



Technical Manual

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

CHAPTER 5 LUBRICATION

SECTION 1 - LUBRICATION PROCEDURES	5-1
General	5-1
Lubricant Cleanliness	5-1
Lubrication Points	5-1
Lubrication Benchmarks	5-8
SECTION 2 - LINCOLN AUTOMATIC SYSTEM	5-2-1
Troubleshooting Systems	5-2-1
Air Locks	5-2-1
Dirty Supply Lines	5-2-1
All Injectors Do Not Function Properly	5-2-1
After Venting, The Indicator Stems On The Injectors Do Not Return To Their Normal Position	5-2-1
Graco Pump Servicing	5-2-2
Pressure Relief Procedure	5-2-2
Replacing the Throat Seals	5-2-2
Disconnecting the Reciprocator and Displacement Pump	5-2-2
Lubrication	5-2-10

CHAPTER 6 TROUBLESHOOTING

APPENDIX A1 - GEAR INSPECTION	1A-1
General	1A-1
APPENDIX A2 - BOLT TORQUING	2A-1
Torque Wrench Method	2A-1
Turn Of The Nut Method	2A-2
APPENDIX A3 - PINION, BRAKE DRUM AND COUPLING INSTALLATION	3A-1
Removal From Shaft	3A-1
Mounting On Shaft	3A-1
APPENDIX A4 - LUBE BENCHMARKS	4A-1
MPG - Multi-Purpose Type Grease	4A-1
Scope	4A-1
Application	4A-1
General Requirements	4A-1
Compounding	4A-1
Notations	4A-1
Air Compressor (Screw Type) Lubricant	4A-2
DPTL - Drill Pipe Thread Lubricant	4A-2
Scope	4A-2
Application	4A-2
General Requirements	4A-2
Specific Requirements	4A-2
MPO - Milti-Purpose Oil	4A-3
Scope	4A-3
Application	4A-3
General Requirements	4A-3
Viscosity Recommendations	4A-3
OGL - Open Gear Lubricant	4A-3
Scope	4A-3
Application	4A-3
Methods of Application	4A-3

10. Install roller into the crawler frame and block in line with the shaft bore.
11. Install the roller shaft and secure the shaft with the retainer and capscrew. Remove the roller blocking.
12. Remove the crawler belt blocking.
13. Adjust belt tension as described in the topic CRAWLER BELT ADJUSTMENT.
14. Lubricate the roller. Propel the machine to distribute the lubricant evenly and check roller operation.

TAKE-UP TUMBLERS

Inspect the take-up tumbler for cracks and damage that can impair normal tracking of the crawler belts (figure 1-2-7).

Every six months raise the machine with the leveling jacks to allow inspection of the tumblers. Block the machine in a raised position. Using a suitable lever, check the clearance of the tumbler bushing by lifting and then lowering the tumbler. Replace the bushing if the clearance is excessive.

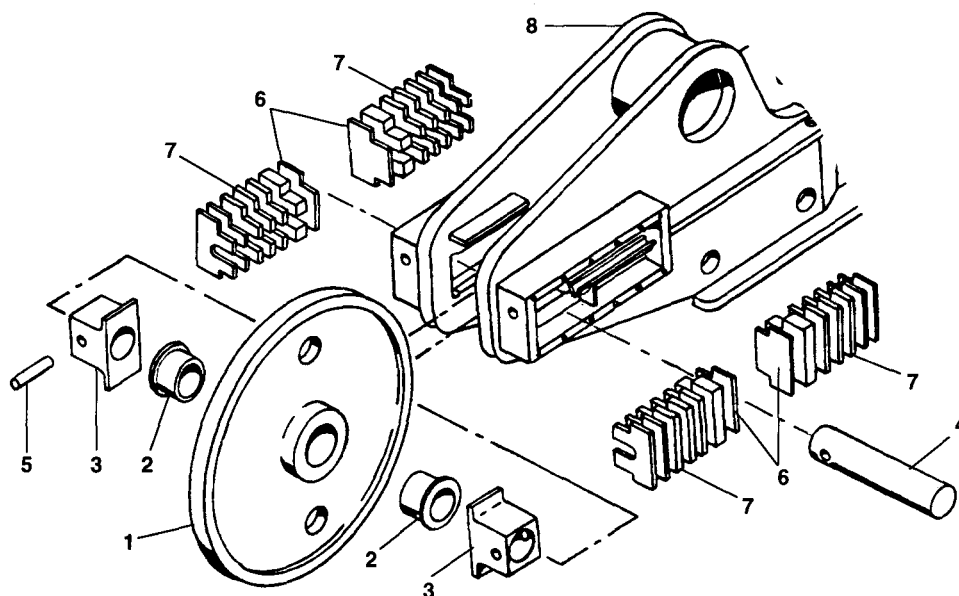
REPAIR

The take-up tumblers do not require replacement or repair very often. The most common problem encountered is bushing wear. However, it is possible for the tumbler to develop cracks. When cracks do occur, they can be repaired by

gouging out metal on both sides of the crack, and welding the crack. Follow welding instructions in APPENDIX.

If bushing replacement is needed, the tumbler must be removed from the machine. To accomplish this:

1. Position the machine so that the take-up tumbler to be removed is over a slight depression (about 6" deep). This depth will be enough to relieve the weight of the machine from the tumbler.
2. Relieve crawler belt tension and separate the crawler belt as described in the topic CRAWLER BELT REPLACEMENT. Separation of the belt should take place at a point near the take-up tumbler, and the links laid back out of the way.
3. Remove the shim guards and lube lines if so equipped.
4. Using a suitable lifting device to support the take-up tumbler, remove the shaft from the tumbler. Lift the tumbler from the crawler frame.
5. Remove the supports and shims from the crawler frame.
6. Inspect the tumbler bushings. Remove and replace the bushings if necessary.
7. Inspect the tumbler shaft and replace if necessary.



1. TAKE-UP TUMBLER
2. TUMBLER BUSHING
3. SHAFT SUPPORT
4. TUMBLER SHAFT
5. SHAFT RETAINING PIN
6. SOLID SHIM
7. SLOTTED SHIMS
8. CRAWLER FRAME

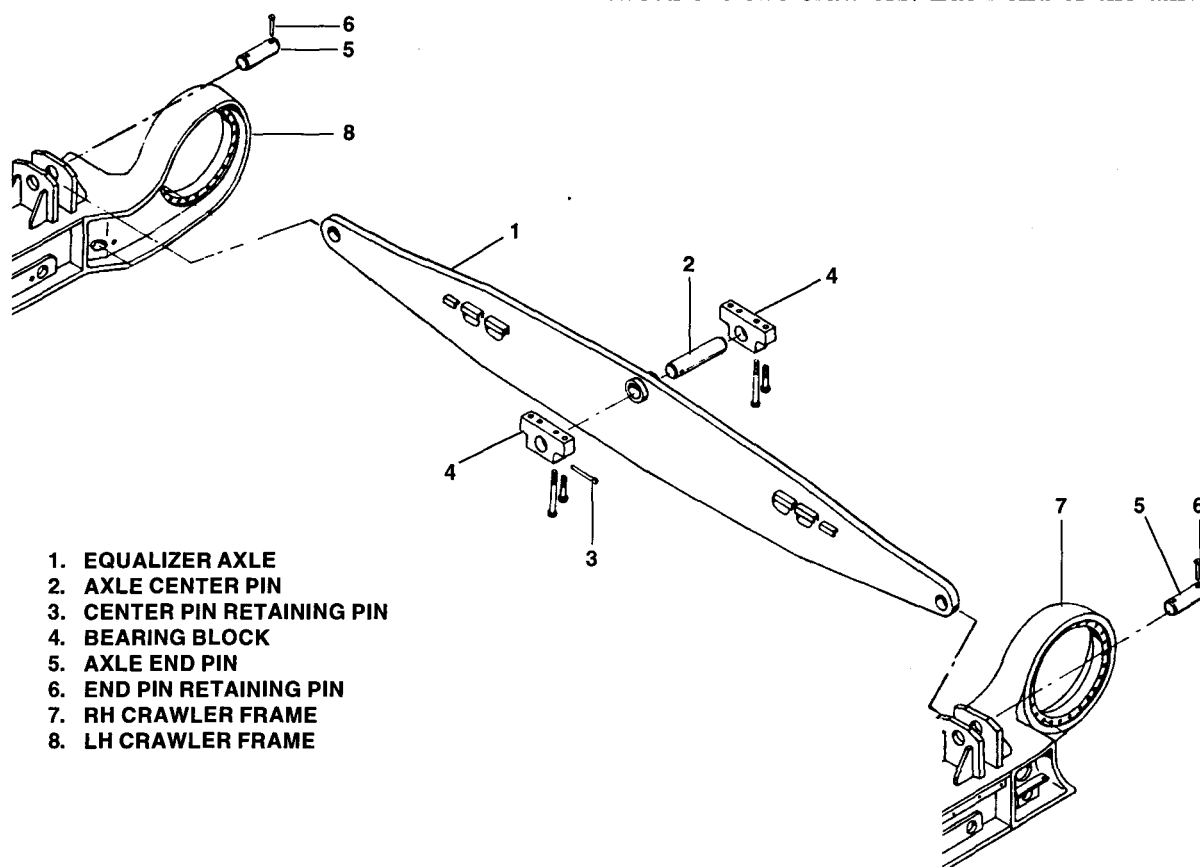
TAKE-UP TUMBLER
FIGURE 1-2-7

NOTE: Steps 5 through 14 describe the procedure for removing and reinstalling one crawler frame. If both frames are to be removed, repeat steps 5 through 14 for the other crawler frame.

