head assembly



Replacement of wear parts

Fig. 145: Gathering head gear case and pot removal and installation

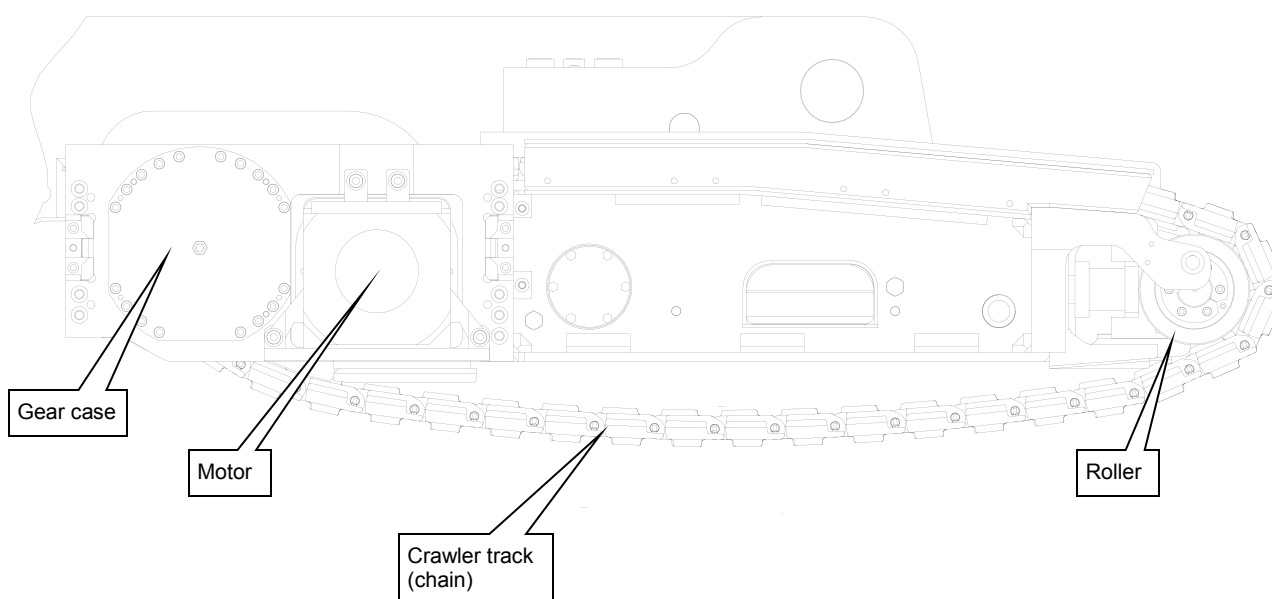


Replacement of wear parts

Crawler assembly

Each (left or right) crawler assembly (Fig. 150) consists of a tram drive motor, a tram drive gear case, a crawler chain, a chain take-up roller, and a grease adjusted, shim lock take-up system. These components are mounted in a crawler frame, which is an integral part of the main frame.

Fig. 150: Crawler assembly



Replacement of wear parts

- ☞ Connect the trailing cable to energize the miner.
- ☞ Operate the tramming function on the side where the tram gear case assembly was installed. Check for correct operation.
- ☞ Disconnect and lock out the electrical power to the miner. Follow all applicable regulations regarding lockout/tagout procedures.

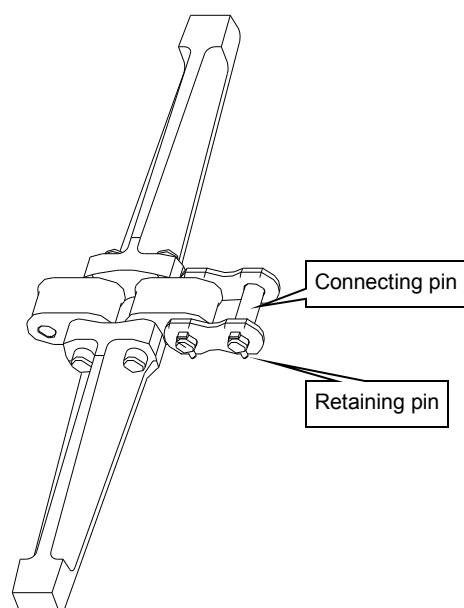
**WARNING!**

Failure to follow all applicable lockout/tagout rules and regulations may result in severe injury, death or machine damage.

- ☞ Replace the tram rub rail, securing it with the two (2) pins.
- ☞ Position the top cover over the posts on the tram rub rail and secure with two (2) bolts.

Replacement of wear parts

Fig. 159: Conveyor chain removal and installation



Replacement of wear parts

discharge conveyor installation

To install the discharge conveyor (Fig. 161):

- ☞ Ensure that the trailing cable is still disconnected and properly locked/tagged out.



WARNING!

Failure to follow all applicable lockout/tagout rules and regulations may result in severe injury, death or machine damage.

- ☞ Ensure that the intermediate conveyor is still securely blocked.
- ☞ Attach a lifting device to the discharge conveyor and slowly lift and maneuver it into the intermediate conveyor section.



WARNING!

