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Operation and Maintenance Manual

FB110 Feeder Breaker

2 Your safety

handling of hydraulic fluids

Avoid direct contact between the skin and hydraulic fluids. Hydraulic fluid can penetrate the skin and cause serious infection.

Never use hydraulic fluid for rinsing or cleaning. Hydraulic fluid represents a very serious danger to health.

maintenance, repair

Only persons who have and can demonstrate a special knowledge of hydraulics are allowed to work on the hydraulic system.

Do not alter the electrical or hydraulic settings from that indicated in this manual or as set at the factory.

Always replace damaged or lost decals and metal instruction plates.

Disconnect power at the main power source on the unit to prevent electrical shock.

Always follow all safety procedures of each particular mine when performing maintenance.

It is important that any procedure not specifically recommended in this guide be thoroughly evaluated from the standpoint of safety before it is implemented.

Some illustrations in this manual show guards or cover panels removed for purposes of clarity. Never operate unit without guards or cover panels in place.

Carry out a visual inspection of all the hydraulic components at regular intervals. In particular check that:

- the hoses are not pinched or trapped
- the hoses have no bubbles or blisters
- the hose or outer sheathes of the hose are not abnormally rigid or hard
- the outer sheath of the hoses is not damaged
- the connectors are securely inserted into the sockets
- the connections are leak-tight

Ensure that no dirt enters the hydraulic system during repair work. Dirt in the hydraulic system can cause serious damage in the whole system! Flush out the hydraulic lines thoroughly before connecting.

If hydraulic hose couplers are difficult to disconnect or cannot be disconnected, the hydraulic line may still be pressurized. Be sure to depressurize the line before disconnecting couplers.

3 Storage and transport

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.)
and

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 feeder breaker into service. In addition, 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
- jacks with adequate lifting capacity

Operation

This chapter contains important information on the operation and maintenance of the machine. It also includes instructions on the replacement of wear parts.
Read this chapter carefully and thoroughly. In particular, observe the safety instructions in chapter 2 “Your safety”.

How to operate the feeder breaker

DANGER!
Incorrect operation endangers yourself and others!
Incorrect operation of the machine is often the cause of very serious accidents! Operate the unit only when you have been sufficiently trained on the machine and have read and understood this operating manual. Should anything be unclear, please contact your immediate supervisor.

Who is allowed to operate the feeder breaker?

The feeder breaker is only allowed to be operated by persons with adequate knowledge of the complete machine.

This also includes:

- what safety devices are installed on the machine,
- where these safety devices are located, and
- how these safety devices are to be operated.

When can conveying be started?

Operation must not be started until the safe condition and proper function of the complete machine has been checked and the daily maintenance operations have been carried out.

- "MOTOR OIL TEMP HEALTHY" light will be on.
- "HYDR OIL LEVEL HEALTHY" light will be on.
- "SPRAY WATER PROVED" light will be off.
- "WATER FLOW" light will be off.
- "OUT BAY CONVEYOR RUNNING" light will be on.
- "NORMAL OPERATION" light will be on.
- "SEQ & WATER MONITORING" light will be off.

To start the motor

☞ Ensure that the "NORMAL/MAINTENANCE" switch located on the door of the starter enclosure is in the "NORMAL" position.

☞ Ensure the water to the mist spray system is in the "OFF" position.

☞ Push and release the "START" pushbutton located on the starter enclosure door.

☞ Pre-start warning consisting of a flashing light and siren will operate for the period set by timer TR4. (Adjustable from 0-30 seconds)

☞ Provided all other control systems are healthy the motor will start immediately following the completion of the pre-start warning period below.

NOTICE:
The crusher scroll is directly coupled to the motor. TR5 will also be energized (adjustable 0-30 seconds) normally set at 7 secs, temporarily overriding the rotational under speed sensor. If the rotational speed is not achieved during this period, the motor will shut down.

To start the discharge conveyor

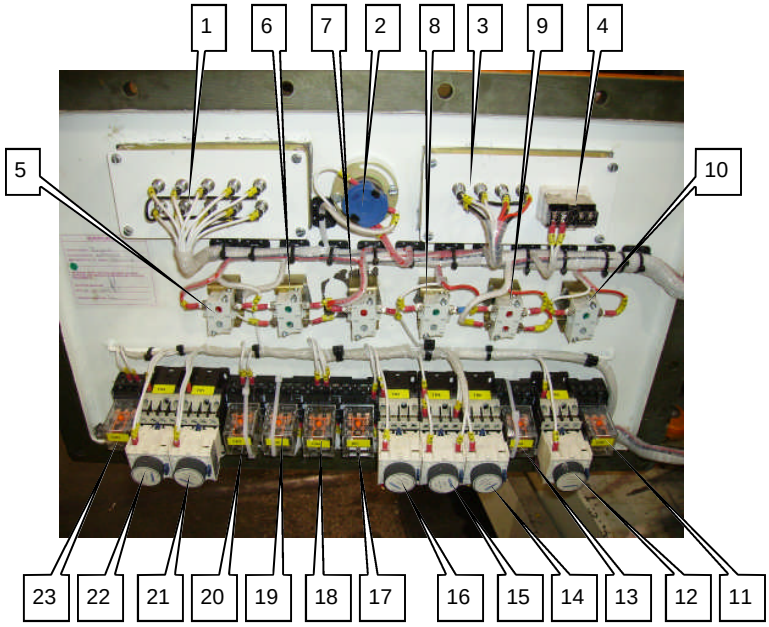
☞ Turn on the water supply. Both water monitoring switches will operate.

