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Technical Manual

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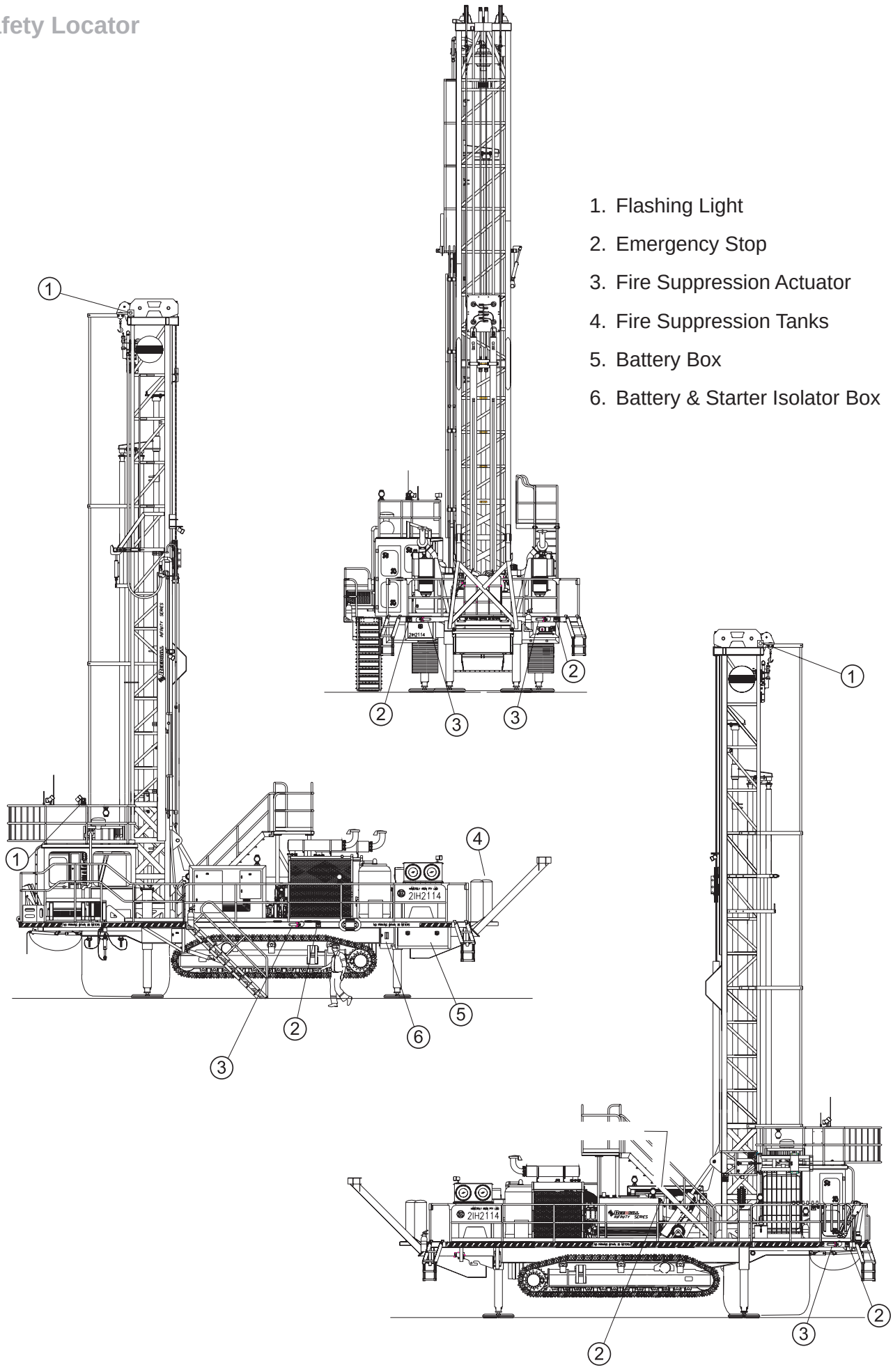
Safety Locator



1. Flashing Light
2. Emergency Stop
3. Fire Suppression Actuator
4. Fire Suppression Tanks
5. Battery Box
6. Battery & Starter Isolator Box

Control Panels

Although there is very little service to perform on the control panels, the indicator readings are vital to other diagnostic operations for the subsystems. The control descriptions on this and following pages are to help the service technician whom may be unfamiliar with the control functions.

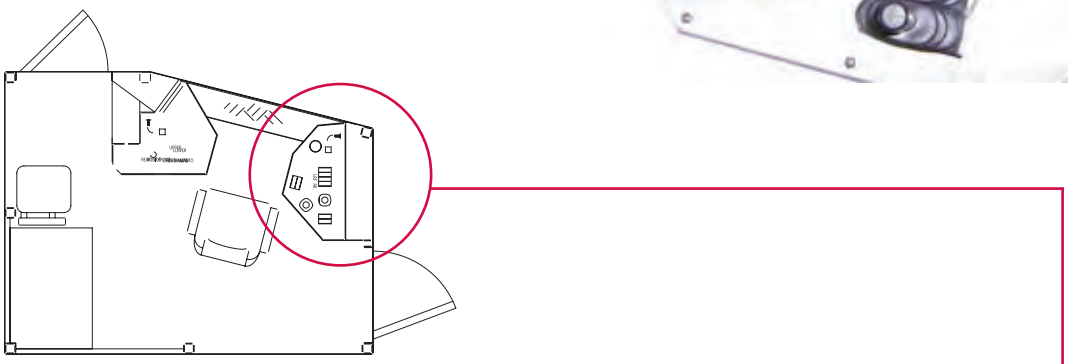


Fig. 2-1 Operator's Cab - Major Components

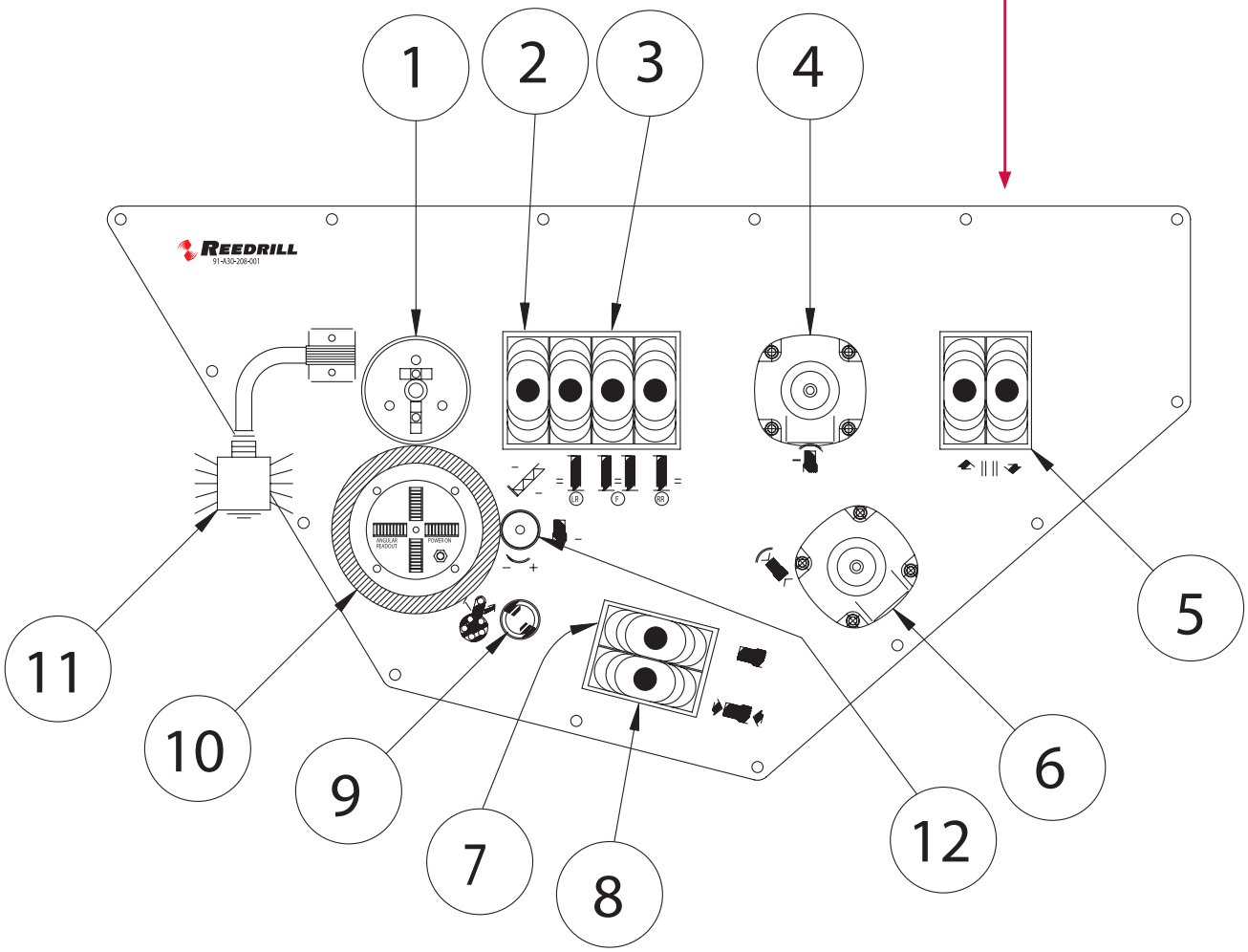


Fig. 2-2 Right Hand Control Panel

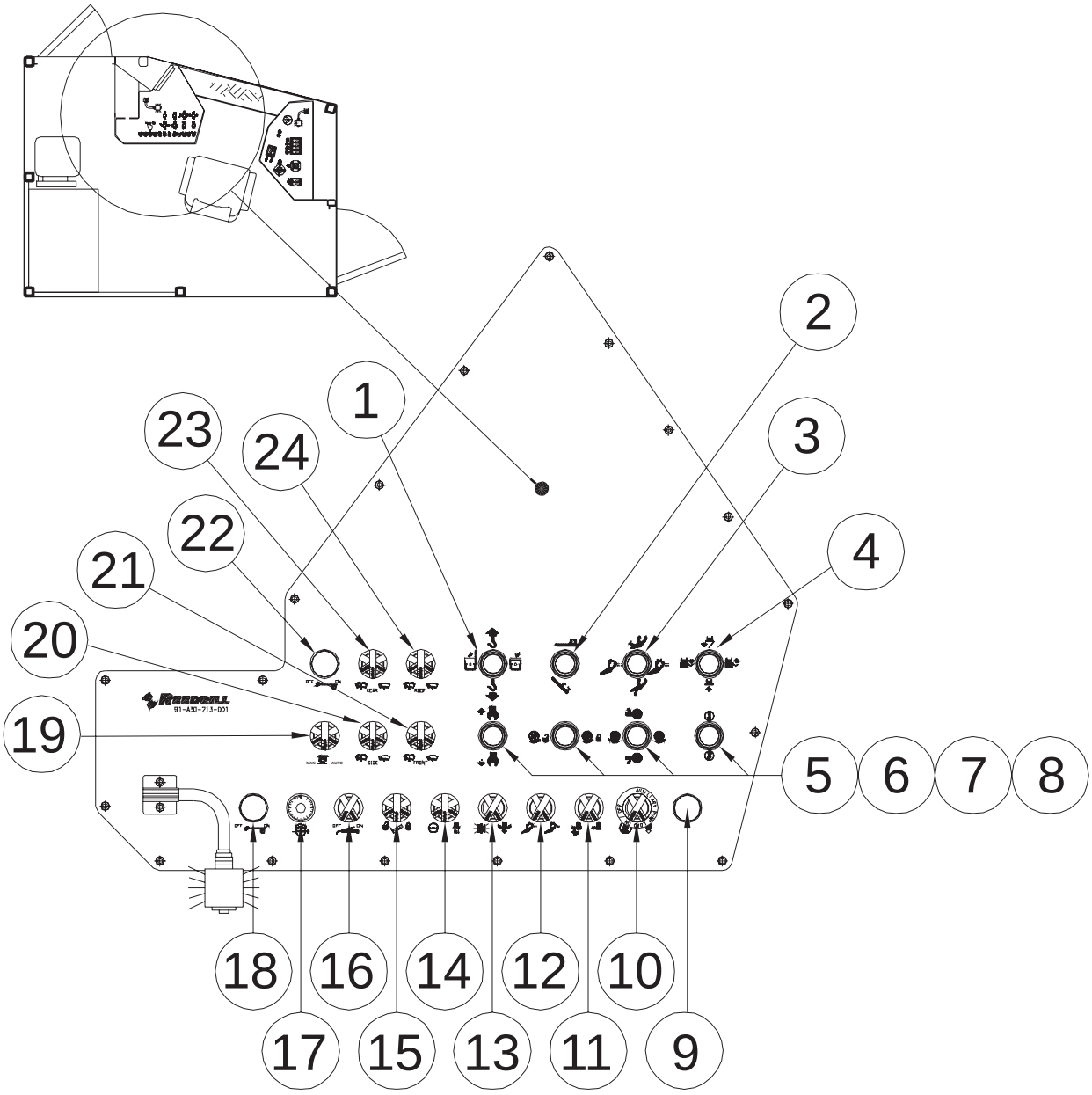


Fig. 2-5 Left Hand Control Panel

16. Auto Lube Switch

Enables operator to manually activate the automatic lubrication for grease points.

- Move switch to the left to automatically lubricate grease points.
- PLC will turn the Auto Lube System off after 30 seconds or when the grease pressure limit is reached. (2500psi)
- This switch stays automatically in the right position.

17. Water Injection Flow Control

Controls the volume of water being injected into the air line.

Turn control clockwise to decrease volume. Turn counterclockwise to increase volume.

18. Plug (not in use)

6. Backseat the suction service valve, but do not disconnect the cylinder at this stage.
7. Allow running conditions to stabilise and check the sight glass and discharge pressure. Add more refrigerant should flashing occur.
8. On completion of the replenishment, tightly backseat the suction service valve and remove the charging line. Fit a sealing cap to the line before storing.

SECTION 4.0 FAULT DIAGNOSIS

4.1 FAULT ANALYSIS CHARTS

The following flow charts are included as an aid in trouble shooting the air conditioning system. In many cases, a problem that causes an air conditioning system to malfunction requires little time to check out and repair. These possible causes should be the first to be examined and corrected. Use the flow charts, in conjunction with the gauge set to determine the cause of the problem and then carry out the remedy prescribed. As a general guide to correct system performance, a table is included to show the acceptable discharge and suction gauge pressures against the ambient temperature during unit operation, (refer Table 4.1.1).

To use the table proceed as follows:

1. Run engine at approximately 2000 r.p.m.
2. Set air conditioning fan speed switch to “HIGH FAN”.
3. Set mode switch to “COOL” position, and thermostat to “COOLER” position.
4. Record ambient temperature.
5. Check pressure in table against applicable ambient temperature.

TABLE 4.1.1

TEMP (^{0}C)	COMPRESSOR DISCHARGE PRESSURE (kPa)	COMPRESSOR SUCTION PRESSURE (kPa)
16	850 - 1200	20 - 100
21	1050 - 1750	20 - 100
27	1250 - 1900	20 - 100
32	1400 - 2150	30 - 150
38	1600 - 2300	30 - 200
43	1900 - 2500	30 - 250

SECTION 5.0 Basic Spare Parts Listing

Please refer “Section 6 - Reference Drawings, AS271546 and AS271547” in conjunction with this spare parts listing.

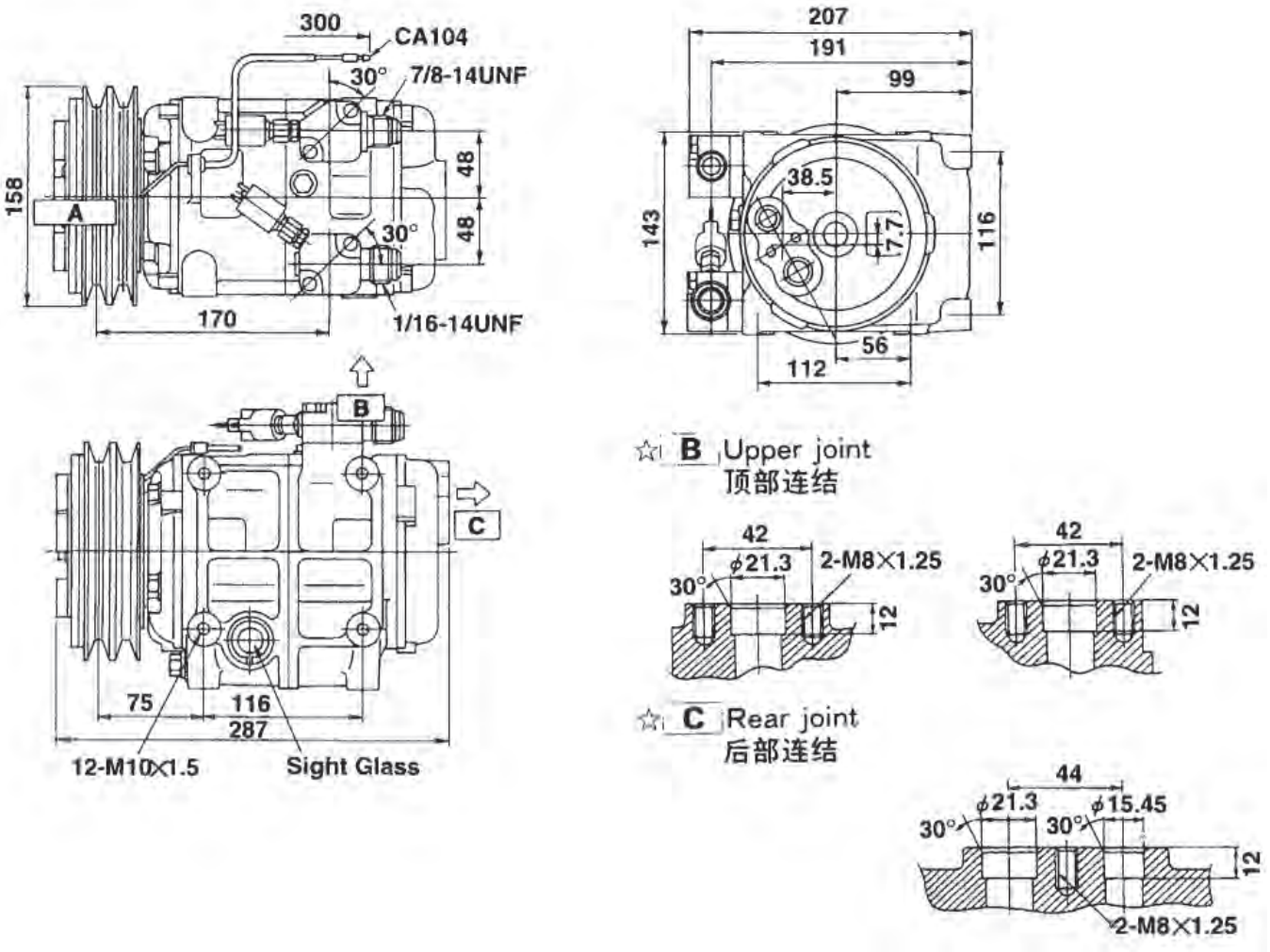
5.1 CASING SPARE PARTS

ITEM	DESCRIPTION	PART NO.	TFC8BX1	TFC8BX2
1	Evaporator Main Case	AS271517	✓	✓
1	Condenser Main Case	AS520724	✓	✓
2	Evaporator Cover (Plastic)	S2715031	✓	✓
2	Condenser Lid	AS520725	✓	✓
36	Remote Control Panel Housing	AS271532	✓	✓
4	Remote Control Panel Cover	S2715038	✓	✓
41	Return Air Filter Assy	AS271535	✓	✓
5	Supply Air Louvre	UC901	✓	✓
6	Supply Air Side Vent (Round)	821300	✓	✓
7	Return Air Filter Retaining Spring	853507	✓	✓
3	Condenser Lifting Lug	S5000147	✓	✓
4	Condenser Lifting Lug/Lid Pivot	S5000183	✓	✓
5	Condenser Lid Prop Mechanism	S5000149	✓	✓
-	Drain Tube	746016	✓	✓
-	Drain Trap	746207	✓	✓
-	Drain Valve	UC504	✓	✓
8	Fresh Air Inlet Plate	AS271529	✓	✓
9	Electrical Panel	AS271525	✓	✓
10	Evaporator Cover Fastener Assy	UC031	✓	✓
11	Evaporator Main Case Top Cover	AS520625	✓	✓

5.2 REFRIGERATION SPARE PARTS

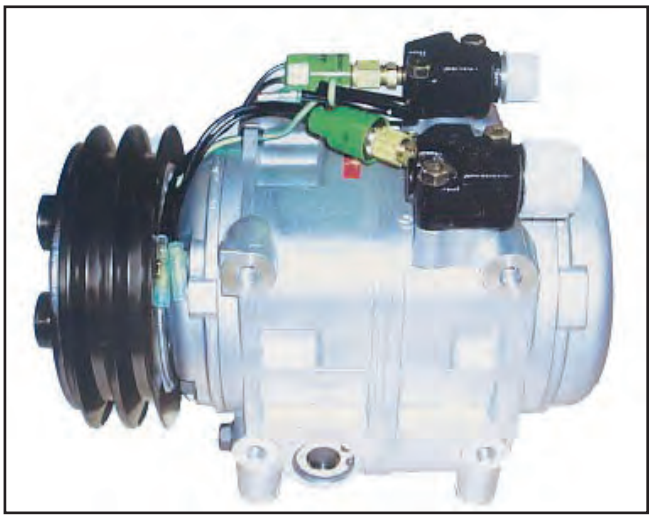
ITEM	DESCRIPTION	PART NO.	TCF8BX1	TCF8BX2
12	Evaporator Coil	120394	✓	✓
9	Condenser Coil	110009	✓	✓
13	TX Valve	521509	✓	✓
14	TX Valve Orifice	521508	✓	✓
37	LP Switch	523365	✓	✓
10	HP Switch	523655	✓	✓
11	Line Valve	517254	✓	✓
12	Filter Drier Receiver	531411	✓	✓
13	In-Line Drier	531353	✓	✓

Zexel DKS-32 Compressor



Specifications

Model	DKS-32
Displacement	313cm³/rev
Number of cylinders	10
Maximum speed	7000r/min
Refrigerant	HFC-134a
Lubricant	ZXL 100PG (DH PS)
	500cm³
Weight (without clutch)	14.5kg
Voltage	DC 12/24V
Power consumption	48W



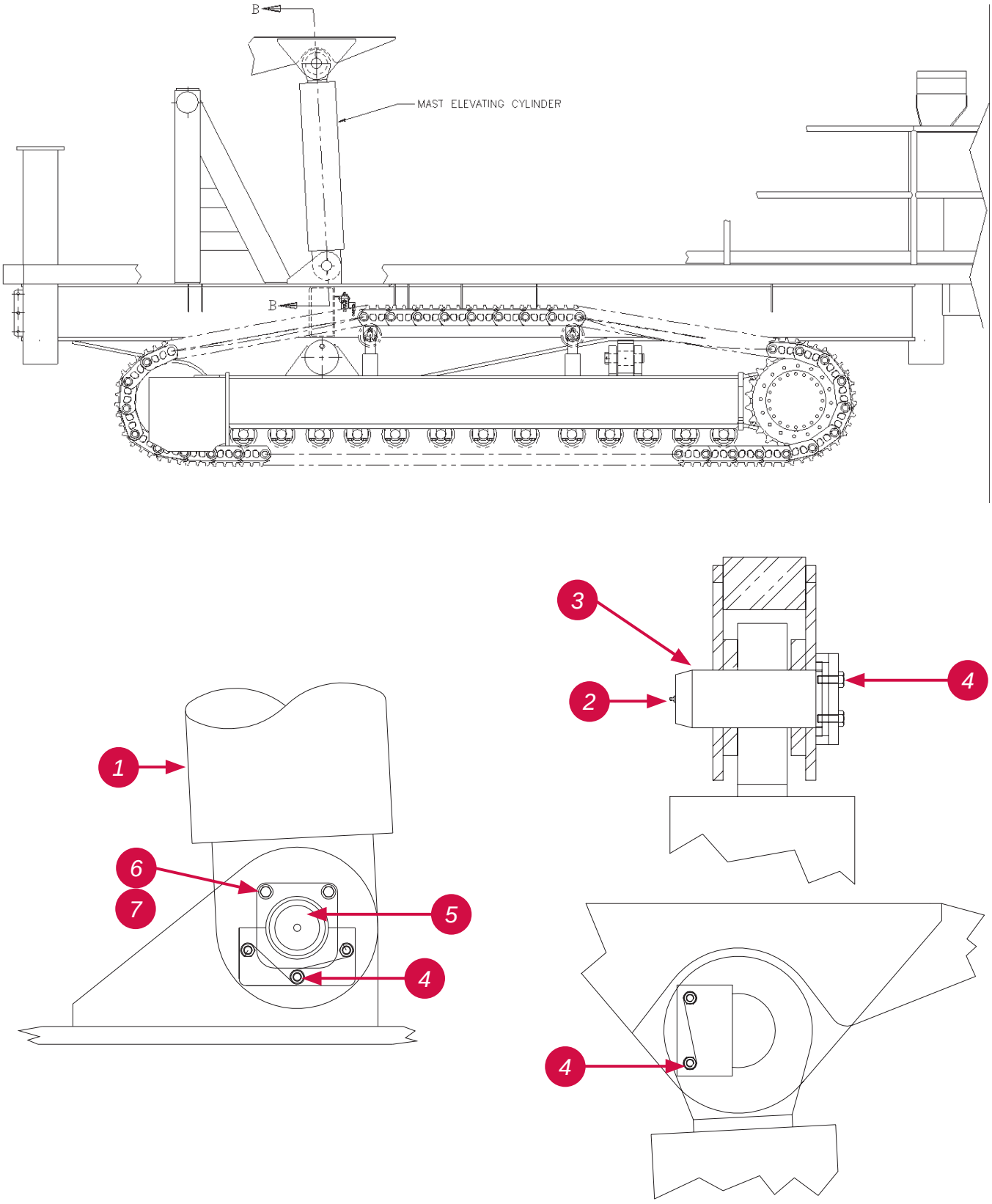


Fig. 3-2. Mast Elevating Cylinders

1. Hydraulic Cylinder - ref part no. 0410704 (2)
2. Grease fitting (4)
3. Upper Pin (2)
4. Bolt 1 3/4" x 1/2"UNC (10)
5. Lower Pin (2)
6. Flat Washer (4)
7. Bolt (4)

WARNING: HIGH PRESSURE The nitrogen tensioner is under high pressure. Bleed off all pressure before any service work is performed on the unit. Follow instructions in this section.
It is recommended that service work on the nitrogen tensioner be done only by factory authorized service agents.
If service work is performed by non-factory authorized personnel, all liability and/or damage is assumed by party (ies) performing the work.
If unit is disassembled, always discard all fasteners and replace with new ones.

Nitrogen Tensioner

If pressure is lost, it is usually due to one of the following reasons:

1. Seal distortion due to extreme cold or hot temperatures.
2. Seal deterioration due to exposure to ultra violet light.
3. Worn seals or scored cylinder caused by piston misalignment in bore.

NOTE: It is recommended that the nitrogen tensioner be repaired only by factory authorized service agents. If cylinder is scored, the entire unit should be replaced.

The use of a charging kit is required for charging or checking pressure (see following instructions for charging). The nitrogen tensioner is pretensioned at the factory. DO NOT exceed the recommended pressures.

Normal Charging Pressure is 2320 PSI (160 bar)

Maximum Allowable Pressure is 4640 PSI (320 bar)

Track Shoe - Mounting to Track Chain

3. Before assembly, verify that the track chain and shoe will accept the same bolt size. Align the track chain before starting.
4. Place track shoes on the track chain and insert bolts. Align the track shoes parallel with each other. Hand start the nuts, making sure the rounded corners of the nuts are showing towards the track link (fig. 3-27a) and the nuts are parallel to the securing edge of the nut seat.

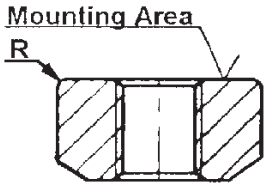


Fig. 3-27a Correct Mounting Position of Track Shoe Nuts

NOTE: When assembling in a workshop, the "straight torque" or "torque turn" methods can be used as an option.

When assembling in the field, only the "torque turn" method can be used.

For either method, make sure the track shoes are not misaligned when torquing.

Use a criss-cross pattern when torquing the bolts.

After torquing all bolts, there is a possibility of contact between the track shoes on certain profiles, which by design have a small gap. The same applies to extremely wide shoes. The contact area is only permissible at the end of the shoes, in an area not exceeding 10% of the total width.