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

- ☞ Check the top and bottom pivot pins and bushings for wear or damage and replace as necessary. Lubricate all pins and bushings with grease prior to installation.
- ☞ Install the top pivot pin and pivot retainer. Secure the retainer with capscrews. Note that the pivot pin has an anti-rotation dowel which must be positioned in the slot in the top conveyor deck.
- ☞ Install the bottom pivot pin and pivot retainer. Secure the retainer with capscrews. Note that the pivot pin has an anti-rotation dowel which must be positioned in the slot in the bottom conveyor deck.
- ☞ If necessary, use adjustment shims to align the decks of the intermediate and discharge conveyors. Misalignment can occur due to wear or damage of the discharge conveyor.
- ☞ Using the lifting device, swing the discharge conveyor fully to the left and right to make sure that it does not bind.
- ☞ Grease the four pivot surface lubrication points (two on each side) until grease is visible on the mating sections of the conveyor. This will lubricate the pivot pins and bushings as well as the large plates which slide on each other.
- ☞ Using the lifting device, position the conveyor to align the swing cylinder clevises with both swing cylinder eyes. Lubricate the cylinder pins with grease and insert them through the clevises and eyes. Secure each pin with a cotter pin.
- ☞ Connect the hydraulic lines to the cylinders.
- ☞ With the discharge conveyor straight, reconnect the conveyor chain (see Conveyor chain installation procedure in this chapter).

Troubleshooting

Individual hydraulic circuit failures

Perform the following checks on the individual circuits in conjunction with the general troubleshooting:

Oil tank fill

- ☞ Check to see that the oil fill strainer is clean.
- ☞ Check for low oil in the new oil supply.

Cutter head raise

- ☞ Check the directional control valve for proper operation.
- ☞ Check to see that hosing has not been crossed, especially if the problem occurs after maintenance or repair work.
- ☞ Check that the "in-line" counterbalance holding valve is piloted and shifting to direct retract port cylinder oil flow back to tank.
- ☞ Check to see that there is no mechanical bind.
- ☞ Check cylinders for bypassing.
- ☞ Check for pilot pressure on the cutter head cylinder's holding valves. Also check that the valves are shifting to send oil back to the tank. (Note: cylinder removal will be required to safely achieve this)

Troubleshooting

Water system including circuits

Table 9: Water system troubleshooting including circuits

Trouble, symptom or cause	Probable cause	Test, check and/or remedy
recommended water volume (gpm) cannot be maintained	☞ Dynamic water pressure (psi) is not being supplied to the recommended psi.	☞ Change setting to the recommended psi.
	☞ Water supply hose is not the minimum diameter	☞ Change hose to the recommended diameter size.
	☞ Incoming supply of water has a problem.	☞ Check the water supply itself to see if there is an issue & fix.
damaged or clogged filter, contaminates in the water system	☞ Dirt in the system.	☞ Remove the filter and clean it thoroughly; flush the system as necessary.
		☞ Change water filter frequently.
plugged water nozzles are restricting the flow of water or pressure fluctuates	☞ Dirt in the system.	☞ Remove the nozzles and clean thoroughly; flush the system as necessary.
		☞ Change water filter frequently.
pressure fluctuates and there is extreme noise in the system	☞ Air in the system.	☞ Check for leaks.
	☞ Pressure too high.	☞ Adjust the pressure.
water function will not shut "OFF" with radio transmitter	☞ Hydraulic pilot operated water valve stuck open.	☞ Clean or replace.
	☞ Faulty solenoid.	☞ Replace.
	☞ Radio transmitter toggle switch faulty.	☞ Replace toggle switch.
no water pressure on the pressure gauge	☞ Water filter plugged.	☞ Replace or clean.
	☞ Main water ball valve "OFF".	☞ Close valve.
	☞ No incoming water.	☞ Fix water supply issue.
water filter stopping up frequently	☞ Contaminated water supply	☞ Clean or filter the incoming water supply to the miner.

Troubleshooting

Table 14: Control system pin outs, continued

**Super Simpson receiver control unit
Connector X4 - GAPL26 26 Pin Female**

Pin No.	Signal Name	Signal Type
X4-A	Right Conveyor Motor Phase A	4-20mA
X4-B	Right Conveyor Motor Phase B	4-20mA
X4-C	Right Conveyor Motor Phase C	4-20mA
X4-D	Blowing System Motor Phase A	4-20mA
X4-E	Blowing System Motor Phase B	4-20mA
X4-F	Blowing System Motor Phase C	4-20mA
X4-H	Left Conveyor Motor Phase A	4-20mA
X4-J	Left Conveyor Motor Phase B	4-20mA
X4-K	Left Conveyor Motor Phase C	4-20mA
X4-L	Left Cutter Motor Phase A	4-20mA
X4-M	Left Cutter Motor Phase B	4-20mA
X4-N	Left Cutter Motor Phase C	4-20mA
X4-P	Right Cutter Motor Phase A	4-20mA
X4-R	Right Cutter Motor Phase B	4-20mA
X4-S	Right Cutter Motor Phase C	4-20mA
X4-T	Pump Motor Phase A	4-20mA
X4-U	Pump Motor Phase B	4-20mA
X4-V	Pump Motor Phase C	4-20mA
X4-W	Left Tram Motor Phase A	4-20mA
X4-X	Left Tram Motor Phase B	4-20mA
X4-Y	Left Tram Motor Phase C	4-20mA
X4-Z	Right Tram Motor Phase A	4-20mA
X4-AA	Right Tram Motor Phase B	4-20mA
X4-BB	Right Tram Motor Phase C	4-20mA
X4-CC	+24 VDC Active	+24VDC
X4-DD	0VDC Neutral	0VDC

**Super Simpson Battery Backup Power Supply
Connector X5 - 8 Pin Burndy Female**

Pin No.	Signal Name	Signal Type
X5-A	Door Switch Input	Link
X5-B	Door Switch Output	Link
X5-C	Main Supply O/P 24V+	24V+ Output
X5-D	Main Supply O/P 0V	0V Output
X5-E	N/C	
X5-F	RS458 - A	Communication
X5-G	RS458 - B	Communication
X5-H	RS458 - Reference	Communication

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