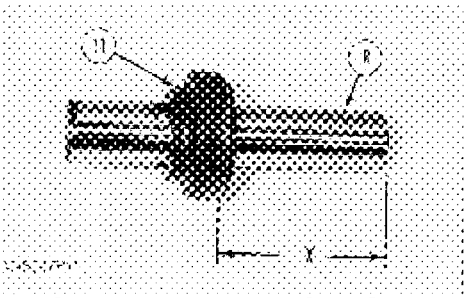
Technical Manual

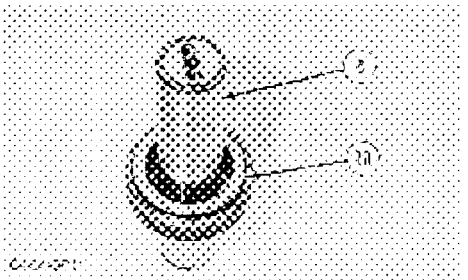


14. Check the condition of the O-ring seal used in collar (11). If the O-ring seal is damaged, use a new part for replacement. Install the O-ring seal in the collar. Put clean oil on the O-ring seal.
15. Using a press, install collar (11) on shaft (8) until dimension **(X)** is **129.2 ± 0.2 mm (5.09 ± .008 in).**
16. Determine shaft end play as follows:
NOTE: Do Not install the Duo-Cone seals in the track carrier roller or collar (11) at this time.
a. Install shaft assembly (8) in the track carrier roller without Duo-Cone seals.
b. Install retainer (7) and socket head bolts (5) and (6) on the end of shaft assembly (8).
c. Use Tooling (C) to measure the end play of shaft assembly (8). The end play of the shaft assembly must be **0.20 to 0.75 mm (.008 to .030 in).** Bearing (12) controls the amount of shaft end play.
d. Disassemble the track carrier roller, but **Do Not** remove collar (11) from shaft (8).

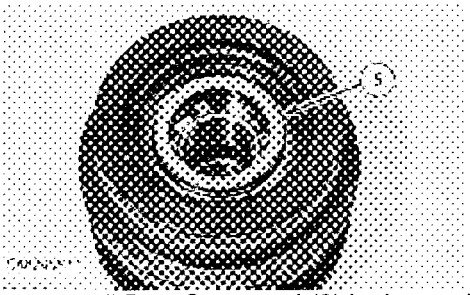
NOTICE

Refer to the topic "Assembly And Installation Of Conventional Duo-Cone Seals" in this module.

NOTE: The rubber seal and all of the surfaces that make contact with the seals must be clean and dry. After the installation of the seals, apply clean SAE 30 oil on the contact surfaces of the metal seals.



17. Install Duo-Cone seal (10) in collar (11) with Tool (B).



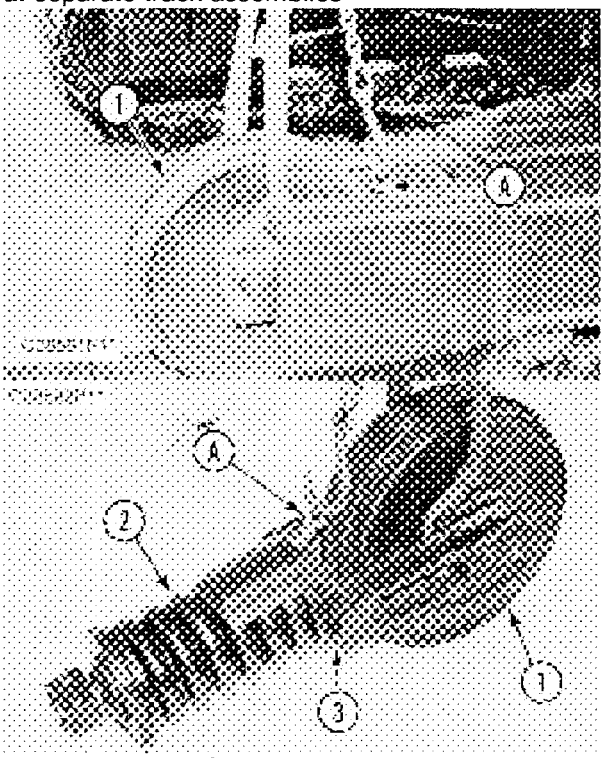
18. Install Duo-Cone seal (9) in the track carrier roller (side without three threaded holes) with Tool (B).

10. If the track shoe on each side of the master pin was removed, reinstall them. Use Tool (E) to reinstall the track shoe mounting bolts.

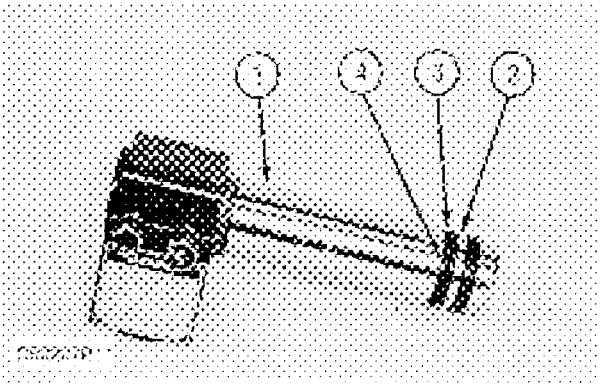
Front Idlers, Recoil Springs & Hydraulic Track Adjusters
Remove & Install Front Idlers, Recoil Springs & Hydraulic Track Adjusters

