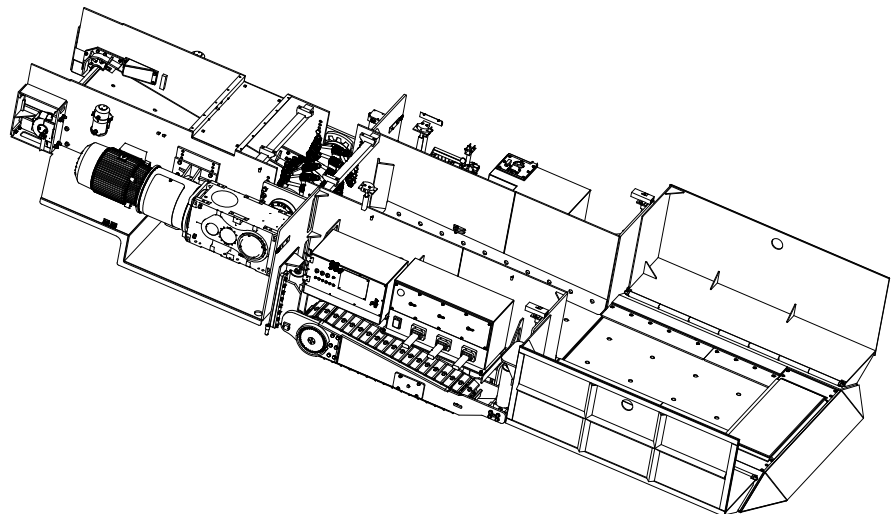




Operation and Maintenance Manual

**Bucyrus - Feeder Breaker
Model - 7MFBH-56DD
Serial Number - 54-2183**

Doc. No.: A6474X353



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Before starting to work

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.

Safety instructions

Storage and transport

Maintain the prescribed storage periods and observe the instructions for storage.

Do not store materials or parts in the travel way or in your working area.

Inform the persons involved about the intended transport route and the anticipated duration of the transport.

transport safety device

Ensure that the transport safety devices are correctly fitted.

Fix all moving parts with transport locks.

Never stand under unsupported parts or suspended loads.

means of attachment

Connect the lifting equipment only to the points of attachment provided for that purpose. Observe the different load limits of the attachment points. Also observe the instructions on the transport sheet.

Only use means of attachment which are in good condition and have been designed for the loads to be handled.

For round components use transport straps, only. Never use chains or steel cables for this purpose.

Do not damage the treated or polished surfaces of shafts, sealing surfaces, etc.

mobile handling equipment

When using mobile handling systems for transport make sure that the center of gravity is as low as possible.

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.

inspection

Inspect the machine and have any malfunctioning, broken or missing parts corrected or replaced before use.

maintenance

Verify that all maintenance has been performed.

instruction and safety tags

Verify that all instruction and safety tags are in place and readable. These are as important as any other equipment on the machine.

operator's area

Clean any foreign material from the operator's area.

Transport

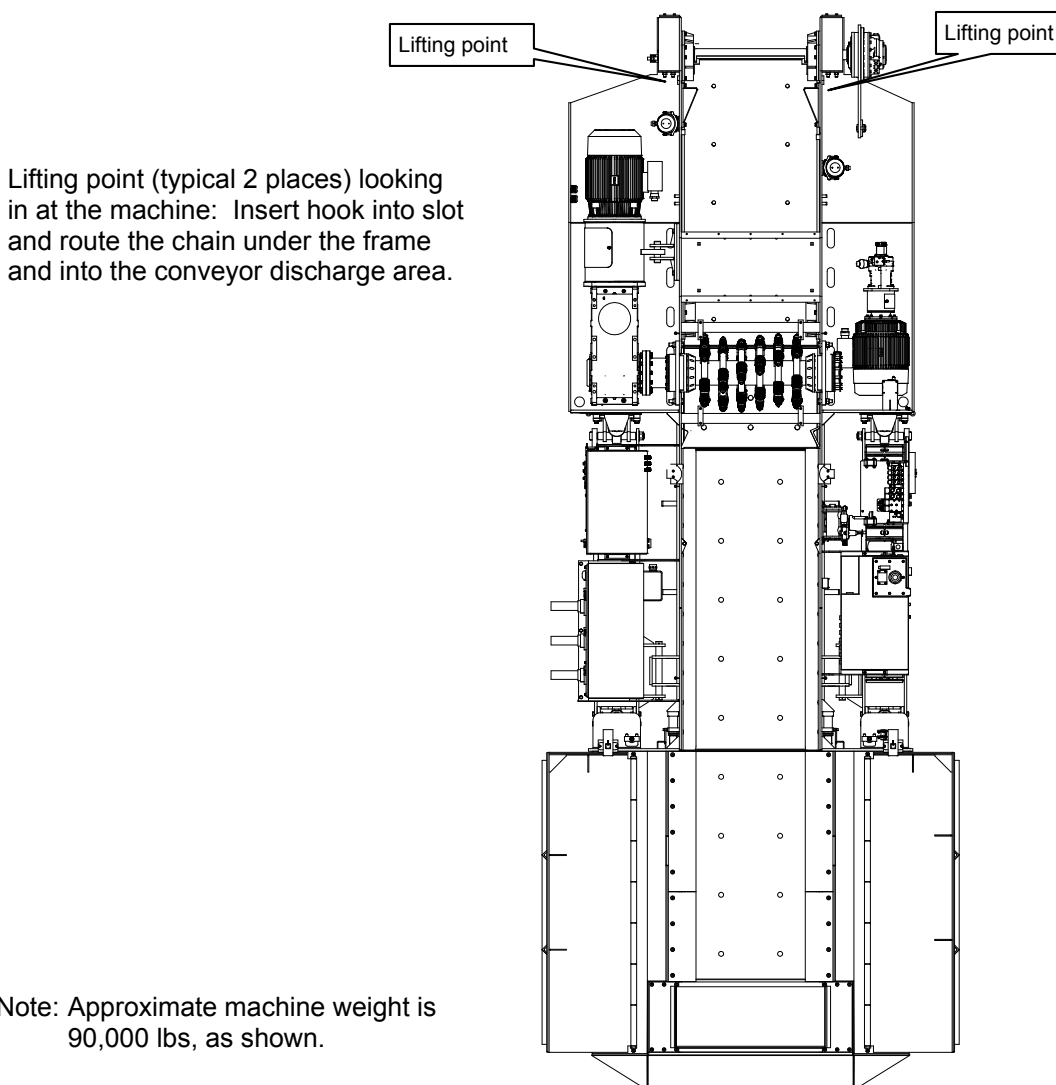
Load units, dimensions, and weights

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

- dimensions,
- weights,
- lifting points, etc. (See Fig. 6 for lifting point locations)

Additional information on the dimensions and weights can be found in chapter 6 in this operating manual.

Fig. 6: Lifting points on the feeder breaker



Towing the feeder breaker



WARNING!

It is not possible, within the scope of this guide, to anticipate all possible arrangements for towing the feeder breaker. Before attempting to tow the machine, you must take all possible precautions to protect the operators and anyone around the feeder breaker and the towing machine from being injured by either the towing machine or the feeder breaker. The primary towing device being used (cables, bars, etc.) and the towing machine must have load limits strong enough and heavy enough to maintain control through all conditions that may be encountered at any time. Safety chains or other safety devices must be used in case of failure of the primary towing device. All operators must be alert at all times to prevent either machine from running out of control during towing. Failure to follow the above warning could cause serious injury or death to you or other workers.

To tow the feeder breaker proceed as follows:

1. Couple the towing machine securely to the feeder breaker.
2. Chock front and rear of both crawler drives.



WARNING!

Failure to chock the front and rear of both crawlers could allow uncontrolled movement of the feeder breaker. Failure to follow this warning could cause serious injury or death to you or other workers.

3. Rotate the torque hub end cap on both right and left sides of the feeder to the free position as follows (Fig. 9).
4. Remove the two (2) bolts that retains the end cover to the center of the torque hub.
5. Rotate cover and reinstall with the two (2) bolts to disengage torque hub. Torque bolts to 120 in lb.



WARNING!

At no time during towing should anyone ride in or on the machine being towed or stand in between the towing machine and the machine being towed. Failure to follow the above warning could cause serious injury or death to you or other workers.



WARNING!

Do not exceed 5 mph during towing. Exceeding 5 mph could cause serious injury or death to you or other workers or damage to machine.

6. Remove chocks from crawler and begin towing.

Fig. 14: "SETUP SCREEN"



Operation

photo eye sensor control panel

The photo eye sensor control panel (Fig. 21) is located on the left side of the machine. On the face of the box are a “LOAD ON” indicator, a “UNIT TEST” switch, and a “UNIT BYPASS” switch.

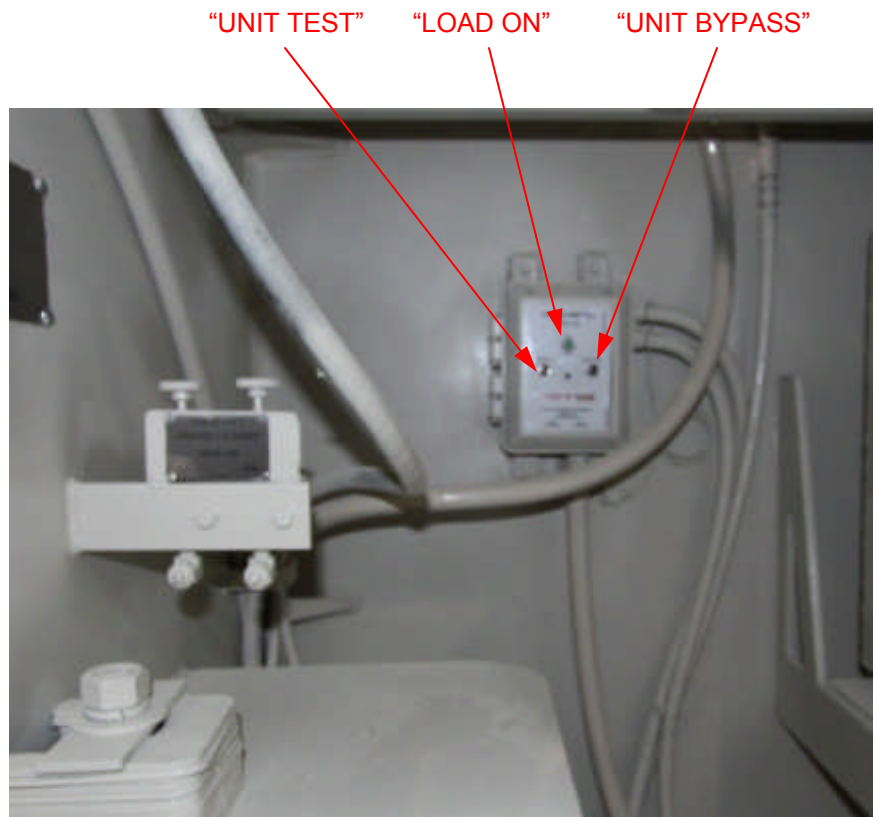
When light strikes either photo eye sensor, a signal is sent to the control unit, which energizes a relay. The relay remains energized for a preset amount of time. If there is no activity during this preset amount of time, the relay is opened. If the photo eye senses light during this preset time, the timer is reset and starts counting again.

“LOAD ON” indicator: The green “LOAD ON” indicator LED is illuminated when the relay is energized.

“UNIT TEST” switch: The “UNIT TEST” switch is used to test the PC board.

“UNIT BYPASS” switch: The “UNIT BYPASS” switch allows manual operation of the unit.

Fig. 21: Photo eye sensor control panel



5. Run the conveyor in reverse to clear the jam by turning the “OFF/ FWD/REV” selector switch located on the cover of the starter enclosure to the “REV” position. The conveyor will run at a preset speed.

**IMPORTANT!**

Running the conveyor in the reverse direction for a period of time with material in the hopper will jam the conveyor and it will be necessary to empty the machine hopper before the conveyor will re-start.

6. Once the jam is cleared, turn the “FWD/OFF/REV” selector switch to the “FWD” position.

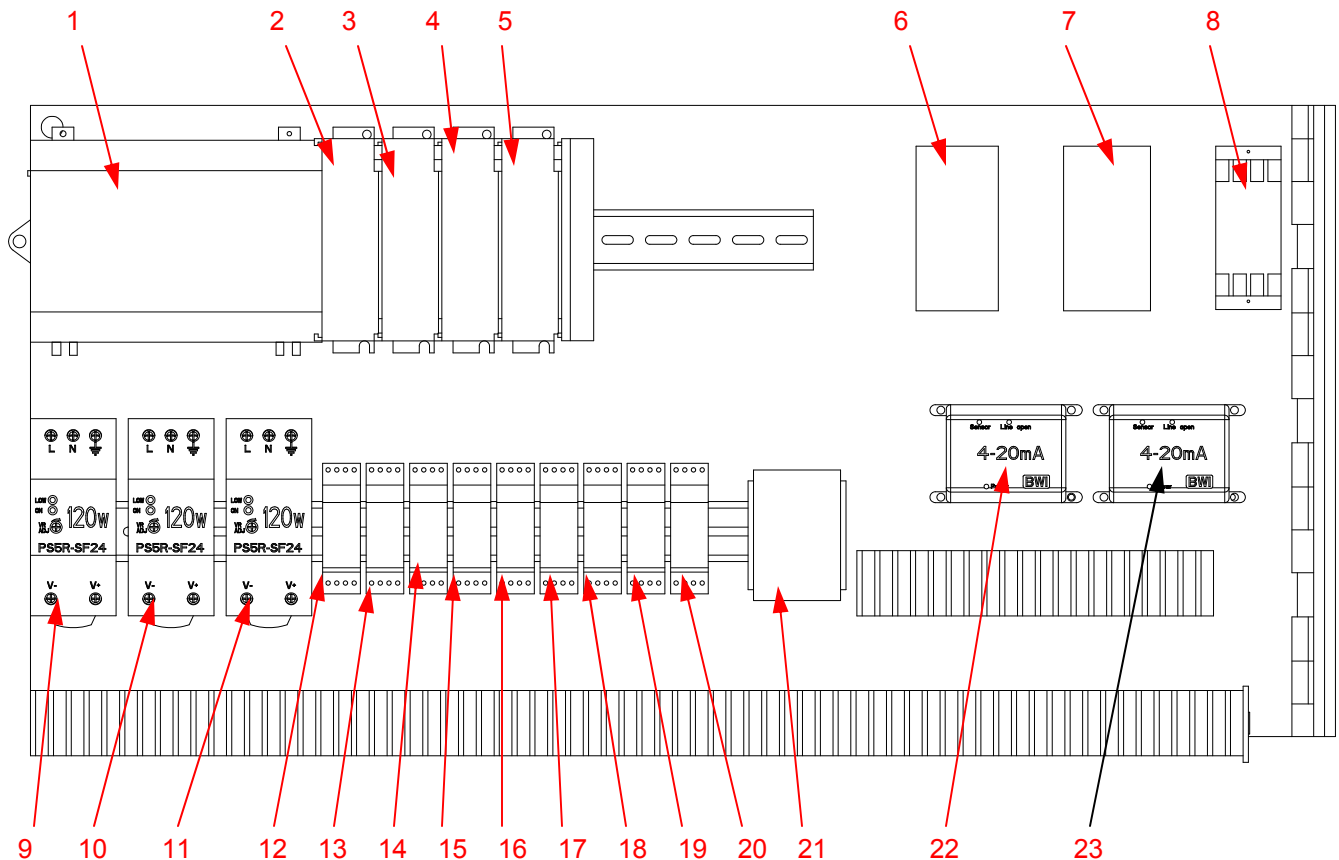
Electrical system

Swing panel - front side

The swing panel (Fig. 27) is accessed by opening the cover on the enclosure. Immediately adjacent to the swing panel is the main circuit breaker, CB1, for the feeder breaker.

Note that component locations are typical. Always consult the parts book for your machine to verify locations.