Direct Torque Method

With an air wrench or a torque wrench, tighten the bolts to 11 ft. lbs. (15 Nm). When starting, make sure to secure the nuts in the nut seat to keep from twisting. Next, proceed to torque the bolts with a torque wrench or computer controlled torque system to the specified torque value as listed in the Grouser Bolt Torque Chart (KN111) - Direct Method, in this section.

Torque Turn Method

With an air wrench or a torque wrench, tighten the bolts to 11 ft. lbs. (15 Nm). When starting, make sure to secure the nuts in the nut seat to keep from twisting. Next, proceed to torque the bolts with a torque wrench or computer controlled torque system to the specified torque value as listed in the Grouser Bolt Torque Chart (KN111) - Torque Turn Method, in this section.

Now tighten the bolts by a third of a turn (120 degrees).

When assembling the track shoes in the field, this method must be used because the final torque is not done with a calibrated torque wrench and although the deviation may be small, the tightening of a third of a turn more, gives the necessary clamping force independent for the required friction factor.

Track Shoe - Retightening

DO NOT merely retorque the bolts in the field. This would lead to failure of the joint due to the altered friction factor and a reduced preload of the bolts.

The CORRECT METHOD of retightening the bolts, is to loosen the bolts until they turn freely. Now torque the bolts using the "torque turn" method described above.

NOTE: This can only be done once and only after a short time of machine operation (approximately 50 hours). After extended operation, loose bolts and nuts must be replaced with new ones for safety reasons.

Item List

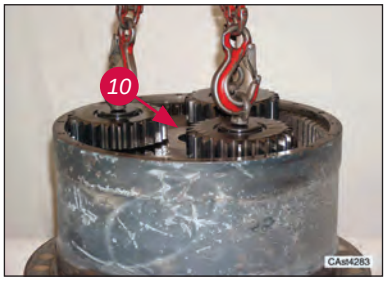
1 F130/206/K125/MB-A Final Drive Assembly
2 O-Ring
3 Screws
4 Hollow Wheel
5 Planetary Gear Carrier Assembly
6 Planetary Gears
7 Snap Ring
8 Washer
9 Gear
10 Planetary Gear Carrier Assembly
11 Planetary Gears
12 Snap Ring
13 Washer
14 Gear
15 Shaft
16 Side Gear Carrier Assembly
17 Side Gears
18 Pins
19 Washer
20 O-Ring
21 Cover
22 Screws
23 O-Ring
24 Flange
25 O-Ring
26 Disc
27 Sealing Ring
28 Screw Plug
29 Screws
30 Screws
31 A2FE125-A2FE160 Motor
32 Screws
33 O-Ring
34 Valve
35 Screw Plug
36 Sealing Ring
37 Beam Assembly
38 Spacer
39 Half Gasket
40 Bearing Cup
41 Outer Gasket
42 Hub Assembly
43 Bearing Cup
44 Shims
45 Ring Nut
46 Snap Ring
47 Disc
48 Springs
49 Piston
50 Gasket
51 Gasket
52 Gasket
53 Gasket
54 Hub
55 Disc Assembly
56 Sintered Discs
57 Steel Discs
58 Shaft Assembly
59 Internal Shim
60 Bearing
61 Snap Ring
62 External Shim
63 Spacer
64 Snap Ring

Planetary Gears F130/206-A

13.

Disassemble gear (14).

14.



Remove planetary gears carrier assembly (10).

15.

Remove the gear (9).

16.

Remove planetary gears carrier assembly (5).

17.

Unscrew and remove screws (3).

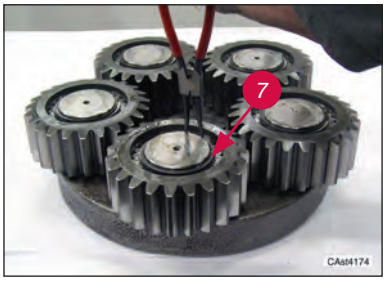
18.

Remove hollow wheel (4).

19.

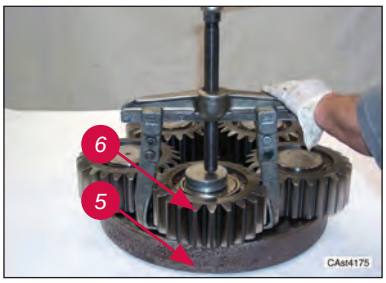
Remove O-Ring (2).

20.



Remove snap ring (7).

21.



By means of an extractor remove planetary gears (6) from side gear carrier (5).

22.

Remove washer (8).

Bearings

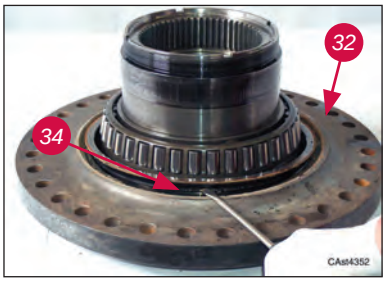
7.

Remove bearing cup (38) from hub (37).

8.

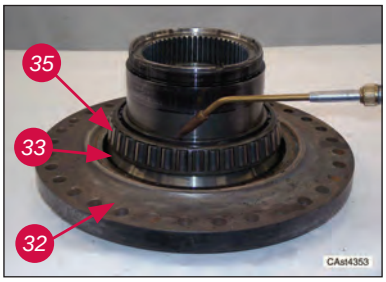
Remove bearing cup (35) from hub (37).

9.



Remove half gasket (34) from beam (32).

10.

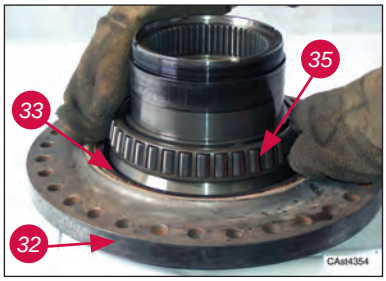


Remove bearing (35).

Remove spacer (33) from beam (32).

Assembly

1.



Assemble the spacer (33) on beam (32).

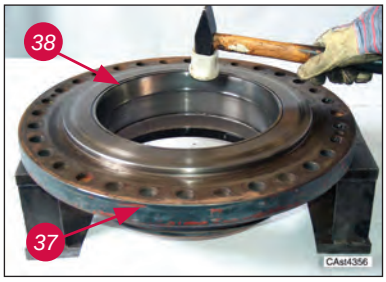
Heat the bearing at 110 °C.

Assemble bearing (35) on beam (32).

2.

Assemble half gasket (34) on beam (32).

3.



Assemble bearing cup (38) on hub (37).

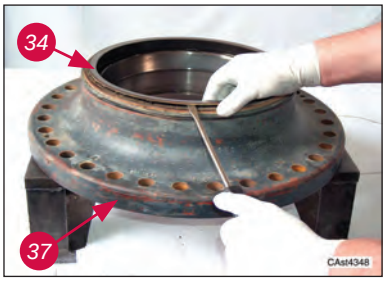
4.

Assemble bearing cup (35) on hub (37).

5.

Assemble outer gasket (34) from hub (37).

6.



Assemble half gasket (34) from hub (37).

Idler Unit - Assembly

7. Position the idler wheel so the fill plug is 45° from vertical as shown in fig. 3-61. Remove plug using a 6mm allen wrench and fill the idler wheel with SAE 90 oil until it runs out the hole. Install plug and tighten.

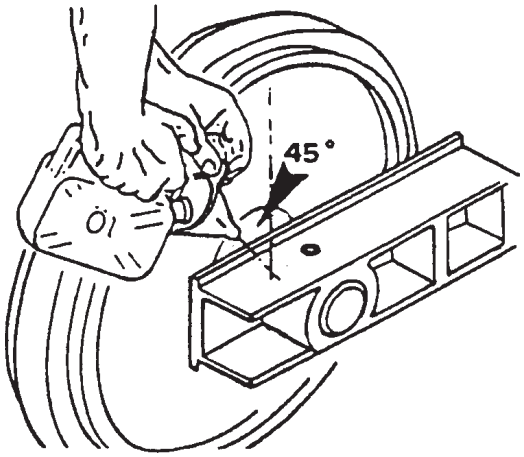


Fig. 3-61 Oil Fill Position

8. Place the sliding block (2) onto the sliding rails (7) and fasten with four capscrews and spring washers.

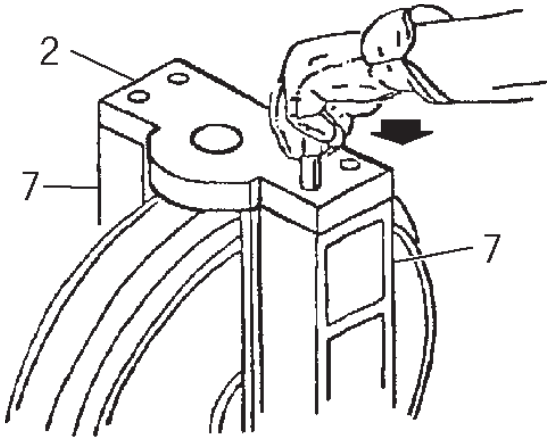


Fig. 3-62 Sliding Block Installation
2. Sliding Block
7. Sliding Rail

9. Place the nitrogen tensioner onto the sliding block and fasten with four capscrews and spring washers.

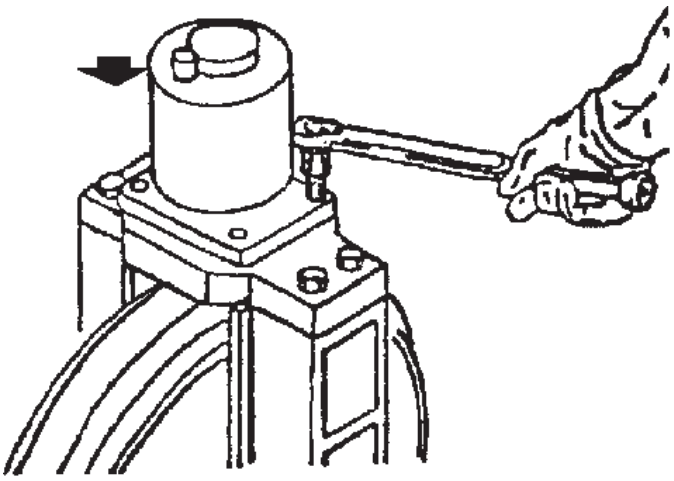


Fig. 3-63 Nitrogen Tensioner Installation

6. Install track roller assembly on track frame (fig. 3-89). Torque capscrews according to "Metric Bolt Torque Specifications" in this section.
7. Install support roller on track frame (fig. 3-90). Torque capscrews according to "Metric Bolt Torque Specifications" in this section.
8. Remove supports and lower track frame onto track chain. Adjust track tension according to "Track Tension Adjustment" at the front part of this section.

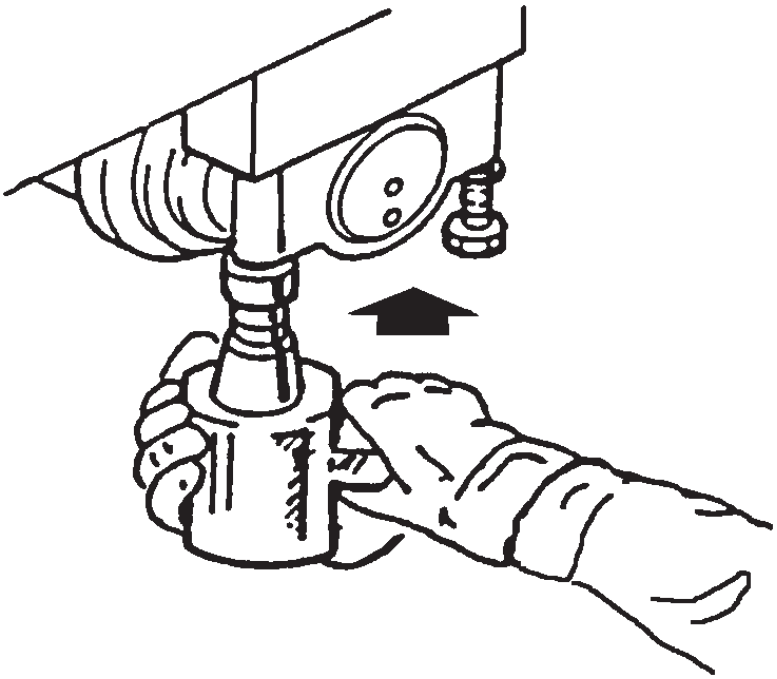


Fig. 3-89 Track Roller - install

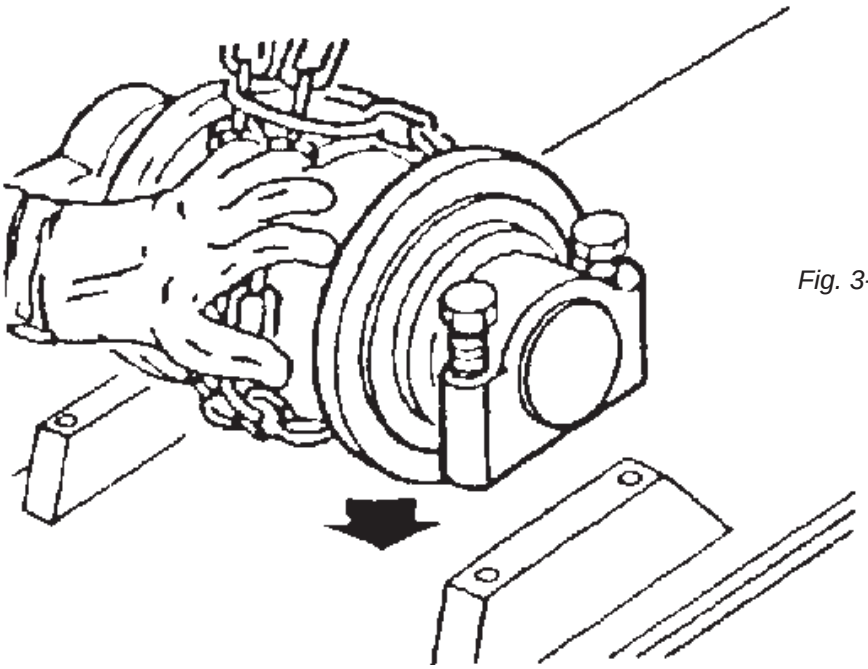


Fig. 3-90 Support Roller - install

Engine Fuel System

The QST30 fuel systems require small pumps to draw fuel from the fuel tank and deliver it through the fuel filters to the injection pumps at approximately 35psig. All engines built prior to March of 2002 included two mechanically driven plunger lift pumps that were attached to the sides of the Bosch fuel injection pumps. In March 2002 Cummins Inc. will introduce a new system that uses two electric roller-vane pumps that are integrated into the fuel filter head (see **Figure 1**) to replace the mechanically driven lift pumps. The new system is called the Electric Fuel Supply (EFS) system and it offers significant benefits for operation and service of the QST30 engine. The EFS will not entail any change in engine envelope.

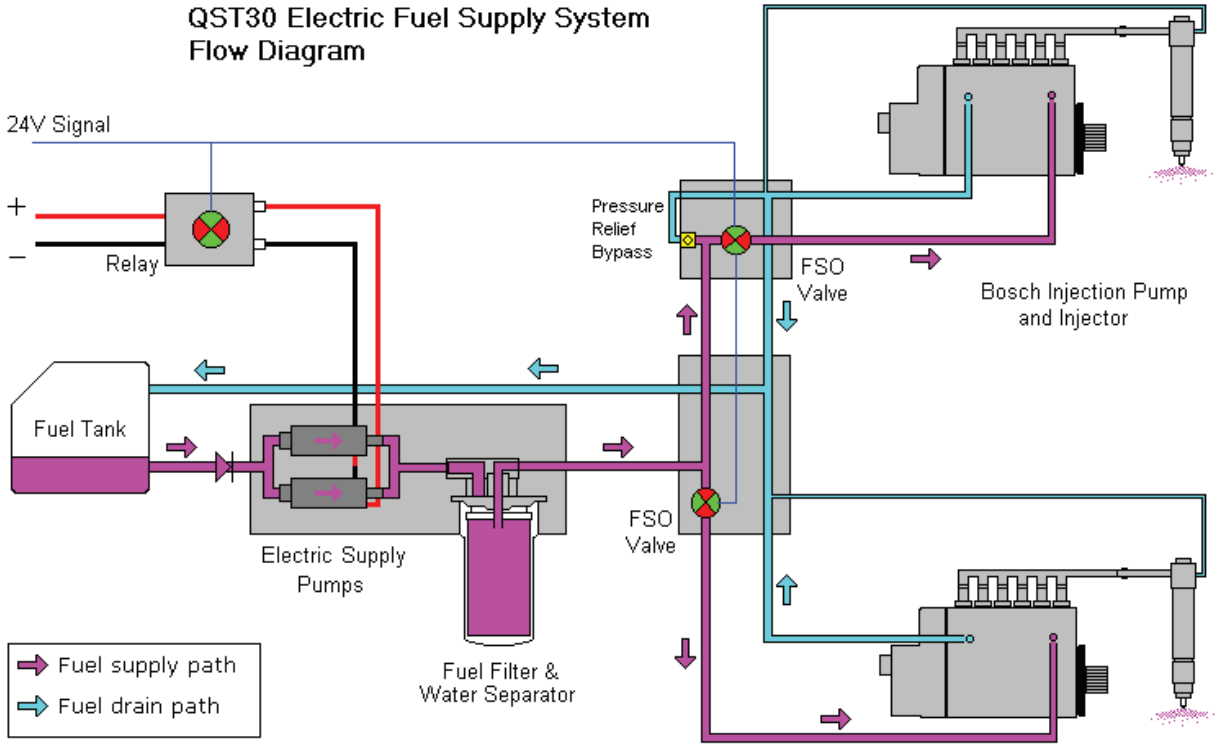
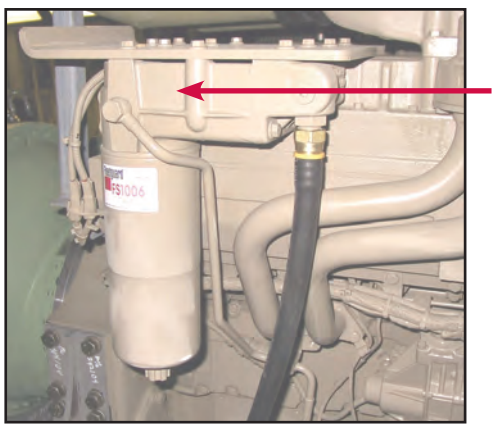


Figure 1: EFS system flow diagram



Electric supply pumps

Fuel system Relay (rear of engine)

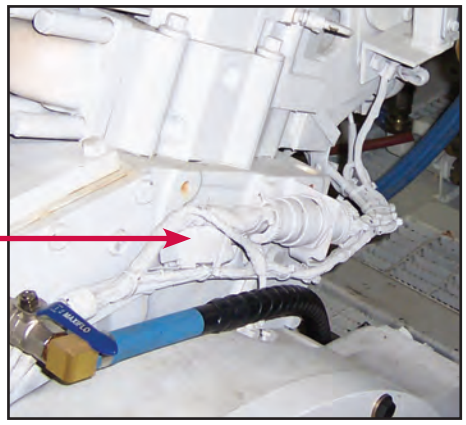
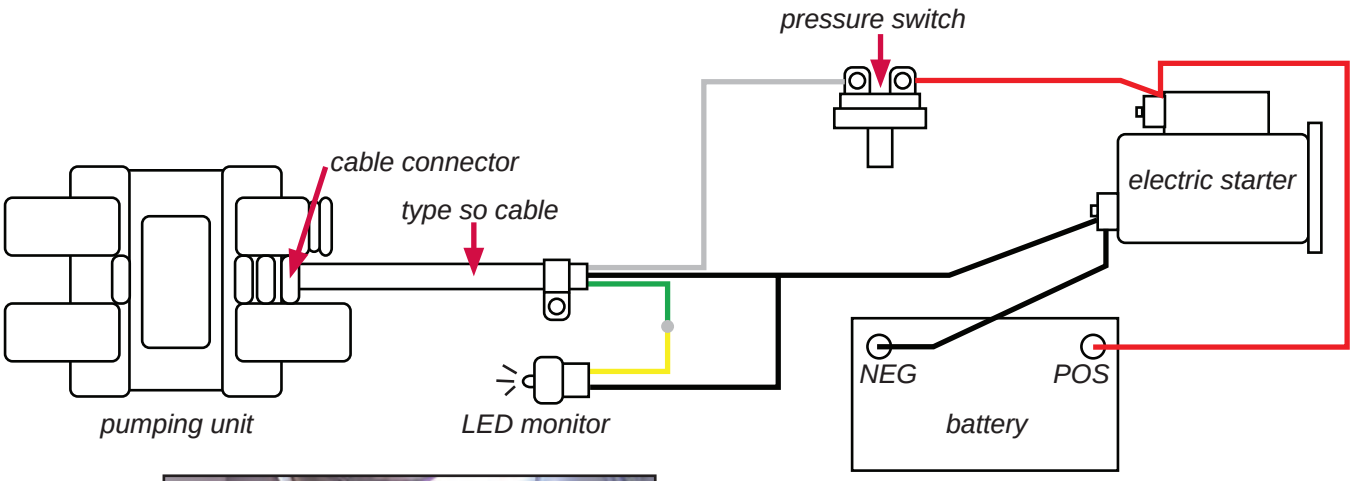


Fig 4-5. Electric Fuel Supply Pumps

Fig 4-6. Fuel System Relay

Wiring Diagram - Oil Reserve Basic Circuit

See Section 8 Electrical for actual circuit drawings



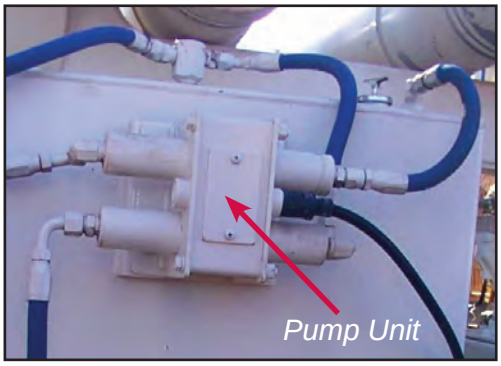


Fig 4-10. Oil Reserve Pump Unit

Connections Inside Pump Unit

R200	
UNIT	**CABLE**
RED	WHITE
BLACK	BLACK
YELLOW	GREEN

Oil Pressure Switch

The Oil Reserve system uses an oil pressure switch, which will not allow the reserve system to run on accessories, draining the battery voltage when the engine is not running. A tank air relief valve (TRV) is used, as reserve tanks are not vented to atmosphere. The lightly loaded TRV allows air in the tank, introduced by the withdrawal tube, to be vented into the oil return line. This eliminates the chance of excessive pressure build-up in the tank. It also acts as an anti-syphoning valve.

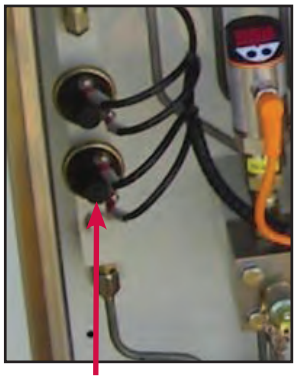


Fig 4-11. Oil Reserve Pressure Switch (Transducer Cabinet)

Oil Reserve System

SERVICING

NOTE: IMPORTANT Oil reserve tank is filled 3/4 of total capacity (as marked on sight glass). Ensure that engine and reserve tanks are not overfilled.

PRE-START (DAILY)

- Check oil before start-up at reserve tank - top up if necessary
- Check engine dipstick as a precaution
- Check oil level at least once a shift

DURING OPERATION

- Operator must be familiar with LED signals and is required to report any unusual operation.

Pump Drive Assembly - Removal and Replacement

WARNING: Be sure to relieve pressure from hydraulic and pneumatic systems before loosening connections or parts.

1. Remove drive shaft cover.
2. Disconnect drive shaft or flex drive coupling from pump drive unit.
3. Drain oil from pump drive gearbox before removing pumps. Oil capacity for the Funk pump drive is (13 Lt). Support hydraulic pumps with a suitable lifting device. Remove mounting bolts and separate from pump drive.

NOTE: For pump drive service only, it is not necessary to remove hoses from hydraulic pumps. Move pumps back far enough to clear pump drive unit for removal.

Provide adequate support for hydraulic pumps.

DO NOT let pumps hang from hydraulic hoses.

4. Support pump drive assembly with a suitable lifting device.
5. Remove the four mounting bolts from each side and lift out pump drive assembly.

   Refer to parts manual for pump drive repair parts.

   Replacement is reverse of removal.

NOTE: If the pump drive gearbox is replaced, the input shaft must be re-aligned with the engine crank to ensure maximum drive shaft life. Laser alignment is recommended. Axial end float should be 2mm.

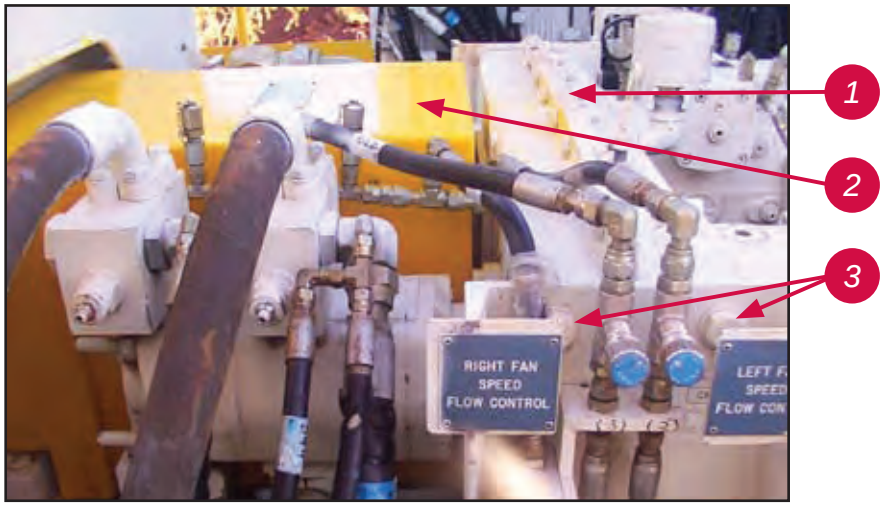


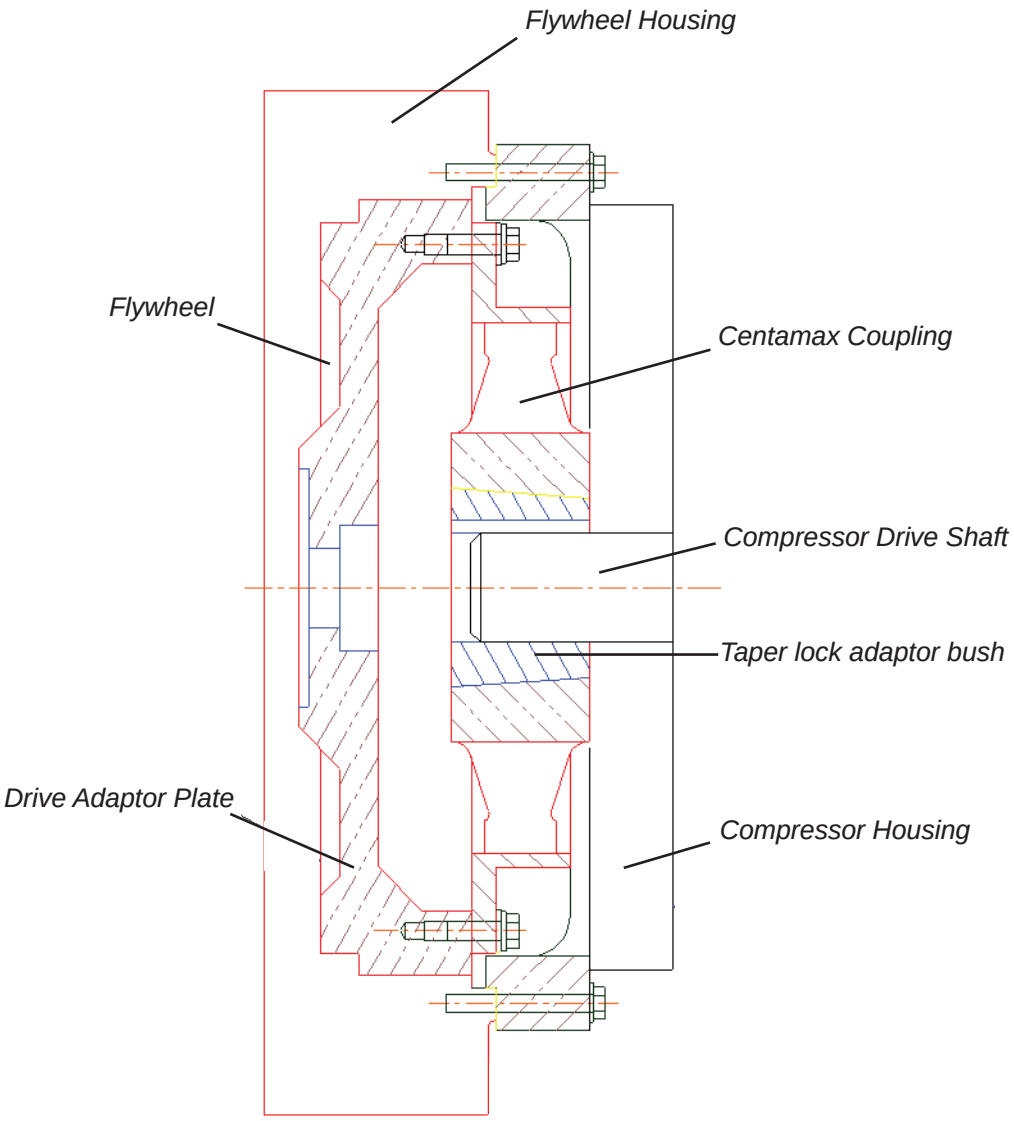
Fig. 4-20. Pump Drive Assembly

1. Pump Drive Gearbox

2. Drive Shaft Cover

3. Mounting Bolts (8)

Compressor Drive Coupling - Removal and Replacement



Before Start-Up of New or Rebuilt Compressor:

1. Reconnect all hoses and valves that were removed.
2. Check all hose Whip Checks are in place and secure.
3. Fill system with new, clean lubricant (see Section 9 for lubricant specifications) and pour 2 quarts (1.9 litres) of lubricant down the inlet.
4. Start engine, check receiver pressure is not over 240 psi, warm up machine and set to high idle.
5. Set the controls at the rated pressure and RPM.
6. Checks engine and compressor operating temperature. The engine water temperature should not be above 200° F (93.3° C) in radiator top tank. Compressor discharge temperature should not be above 260° F (127° C).
7. Check all shutdown devices for proper operation and temperature range.

