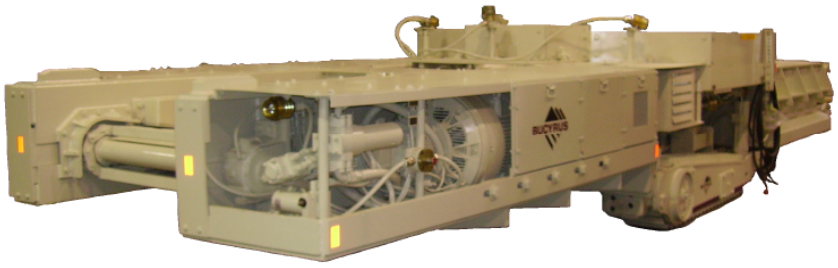
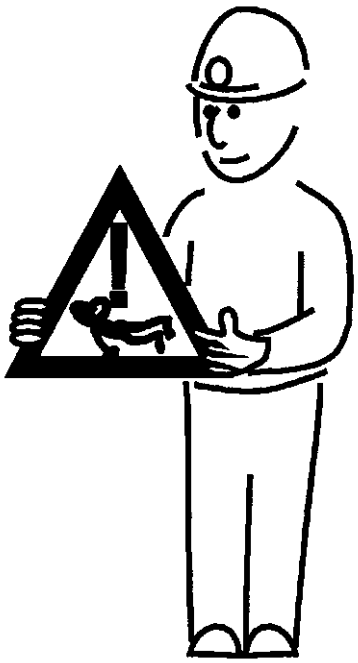
Operation and Maintenance Manual

Bucyrus - Feeder Breaker
Model - 7MFBH-48A



Bucyrus America, Inc.
4041 Wurno Road
Pulaski, VA 24301
Telephone: 540-980-4530
Fax: 540-994-3763
Internet: www.bucyrus.com

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.

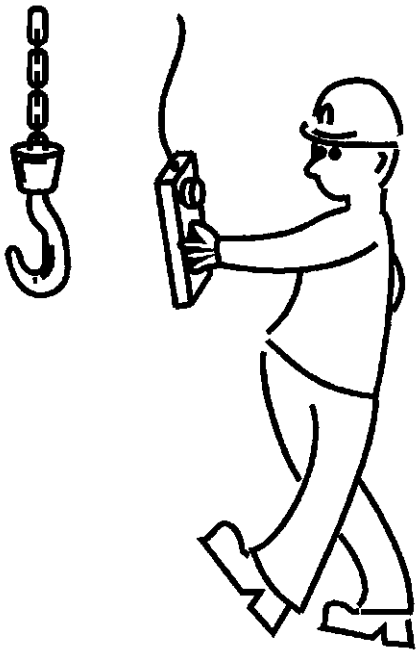
Carry out a visual inspection of all the hydraulic components at regular intervals. In particular check that:

- 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 Bucyrus America, Inc. 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

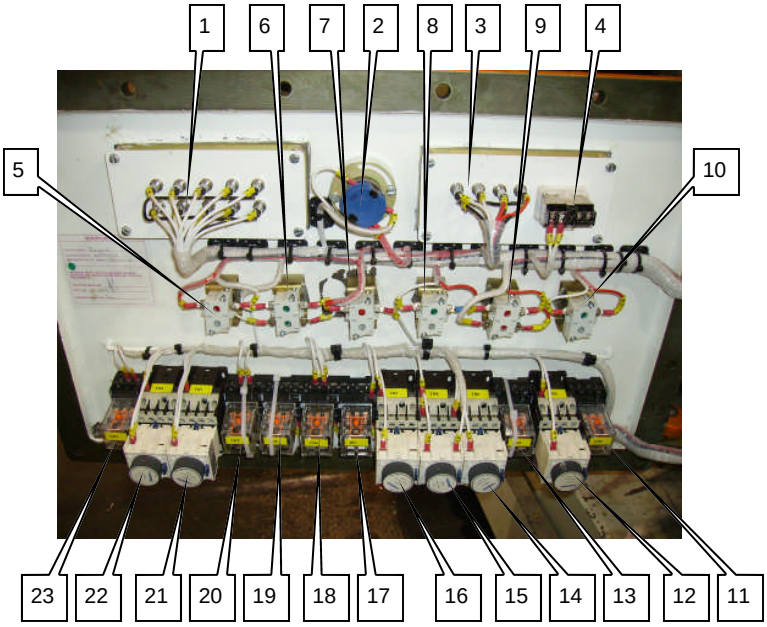
☞ Turn on the water supply. Both water monitoring switches will operate.

☞ 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

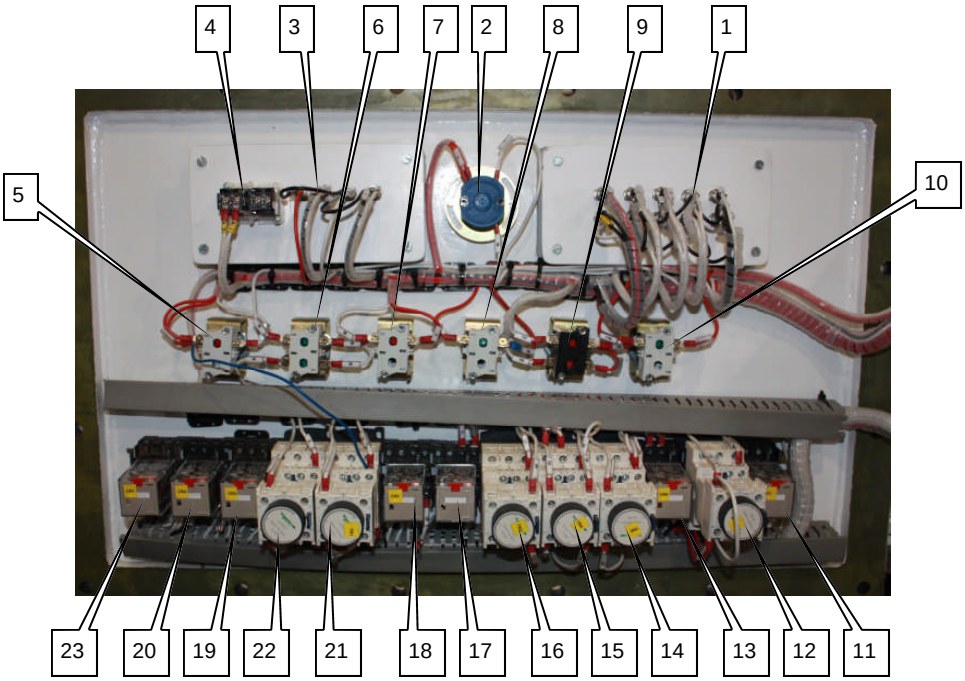
Serial number 54-2168



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

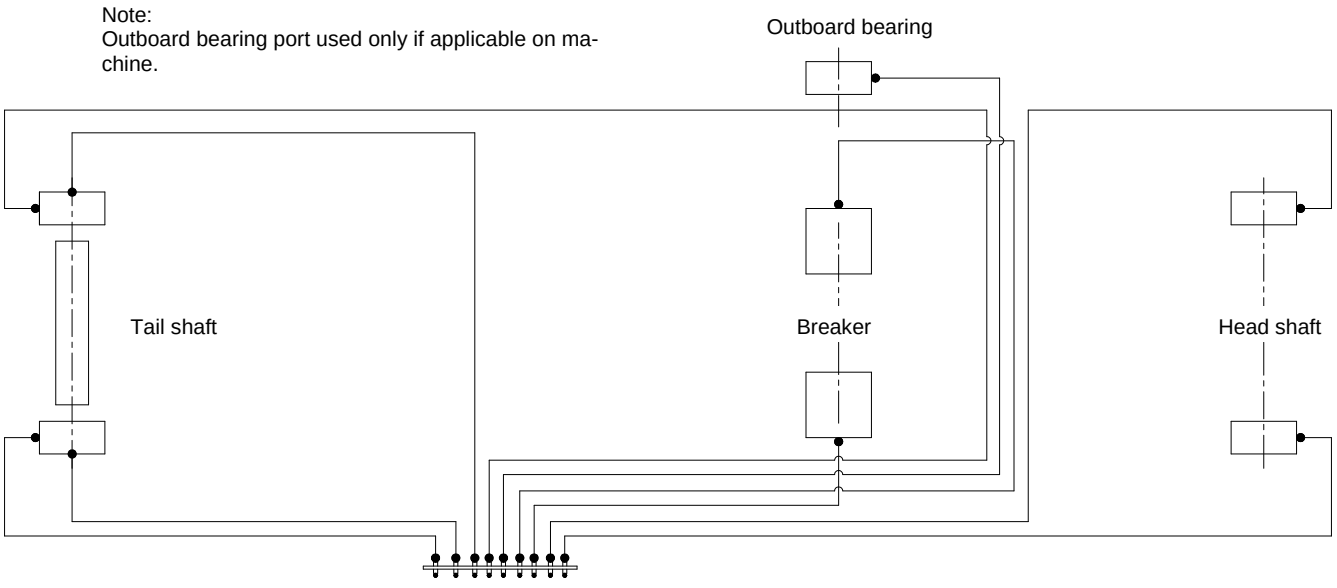
Location	Specification	Approximate capacity
Hydraulic oil tank	Spec. 100-1	162 gal (613 L)
Breaker reducer	Spec. 100-6	10 gal (38 L)
Tram Reducer	Spec. 100-2 or Spec. 100-13	2.5 gal per side (10 L per side)
Grease points	Spec. 100-3	As required

