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Operation and Maintenance Manual

25M3 (CM240) Continuous Miner

S/N 433612
S/N GEW00900

МГ07

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. Safety regulations can be found on the container or on the Material Safety Data Sheet (MSDS) for 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.

Transport

Load units: dimensions and weights

Observe the transport sheets for the machine and spare parts. They contain information on:

- dimensions,
- weights,
- lifting points, etc.

Additional information on the dimensions and weights can be found in chapter 6 and in the lifting weight guide (Table 1) in this operating section. Fig. 5 illustrates the position of lifting eyes on the miner.

WARNING!
Use only load handling devices complying with the technical and legal regulations for the transport of loads. You could be seriously injured or even killed by falling loads. Use only suitable load handling devices.

Table 1: Lifting weights of individual assemblies

Description	Approximate Weight
Complete Machine	160,000 lbs.
Tractor Frame Assembly	75,000 lbs.
Gathering Head Assembly	23,000 lbs.
Conveyor Assembly	17,000 lbs.
Cutter Head Assembly	45,000 lbs.

removal and installation of heavy components

Whenever possible, all removals should be accomplished using an adjustable lifting beam. All supporting members (chains and cables) should be parallel to each other and as nearly perpendicular as possible to the top of the object being lifted.

When it is necessary to remove a component on an angle, remember that the capacity of an eyebolt diminishes as the angle between the supporting members and the object increases. Eyebolts and brackets should never be bent.

When an eyebolt is provided to lift a component, use it to lift only that component.

WARNING!
You could be seriously injured or killed as a result of falling loads. Do not use the eyebolt to lift the component and its related assemblies.

scrubber/dust suppression (optional)

The Continuous Miner may be equipped with an optional dust suppression package (scrubber). The dust suppressor allows the Miner operator to use fan induced ventilation at the face. The fan suction draws in the dust and liberated methane from the intake duct(s). The dust laden air is then drawn through the scrubber screen, which is constantly flooded with water spray. The dirty water is then removed from the air stream by a de-mister which is located directly behind the scrubber screen. The dirty water flows down to a sump tank where a water powered jet pump empties the sump and dumps the dirty water onto the conveyor. The clean, dry air exits the de-mister and is discharged into the mine atmosphere at the rear of the miner, diffused downward and towards the rib to prevent coal fines from being blown on the offside shuttle car operator.

guards and covers

The machine is equipped with guards and covers to reduce the possibility of personnel coming in contact with rotating or moving parts. All guards and covers must be installed and securely fastened during operation.

DANGER!
Do not operate the machine with any of the guards or covers removed. You or other personnel could be seriously injured from moving or rotating parts.

cutter boom safety supports

There are two cutter boom safety supports, one on each side of the cutter boom. The supports are used to block up the cutter boom during maintenance operations.

conveyor safety supports

There are two conveyor safety supports, one on each side of the conveyor. The supports are used to block up the conveyor during maintenance operations.

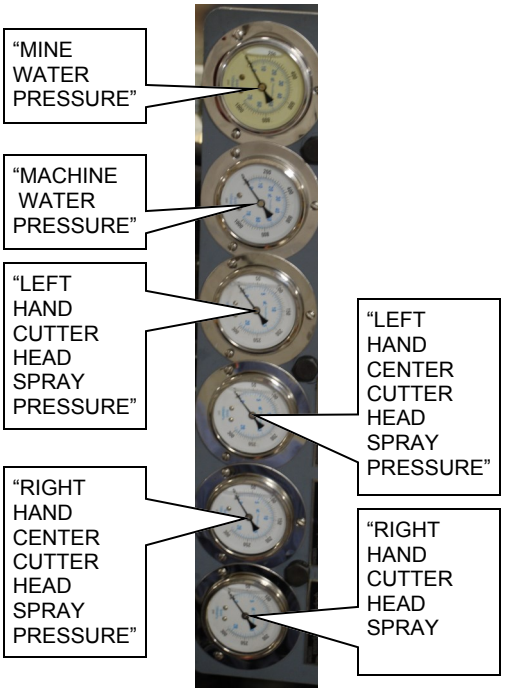
start switch safety covers

Every switch on the operator's controller case that engages a function (pump start, cutter start, etc.) is protected from accidental activation by a cover.

methane monitor

The machine is equipped with a methane monitor that detects the presence of methane in the mine atmosphere. When the miner is being powered up, the monitor looks for methane before any other function is energized. If the methane monitor detects a level of methane within a preset tolerance, the methane monitor relay will close and power will be supplied to the other functions on the machine.

Fig. 9: Gauge panel



circuit breaker

The circuit breaker is the main circuit breaker for the machine. The circuit breaker has three (3) positions: "OFF," to de-energize the machine's electrical systems and "ON," for normal operation, and “TRIPPED” when the circuit breaker has tripped. The circuit breaker should be in the "OFF" position before the machine is serviced or shutdown.

WARNING!
The machine circuit breaker de-energizes the electrical controller and motors. However, electrical power is still present inside the connection box to the circuit breaker. If the circuit breaker inside the connection box requires service, the trailing cable should be disconnected from the power center.

manual circuit breaker reset (optional)

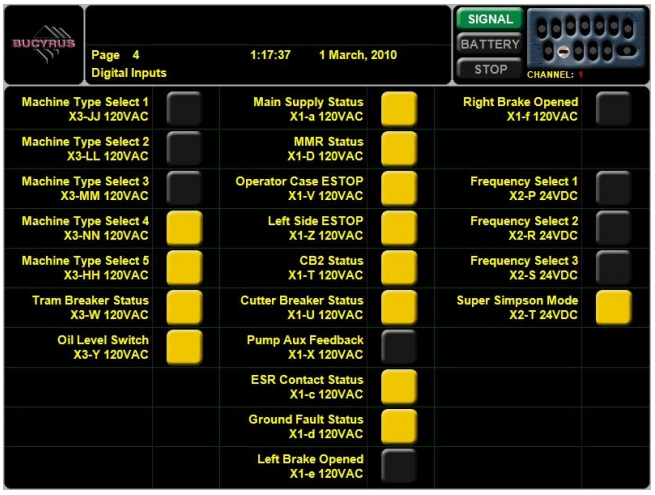
The manual circuit breaker reset levers are located below the electrical switches at the operator’s control station. The circuit breaker trips when the electrical system is overloaded or shorted.

WARNING!
Once the breaker has tripped, it will not stay in the “ON” position without first being moved to the "RESET" position, and then to "ON".

To reset the circuit breaker manually proceed as follows:

- ☞ Move the selector to “RESET” position and move the circuit breaker to full “OFF” position.
- ☞ Move the selector to the “ON” position for normal operation.

Fig. 17: Graphics display diagnostic pages, examples, continued



Safety precautions for underground operation

In addition to the preceding instructions for operating the Continuous Miner, observe the following special precautions after the Continuous Miner is taken underground.