5. Remove rear axle retainer and shims or clamp collar.
6. Remove the equalizer axle pin retaining pin cotter pins, retaining pins and pin.
7. Using suitable rigging and suitable vehicle(s), pull the crawler frame straight away from the machine. Pull the crawler frame to a position to be repaired or handled with lifting equipment.
8. Repair the crawler frame and components as necessary.
9. To replace the crawler frame, first position the crawler in-line with the rear equalizer axle.
10. Lubricate the rear axle, axle bore, equalizer axle pin and bores.
11. Using suitable rigging and vehicle(s), pull the crawler frame toward the machine. Proceed slowly when attaching the crawler to the rear axle. Make sure the crawler is straight as it is being pulled onto the axle.
12. When the crawler is in position, insert the equalizer axle pin and retaining pins. Insert the retainer pin cotter pins.
13. Install the rear axle retainer or clamp collar.
14. Connect the hydraulic and lubrication lines.
15. Raise the machine with the leveling jacks just enough to remove the blocking, then lower the machine.
16. Propel the machine to check the operation of the crawler components.

AXLES

The crawler frames are attached to the machine by two axles. The front axle (equalizer axle) (figure 1-2-30) allows the front of the crawlers to pivot, equalizing the load of the machine between the two crawlers. Each end of the axle is

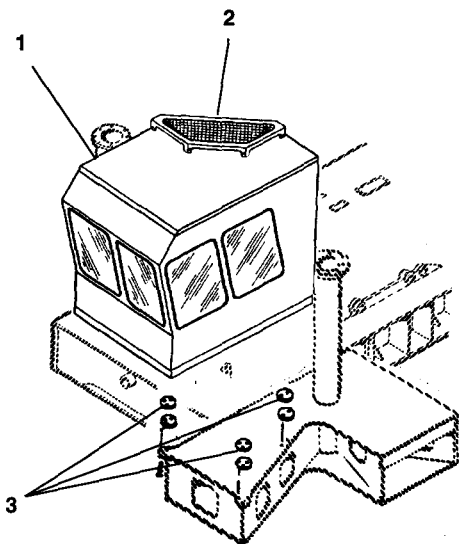


1. EQUALIZER AXLE
2. AXLE CENTER PIN
3. CENTER PIN RETAINING PIN
4. BEARING BLOCK
5. AXLE END PIN
6. END PIN RETAINING PIN
7. RH CRAWLER FRAME
8. LH CRAWLER FRAME

EQUALIZER AXLE
FIGURE 1-2-30

OPERATOR'S CAB

Inspect the operator's (figure 1-3-9) cab daily for cracks or structural damage to all side, roof and floor panels. Check the doors and windows for proper operation and correct sealing. Keep the cab clear of all oil, grease or water spills to help prevent slipping.

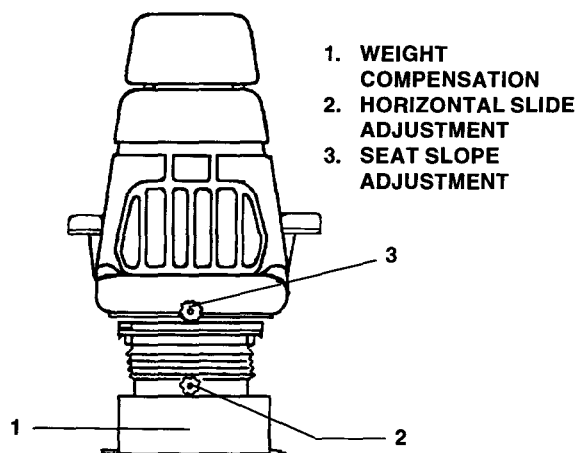


- 1. CAB
- 2. CAB WINDOW GUARD
- 3. CAB PADS

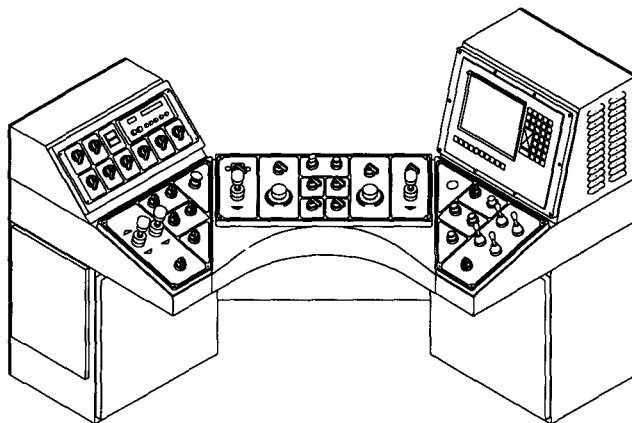
OPERATOR'S CAB
FIGURE 1-3-9

OPERATOR'S SEAT

The individual operator may adjust the operator's seat (figure 1-3-10) as desired with respect to height, tilt and travel. Periodically lubricate all bearings and pivot points to maintain smooth movement.



TYPICAL OPERATOR'S SEAT
FIGURE 1-3-10



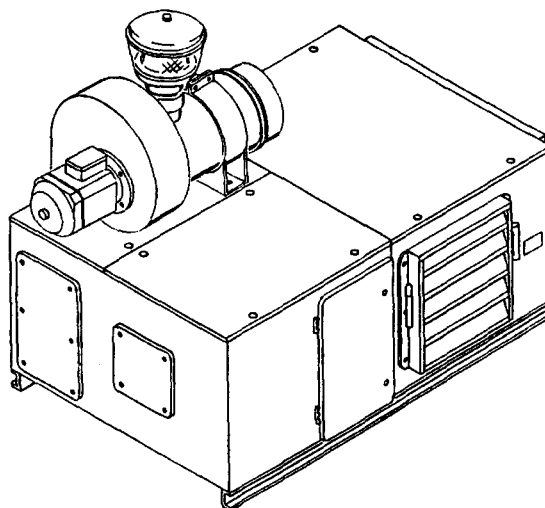
TYPICAL OPERATOR'S STATION CONTROLS
FIGURE 1-3-11

OPERATOR'S CONTROLS

Inspect all of the operator's controls (figure 1-3-11) daily for wear or damage. Verify the correct operation of all controls daily. Repair or replace malfunctioning controls immediately. Clean all nameplates and markers and maintain all markers and signs in a legible condition including warning signs.

AIR CONDITIONING UNIT

Inspect the air conditioning unit (figure 1-3-12) on the operator's cab roof for proper operation, structural integrity and sealing. All permanent side panels should be in place and adequately sealed and secured.



TYPICAL AIR CONDITIONING UNIT
FIGURE 1-3-12

⚠ CAUTION: Open and tag the auxiliary power and control breakers in the machinery house. Do not attempt to disconnect the motor leads with these breakers closed. A voltage hazard is present and electrocution is possible if these breakers are left closed.

2. Have an electrician identify and disconnect the electrical leads to the rotary motor. Remove the cable from the junction box on the motor.
3. Remove the motor attachment stud nuts and washers.
4. Using a suitable crane and rigging, lift the motor from the rotary gearcase.
5. Repair or replace the motor as necessary.
6. The motor pinion is press fit to the motor shaft. Refer to the APPENDIX for instructions regarding replacement or installation of the motor pinion.
7. Prior to installation of the motor clean the mounting surfaces on both the gearcase and the motor
8. Install the rotary motor in reverse order of removal. Torque the attachment stud nuts using turn-of-the-nut method. Tighten nuts snug, and then an additional 1/3 turn.