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

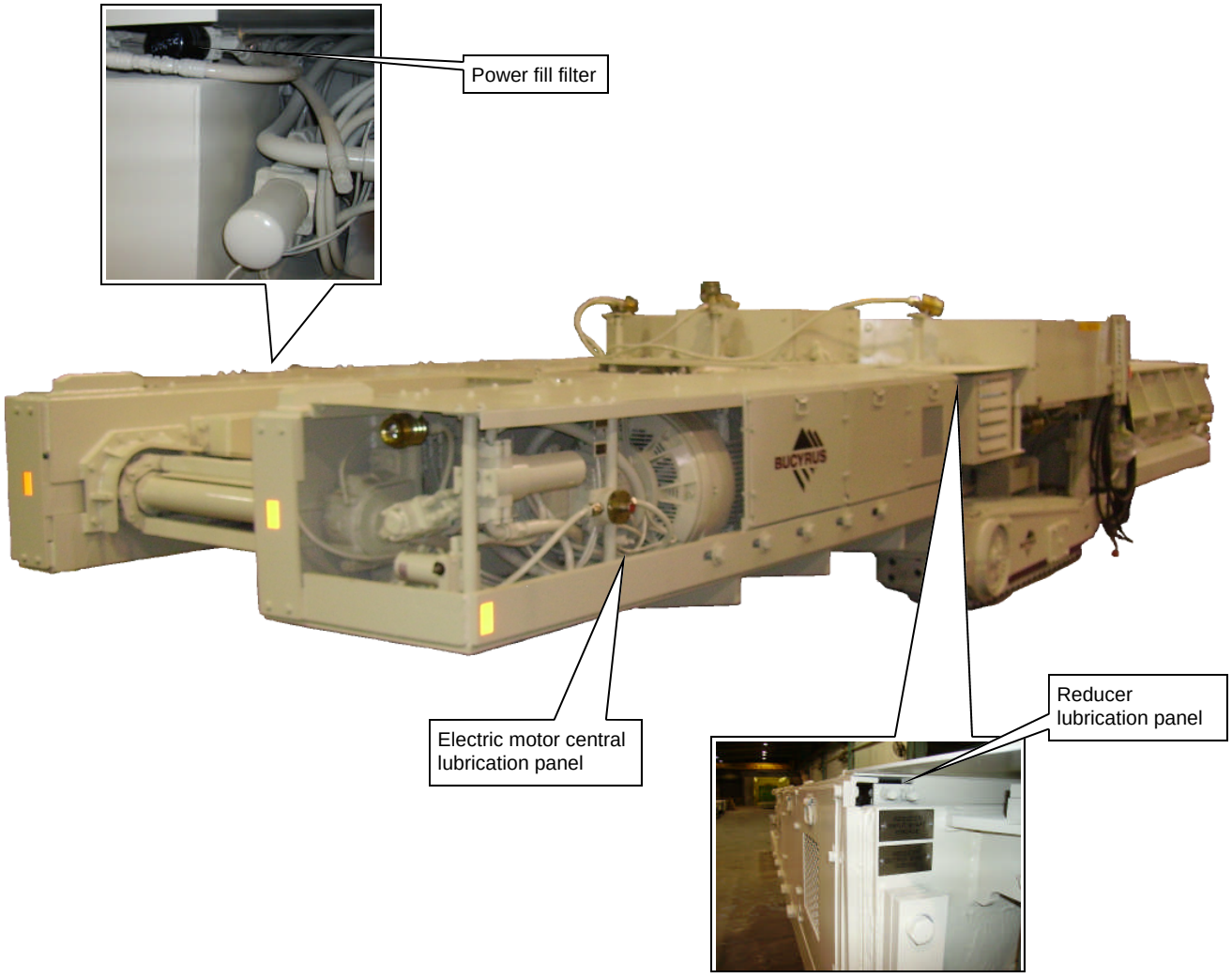
electric motor Lubricate the feeder breaker's electric motor with Spec. 100-14 or 100-16 through the two (2) grease fittings located on each end of the motor (Fig. 42) . Pump only one or two pumps of grease into each fitting.

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.

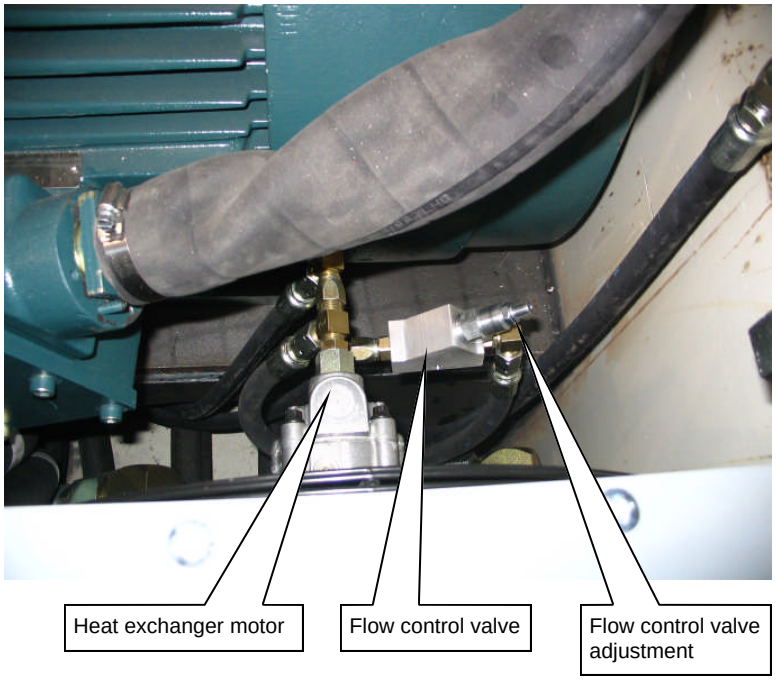
NOTICE!
Make certain that the same amounts of shims are used on both sides of the conveyor to prevent chain from stretching unevenly. Incorrect tension or adjustment can cause premature wear of sprockets and chain.

- ☞ 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 Bucyrus 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.

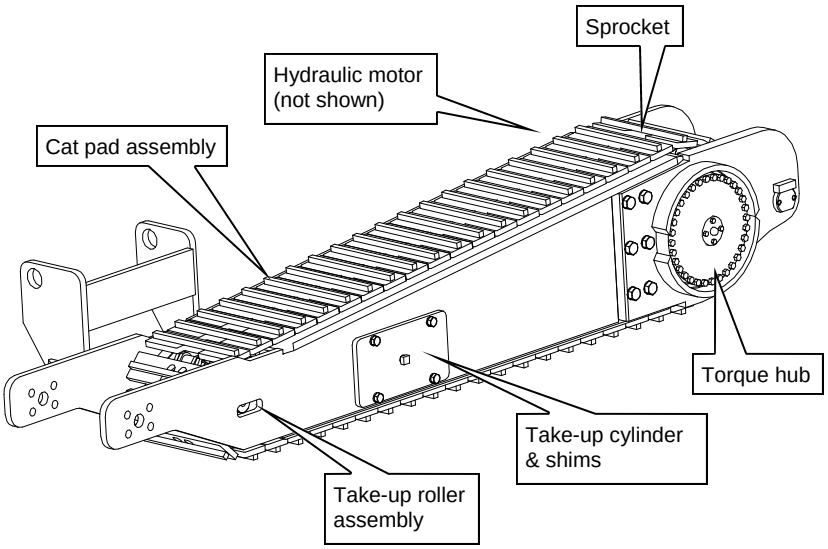
Crawler assembly

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

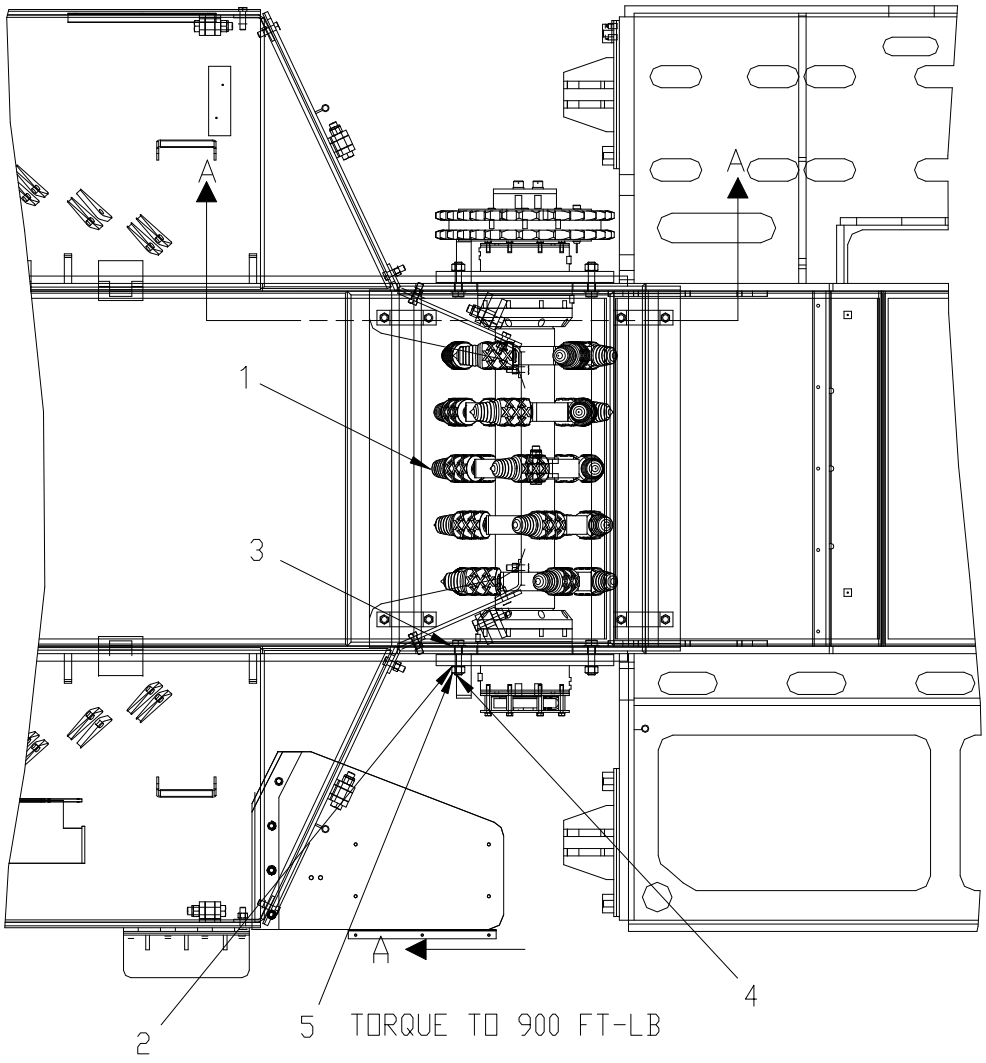
To disassemble the power unit proceed as follows (Fig. 69):