- Communication is a key element in maintaining safety. Exact instructions and warnings should be given to, and thoroughly understood by each workman. Good communications between the entire crew must be maintained throughout the shift.
- Check the condition of the trailing cable before turning power on at the power source.
- This machine must be maintained in a permissible condition, following all state and federal laws.
- Make a visual check of the Continuous Miner before energizing. Look for loose bolts, covers, locking devices, damaged parts, and cracked or broken lenses. Any part of the machine which does not function properly is a hazard. Report it immediately to your immediate supervisor or their designee.
- Prior to operation, make sure the working area is safe. Make a visual inspection of roof and ribs and take all steps necessary to insure safety.

Tramming safety rules

- Communicate your intentions to the workmen affected by the movement of the Continuous Miner.
- Check the position of the water hose and trailing cable to be sure there is sufficient slack to finish the operation.
- Note the condition of the roadways and physical surroundings of the route.
- Position the cutter and gathering head for tramming.
- Position the stabilizer shoe and booms for tramming.
- Position your body completely inside the operator's compartment (optional), facing the intended direction of travel.
- Position the Continuous Miner in the center of the road way to allow maximum safe clearance. Consistently maintain clearance, which is critical to the safe movement of the Continuous Miner.

Fire suppression in radio remote

The control system uses a solenoid output to drive the fire suppression system on the continuous miner. The fire suppression can be activated at any time from the remote control console. If the machine is fitted with the battery backup version of the power supply, the fire suppression can also be activated in battery standby mode. The system will remain in battery standby mode for at least ten minutes after loss of main power to the machine.

When in radio mode, the fire suppression can be activated from the radio as follows:

- ☞ Press the “SHIFT” and “FIRE” keys at the same time and hold for two (2) full seconds.
- ☞ After two seconds, the fire suppression system will activate. At this time, the “SHIFT” and “FIRE” keys can be released.

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

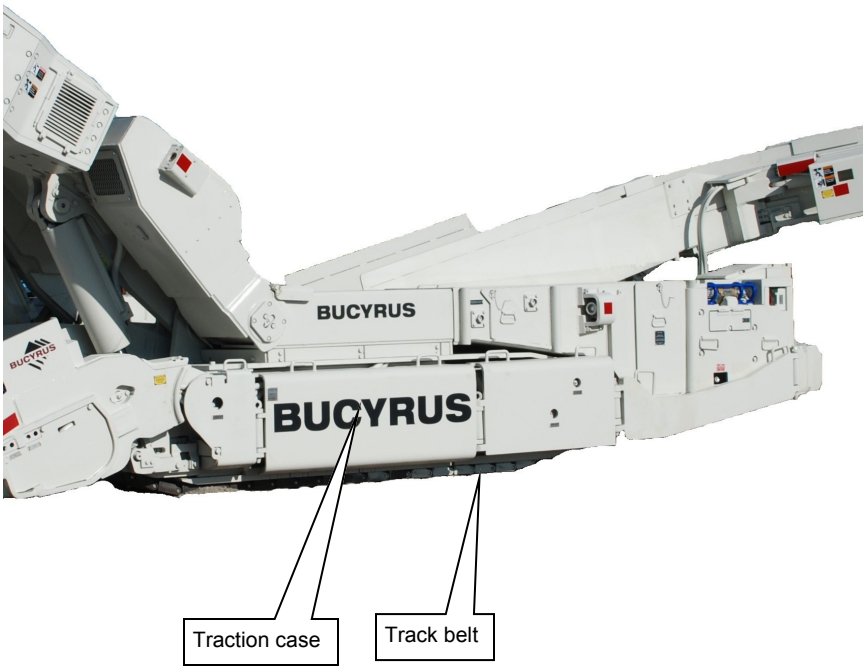
Traction system

The Continuous Miner is trammed by two individually controlled traction systems (Fig. 32). 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 sun 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. 32: Traction system



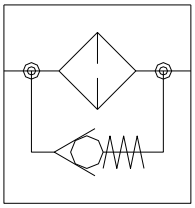
filters

Filters and strainers are designed to protect a hydraulic oil system from harmful levels of particulate contamination. High levels of contaminants accelerate wear of components, cause improper functioning, and add to system sluggishness. Other problems such as seizure of parts, higher temperatures due to increased fluid friction, leakage, and loss of control may occur. Contamination also contributes to oxidation and chemical breakdown of the fluid.

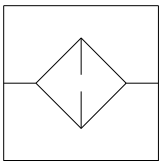
The primary cause of hydraulic component failure is system contamination. Please see the troubleshooting section in this chapter to better learn how to prevent contamination.

WARNING!
Never run the machine without the proper filter elements in place. Running the machine with incorrect or no filters may result in hydraulic system contamination, machine failure, erratic operation, and injury.

Fig. 40: Filter hydraulic symbols



Filter, bypassing



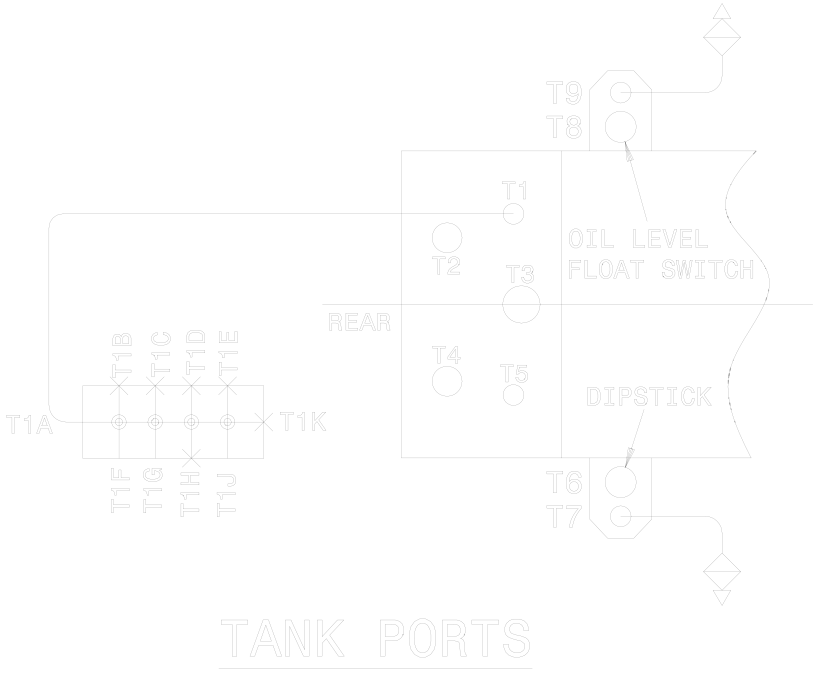
Filter, non-bypassing

Tank Ports

Return oil from hydraulic system components connect to a 10-port pressure manifold. Oil flows from the pressure manifold to the oil tank reservoir. The oil tank reservoir includes the oil level float switch, a dip-stick and two tank breathers.

The schematic shown is Fig. 46 is typical for tank port connections. Always refer to the schematic in the parts book for your machine.