Fig. 27: Swing panel, front side



- | | | |
|-------------------------|------------------------|------------------------|
| 1. Base unit | 9. AC/DC converter #1 | 17. CR2 |
| 2. Analog input module | 10. AC/DC converter #2 | 18. CRR |
| 3. Analog input module | 11. AC/DC converter #3 | 19. SSR |
| 4. Analog output module | 12. MCRA | 20. STR |
| 5. Input module #1 | 13. SR | 21. Current transducer |
| 6. Amplifier card 1 | 14. MCR | 22. TAC monitor |
| 7. Amplifier card 2 | 15. CRWS | 23. TAC monitor |
| 8. IS Relay | 16. CR1 | |

Primary hydraulic circuit

The primary hydraulic circuit is powered by an open loop load sense pump rated at 165cc/75 gpm at 1750 rpm electric motor speed. This pump supplies oil flow to the main valve bank. The main valve bank operates the conveyor motor, tram motors, lift cylinders, tilt cylinders, and power fill function.

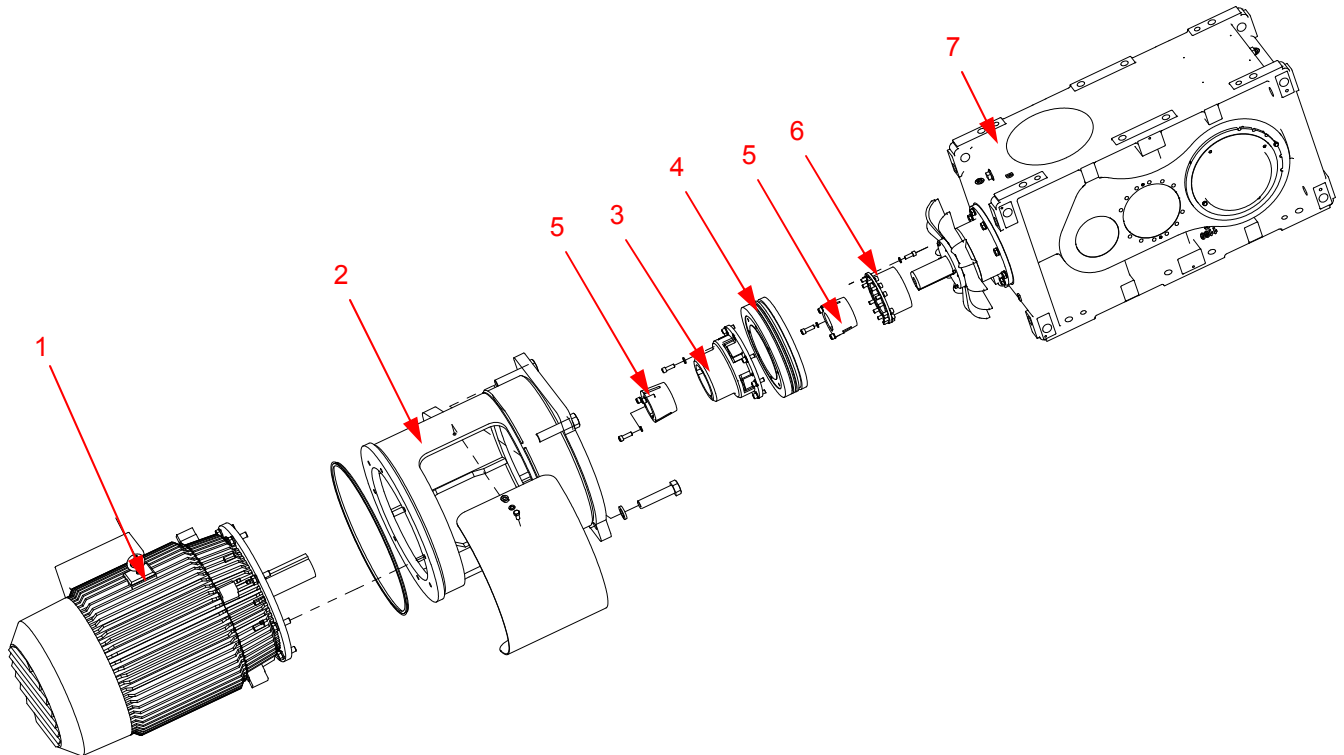
There is a suction transducer located between the oil tank and the pump. If the suction pressure drops below a preset value, meaning that the line is pulling in air from either a low oil condition or a leaking suction line, an alarm will be issued by the PLC. If the condition lasts longer than three seconds, the PLC will shutdown the machine to avoid pump damage. From the pump, oil enters a 5 micron by-passing pressure filter and continues to the main valve bank, whose relief is set at 5,000 psi.

Mechanical assemblies

Breaker power unit

The breaker power unit (Fig. 40) drives the pick breaker. It consists of a 200 HP electric motor coupled to a reducer. The power unit has been assembled as a unit and can be removed as a unit or as individual components (see Replacement of wear parts section of this chapter).

Fig. 40: Breaker power unit



1. Electric motor, 200 hp
2. Connecting tube
3. Flexible coupling
4. Torque limiter
5. Taperloc bushing (2)
6. Companion flange
7. Gear reducer

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hydraulic oil tank

Check the hydraulic oil level by looking at the sight glass located on the side of the oil tank (Fig. 45). The oil level should not be allowed to drop below the bottom of the sight glass. If the hydraulic oil level is low, add hydraulic oil (Spec. 100-1). To add oil via the power fill, reference the following procedure.

**WARNING!**

The “TANK FILL/AUX VB” lever is the only lever on the valve bank that does not spring return to neutral when released. When not in use, the valve should be manually returned to the neutral position. Failure to do so could result in unexpected machine movement if the secondary valve bank is energized and a lever on the secondary valve bank is inadvertently moved or machine overheating if the power fill pump is left energized. Unexpected machine movement could result in serious injury to personnel or damage equipment.

To operate the power fill:

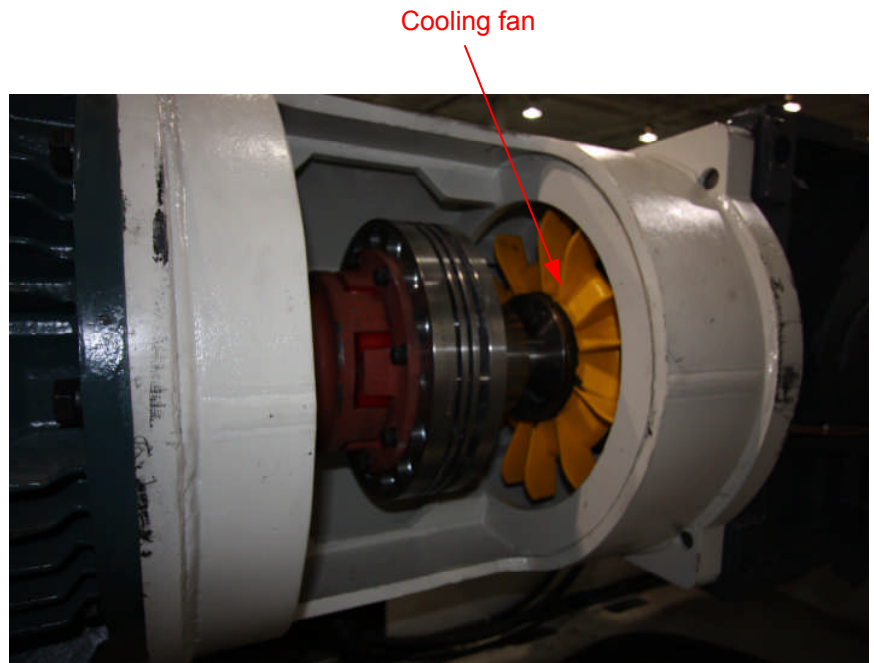
1. Clean suction hose attached to the hydraulic power fill motor, located on top of the oil tank.
2. Remove the suction hose plug and submerge the suction hose in the new oil supply.
3. Turn the handle of the ball valve to the open position. The handle should now be inline with the hydraulic hose to which it is attached.
4. Position the “TANK FILL/AUX VB” lever in the “TANK FILL” position. Oil from the valve bank will now drive the power fill motor and a suction force will be created in the suction line. Oil from the new oil supply will be drawn through the power fill motor to the hydraulic oil tank.
5. Once the tank is filled to the desired level, pull the power fill lever on the valve bank to the neutral (center) position.
6. Turn the ball valve handle 90° to close the ball valve.
7. Remove the suction hose from the new oil supply.
8. Clean and install hose plug into suction hose. Store the suction hose on top of the oil tank.

**CAUTION!**

After oil filling operation is complete, manually return the “POWER FILL” lever to the centered, neutral, position or overheating of the machine may occur.

Every three months**breaker reducer cooling fan**

Remove the connecting tube cover (Fig. 57) and inspect the breaker reducer fan. Clean all accumulated debris from the fan, guard, and deflector.

Fig. 57: Breaker reducer cooling fan

Recharge of fire suppression system

To return your fire suppression system to service after use (Fig. 62).

1. Pull ring on safety valve to relieve actuator system pressure.
2. Disconnect actuation system hose at cartridge receiver/actuator assembly.
3. Open bursting disc union assembly.
4. Remove extinguisher from bracket.
5. Replace ruptured bursting disc with new disc. (Full disc side must face extinguisher).
6. Fill extinguisher to rated capacity with Ansul dry chemical specified on nameplate.
7. Clean fill opening threads and gasket seating surface.
8. Secure fill cap, hand tighten.
9. Remove cartridge guard assembly.
10. Remove empty cartridge.
11. Make certain that receiver/actuator puncture pin is fully retracted.
12. Screw full charged cartridge into receiver/actuator assembly, hand tighten.
13. Replace cartridge guard.
14. Secure extinguisher in bracket.
15. Assemble bursting disc union, wrench tighten.
16. Connect actuation system hose at cartridge receiver/actuator assembly, wrench tighten.
17. Replace cartridge in remote actuator (dashboard type). Pull out button, insert ring pin and remove empty cartridge. Screw fully charged cartridge into actuator, hand tighten. Seal ring pin to actuator button stem with lead and wire seal.
18. Record date of recharge and notify operating personnel that system is back in service.

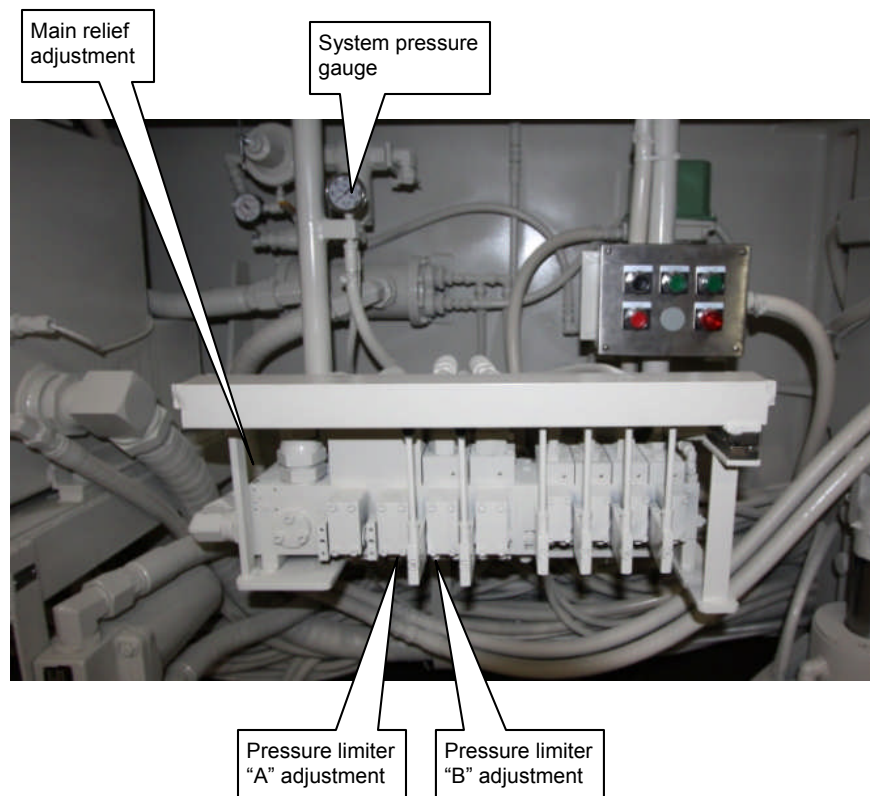
Adjustment procedures

Main relief pressure

To adjust the main relief (Fig. 67):

1. Maximize the main relief setting.
 - a. Loosen the jam nut that holds the adjustment stem in place.
 - b. Turn the adjustment stem fully clockwise.
2. Adjust the pressure compensator to 5,500 psi (see Pressure compensator adjustment procedure in this section).
3. Read the pressure on the system pressure gauge. If needed, adjust the main relief until the pressure reads 370 bar (5,365 psi). Turn the adjustment stem clockwise to increase pressure or counterclockwise to decrease pressure. The relief will be audible when dumping over.
4. Tighten the jam nut to secure the relief adjustment stem.
5. Adjust the pressure compensator to 350 bar (5,000 psi) (see Pressure compensator adjustment procedure in this section).
6. Once the pressure compensator is set, reset the margin pressure to 30 bar (435 psi) (see Margin pressure adjustment procedure in this section).

Fig. 67: Main relief



Replacement of wear parts

How to remove the tailshaft



WARNING!

You could be seriously injured or even killed by falling loads. Whenever instructed to lift or block, observe the safe working load limits of lifting or blocking devices and keep a safe distance from suspended loads.

To remove the tailshaft assembly (Fig. 72):

1. Remove the RTV silicone from twelve (12) bolt heads and remove the bolts from each end of the tailshaft retainers and lift out the retainers.
2. Make sure the grease take-up release valves are closed and pump up the grease cylinders until the grease shims are loose.
3. Release tension on the conveyor chain by removing the tail shaft shims. Open the valves on the grease cylinder take-up manifold located on the left hand side of the machine, directly above the tilt cylinder. Pry the tailshaft toward the discharge end of the machine to fully collapse the grease take-up cylinders.
4. Disconnect, tag and cap the central lubrication hoses to the tail shaft.
5. Separate conveyor chain and fold back to clear tail shaft. (See Conveyor chain replacement in this chapter).
6. It may be necessary to remove the take-up cylinders from the feeder frame and disengage the take-up pushrod from the take-up bearing.
7. Attach an appropriate lifting device to the tail shaft assembly and and slowly lift from machine.

How to install the tail shaft

To install the tailshaft assembly (Fig. 72):

1. Apply a coat of grease to the bearing guide bars.
2. With an appropriate lifting device, insert tail shaft into the receiving end of the feeder breaker. Center the tail shaft in the feeder breaker frame, ensuring that the slots of the take-up bearing are aligned with the guide bars and that the bearings are fully seated on the guide bars. It may be necessary to loosen the set screws of the bearing retainer collars and reposition the bearings so that the bearing slots are aligned with the frame guide bars. Apply Loctite 242 and torque set screws to 100 ft-lbs if loosened.
3. Install the take-up pushrod into the take-up bearing.
4. Fold the conveyor chain over tailshaft.

Replacement of wear parts

How to install the crawler track pad assembly

To install the crawler track pad assembly proceed as follows (Fig. 76):

1. Remove old crawler track pad assembly (see previous section, How to remove crawler track pad assembly).



WARNING!

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

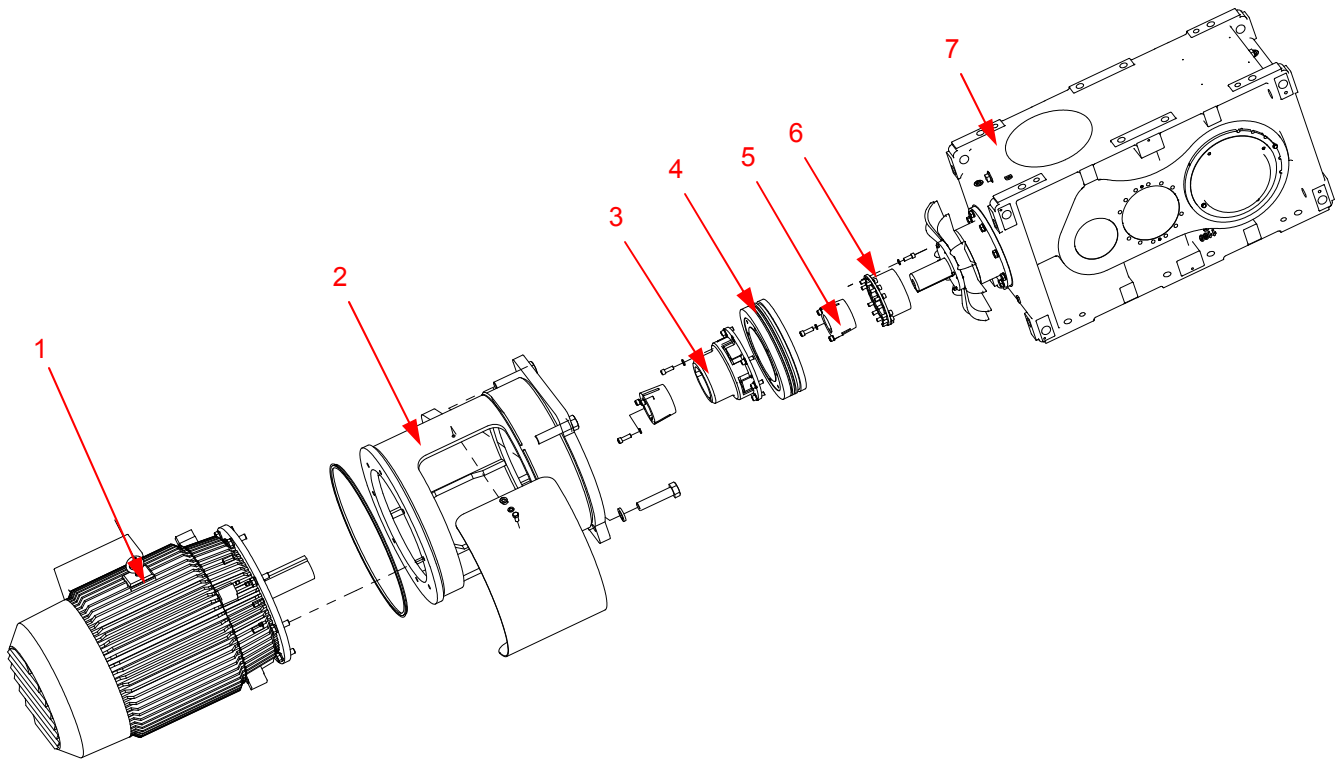
2. Check to ensure that crawler track tension cylinder is completely retracted (see Crawler track adjustment in this chapter).
3. Slide crawler track pad assembly under crawler assembly.
4. Fold pad assembly over both ends of crawler assembly. Ensure that pad assembly meshes with drive sprocket and idler roller.
5. Connect crawler track pad assembly (see How to assemble crawler track pad assembly in this chapter for proper connection).
6. Adjust tension on the crawler track pad assembly (see Crawler track pad adjustment procedure in this chapter for proper adjustment).

Replacement of wear parts

Breaker shaft and breaker power unit

The breaker power unit (Fig. 80) and the breaker shaft assembly (Fig. 81) can be removed or installed as a single assembly (Fig. 82) or as two separate assemblies.

Fig. 80: Breaker power unit main components



1. Electric motor, 200 hp
2. Connecting tube
3. Flexible coupling
4. Torque limiter clutch
5. Taperloc bushing
6. Companion flange
7. Gear reducer

It is important to check the torque limiter clutch (item 4) for wear. See the Maintenance section of this chapter for the wear check procedure.

Replacement of wear parts

How to install the breaker shaft assembly

Whenever performing maintenance procedures, follow all safety regulations and be aware of the following:



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.

To install the breaker shaft assembly (Fig. 86).

1. Attach an appropriate lifting device to the breaker shaft in such a manner that the breaker shaft is level during the lift and slowly lift the unit onto the machine.
2. Install the one inch hex bolts, hex nuts, and lockwashers into the breaker side plates. Torque to 545 ft-lbs.
3. Install the one inch socket head shoulder bolts, 3/4 inch lock washers, and 3/4 inch hex nuts to attach breaker shaft bolt flange to stub shaft in gear reducer. Torque to 240 ft-lbs.
4. Remove support from under gear reducer.
5. Remove lifting device from breaker shaft.
6. Remove caps and install all grease lines to the breaker shaft.
7. Install all breaker covers.
8. If necessary, adjust the height of the breaker shaft using the grease cylinders. There is one grease cylinder mounted under each breaker side plate and one mounted under the reaction pin (see Breaker shaft height adjustment procedure in this chapter).
9. Turn the machine circuit breaker on.
10. Unlock and remove tags from electric power at the power center.
11. Check for proper breaker shaft rotation direction. It may be necessary to switch the breaker motor leads if the shaft is turning in the wrong direction.

Replacement of wear parts

How to assemble the conveyor power unit (Fig. 88)

1. Install the key in the electric motor shaft.
2. Apply Never Seez to the electric motor shaft and install the coupling hub onto the electric motor shaft. Roughly position the hub even with the end of the shaft. Do not tighten the set screw as final positioning of the hub will be determined at the end of assembly.
3. Install the element onto the coupling hub on the electric motor.
4. Apply Never Seez onto the open loop pump splined shaft. Install the remaining coupling hub onto the hydrostatic pump splined shaft (refer to Fig. 96 for dimensions).
5. Clean all mating surfaces on the connecting tube and the electric motor.
6. Apply Loctite 242 (blue) to the eight bolts and install bolts, flat washers, and lock washers into the connecting tube. Torque incrementally and evenly to 170 ft-lbs as follows:
 - Step 1: 50 ft-lbs
 - Step 2: 100 ft-lbs
 - Step 3: 170 ft-lbs



IMPORTANT!

It is extremely important that the connecting tube pulls up evenly on the electric motor. If the connecting tube is cocked, misalignment between the pump and the electric motor will occur and the coupling will fail.