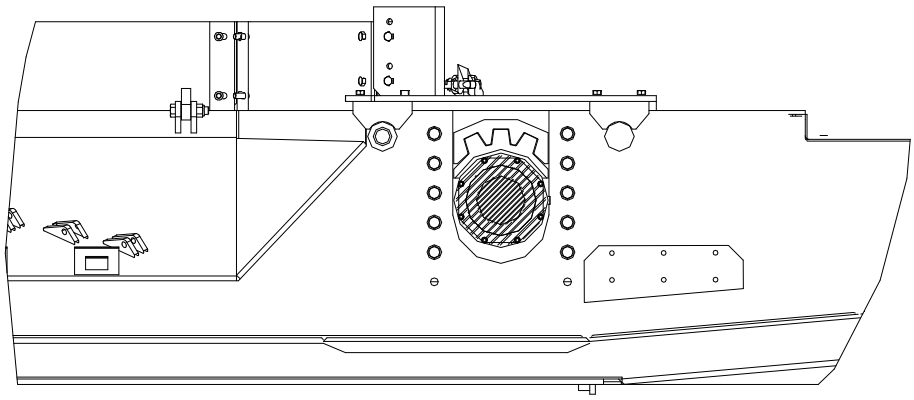
- ☞ Remove complete unit from machine. (See How to remove the drive unit in this chapter)
- ☞ Remove the four (4) bolts and lockwashers from gear pump (item 17) and remove pump.
- ☞ Open access cover on connecting tube (item 8) and loosen the two (2) bolts on the pump end and set screw on the motor end 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

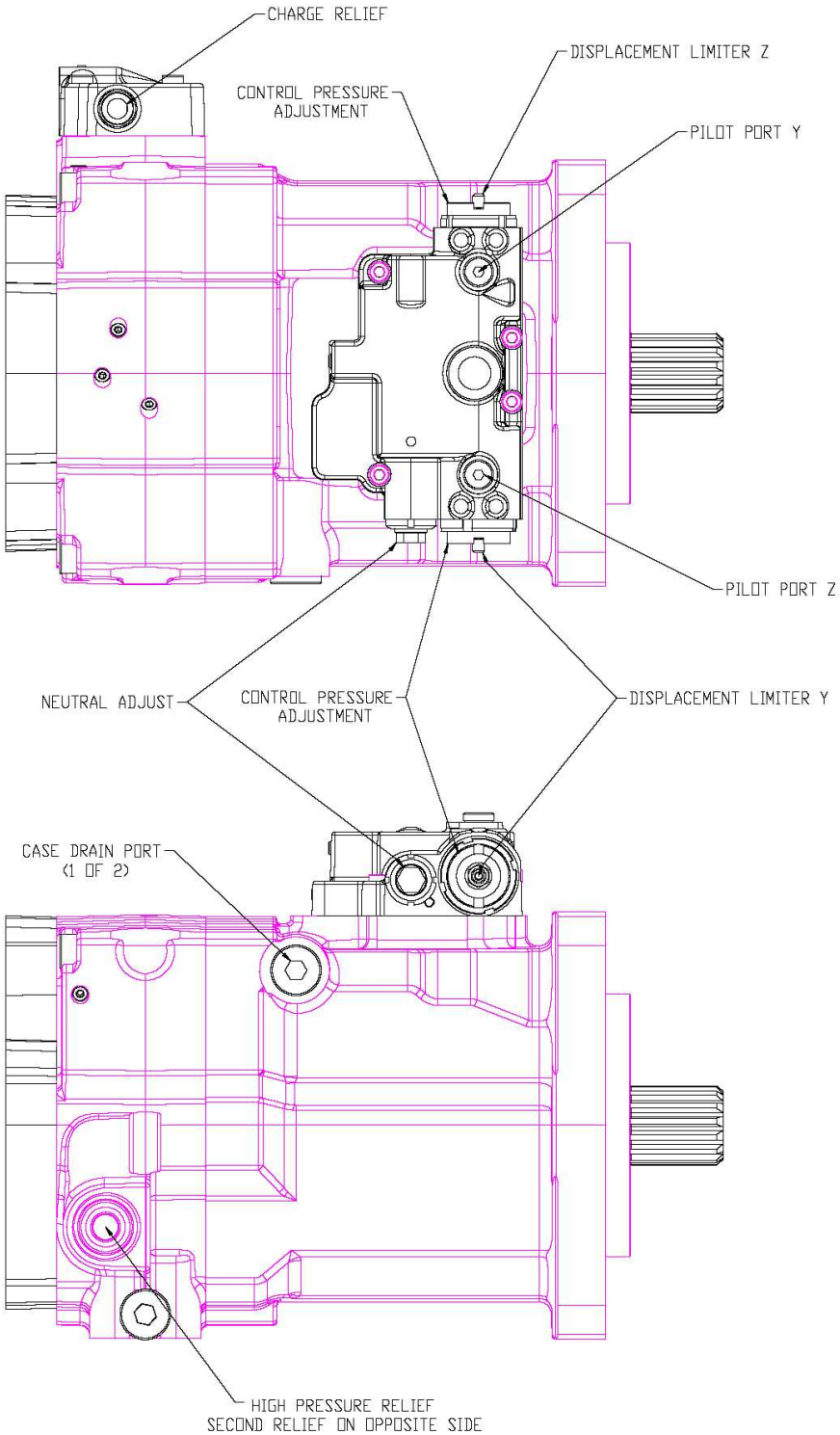
D. ☞ overhaul or replace part

E. ☞ repair command console or interconnecting wires

F. ☞ lubricated

G. ☞ adjust, repair, or replace counterbalance valve

Fig. 75: Pump



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

Table 26: Light gear oil, SAE 40 motor oil (Spec. 100-10)

	Supplier	Brand name
1	Amoco Oil Company	Amoco 300 SAE 40
2	Gulf oil	Super Duty 40
3	Mobil Oil Corporation	Delvac 1340
4	Chevron U.S.A.	Chevron RPM Heavy Duty Motor Oil 15W-40
5	Sun Oil Company	Sunoco Super C 40
6	Unocal 76	Guardol Motor Oil SAE 40
7	Shell Oil company	Rotella Oil 40 (Automotive) Turbo Oil 150 (Industrial) Rimula CT40 (Foreign) Rotela SX40 (Foreign)
8	Century	Flexe SAE 40
9	Texaco Lubricants Company	Ursa Super plus SAE 40
10	Exxon	XD-3 Extra SAE 40 or XD-3 SAE 40
11	Pennzoil	Long Life SAE 40 Motor Oil
12	Lubricating Engineers	8440 Monolex GFS Engine Oil
13	Conoco Inc.	Fleet Heavy Duty Motor Oil SAE 40
14	Hydrotex	Hyfilm SAE 40
15	Phillips	Super HD II Motor Oil SAE 15W-40

Table 27: Synthetic EP gear lubricants (Spec. 100-11)

	Supplier	Brand name
1	Century Lubricants Company	Synthetic EP Gear Lubricants

Table 28: Multi-purpose tractor hydraulic fluid (Spec. 100-12)

	Supplier	Brand name
1	Exxon / Mobil	Mobilfluid 424
2	Century / Fuchs	Multitran
3	Shell	Donax TD
4	Chevron	Tractor Hydraulic Fluid
5	BP Lubricants	Tractran UTH
6	Quaker State	Quaker State FCI HD
7	Conoco	Powertran Fluid

Contents

Options (Continued)

Bypass Function

In some applications it is desirable to bypass fluid around the variable displacement pump when pump shaft rotation is either not possible or not desired. For example, a “down” vehicle may be moved to a service or repair location or winched on a trailer without operating the prime mover.

Series 90 pumps are designed with a bypass function. The bypass is operated by mechanically rotating the bypass hex on both multi-function valves three (3) turns counter-clockwise (CCW). Refer to figures 8 on page 14.

This connects working loop A and B and allows fluid to circulate without rotating the pump and prime mover.

Caution !

Bypass valves are intended for moving a machine or vehicle for very short distances at very slow speeds. They are NOT intended as “tow” valves.

Speed Sensor

Series 90 pumps are available with an optional speed sensor for direct measurement of pump input speed.

A special magnetic speed ring is pressed onto the outside diameter of the cylinder block and a Hall effect sensor is located in the pump housing. The sensor accepts supply voltage and outputs a digital pulse signal in response to the speed of the ring. The output changes its high/low state as the north and south poles of the permanently magnetized speed ring pass by the face of the sensor. The digital signal is generated at frequencies suitable for microprocessor based controls.

This sensor will operate with a supply voltage of 4.5 to 15 VDC, and requires a current of 12 mA at 5.0 VDC under no load. Maximum operating current is 30 mA at 1 kHz. Maximum operating frequency is 15 kHz. Output voltage in “High State” (VOH) is sensor supply voltage minus 0.5 VDC, minimum. Output voltage in “Low State” (VOL) is 0.5 VDC, maximum.

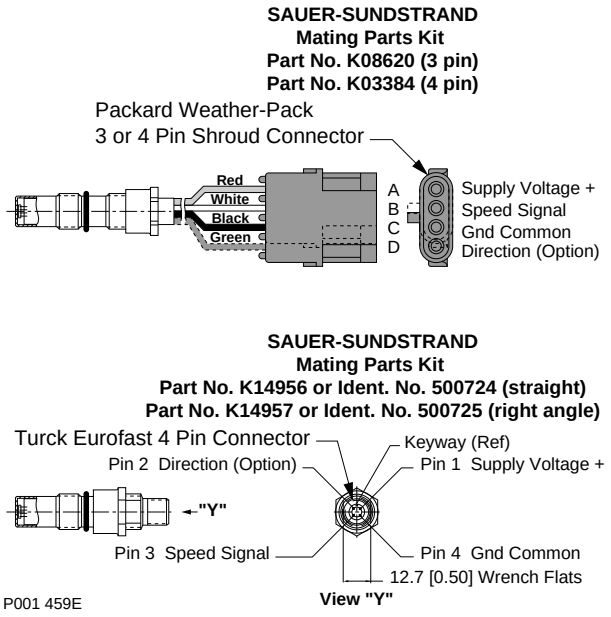
The sensor is available with a Packard Weather-Pack 3 or 4-pin sealed connector or a Turck Eurofast M12x1 4-pin connector.

Table 2: Pulse frequency

Frame Size	**030**	**042**	**055**	**075**
Pulses per revolution	43	48	52	58
Frame Size	**100**	**130**	**180**	**250**
Pulses per revolution	63	69	-	-

- = not available

Figure 11: Speed sensor



Controls - Circuit Diagram, Nomenclature and Description (Continued)

3-Position (FNR) Electric Control, Options DC, DD (Continued)

Response Time

The time required for the pump output flow to change from zero to full flow (acceleration) or full flow to zero (deceleration) is a function of the size of the orifice in the control flow passage.

A range of orifice sizes is available for the Series 90 Electric Displacement Control to assist in matching the rate of swashplate response to the acceleration and deceleration requirements of the application. **Testing should be carried out to determine the proper orifice selection for the desired response.**

Typical response times between neutral and full flow at the following conditions:

Δp =	210 bar	(3 000 psi)
Temperature =	50 °C	(122 °F)
Charge Pressure =	24 bar	(340 psi)

Table 11: Typical response times

Frame Size	Maximum Time Seconds (Smallest Orifice) Option 01	Minimum Time Seconds (No Orifice) Option 00
030	1.5	0.60
042	1.9	0.22
055	3.6	0.27
075	3.7	0.32
100	4.8	0.42
130	7.5	0.70
180	7.5	0.55
250	9.0	1.0

Table 12: Pump output flow direction vs. control voltage

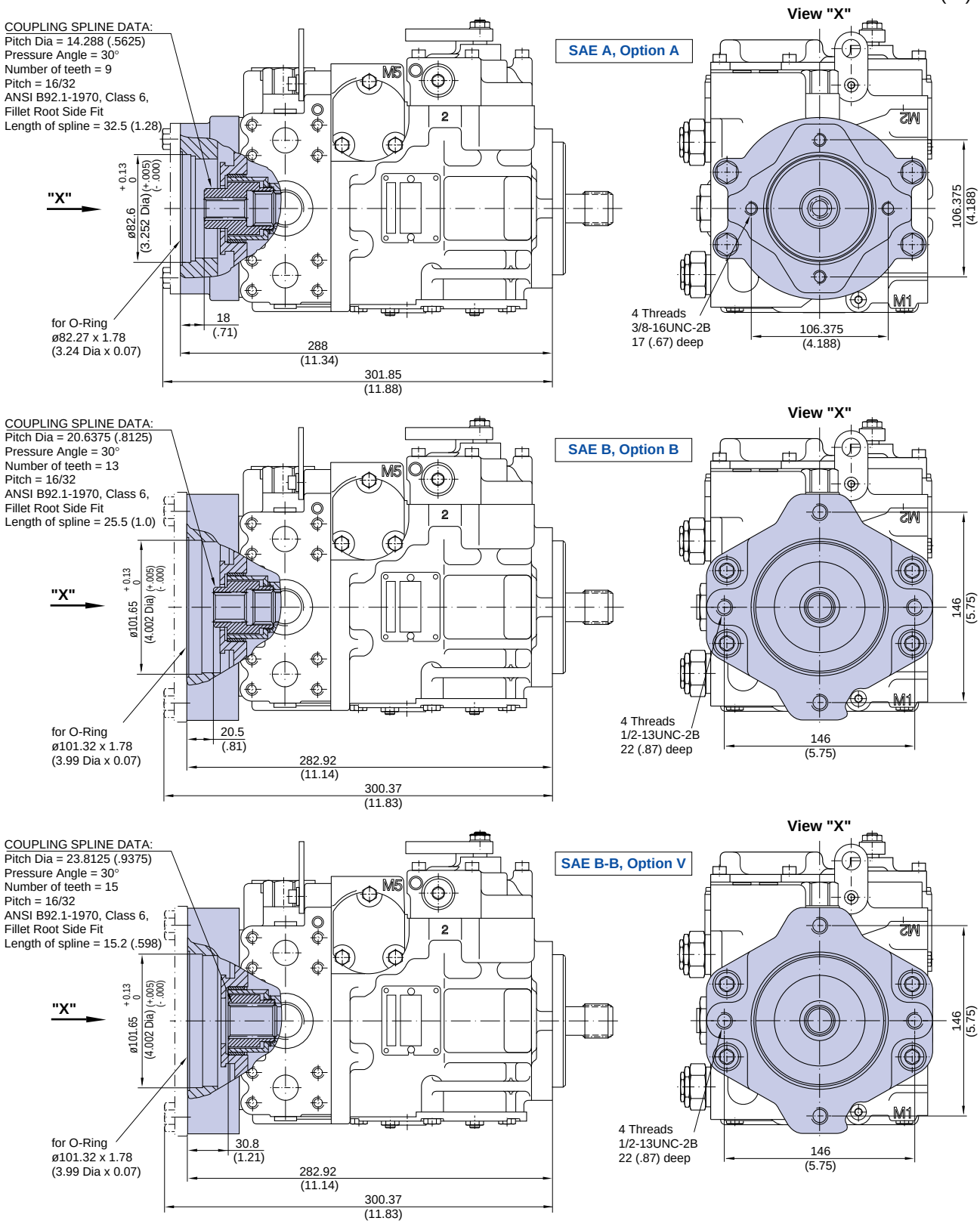
Input Shaft Rotation	CW		CCW	
Signal at Magnet	a	b	a	b
Port A Flow	Out	In	In	Out
Port B Flow	In	Out	Out	In

Refer to dimensions for port locations

Dimensions • Frame Size 042 (Continued)

Continued Figure 39: Auxiliary Mounting Pad - Options A, B, V

mm
(in.)

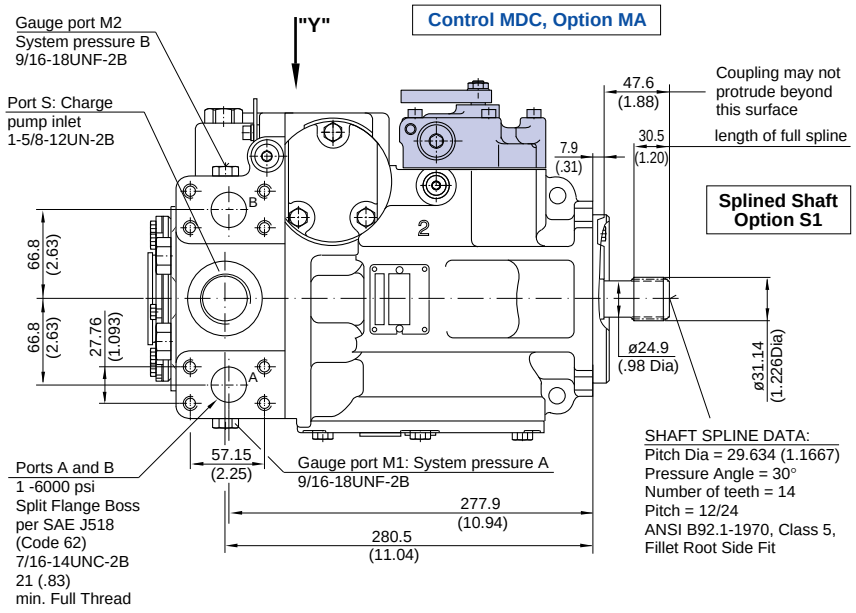


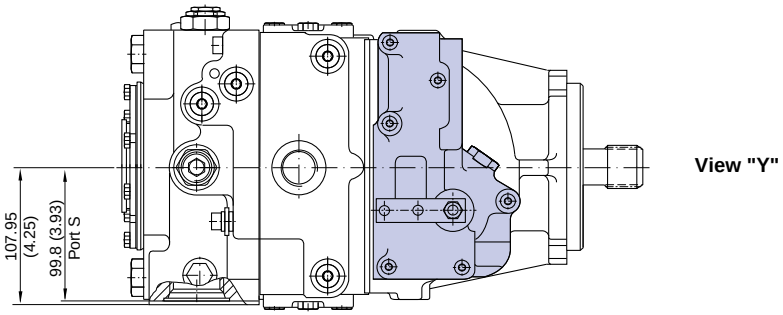
P001 362E

Dimensions • Frame Size 100 (Continued)

Continued Figure 42: Axial Piston Variable Displacement Pump with Manual Displacement Control (MDC) mm (in.)