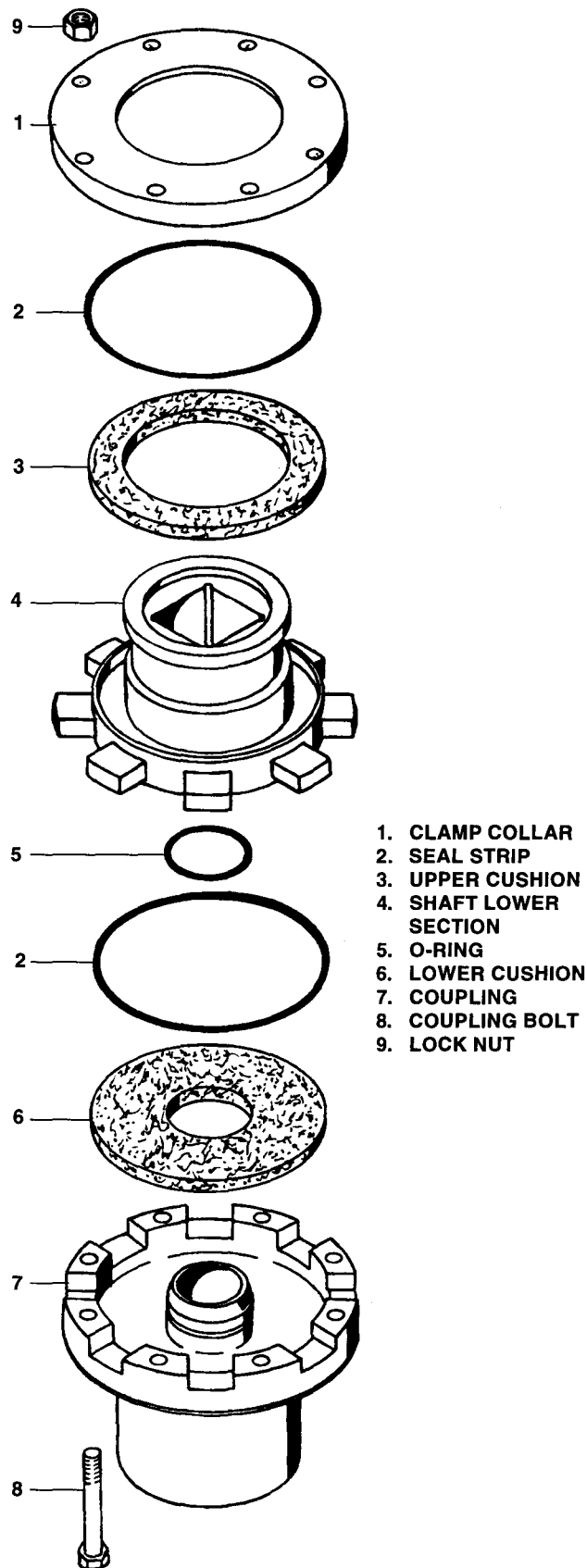
ROTARY COUPLING

The rotary coupling (figure 1-4-9) is an optional assembly that connects the rotary drive shaft to the tool string. The coupling incorporates rubber cushions to reduce shock loading and an O-ring to seal the main air passage.

Inspect the rotary coupling every shift for loose or missing bolts or other wear or damage. Check the coupling frequently for air leaks and worn cushions. Check the coupling teeth for wear and damage.

REPAIR

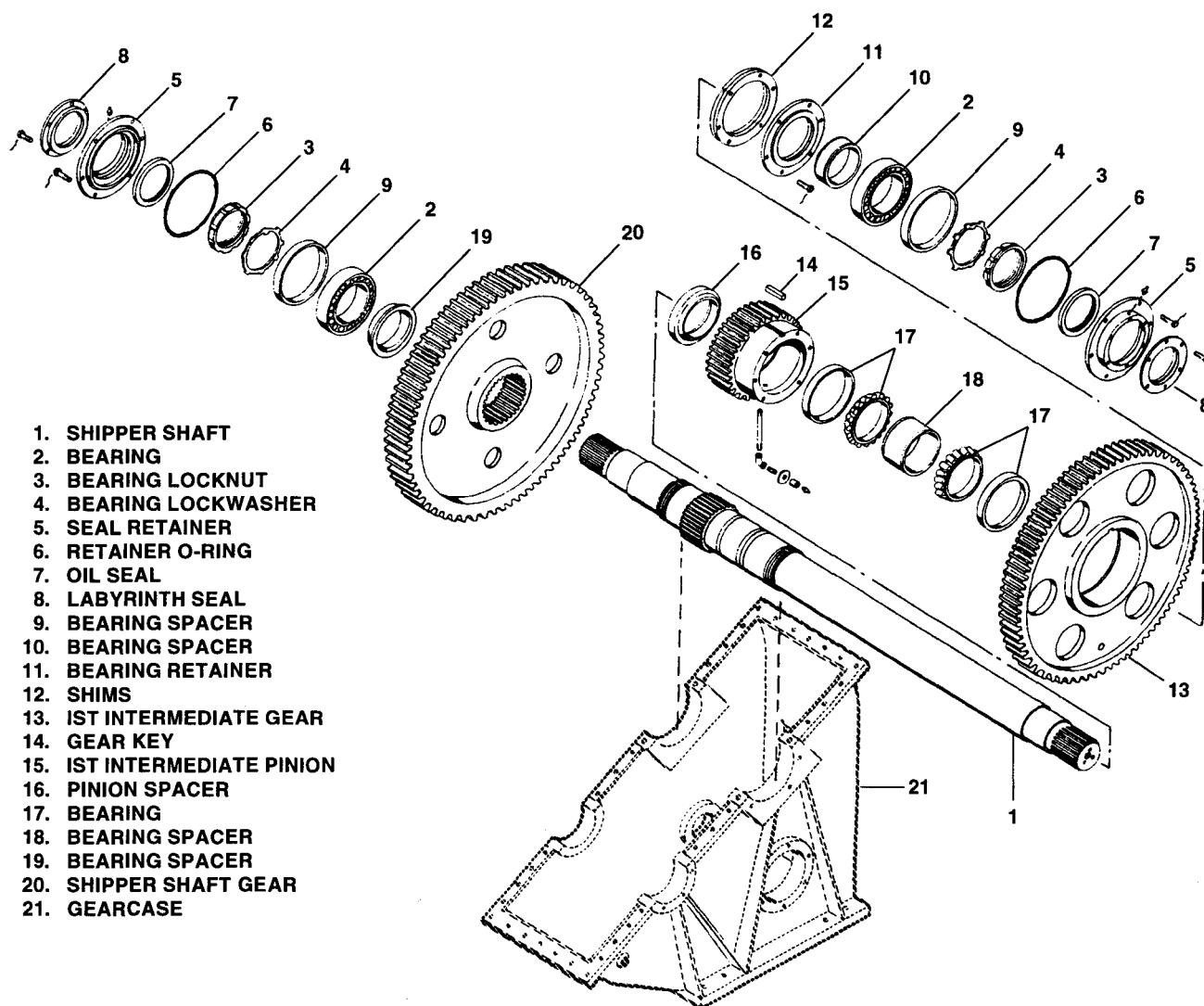
⚠ CAUTION: Unexpected operation or movement of the pulldown unit and/or rotary gearcase during service or inspection procedures can cause severe personal injury or death. Lower the pulldown unit to its lowest possible position or secure it in place. Lockout and tag controls to prevent unexpected operation.



ROTARY COUPLING
FIGURE 1-4-8

The bearings have an interference fit to the shaft.

2. Slide the bearing housing from the shaft and separate the inner labyrinth seal from the housing.
3. If not previously done, drain the gearcase.
4. Remove bearing cover (4) from the pinion end of the second intermediate shaft. Remove O-ring (5) from the cover.
5. Remove encoder housing cover (18), gasket (19) and housing (17) from the opposite end of the second intermediate shaft.
6. Remove encoder coupling spring pins (15), then unbolt and remove encoder (16) and coupling (14). Remove retainer/encoder support (13) from the gearcase. Remove the O-ring and oil seal (12) from the retainer.
7. Remove the bearing retainer (5) from each end of shipper shaft (1, figure 1-4-16). Separate O-ring (6), oil seal (7) and labyrinth seal (8) from each retainer.
8. Remove the rod bolts, tapered pins and capscrews securing the gearcase cover to the gearcase. With a crane lift the cover from the gearcase.
9. Lift the shipper shaft from the gearcase (figure 1-4-16). Remove the bearing spacer from the long end of the shipper shaft.
10. Remove bearing retaining nut (3), lockwasher (4), bearing (2) and bearing



**PULLDOWN MACHINERY
 FIRST INTERMEDIATE & SHIPPER SHAFT
 FIGURE 1-4-16**

fore removing the retaining pin. Failure to restrain the pawl will result in it being forcibly ejected from the cylinder body, possibly causing death or serious injury to personnel in the area.

4. Completely relax the tension on the pawl springs. When tension is completely removed, remove the pawl and pawl springs from the cylinder body.
5. Inspect the springs and pawl and replace as required.
6. Lubricate the springs and pawl with an approved lubricant and reassemble the components in reverse order of disassembly.

BREAKOUT WRENCH

The breakout wrench is used to break pipe joints that will not break using the rotary drive.

With the pipe secured by the tool wrenches, the breakout wrench switch is turned to and held in the EXTEND position. The breakout wrench extends, grips the pipe, then turns, breaking the pipe joint.