WARNING DO NOT open the fluid fill cap when the compressor is pressurised. Shut down the compressor and bleed the sump to 0 psig before removing the cap.

Compressor Cooling and Lubrication System, Functional Description

Refer to Compressor Fluid Circuits on following pages

The compressor cooling and lubrication system is designed to provide adequate lubrication as well as maintain the proper operating temperature of the compressor. for lubricant life, run the lubricant and discharge temperature as low as possible. However, depending on the inlet temperature and relative humidity of the air entering the compressor inlet and the discharge pressure of the compressor, the compressed air can have water condense in the fluid separator.

Figure 4-4 shows the temperature at which water will start to condense. The temperature in the fluid separator, not the compressor discharge, must be maintained above this temperature. In addition to a cooler and fan, the system consists of a fluid filter, thermal valve with pressure bypass valve and fluid stop valve.

Fluid is used in the system as a coolant and a lubricant. The fluid is housed in the receiver/sump/ Upon start-up, the temperature of the fluid is cool and routing to the fluid cooler is not necessary. The fluid flows to the thermal valve from the sump.

The thermal valve has two entrance ports and two exit ports. The entrance ports will be referred to as Port A and Port B. Port A accepts fluid from the sump and Port B accepts fluid from the cooler, Port C sends fluid to the cooler, Port D sends fluid to the compressor. Ports B and D are connected together internally.

As previously stated, upon start-up the fluid temperature is cool and routing to the cooler is not required. the fluid first enters the thermal valve and then flows on to the compressor unit, bypassing the cooler. As the compressor continues to operate, the temperature of the fluid rises to 170°F (76.7°C) causing the internal thermal valve to move. This movement causes a portion of the fluid entering Port A to flow out of Port C to the cooler. The fluid is cooled and returned to the thermal valve at Port B. The cooler is a radiator type cooler that works in conjunction with the fan. The fan forces air through the cooler removing the heat of compression from the fluid. From the cooler the fluid is routed back to the thermal valve, entering at Port B. When the temperature of the fluid reaches 170°F (76.7°C), all the fluid flows to the cooler. The pressure bypass valve insures a supply of fluid to the compressor during periods of excessive pressure drop across the cooler which may occur in extremely cold weather. After the fluid passes through the thermal valve it is then directed through the main fluid filter. There the fluid is filtered in preparation for injection into the compression chamber and bearings of the compressor unit. The filter has a replaceable element and a built-in bypass valve which allows the fluid to flow even when the element becomes plugged and requires changing, or when the viscosity of the fluid is too high for adequate flow. After the fluid is properly filtered, it lubricates, seals and cools the compression chamber as well as lubricates the bearings and gears. The fluid stop valve functions on shutdown when it shuts off the fluid supply to the compressor unit and keeps compressor from pressurising and filling with fluid. The fluid stop valve is held open by a pressure signal from the compressor unit. At shutdown, the pressure signal is lost and the fluid stop valve closes, isolating the compressor unit from the cooling system.

Compressor Air Circuit - 2400cfm @ 100psi

Run Unloaded

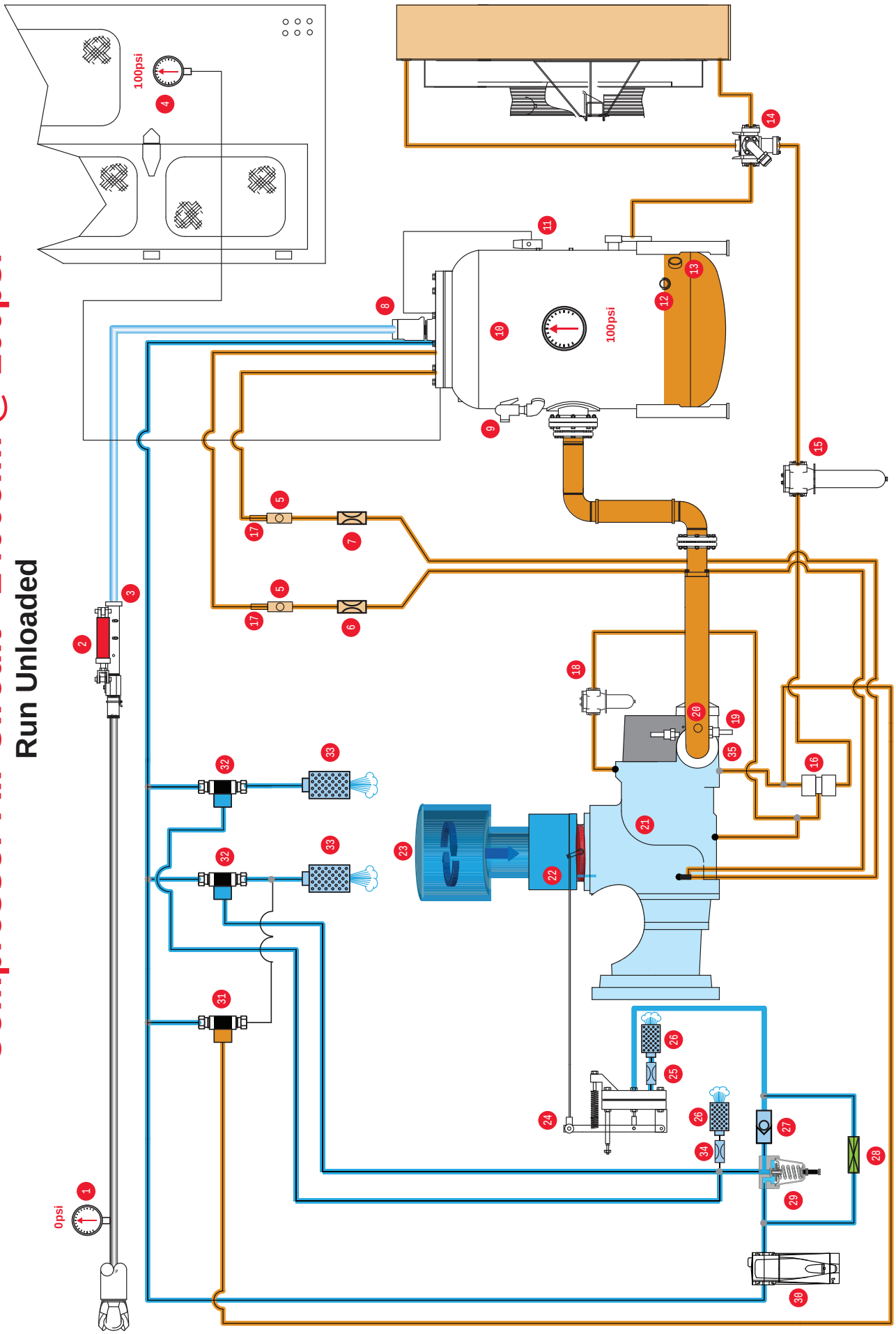


Fig. 4-33 Receiver Tank Assembly

1. *Connector, Flex (2)*
2. *Plug, Sight Glass (2)*
4. *Connector, Tube*
5. *Flange*
6. *Filter Assembly (2)*
7. *Orifice, 1/8" NPT x 1/32"*
8. *Orifice, 1/8" NPT x 3/32"*
9. *Sight Glass (2)*
10. *Element, Separator, Primary*
11. *Element, Separator, Secondary*
12. *Boom, for lifting Receiver Tank Cover*
13. *Tank, Oil Separator*
14. *Valve, Relief, 150 PSI (10.3 bar)*
15. *Valve Installation, Blowdown*

15a. *Valve, Blowdown, Shutdown*
15b. *Valve, Blowdown, Running*
15c. *Silencer, Air*
15d. *Orifice, .187" (4.76 mm)*

16. *Support, Oil Return Sightglass*
17. *Valve, Minimum Pressure*
18. *Tube, Oil Return, Primary*
19. *Tube, Oil Return, Secondary*
20. *Tube, Oil Return, 90 deg. Primary*
21. *Tube, Oil Return, 90 deg. Secondary*
23. *Plug (2)*
24. *Indicator, Separator Element Service*
25. *Gasket*
26. *Hose Assembly*
27. *Union, Pipe*
28. *Cross, Pipe*
29. *Elbow, Pipe, 90 deg.*
30. *Bushing, Reducer*
31. *Bushing, Reducer*
32. *Bushing, Reducer*
33. *Plug, Pipe*
34. *Plug, Pipe*
35. *Plug, Pipe*
36. *Elbow, Tube Union (2)*
37. *Connector, Tube*
38. *Nipple, Pipe*
39. *Nipple, Pipe (2)*
40. *Nipple, Pipe*
41. *Nut, Hex (4)*
42. *O Ring*
43. *Capscrew, Hex (2)*
44. *Washer, Lock (4)*
45. *Stud (4)*
46. *Connector (2)*
47. *Elbow, 90 deg.*
48. *Elbow, 90 deg.*
49. *Tee*
50. *Elbow, Pipe, 90 deg.*
51. *Nipple, Pipe*
52. *Coupling, Pipe*
53. *Tee, Male Pipe*
54. *Connector, 90 deg.*

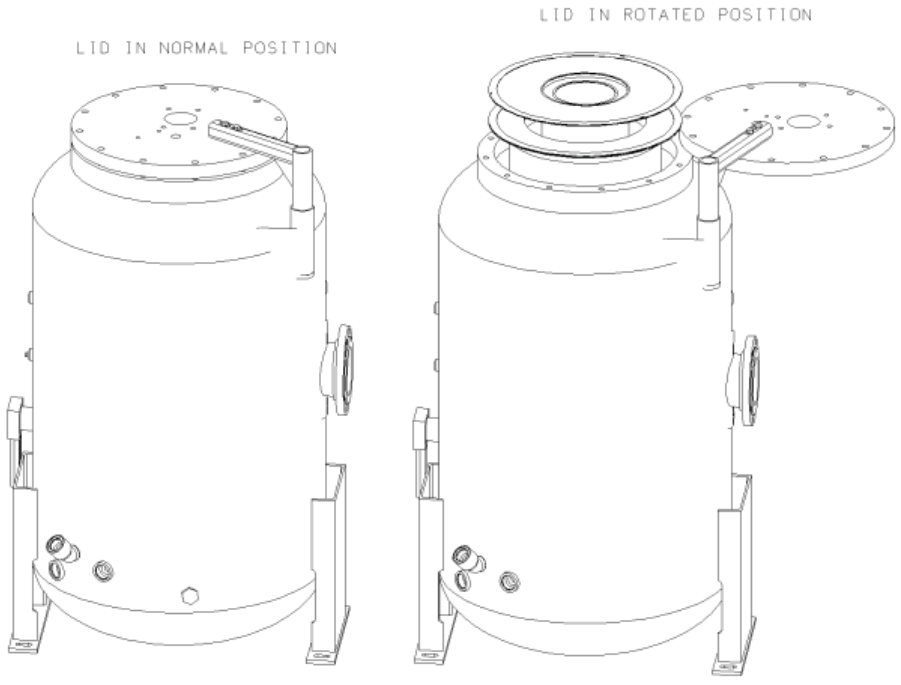
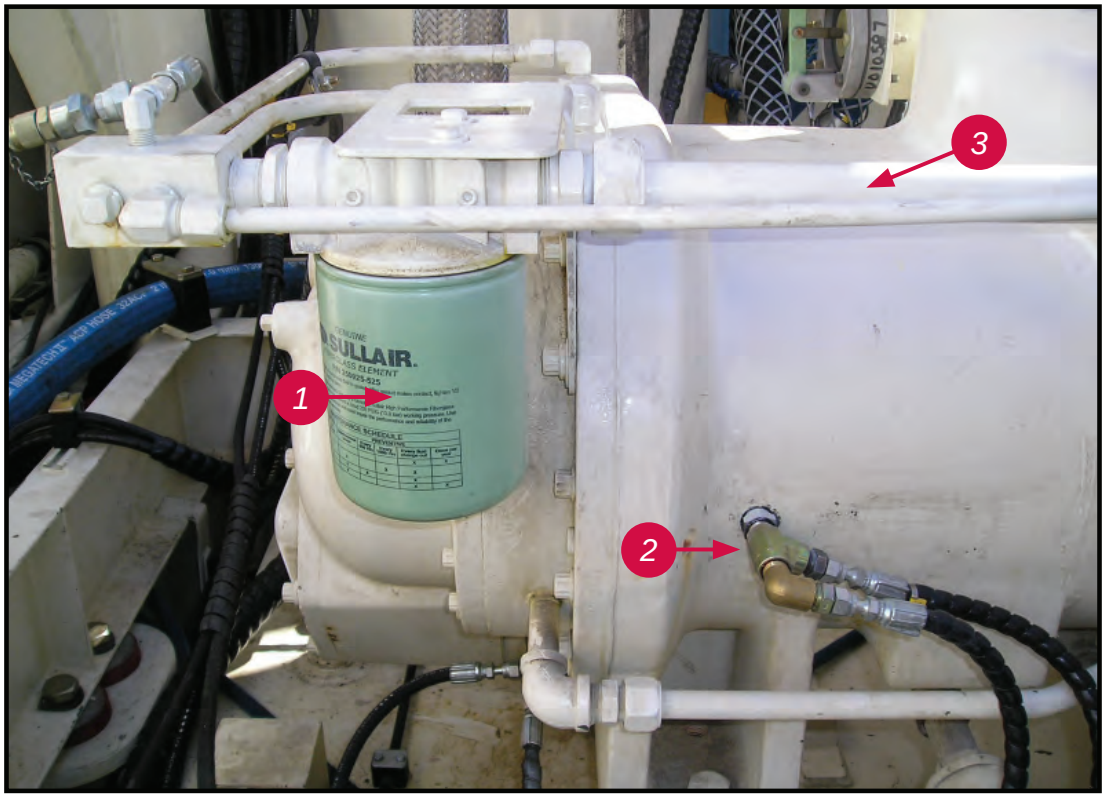
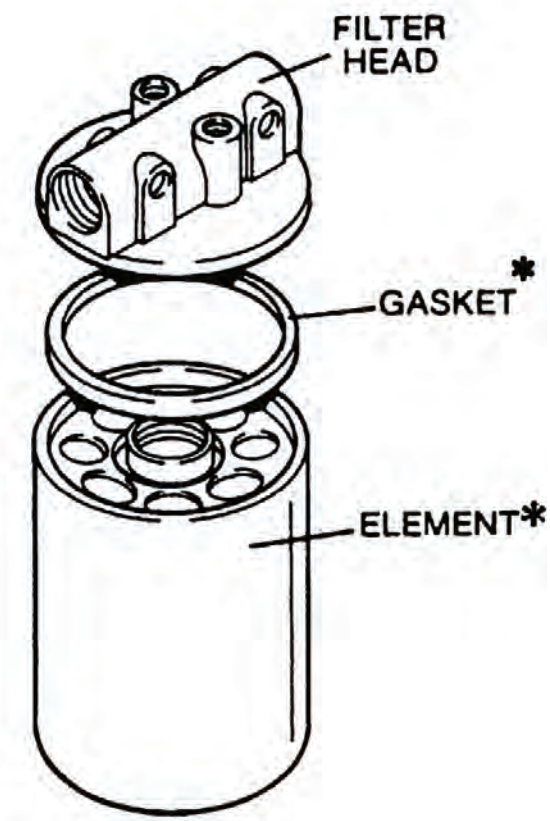


Fig. 4-33a Receiver Tank Cover Boom (item 12, fig. 4-11)

Bearing Oil Filter



1. *Bearing Oil Filter*
2. *Scavenge line from Separator Tank enters screw chamber*
3. *Oil supply to lubricate Bearings*



Compressor Fluid Filter Element Replacement

1. Using a strap wrench, remove the old element and gasket.
2. Clean the gasket seating surface.
3. Apply a light film of fluid to the new gasket.
4. Hand tighten the new element until the new gasket is seated in the gasket groove.
5. Continue tightening the element by hand an additional ½ to ¾" turn.

Running Blowdown Valves

This 2-way normally closed (N.C.) valves are piloted open by the system pressure regulator. The Blowdown Valves open when the regulator pressure is reached and the air volumn drawn through the closed inlet is vented to atmosphere.

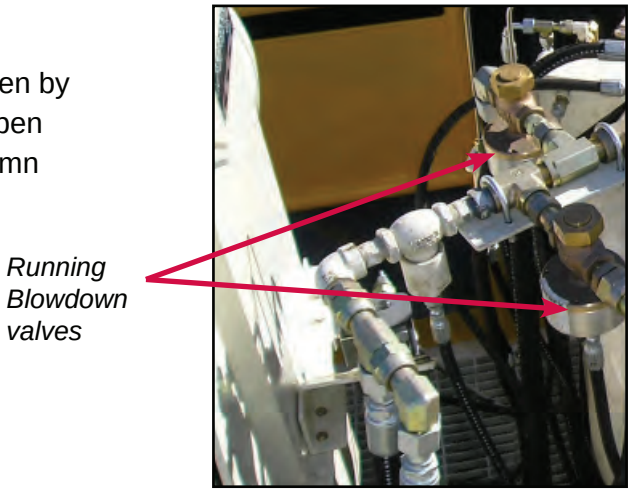


Fig 4-46. Running Blowdown Valve

Running Blowdown is normally closed N/C (no signal/pilot pressure present)

Pilot signal from System (Reducing) regulator opens Running Blowdown

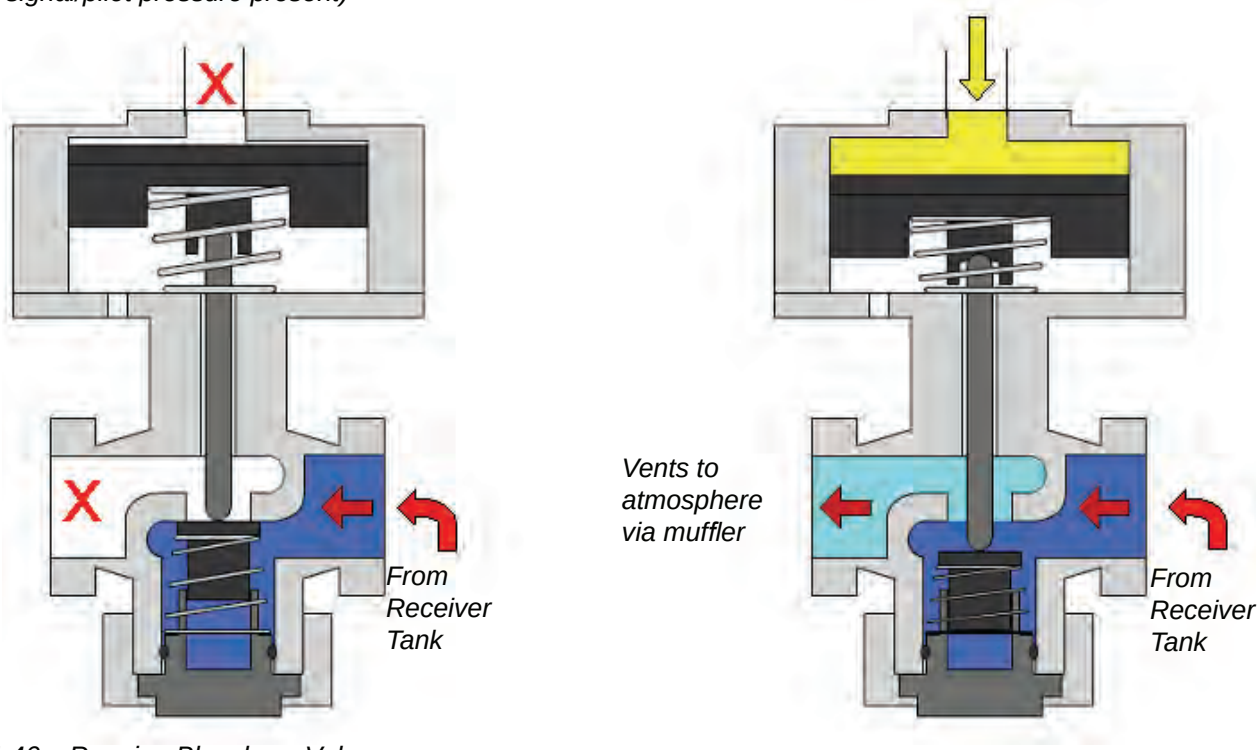


Fig 4-46a. Running Blowdown Valve

If the valve fails to vent at all, check:

- Gland nut has not unscrewed and is tight
- Cup seal is clean and in good condition (not by-passing) through Tell-Tale vent

If the valve continuously vents check:

- The O-ring is OK on the poppet assembly (check body surface also)
- The spring or springs are not broken

Compressor oil cooler

Compressor oil flows from the receiver tank through the thermal / thermostat by-pass valve, through a filter and then to the compressor. Once the thermostat temperature of 121ºC (250ºF) is reached, the thermostat shifts and diverts oil from the receiver through the thermal by-pass valve, through the cooler than back to the receiver.

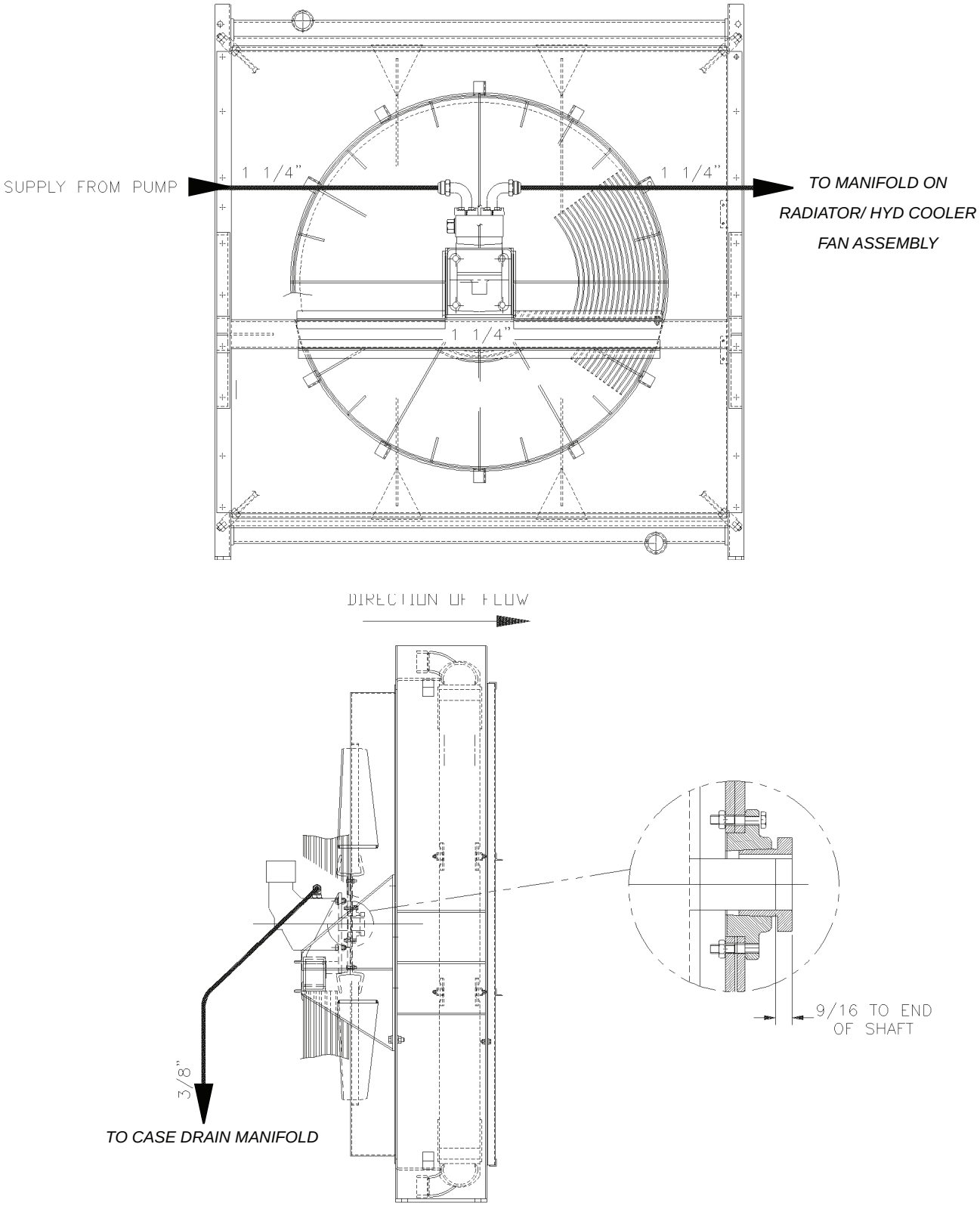


Fig. 4-49. Compressor Oil Cooler Assembly

SERVICE MANUAL

MESABI®

COPPER TUBE

- RADIATORS
- CORES
- CHARGE AIR COOLERS

Please read and follow instructions carefully before proceeding with any service work and/or repairs. Consult factory before proceeding with any possible warranty claims.

Dust Control Systems

Three individual systems make up the complete Dust control package for the Drill.

1. Fully enclosed under deck area (includes the deck seal).
2. Down hole water injection.
3. Dust Collector

The under deck area is fully enclosed by replaceable dust curtains, these curtains require trimming to a length that will provide the best sealing capabilities, based on the type of terrain in which the drill is being used ie: If the terrain is generally level the the curtains can be trimmed to a common length all round, but should the terrain be sloping then the curtains will need to be trimmed longer or shorter at a particular end to maximise sealing. Trim length of curtains to approximately 200mm (8”) overhang on the ground. Excessive overhang on the ground may result in the curtains being caught and torn by larger rocks or the build up of cuttings from the drill hole.

The deck seal also plays an integral part in sealing of the under deck area and requires regular inspection. This is to prevent dust and drill cuttings from entering the top of the drill deck which if left unchecked for a prolonged period, will reduce the service life of the deck bush and also create a build up of material on the deck itself.