Endcap Twin Ports, Option 8





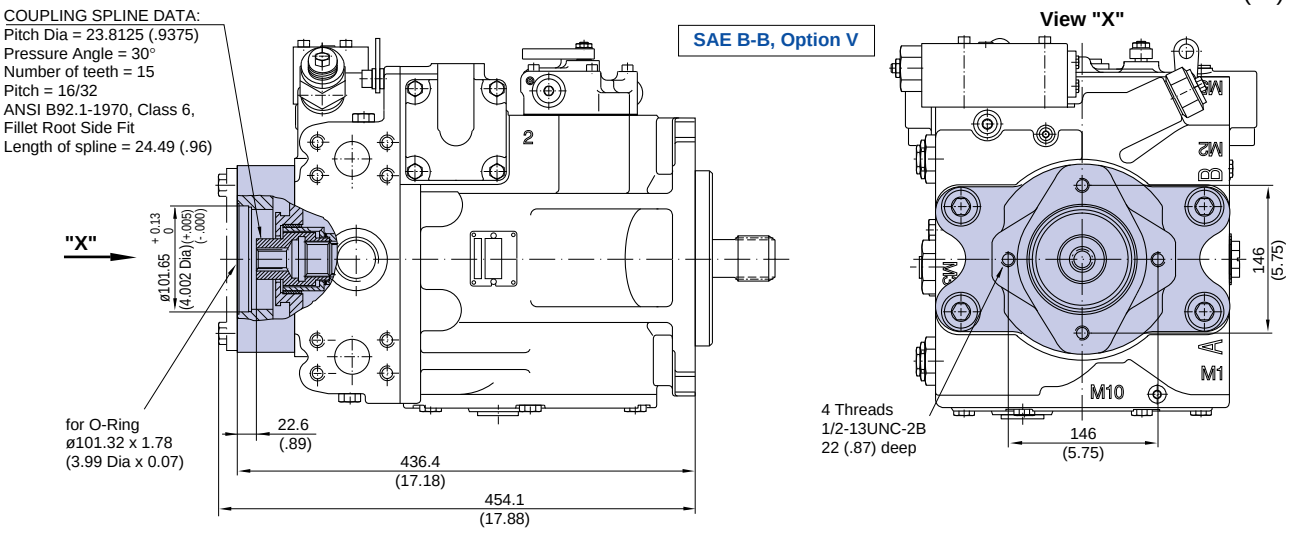
View "Y"

P001 378E

Dimensions • Frame Size 180 (Continued)

Continued Figure 44: Auxiliary Mounting Pad - Options A, B, C, D, E, H, V

mm
(in.)



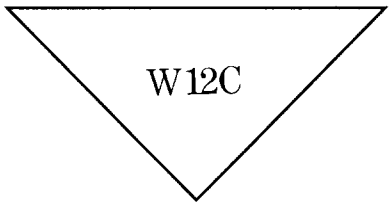
P001 469E/1

TORQUE-HUB®

Final Drives

ASSEMBLY-DISASSEMBLY MANUAL

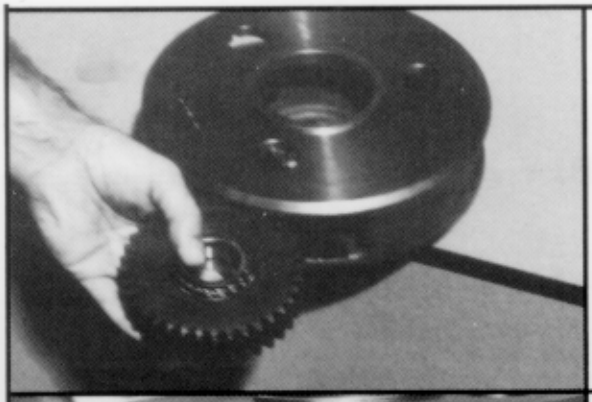
FOR THE



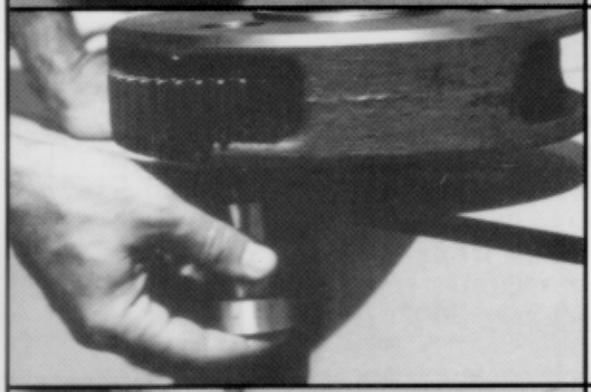
UNIT

FAIRFIELD

THE FORCE BEHIND THE FUTURE



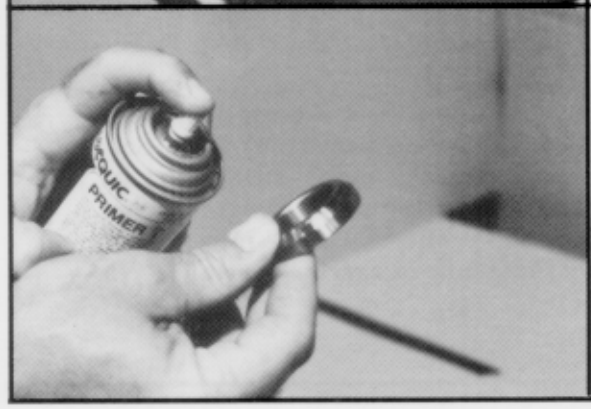
5. Place assembled **planet gear (3F)** into **first stage carrier housing (3A).**



6. Slide **planet shaft (3E)**, small end up, into the holes through the **first stage carrier (3A)**, starting from the bottom of the carrier.

7. Slide **carrier housing (3A)** all the way onto table. Line up the rounded notch (lock pin holes) in the **first stage carrier housing (3A)** and the **planet shaft (3E)**. Drive the **lock pin (3D)** into the aligned holes. Use an alignment punch to drive the lock pin all the way into the holes.

8. Place **lockwasher (3H)** over end of **planet shaft (3E).**

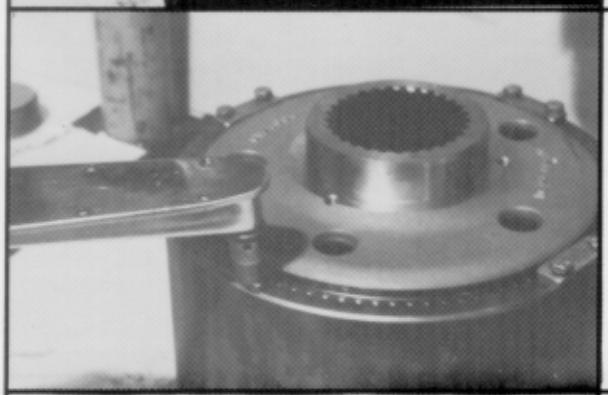


9. Spray the threads on **locknut (3G)** with Primer T. Allow 2-3 minutes' drying time.

10. Place **internal gear hub (1Q)** into **internal gear (1P).**

11 Place the four **plates (1R)** over the holes in **internal gear (1P).**

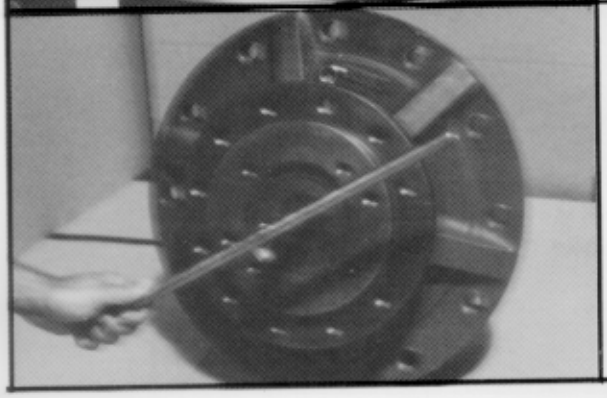
12. Apply "Loctite 277" to **bolts (1S)** and install them in the bolt holes in **plates (1R).**



13. Torque **bolts (1S)** to 13-17 ft.-lbs.

14. Lockwire the **bolts (1S)** together. Make sure the wire does not extend out past the edge of the internal gear's outside diameter. Follow steps A to I to lockwire bolts together:

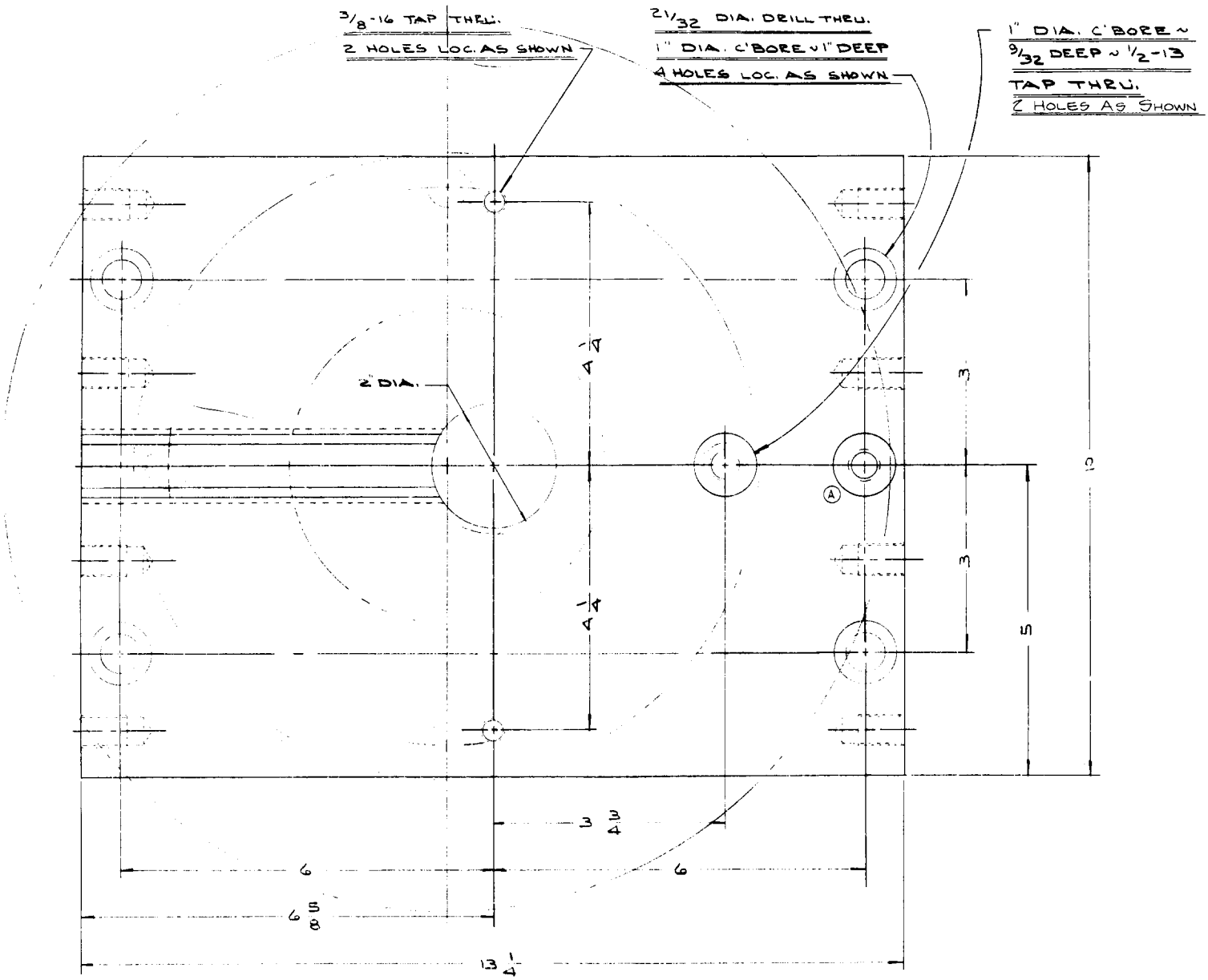
23. Turn **hub (1G)** over onto its cover and place **coupling (16A)** into the end of **spindle (1A)**.



24. Roll test the unit in both clockwise and counterclockwise directions. Perform the same number of rolls in each direction as the ratio of the unit. The ratio is the same as the last two digits of the model number found on the ID tag of the unit. For example, model W12C100440X should be rolled 40 times in both directions.

25. Leak test the unit at a pressure of 8 psi for 2-3 minutes.

26. At this point, the main assembly is complete.



T-148965
ASSEMBLY TORQUING FIXTURE

Contents

3.1.1 Lifting methods

Always make sure where the centre of gravity is before any lifting.

Fig. 3.4

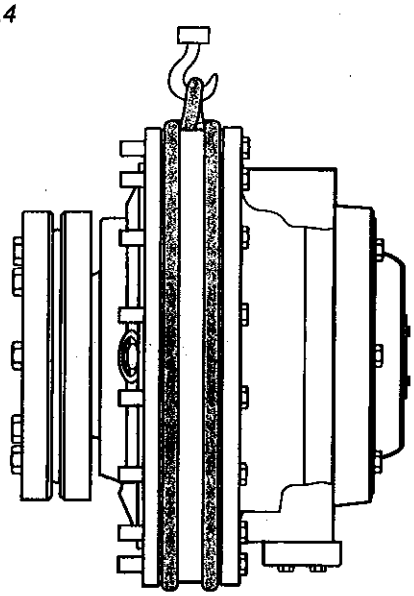
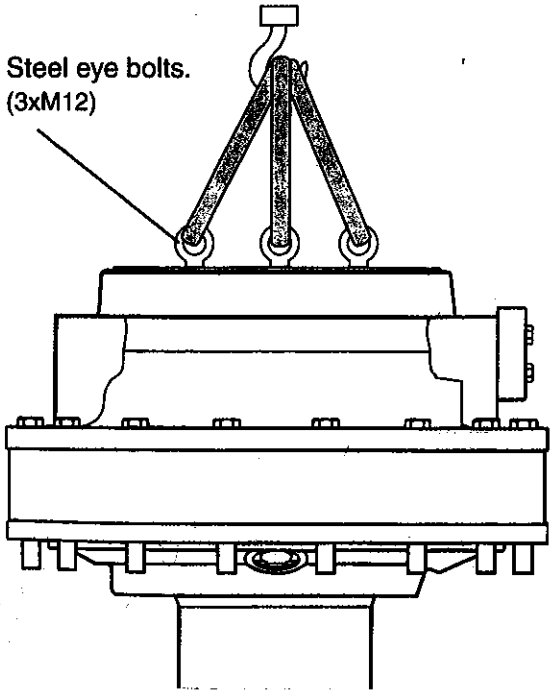


Fig. 3.4a

Note: *Motor lifted without coupling fitted, danger of slipping off.*



Note: *The End cover and screws must be removed before mounting the Steel eye bolts. After the lift refit the End cover and screws with torque 81 Nm (59 lbfft).*

Lifting the torque arm

Fig. 3.5

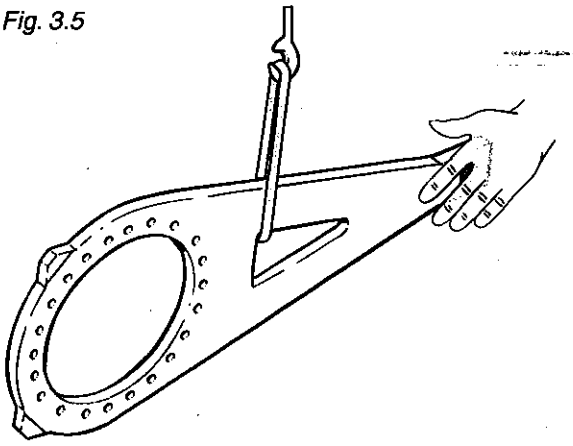
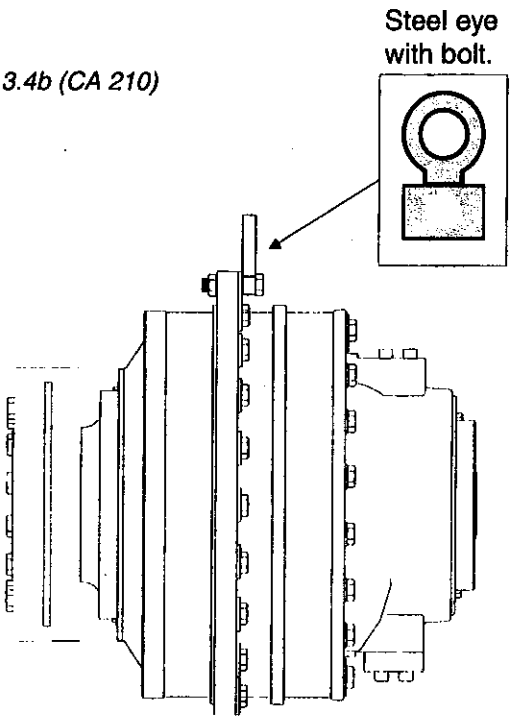
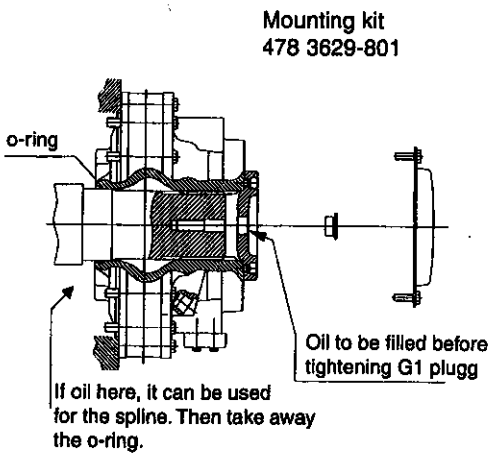


Fig 3.4b (CA 210)



Always make sure where the centre of gravity is before any lifting. Never stand below a hanging motor or torque arm.

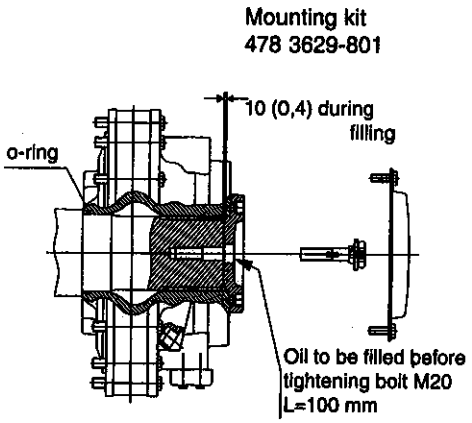
3.1.4b Mounting the motor onto the driven shaft - splines



Flange mounted motors

For flange mounted motors, the spline shall normally not be subject to radial load. With no radial load, the splineshaft can be oiled before mounting the motor. If the motor is subject to radial load, the splines shall be filled up with oil.

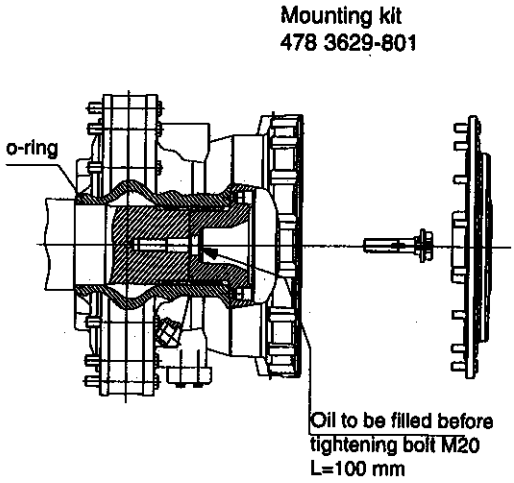
- Mount the motor on to the shaft.
- Bolt the motor to the flange.
- Fill up hydraulic oil to the G1 plug.
- Torque the G1 plug. M_V=125 Nm/90 lbf·ft.
- Mount the cover. M_V=81 Nm/59 lbf·ft.



Torquearm mounted motors

Motors that carry radial load, must have the splines oiled. The motor can be used for horizontal mounting and mounting with motor shaft pointing downwards.

- Mount the motor on to the shaft.
- Fill up hydraulic oil to the G1 plug.
- Mount washer and bolt.
- Torque the bolt. M_V=385 Nm/280 lbf·ft.
- Mount the cover. M_V=81 Nm/59 lbf·ft.



Torquearm mounted motors with brake

Motors with brake MDA, must have the brake disassembled. See 3.1.10. For motors with brake BICA see Installation and Maintenance manual BICA.

- Mount motor with brake housing on the shaft.
- Fill up hydraulic oil to the G1 plug.
- Mount washer and bolt.
- Torque the bolt. M_V=385 Nm/280 lbf·ft.
- Mount the brake according to 3.1.9.

3.2 Oil connections

When using (heavy wall) piping and in frequent reversal drives, it is recommended to fit flexible hoses between the motor and piping to avoid damage due to vibration and to simplify installation of the motor. The length of the hoses should be kept fuirly short.

Fig. 3.25a

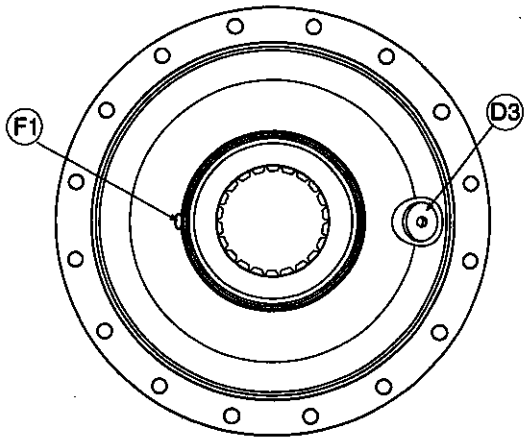


Fig. 3.25

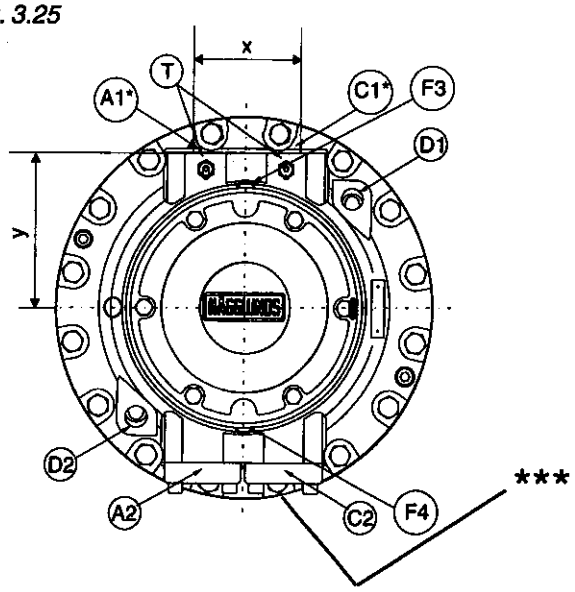
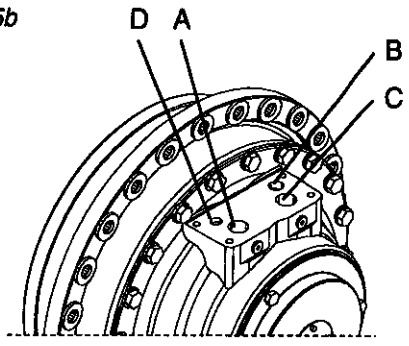


Fig. 3.25b



Connection	Description	Remarks
C1*, C2	Main connection	If C is used as the inlet, the motor shaft rotates clockwise, viewed from the motor shaft side*.
A1*, A2	Main connection	If A is used as the inlet, the motor shaft rotates counter-clockwise, viewed from the motor shaft side*.
D1	Drain outlet	Normally plugged at delivery.
D2, D3	Alternative drain outlets	Normally plugged at delivery.
F1	Flushing connection	For flushing of radial lip seal. Normally plugged.
F3, F4	Flushing connection	For flushing of axial bearing and motor case.
T	Test connections	Used to measure pressure and/or temperature at the main connections.

A, B, C and D: Connections for 2-speed valve. See fig. 3.25b

Motor	A**	C**	D1, D2	D3	F1, F3, F4	T	y mm	y in	x mm	x in
CA 50...210	1 1/4"	1 1/4"	G 3/4"	G 3/4"	G 1/4"	G 1/4"	188	7,40	99	3,90

*Not valid for motors prepared for displacement shift.
**SAE coupling J 518 C, code 62, 414 bar (6000 psi).
*** A2-connection and C2-connection is blocked at delivery. They are able to withstand max pressure.

FAULT FINDING

Hydraulic motor with MDA brake

Fault	Probable cause	Action
Insufficient braking torque.	The brake cylinder is not drained in the described manner, excessive counter pressure in drainage line.	Remove the cause of the pressure. Concerning the maximum counter pressure, see the section dealing with draining the brake cylinder under 3.3.10/13, "Draining of brake cylinder".
	The brake linings or the discs are worn out.	Control of braking torque according to 3.1.14. Dismantle the brake and replace the worn discs.
The brake does not open.	Insufficient brake opening pressure.	For the required opening pressure see the section dealing with brake MDA under 3.1.7 "Brake MDA".
	Seals or piston damage.	Replace seals. Replace the piston. IMPORTANT! The spring in the brake cylinder is tensioned.

Hydraulic motor with two-speed valve, VTCA 600

Fault	Probable cause	Action
Motor only works at one speed.	Pilot pressure low.	Suitable pilot pressure - see AC-3.1 Engineering manual.
	The valve piston has stuck in single-speed position due to impurities in the oil.	Inspect piston and remove impurities.

Proper storage of drives will permit protection for approximately one year against corrosion from condensation. For longer periods follow the Long Term Storage instructions or consult Link-Belt Drive Division.

Caution:
Improper storage of drives may cause damage to internal parts. The storage procedure outlined in the following paragraphs must be followed, otherwise the standard warranty may be voided.

OUTDOOR AND LONG TERM STORAGE OF SPEED REDUCERS

It is always preferable to store speed reducers indoors. When this is not possible, or when storage is for a period longer than one year, follow these instructions.

1. Reducers should never be exposed to the elements. They must be protected from the elements in some manner. If stored outdoors, cover with a tarp that can be secured to the base of the reducer housing.
2. Remove plug from breather hole and attach a sufficient length of pipe to extend above the highest part of the speed reducer.
3. Cap the pipe (pipe cap should be drilled and tapped for alemite fitting) and install alemite #317400 fitting to relieve potential internal pressure.
4. Fill reducer completely with a heavy rust inhibitor such as Gulf No-Rust Engine Oil, Grade 3, which conforms to Military Specification MIL-L-21260.
5. At least every three months rotate input shaft. Be sure the output shaft rotates more than one revolution. This is done to insure all internal parts are coated with fresh oil and that the shaft seals are free and the seal journals are coated with oil.
6. At least every three months check the speed reducer for water condensation by removing lowest drain plug and allowing small amount of oil to drain from the oil sump. All water that may have accumulated will be at bottom of reducer housing and will drain out first.
7. Check all exposed fittings and shaft projections every three months for integrity of the protective coating. Reapply coating if required, to prevent possible corrosion of shafts. Use Cosmoline 1102 MIL-C-16173 Grade 2 or equivalent.

Before starting the reducer be sure to drain preservative oil and refill to proper level with the appropriate oil listed in the lubrication instructions.

LUBRICATION

Model "R" Speed Reducers are normally equipped with an automatic splash system of lubrication which supplies ample lubricant to all moving parts. All shaft extensions are sealed with the latest design in oil seal arrangement. A lip type oil seal is used to contain the lubricant within the housing, and a labrynth type shroud prevents penetration of contaminants to the lip seal, bearings, gears and lubricant.

Before starting, fill to the oil level indicated by the center of the round oil sight glass or the top marking on the oil level gauge or dipstick. The information given in the table of oil quantities is only a guide for ordering purposes. Always fill the reducer to the indicated oil level. Use fresh oil of the type indicated by the table of lubricants for the ambient temperature in which the unit will operate.

PUMP LUBRICATION SYSTEM

In some cases, where the reducer is mounted in a non-standard position it will be supplied with an oil pump, refer to the separate pump operating instructions. The normal oil pressure range is between 8 PSI and 40 PSI at normal operating temperatures. An oil pressure activated switch should be wired in series with the main motor control, to activate an alarm when oil pressure drops below the acceptable level predetermined by the pump and reducer manufacturers.

When an oil pump lubrication system is used the system must be checked for oil tightness after the reducer has been filled to the proper level with oil, and run. If the oil level must be corrected, be sure the oil pump has been turned off prior to removing the inspection cover or oil fill plug.