REPAIR

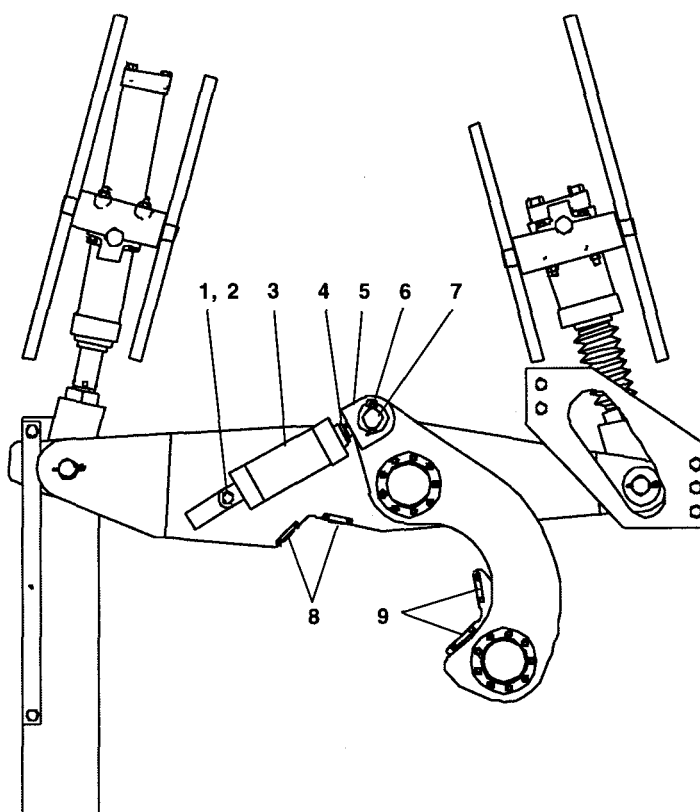
The breakout wrench should be inspected daily for wear or damage, loose or missing hardware, and proper operation. Repair of the breakout wrench is limited to the replacement of worn or damaged components.

ADJUSTMENT

Refer to figure 1-4-24. If jaws inserts (9) do not contact the pipe, adjust the breakout wrench as follows:

1. Remove cotter pin (6) from rod pin (7).
2. Remove split rings (1) from clevis mount (2).
3. Swing the cylinder out of the clevis mount (2).
4. Lift the cylinder off rod pin (7).
5. Unthread rod eye (5) from the cylinder rod on full revolution.
6. Reinstall the cylinder in reverse order, except for cotter pin (6).
7. Check the operation of the wrench. If the inserts (9) contact the pipe, go to step 8. If inserts (9) do not contact the pipe, repeat steps 2 to 7.

1. SPLIT RINGS
2. CLEVIS MOUNT
3. CYLINDER
4. CYLINDER ROD
5. ROD EYE
6. COTTER PIN
7. ROD PIN
8. INSERTS, ARM
9. INSERTS, JAW



BREAKOUT WRENCH ADJUSTMENT

FIGURE 1-4-24

and all other cylinders retracted, the reservoir should be slightly below 7/8 full.

! CAUTION: Before topping off the fluid in the hydraulic tank, verify that the mast cylinders are extended and all other cylinders are retracted. Failure to comply with the above (i.e. jack cylinders extended) will overfill the tank when the jack cylinders are retracted and will cause the tank to rupture.

WARNING: Do not operate with low oil level. Operating with low oil level can cause cavitation and air pockets. This will cause faulty operation and can also cause damage to the system components.

Inspect all components and lines to be sure they are in good operating condition. Check for obstructed or distorted cylinders. Inspect the system for leaks. If a leak is found, tighten the screws or fittings around the leaking area before beginning major repairs. If that does not stop the leak, it may then be necessary to repair or replace the leaking part. If an O-ring is damaged or missing from the hydraulic plumbing, check O-ring kit 68120749 for replacement O-rings.

OIL RESERVOIR REPAIRS

The hydraulic oil reservoir is epoxy coated on the inside to prevent scale and oxidation.

WARNING: DO NOT weld on the reservoir; it will damage the coating.

LEVELING JACK COUNTERBALANCE VALVE PRESSURE RELIEVING PROCEDURE

If it becomes necessary to work on the leveling jack counterbalance valve for any reason, relieve pressure in the cylinder using the following procedure:

1. Position the machine with crawlers on the ground and jacks retracted so that the jack pads are approximately one inch off the ground.
2. Turn off the hydraulic pump and relieve any pressure in the system by loosening the reservoir breather. When trapped air in the reservoir is relieved, immediately replace the breather.

REAR JACKS

1. Uncouple the quick disconnect using a 1 1/4" open end wrench. The male half of the quick disconnect will remain attached to the valve.
2. Remove the other end of the quick disconnect hose from the electrical junction box on the jack.
3. Place the hose end, removed from the electrical junction box, into a clean five gallon container.
4. Re-couple the quick disconnect. As the connection nears completion, oil will run out of the hose end in the container and the jack pad will drop to the ground! This will relieve all pressure on the piston rod and create a vacuum on the housing end of the cylinder.

! CAUTION: Always maintain a firm grip on the hose while the oil is flowing from it. Do not allow the stream of oil to contact your skin as injury can occur.

5. When the oil flow has stopped and the jack pad is on the ground, the loose end of the hose can be reconnected to the electrical junction box.
6. With the pressure relieved, the counterbalance valve or jack cylinder can now be safely worked on.

FRONT JACK

1. Uncouple the quick disconnect at both front jacks, using a 1 1/4" open end wrench. The male half of the quick disconnect will remain attached to the valve.
2. At one front jack only, remove the other end of the quick disconnect hose from the electrical junction box on the jack.
3. Place the hose end, removed from the electrical junction box, into a clean five gallon container. (Two additional 5 gallons will be required to handle the oil from both front jacks.)

! CAUTION: Always maintain a firm grip on the hose while the oil is flowing from it. Do not allow the stream of oil to contact your skin as injury can occur.

4. Re-couple the quick disconnect. As the connection nears completion, oil will run out

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

2. Adjust pressure reducing valve located immediately beneath test port 76, to see 175 PSI on gauge.
3. De-energize Main Flow Increase Valve (MFV).
4. With an empty 5-gallon container available, locate washdown switch and hose.

NOTE: Switch is in operator's cab on water injection console. A coiled hose with a quarter-turn shut-off valve is secured on hooks outside of the railing to the rear of the left rear jack tower. When the switch is energized, the Washdown Valve (WV) will energize causing a quarter-turn water valve to block flow to the main air line and also causing the water pump to run at maximum speed.

5. Remove sufficient hose length from the hooks so the manually operated quarter-turn valve can be positioned close to the 5-gallon container. With quarter-turn valve CLOSED, energize washdown switch. Open quarter-turn valve to check function.

6. Close quarter-turn valve and de-energize switch. Open quarter-turn valve with switch de-energized to relieve water pressure from the hose.

7. Re-coil hose on hooks.

CHECK JACKS IN AUTO LEVEL MODE

1. Manually position all jacks such that they are midway between the ground and fully up.
2. Position auto level switch to RETRACT mode and observe that all 4 jacks simultaneously retract.
3. Maintain step 2 until all 4 jacks are fully up, at which time the operator's display terminal screen WILL SHOW THE JACKS TO BE FULLY UP and the retract solenoids at the jack valve control manifold have each turned off. Jack Loader Valve (JLV) will stay energized so long as the switch position is maintained in RETRACT. When the auto level switch is returned to NEUTRAL, solenoid JLV should turn off.
4. With all jacks fully extracted, position the auto level switch to extend and observe that all 4 jacks extend simultaneously. Do not extend jacks all the way to the ground.

NOTE: If the crawlers are not mounted, use extreme care during step 5 through step 8.

5. With step 3 and step 4 complete, run each jack down individually and manually check that each ground pressure switch activates and is shown on the operator's display terminal screen.
6. With step 5 complete, repeat step 2 and step 3.
7. With step 6 complete, position the auto level switch to EXTEND and observe the following actions of auto level while maintaining switch position:
 - a. Starting from full retract into extend, all cylinders will extend at once.
 - b. As each cylinder pad is lowered enough to generate ground pressure, it will stop moving, until all four cylinder ground pressure indications are shown on the operator's display terminal.
 - c. If the machine is out of level, it will level itself (first side to side and then front to back).
 - d. The machine will raise up straight and level on all four jacks.

NOTE: Step 5, step 6, and step 7 must be done with EXTREME care if crawlers are not mounted to machine.

8. With step 7 complete, position auto level switch to RETRACT to check function.

NOTE: If crawlers are unmounted, step 8 should not be run unless AT LEAST one observer is present outside the machine.