☞ Push and release one of the remote "START" pushbuttons or the "START' pushbutton on the starter enclosure door. The conveyor will now run for the preset period set by TR3 timer. Operating a remote "START" pushbutton or the "START" pushbutton on the door of the starter enclosure will reset the TR3 timer.

☞ If the mist spray fails to reach the preset parameters set within the monitoring switches the conveyor will stop after the TR1 timer (adjustable from 0-30 seconds) usually set at 3 seconds times out.

Fig. 18: Starter enclosure door

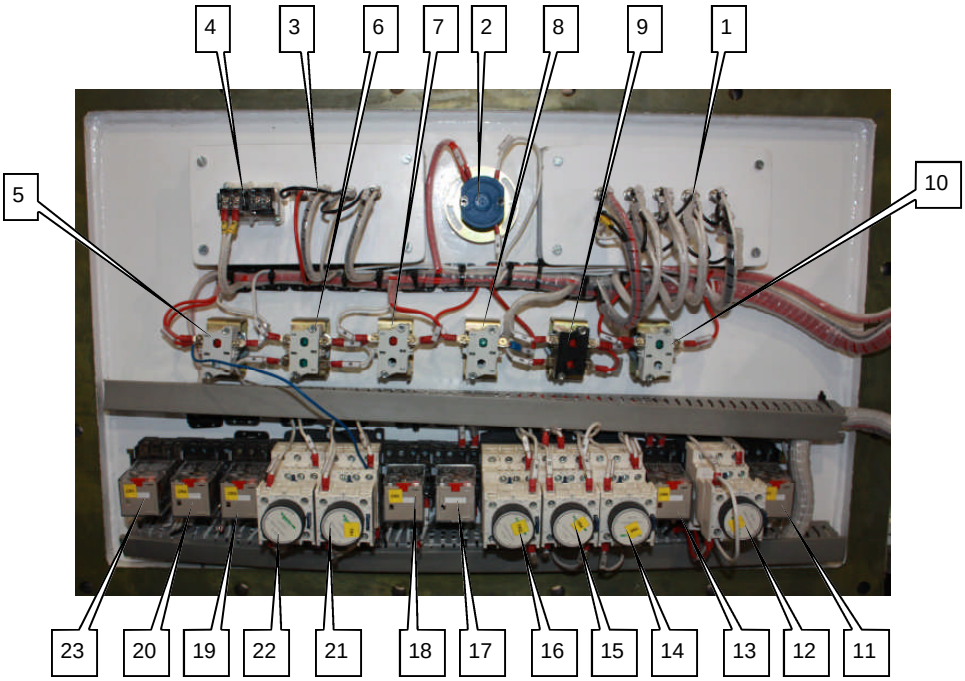
Serial number 54-2168



Door panel components

1. Indicator lights
2. Mode of operation switch
3. Indicator lights
4. Hour meter
5. Overload reset button
6. Start button
7. Emergency stop button
8. 12V Earth leakage test button
9. 12V/110V Earth leakage reset button
10. 110V Earth leakage test button
11. “CR7”
12. “TR3”
13. “CR6”
14. “TR5”
15. “TR4”
16. “TR2”
17. “RR”
18. “CR5”
19. “CR3”
20. “CR4”
21. “TR1”
22. “TR6”
23. “CR1”

Serial number 54-2184



loop flushing valve

The machine is equipped with a loop flush valve located on the discharge end of the machine on the frame side plate behind the hydrostatic pump. The valve is used to dump approximately 30% of the charge oil to the low pressure side of the circuit.

heat exchanger

The oil to air type heat exchanger is located on the right side of the machine. It used to remove heat from the hydraulic circuit prior to dumping into tank.

conveyor direction/speed control valve

The two (2) position conveyor control valve located above the left hand crawler is used to control the conveyor direction of travel and speed.

charge filter

The charge filter located under the gear pump on the right hand side of the machine is used to filter the charge fluid. The filter removes hot oil from the circuit, allowing the charge pump to replenish the circuit with cooler oil.

pressure filter (s)

Two (2) pressure filter (s) are located above the crawler on the left hand side of the machine and are used to filter fluid on the pressure side of the circuit.

return filter

The return filter located on the left hand side of the discharge end of the machine is used to filter fluid from the case drains of the hydraulic pump and motors.

tank fill filter

The tank fill filter located on top of the oil tank is used to filter fluid that is being pumped with the power fill system from an external source to the hydraulic oil tank.

pressure filter (hydrostatic)

The pressure filter located above the gear pump is used to filter fluid that is being pumped by the hydrostatic pump.

ball valve

The ball valve is located on the left hand side of the discharge section of the machine on top of the oil tank and is used to control the flow of hydraulic fluid from the tank fill pump.