Fig. 46: Tank port connections



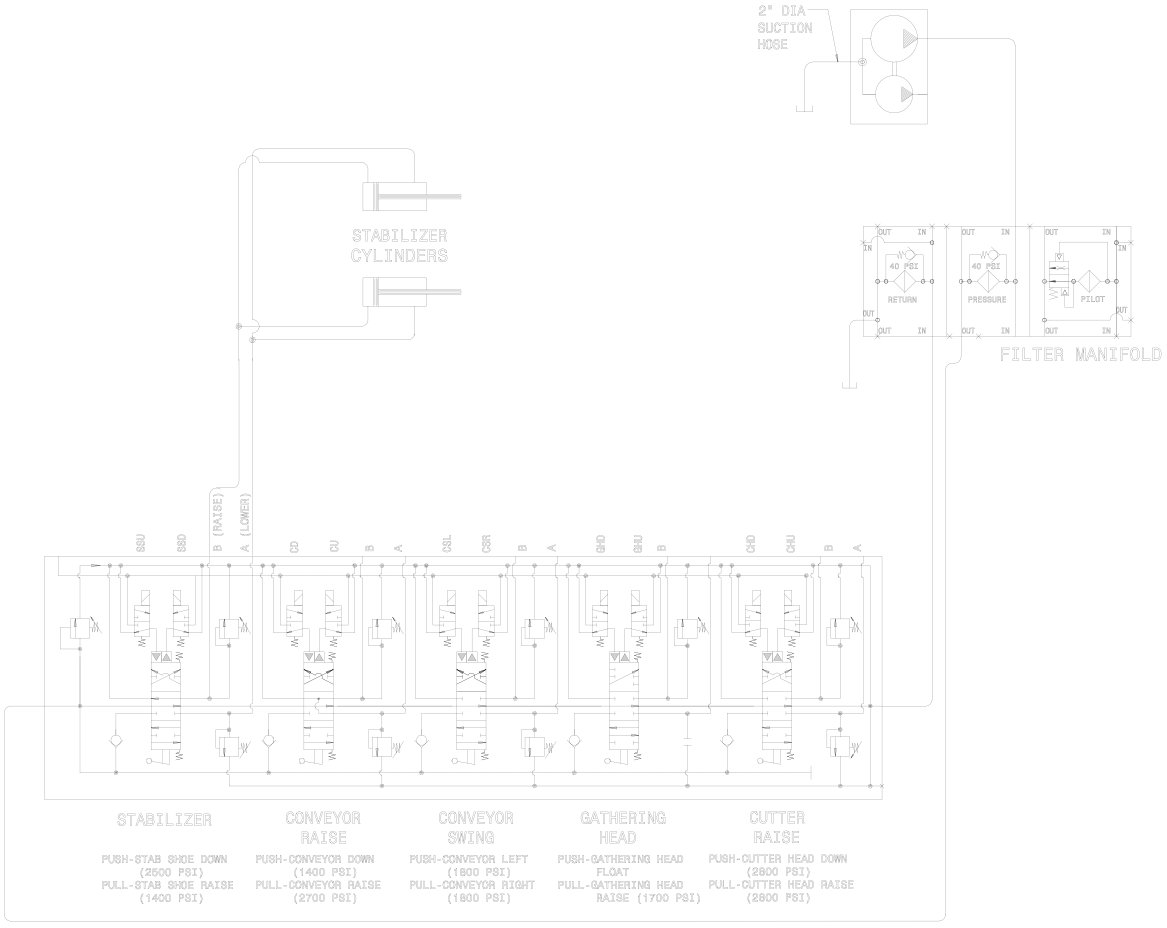
Stabilizer shoe cylinders circuit

Oil is supplied by the hydraulic pump through a 10-micron bypassing pressure filter (tri-filter) to the stabilizer shoe working section on the main control valve. By manual or remote solenoid control, the spool allows oil to enter the stabilizer shoe circuit. The stabilizer shoe cylinder is a double-acting cylinder. There are two stabilizer shoe cylinders.

There are two port reliefs in the working section on the main control valve. Port relief to lower the stabilizer shoe is set at 2500 psi. Port relief to raise the stabilizer shoe is sat at 1400 psi. Push the handle it extends the cylinders and lowers the stabilizer shoe. Pull the handle it retracts the cylinders and raise the stabilizer shoe. Solenoid designations are SSU (stabilizer shoe up) and SSD (stabilizer shoe down).

The schematic shown is Fig. 51 is a typical stabilizer shoe cylinder circuit. Always refer to the schematic in the parts book for your machine.

Fig. 51: Stabilizer shoe circuit



Deluge water fire circuit

The deluge fire suppression circuit (Fig. 57) can be operated by manual or remote solenoid control (see Electrical section in this chapter). When the solenoid coil is energized, it shifts a spool, allowing hydraulic oil to travel to a 2-way, 2-position water valve. The hydraulic fluid shifts the spool, allowing the water to pass through it to the deluge fire spray manifolds. For the hydraulic portion of this circuit, see Fig. 61 in the Hydraulic section of this chapter. The water valve has a detent spool, which keeps the valve open. The 2-way, 2-position valve can be operated manually and is typically mounted on the left hand side of the machine. The valve must be manually reset to reset the fire suppression circuit.

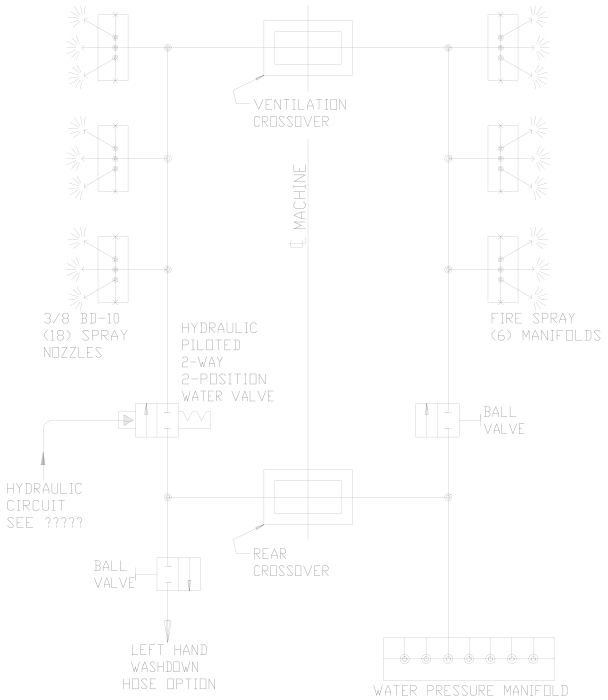
In addition, there is a ball valve used to manually operate the fire suppression circuit that is typically located on the right rear corner of the machine. The valve must be manually turned off to reset the fire suppression system.

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

For deluge water fire circuit component locations, see Fig. 58.

IMPORTANT!
You must manually reset the 2-way, 2-position water valve to reset the deluge fire spray circuit.