PIPE RACK POSITION CHECK

With 0-7,500 PSI gauge at test port 16, with selector switches in operator's cab set to DRILL mode, and at PIPE RACK/JOINTS, proceed as follows:

1. Raise left joystick out of detent, without leaving NEUTRAL, until one second has passed.

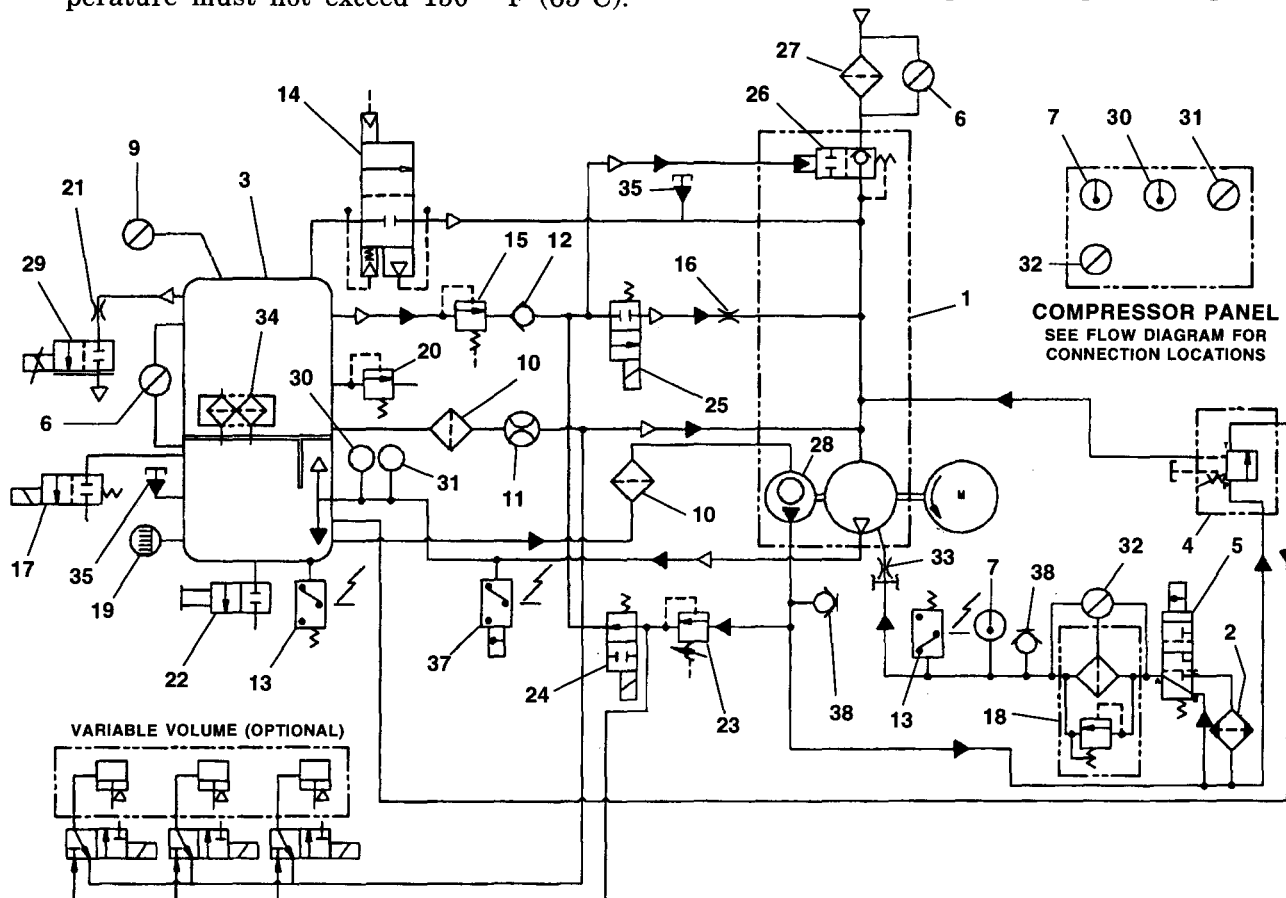
NOTE: Step 1 is intended to allow sufficient time for the pipe rack lock pin to unlock the rack, before rack is allowed to be moved.

2. With step 1 accomplished, move joystick to full stroke, first in one direction and then the other. Pressure should increase smoothly with increasing stick travel. Pres-

12. UNLOADING COMPRESSOR – To unload the compressor, close the downstream butterfly valve. The compressor inlet regulating valve will close automatically and the air receiver pressure will rise approximately 10 PSI above the air pressure control valve setting. The discharge air temperature must not exceed 200°F (93° C). Oil injection temperature must not exceed 150° F (65°C).

Discharge air pressure should not be higher than 15 PSIG above the rating plate pressure.

13. In cold weather, immediately after start-up, close the downstream butterfly valve to unload the compressor. The resulting higher receiver pressure will produce a faster oil heating rate and provide a greater



- | | |
|---|--|
| <ul style="list-style-type: none"> 1. SCREW COMPRESSOR ASSEMBLY 2. OIL COOLER 3. AIR/OIL TANK ASSEMBLY 4. OIL SYSTEM RELIEF VALVE 5. TEMPERATURE CONTROL VALVE 6. AIR PRESSURE DIFFERENTIAL INDICATOR 7. OIL TEMPERATURE INDICATOR 8. TEMPERATURE SWITCH (RTD) 9. PRESSURE INDICATOR 10. Y-STRAINER 11. SIGHT GLASS 12. CHECK VALVE 13. PRESSURE SWITCH 14. VACUUM BREAKER 15. AIR PRESSURE CONTROL VALVE 16. BLEED ORIFACE 17. BLOWDOWN SOLENOID VALVE 18. OIL FILTER 19. LEVEL INDICATOR | <ul style="list-style-type: none"> 20. SAFETY/RELIEF VALVE 21. FLOW CONTROL ORIFACE 22. CONDENSATE DRAIN VALVE 23. RUH CONTROL VALVE 24. RUH SOLENOID VALVE 25. VENT SOLENOID VALVE 26. INLET REGULATING VALVE 27. INLET AIR FILTER 28. HYDRAULIC PUMP 29. CUSTOM AIR VENT 30. AIR TEMPERATURE INDICATOR 31. AIR PRESSURE INDICATOR 32. OIL PRESSURE DIFFERENTIAL CONTROL 33. ORIFACE, BACK PRESSURE CONTROL 34. SEPARATOR ELEMENTS 35. FILL POINT 36. MAGNETIC PIPE PLUG 37. TEMPERATURE SWITCH 38. PRESSURE TEST PORT |
|---|--|

TYPICAL FLOW DIAGRAM
FIGURE 3-3-5

On start-up, with the unit cold, the thermal element is open to the bypass line. The full flow of oil, flows from port B through port A to the compressor, bypassing port C to the cooler. The element is factory set to open at 140° F (60° C). As the receiver oil warms up to this temperature, the thermal element gradually closes port B and opens port C. This allows the cool oil from the radiator cooler to mix with the bypass oil. After the unit reaches the proper temperature, the thermostatic control valve will normally be open to port C. This produces an oil injection temperature approximately 140° F (60° C), but not higher than the maximum allowed 150° F (65°C).

If the compressor shuts down under high air temperature conditions, the thermal element may be stuck in the bypassed position from port A to port B. Let the unit cool down and then restart the compressor. If the oil injection temperature continues to rise past the 150° F (65°C) maximum allowable, shutdown the unit immediately. Remove, clean, test, and replace the element, if required.

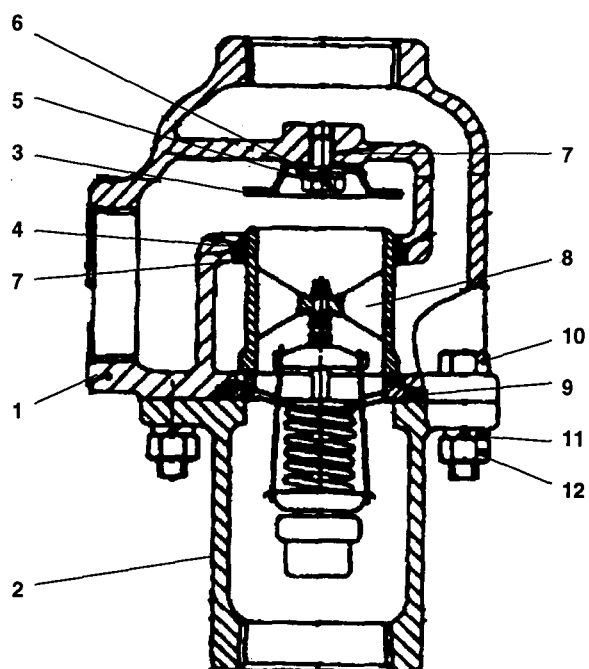
NOTE: Make sure the oil cooler is clean an free from dirt, debris and the fan is pushing air through the cooler.

If the compressor shuts down under high air temperature conditions, the thermal element may be stuck in the bypassed position from port B to port A. Let the unit cool down and then restart the compressor. If the oil injection temperature continues to rise past the 150° F (65°C) maximum allowable, shutdown the unit immediately. Remove, clean, test, and replace the element, if required.

Remove, clean and test the temperature control valve (figure 3-3-13) as follows:

1. Remove the four capscrews (10), nuts (12) and lockwashers (11).
2. Remove the lower housing (2).
3. Remove element assembly (8).
4. Clean the element and test as follows:

CAUTION: Use suitable protective equipment when handling hot items.