“TRAM/CONVEYOR” control valve

The tram/conveyor control valve allows the operator to select either “TRAM” or “CONVEYOR” mode. Push the control lever down for conveyor mode and pull the control lever up for tram mode.

tram circuit system pressure gauge

The tram circuit system pressure gauge is a high pressure gauge (6,000 psi) located on the right side of the discharge end. This gauge gives the operator a constant reading of the tram circuit system pressure.

tram circuit charge pressure gauge

The tram circuit charge pressure gauge is a low pressure gauge (600 psi) located on the right side of the discharge end. This gauge gives the operator a constant reading of the tram circuit charge pressure.

auxiliary function pressure gauges

The auxiliary function pressure gauges are high pressure gauge (6,000 psi) located to the left of the tram control levers. These gauges give the operator a constant reading of the auxiliary system pressures.

Lubrication and inspection

Maintenance includes

- Lubrication of the machine in accordance with the lubrication schedule.
- Inspection of the machine for faults and proper function.
- Inspection for wear parts.

Table 1: Lubricants: Fluids and capacities

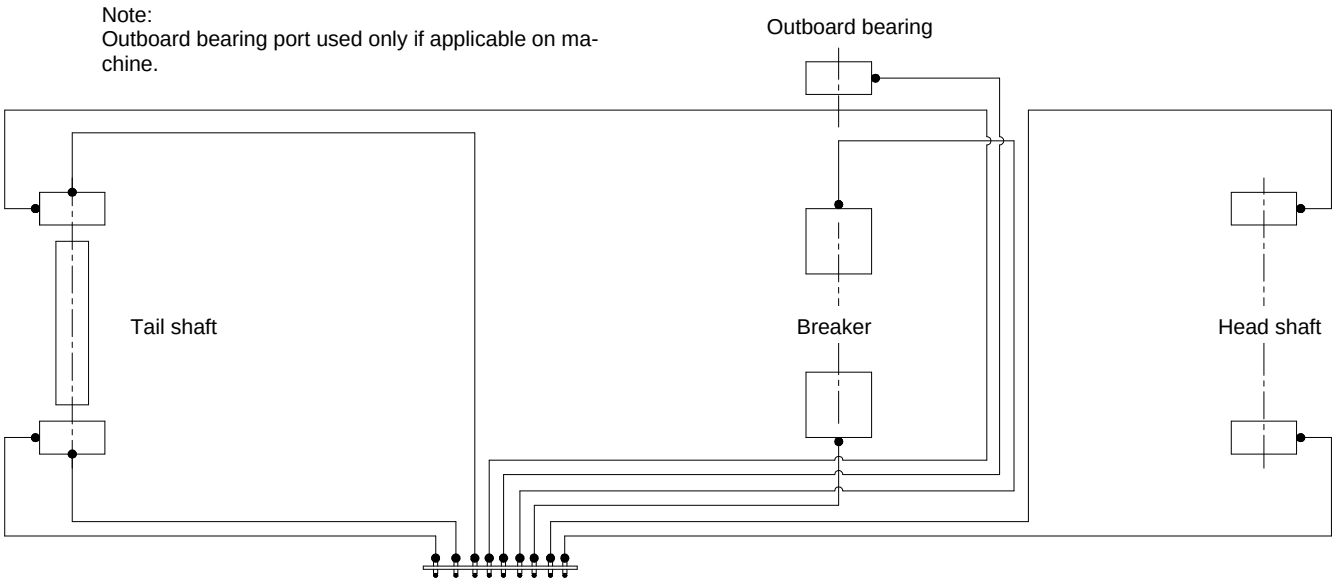
Location	Specification	Approximate capacity
Hydraulic oil tank	Spec. 100-1	162 gal (613 L)
Breaker reducer	Spec. 100-6	10 gal (38 L)
Tram Reducer	Spec. 100-2 or Spec. 100-13	2.5 gal per side (10 L per side)
Grease points	Spec. 100-3	As required

IMPORTANT!
The feeder breaker is equipped with a central lubrication system that allows several lubrication points to be lubricated from one central point. See the following section.

Central lubrication system

The central lubrication manifold (Fig. 30) is located on the left hand side of the receiving end of the feeder breaker. This allows the following to be easily lubricated from a central point; head shaft, breaker shaft and tail shaft.