Tools Needed	A
138-7573 Link Bracket	1

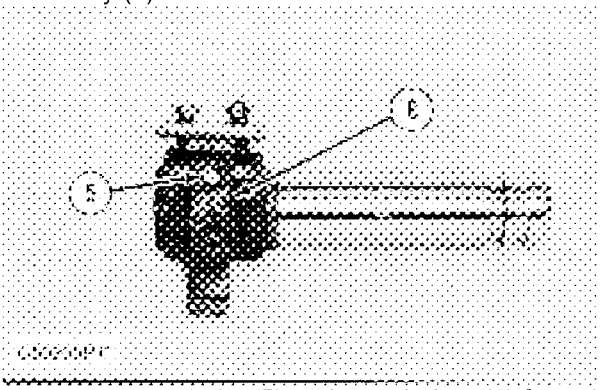
Start By:
a. separate track assemblies



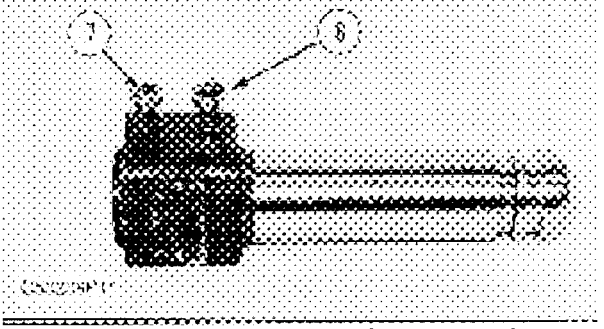
1. Remove one of the mounting bolts that hold the cover over the front of the recoil spring assembly. Fasten Tool (A) to the front support for the recoil spring, as shown. Use the cover mounting bolt hole to fasten Tool (A) in place.
2. Fasten a hoist to front idler (1) and Tool (A), as shown.
3. Slide front idler (1), the recoil spring and the hydraulic track adjuster (2) out of the under carriage frame assembly as a unit. The weight of the unit is **204 kg (450 lb).**
4. Remove four bolts (3) that hold the front idler to the front support for the recoil spring. Separate the front idler from the recoil spring and the hydraulic track adjuster. The weight of the front idler is **109 kg (240 lb).** The weight of the recoil spring and the hydraulic track adjuster as a unit is **95 kg (210 lb).**
NOTE: The following steps are for the installation of the front idlers, the recoil springs and the hydraulic track adjusters.
5. Be sure the mating surfaces on the front support for the recoil spring and the two bearings for the front idler are clean and free of dirt and debris prior to reassembly.
6. Fasten a hoist to the recoil spring and the hydraulic track adjuster. Put the unit in position on the front idler. Temporarily install four bolts (3) that hold the unit together.
7. Install Tool (A) on the front support for the recoil spring. Fasten a hoist to the front idler and Tool (A).



4. Remove two O-ring seals (2), two rings (3) and two rings (4) from the grooves in piston assembly (1).



5. Remove two bolts (5) and guard plate (6) from the piston assembly.



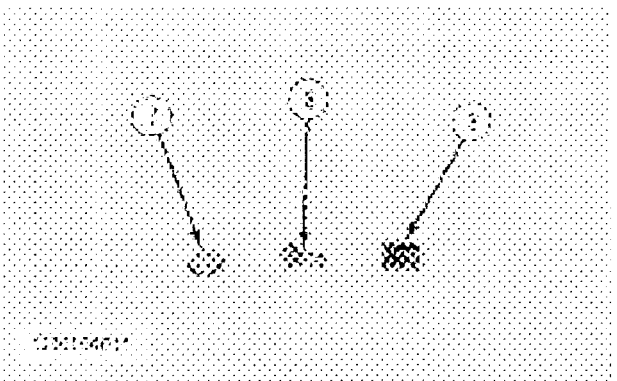
6. Remove relief valve (7) and fill valve (8) from the piston assembly.

NOTE: The following steps are for the assembly of the hydraulic track adjuster.

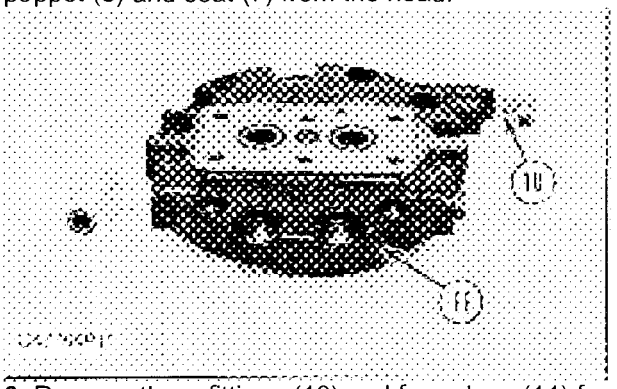
7. Thoroughly clean all parts of the hydraulic track adjuster prior to assembly. Check the condition of O-ring seals (2), rings (3) and rings (4). If any of the components are worn or damaged, use new parts for replacement.

8. Install relief valve (7) and fill valve (8) in the piston assembly. Tighten each valve to a torque of **34 ± 5 N*m (25 ± 4 lb ft).**

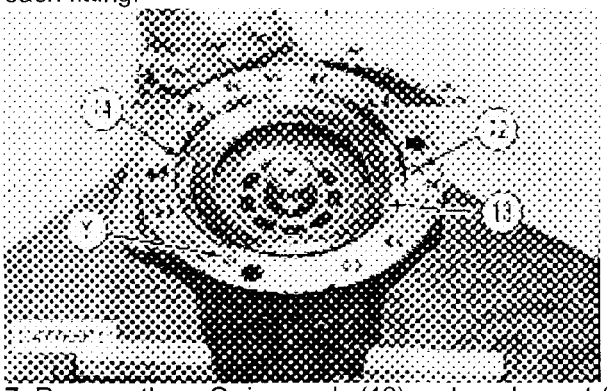
9. Install guard plate (6) and two bolts (5) that hold it.