- | | |
|------------------|---------------------|
| 1. UPPER HOUSING | 7. O-RING |
| 2. LOWER HOUSING | 8. ELEMENT ASSEMBLY |
| 3. SEAT | 9. O-RING/GASKET |
| 4. SLEEVE | 10. CAPSCREW |
| 5. CAPSCREW | 11. LOCKWASHER |
| 6. LOCKWASHER | 12. NUT |

TEMPERATURE CONTROL VALVE

FIGURE 3-3-13

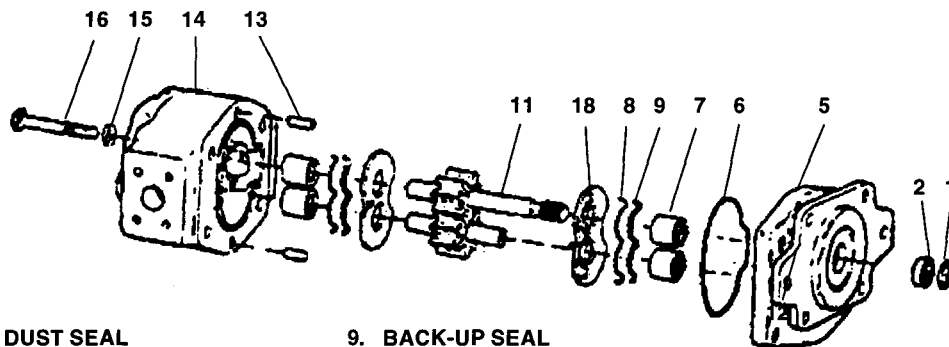
Place the element in 150° F (65°C) water and stir the water vigorously with the element for 5 minutes. Immediately place the element in the housing. If the element is fully stroked, the seating of the element against the upper housing can be felt. Replace with a new element, [140° F (60° C). setting] if the element is not fully stroked and seated.

WARNING: Replacement element must be the same as the original. Do not replace with other brands.

5. Clean the internals of the upper and lower housings before reinstalling the element.
6. Lubricate a new O-ring seal (7) and insert it in the groove in the upper housing (1).
7. Insert element assembly (8) through O-ring seal (7) with a twisting motion.

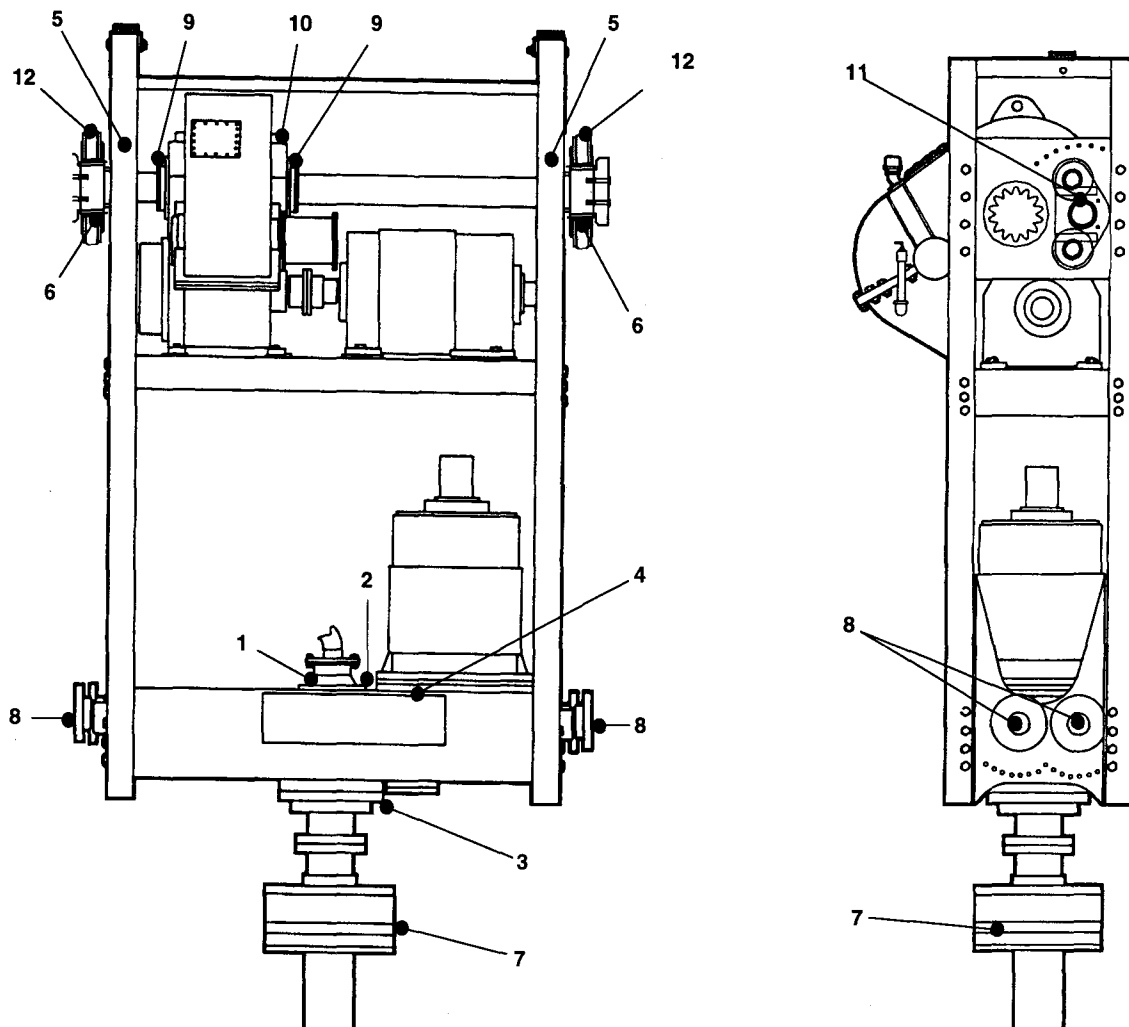
- | | | |
|-----------------------------------|----------------------|----------------------|
| 1. CYLINDER | 34. SEAL, O-RING | 67B. EARING, SPECIAL |
| 2. ROTOR, MALE | 35. SCREW, CAP | 68. WASHER, LOCK |
| 3. ROTOR, FEMALE | 36. VALVE, INTAKE | 69. CAPSCREW |
| 4. BEARING RETAINER, REAR | 37. SHAFT, VALVE | 70. RING |
| 5. PIN, DOWEL | 38. SPRING, VALVE | 71. OPEN FLANGE |
| 6. PIN, SPIROL | 39. RETAINER, SPRING | 71A. BLIND FLANGE |
| 7. CAPSCREW | 40. CAPSCREW | 72. CAPSCREW |
| 8. SPECIAL SCREW | 41. CAPSCREW | 73. FITTING |
| 9. SPECIAL BEARING | 42A. SPRING | 74. FITTING |
| 10. RETAINER, BEARING | 42. SPRING | 75. TUBE |
| 11. SPECIAL SCREW | 43. PISTON | 79. TUBE |
| 12. COVER, REAR BEARING | 44. SEAL, PISTON | 87. CYLINDER |
| 12A. COVER, REAR BEARING, SPECIAL | 45. SLEEVE | 88. PISTON |
| 13. O-RING SEAL | 46. SEAL, O-RING | 89. SEAL |
| 14. CAPSCREW | 47. FLANGE | 90. COVER |
| 15. HOUSING, GEAR | 48. FITTING | 91. O-RING |
| 16. BEARING, ROLLER | 49. TUBE | 92. CAPSCREW |
| 17. BEARING, ROLLER | 50. FITTING | |
| 18. SPACER | 51. FITTING | |
| 19. CAPSCREW | 52. FITTING | |
| 20. WASHER, FLAT | 53. TUBE | |
| 21. GEAR, DRIVEN | 54. ADAPTER | |
| 22. KEY, DRIVE | 55. FITTING | |
| 23. SLEEVE, GEAR RETAINER | 56. TUBE | |
| 24. GEAR, DRIVE | 57. FITTING | |
| 25. KEY, DRIVE | 58. TUBE | |
| 26. SHAFT, INPUT | 59. FITTING | |
| 27. SPACER | 60. TUBE | |
| 28. BEARING, ROLLER | 61. FITTING | |
| 29. COVER, GEAR HOUSING | 62. O-RING | |
| 30. SCREW, CAP | 63. O-RING | |
| 31. ROLLER BEARING, SPECIAL | 64. THRUST PLATE | |
| 32. SEAL, INPUT SHAFT | 64A. COLLAR | |
| 33. RETAINER, SEAL | 65. O-RING | |
| | 66. IBUSHING | |

AIR COMPRESSOR ASSEMBLY - KS27AC & KS31AC(X)
 FIGURE 3-3-18 AND FIGURE 3-3-18A LEGEND



- | | |
|--------------|-------------------|
| 1. DUST SEAL | 9. BACK-UP SEAL |
| 2. SEAL | 10. WEAR PLATE |
| 5. ADAPTER | 11. DRIVE SHAFT |
| 6. SEAL RING | 12. DRIVER SHAFT |
| 7. BEARING | 13. DOWEL |
| 8. SEAL RING | 14. COVER HOUSING |
| | 15. LOCKWASHER |
| | 16. CAPSCREW |

TYPICAL OIL PUMP
 FIGURE 3-3-19



LUBE POINT	NO. OF POINTS LUBRICATED	TYPE LUBRICANT	HOURS				AS REQ.	AUTOMATED	COMPONENTS
			8	40	160	1000			
1	1	MPG	X					X	AIR SWIVEL SEAL
2	1	MPG	X					X	UPPER ROTARY SHAFT BEARING
3	1	MPG	X					X	ROTARY SHAFT LOWER SEAL
4	1	MPG	X					X	INT. SHAFT UPPER BEARING
5	2	MPG	X					X	SHIPPER SHAFT BEARING
6	2	MPG	X					X	RACK AND PINIONS
7	1	MPG				X			SHOCK SUB OR ROTARY COUPLING SEAL
8	6	MPG	X					X	GUIDE ROLLERS
9	2	MPG	X					X	1ST INT. & SHIPPER SHAFT BEARINGS
10	1	MPG				X			1ST INT. GEAR BEARINGS
11	2	MPG	X						BOGIE FRAME PIVOT PIN
12	4	MPG	X						BOGIE ROLLER BEARING

NOTE: The above frequencies are for manual lubrication. If the machine is equipped with automatic lube systems the frequencies are set at the lube control station.