Fig. 57: Deluge water fire circuit



Operator's case—control breakers

Mounted on the front wall of the operator's case (Fig. 65) are control breakers.

control breaker "CB1" "CB1" is a 15A breaker for the 120VAC+ supply voltage.

control breaker "CB2" "CB2" is a 15A breaker for the 120VAC- supply voltage.

control breaker "CB3" "CB3" is a 15A breaker for the 120VAC+ side of the area light circuit.

control breaker "CB4" "CB4" is a 15A breaker for the 120VAC- side of the area light circuit.

control breaker "CB5" "CB5" is a 25A breaker for the 12VAC+ side of the head light circuit.

control breaker "CB6" "CB6" is a 25A breaker for the 12VAC- side of the head light circuit.

control breaker "CB7" "CB7" is a 5A breaker for the 12VAC+ side of the motor temp module circuit..

control breaker "CB8" "CB8" is a 5A breaker on the 12VAC- side of the motor temp module circuit.

control breaker "CB9" "CB9" is a 5A breaker on the 120VAC+ side of the motor relay circuit.

control breaker "CB10" "CB10" is a 5A breaker on the 90VDC+ side of the solenoid circuit.

control breaker "CB11" "CB11" is a 5A breaker on the 24VDC+ side of the controller power circuit.

control breaker "CB12" "CB12" is a 5A breaker on the 0VDC- side of the controller power circuit.

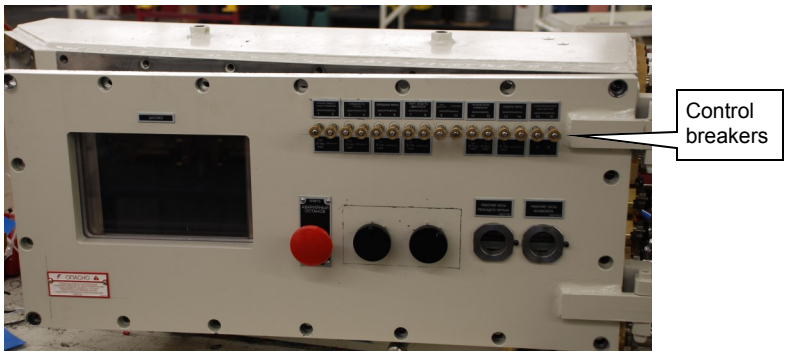
control breaker "CB13" "CB13" is a 15A breaker on the 12VAC+ side of the reverse lights circuit.

control breaker "CB14" "CB14" is a 15A breaker on the 12VAC- side of the reverse lights circuit.

control breaker "CB15" "CB15" is a 5A breaker on the display communications circuit.

control breaker "CB16" "CB16" is a 5A breaker on the display communications circuit.

Fig. 65: Operator's case - control breakers

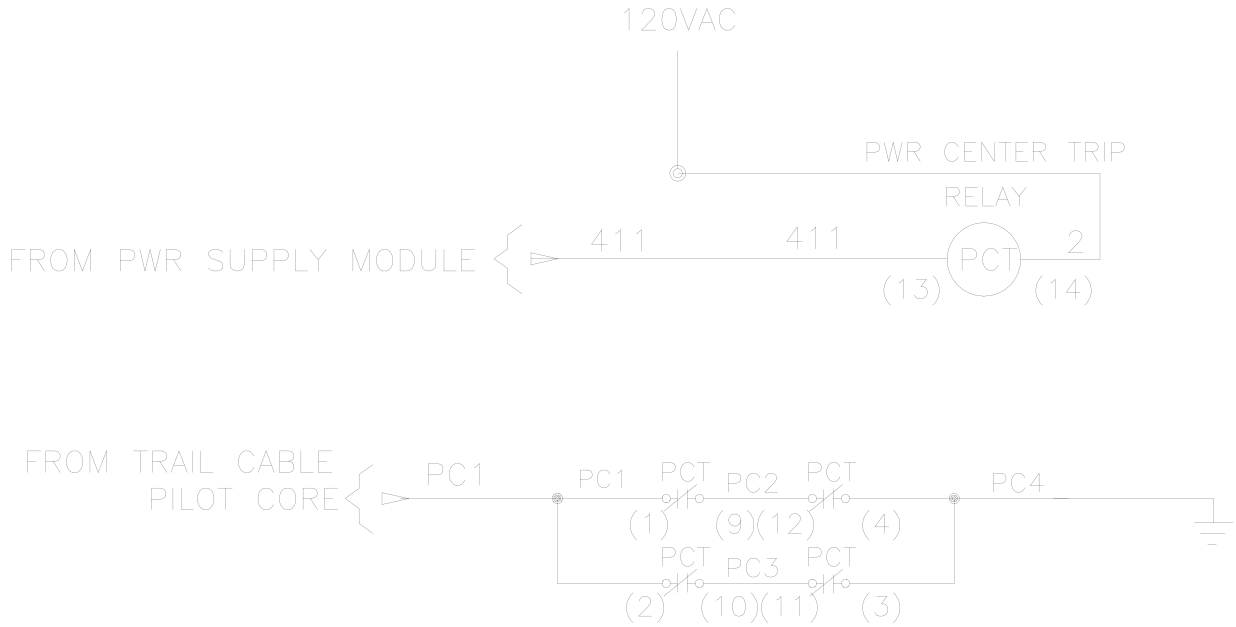


Control of the power center trip relay, “PCT”

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. 74 is typical. Always refer to the schematic in the parts book for your machine.

Fig. 74: Power center trip relay control circuit

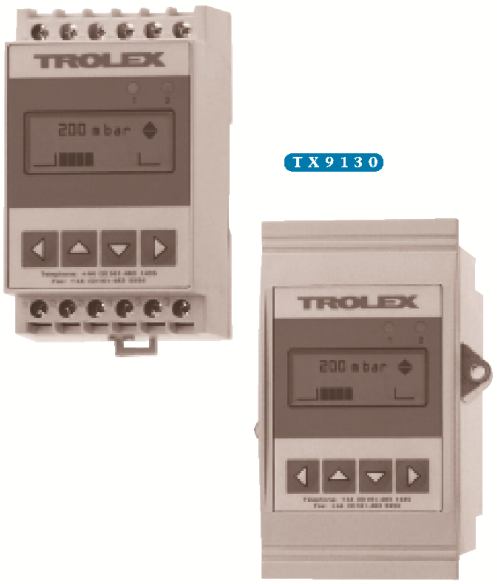


control & display sensors

PROGRAMMABLE TRIP AMPLIFIER

COMPLETE VERSATILITY OF UNDERGROUND SENSOR MONITORING SYSTEMS

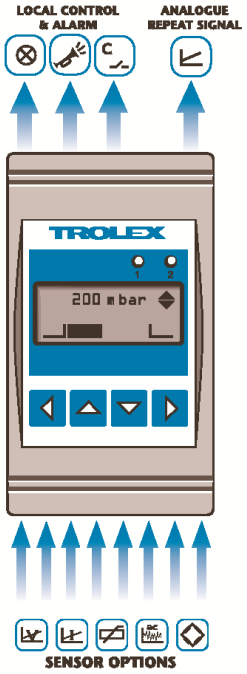
Gas sensors, flow sensors, pressure sensors, vibration monitoring, temperature devices, frequency inputs and digital sensors – direct fingertip programming of input and output functions with full information display and data communications for mine sensor monitoring alarms and local control functions.