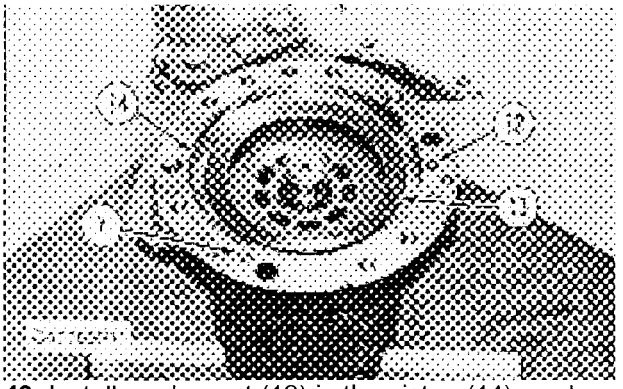
4. Turn head (2) over, and remove O-ring seal (6), shim(s) (5), port plate (4) and bearing (3) from the head. Remove the two check valve assemblies from the head.
NOTE: There is a retainer located under spring (9). This retainer is a press fit in head (2). Do Not remove the retainer.
5. Install a small diameter rod in hole (X). Tap the rod with a plastic hammer to remove spring (9), poppet (8) and seat (7) from the head.



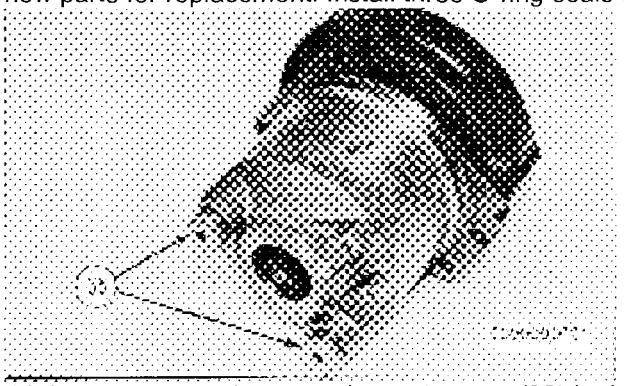
6. Remove three fittings (10) and four plugs (11) from the head. Remove the O-ring seal from each fitting.



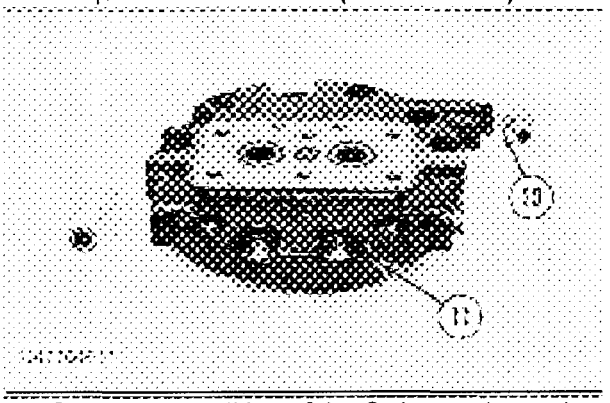
7. Remove three O-ring seals (12) and washer set (13) from the travel motor body.
8. Place a shop towel over brake piston (14). While retaining brake piston (14) by hand, apply shop air pressure (free of water) of **approximately 525kPa (75 psi)** to brake release port (Y). Brake piston (14) will move up and out of the piston guide. Remove brake piston (14) from the travel motor body.



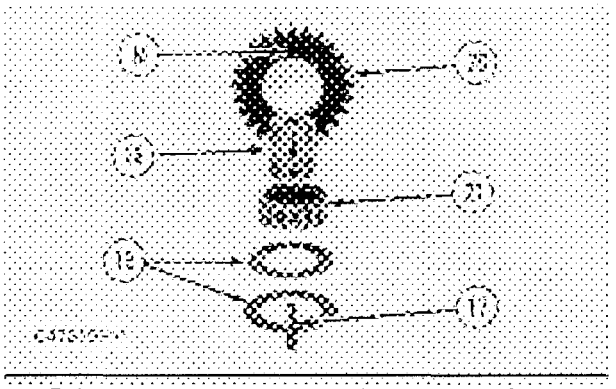
42. Install washer set (13) in the piston (14) as shown.
43. Check the condition of three O-ring seals (12). If the O-ring seals are worn or damaged, use new parts for replacement. Install three O-ring seals (12) in the travel motor body as shown.



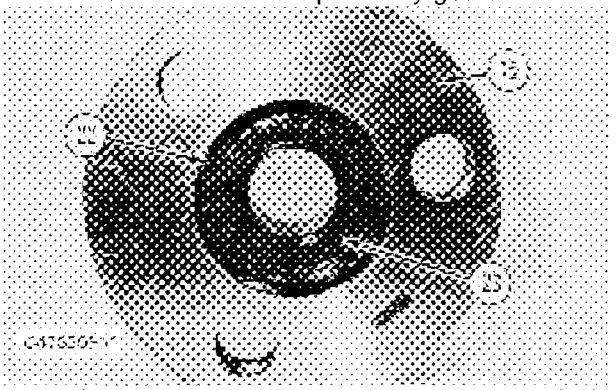
44. Install the two pistons and two stoppers (39) in the travel motor housing. Tighten the stoppers to a torque of **140 ± 14 N*m (105 ± 10 lb ft).**



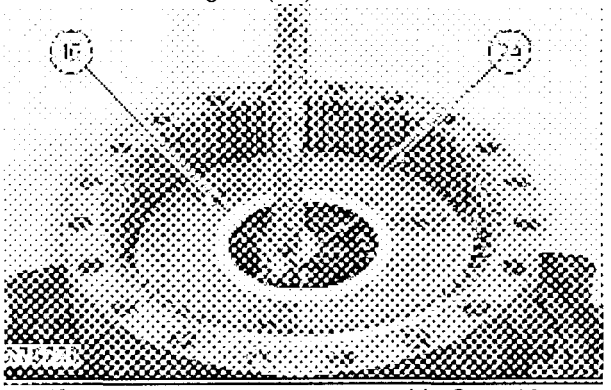
45. Check the condition of the O-ring seals used on fittings (10). If the O-ring seals are worn or damaged, use a new parts for replacement. Install Pipe Sealant on the threads of fittings (10). Install the fittings in the head as shown.
46. Reinstall plugs (11) in the head. Tighten each plug to a torque of **15 ± 2 N*m (11 ± 1 lb ft).**



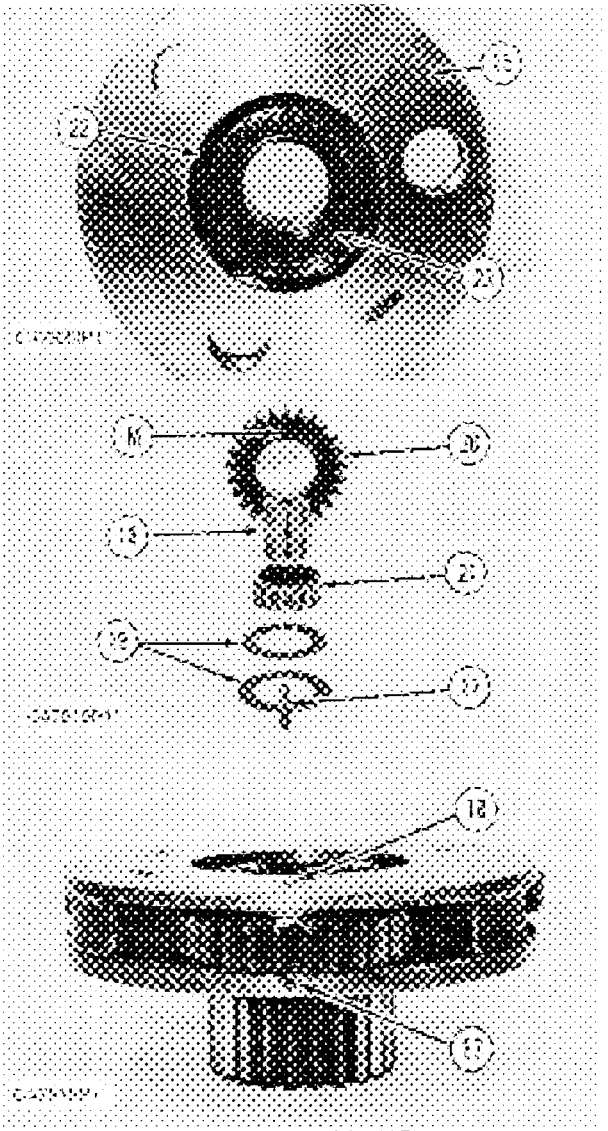
20. Drive spring pin (17) into planetary shaft (18) with a hammer and a punch.
NOTE: Planetary gears (20) have identification marks (M) on them. Note the position of the identification marks in relation to the carrier for assembly purposes.
21. Remove planetary shaft (18), two thrust washers (19) and planetary gear (20) from the carrier.
22. Remove bearing (21) from the planetary gear.
23. Remove spring pin (17) from planetary shaft (18) with a hammer and a punch.
24. Remove the other two planetary gears from the carrier as in Steps 20 through 23.



25. Using a screwdriver, remove retaining ring (22).
26. Remove sun gear (23) from the carrier.



27. If spacer (16) was not removed in Step 19, remove it from carrier assembly (24) at this time.
28. Slide a piece of steel bar stock in between the planetary gears in carrier assembly (24) as shown. Make sure the bar stock is centered in the carrier assembly.
29. Fasten a lifting sling and a hoist to the steel bar stock as shown. Slowly lift carrier assembly (24) from the final drive. The weight of the carrier assembly is **36 kg (80 lb).**



65. Assemble carrier assembly (15).
a. Install sun gear (23) in carrier (15).
b. Make sure identification grooves (M) are facing in the correct direction as noted during the disassembly of the carrier assembly.
c. Using a screwdriver, install retaining ring (22) that holds the sun gear in the carrier.
d. Put clean **SAE 30** oil on bearing (21).
e. Install bearing (21) in planetary gear (20).
f. Install a thrust washer (19) on each side of the planetary gear.
g. Install thrust washers and the planetary gear in carrier (15).
h. Install planetary shaft (18) in carrier (15) and through planetary gear (20). Make sure the spring pin hole in the carrier is in alignment with the spring pin hole in the planetary shaft.
66. Install spring pin (17) in the carrier and into the planetary shaft. Install the spring pin until it is even with the outside surface of the carrier and with the split in the spring pin oriented horizontal to the carrier either to the left or right.

Maintenance Interval Schedule - C-15 Caterpillar Diesel engine

Operating conditions and oil API Classifications will determine the amount of service hours for the PM Level 1 Maintenance Interval Schedule. Refer to Operation and Maintenance Manual, "Engine Oil and Filter - Change" for your specific oil change interval.

Note: Ensure that the Safety Information, warnings, and instructions are read and understood before operation or maintenance procedures are performed.

Note: Use fuel consumption, service hours, or calendar time, **whichever occurs first** in order to determine the maintenance intervals. Engines that operate in severe operating conditions may require more frequent maintenance.

Before each consecutive interval is performed, all of the maintenance requirements from the previous interval must also be performed.

When Required

Battery - Replace
Battery or Battery Cable - Disconnect
Engine Air Cleaner Element (Dual Element) - Clean/Replace
Engine Oil Level Gauge - Calibrate
Engine Storage Procedure - Check
Ether Starting Aid Cylinder - Replace
Fuel System - Prime
Severe Service Application - Check

Daily

Cooling System Coolant Level - Check
Driven Equipment - Check
Engine Air Cleaner Service Indicator - Inspect
Engine Air Precleaner - Check/Clean
Engine Oil Level - Check
Fuel System Primary Filter/Water Separator - Drain
Power Take-Off Clutch - Check/Adjust/Lubricate
Walk-Around Inspection

Initial 20 to 40 Service Hours

Belt - Inspect

Between 250 Service Hours and 1000 Service Hours

Electronic Unit Injector - Inspect/Adjust
Engine Valve Lash - Inspect/Adjust
Engine Valve Rotators - Inspect

Every 6000 Service Hours or 6 Years

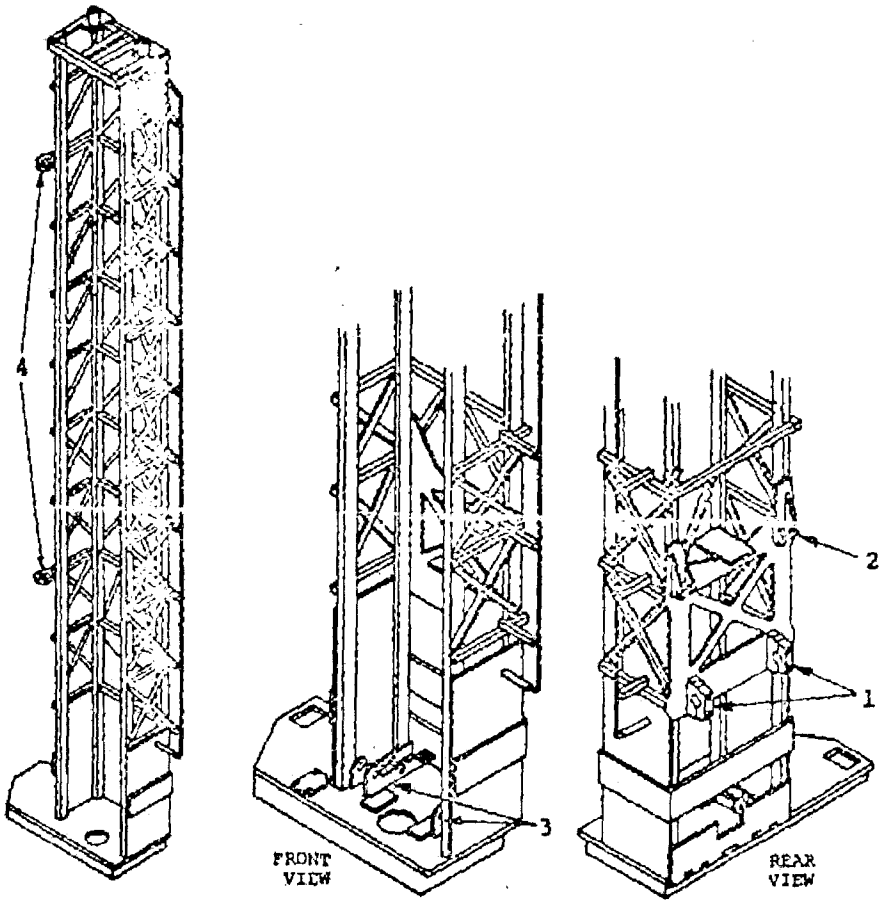
Cooling System Coolant (ELC) - Change

CHAPTER 1
MECHANICAL MAINTENANCE
SECTION 4 — MAST

MAST STRUCTURE

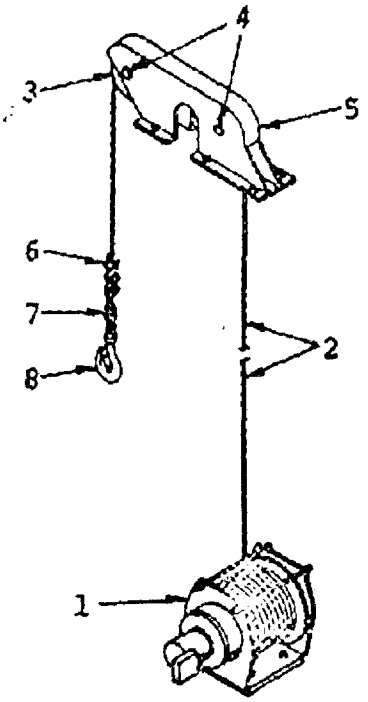
The 35HR drill mast (figure 8) is a fabricated structure made of steel tubes, angles and plates. The structure is formed by four vertical tubes tied together on three sides with tubular lacing. The fourth side is open to allow the rotary drive unit to be raised and lowered the length of the mast.

Inspect the mast structure daily for wear or damage. Inspect the cast ladder for loose hardware and structural integrity. Inspect the mast hinge bearing blocks and the structure surrounding the blocks for wear or damage. Verify that the hinge bearing block cap screws are in place and tight. Inspect the mast hoist cylinder attachments for wear or damage. Lubricate the pins weekly with the appropriate lubricant.



Mast
Figure 8

1 – MAST HINGE BEARING BLOCK
2 – MAST HOIST CYLINDER ATTACHMENT
3 – PULLDOWN CYLINDER ATTACHMENT
4 – BARREL LOADER HANGER SUPPORT BRACKETS



1. HYDRAULIC WINCH
2. WINCH ROPE
3. GUIDE SHEAVE
4. SHEAVE PIN
5. SHEAVE BRACKET
6. ROPE CLIP
7. THIMBLE
8. HOOK

WINCH
FIGURE 20

For repair of the hydraulic winch refer to the hydraulic section of this manual.

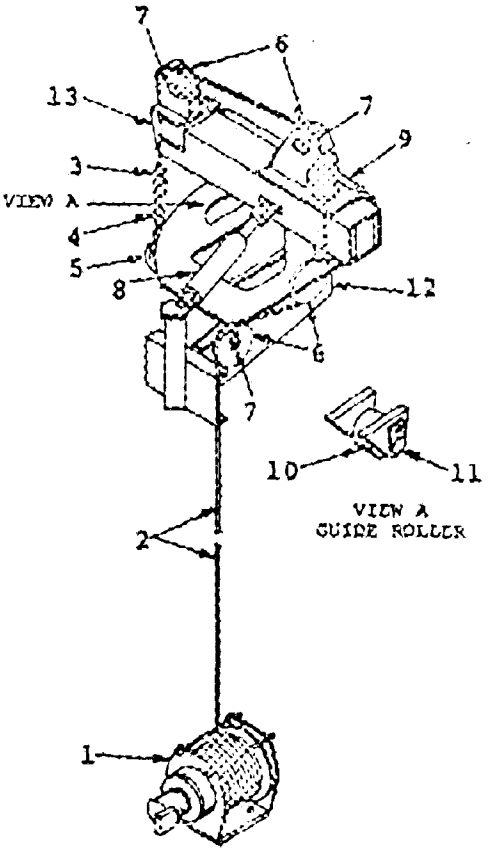
WINCH JIB

The winch jib (figure 21) is an optional feature that allows the winch to perform more functions by means of the jib's ability to be swung in a 90 degree arc and be extended.

The jib hydraulic cylinders and piping should be checked daily for leaks. The jib sheaves and extension lubrication points should be lubricated every three shifts.

To disassemble the jib proceed as follows:

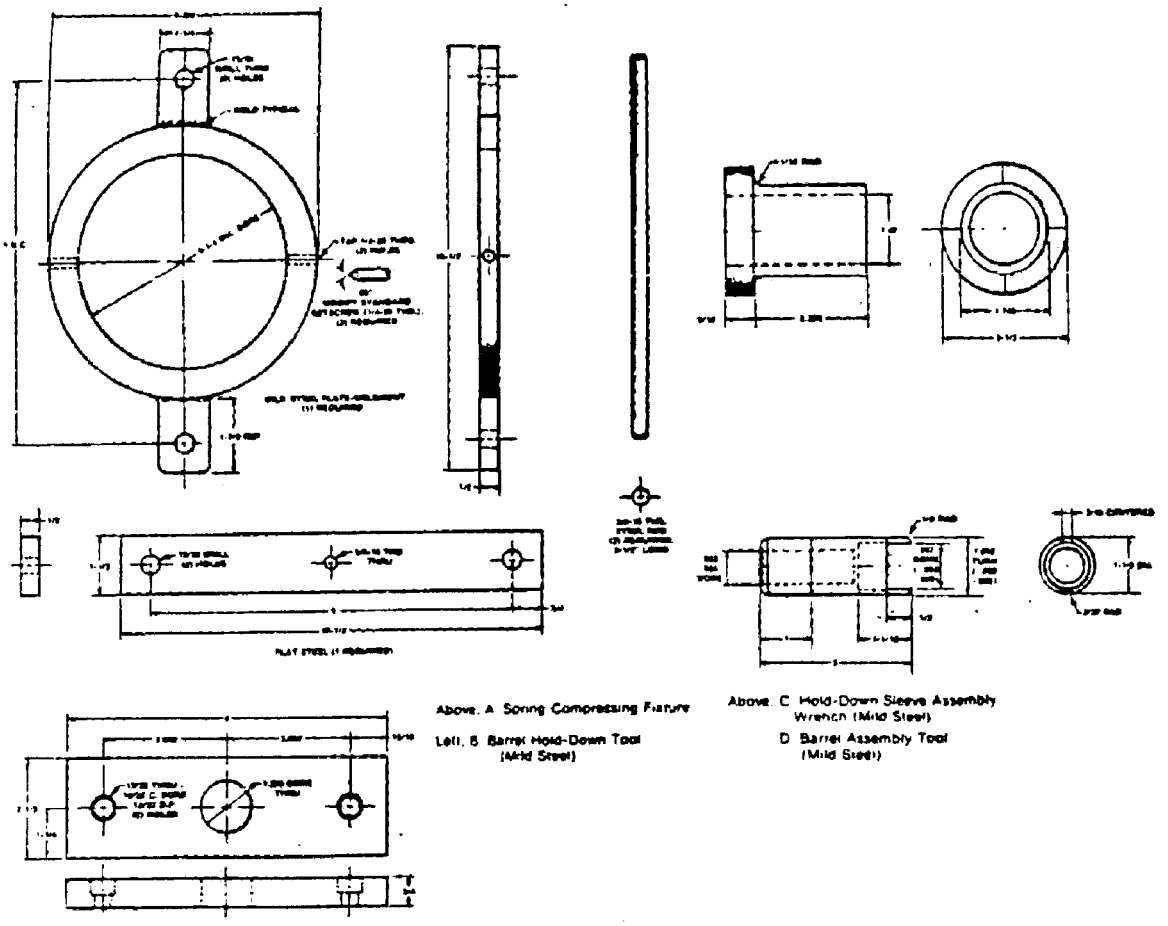
1. Lower the mast to gain access to the jib. Shut off and tag the controls.
2. Disconnect all piping to the jib cylinders. Plug and tag all piping and cylinder ports.
3. Remove the jib swing cylinder anchor pins and remove the cylinder.
4. Back off on the pivot shaft nut set screw, then remove the nut and thrust washer. With a crane and proper rigging lift the jib from the jib mount.
5. Remove the pins that anchor the extension cylinder to the jib. Remove the cylinder. Remove the jib sheave pins and sheaves. Remove the jib guide roller pin, thrust washers and roller. Separate the jib extension from the main jib.



1. HYDRAULIC WINCH
2. WINCH ROPE
3. ROPE CLIP
4. THIMBLE
5. HOOK
6. GUIDE SHEAVES
7. SHEAVE PIN
8. SWING CYLINDER
9. EXTEND CYLINDER
10. GUIDE ROLLER
11. ROLLER PIN
12. JIB SUPPORT
13. JIB

WINCH WITH JIB
FIGURE 21

CAUTION: Before removing any hydraulic fittings make sure no pressure exists in the tank or hydraulic lines.



Above, A Spring Compressing Fixture

Left, B Barrel Hold-Down Tool (Mild Steel)

Above, C Hold-Down Sleeve Assembly Wrench (Mild Steel)

D Barrel Assembly Tool (Mild Steel)

SPECIAL TOOLS
FIGURE 25

CHAPTER 3
AIR SYSTEM

MAIN AIR SYSTEM

The main air system of the 35HR drill supplies compressed air for bailing the hole during drilling. The air also cleans and cools the bearings in the bit. Inlet air passes through a filter before entering the compressor, when the air control valve is activated a shutoff valve on the air/oil receiver is opened and the compressed air flows through the main air piping, up the mast air piping and hose to the air seal connection of the rotary gearcase. The compressed air flows down through the drill pipe, through the bit and out of the hole, carrying out the cuttings. When the air control valve is deactivated, the shutoff valve closes and the air is vented to the atmosphere.

SAFETY

Whenever work is to be done on the compressed air system there are three important rules to follow:

1. **Turn the air compressor switch in the operator's cab to the "off" position and attach a warning tag to the switch.**
2. **Open the auxiliary power circuit breaker and attach a warning tag to the breaker.**
3. **Drain the air from the air tank and air lines.**

The general maintenance required for the main air system consists mainly of inspection of the components of the system to see that they are working properly, that all adjustments are correct and that all liquids are at their proper level.

EVERY 150 HOURS OF OPERATION:

1. Replace compressor filter elements or when filter warning system indicates, whichever occurs first. See chart C-1, item 4.
2. Consult engine manual for power unit oil change intervals.

EVERY 300 HOURS OF OPERATION:

1. Change all hydraulic oil filter elements per chart C-1. items 2 and 3.
2. Inspect dust control elements for restrictions per chart C-1. item 11.

EVERY 450 HOURS OF OPERATION:

1. Inspect air line control filter elements, replace as required per chart C-1, item 5.
2. Inspect and clean water injection strainer per chart C-1. item 10.
3. Drain, flush and refill pump gearbox per chart C-2, item 5.
4. Drain, flush and refill rotary head gearbox per chart C-2, item 6.

EVERY 1000 HOURS OF OPERATION:

1. Change compressor oil per chart C-2, item 3.

EVERY 2000 HOURS OF OPERATION:

1. Replace receiver defogger element per chart C-1, item 6.
2. Inspect and clean sump strainers per chart C-1, items 8 and 9.
3. Drain, flush and refill hydraulic tank per chart C-2, item 4.

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Long Term Storage 39
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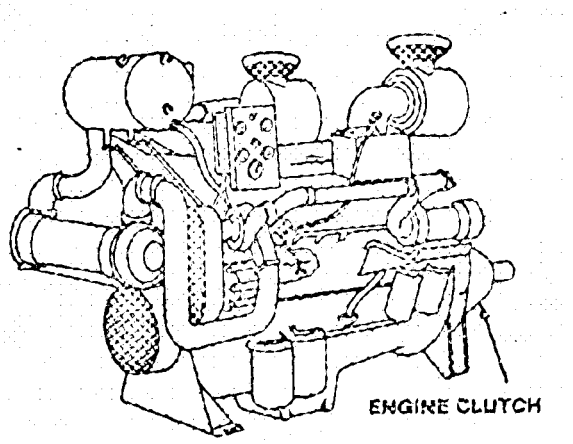
SECTION 3 - START-UP

INTRODUCTION

Start-up of the drill is not a difficult operation, but it is very important. Improper start-up could cause various safety and operating difficulties as well as damage to the machine. Following the step-by-step procedure listed below to start the machine will help reduce the possibility of accidental injury or machine damage.

DIESEL STARTING (Figure 5)

1. Be sure all controls are in the neutral position.
2. Refer to engine manual for engine starting instructions.
3. Set the engine throttle control lever at approximately 1500 RPM. never less than 1000 RPM, and allow engine, compressor (unloaded) and hydraulic system to warm up. If outside air temperature is below 40°F, allow hydraulic system to warm up for (10) ten minutes. Ideal hydraulic oil temperature for operation is from 125°F to 175°F. In cooler temperatures, allow longer warm-up periods accordingly.



TYPICAL DIESEL ENGINE

NOTE: It has been determined that the compressor, drive train and engine lave a longer life if not subjected to operation at speeds under l000 RPM. Under 1000 RPM the engine is approaching the "lug" condition.