Fig 5-1. Dust Collector

Fig 5-2. Underdeck Dust Curtains

Water Tank Top up Solenoid Valve

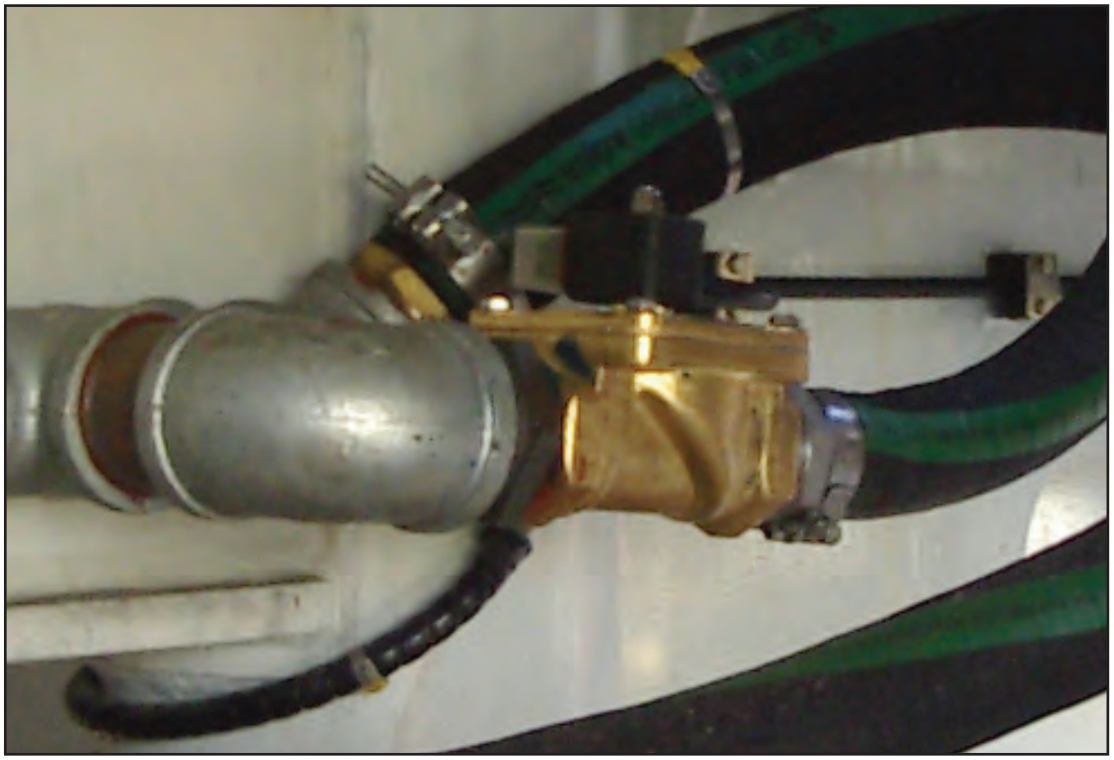
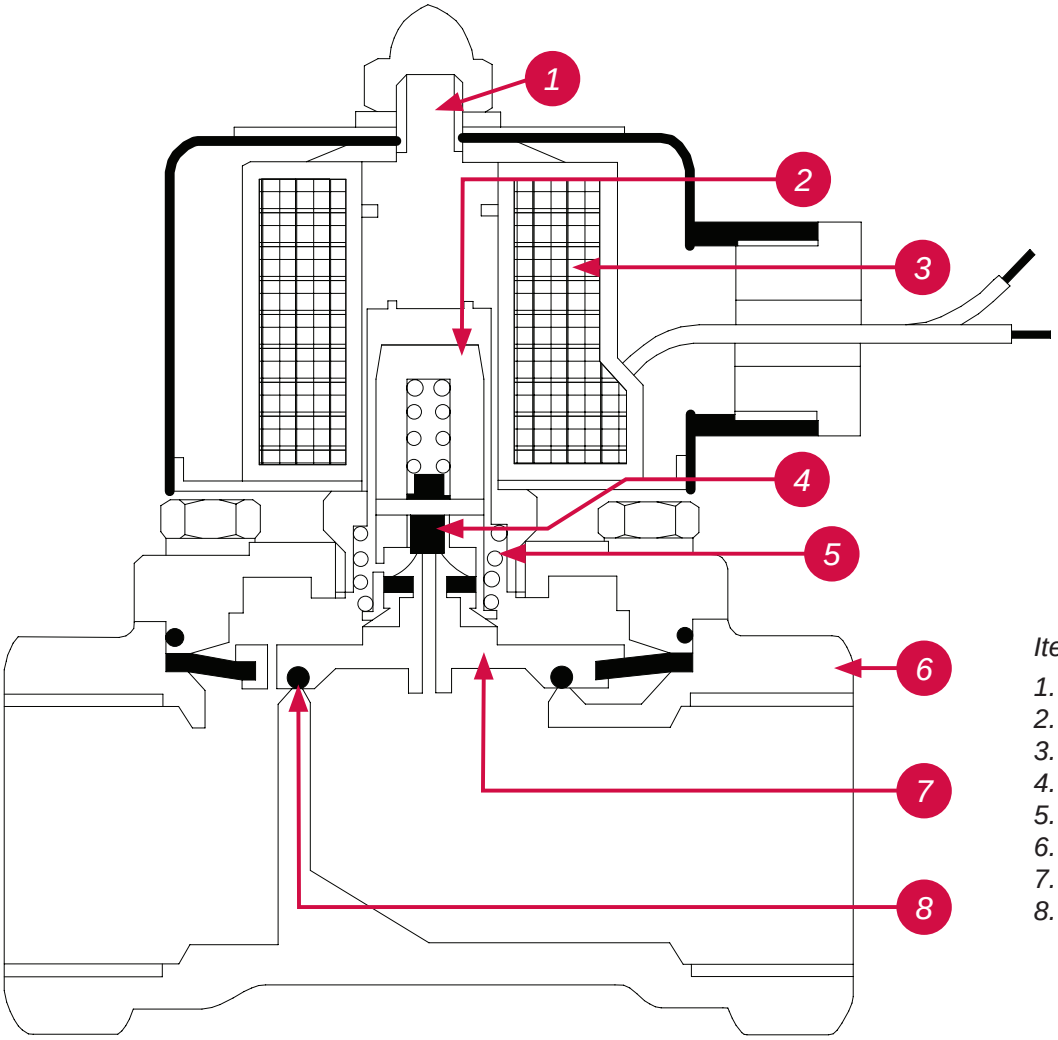


Fig 5-6. Water Solenoid Valve



Item	Article
1.	Armature
2.	Plunger
3.	Coil
4.	Plunger Seat
5.	Spring
6.	Valve Body
7.	Diaphram
8.	Leak Proof Ring

Fig 5-6a. Water Solenoid Valve

Replacing Power End Bearings

1. Remove bottom drain pipe plug and drain all oil from power frame.
2. Disconnect suction and discharge piping, power source, and remove pump from mounting base.
3. Although it is not required, it is easier to remove the crankshaft if the fluid end and pistons have been removed. To remove the fluid end, follow steps 1-3 of the section titled Replacing Piston Cup Seals.
4. Remove the six (6) hex head cap screws, washers, and mounting base from rear of pump. When removing the mounting base from the pump, be careful not to damage oil seal gasket as the mounting base is broken loose.
5. Remove cap screws from the connecting rod assemblies and take out the back half of the connecting rod shell bearing. Note the orientation of the machine markings on the connecting rod and cap. Connecting rod halves are not interchangeable and must be reassembled in their original positions.
6. Remove the oil slinger from the crankshaft.
7. Push the connecting rods and crosshead assemblies as far forward into the power frame as possible to provide clearance for the crankshaft.
8. Once the crankshaft is clear of the connecting rods, remove forward half and the split connecting rod bearing.
9. Use snap ring pliers to remove the crankshaft retainer snap ring from each side of the pump.
10. Using a hammer and wood block or rubber mallet, drive the shaft and bearings out either side of the power frame.
11. Remove bearings from crankshaft using a press. Be sure to provide suitable support for the back side of the bearings during this step. Note: Never pound directly on the bearings or they may be damaged.
12. Carefully clean and inspect all parts. Replace worn or damaged components as necessary.
13. Install crankshaft with (new) bearings into the power frame.
14. Place the oil seals over the ends of the crankshaft with the lip of the seals facing the inside of the power frame.
15. Seat the snap rings in the grooves in the bearing housing against the oil seals and tap the crankshaft to allow a SLIGHT endplay in the crankshaft.
16. Reassemble the connecting rods and shell bearings around the crankshaft. The connecting rod and cap are a matched set. Be sure to properly match the connecting rods and caps back into their original position and orientation. Torque connecting rod bolts as shown in the Fastener Torque Requirements section of this manual.

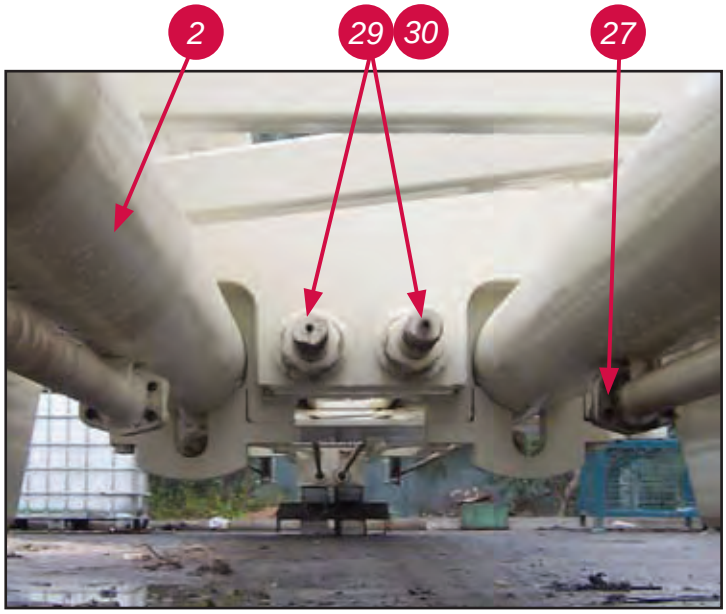


Fig. 6-7 View of Underside of Mast (in horizontal position)

2. Feed Cylinders
29. Pulldown Adjusting Nuts (4)
30. Flat Washers (2)
27. Split Flange Connections

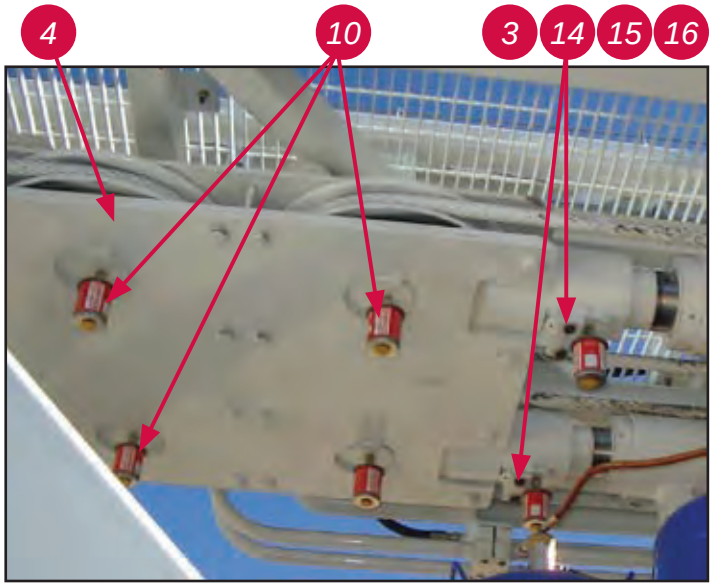


Fig. 6-8 View of Underside of Mast (in horizontal position)

3. Pin
4. Sheave Carriage "TiePlate"
10. Uniquip Auto Lubricators (6)
14. Bolt
15. Flat Washer
16. Plate

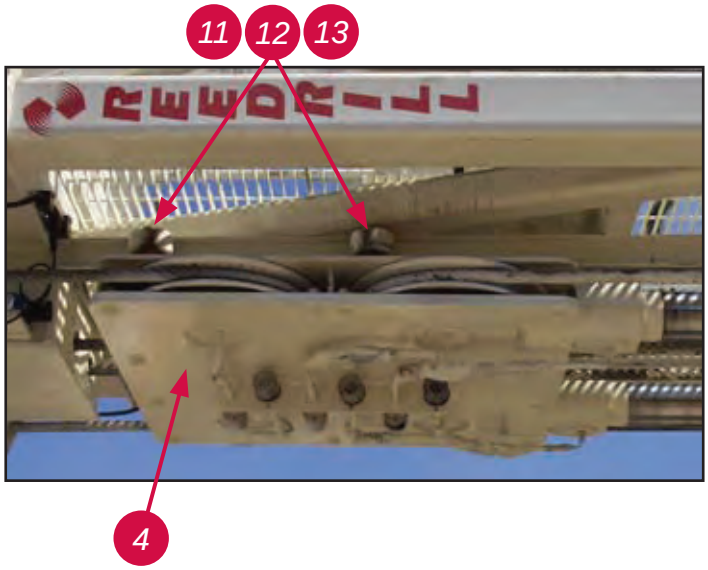


Fig. 6-8a View of Underside of Mast (in horizontal position)

4. Sheave Carriage "Tie Plate"
11. Roller Assembly (4)
12. Capscrew (16)
13. Lock Washer (16)

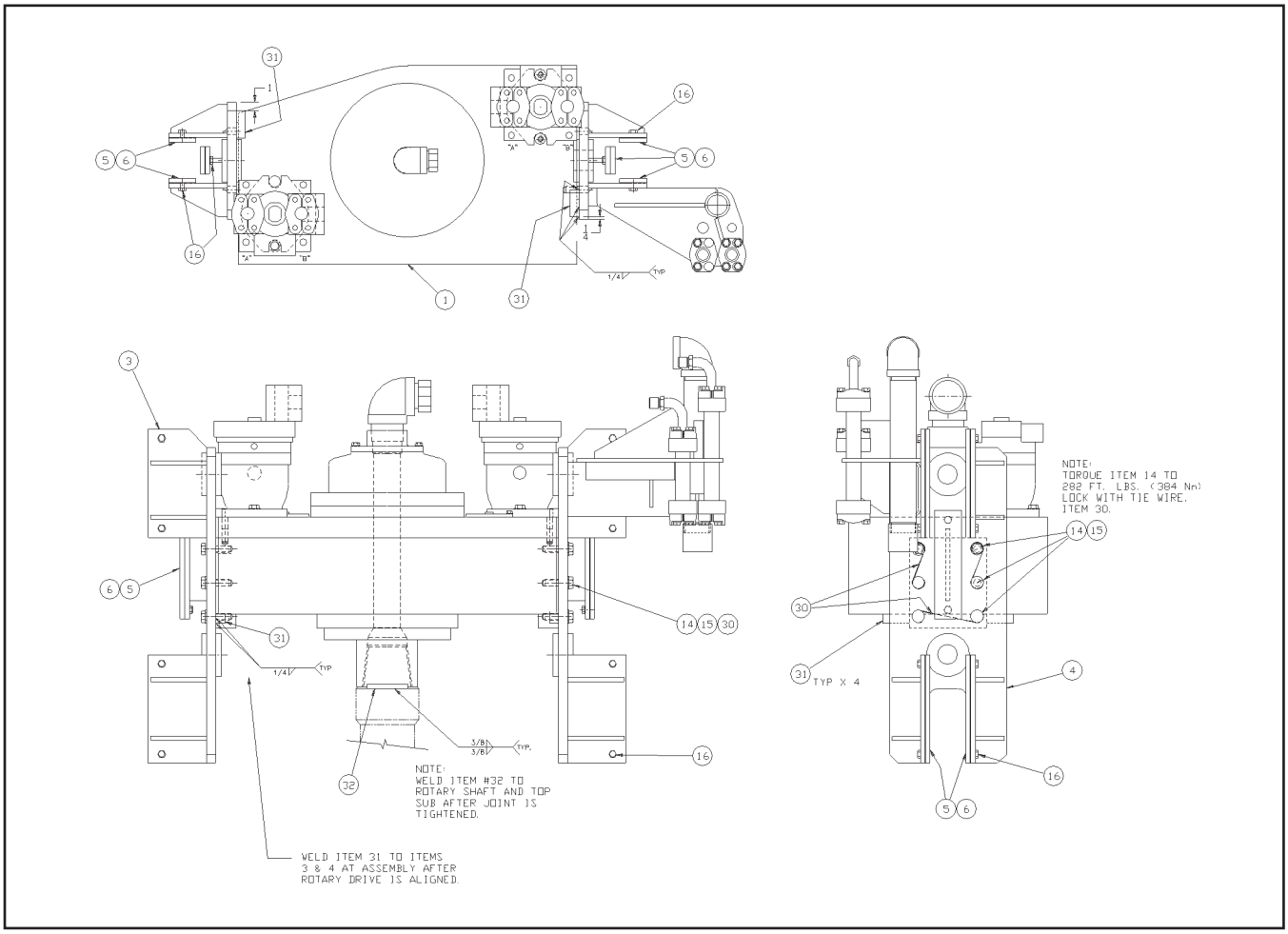


Fig. 6-13 Rotary Drive Assembly

1. *Rotary Gearbox*
3. *L.H. Rotary Guide*
4. *R.H. Rotary Guide*
5. *Wear Pad (10)*
6. *Wear Pad Shim (10)*
14. *Capscrew, Drilled (12)*
15. *Flat Washer (12)*
16. *Capscrew, Brass (20)*
30. *Safety Wire, Stainless Steel*
31. *Chock Bar (6)*
32. *Chock Bar (2)*

Wedge Sockets

One of the more popular end attachments for wire rope is the wedge socket. For field, or on-the-job attachment, it is easily installed and quickly dismantled.

1. Inspect the wedge and socket; all rough edges or burrs, that might damage the rope, should be removed.
2. If the rope is welded, the welded end should be cut off. This will allow the distortions of the ropes strands, caused by the sharp bend around the wedge, to adjust themselves at the end of the line. If the weld is not cut off, the distortions will be forced up the working line. This may result in the development of high strands of wavy rope.
3. Place the socket in an upright position and bring the rope around in a large, easy to handle loop. Care must be taken to make certain that the live-loaded side of the rope is in line with the ears.
4. The dead end of the rope should extend from the socket for a distance approximately nine times the rope diameter. The wedge is now placed in the socket, and a wire rope clip is placed around the dead end by clamping a short, extra piece or rope to the tail. (DO NOT clamp to the live part.) The U-bolt should bear against the tail; the saddle of the clip should bear against the short extra piece.
5. Secure the ears of the socket to a sturdy support and carefully take a strain on the live side of the rope. Full the wedge and rope into position with tension sufficiently tight to hold them in place.
6. After final pin connections are made, increase the loads gradually until the wedge is properly seated. Avoid sudden shock loads.

The foregoing is the recommended procedure. If variations are made to suit special conditions, they should be carefully evaluated beforehand.

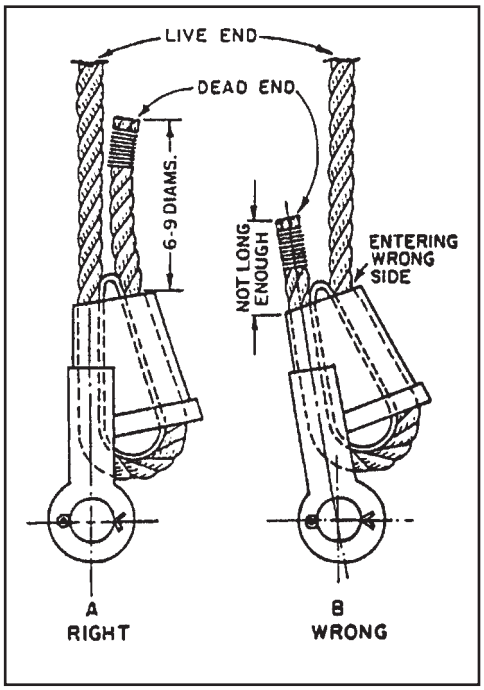
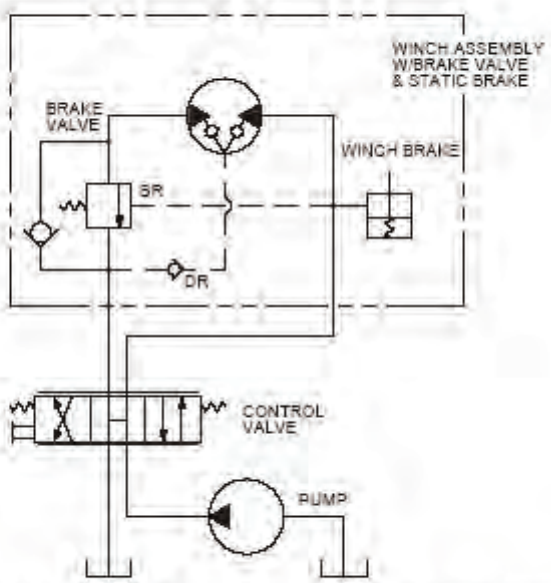


Fig. 6-21



7. The winch directional control valve must be a three position four way valve with a motor spool such that when the valve is in the center position both work ports are open to tank (open center, open port).

8. High quality hydraulic oil is essential for satisfactory performance and long hydraulic system component life.

   Oil having 150 to 330 SUS viscosity at 100°F (38°C) and viscosity index of 100 or greater will give good results under normal temperature conditions. The use of an oil having a high viscosity index will minimize cold-start trouble and reduce the length of warm-up periods. A high viscosity index will minimize changes in viscosity with corresponding changes in temperature.

   Maximum cold weather start-up viscosity should not exceed 5000 SUS with a pour point at least 20° F (-7° C) lower than the minimum temperature.

   Under continuous operating conditions the temperature of the oil at any point in the system must not exceed 180° (82°C). Optimum oil temperature is generally considered to be 120-140°F (49-60°C).

   In general terms; for continuous operation at ambient temperatures between 50 and 110°F (10 to 43°C) use SAE 20W; for continuous operation between 10 and 90°F (-12 to 32°C) use SAE 10W; for applications colder than 10°F (-12°C), contact the BRADEN Service Department. The use of multi-viscosity oils is generally not recommended.

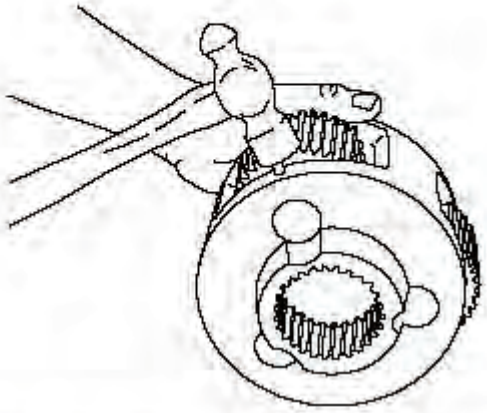
9. The hydraulic oil filter should have a 10 micron nominal rating and be full flow type.

A regular program of preventive maintenance for your

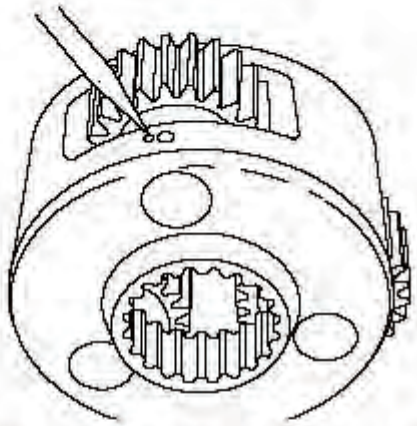
WIRE ROPE INSTALLATION

NOTE: Standard cable anchor or wedge shipped with the winch will anchor 3/8 to 9/16 in. wire rope (Part No. 74780). For 1/4 and 5/16 in. wire rope, use Part No. 24119. For 5/8 and 3/4 poly rope ONLY, use Part No. 26095.

Take the free end of the wire rope and insert it through the small opening of the anchor pocket. Loop the wire rope and push the free end about 3/4 of the way back through the pocket. Install the wedge, then pull the slack out of the wire rope. The wedge will slip into the pocket and secure the wire rope into the drum. The anchor is designed to accommodate several different sizes of wire rope. You may anchor 3/8 in. and 7/16 in. (10 & 11 mm) wire rope by inserting the wedge, large end first. 1/2 in. and 9/16 in. (13 & 14 mm) wire rope may be anchored by inserting the wedge, small end first.



3. Carefully align the pin hole in the carrier with the hole in the planet gear shaft and drive the roll pin into place. Always use NEW roll pins.

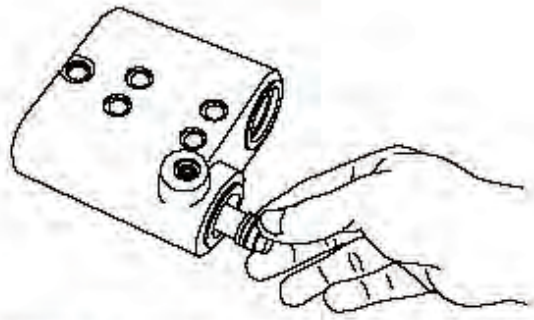


4. Note that the roll pin is slightly recessed in the carrier when properly installed. With a center punch, stake the carrier next to the pin hole as shown. This will distort the hole so the pin will not back out. Repeat these steps for each of the three planet gears.

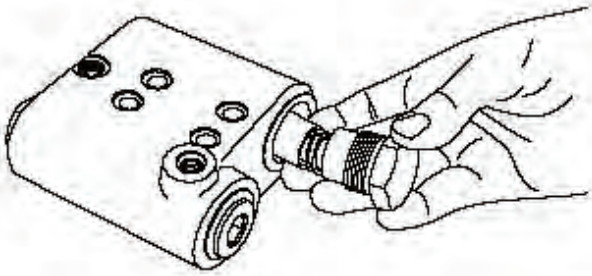
PRIMARY PLANET CARRIER

1. To service the primary planet carrier, the steps are the same as for the output carrier except there is only one bearing for each gear and no bearing spacer.

NOTE: All BG8 winches have a round thrust plate between the primary and output sun gears. In winches with a 23:1 ratio, the plate is not contained in the primary planet carrier. In all other ratios, the thrust plate is captive in the carrier assembly.



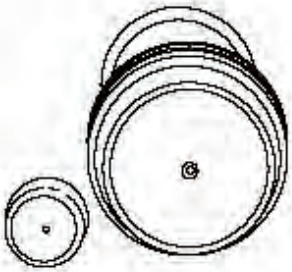
4. Remove spool plug and carefully remove spool assembly.
5. Remove the damper piston from the spool. The piston will come out slowly, because of a partial vacuum formed as it is removed. Use extreme care to avoid damaging the polished surfaces of the piston or spool.



6. Remove the check valve spring retainer, spring and check valve poppet. Check spring free length. Replace spring if less than 1-1/2 in. (38.1 mm) long.

CLEAN AND INSPECT

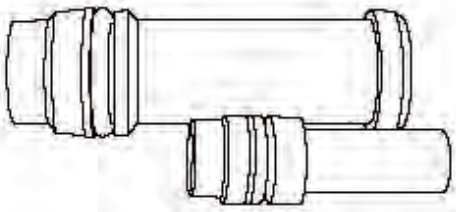
1. Discard all O-rings and back-up rings. Clean all parts in solvent and blow dry. Inspect polished surfaces of spool and damper piston for damage that may cause binding or leakage. Inspect spool bore in valve housing for damage or scoring. Inspect check valve seat in valve housing and check valve poppet. If the spools, bores or valves are damaged, the entire valve must be replaced as these parts are not serviced separately.



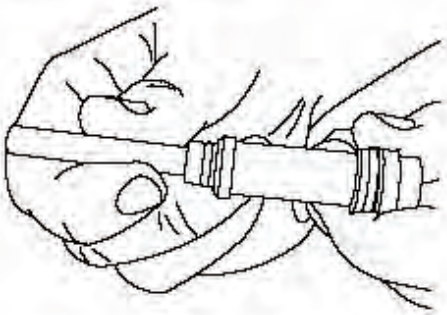
2. Inspect the .020 inch orifice in the end of the spool and the pilot orifice to be certain they are open.

ASSEMBLY

1. Install new O-rings on the plug and spring retainers.



2. Install new O-rings and back-up rings on the spool and damper piston as shown. It is important that each back-up ring is on the correct side of its O-ring. Take care not to cut the O-rings during assembly. Let the spool and damper piston set for ten minutes before installing them in their respective bores. This will allow the O-rings to return to their original size after being stretched.
3. Lubricate the spool and damper piston O-rings with hydraulic oil. Carefully install the damper piston into the spool.



4. Lubricate the spool bore and spool O-rings with hydraulic oil. Carefully install the spool into the valve housing. Always install the spool from the plug end as shown to minimize the possibility of damaging the O-ring. Install the plug, spool spring and spring retainer.
5. Install the check valve poppet, spring and check valve spring retainer.
6. Install the motor drain check ball, spring and elbow fitting.
7. Install the pilot orifice into the valve housing.
8. The brake valve is complete and ready to be installed on the winch motor.