- Programmable Trip Amplifier with dual set point relays and optional analogue repeater output signal.
- Compatible with standard sensor signals; 0.4...2V, 4...20mA, PT100.
- Repeater relay unit option.
- Microprocessor based, menu operated mode selection for all functions:

  Scale, units, offset, set points, time delays, relay phase, latching, hysteresis, etc.
- LCD information display of input signal status – also displays all operating mode information.
- Application flexibility with a choice of mounting formats:-

  Front of panel, DIN rail or 19" rack mounting.
- Certified intrinsically safe to EURONORM standards for underground mining.



Torque values

When installing bolts, refer to the torque values on the drawings in the parts book for your machine. If a torque value is not listed, refer to Chapter 6 of this manual

Lubricants and fluid capacities

Table 1: Lubricants and fluid capacities

Location	Specification	Approximate capacity	Notes
Hydraulic oil tank	Spec. 100-1	75 gals. (284 L)	2
GH Assembly CLA Primary	Spec. 100-15	1 gal (3.79 L)	2
GH Assembly CLA POT	Spec. 100-15	2.5 gal (9.46 L)	2
Tram Drive Assembly	Spec. 100-15	3 gal (11.36 L)	2
Drum Drive Assembly, high speed (back)	Spec. 100-15	0.5 gallon (1.89 L)	2
Drum Drive Assembly, low speed (front)	Spec. 100-15	5 gal (18.93 L)	2
Motor Lube Hoses	Spec. 100-14	variable	1, 2

Notes:

1. All motor lube hoses are to be filled with high temperature synthetic lithium complex grease (Spec. 100-14) before assembling them to the electric motor to ensure that there are no air gaps between the grease nipple and the point where the grease enters the motor.

2. See Chapter 6, Permissible Media, for approved lubricants for each specification.

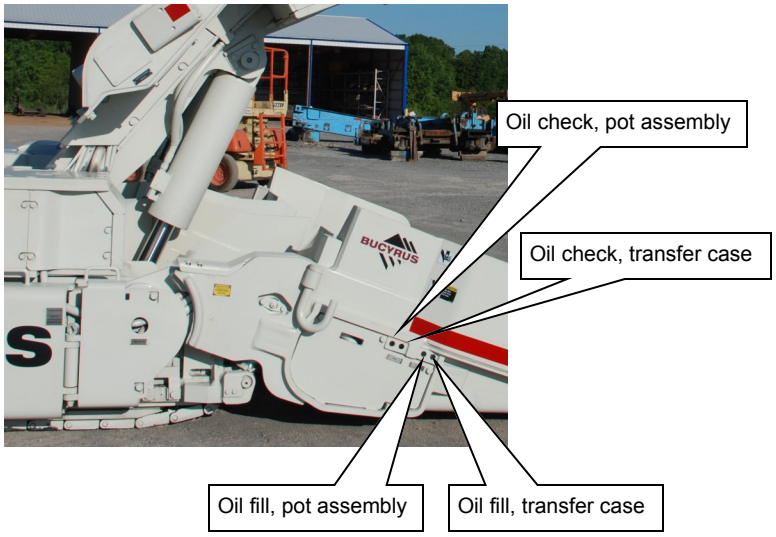
CLA head pot assembly (right and left)

Level the miner and place the gathering head on grade before checking or adding lubricant. Check the oil level in the pot assembly (Fig. 95). If oil is needed, add oil through the fill hole until oil comes out the breather.

CLA head transfer case (right and left)

Level the miner and place the gathering head on grade before checking or adding lubricant. Check the oil level in the hydraulic transfer case (Fig. 95). If oil is needed, add oil through the fill hole until oil comes out the breather.

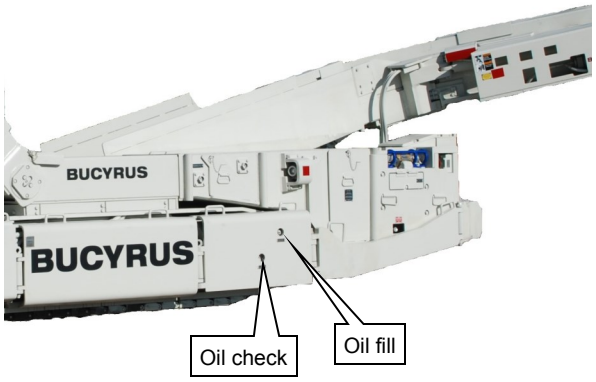
Fig. 95: CLA head pot assembly and transfer case lubrication



tram gear case (right and left)

With the miner in a level position, check the oil level in both tram gear cases by looking at the sight glass located on the side of each gear case (Fig. 96). Oil should be visible in each sight glass. If oil level is low, add oil through the fill plug hole.

Fig. 96: Tram gear case oil level



IMPORTANT!
Always use the collection hose provided with each bottle. Always discard hose immediately following collection of the oil and do not use it for the next sample. To do so will contaminate the next sample with oil from the previous sample.

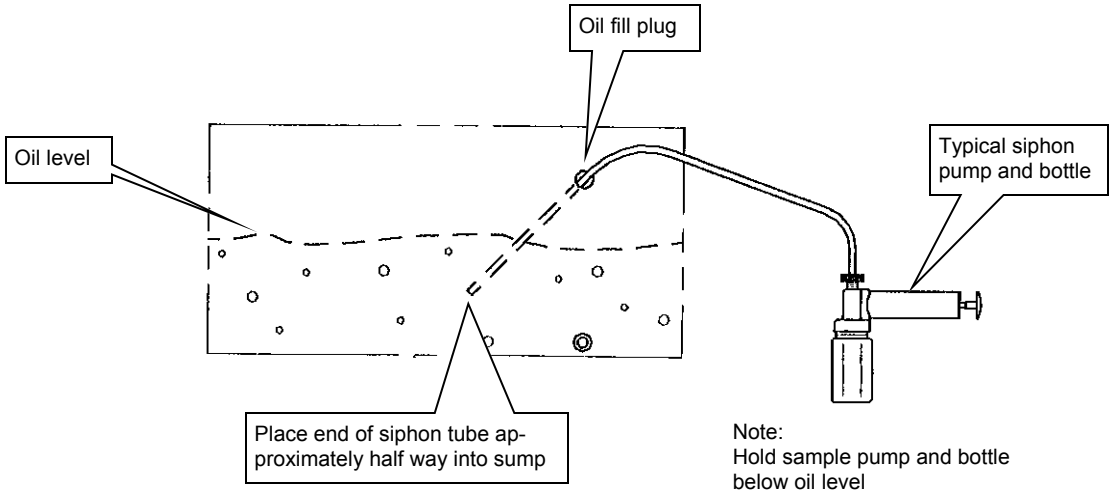
After taking sample, check and refill gear case back to proper fill level.

Following collection of all oil samples, record the specific brand and product name of the lubricant that has been installed in each gear case.

Recommended gear cases to be sampled:

- Input cutter head gear case (left and right)
- Main cutter head gear case (left and right)
- Input gathering head gear case (left and right)
- Main gathering head gear case (left and right)
- Main hydraulic oil tank

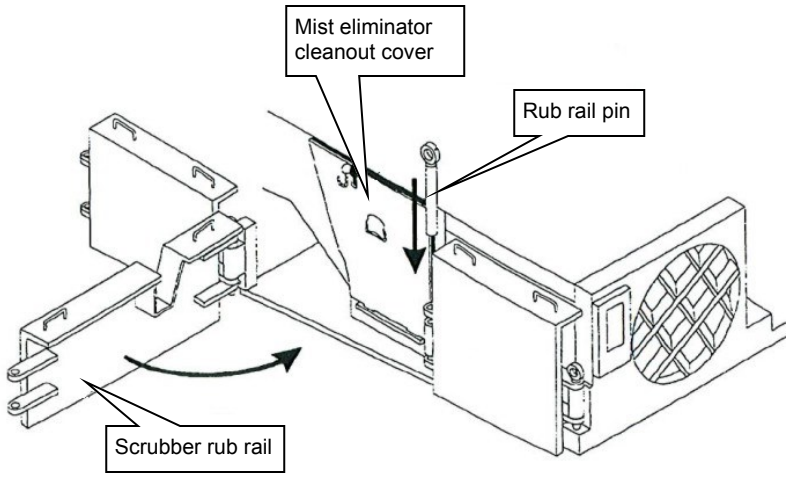
Fig. 105: Oil sampling



☞ 19. Replace the mist eliminator/screen clean-out cover (Fig. 116) and gasket and secure it by sliding the pin into the half-link.

☞ 20. Swing the scrubber rub rail closed and secure with the rub rail pin.

Fig. 116: Cover replacement



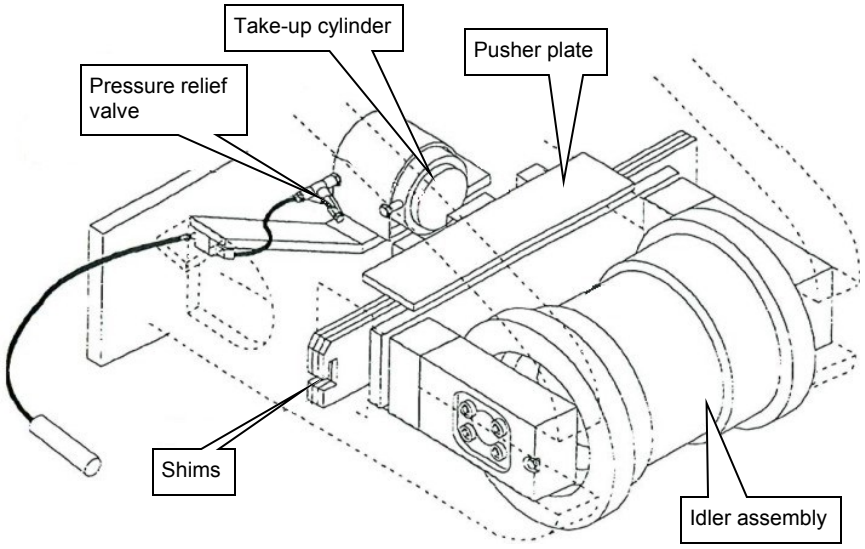
☞ 14. If the tram track is too loose, readjust the idler position using the following steps:

- ☞ 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 4 – 5” (100 to 125 mm) from the bottom wear shoes when the tractor frame is blocked off the floor.
- ☞ Insert shims (Fig. 119) into the idler slide channel until the space between the tractor frame and the pusher plate is filled.
- ☞ Open the pressure release valve 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. 119: Tram track adjustment



Chain tension adjustment - hydraulic take-up

If the machine is equipped with a hydraulic chain take-up, the only adjustment is to the conveyor chain take-up valve. If the valve needs adjusted, see Conveyor chain take-up valve adjustment procedure in this chapter.

To remove the tapered (McSweeney) boom pivot pin:

☞ 9. Remove the hex head bolts and nuts that secure the inside cap then remove the cap.

☞ 10. Remove the hex head bolts and nuts that secure the outside cap then remove the cap.

☞ 11. Remove the pin.

boom pivot pin installation

To install the straight boom pivot pin

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

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

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

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

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

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

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

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

☞ 6. Insert hex head capscrews into the open holes (those not blocked by the guides) of the end drum.

☞ 7. Tighten the capscrews into the threaded holes of the cutter drum drives gear case planetary casting.

☞ 8. Remove the wooden alignment dowels and insert the last four hex head capscrews through the end drum and into the threaded holes of the cutter drum drive gear case planetary casting.

☞ 9. Using the torque wrench with 20-to-1 multiplier, tighten all hex head capscrews to 1,200 ft-lb.

IMPORTANT!
Make sure that the holes for the cover plate's capscrews are not covered by the strapping.

☞ 10. When all bolts have been properly torqued, strap the bolts together in pairs and tack weld with the welding equipment.

☞ 11. Install the cover plate by inserting hex head capscrews through lock washers, through the cover plate, and into the holes in the end drum.

drum drive motor torque limiting clutch installation

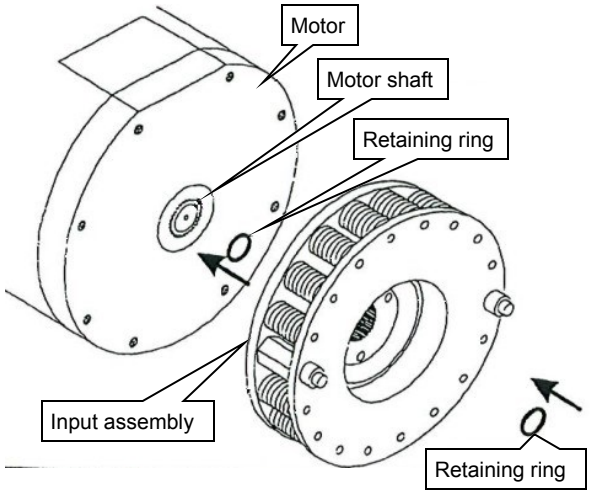
To install the drum drive torque limiting clutch

☞ 1. Using retaining ring pliers, place a retaining ring into the motor shaft ring channel nearest the motor (Fig. 149).

☞ 2. Slide the input assembly onto the motor shaft.

☞ 3. Using the retaining pliers, place the retaining ring on the end of the motor shaft to secure the input assembly.

Fig. 149: Input assembly installation



☞ 4. After placing the disc spring input the motor side of the keeper plate, place the keeper plate into position against the input hub.

☞ 5. Secure the keeper plate to the input hub with low head socket head capscrews and serrated washers.

☞ 6. Tighten all the keeper plate's socket head capscrews to 50 ft-lb.

☞ 7. Double-check the socket head capscrew torque.

☞ 8. Place the retaining ring into the exterior of the keeper plate.

☞ 9. Place the seal and then the bearing onto the output hub (with friction disc).

☞ 10. Place the output assembly against the input assembly.

☞ 11. Slide the pressure plate onto the input assembly's spring shafts.

☞ 12. Secure the pressure plate to the spring shafts with the lock nuts.

☞ 13. Tighten all the locknuts to 87 ft-lb..

gathering head assembly installation

To install the gathering head assembly

☞ 1. Position the gathering head assembly at the front of the tractor frame. Block up the rear of the gathering head so that it's pivot points are at the level of the tractor frame clevises.

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

CAUTION!
When tramming the miner toward the gathering head, be careful that the conveyor chain and gathering head lift cylinders do not become pinched between the tractor frame and the gathering head.

☞ 2. Raise the cutter head assembly to its highest point.

☞ 3. Slowly tram the miner forward until the gathering head pivot points are inserted into the tractor frame clevises.

☞ 4. Place blocking underneath the cutter head and lower the cutter head onto the blocking.

☞ 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. Thread the lower end of the conveyor chain into the gathering head assembly return pan so that the end appears on the foot shaft return plate. Place the upper end of the conveyor chain down the front of the gathering head entrance pan.

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

WARNING!
You could be seriously injured or killed by falling loads. Observe the safe working load limits of blocking and lifting devices and stand clear of the blocked cutter head and the gathering head during the gathering head lift extension.

☞ 8. Extend the gathering head lift cylinders so that the piston end bearings can be inserted into the gathering head lift cylinder clevises.

☞ 9. 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.

gathering head gear case installation

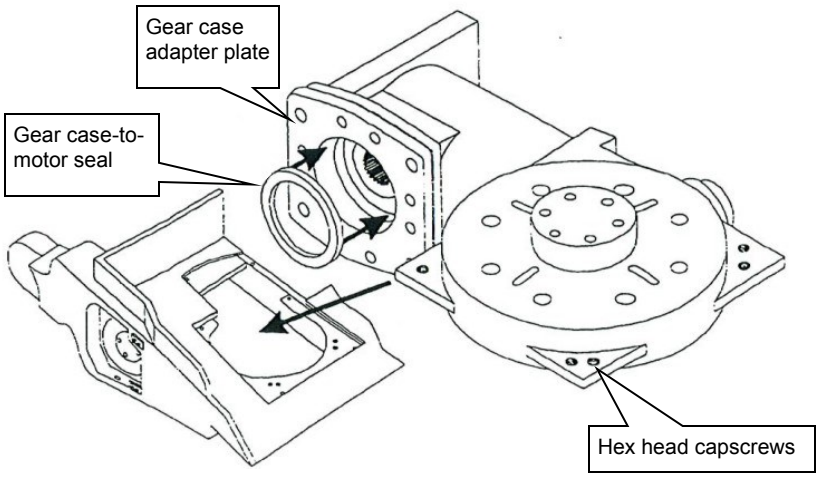
To install the gathering head gear case

☞ 1. Insert a new gear case-to-motor seal between the adapter plate and the gear case (Fig. 166). When the gear case is inserted into the gathering head and the transfer case is positioned against the gathering head motor, the seal should be located between the surfaces of the motor and the gear case.

☞ 2. Carefully insert the gathering head gear case into position in the gathering head assembly.

☞ 3. Insert and tighten the hex head capscrews and lock washers to secure the gear case pot to its mounting plate.

Fig. 166: Gear case mounting



☞ 4. Install the motor.

☞ 5. Align the four holes on the corners of the adapter plate with the four attachment bolt holes on the gear case side of the motor.

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

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

☞ 8. Attach the four lubrication connections to the gathering head gear case.

☞ 9. Attach the rose gun to the lower ports located adjacent to the gathering head side cover and fill the gathering head gear case to the proper level with lubricant. Check the gear case lubricant level at the sight glass adjacent to the gathering head side cover.

IMPORTANT!
The bottom ports on the high speed input cases are the fill lines.
The top ports on the high speed input cases are the check lines.

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.

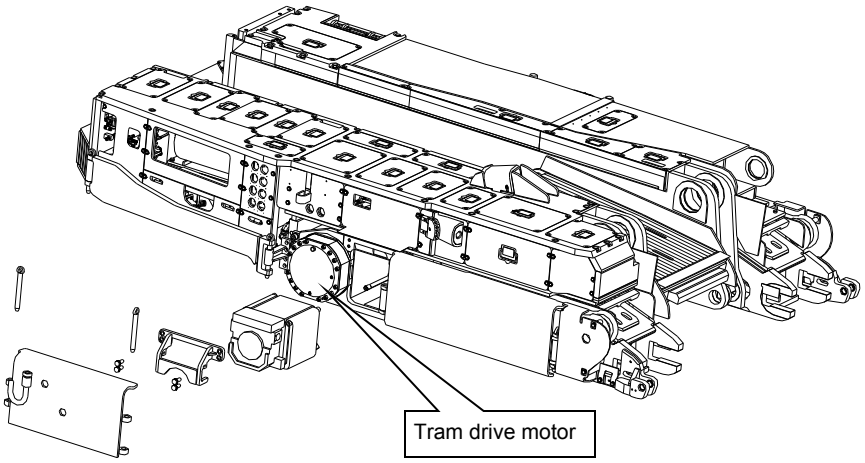
☞ 3. Disconnect the trailing cable to de-energize the miner. Follow all Federal and mine regulations for lockout/tagout.

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. 175).

Fig. 175: Tram drive motor location



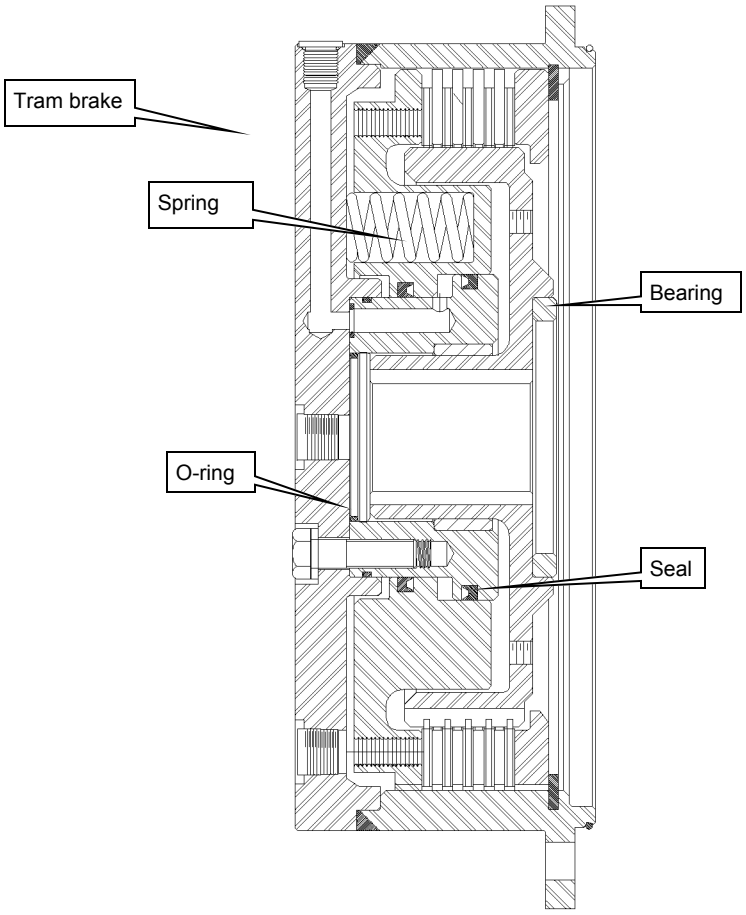
☞ 6. Remove the hex head capscrews and hi-collar lock washers that secure the input shaft access cover to the motor housing. Note that the cooling water hose support clamp is secured by one of the capscrews. Remove the tram motor cooling water bypass hose when the clamp capscrew is removed.

☞ 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. 176).

Fig. 183: Tram brake assembly 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.

☞ 25. 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.

☞ 26. 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.

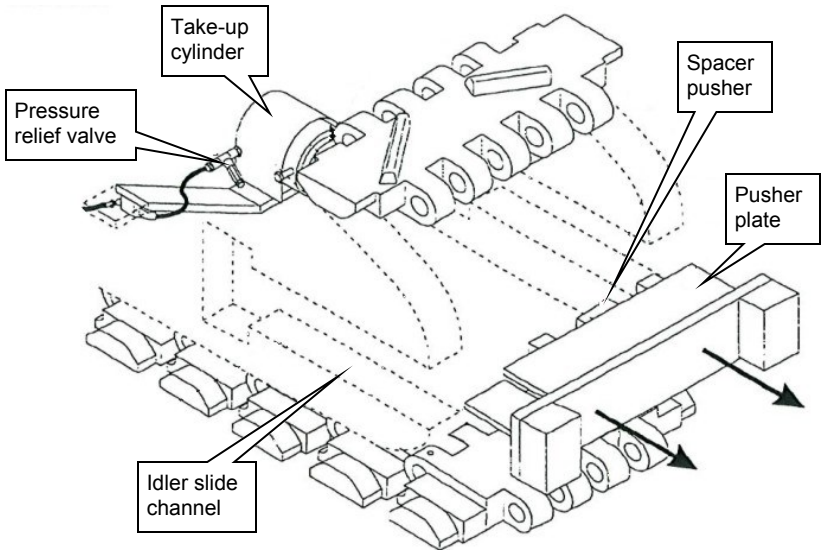
☞ 34. Raise the tractor frame by lowering the stabilizer and the gathering head and cutter head assemblies.

☞ 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 (Fig. 211).

Fig. 211: Pusher plate removal



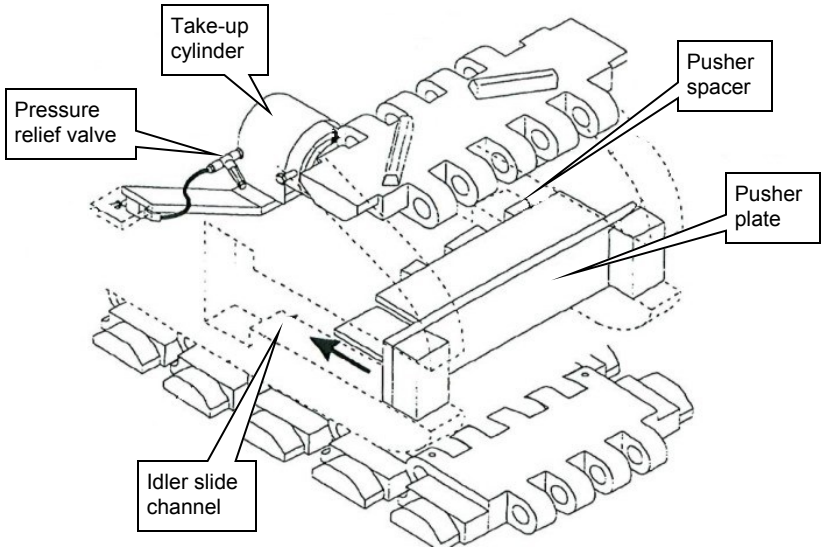
tram track front idler installation

To install the tram track front idler

☞ 1. Insert the pusher spacer (Fig. 212) 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. 212: Pusher plate installation



Scrubber fan/motor removal and installation

scrubber fan/motor removal

To remove the scrubber fan/motor

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

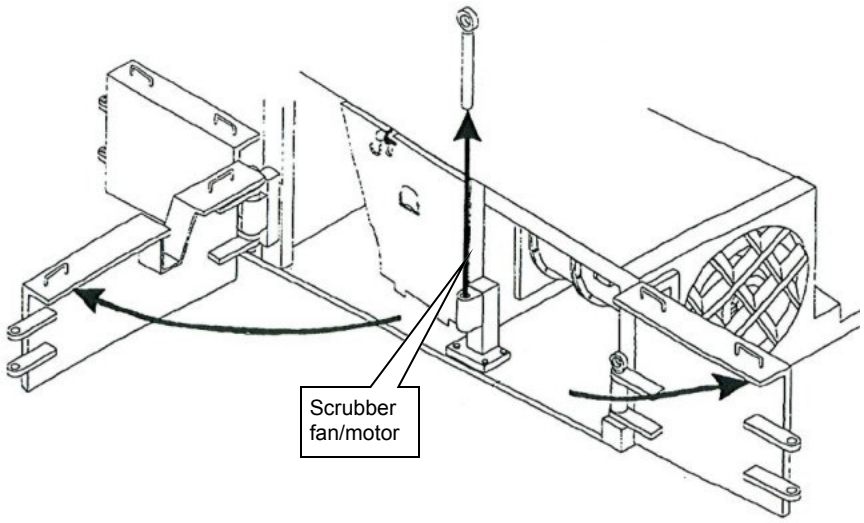
☞ 2. Lower the gathering head and cutter head assemblies until they rest on the floor.

☞ 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. 219) and remove the pin that secures the rear rub rail to the rail adjacent to it. Open both rub rails.

Fig. 219: 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.

The troubleshooting charts cover the following areas:

- 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 "Contaminants in hydraulic systems" section.

Contaminants in hydraulic systems

The primary cause of hydraulic component failure is SYSTEM CONTAMINATION! 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
   - install desiccant breathers on all bulk tanks
   - use sealed plastic containers for adding oil to small sumps
   - locate bulk tanks near equipment and pump directly to reservoirs
   - utilize filter carts to maintain oil cleanliness standards
   - properly train personnel on the importance of clean oil and best practices for storage and handling
   - monitor your program closely and look for continuous improvement

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	Misadjusted or malfunctioning valve amplifier	C
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	Malfunctioning feedback transducer	E		
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. ☞ lubricate

H. ☞ adjust, repair, or replace counterbalance valve