CAUTION: Do not attempt to repair or service the rotary drill while the engine is operating. Maintain rigid safety procedures during operation.

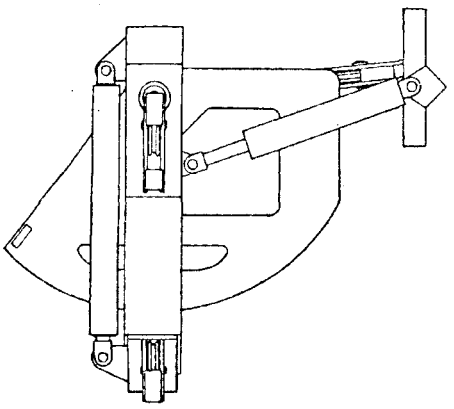
ELECTRIC STARTING

7. Be sure all controls are in the neutral position.
8. Verify that the propel switch is in the "Off" position.
9. Verify that the anti-condensation heater switch is in the "Off position.

BARREL LOADER OPERATION (Figure 20)

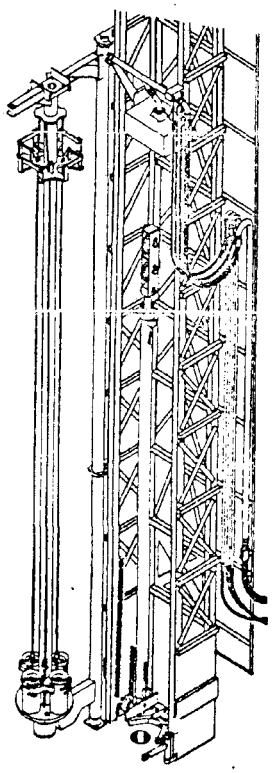
The barrel loader is used to store the drill pipe on the machine. The barrel holds four drill pipe. The loader function is completely operated from the operator's cab. There are three levers on the operator's console that control the loader, the loader lock lever is used to lock the loader in the stored position, the loader swing lever is used to swing the loader over the drill hole, and the loader index lever is used to rotate the loader barrel to select the desired drill pipe from the loader. To operate die barrel loader proceed as follows:

1. Pull on the loader lock lever to release the loader.
2. Push on the loader swing lever to swing the loader in over the drill hole.
3. Push left on the loader index lever to rotate the barrel clockwise or pull right on the lever to rotate the barrel counter-clockwise.
4. After the pipe has been removed from the barrel pull back on the loader swing lever to move the loader back to the stored position.
5. Push left on the loader lock lever to engage the loader lock pin and secure the loader.



JIB OPERATION

FIGURE 19



BARREL LOADER OPERATION

FIGURE 20

SECTION 5 - DRILLING

VERTICAL DRILLING

GENERAL OPERATING PROCEDURES

Once the drill has been inspected and started, positioned, leveled, and the tool string assembled, it is now ready to begin drilling. There are two methods of drilling, vertical drilling and angle drilling. Vertical drilling is, as the name implies, drilling a vertical hole. Angle drilling is drilling the hole at some angle from vertical (up to 30 degrees). This section of the Operator's Manual details the procedures involved in the drilling of vertical holes.

The actual drilling procedure involves three main sections:

1. starting the hole (collaring),
2. drilling the hole, and
3. cleaning or reaming the hole.

Many types of formations are found in mining areas. Formations that are drilled may range from a wet clay to solid taconite. Each formation, and the parts of the hole within each formation, requires drilling techniques expressly for that formation. A hole drilled through fragmented limestone is not drilled the same way that a hole is drilled through consolidated taconite. For this reason it is important that the operator not only become familiar with the basic drilling procedures and the specific machine being operated, but that he also become familiar with the formation being drilled.

For the purpose of this section of the Operator's Manual it is assumed that the hole will be drilled in a consolidated rock formation. This is probably the simplest formation to drill in. Special circumstances will be taken into account in the DRILLING IN DIFFICULT FORMATIONS section of this manual. It is also assumed that the operator is familiar with the location and operation of all of the controls on the machine and that the machine is in good repair.

NOTE: For drilling information such as BAILING AIR VELOCITY, DOWN

PRESSURE, and ROTARY SPEED to be used during drilling refer to Appendix 2.

BEGINNING THE HOLE (COLLARING)

Since the first few feet of a hole are usually in unconsolidated material, the procedure for drilling through this material will be different than for the remainder of the hole. This procedure is commonly referred to as collaring the hole.

To begin, or collar the hole, proceed as follows:

1. Verify that the stem wrench is retracted fully and that the-casing tong is secured out of the way. Clear the drill table of personnel and material which is not necessary for the drilling procedure (i.e., oil drums, tools, spare bits, etc.). Verify that the guide bushing is firmly seated in the hole in the drill table. Make sure that the slots in the bushing align with lugs on the drill table.
2. Shift the dust control lever to activate the dust control system being used.
3. On diesel machines, increase the throttle setting to 2100 RPM.

WARNING: Do not operate engine over 2100 RPM. Over speed will result in damage to the compressor and hydraulic pumps.

4. Push the air control lever to activate the the bailing air system, then move the compressor unloader valve to the load position.
5. Pull on the rotation control lever and adjust the volume control lever for satisfactory rotation speed.
6. Pull back on the drill control lever and adjust the pressure feed valve as necessary to allow the bit to penetrate the unconsolidated material at the top of the formation. Monitor the vibration coming from the tool string. To reduce vibration slow the rotary speed with the volume control lever. Keep the vibration to a minimum. As the vibration lessens, increase the rotary speed and the pulldown force while monitoring the down hole air pressure gauge and the pulldown hydraulic pressure gauge.