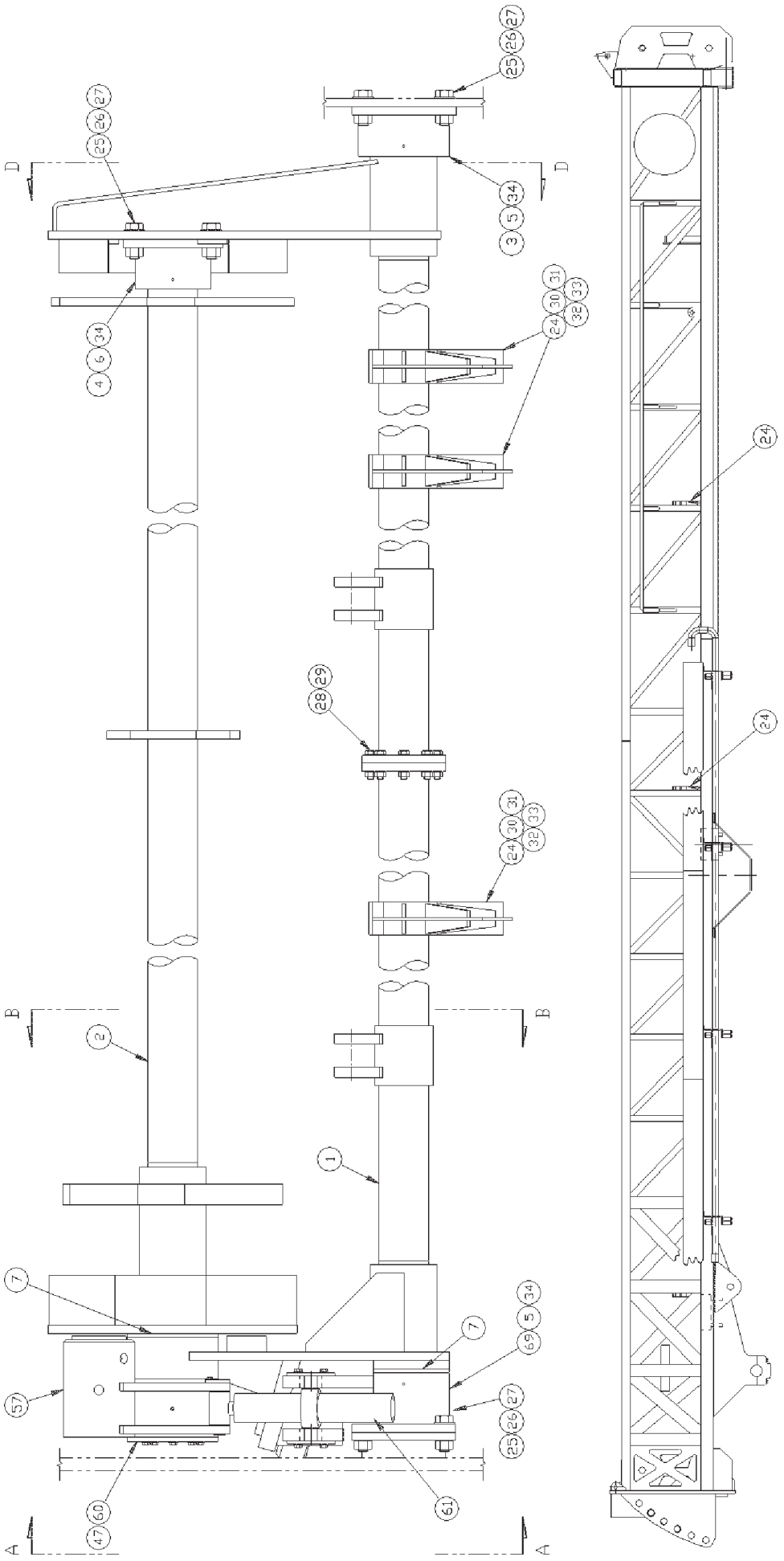


Fig. 6-34 Pipe Rack Assembly

1. *Pipe Rack Support*
2. *Carousel Weldment*
3. *Bearing Cap, Support*
4. *Bearing Cap, Carousel*
5. *Bearing, Journal (4)*
6. *Bearing, Journal*
7. *Thrust Washer (2)*
24. *Mid-Support (2)*
25. *Capscrew (12)*
26. *Nut, Hex (12)*
27. *Washer, Flat (24)*
30. *Bushing (2)*
31. *Nut, Elastic Stop (4)*
32. *Washer, Flat (4)*
33. *Capscrew (4)*
34. *Grease Fitting (10)*
47. *Shim Kit*
57. *Index Plate*
60. *End Cap*
61. *Cylinder, Index*
69. *Bearing Cap, Support*

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Main Return and Case Drain Filter

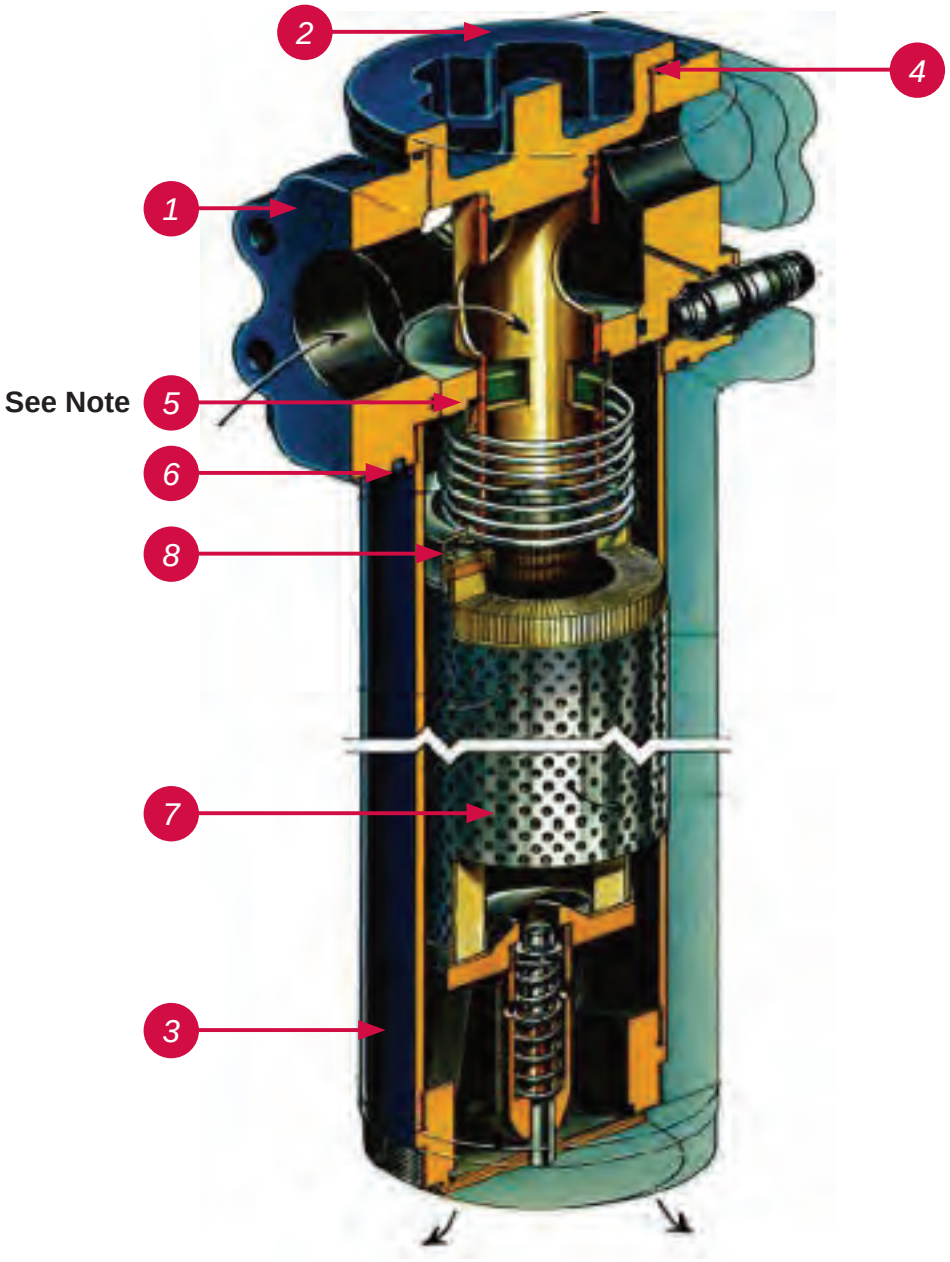


Fig. 7-2 Main Return and Case Drain Filter

1. *Head*
2. *Cover Assembly*
3. *Shell*
4. *Upper Cover O-Ring*
5. *Lower Cover O-Ring*
6. *Head to Reservoir O-Ring*
7. *Filter Element*
8. *Element O-Ring*

NOTE: To prevent premature failure of the hydraulic system always confirm that the lower cover O-ring (Item 5), has not been damaged or dislodged.

Port Locations

Mechanical centering adjustment

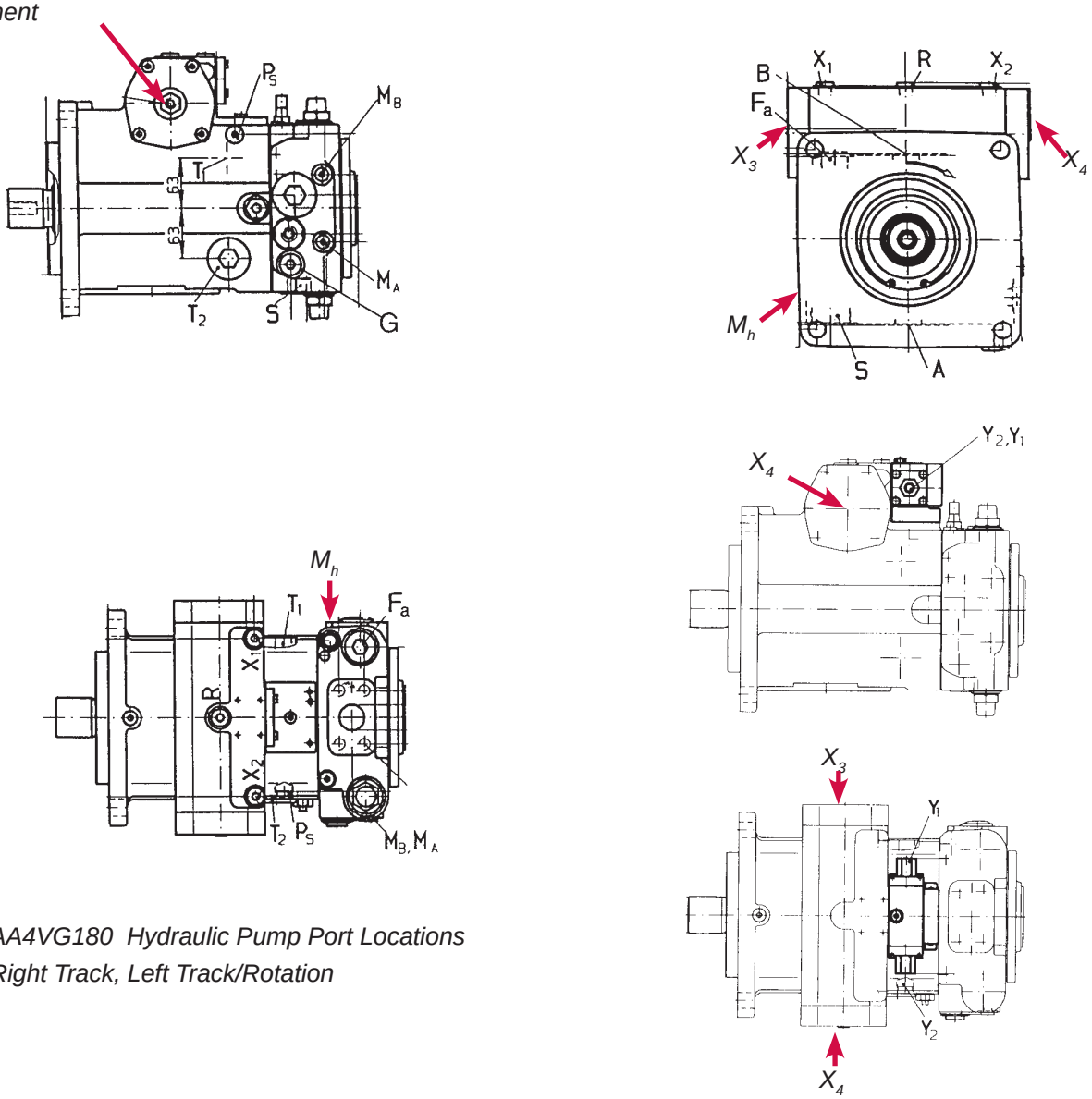


Fig. 7-4e AA4VG180 Hydraulic Pump Port Locations Right Track, Left Track/Rotation

Connections

A, B	High pressure ports	1¼" SAE 420 bar (6000 psi - Code 62)
T_1	Case drain or filling port	1⅝"-12 UN-2B; 20 deep
T_2	Case drain port	1⅝"-12 UN-2B; 20 deep
M_a	Gauge port-sys. pressure A	7/16"-20 UNF-2B; 12 deep
M_b	Gauge port-sys. pressure B	7/16"-20 UNF-2B; 20 deep
M_h	Gauge port-sys. pressure A or B	7/16"-20 UNF-2B; 20 deep
R	Case vent port	9/16"-12 UNF-2B; 20 deep
S	Charge suction port	1⅞"-12 UNF-2B; 20 deep
X_1, X_2	Stroking pressure ports (before orifice)	9/16"-12 UNF-2B; 20 deep
G	Charge pressure gauge port	⅞"-12 UNF-2B; 20 deep
Y_1, Y_2	Pilot pressure ports (only for HD control)	9/16"-12 UNF-2B; 20 deep
P_S	Control pressure gauge port	9/16"-12 UNF-2B; 20 deep
X_3, X_4	Stroking pressure ports (after orifice)	7/16"-12 UNF-2B; 20 deep

Maintenance

Troubleshooting Procedure

3...Transmission Drives in One Direction Only

3.1	With control lines lines switched does pump drive in opposite direction only?	No Yes	Proceed to step 3.2. Control signal from one side does not work properly. Repair as necessary.	3.4	Check flushing valve (If Installed). Is shuttle spool stuck in one position?	No Yes	(Not installed) Proceed to step 3.5. Remove flushing valve and clean or replace.
3.2	With control lines still switched does pump drive in initial direction only?	No Yes	proceed to step 3.3. Problem is one side of control module or the pump. Proceed to step 3.3.	3.5	Switch relief valves. does transmission drive in other direction only?	No Yes	Proceed to step 3.6. Repair or replace relief valve on nondriving side.
3.3	Is there control pressure or current from both control lines?	No Yes	Correct control signal problem. Proceed to step 3.4.	3.6	Replace control module and reconnect control lines. Does pump operate properly?	No Yes	Replace or repair pump. Operate transmission.

4...Transmission Drives in the Wrong Direction

4.1	Pump with HD control.		Switch control lines on ports Y_1 and Y_2.	4.3	Pump with HW Control.		Rework linkage or cable to give correct drive direction.
4.2	Pump with EP Control.		Switch electrical connectors on solenoids A & B.				

5...Pump Does Not Find or Hold Neutral (Also refer to pages 27 & 28)

5.1	Does pump return to neutral with control lines removed?	No Yes	Proceed to step 5.2. Check control for electrical signal problem (EP control) or back pressure in the pilot lines (HD Control).	5.2	Check mechanical centering of pump and control per pages 27 & 28. Does pump return to neutral with control lines removed?	No Yes	Repair or replace pump. Replace control module if needed. Operate transmission.

6...Transmission Drives at a High Noise Level

6.1	Are the drive gearboxes filled with correct grade of oil?	No Yes	Fill gearbox with correct grade of oil to the prescribed level. Proceed to step 6.2.	6.4	Is the suction pressure at the charge pump inlet within recommended limits?	No Yes	Return to step 1.7. Proceed to step. 6.5.
6.2	Is the drive coupling correctly installed and aligned?	No Yes	Install coupling per manufacturer's instructions and tolerances. Proceed to step 6.3.	6.5	Is there air in the hydraulic oil? This may be indicated by foaming or milky colored oil.	No Yes	Proceed to step 6.6. Deaerate the oil and inspect system for cause of air induction.
6.3	Is rigid piping connected to the pump and motor?	No Yes	Proceed to step 6.4 Install short length of hose between pressure ports and the system piping.	6.6	Is the hydraulic motor operating at excessive speed?	Yes	Check motor sizing in relation to available oil flow from the pump. Check motor minimum displacement. See page 20.

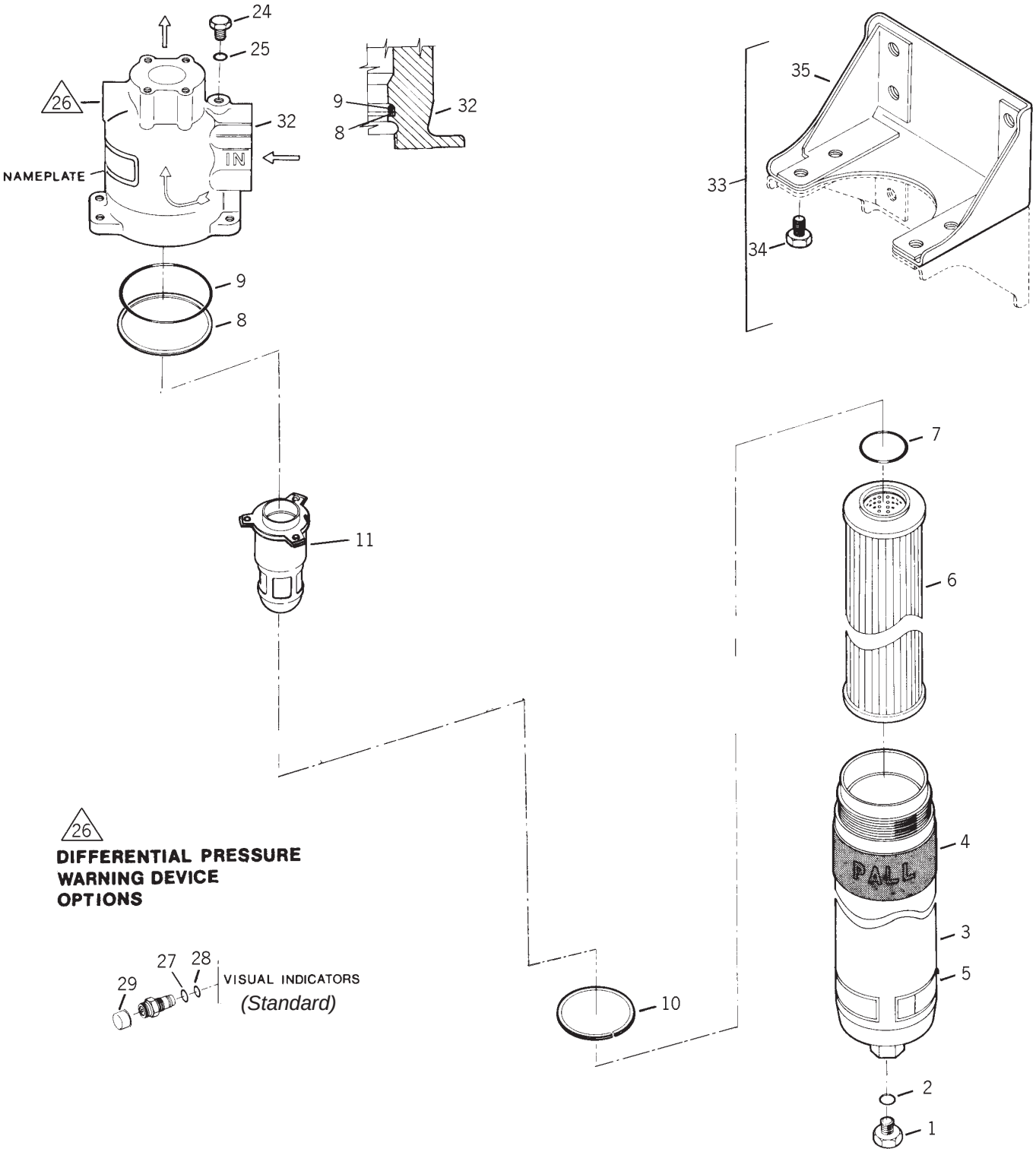


Fig. 7-14 Loop Filter - Exploded View (PIHC-SI-966B)

1. *Bleed Plug*
2. *O-Ring*
3. *Bowl*
4. *Safety Grip*
5. *Label, Element Change*
6. *Filter Element*
7. *O-Ring*
8. *Backup Ring*
9. *O-Ring*
10. *Retaining Ring*
11. *Reverse Flow Valve*
24. *Bleed Plug*
25. *O-Ring*
26. *Differential Pressure Device (Standard)*
27. *O-Ring*
28. *O-Ring*
29. *Dust Cover*
32. *Head*

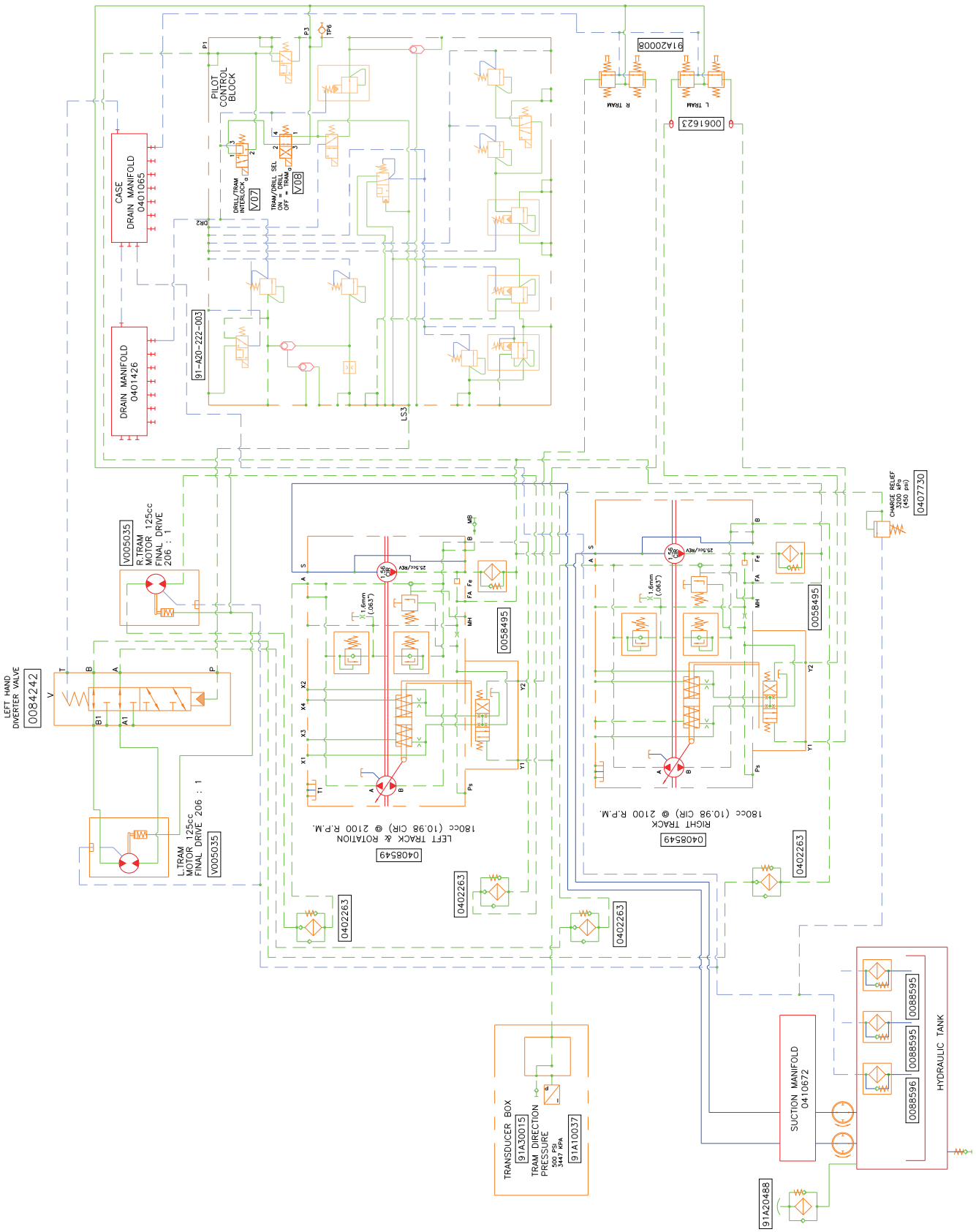


Fig. 7-22. Tram Circuit

MP18 Valve - Jack and Mast Raise Valve

- Parallel and series parallel valve with wide range of section circuitry, including, 3-way, 4-way, float, motor control, 3 and 4 position regenerative, and priority. Available with both flow and pressure control spools.
- May be combined with MP18 series 10 sections.
- Section compensator allows each section to operate at a predetermined flow rate independent of pump discharge flow and pressure.
- Low spool operating forces possible by elimination of series by-pass circuits through the valve. This lends itself to remote operation of valve spools.
- Variety of main spool operators including manual, hydraulic, electro-hydraulic (proportional or on-off control), and mechanical detents. Electro-hydraulic and hydraulic remote also available with manual handle override.
- Section with pressure regulator or remote regulator port allows each section to operate at a predetermined maximum pressure level independent of pump discharge pressure. Dual stage regulator also available.
- Open or closed center operation allows converting open center systems to closed center operation with no major modifications.
- Low neutral pressure drop with open center inlet section, pressure drop remains constant regardless of number of sections. Pump discharge flow is directed back to the reservoir at low pressure through the unloading valve located within inlet section.
- Primary relief in open center unloading inlet section and priority port relief in priority inlet section which provides accurate pressure control over a wide flow range

Series 20

Functional Description

MP18, series 10 mobile stack type valves are load sensing pressure compensated valves. They control the volume, direction of oil flow and maintain a constant flow regardless of changing load pressures.

An advantage of the MP18 is that the starting point for movement of the function always remains the same, i.e., a specified control spool position always has the same metering characteristics. This is accomplished by a compensating spool in each section.

While the main spool is in neutral, the primary shuttle and secondary shuttle are vented to tank. When the main spool is operated, the load pressure is directed via the primary shuttle to the spring end of the pressure compensator spool. The section compensator now moves to the open position. Dependent on the pressure drop between the section compensator and the control spool opening, a specific volume now flows to the function. The load signal also simultaneously communicates to the secondary shuttle and on to the system compensating device. The system compensating device can be either an inlet compensator (open center unloading inlet) in the case of a fixed pump system or a pump compensator control in the case of a variable pump system.

Technical Data

MP18 Specifications

Flow range		GPM (L/min)	35 (133) ***Note…Consult factory for higher flow rates***
Primary operating pressure	Port T	PSI (bar)	290 (20)*
	Port P	PSI (bar)	3625 (250)*
Secondary relief valve setting	Port A, B	PSI (bar)	4200 (290)*
Hydraulic fluid			Petroleum oils (HM, HL, HLP)
Fluid temperature range		° F (° C)	t_{min} = –4° F (–20) t_{max} = 158° F (70)
Viscosity range		SSU (mm ²/s)	35–1760 (10–380) (dependent upon fluid)
Cleanliness level			18/15 according to ISO 4406

*For applications outside these parameters, please consult Rexroth

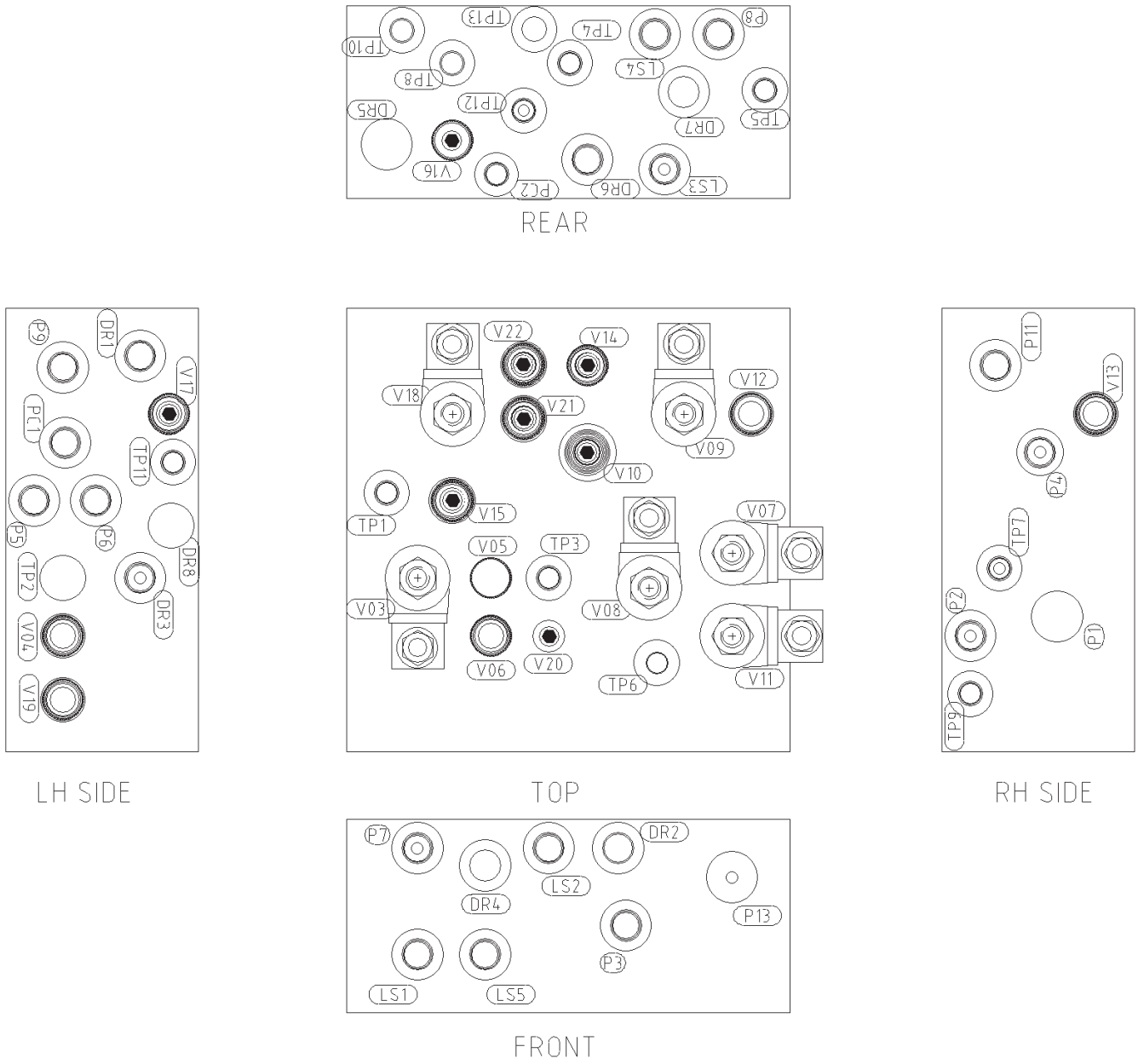
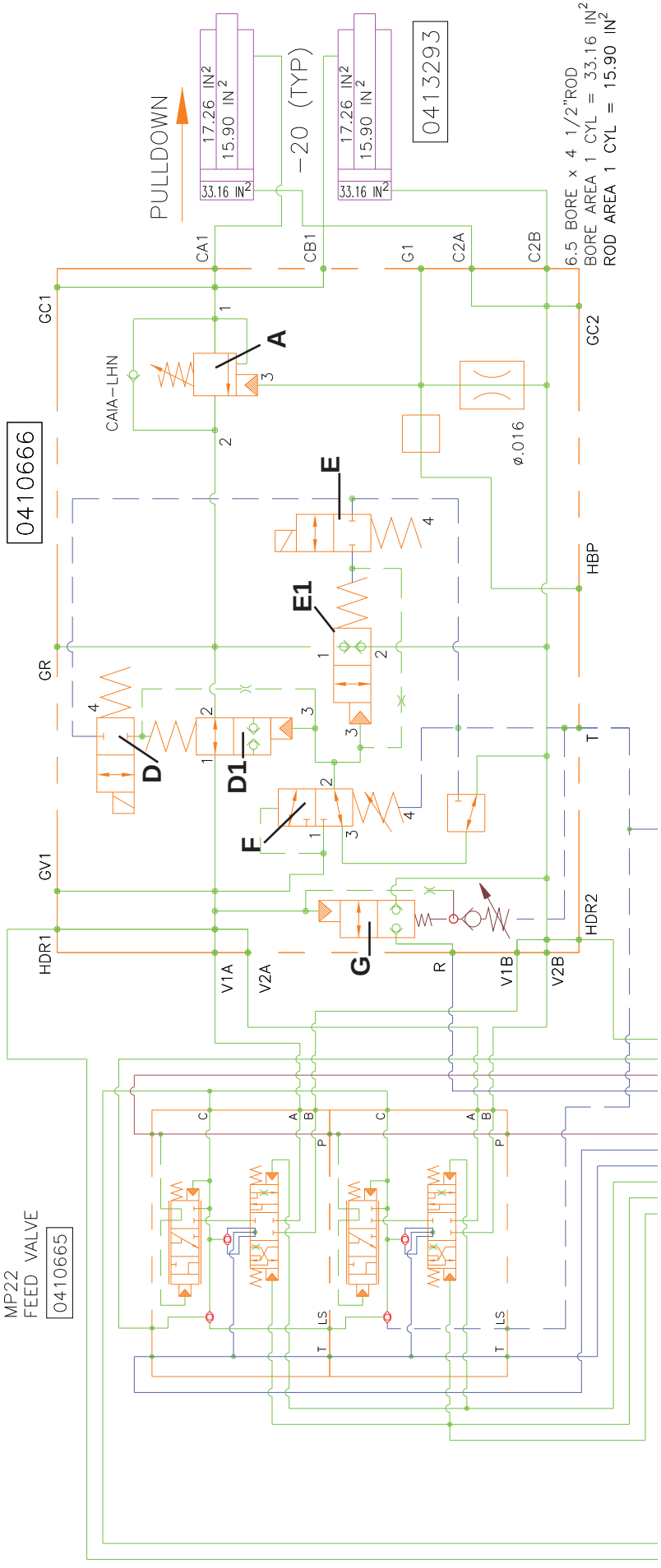


Fig. 7-33 Pilot Control Manifold (ref. 421879)

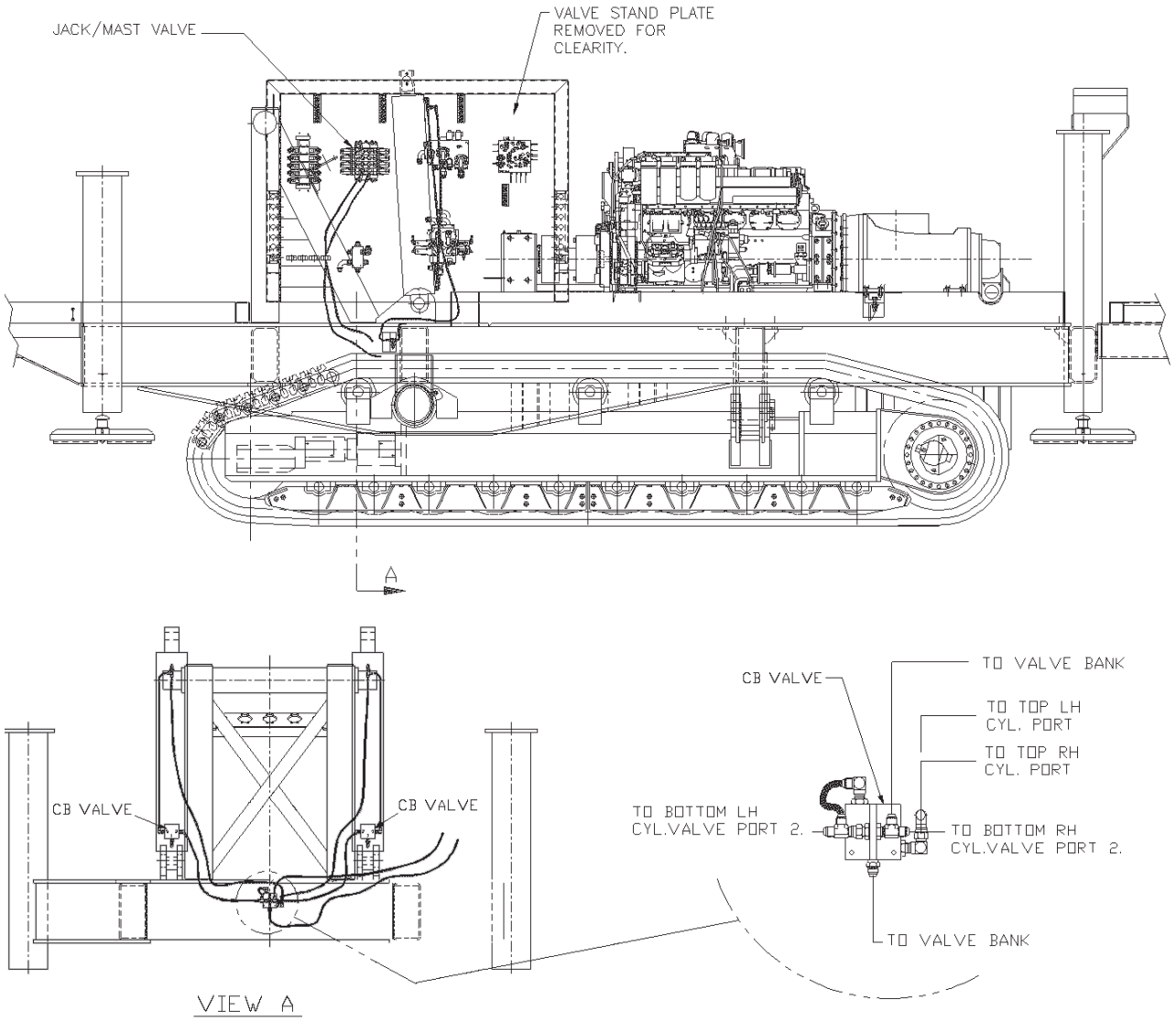
V03 Auxiliary Pump, OFF=LS, ON-HI
V04 Shuttle
V05 Aux. Press. Aux. Pump RV
V06 Jacks/Mast Raise RV
V07 Drill/Tram Interlock
V08 Drill/Tram Select, OFF=DRILL, ON=TRAM
V09 Auto Pulldown Solenoid
V10 Rotary Torque Switch
V11 Set-up Lock
V12 Auto Pulldown PRV
V13 Shuttle
V14 Rotary Torque Safety Relief
V15 Max. Pulldown RV
V16 Pulldown RV
V17 Pulldown Reduction RV
V18 Pulldown Reduction Solenoid
V19 Shuttle
V20 Orifice, 0.8mm
V21 Rotation Control RV
V22 Rotation Control PRV

RV = Relief Valve
PRV = Pressure Reducing Valve



NOTE: Refer to envelope in rear of manual for complete Feed circuit drawing

Fig. 7-34 Hydraulic Feed Circuit



The elevating cylinders have a built in cushioning design for full extension protection. As the cylinder approaches full extension the rod end of the piston which has an extended back end, enters the cylinder gland and blocks off the normal oil porting. Oil then passes through a restricting orifice which slows down the flow leaving the cylinder, thus slowing the travel speed of the cylinder.

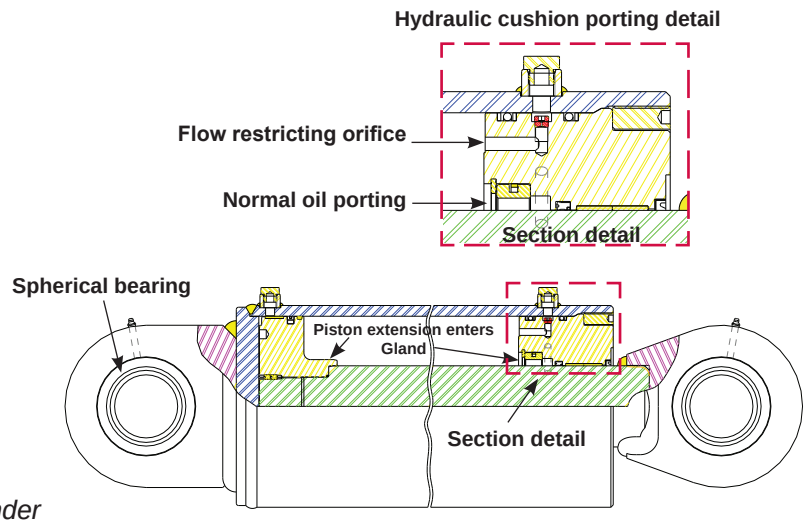


Fig 40a. Mast Elevating Cylinder

Hydraulic Motor

Specifications and Tools

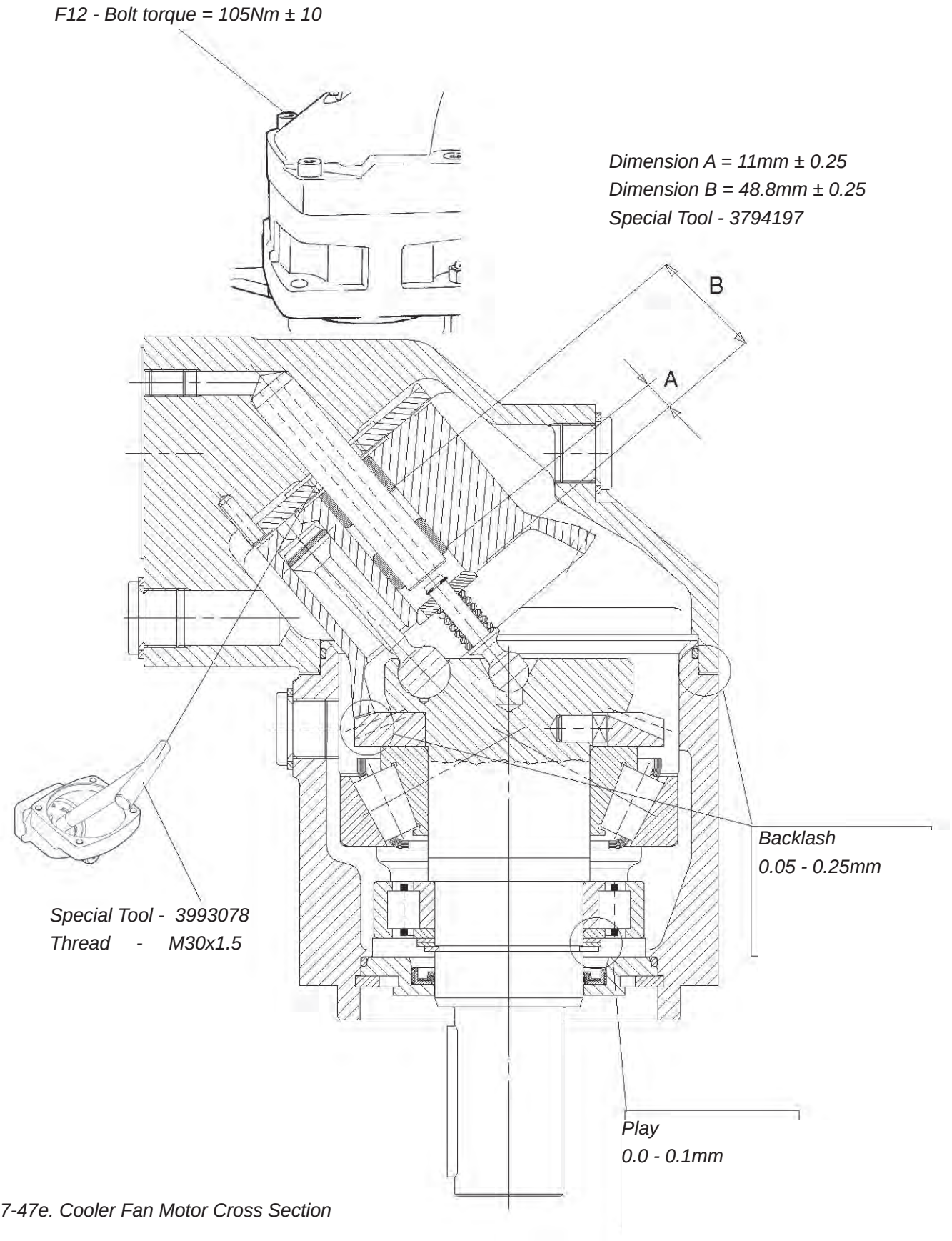


Fig 7-47e. Cooler Fan Motor Cross Section

Water Injection Circuit

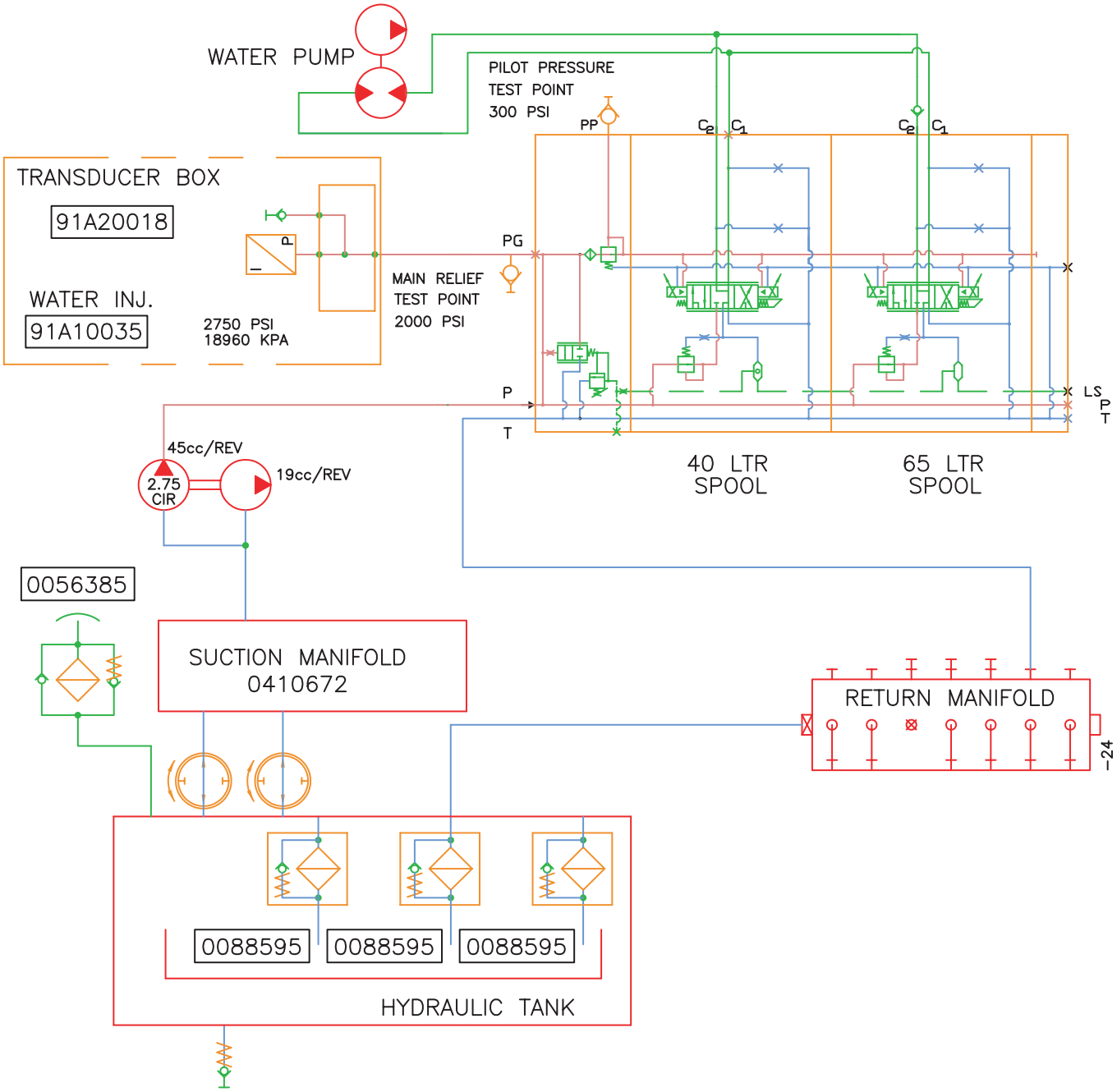


Fig. 7-52 Water Injection Circuit

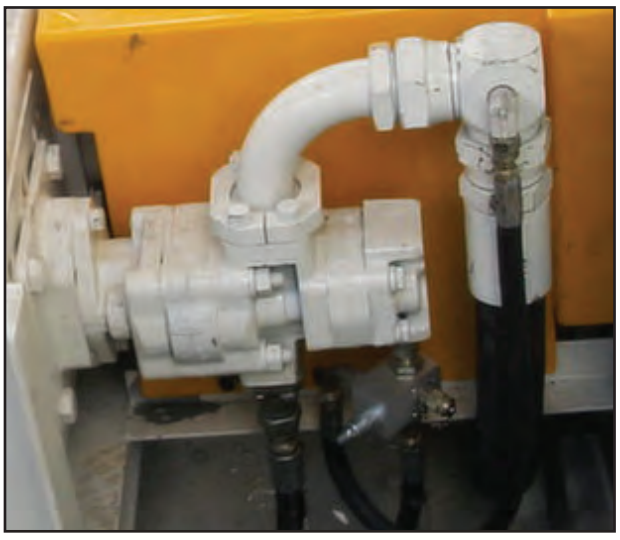
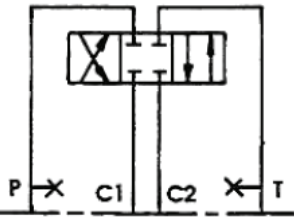


Fig 52a. Water Injection Pump

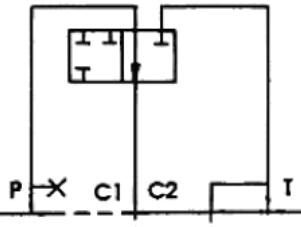
SECTION VALVE SPOOL
CONNECTIONS TO TEST STAND
(SHOWN IN FIGURE 1)

2 POSITION, 4-WAY
P→C1
3 POSITION, 4-WAY
P→C1/P→C2



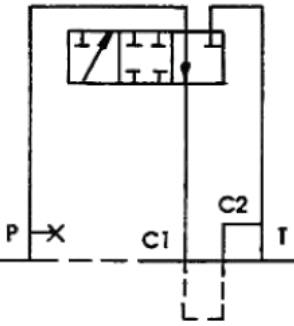
TEST STAND
FROM FIGURE 1

2 POSITION, 2-WAY
P→C1



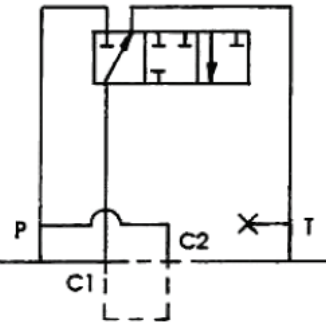
TEST STAND
FROM FIGURE 1

3 POSITION, 3-WAY
P→C1



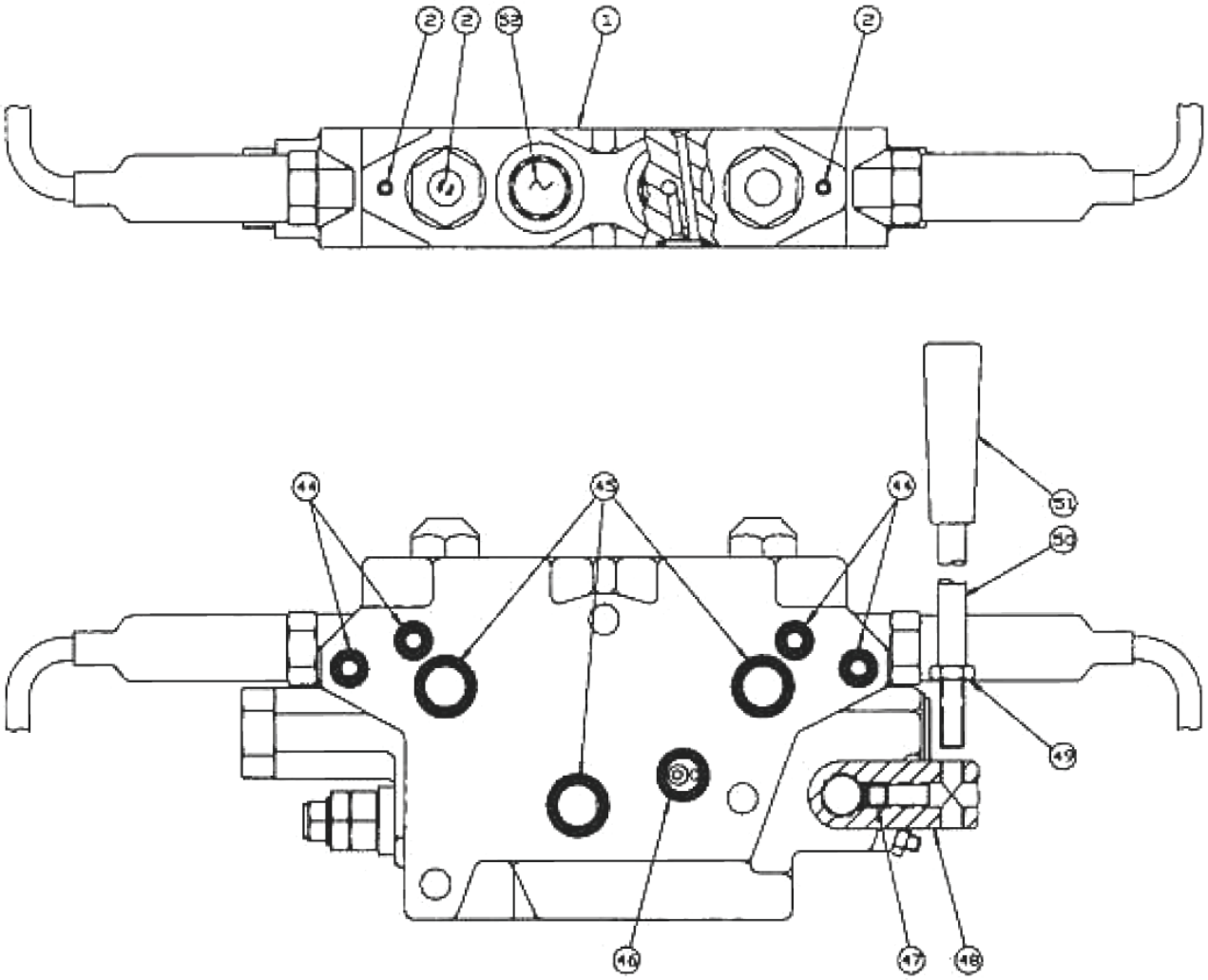
TEST STAND
FROM FIGURE 1

3 POSITION, 3-WAY
C1→T



TEST STAND
FROM FIGURE 1

Water Injection Valve

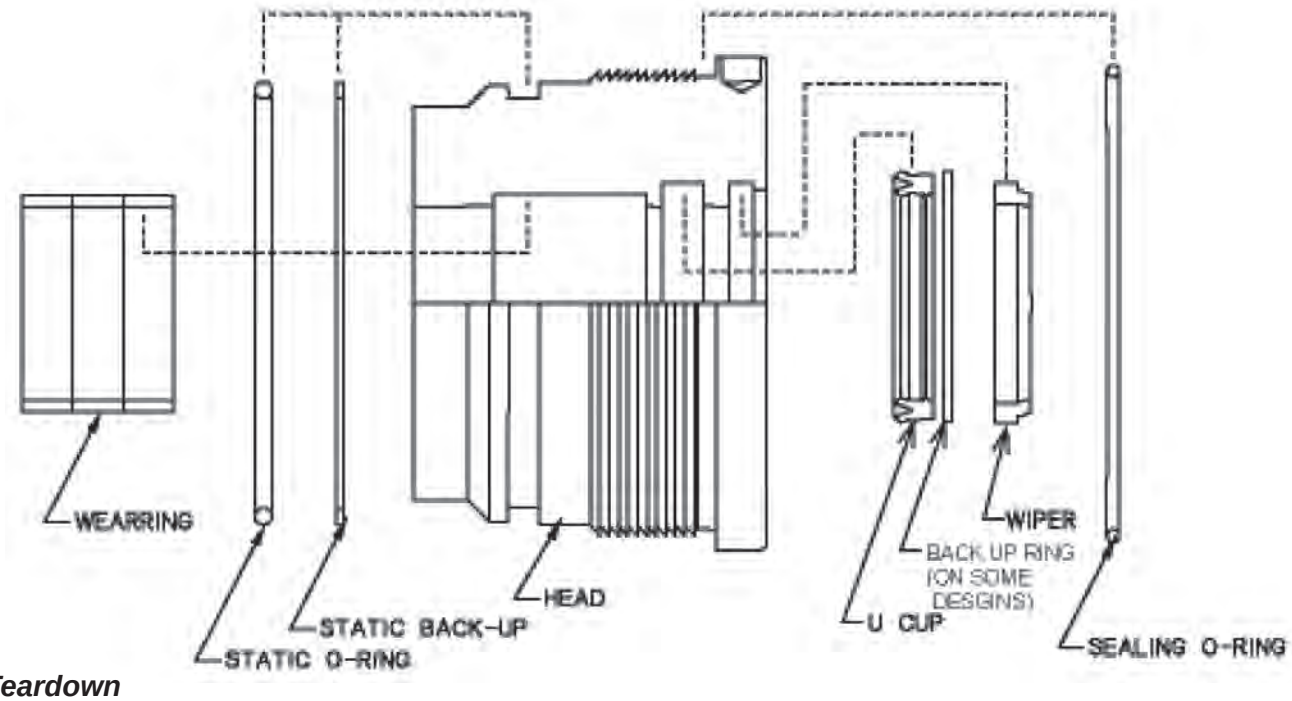


1. *Main Segment Valve Body*
2. *Construction Plug*
6. *Shaft*
7. *Shaft Seal*
8. *Linkage*
9. *Socket Hex Plug*
10. *Hook*
11. *F.L. Set Screw*
12. *Seal Nut*
13. *O'Ring*
17. *Pipe Plug*
20. *Compensator Spool*
21. *Comp Shim (0.025")*
22. *Comp Shim (0.008")*
23. *Comp Shim (0.003")*
24. *Compensator Spring*
25. *Secondary Comp Spring*
29. *Compensator Spring*
30. *Main Spool Spring*
31. *Centering Spring*
32. *Spring Guide*
33. *Retaining Ring*
36. *Solenoid Assembly*
37. *Solenoid Plug Sub Assembly*
39. *Relief / A.C. Cartridge*
40. *Relief / A.C. Cartridge*
41. *Check Ball (1/2")*
42. *Check Spring*
43. *Port Plug*
44. *O'Ring*
45. *O'Ring*
46. *O'Ring*
47. *Adaptor Screw*
48. *Handle Adaptor*
49. *Jam Nut*
50. *Handle Adaptor*
51. *Knob*
52. *Shipping Plug*
58. *Lock Nut*
60. *Defeat Spring*
61. *Delta Defeat Spring*
62. *Solenoid Valve S/A*

Z Head

General

The Z series head uses ductile iron material and has a polyurethane u-cup as the primary sealing element. Cylinders rated for pressures above 3500 psi, may have a back up ring behind the u-cup. The wiper is a standard type D polyurethane. The head is retained within the tube by means of its own buttress threads. There is a sealing o-ring that prevents contaminant from reaching the threads and provides an anti-rotation function. General procedures for teardown, inspection and rebuild are contained in the General Procedures Maintenance Manual. See your Texas Hydraulics Sales Engineer if you have any questions.



Teardown

Remove the head as follows: Insert a spanner wrench into the holes provided. Turn the head counter clockwise (it is a right hand thread) to remove it. If the head is difficult to remove or moves erratically, tap the tube adjacent to the head with a brass or plastic mallet while turning it.

Rebuild

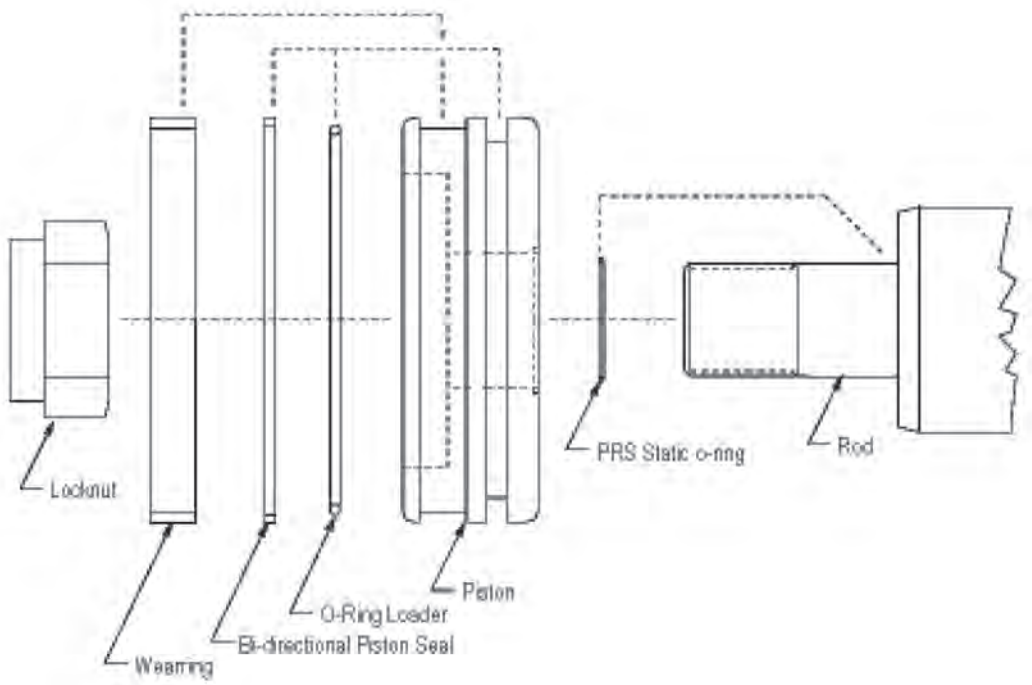
Lubricate the head and all seals with hydraulic fluid prior to installation. Using round nose pliers or special installation tools, twist the dual lip u-cup seal into a “C” shape and allow it to snap into groove. Use a similar technique for installing the wiper. Install the static o-ring and backup into the static seal groove verifying that the backup is closest to the threads. Install the sealing o-ring into the groove between the threads and the flange lip. If possible, the head/seal assembly should sit for at least one hour to allow the seals to elastically restore.

Slide the head into the tube and engage the threads. Turn the head counter clockwise until the first thread just passes the engagement point (the head will move noticeably) then turn the head clockwise until it is hand tight or fully seated. Insert a spanner wrench into the holes provided and tighten 1/8 to 1/4 turn past fully seated.

N Piston

General

The N series piston uses aluminium material and has both an o-ring energised bidirectional seal and a close tolerance wearing. Cylinders designed for use a pressures above 3500 psi may have a back-up ring on one or both sides of the bidirectional seal. See the engineering drawing to determine if your cylinder has this ring and which side of the seal it is located. A small o-ring is used to seal the static side. On some designs it is installed in a groove in the rod, for others, it fits in a groove on the edge of the piston in contact with the rod. General procedures for teardown, inspection and rebuild are contained in the General Procedures Maintenance Manual. See your Texas Hydraulics Sales Engineer if you have any questions.



Teardown

After removing the piston, remove and discard the PRS static o-ring from the threaded portion of the rod. Remove the bidirectional piston seal and o-ring loader by means of blunt instruments of bronze or aluminium. Be sure there are no sharp edges on these tools. Be particularly careful of scratching the groove surface finish. Remove the wear ring by spreading the ring into a “C” shape at the split.

Rebuild

Lubricate the piston and all components with hydraulic fluid. Stretch the o-ring loader into the seal groove. Be extremely careful to avoid damaging the seal groove during installation. Scratching the groove may cause bypass leakage. Verify that the rubber o-ring is not pinched or twisted. Start one edge of the bidirectional piston seal into the seal groove. Use your thumb to push the remaining portion of the diameter over the edge of the piston and into the groove. Be very careful not to cut the OD of this seal. Spread the wear ring into a “C” shape only enough to fit over the outside of the piston and snap it onto its groove.

Jump Starting

Precautions

1. DO NOT smoke or use open flame near batteries.
2. DO NOT jump start if the battery fluid is frozen or slushy as the battery may explode. The battery should be warmed to at least 40°F (4.4°C) before attempting a jump start.
3. Jump start only with an external power source, having an electrical system of the same voltage, ground polarity and equipped with battery or batteries of comparable size or larger.
4. DO NOT jump start using motor generator sets, welders or other sources of DC power.
5. DO NOT jump start 24V electrical systems with two 12V batteries connected in series. The current drain will be too high on the 12V batteries possibly causing an explosion.
6. DO NOT permit metal-to-metal contact between the machine and starting vehicle and do not allow jumper cable terminal clips to contact either vehicle as arcing may result in fire or explosion.
7. Use only jumper cables that are clean, in good condition, and are heavy enough to handle the starting current.

Procedure:

1. Turn ignition switch OFF. Turn all accessories OFF.
2. Connect jumper cable to isolator box jump start recptical on drill. Connect other end of jumper cable to jump start recptical on source machine.
3. Stand as far away as possible from batteries before actual starting.
4. Charge batteries. The engine will not continue to run after starting if the batteries have not been charged.
5. Start engine. As soon as engine starts, remove jumper cables in reverse order of installation.

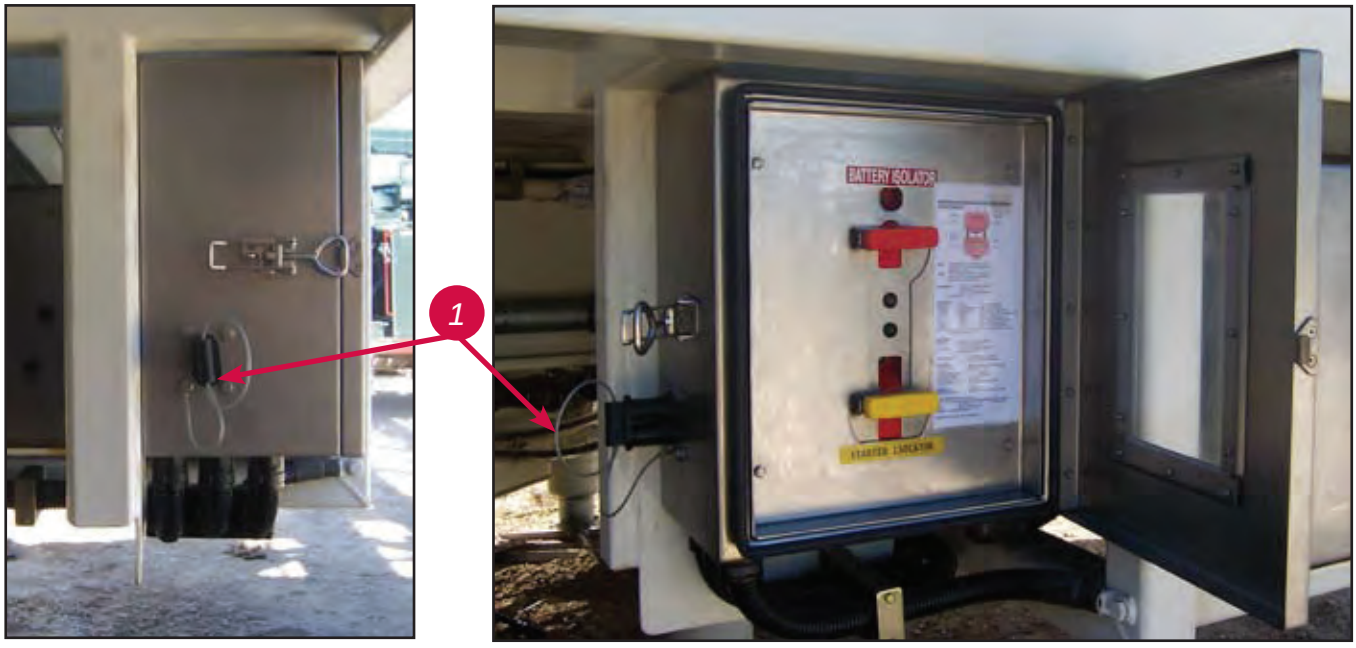


Fig 8-2.
1. Jump start receptical

Pipe in Hole Detection

This option inhibits the movement of the MAST, JACKS and TRAMMING.

All of the following 3 conditions must be met to verify that the pipe is out of the hole.....

1. The Rods on string must be 1 or less (the last rod in the string will still be on the head).
2. The depth must equal zero (the actual depth must have counted all the way back to zero).
3. The head must be above the “Pipe in Hole” set point (the head must be at the top of the mast).

Tram Protection

The Pipe in Hole is deemed to be clear to Tram only after ALL THREE above conditions are met OR the Override function is operated on the Touchscreen.

The operation of the Tram Override function (on the Tram Screen) is logged on the screen and memory. The Tram Override function will self reset when the operator switches back to drill mode for the next hole or whenever the drill is first started.

Mast and Jack Lowering Protection

The Pipe in Hole is deemed to be clear to Tram only after ALL THREE above conditions are met OR the Override function is operated on the Touchscreen.

The operation of the Pipe in Hole Override function (on the Drill Screen) is logged on the screen and memory. The Pipe in Hole Override function will self reset when the operator switches to tram mode for the next hole or whenever the drill is first started.

NOTE: All “OVERRIDE” operations and buttons are operated with the full understanding and acceptance of the system or operation to be overridden.
Overriding any system has the potential for component or machine damage, this procedure must be done only after fault evaluation and with due care.

Pipe Rack Swing Interlock

If the Head is below the “Head Clear” set point. The Pipe Rack will not be allowed to swing into the Head. This interlock prevents collision between the Head and the Pipe Rack carousel.

Distance Meter

Setting Up

Magnetic Proximity switch is located on the crawler and senses a ring of flags attached to the track drive.

The distance between each flag count is approx. 112mm (This may vary slightly on each drill. The actual calibrated figure can be obtained from the commissioning sheet)

The tram direction pressure switch is used to detect a change in direction (Switch must be set to be ON when tram is just moving in one direction only).

It is critical that all flags are being sensed by the proximity switch when the drill is tramming. If the proximity is too far away from the flag ring, random sensing will occur, resulting in an incorrect and unrepeatable distance measurement. Initially random sensing can be seen as too many counts being registered and distance displayed incorrect, indicating the proximity switch is ‘flickering’ on-off over each flag. Adjustment may be needed to the Proximity, (adjusting it closer to the flag ring increases detection reliability).

Do not adjust the proximity any closer than 3mm.

Inclinometers

Two incline sensors (which are mounted under the dash) are used to detect the machine incline angles when tramming. There are two alarm set points.

- Excessive Incline Warning: This warning indication only alarm is preset 2 degrees below machine operating parameters when tramming. The operating parameters vary on type of machine, whether mast is up or down and which direction the drill is facing when tramming up or down an incline.
- Excessive Incline - Tip over Imminent: This shutdown alarm is preset set at an angle of 45 degrees. It is obvious that at this point the Machine will be on its side and the Drill PLC system will automatically shutdown the machine.

The incline sensor is a 4-20mA device and feedback can be measured with a multimeter.

4mA = (-) 80¼ (degrees)

20mA = (+) 80¼ (degrees).

Inclinometer setup

To set up newly installed NG4I Inclinometer:

- Machine must be jacked and level to correctly perform Inclinometer setting.
- Connect Inclinometer wiring as per As built Electrical schematics.
- Mount the inclinometer loosely and apply power.
- Slowly rotate the inclinometer and check the indicated angle on the relevant touch screen display. *(Buffering in the PLC will cause the Touchscreen incline display to update slowly)*
- When the zero point is achieved firmly mount the Inclinometer in that position.

Safety Instructions

These safety and operating instructions should be carefully read and followed during operation and handling of the LDM 40 A.

WARNING: There is danger from laser radiation or electrical shock! For repair work, the LDM 40 A may not be opened by anyone other than Manufacturer personnel or expressly authorised and duly instructed persons. Please note that dangerous high voltage and laser radiation is present in the inner product space.

Compliance with the prescribed operating conditions is necessary.

Failure to observe advice or information contained herein or non-conforming usage of the LDM 40 A may cause physical injury to operating personnel or material damage to the measuring module.

To operate the LDM 40 A, use only 10 V to 30 V direct voltage supply inall cases.

Important operating advice

To be able to fully utilise the system's capabilities, you should strictly follow these rules:

- Do not operate the module if there is fogging or contamination on optical parts.
- Do not touch the module's optical parts with bare hands.- Use caution when removing dust or soiling from optical components.
- Prevent exposure to shock impacts during transportation and operation.
- Prevent overheating of the module. Do not expose the module to direct sun radiation while it is stored in a motor vehicle.
- The LDM 40 A is splash proof and dust proof as required under IP65 internal protection standards.
- The LDM 40 A laser distance measurement module is a class 2 laser product under DIN EN 60825-1:2001-11.

WARNING: There is class 2 laser radiation when the cover is removed. Do not look into the beam!

Transmission Protocol

ASCII string		Description
ID	Enter (0Dh)	Calls up a list of commands
DT	Enter (0Dh)	Starts distance tracking
DF	Enter (0Dh)	Distance measurement mode with remote triggering
DM	Enter (0Dh)	Single distance measurement
DW	Enter (0Dh)	Starts distance tracking with white target
TP	Enter (0Dh)	Inner temperature [^{0}C]
SA	Enter (0Dh)	Sets / displays time to measure 0...25
SA	Enter (0Dh)	Sets / displays mean value
SF	Enter (0Dh)	Sets / displays scale factor
AC	Enter (0Dh)	Sets / displays alarm centre [m]
AH	Enter (0Dh)	Sets / displays alarm hysteresis [m]
RB	Enter (0Dh)	Sets / displays distance [m] for Iout = 4 mA
RE	Enter (0Dh)	Sets / displays distance [m] for Iout = 20 mA
TD	Enter (0Dh)	Sets / displays trigger delay [ms] and trigger level
BR	Enter (0Dh)	Sets / displays baud rate (1200...38400)
AS	Enter (0Dh)	Sets / displays Autostart command
OF	Enter (0Dh)	Sets / displays distance offset
LO	Enter (0Dh)	Turns the laser on
LF	Enter (0Dh)	Turns the laser off
PA	Enter (0Dh)	Displays parameter
PR	Enter (0Dh)	Resets parameter

Error Messages

Code	Description	Code	Description
E15	Reflexes are too weak, use target board or distance between LDM 40 A (front edge) and target < 0.1 m	**E53**	Notify service!
E16	Reflexes are too strong, use target board	**E54**	Notify service!
E17	Too much steady light (e.g. sun)	**E55**	Notify service!
E23	Temperature below – 10^{0}C	**E61**	Illegal command
E24	Temperature above + 50^{0}C	**E62**	Notify service!
E31	Notify service!	**E63**	Notify service!
E51	Notify service!	**E64**	Notify service!
E52	Notify service!		

13. Service, Maintenance, Warranty

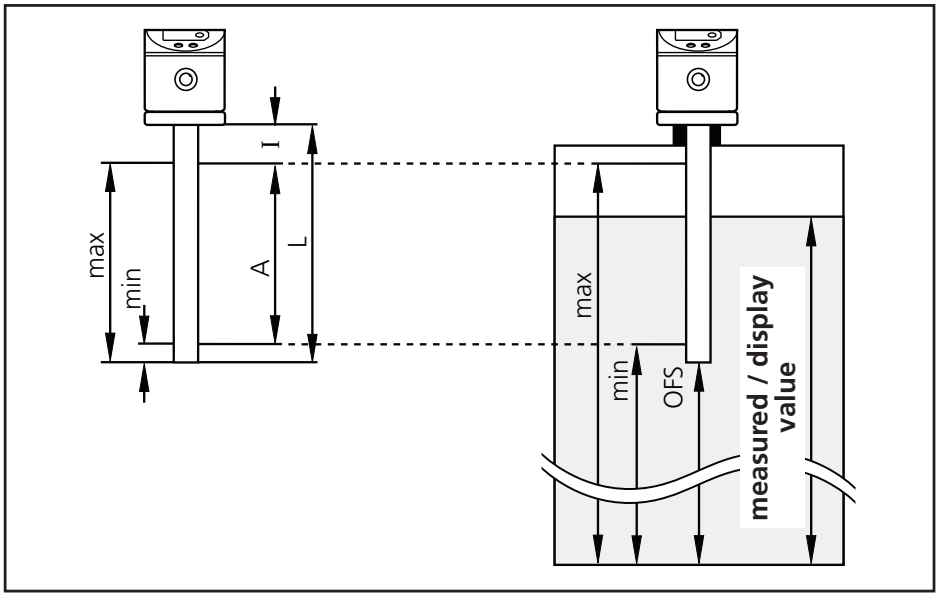
The warranty period is one year. To ensure that all functions are regularly checked and your LDM 40 A operates faultlessly over a long period of time, you are advised to have the LDM 40 A laser distance measurement module inspected at ourlocation at annual intervals. If a repair becomes necessary, you should carefully pack and send the LDM 40 A to our local dealer.

Function and features

- The sensor **detects** the **level of media** in tanks within the active zone,
- shows the current level on its **display**
- and generates **2 output signals** according to the set output configuration.

output 1	output 2
hysteresis function / N.O. (**Hno**)	analog 4 ... 20 mA (**I**)
hysteresis function / N.C. (**Hnc**)	
window function / N.O. (**Fno**)	analog 0 ... 10 V (**U**)
window function / N.C. (**Fnc**)	

Measuring range



		LK3022	LK3023	LK3024
L = probe length	cm	26.4	47.2	72.8
	inch	10.4	18.6	28.7
A = active zone/ measuring range	cm	19.5	39.0	58.5
	inch	7.7	15.4	23.0
I = inactive zone	cm	5.3	5.3	10.2
	inch	2.0	2.0	4.0
min = lowest measured value	cm	1.5*	3.0*	4.0*
	inch	0.6*	1.2*	1.6*
max = highest measured value	cm	21.0*	42.0*	62.0*
	inch	8.3*	16.6*	24.4*
OFS = offset	cm	0 ... 78.0	0 ... 57.0	0 ... 186
	inch	0 ... 30.7	0 ... 22.5	0 ... 73.2

*With offset > 0 the OFS value is added to these values.
factory setting: OFS = 0

Offset

The area between the bottom of the tank and the lower face of the measuring probe can be entered as offset value. Thus the display and the switch points refer to the real tank level.

Order: 5343A

Type
5343A

Connections:

Electrical specifications:

Specifications range:
-40°C to +85°C

Common specifications:

Supply voltage, DC	8.0...35 V
Internal consumption	25 mW...0.8 W
Voltage drop	8 VDC
Warm-up time	5 min.
Communications interface	Loop Link
Signal / noise ratio	Min. 60 dB
Response time (programmable)	0.33...60 s
Signal dynamics, input	19 bit
Signal dynamics, output	16 bit
Calibration temperature	20...28°C

Accuracy, the greater of the general and basic values:

General values		
Input type	Absolute accuracy	Temperature coefficient
Lin. R	≤ ±0.1% of span	≤ ±0.01% of span / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
Lin. R	≤ ±0.05 Ω	≤ ±0.002 Ω / °C

EMC immunity influence	< ±0.5% of span
Effect of supply voltage change	< 0.005% of span / VDC
Vibration	IEC 60068-2-6 Test FC
Lloyd's specification no. 1	4 g / 2...100 Hz
Max. wire size	1 x 1.5 mm² stranded wire
Humidity	< 95% RH (non cond.)
Dimensions	Ø 44 x 20.2 mm
Tightness (enclosure / terminal)	IP68 / IP00
Weight	50 g

Electrical specifications, input:

Linear resistance input:

Measurement range	0...100 kΩ
Min. measurement range (span)	1 kΩ
Max. offset	50% of selec. max. value
Cable resistance per wire (max.)	100 Ω
Sensor current	> 25 µA, < 120 µA
Effect of sensor cable resistance (3-wire)	< 0.002 Ω / Ω
Sensor error detection	Yes

Output:

Current output:

Signal range	4...20 mA
Min. signal range	16 mA
Updating time	135 ms
Load resistance	< (Vsupply - 8) / 0.023 [Ω]
Load stability	< ±0.01% of span/100 Ω

Sensor error detection:

Programmable	3.5...23 mA
NAMUR NE43 Upscale	23 mA
NAMUR NE43 Downscale	3.5 mA

Marine approval:

Det Norske Veritas, Ships & Offshore	Standard for Certification No. 2.4

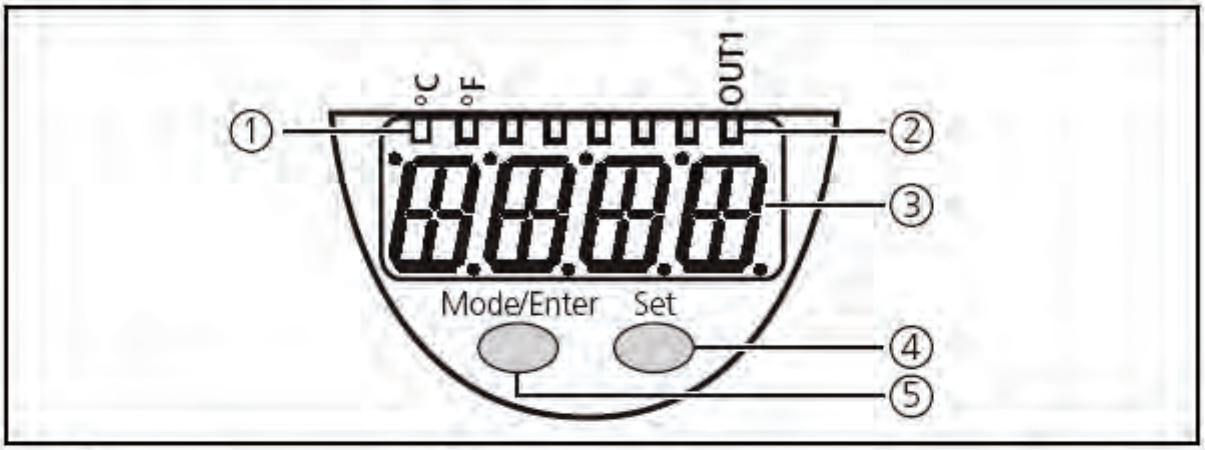
Observed authority requirements:	**Standard:**
EMC 89/336/EEC, Emission	EN 50081-1, EN 50081-2
Immunity	EN 50082-2, EN 50082-1
Emission and immunity	EN 61326

Of span = Of the presently selected range

Temperature Transducer - Control Monitor For Temperature Sensors

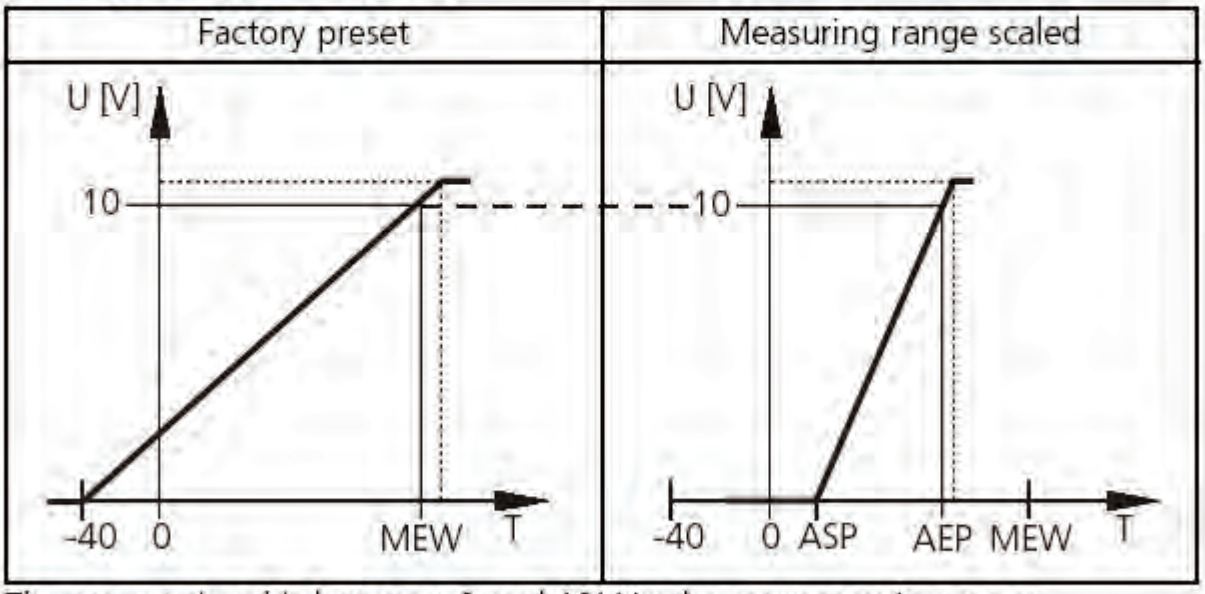
Operating Instructions

Controls and visual indication



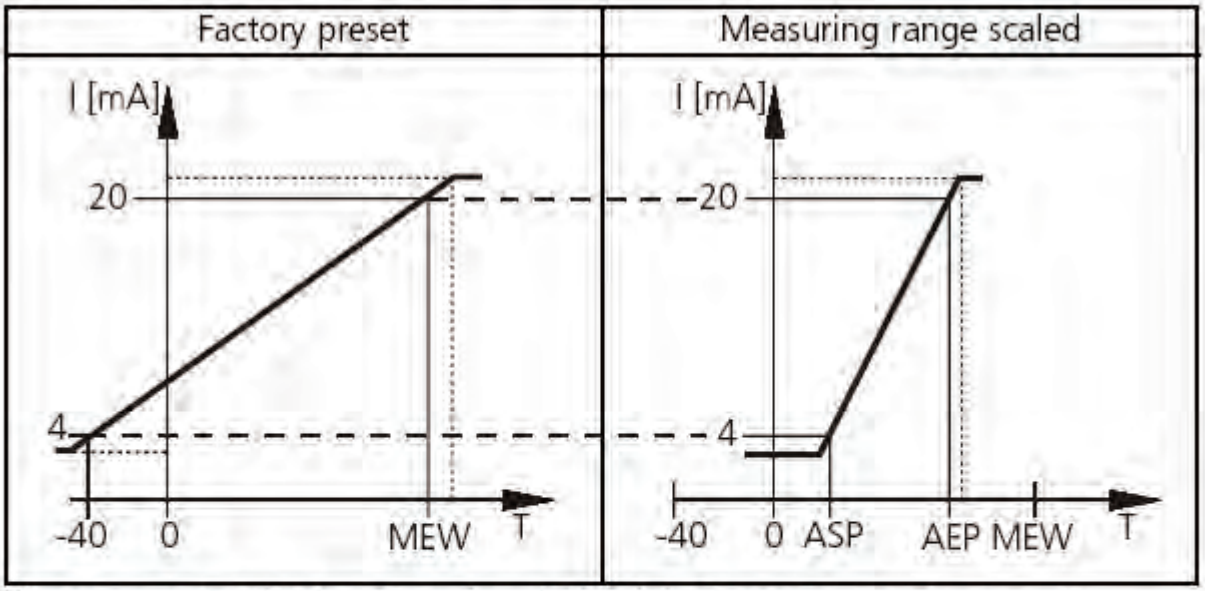
①	2 x LED green	Lithning LED = set display unit.
②	LED yellow	Switching status; lights if the switching output has switched.
③	4-digit alphanumerical	Display of the system temperature, display of parameters and parameter values.
④	Set button	Setting of the parameter values (scrolling by holding pressed; incremental by pressing briefly).
⑤	Mode / Enter button	Selection of the parameters and acknowledgement of the parameter values.

Voltage output 0 ... 10 V



The output signal is between 0 and 10V in the set measuring range.
It is also indicated:
System temperature above the measuring range: output signal 10 ... 10.3V).

Current output 4 ... 20 mA

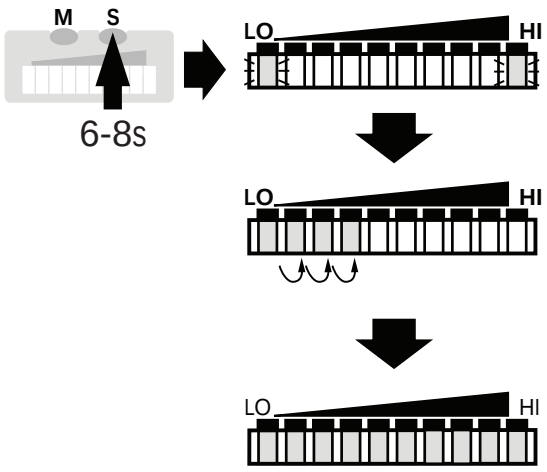


The output signal is between 4 and 20 mA in the set measuring range.
It is also indicated:

- System temperature above the set measuring range: output signal 20 ... 20.5 mA).
- System temperature below the set measuring range: output signal drops to max. 3.8 mA.

Adjustment to maximum flow (HI-Teach)

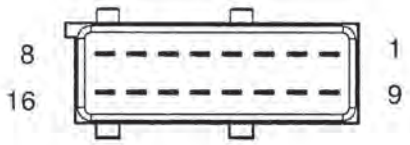
The unit detects the current flow and sets this value as the maximum value for the LED display (LED 9).
In normal operation all LEDs are lit in green when the max. flow is reached. They go out step by step as the flow decreases.

1	Apply the operating voltage. After approx. 15s the unit is ready. Set the **maximum flow** and keep it constant.	
2		Press the **Learn/Set** button and keep it pressed. The green LEDs on the right and on the left flash, after 5s the LEDs light step by step (**release the button** now). The unit stores the current flow as maximum flow and passes into the operating mode.

6 Installation

Connector C1

Connector kit	**Parker no. 5031105**
Housing	Amp no. 1-963217-1
Plane sealing, 16 p	Amp no. 963216-1
Pin type	Amp no. 929939-1
Cables	0,75-1,0 mm²
Seals	Amp no. 828904-1
Plugs (empty pos.)	Amp no. 828922
IQAN toolkit	**Parker no. 5031061**



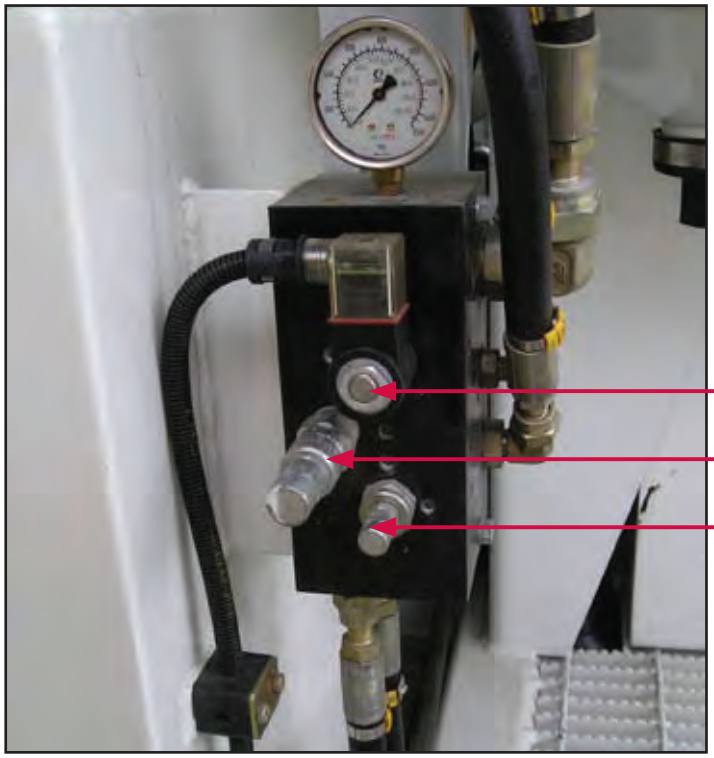
The IQAN tool kit is found in the 'IQAN accessories' datasheet.

Pos	Signal name	Pos	Signal name
1	+BAT (12V, 24V)	9	-BAT
2	CRET-A+	10	CRET-B+
3	CRET-A-	11	CRET-B-
4	COUT-A	12	COUT-B
5	DATA-OUT	13	DATA-IN
6	DIN-A	14	DIN-B
7	+VREF	15	-VREF
8	VIN-A	16	VIN-B

Central Lube System

The fan circuit supplies the pressure for the central lube system. A pressure reducing valve is fitted into the supply before it continues to the control module. The grease pump is hydraulic driven and the timing for the system is controlled by the Vigilante system.

1. *Vent Valve*
2. *Hydraulic driven Pump*
3. *Hydraulic Control*



1. *Solenoid valve Controlled by the Vigilante system*
2. *Pressure reducing valve set at 1400 psi*
3. *Flow control valve, set to enable grease pressure to reach 2500 psi in under 30 seconds*

Installation

Reservoir

Mount reservoir [Fig. 2, item (P)] on sturdy flat surface with 6, 3/8 in. diameter bolts. Note location of fill port (K), hydraulic lines, and lubricant outlet port (G) for easy access once installed.

⚠ WARNING

Hydraulic system must depressurized before connecting high pressure hydraulic supply line.

⚠ CAUTION

Hydraulic supply must be 10µ filtered or better and supply 0.5 – 3.0 gpm (1.9 – 11.4 lpm) at 800 psi – 3500 psi (55 bar – 241 bar, 5.5 MPa – 24 MPa).

1. Read instruction manual 308156 (included) before installing this product.
2. Install ball valve (Fig. 2, item AA) (user provided) in the 3/8” hydraulic supply line (X).
3. Connect the 3/8” hydraulic supply line (X) to the swivel (Y).
4. Connect the 3/4” hydraulic tank line (T) to the swivel (Z).
5. Connect the 24 VDC timer controlled signal to the 3–way solenoid valve (F).
6. Connect supply line (G) to the lubricant swivel (C).
7. Ground system (see **Grounding** below). Mount reservoir to grounded chassis member.

Grounding (for non–mobile installation)

Loosen grounding lug locknut [Fig. 1 item (A)] and washer (B). Insert one end of a 12 ga (1.5 mm^2) minimum ground wire (C) into slot in lug (D) and tighten locknut securely. Connect other end of wire to true earth ground. To order a ground wire and clamp, order part number 222011.

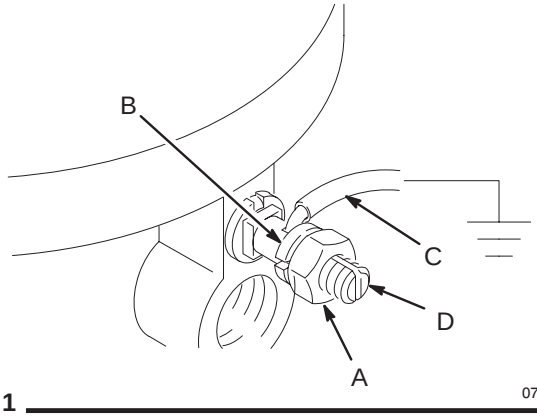


Fig. 1 0720

Vent Valve Kit for Custom Tank (Part Number 243170) Installation (See Figure 3)

1. Weld the bracket (see Fig.5) in place per recommended configuration for mounting the vent valve . Paint the bracket if desired.
2. Connect the hydraulic control line (Fig. 3, item A) to the control module vent valve hydraulic control line (Fig. 4, item J).
3. Connect the high pressure lubricant line (Fig. 3, item C) feeding the injector system to the lubricant output (E).
4. Connect the vent line (F) to the lubricant reservoir.

Control Module Kit for Custom Tank (Part Number 243501) Installation (See Figure 4)

1. Mount the control module on a flat, sturdy surface per the recommended configuration (see Fig.2)
2. Connect the hydraulic tank line (Fig. 4, item G) to the pump hydraulic outlet port.
3. Connect the vent valve hydraulic control (J) connection to the hydraulic control line (Fig. 3, item A).
4. Connect the pump high pressure hydraulic line (Fig. 4, item H) to the pump hydraulic input port.
5. Connect the high pressure hydraulic supply to the high pressure hydraulic supply connection (L) and the tank lines to the hydraulic tank connection (K).
6. Connect the 3–way solenoid valve (P) to the timer.

Note: Coil should always be installed with lettering facing out.

Central Lube Pump

Symbols

Warning Symbol

⚠ WARNING

This symbol alerts you to the possibility of serious injury or death if you do not follow the corresponding instructions.

Caution Symbol

⚠ CAUTION

This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the corresponding instructions.

⚠ WARNING

EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are not sure, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated component in your system. This equipment has a **1500 psi (10 MPa, 102 bar) maximum hydraulic input pressure and 7500 psi (51 MPa, 517 bar) maximum fluid outlet pressure.**
- Use fluids and solvents that are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Handle hoses carefully. Do not pull on hoses to move equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82°C (180°F) or below –40°C (–40°F).
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

Service

Disconnecting the Reciprocator and Displacement Pump

See Fig. 6.

NOTE: When displacement pump 224914 is purchased separately, it comes with the priming piston (112) and priming cylinder (111) unassembled. Connect the displacement pump to the hydraulic reciprocator before assembling the priming piston and cylinder. Torque the priming piston to 35 ft-lb (47 N-m).

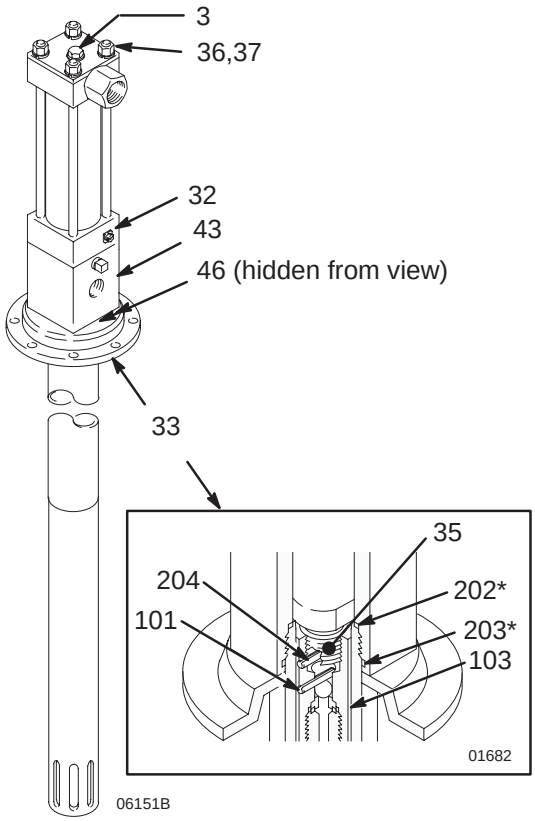


Fig. 6

⚠ CAUTION

Keep The Hydraulic System Clean
It is essential to keep the hydraulic oil system clean and free of contaminants to reduce the risk of damaging the hydraulic reciprocator. Always install a plug in each tube fitting and on each hose end whenever fluid lines are disconnected to prevent contamination.

1. Flush the pump if possible and stop it with the displacement rod in the lowest position.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

2. Relieve the pressure.
3. Disconnect the outlet hose from the displacement pump.
4. Slowly loosen the hydraulic supply (58) and return (5) fittings to relieve any pressure, and then remove the hoses. Install plugs on the tube fittings and in the hose ends. Check the o-rings (5a, 58a) on the fittings and replace them if they are worn or damaged. See Fig. 4 and the Parts Drawing.
5. Using a strap wrench on the displacement cylinder (108), screw it out of the pump adapter (43), and slide it down as far is it will go.
6. Pull the connecting rod (35) down as far as it will go. Remove the cotter pin (204).

NOTE: For the 35 lb. length pump, the priming cylinder (111) and the priming piston (112) must be completely removed before you can pull down the displacement cylinder (108) far enough to remove the cotter pin (204).

7. Unscrew the piston coupling (103) to remove the pump.

Pump Parts

Model 224752, Series C
400 pound drum size

Ref. No.	Part No.	Description	Qty.
201	239883	RECIPROCATOR, see page 21	1
202*	183715	GASKET, copper	1
203*	108993	O-RING	1
204	108992	PIN	1
205	223514	DISPLACEMENT PUMP see page 19	1
206	183741	LABEL, identification	1

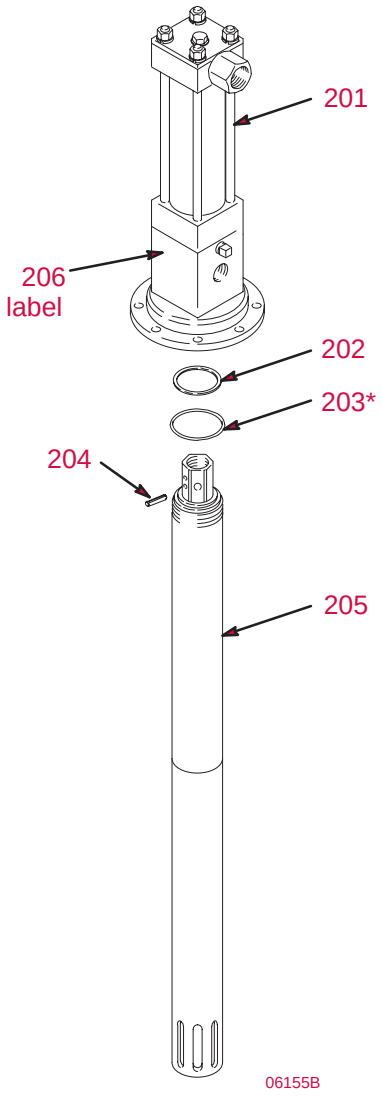
Model 224751, Series C
120 pound drum size

Ref. No.	Part No.	Description	Qty.
201	239883	RECIPROCATOR, see page 21	1
202*	183715	GASKET, copper	1
203*	108993	O-RING	1
204	108992	PIN	1
205	223513	DISPLACEMENT PUMP see page 19	1
206	183741	LABEL	1

Model 224912, Series C
35 pound drum size

Ref. No.	Part No.	Description	Qty.
201	239883	RECIPROCATOR, see page 21	1
202*	183715	GASKET, copper	1
203*	108993	O-RING	1
204	108992	PIN	1
205	224914	DISPLACEMENT PUMP see page 19	1
206	183741	LABEL	1

* *These parts are included in Repair Kits 223426 and 223427, which may be purchased separately.*



Symbols

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- Read all instruction manuals, tags, and labels before you operate this equipment.
- Use the equipment only for its intended purpose. If you are not sure, call your Graco distributor.
- Do not alter or modify this equipment.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure stated on the equipment or in the **Technical Data** for your equipment. Do not exceed the maximum working pressure of the lowest rated component in your system.
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Do not use 1,1,1–trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids that contain such solvents in pressurized aluminum equipment. Such use could result in a chemical reaction, with the possibility of explosion.
- Handle hoses carefully. Do not pull on hoses to move equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82°C (180°F) or below –40°C (–40°F).
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

Air Motor and Throat Service

12. Grease and reinstall the seal (2*) with the lips down, thread the throat bearing (36) into the air motor base (28), and torque the throat bearing to 30 to 40 ft-lb (41 to 54 N.m) using a 1 5/8-in. socket.

13. Slide the piston rod (29) down through the packing, and lower the piston assembly (27) into the air motor base (28).

14. Carefully lower the cylinder (30) straight down onto the piston assembly (27). Tighten the eight screws (3) that hold the cylinder to the base (28).

⚠ CAUTION

To avoid damaging the cylinder wall, lower the cylinder straight down onto the piston. Do not tilt the cylinder while you lower it.

15. Grip the trip rod (31) with padded pliers, screw the lift ring (24) onto the trip rod, push the lift ring down, and screw it into the top of the cylinder.

16. Install the seal (107*) with the lips up, and place the seal retainer washer (113) on the piston/valve seat (109). *Make sure the lips of the seal face up*. See Fig. 3.

17. Place the piston ball (103) in the displacement rod (29).

18. Clean the threads of the piston/valve seat (109), Apply Loctite® to the threads, and thread the assembly from Step 16 onto the displacement rod (29).

19. Clamp the flats of the piston/valve seat (109) in a vise, and torque the displacement rod (29) to the piston valve seat to 45 to 55 ft-lb (61 to 75 N.m).

20. Clamp the air motor base (28) in a vise horizontally by closing the vise jaws on the flange

21. Thread piston assembly tool (A) (included in repair kit 238751) onto the threads of the displacement pump cylinder (110). See Fig. 5.

22. Insert the piston assembly (B) into the displacement pump cylinder.

23. Unscrew the piston assembly tool from the displacement pump cylinder. Clip the piston assembly tool with a diagonal cutter (C), and discard it.

NOTE: Be careful that you do not scratch the rod.

24. Use a strap wrench to screw the displacement pump cylinder (110) to the air motor base (28). See Fig. 3.

25. Before you remount the pump, connect an air hose and run the air motor slowly, starting with just enough air pressure to make the air motor run, and make sure that it operates smoothly.

26. Reconnect the ground wire before regular operation of the pump.

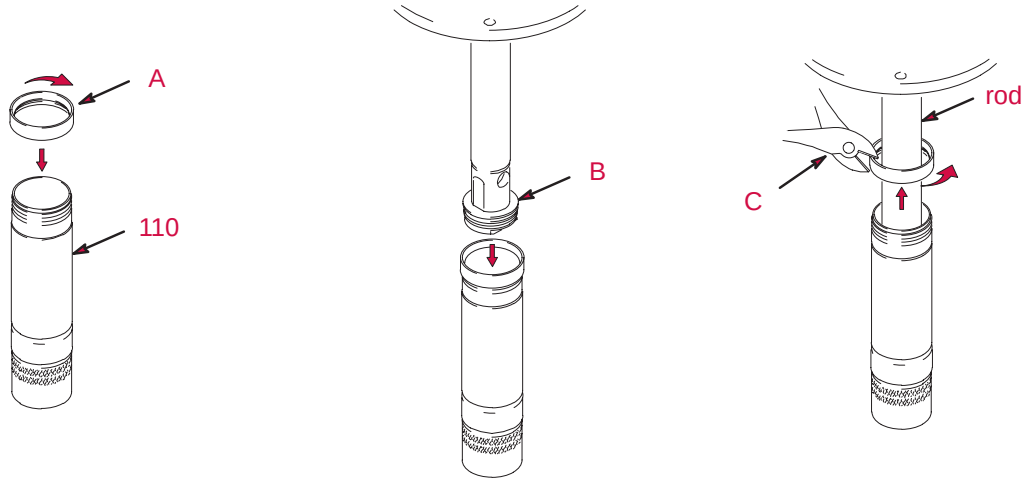


Fig. 5

⚠ WARNING

FAILURE TO HEED THE FOLLOWING WARNINGS INCLUDING MISUSE, OVER PRESSURIZING, MODIFYING PARTS, USING INCOMPATIBLE CHEMICALS AND FLUIDS, OR USING WORN OR DAMAGED PARTS, MAY RESULT IN EQUIPMENT DAMAGE AND/OR SERIOUS PERSONAL INJURY, FIRE, EXPLOSION, OR PROPERTY DAMAGE.

- Do not exceed the stated maximum working pressure of the pump, or of the lowest rated component in your system.
- Do not alter or modify any part of this equipment.
- Do not operate this equipment with combustible gas.
- Do not attempt to repair or disassemble the equipment while the system is pressurized.
- Make sure all grease connections are securely tightened before using this equipment.
- Always read and follow the grease manufacturer's recommendations regarding grease compatibility, and the use of protective clothing and equipment.
- Check all equipment regularly and repair or replace worn or damaged parts immediately.
- Never point the dispensing valve at any part of the body or at another person.
- Never try to stop or deflect material from dispensing valve or leading connection or component with your hand or body.
- Always check equipment for proper operation before each use, making sure safety devices are in place and operating properly.
- Always follow the pressure relief procedure after shutting off the pump, when checking or servicing any part of the system, and when installing, cleaning or changing any part of the system.

INSTALLATION

Typical drum and pail hookups are described as follows only as a guide in selecting and installing a system. Contact a Lincoln factory representative for assistance in designing a system for a specific requirement.

⚠ WARNING

This pump can develop 7500 PSI working pressure at 150 PSI maximum incoming air pressure. Be sure that all system equipment and accessories are rated to withstand the maximum working pressure of this pump. DO NOT exceed the maximum working pressure of the lowest rated component in the system.

IMPORTANT: Accessory item "whip" hoses for dispensing valve are rated 4500 PSI. DO NOT exceed 90 PSI air pressure to pump when using "whip" hoses.

TYPICAL SYSTEM HOOKUP

Determine the drum or pail system for your requirement.

Obtain an air line filter/regulator/lubricator to use with the inlet air supply and the correct sized air and grease lines/hoses with any required reducers, connectors and accessories.

Clean/flush the supply lines, hoses, reducers, connectors and accessories with mineral spirits or oil based solvent to purge any contaminants such as dirt, moisture, or metal shavings that could damage the pump or system components. Blow dry with air.

⚠ CAUTION

The pump was tested in lightweight oil which was left in to protect the pump from corrosion. Flushing the pump before connecting it to the system might be desired to prevent possible contamination of the grease you are pumping

⚠ WARNING

To reduce the risk of injury from splashing or static sparking when flushing the pump with solvents, always hold a metal part of the dispensing valve firmly to the side of a grounded metal pail and operate pump at lowest possible fluid pressure.

Clean/flush the pump with mineral spirits or oil based solvents if necessary.

Assemble the cleaned pump and supply line together with any required accessory.

Mount the assembled pump to the drum or pail.

Connect the material output line/hose to the pump.

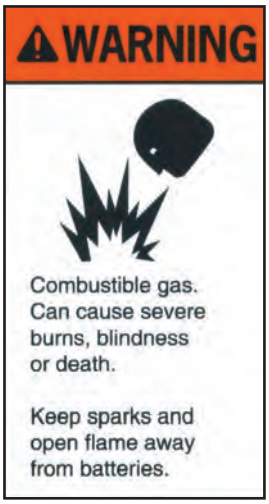
Connect the air regulator to the pump.

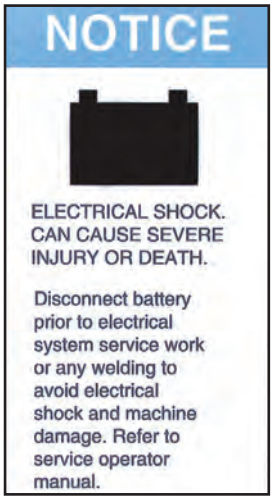
Make sure all connections are securely tightened.

Maintenance and day to day lubrication is essential to smooth running, and will ensure that the drill will perform to it's full potential. This section will cover the points on the drill that will require daily/250/500/1000 and 2000hr lubrication and servicing. These service intervals are set out to give optimal component life and to keep the drill in Excellent Working Condition.

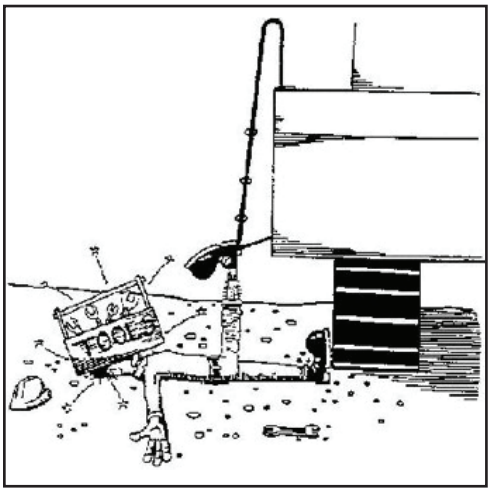
Safety Precautions

Ensure all stored pressure has been released from the hydraulic and pneumatic systems.





Isolate machine by using the correct lock out procedure, ensuring the machine cannot be started.



Ensure that when refilling any oil's that any oil spillage is cleaned up before starting the machine.

Caution must also be taken around hot surfaces and oils which may also be at temperatures which may be potentially dangerous.

Track Gear

10hrs Or Daily

- Check/Clean/Adjust Track Chain's, Rollers And Sprockets As Required
- Check Track Frames,Axles,Mounts For Security And Tension
- Check Equilisers Pins And Bolts For Tension

250hrs

- Check/Refill Track Final Drives

500hrs/1000hrs/2000hrs

- Track Drive Gearbox's Drain/Refill (85W140 12 Litres Per Final Drive)
- Check/Adjust Track Chains

Air Conditioner Maintenance

250hrs

- Check Tension And Condition Of Air Conditioner Belts

500hrs

- Replace Air Filter

1000hrs

- Clean Air Conditioner Condenser
- Clean Air Conditioner Evaporator
- Replace Condensor Fan Motor Brushes

Battery Maintenance

WARNING: Batteries can emit explosive gases.
DO NOT smoke or use open flame near batteries, serious personal injury can result. Batteries contain acid.
ALWAYS wear eye protection when working around batteries.
ALWAYS remove negative (-) battery cable first and attach negative (-) battery last.

200hrs

- Check all wiring and connections for damage, corrosion and tightness

500hrs

- Check Electrolyte Level In Batteries
- Check/Clean Terminals
- Check Batteries For Security

NOTE: NEVER weld on any part of the machine without first switching the battery disconnect switch to the OPEN position and removing the ECM connections from the engine (refer to electrical section for complete information).

Lubrication System Maintenance

10hrs/Daily

- Check/Refill Hammer Oiler system pilot air Lubricator (Tellus ISO100 100ml)
- Check/Refill Pipe Thread grease pump Lubricator (Tellus ISO100 100ml)

Fire Suppression Maintenance

10hrs/Daily

- Check system charge on Fire Suppression
- Check Condition And Security Of Fire Extinguishers
- Report Any Damage Or Undercharged System

TEREX

REEDRILL SKSS-LP
500 HOUR SERVICE

Equipment No: _____ Hours: _____ Date: _____

	PLEASE PRINT YOUR NAME CLEARLY	INITIAL
Maintainer		
Maintainer		
Maintainer		
Maintainer		
Maintainer		
Maintainer		
Maintainer		
Maintainer		

SAFETY PROCEDURES

WARNING

- Always use a spotter when locating the drill in the workshop or a confined area.
- Always check that maintainers are clear of the drill during testing.
- Always look up and check for overhead powerlines before raising the mast.
- Always CHECK for hydraulic leaks with a piece of cardboard and gloves. Do not use bare hands.
- Always CHECK that the oil pressure has been discharged before dismantling hydraulic hoses and lines.
- Always CHECK that the air pressure has been discharged before dismantling compressor hoses and lines.
- All Isolation Procedures and Safe Work Procedures MUST be followed.
- WARNING: Confirm the isolation by attempting to start the machine at the key switch.
- Use Workshop Manuals for references
- Seek clarification on any issues that you are not sure of.

Lubrication & Maintenance Chart - 500hr

ADDITIONAL JOB DETAILS		
DETAILS OF ADDITIONAL WORK (INCLUDING PART REQUIREMENTS)	WORK ORDER ORIGINATOR	WORK ORDER NUMBER

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