Fig. 30: Central lubrication



Every 3 months

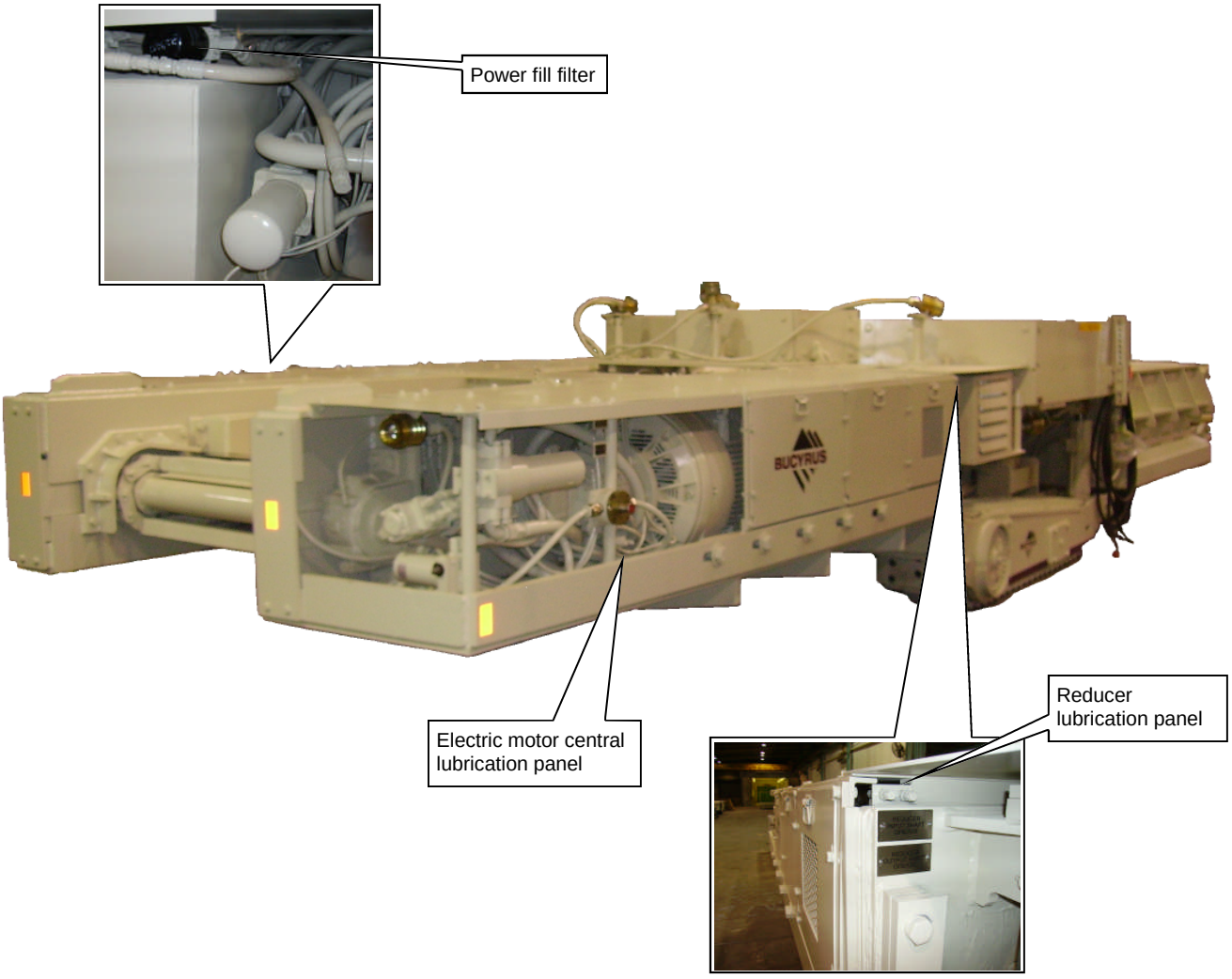
electric motor Lubricate the feeder breaker's electric motor with Spec. 100-14 or 100-16 through the two (2) grease fittings located on each end of the motor (Fig. 42) . Pump only one or two pumps of grease into each fitting.

NOTICE!
Incorrect grease or over greasing may cause serious damage to the electric motor.

reducer Lubricate the reducer with Spec. 100-3 through the two (2) grease fittings located on the central lubrication panel (Fig. 42) located on the right side of the discharge section. Pump only one or two pumps of grease into each fitting.

power fill filter Change the power fill filter element (Fig. 42). If the element is extremely dirty, a more frequent interval may be required.

Fig. 42: Electric motor and reducer lubrication



Instructions on the adjustment procedures

It is essential that adjustments be made periodically to the conveyor chain, breaker drive chain and crawler tracks, as otherwise damage can be caused to other parts of the machine or to the assembly itself. Inspect the adjustments at regular intervals.

Conveyor chain adjustment

The conveyor chain is a complete assembly and should be checked for correct tension at regular intervals.

NOTICE!
The following adjustment procedure for conveyor chain take-up must be performed on both right and left hand sides of the conveyor.

To adjust tension on the conveyor chain with the take-up cylinders proceed as follows (Fig. 47):

- ☞ Close the stop valve on manifold assembly securely.
- ☞ Attach a grease gun to the grease fitting located on the manifold and apply grease until 2” - 3” (50 mm - 75 mm) of sag is achieved underneath the head shaft sprockets.
- ☞ After tensioning chain, remove the allen head bolts from the tail shaft retainers and lift out retainers.
- ☞ Insert shims over cylinder rod to maintain gap between bearing and end plate of box.
- ☞ Allow tail shaft pressure to rest completely on shims.

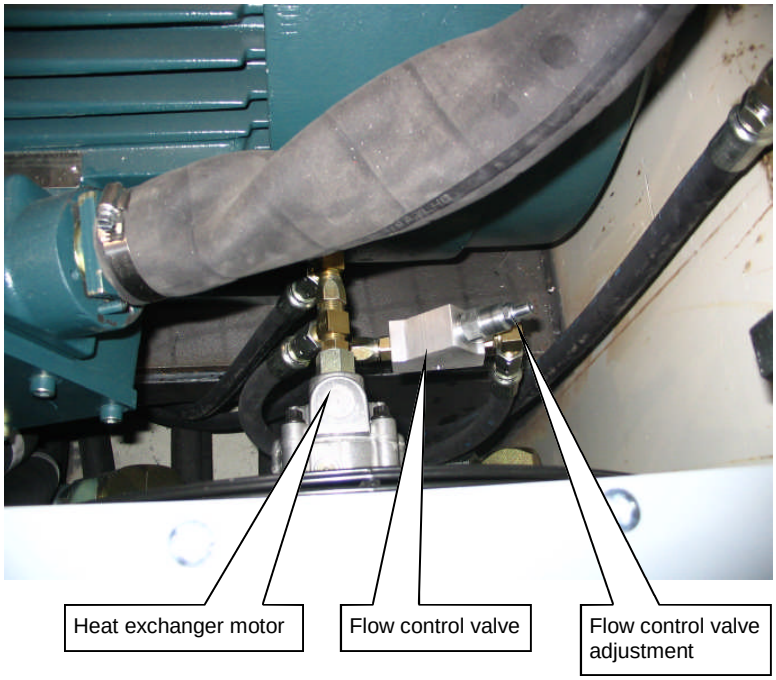
NOTICE!
Make certain that the same amounts of shims are used on both sides of the conveyor to prevent chain from stretching unevenly. Incorrect tension or adjustment can cause premature wear of sprockets and chain.

- ☞ Replace retainers.
- ☞ Release pressure on the take-up cylinders by opening the top valve to vent grease. After grease has vented, close valve.

WARNING!
Due to grease cylinders being under high pressure, do not stand in direct line of grease fitting or bleeder valve when releasing pressure. You could be seriously injured from high pressure grease.

- ☞ Store any unused shims under cover plate.

Fig. 52: Flow control valve adjustment



Pump and charge system reliefs

The pump and charge system reliefs are non-adjustable. If settings are incorrect, the cartridges must be replaced. See the pump drawing in the parts book for your machine.

How to remove the tail shaft

To remove the tail shaft assembly from the receiving boom proceed as follows (Fig. 58):

- ☞ Release tension on the conveyor chain. (See Conveyor chain adjustment in this chapter).
- ☞ Remove the five (5) bolts and lock washers from each of the tail shaft retainers and lift out the retainers.
- ☞ Disconnect, tag and cap the central lubrication hoses to the tail shaft.
- ☞ Remove the tail shaft shims.
- ☞ Separate conveyor chain and fold back to clear tail shaft. (See Conveyor chain replacement in this chapter).
- ☞ Attach an appropriate lifting device to the tail shaft assembly and and slowly lift from machine.

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.

How to install the tail shaft

To install the tail shaft assembly into the receiving boom proceed as follows (Fig. 58):

- ☞ With an appropriate lifting device, insert tail shaft into receiving boom.
- ☞ Fold the conveyor chain over tail shaft.
- ☞ Connect conveyor chain (see Conveyor chain replacement in this chapter.
- ☞ Connect central lubrication hoses and lubricate tail shaft and slide plate bearings with Spec. 100-3 grease.
- ☞ Adjust tension on the conveyor chain (see Conveyor chain adjustment in this chapter).
- ☞ Install the tail shaft retainers with the five (5) bolts and lock washers in each side.
- ☞ With machine running, visually inspect tail shaft to ensure that the shaft is turning and conveyor chain is not sliding across tail shaft.

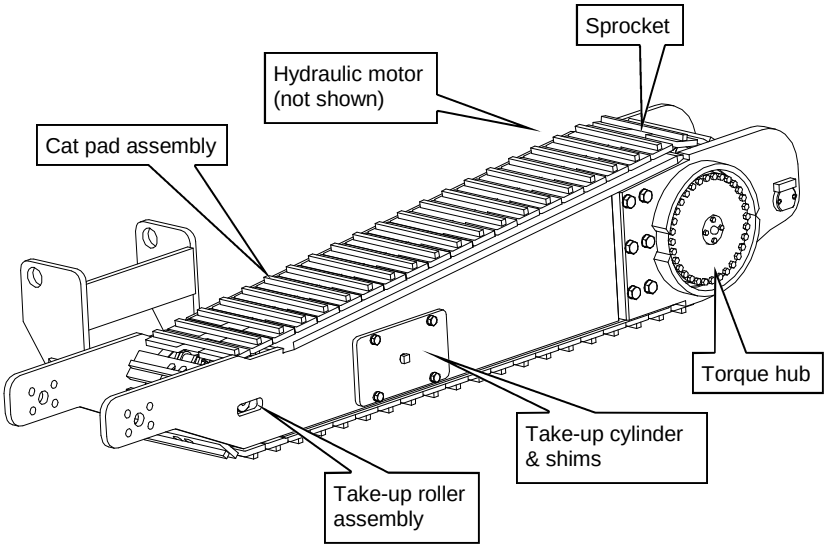
Crawler assembly

The crawler assembly (Fig. 63) consists of a take-up assembly and drive assembly that transmits torque to the crawler track via a hydraulic drive motor coupled to the tram drive torque hub. As soon as any component of the drive assembly is worn or damaged, the component must be replaced.

The crawler assembly consists of the following main components:

- hydraulic drive motor
- tram drive torque hub
- cat pad assembly
- take-up roller assembly
- grease take-up assembly
- drive sprocket

Fig. 63: Crawler assembly main components



How to disassemble the breaker power unit

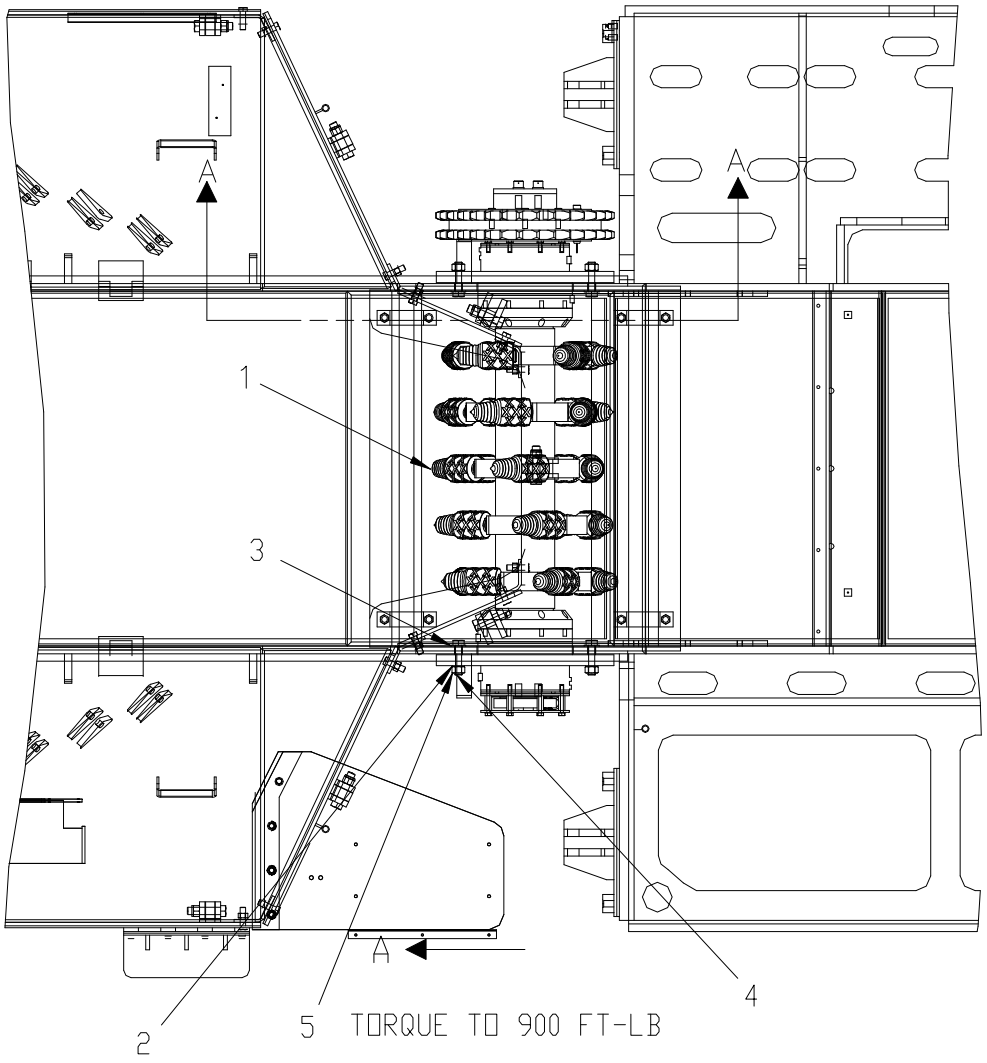
To disassemble the power unit proceed as follows (Fig. 69):

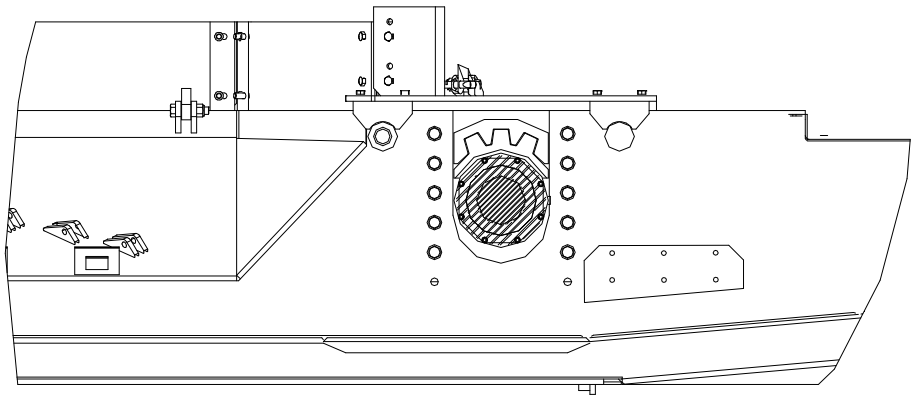
- ☞ Remove complete unit from machine. (See How to remove the drive unit in this chapter)
- ☞ Remove the four (4) bolts and lockwashers from gear pump (item 17) and remove pump.
- ☞ Open access cover on connecting tube (item 8) and loosen the two (2) bolts on the pump end and set screw on the motor end of the coupling.
- ☞ Remove the four (4) bolts and lockwashers from hydrostatic pump (item 12). With the aid of a lifting device, slowly pull pump from coupling (item 7) and connecting tube (item 8).

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.

- ☞ Remove the eight (8) bolts and lockwashers from connecting tube (item 8) and remove connecting tube from motor (item 5).
- ☞ Remove coupling (item 7) and key from motor shaft.
- ☞ Remove the four (4) bolts and nuts from motor base and the eight (8) bolts, lockwashers and nuts from the reducer base. With the aid of a lifting device, slowly lift motor and reducer from mounting base (item 11).
- ☞ Remove sprocket (item 6) and key from reducer shaft.
- ☞ Separe motor and reducer coupling halfs by removing the twelve (12) bolts from around the center of coupling (item 3).
- ☞ With the aid of a lifting device, slowly separate motor (item 5) and reducer (item 1).
- ☞ Remove the bolt, lockwasher and end cap (item 22) the end of the reducer shaft.
- ☞ Remove the three (3) bolts that secures the taper lock (item 2) to the reducer shaft.
- ☞ Insert two (2) of the bolts removed from the taper lock into the jack screw threaded holes located in the end of the taper lock (Fig. 68). Tighten both bolts equally until the taper lock is free from reducer shaft.
- ☞ Remove the bolt, lockwasher and end cap (item 22) the end of the motor shaft.

Fig. 72: Breaker assembly removal and installation





SECTION A–A

1. breaker shaft assembly
2. lock washer
3. flat washer
4. bolt
5. nut

Table 8: 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	D	Fluid viscosity too high	A	Air in fluid	See Table 3	Overriding work load	G
Mechanical bind	B	Insufficient control pressure for valves	See Table 6	No lubrication of machine ways or linkage	F		
Worn or damaged cylinder or motor	D	No lubrication of machine ways or linkage	F	Sticking valve	C		
		Sticking valve	C	Worn or damaged cylinder or motor	D		
		Worn or damaged cylinder or motor	D				
		Pilot filter clogged	See Table 5				