7. Install the open loop pump. Align the pilot hub on the pump with the pilot bore of the connecting tube while simultaneously engaging the jaws of the Rotex coupling halves.
8. Install four bolts, flat washers, and lock washers and torque incrementally and evenly to 280 ft-lbs as follows:
 - Step 1: 90 ft-lbs
 - Step 2: 200 ft-lbs
 - Step 3: 280 ft-lbs

Refer to Figure 96 to verify distance between the coupling jaws and the coupling element of 0.18". This distance must be maintained to avoid element failure. Adjust the gap as required by repositioning the hub on the electric motor shaft as required.

9. Check coupling half alignment by using a straight edge across the two coupling halves (see Fig. 90). Rotate the electric motor and measure the spacing in at least two places to ensure the electric motor and pump shafts are aligned. If there is misalignment, the connecting tube may be cocked or the mating surfaces may not be clean. This misalignment must be corrected before proceeding with assembly.

Troubleshooting procedures

Typical hydraulic problems

The most common causes for improper hydraulic functions are:

- contaminated or poor quality hydraulic oil
- low or insufficient oil in the system
- using the wrong type or viscosity grade of hydraulic oil
- air in the hydraulic system
- internal or external leakage of the hydraulic system
- improper mechanical adjustments (such as reliefs)
- mechanical or structural damage leading to component failure
- components by-passing (internal leaking or inability to hold pressure) which leads to erosion of bushings, valve spools, or other critical components

The greatest aid to troubleshooting a hydraulic system is the confidence that comes with knowing the intended operation of the system, along with a fundamental understanding of basic hydraulic principles.

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 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.
 - 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

Hydraulic cylinders

Table 10: Hydraulic cylinder troubleshooting

Trouble or symptom	Probable cause	Test, check and/or remedy
cylinder drifts	<ul style="list-style-type: none"> ☞ Piston seal leak. ☞ Control cartridge by-passing. ☞ Other circuit leaks. 	<ul style="list-style-type: none"> ☞ Repair seals or replace cylinder. ☞ Replace cartridge or cylinder as required. ☞ Correct leaks.
cylinder fails to move the load when actuated	<ul style="list-style-type: none"> ☞ Pressure too low. ☞ Piston seal leak. ☞ Piston rod broken internally. ☞ Contamination in hydraulic system resulting in scored cylinder bore. 	<ul style="list-style-type: none"> ☞ Check pressure of circuit controls and cylinder to insure designed system pressure is attained. ☞ Repair seals or replace cylinder. ☞ Repair as required or replace cylinder. ☞ Replace cylinder. Check oil cleanliness and change as required.
erratic or chatter in operation	<ul style="list-style-type: none"> ☞ Excessive friction due to misalignment and/or side loading. ☞ Air in circuit. 	<ul style="list-style-type: none"> ☞ Inspect cylinder installation for proper operation and/or for foreign objects that inhibit the normal operation of the cylinder. ☞ Cycle cylinder to full stop positions to purge air.
excessive or rapid piston seal wear	<ul style="list-style-type: none"> ☞ Excessive system pressure due to over adjustment. ☞ Excessive friction due to misalignment and/or side loading. 	<ul style="list-style-type: none"> ☞ Check and correct pressure adjustment to rated limits. ☞ Inspect cylinder installation for proper operation and/or for foreign objects that inhibit the normal operation of the cylinder.
cylinder body seal leak	<ul style="list-style-type: none"> ☞ Excessive pressure. ☞ Seal is pinched or extruded. ☞ Seal deterioration (soft or gummy). 	<ul style="list-style-type: none"> ☞ Check and correct pressure adjustment to rated limits. ☞ Replace seal and/or cylinder as required. ☞ Check for contamination of fluids (incompatibility). Flush system and refill with correct fluid. Replace seal and/or cylinder as required.
piston is leaking	<ul style="list-style-type: none"> ☞ Dirt has scored the piston or the rod. 	<ul style="list-style-type: none"> ☞ Replace cylinder.
piston freezes to the tube	<ul style="list-style-type: none"> ☞ Scoring in the piston. 	<ul style="list-style-type: none"> ☞ Replace cylinder.
packing and gasket leaks develop	<ul style="list-style-type: none"> ☞ Excessive heat/wear. 	<ul style="list-style-type: none"> ☞ Replace seal and/or cylinder as required.

Technical data

This chapter contains the most important technical data on the Model 7MFBH-56DD Feeder Breaker, serial number 54-2183. Further data can be found in the spare parts lists. At the end of this chapter you will find information on the bolt tightening torques, HFA fluids, greases, etc. Read this chapter through carefully and pay particular attention in particular to the safety instructions.



The technical data listed in this chapter is for serial number 54-2183 only. Other machines with the same model number may vary.

Technical data sheet

general

Overall length: approx. 37' 9-11/16"

Overall width..... approx. 11' 8-1/2"

Tramming height (minimum): approx. 71-7/16"

Ground clearance:

 minimum, main frame approx. 16"

 minimum, crawlers approx. 6"

 maximum approx. 28-1/8"

Receiving height (min.): approx. 13-1/2"

Discharge clearance height:..... approx. 62"

Discharge overhang approx. 67" to center
of headshaft (82-5/8"
total)

Level hopper capacity: approx. 1,387 ft³

Weight: approx. 90,000 lbs

performance

Material input size, maximum): approx. 2' x 3' x 4'

Maximum material strength:..... approx. 30,000 psi

Nominal output size:..... approx. 8" (one dimension)

Discharge rate (max.):

 3" pick to flight clearance approx. 2,000 tph @ 118 fpm

 5" pick to flight clearance approx. 2,240 tph @ 118 fpm

 7" pick to flight clearance approx. 2,480 tph @ 118 fpm

 9" pick to flight clearance approx. 2,725 t/j @ 118 fpm

Material to be broken:..... Coal @ 88 lb/ft³

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