NOTE: When the oil is cold the oil pressure may be substantially higher than the normal pressure indicated in the relevant instructions and must therefore be checked again in the hot running condition.

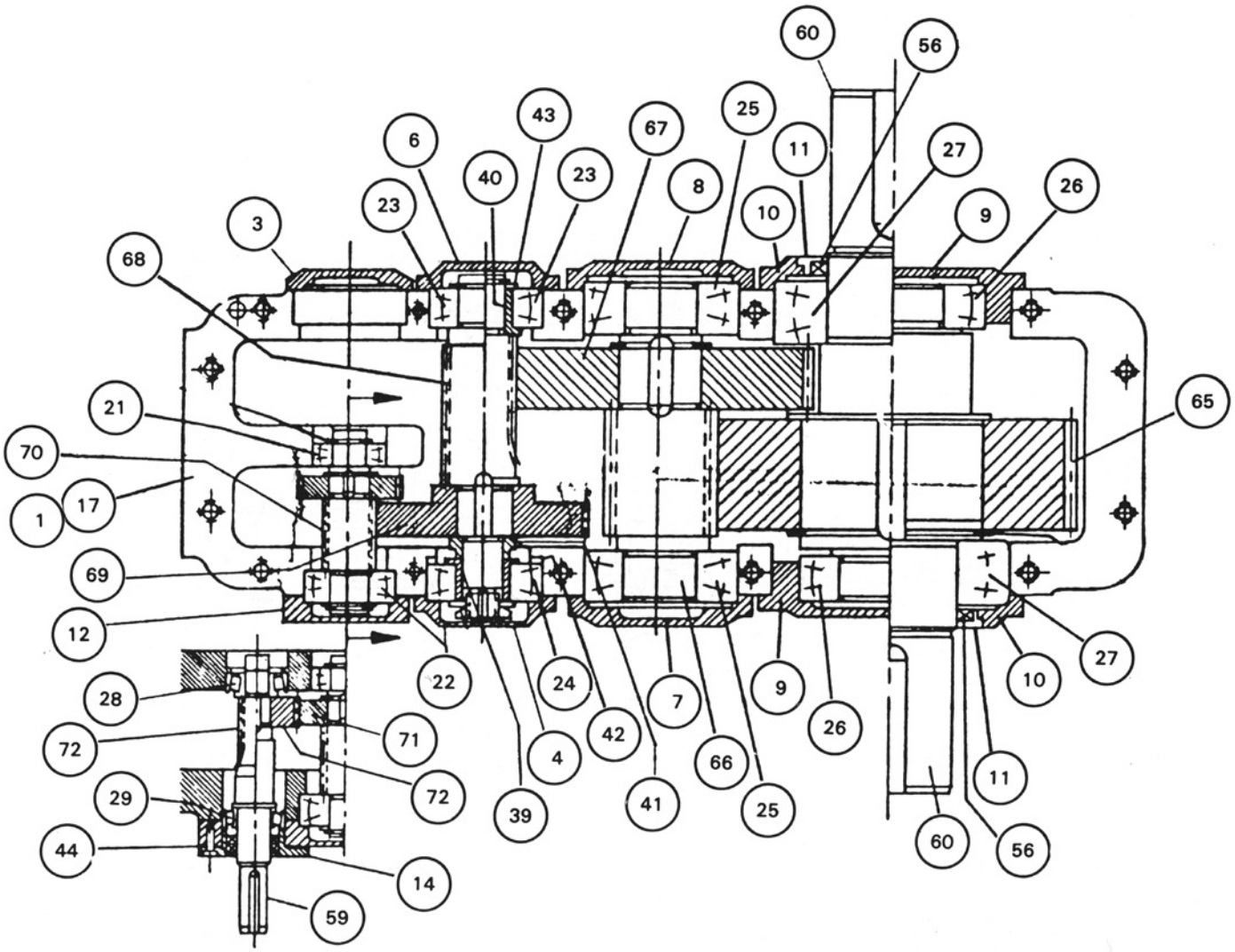
Details concerning oil pressure will be supplied with all units using forced oil lubrication.

GREASE LUBRICATION

Greasing is only required in unusual cases; special instructions will be supplied with reducers requiring grease lubrication.

Oil level, oil temperature (and if an oil pump is used) oil pressure, must be monitored constantly to insure proper operation.

MODEL "R" TYPE E QUADRUPLE REDUCTION



LOC. NO.	NAME OF PART	QTY. PER DR.	LOC. NO.	NAME OF PART	QTY. PER DR.
1	HOUSING ASSEMBLY	1	29	H.S. BEARING	1
3	I.S. BEARING RETAINER	1			
4	I.S. BEARING RETAINER	1	39	SPACER	1
6	I.S. BEARING RETAINER	1	40	SPACER	1
7	I.S. BEARING RETAINER	1	41	SPACER	1
8	I.S. BEARING RETAINER	1	42	SHIM	1
9	L.S. BEARING RETAINER	1	43	SHIM	1
10	L.S. BEARING RETAINER	1	44	SHIM	1
11	SEAL RETAINER	1	55	H.S. OIL SEAL	2
12	H.S. BEARING RETAINER	1	56	L.S. OIL SEAL	1
14	H.S. BEARING RETAINER	1	59	H.S. SHAFT	1
17	INSPECTION COVER	1	60	L.S. SHAFT	1
			65	L.S. GEAR	1
21	I.S. BEARING	1	66	L.S. PINION	1
22	I.S. BEARING	1	67	I.S. GEAR	1
23	I.S. BEARING	1	68	I.S. PINION	1
24	I.S. BEARING	1	69	I.S. GEAR	1
25	I.S. BEARING	2	70	I.S. PINION	1
26	L.S. BEARING	1	71	H.S. GEAR	1
27	L.S. BEARING	1	72	H.S. PINION	1
28	H.S. BEARING	1			

LOCATION

The motor should be installed in a location compatible with the motor enclosure and specific ambient.

To allow adequate air flow, the following clearances must be maintained between the motor and any obstruction:

TEFC (IC0141) Enclosures	–	
Fan Cover Air Intake	– 180 – 210T Frame	1"
	250 – 449T Frame	4"
	IEC 112 – 132	2.5 cm
	IEC 160 – 280	10 cm
Exhaust	– Envelope equal to the "P" dimension on the motor dimension sheet	
Protected Enclosures	–	
Bracket Intake	– Same as TEFC	
Frame Exhaust	– Exhaust out the sides-envelope a minimum of the "P" dimension plus 2" (5cm). Exhaust out the end-same as intake.	

LIFTING MEANS

! CAUTION

WHEN A LIFTING MEANS IS PROVIDED FOR HANDLING THE MOTOR, IT SHOULD NOT BE USED TO LIFT THE MOTOR PLUS ADDITIONAL EQUIPMENT SUCH AS GEARS, PUMPS, COMPRESSORS, OR OTHER DRIVEN EQUIPMENT. FAILURE TO FOLLOW THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

In the case of assemblies on a common base, any lifting means provided on the motor or generator should not be used to lift the assembly and base but, rather, the assembly should be lifted by a sling around the base or by other lifting means provided on the base. In all cases care should be taken to assure lifting in the direction intended in the design of the lifting means. Likewise, precautions should be taken to prevent hazardous overloads due to deceleration, acceleration or shock forces.

MOUNTING

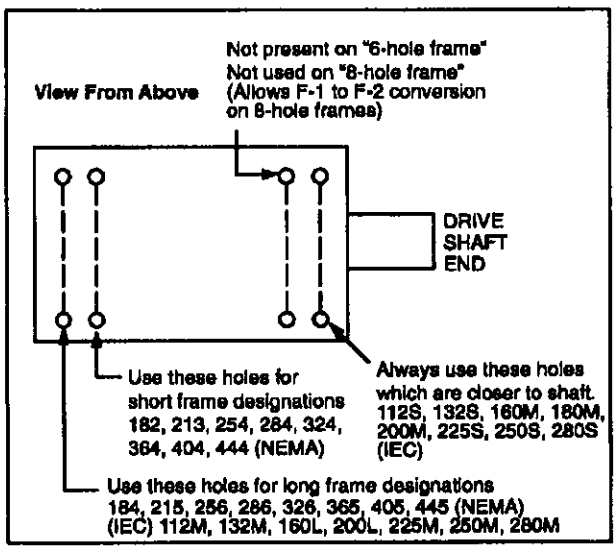
Mount the motor on a foundation sufficiently rigid to prevent excessive vibration. Roller bearing and ball-bearing motors may be mounted with the shaft at any angle. Roller bearing motors are not suitable for coupled duty applications. After carefully aligning the motor with the driven unit, bolt securely in place.

When motors, which are normally mounted with the shaft in a horizontal position, are mounted vertically, it may be necessary to provide additional guards to prevent foreign objects from falling into the motor openings and striking rotating parts. Such guards may be obtained at the time of purchase or from a local service repair center.

Explosion proof motors are shipped from the factory with the conduit box mounted. If the conduit box is removed or rotated, a minimum of five (5) full threads of engagement on the motor pipe nipple must be maintained for explosion proof integrity of the conduit box.

Some motors have standardized frames containing 6 or 8 mounting holes. 6 hole frames are not suitable for field reversal of mounting from F-1 to F-2, etc. The following diagram indicates the proper mounting holes to use.

MOUNTING OF 6 & 8 HOLE MOTOR FRAMES



DRIVE

The pulley, sprocket, or gear used in the drive should be located on the shaft as close to the shaft shoulder as possible. Heat to install. Driving a unit on the shaft will damage the bearings.

Belt Drive: Align the pulleys so that the belt will run true; tighten the belt just enough to prevent slippage, any tighter will cause premature bearing failure. If possible, the lower side of the belt should be the driving side.