Remedies

A. ☞ check fluid temperature
☞ check system fluid viscosity; change if necessary

B. ☞ locate bind and repair

C. ☞ clean and adjust or replace part
☞ check condition of system fluid and filters

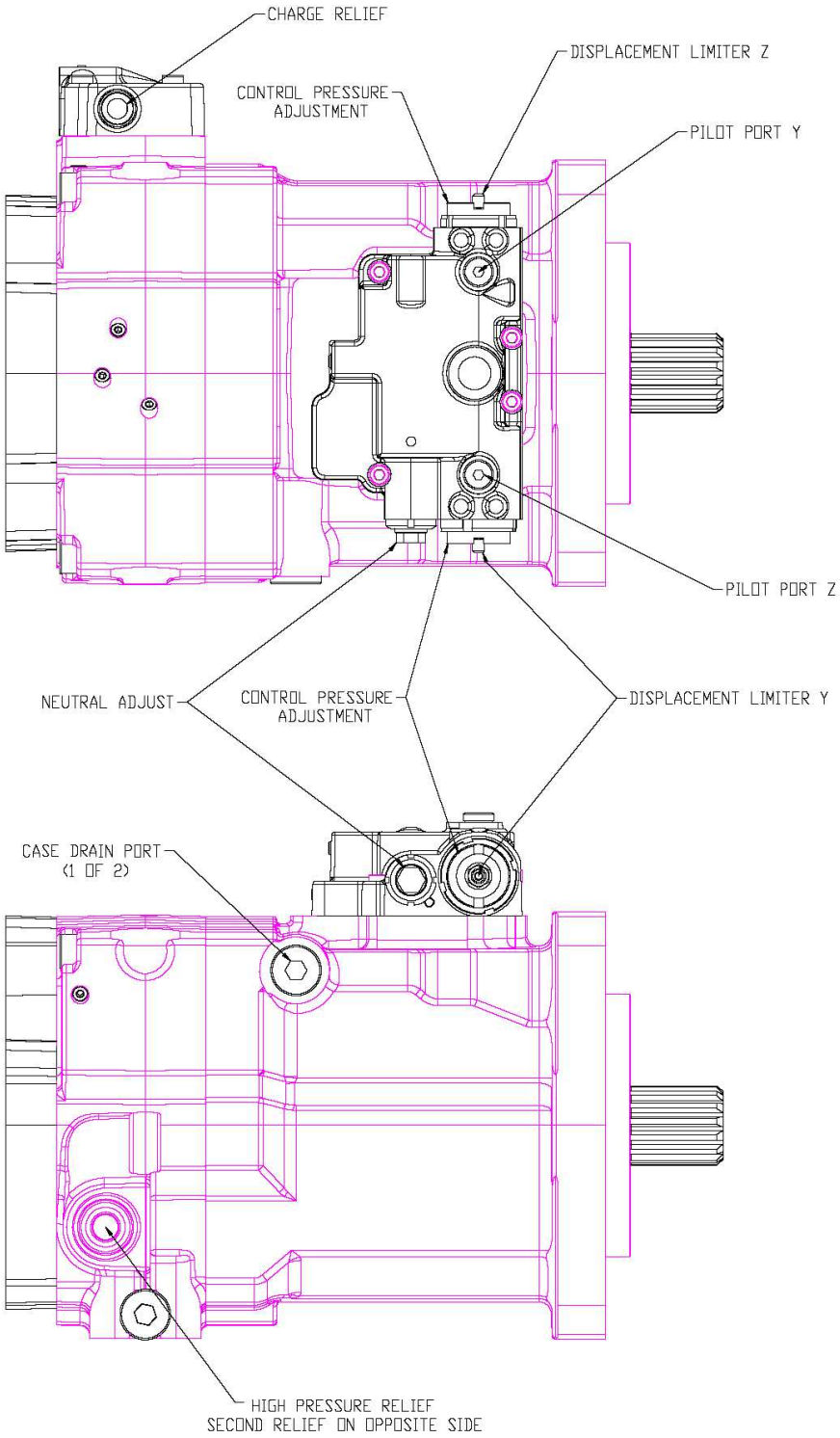
D. ☞ overhaul or replace part

E. ☞ repair command console or interconnecting wires

F. ☞ lubricated

G. ☞ adjust, repair, or replace counterbalance valve

Fig. 75: Pump


CHARGE RELIEF
DISPLACEMENT LIMITER Z
CONTROL PRESSURE ADJUSTMENT
PILOT PORT Y
PILOT PORT Z
NEUTRAL ADJUST
CONTROL PRESSURE ADJUSTMENT
DISPLACEMENT LIMITER Y
CASE DRAIN PORT (1 OF 2)
HIGH PRESSURE RELIEF
SECOND RELIEF ON OPPOSITE SIDE

Tightening torques

IMPORTANT!
Due to the application of fasteners being subject to great stresses and heavy or extreme vibration, it is imperative that all bolts be applied with an adequate amount of torque. For this reason this list of recommended torque settings for different types and sizes of fasteners used has been compiled. The tightening torques stated in the spare parts lists have to be observed, as well, for installation and maintenance.

IMPORTANT!
Use a calibrated torque wrench for accuracy.

Table 15: Grade 8 bolt torque specifications (calculated at 75% proof load)

Bolt size	Recommended torque setting (ft-lbs) (dry)	Recommended torque setting (ft-lbs) (wet)
1/4	13	8
5/16	26	16
3/8	47	28
7/16	75	45
1/2	115	70
9/16	165	99
5/8	225	135
3/4	400	240
7/8	645	390
1	905	545
1-1/8	1,380	830
1-1/4	1,935	1,160
1-3/8	2,540	1,525
1-1/2	3,380	2,030