On automatic lube systems the injectors should be set at full opening at start-up of a new machine and then readjusted as required.

MAST LUBRICATION - PART 2
FIGURE 5-1-5

(34.) Install the cotter pin (204). Install a new copper gasket (202). Make sure the seal (203) in the bottom of the adapter (43) is in good condition. Push the cylinder up into the adapter and engage the threads. Screw in the pump using a strap wrench for the final tightening. See figure 5-2-8.

26. Connect the hydraulic supply and return hoses to the fittings.

! CAUTION: To reduce the risk of static sparking, be sure to reconnect the ground wire before operating the pump.

Pump Repair

1. If possible, flush the pump. Follow the PRESSURE RELIEF PROCEDURE.
2. Follow the DISCONNECTING THE RECIPROCATOR AND DISPLACEMENT PUMP procedure.
3. Place the pump in a vise. Unscrew the priming cylinder (111). See figure 5-2-9.
4. Unscrew the priming piston (112) and the piston rod (119).
5. Loosen the packing housing (110). Unscrew the cylinder (118).
6. Unscrew the packing housing (110) and remove all parts.
7. Unscrew the priming tube (108) and remove all parts.
8. Unscrew the piston stud (107) and remove all parts.
9. Clean all parts thoroughly with a compatible solvent. Inspect the parts for wear, and replace as needed. Scoring or irregular surfaces on the priming tube (108), or inside the cylinder (118) causes premature packing wear and leaking.

NOTE: The balls (116) cannot be resealed on the hardened seats (102). However, the seats can be reversed and used a second time.

NOTE: Lubricate all parts with a light, waterproof grease.

10. Assemble the piston (107), spacer (106), seal (105), packing (104), gasket (115), seat (102), and ball (116). Install the pin

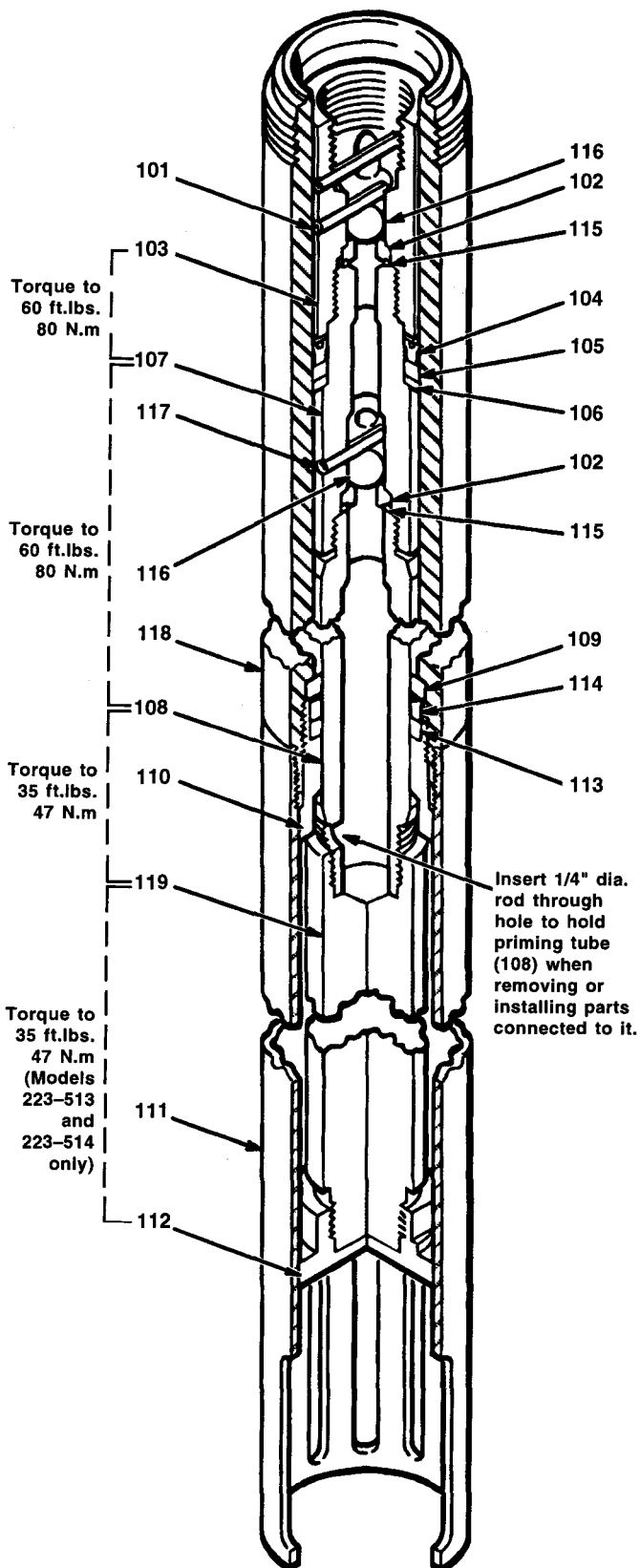


FIGURE 5-2-9

PROBLEM	CAUSE	CORRECTIVE ACTION
Air blowing through blowdown valve while loaded.	<ol style="list-style-type: none"> 3. Inlet regulating valve malfunction. 4. Vacuum breaker valve not opening. 5. By-pass line plugged. 6. Air leak. 	<ol style="list-style-type: none"> 3. Check that valve is not stuck open. Check valve for plugged orifice. Check to see that diaphragm is not leaking or ruptured on LU design units. (On AC design units, check to see if piston is leaking). 4. Repair valve or replace. 5. Clean line. 6. Tighten all fittings.
Excessive oil consumption.	<ol style="list-style-type: none"> 1. Loose wiring. 2. Solenoid coil failure. 3. Dirt in valve. 4. Seat worn. 	<ol style="list-style-type: none"> 1. Check wiring connections. 2. Replace coil. 3. Clean valve. 4. Replace seat or complete valve.
Low delivery pressure.	<ol style="list-style-type: none"> 1. Oil carry-over through discharge line. 2. Leaking fitting in gasket. 3. Compressor shaft seal failure. 	<ol style="list-style-type: none"> 1. Check for clogged, strainer or sight glass orifice in oil scavenging return line. Check for ruptured oil separator element. Check oil being used, maybe foaming. 2. Tighten fittings. Replace gasket. 3. Replace seal.
HYDRAULIC SYSTEM		
Insufficient pressure or sluggish action.	<ol style="list-style-type: none"> 1. Clogged inlet air filter. 2. Regulating valve inlet restricted. 3. Inlet valve stuck. 4. Air pressure valve set too low. 5. Air pressure valve malfunctioning. 6. Leaking in downstream piping. 	<ol style="list-style-type: none"> 1. Clean or change filter element. 2. Clear restriction. 3. Remove valve and repair or replace. 4. Readjust setting. 5. Repair or replace valve. 6. Tighten piping joints.
	<ol style="list-style-type: none"> 1. Low oil level. 2. Leaking suction line allowing air intake. 3. Pump problem. 4. Oil overheated. 5. Control valve problem. 6. Motor problem (in the case of propel or cable reel system.) 	<ol style="list-style-type: none"> 1. Keep tank filled to proper level. 2. Repair or replace line. 3. Check pumps. 4. Check oil cooler. 5. Check control valve. 6. Check hydraulic propel motor or cable reel motor.

APPENDIX A4 - LUBE BENCHMARKS

MPG - MULTI-PURPOSE TYPE GREASE

SCOPE

Lubricants performance requirements for Multi-Purpose Type Grease.

APPLICATION

For heavy duty ball, roller and plain bearings.

GENERAL REQUIREMENTS

1. HEAT RESISTANCE - Shall be thermal stable.
2. RETENTION IN BEARINGS - Shall not exhibit high leakage.
3. MECHANICAL STABILITY - Shall work continuously with a minimum change in consistency.
4. WATER RESISTANCE - Shall withstand water wash-out or leaching.
5. REVERSIBILITY - Shall be stable with repeated heating and cooling.
6. PRESSURE OIL SEPARATION - Shall resist oil-soap separation.
7. DISPENSABILITY - Shall have the ability to be pumped through automatic lubrication systems without the aid of heat tracing on the lube lines at the designated ambient temperatures.
8. EXTREME PRESSURE - Shall withstand heavy shock loading.
9. COMPATIBILITY - Low temperature greases shall be compatible with mineral oil base greases and their oil seal material.

COMPOUNDING

Suitable for producing the extreme pressure characteristics (without inert fillers) required for heavy duty ball, roller and plain bearing lubrication.

SPECIFIC REQUIREMENTS

AMBIENT TEMPERATURE	NOTE #1	110° TO 30°F	40° TO 0°F	+10 TO -50°F
NLGI	ASTM. DD-217	2	1	NOTE #2
TYPICAL PENETRATION	ASTM. D-217	265-295	310-340	NOTE #2
DROPPING POINT °F. MIN.	ASTM. D-2265	325	325	NOTE #2
TIMKEN O.K. LOAD, LBS., MIN.	ASTM. DD-2509	40	40	40
SHELL FOUR BALL EP	ASTM. D-2596			
LOAD WEAR INDEX, KG., MIN.	ASTM. D-2596	40	40	35
LOAD WELD, KG., MIN.	ASTM. D-2596	200	200	200
SHELL FOUR BALL WEAR	ASTM. D-2266			
WEAR SCAR DIAM., MM., MAX.	ASTM. D-2266	0.60	0.60	0.60
COPPER STRIP CORROSION	ASTM. D-130	PASS	PASS	PASS
RUST TEST	ASTM. D-1743	PASS	PASS	PASS

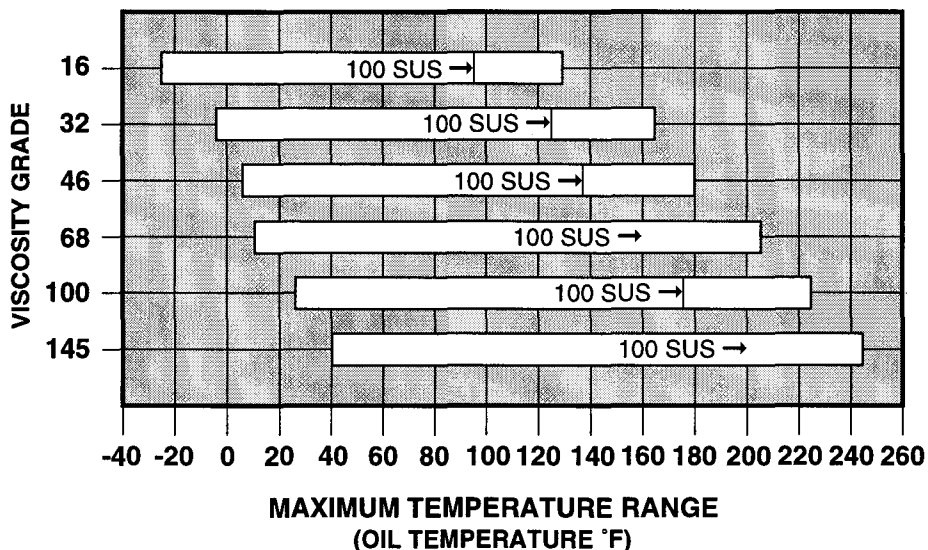
NOTATIONS

1. AMBIENT TEMPERATURE - The ambient temperature shall be the temperature at the point of lubricant application.
2. LOW TEMPERATURE GREASE - For extended use in low temperature (+10° to -50°F) areas, this product should be capable of slumping in containers and should be pumpable through lube lines without the aid of heat tracing.

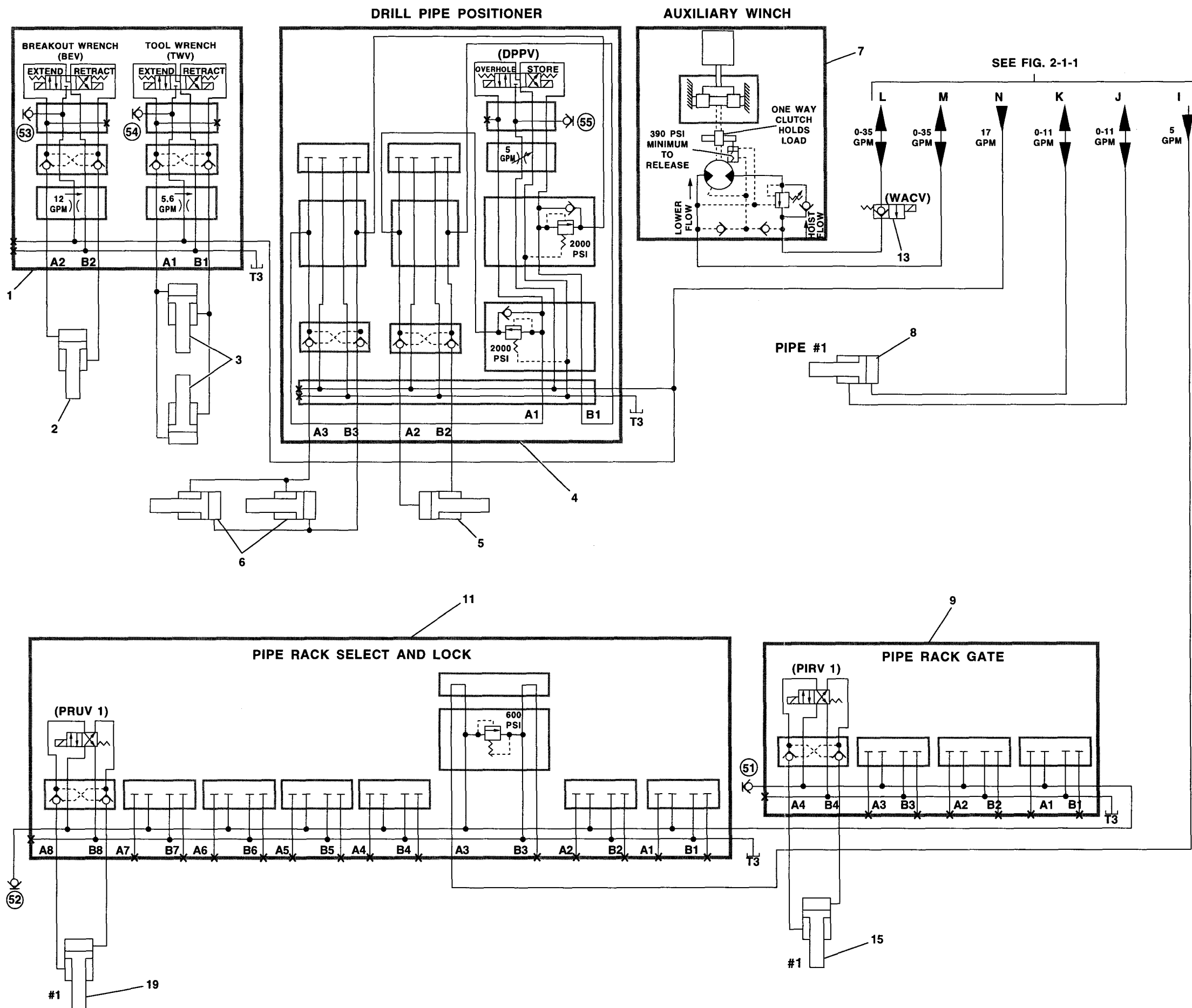
In order to minimize compatibility problems, it is desirable that the thickener and additive system be the same as NLGI #1 and #2 greases.

1. THE LEFT SIDE OF BAR IS ABSOLUTE MIN. AMBIENT TEMP. FOR COLD START
2. THE RIGHT SIDE OF BAR IS ABSOLUTE MAX. OIL TEMP.
3. IDEAL MAX. OPERATING OIL TEMP. IS A VISCOSITY OF 100SSU

NOTE: When determining an oil for the hydraulic system, Bucyrus designed the system for an all-year oil and for use without heaters. The hydraulic system is tailored to the ambient temperature at the customer's mine site and the correct type of hydraulic fluid is selected. For extremely cold temperatures, a very light fluid is used with oversize oil coolers to accommodate higher summer temperatures. With this procedure, viscosity limits as little as 30° above ambient can be met.



MOBIL DTE 10 SERIES OIL PERFORMANCE
 FIGURE 4A-2



1. BLOCK MANIFOLD ASSEMBLY
2. BREAKOUT WRENCH CYLINDER
3. TOOL WRENCH CYLINDER
4. BLOCK MANIFOLD ASSEMBLY
5. POSITIONER CLAMP CYLINDER
6. POSITIONER CYLINDER
7. AUXILIARY WINCH
8. RACK POSITION CYLINDER
9. BLOCK MANIFOLD ASSEMBLY
10. PIPE RACK GATE CYLINDER
11. BLOCK MANIFOLD ASSEMBLY
12. PIPE RACK LOCK CYLINDER
13. 2-WAY SOLENOID VALVE

NOTES:

1. For machine location of test points, see separate chart.
2. ○ circled numbers represent test points.
3. See figure 2-1-9 for identification of tank symbols - $\begin{matrix} \downarrow \\ T1 \end{matrix}$ $\begin{matrix} \downarrow \\ T2 \end{matrix}$ $\begin{matrix} \downarrow \\ T3 \end{matrix}$ $\begin{matrix} \downarrow \\ IN \end{matrix}$

**TYPICAL HYDRAULIC SCHEMATIC
MAST - 1 PIPE RACK
(for machines 141025 and future,
except 141031, 141061 & 141062)
FIGURE 2-1-2**

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL