JT100 Mach 1/All Terrain

Operator's Manual

CE

CMW®

Issue 4.0
Original Instruction

053-1348

Crane Precautions

Preparation

Visually inspect crane each day to determine that it is in good condition before it is used. Check the following:

- Make sure crane is free of excess oil, grease, mud and debris before operation.
- Test crane at the beginning of each shift to determine that the operating systems are in good working order.
- Check safety devices to ensure they are functioning and in place.
- Check crane boom, hoses and connecting pins for wear and damage.

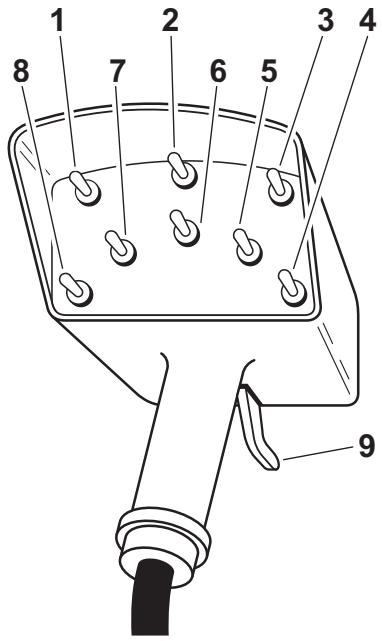
Transportation

- Always store auxiliary stabilizer before moving unit.
- Always store crane properly for transportation.
- Never drive with load suspended from crane.

Jobsite Setup

- Always use unit stabilizers during crane operation. Ensure that they are firmly positioned on solid footings.
- Always install auxiliary stabilizer for crane operation on **engine side** of unit.
- If auxiliary stabilizer rests on curb or other object that prevents it from supporting load, consider blocking under the arm of the auxiliary stabilizer as near the outer end as possible to support load.
- If auxiliary stabilizer does not rest on ground due to holes or grades, it must be blocked up to provide level and firm support for the unit.
- When working in soft soil conditions, use wide pad under auxiliary stabilizer foot to prevent sinking.
- Ensure loads are securely attached before lifting.

Tethered Crane Control



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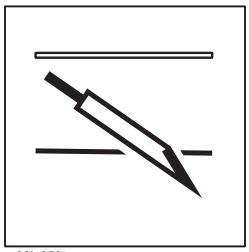
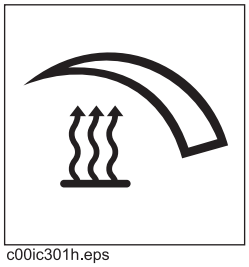
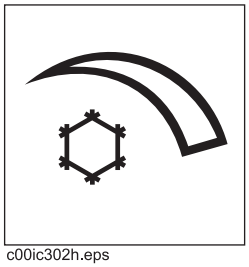
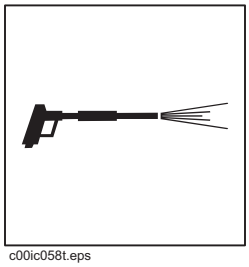
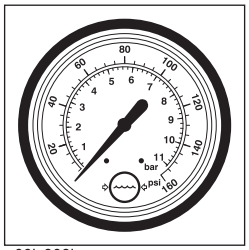
1. Power switch
2. Remote engine stop switch
3. Auxiliary control switch
4. Anchor driver control switch
5. Extension control switch
6. Crane arm swing control switch
7. Outer boom control switch
8. Inner boom control switch
9. Speed control

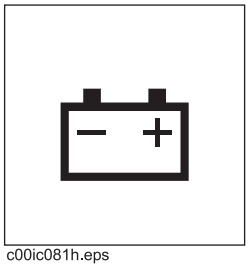
IMPORTANT:

- Tethered crane controller will not work if operator is in drilling unit seat and crane enable switch is not enabled.
- Before operating crane, release stow strap on crane boom.

Item	Description	Notes
2. Add pipe/manual/ remove pipe switch  c00ic059t.eps	To select "add pipe" automated pipeloader function, press green part of switch. To use manual pipeloader controls, move to center. To select "remove pipe" automated pipeloader function, press white part of switch.	See "Add Pipe" on page 126. See "Remove Pipe" on page 134.
3. Pipe lift switch	To lower, press To raise, press	
4. Pipe gripper switch	To close, press To open, press	
5. Pipe shuttle switch	To move toward pipe box, press To move toward spindle, press	**IMPORTANT:** Shuttles will not function unless shuttle guard is in operating position.
6. Front frame tilt switch	To lower front of drill frame, press To raise front of drill frame, press	
7. Back frame tilt switch	To lower rear of drill frame, press To raise rear of drill frame, press	
8. Pipe lubricator switch	To spray joint compound on threads at saver sub and wrenches, press	
9. Front wrench clamp switch	To unclamp, press To clamp, press	

Item	Description	Notes
3. Heater temperature control  c00ic301h.eps	To make air warmer, turn clockwise. To make air cooler, turn counterclockwise.	
4. Air conditioner temperature control  c00ic302h.eps	To make air cooler, turn clockwise. To make air warmer, turn counterclockwise.	

Item	Description	Notes
2. Wash wand switch  c00ic058t.eps	To spray, press  To turn off, press 	
3. Fluid pressure gauge  c00ic308h.eps	Displays drilling fluid pressure supplied to the pump.	

Item	Description	Notes
7. Electrical power supply indicator  c00ic081h.eps	Green light means control box has sufficient electrical power for operation. Strike system is operating if OK indicator is also on.	
8. Self test button  c00ic075h.eps	To start manual self test, press. To reset system after a strike has been detected, press.	Checks all systems and circuits except voltage limiter. **NOTICE:** See "If an Electric Line is Damaged" on page 18.

Backreaming

1. Assemble backream string. See page 132.
2. Start drilling unit and adjust throttle.
3. Set drilling fluid flow. Check that fluid flows through all nozzles. See page 163.
4. Remove pipe from bore. See page 134.
5. Remove full pipe box and add empty box (see page 142) to complete backream.
6. Remove pullback device. See page 136.

Backreaming Tips

- Plan backreaming job before drilling. Plan bore path as straight as possible. Check bend limits of pullback material. Check that appropriate pullback devices are on hand.
- Keep all bends as gradual as possible.
- Drilling fluid quality is a key factor in backreaming success. Contact your Ditch Witch dealer for information on testing water, selecting additives, and mixing drilling fluid.
- Backreaming requires more fluid than drilling. Make sure enough fluid is used.

Leaving Jobsite

1. Remove anchors. See page 139.
2. Rinse unit and downhole tools. See page 189.
3. Disassemble strike system (see page 149) and disconnect from fluid system (see page 190).
4. Stow tools. See page 190.
5. Load unit onto trailer. See page 190 and page 111.

Storing Equipment

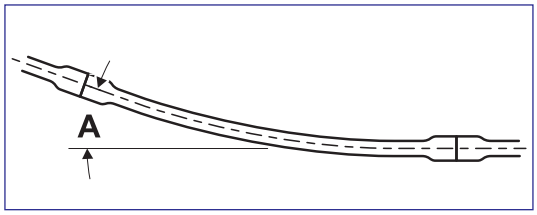
1. For cold weather storage, antifreeze drilling unit. See page 188.
2. For long-term storage, disconnect battery disconnect switch.

Recommended Bend Limits

Ditch Witch drill pipes are designed to bend slightly during operation. Slight bending allows for steering and correcting direction. Bending beyond recommended limits will cause damage that might not be visible. This damage adds up and will later lead to sudden drill pipe failure.

IMPORTANT: Consider recommended bend limits during any bend, not just during bore entry.

Pipe Pitch



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Ditch Witch drill pipe is tested to bend at a maximum percent pitch. For JT100 **Mach 1** drill pipe, make sure pitch (A) changes no more than **7%** over the full length of each pipe. For JT100 **All Terrain** drill pipe, make sure pitch (A) changes no more than **7%** over the full length of each pipe.

NOTICE: Bending drill pipe more sharply than recommended will damage pipe and cause failure over time. Changes in pitch must be **equally distributed** over the length of a pipe. Maximum changes in pitch within 1-2' (300-600 mm) of pipe create sharp bends that will damage pipe.

Monitor the pitch of each pipe with the remote display on the operator's console. See "750/752 Display" on page 71.

Prepare Equipment

Fluid Levels

- fuel
- hydraulic fluid
- engine coolant
- battery charge
- engine oil

Condition and Function

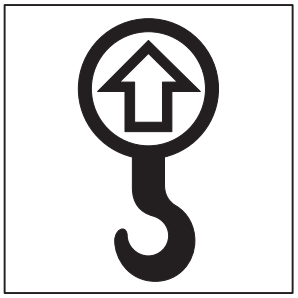
- filters (air, oil, hydraulic)
- fluid pump
- couplers
- tires and tracks
- pumps and motors
- drilling fluid mixer
- hoses and valves
- water tanks

Lift

This machine is not configured for lifting. If the machine must be lifted, load machine into a container or onto a platform appropriate for lifting. See “Specifications” for weight of machine.

Pipe Box Lifting Procedure

Pipe Box lifting points are identified by lifting decals. Lifting at other points is unsafe and can damage machinery.



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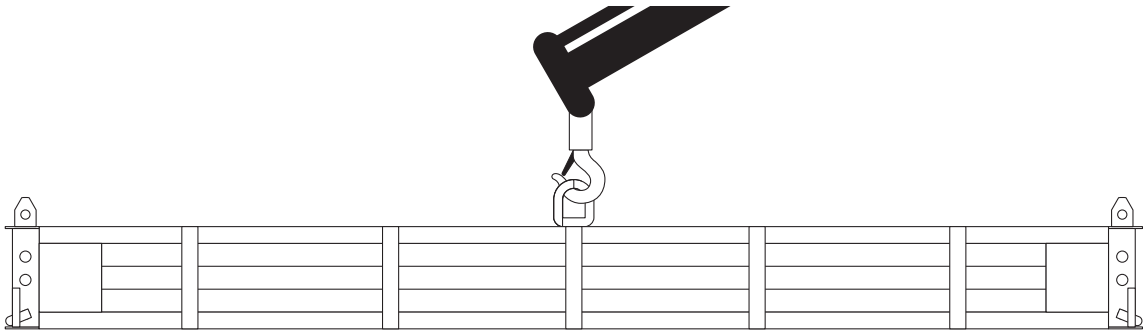
Pipe Box



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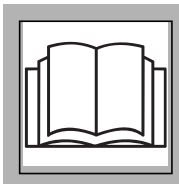
Use optional onboard crane attachment (see “Remove/Install Pipe Box” on page 142) or other crane capable of supporting the equipment's size and weight. See “Specifications” on page 235 or measure and weigh equipment before lifting.

Clamp Pipe

DANGER Turning shaft can kill you or crush arm or leg. Stay away.

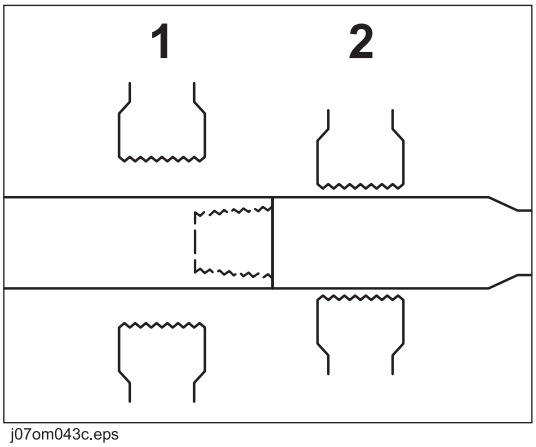
NOTICE: Clamping anywhere else on the pipe will weaken the pipe. Pipe can later break, even when operating under normal loads.



WARNING Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.

NOTICE: Wrenches can open after engine shutdown. Ensure that any downhole tool or pipe in wrenches is attached to spindle or removed before transport.

Clamp on pipe when joint is centered between wrenches (1 and 2). Always clamp on the larger diameter areas on either side of the tool joint face.



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Record Bore Path

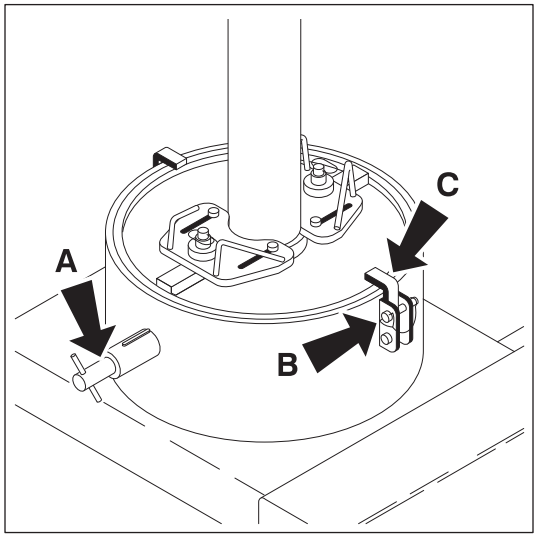
Locate drill head every half-length of pipe. As the job is completed, record the actual data for each drill pipe. List pitch and depth of each joint and a brief description of the procedure. In addition, draw a simple sketch of the site and record depth and rough location of pullback.

The Trac Management System Plus is also available for plotting and tracking your bore path. It utilizes the 750/752 or 8500 Tracker, 750/752 or 8500 Display, a tracking beacon, and special software. The display can store jobs in its memory or the system can be run in the field using a laptop computer equipped with the Windows® 95 or higher operating system. See your Ditch Witch dealer for details.

⚠ WARNING Moving parts could cut off hand or foot. Stay away.

⚠ DANGER Turning shaft will kill you or crush arm or leg. Stay away.

3. Ensure that anchor driver is attached to crane and slowly swing crane boom to front of drilling unit.
4. Attach anchor driver to auger shaft.
5. Using crane, raise auger shaft slightly and release spring loaded pin (A) on side of auger cap.
6. If pin will not release, pull snapper pin (B) and release cap retainer (C).
7. Use crane rotation and boom controls to slowly drive auger into ground.



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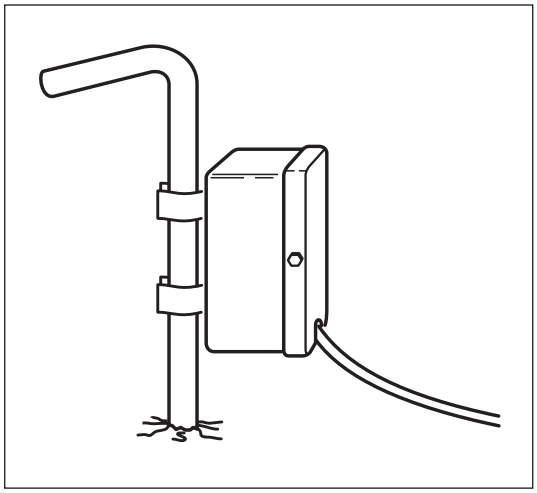
IMPORTANT: Adjust outer boom while driving auger so that auger shaft maintains 90° angle with ground.

8. If auger shaft does not drive all the way into ground, use nut driver to tighten nut against auger cap.
9. Detach anchor driver from auger shaft.
10. Lower nut driver onto auger shaft and over nut.
11. Attach anchor driver to nut driver.
12. Use crane rotation and boom controls to slowly rotate nut driver until nut is securely tightened against auger cap.
13. Detach anchor driver from auger shaft or nut driver and raise crane before drilling.

IMPORTANT: Ensure that the crane is not exerting up pressure or down pressure on auger shaft before detaching anchor driver. Excess pressure can cause anchor driver to jerk up suddenly when detached.

Assemble Voltage Detector

1. Drive voltage stake into ground at least 6' (2 m) away from any part of system.
2. Clip voltage limiter to voltage stake.



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Test Strike System

If system fails any part of this test, see "Troubleshoot Strike System" on the following page. Do not drill until test is completed successfully.

1. Turn on drilling unit.
2. ESID control module will perform internal tests which check everything but alarms and strobe.
3. If green OK indicator and electrical power supply indicator lights remain on, press self test button to perform total test of strike system. During this test:
   - All lights should glow.
   - Alphanumeric readout should display numbers.
   - Alarms and strobes on all connected units should sound.
4. If this test is successful, OK indicator and electrical power supply indicator lights will remain on.
5. Use Electric Strike Simulator to test voltage and current sensors. See page 153.

Tracker Control

Overview

WARNING Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.

This mode allows the 750/752 or 8500 Tracker operator to disable hydraulic power to drilling unit thrust and rotation.

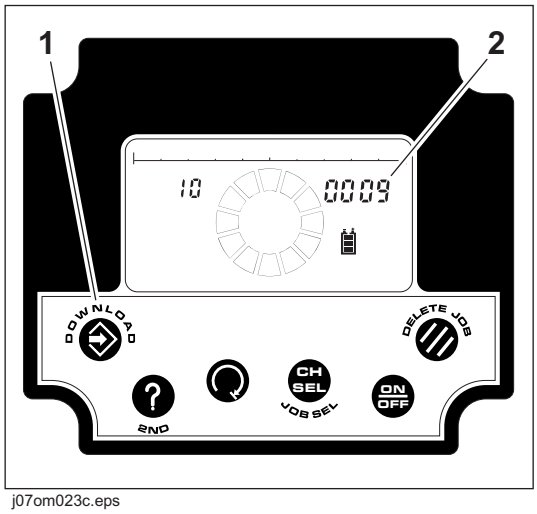
NOTICE: This mode does not disable thrust and rotation immediately. Functions are disabled within 16 seconds.

Use tracker control any time you change downhole tools or during other times when the drill string is exposed. Tracker control works by stopping communication between the tracker and the display. When this happens, the green tracker control light on the drilling unit comes on and thrust and rotation are disabled.

Operation

Enable Thrust and Rotation

1. Start drilling unit.
2. Turn off 750/752 or 8500 Display.
3. Press and hold DOWNLOAD (1) while turning on 750/752 or 8500 Display until a four-digit code (2) appears.



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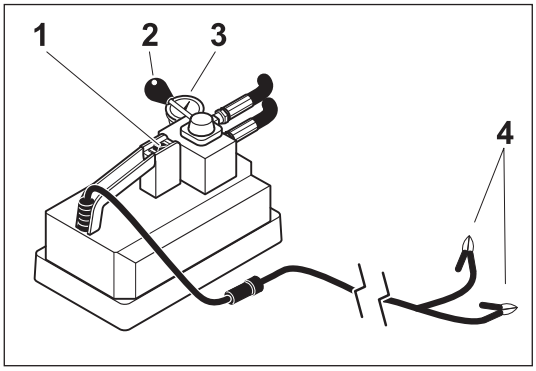
6. Connect Hydratong power pack.
   - Attach hoses from power pack to cylinder.
   - Attach leads (4) to 12V battery.
7. To tighten or loosen joint, move shuttle valve handle (2) toward gauge (3) and press power switch (1).
8. To reposition chain tongs and continue tightening or loosening joint, move handle away from gauge, then back toward gauge, and then press power switch.
9. Monitor gauge and refer to decal to achieve approximately 4000 ft•lb (5420 N•m) of torque. Then tighten joint until second line (B) meets first (A).



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IMPORTANT: Gauge gives an estimate of torque. Use scribe line to get exact torque.

10. Move handle to center (neutral) position to relieve pressure.
11. Disconnect hoses and remove Hydratong components.

Code	Condition	Result	Severity
215	no continuity to float position sensor	assisted makeup is blocked and code is stored	non-essential
221	system voltage is below 12.5V	code is stored	non-essential
233	drill and drive inputs both on	drill and drive are blocked	essential
234	add pipe and remove pipe inputs both on	add pipe and remove pipe are blocked	non-essential
235	front home and rear home inputs both on	add pipe and remove pipe are blocked	non-essential
241	shuttles not responding correctly	add pipe or remove pipe is aborted and code is stored	non-essential
242	front wrench not responding correctly	add pipe or remove pipe is aborted and code is stored	non-essential
245	controller is wrong or unidentifiable	all functions are blocked	essential
251	float sensor is reading out of range	assisted makeup is blocked and code is stored	non-essential
253	internal controller error	code is stored	non-essential
254	error reading setup table information	add pipe and remove pipe are blocked	essential
255	undefinable diagnostic code reported	code is stored	non-essential

Disconnect

Disconnect and store the following hoses and cables (if used):

- electric cable
- electric strike system voltage stake
- fluid hose

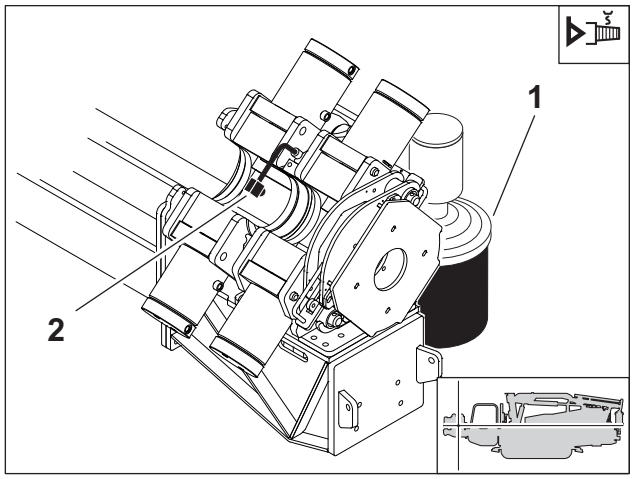
Stow Tools

Make sure all wrenches, bits, pullback devices, and other tools are loaded and properly secured on trailer.

Prepare Drilling Unit to Load

Ensure that crane is in stow position, operator's station is in driving position, pipeloader guard is up, and fuel tank is at least half full.

Check Pipe Lube System



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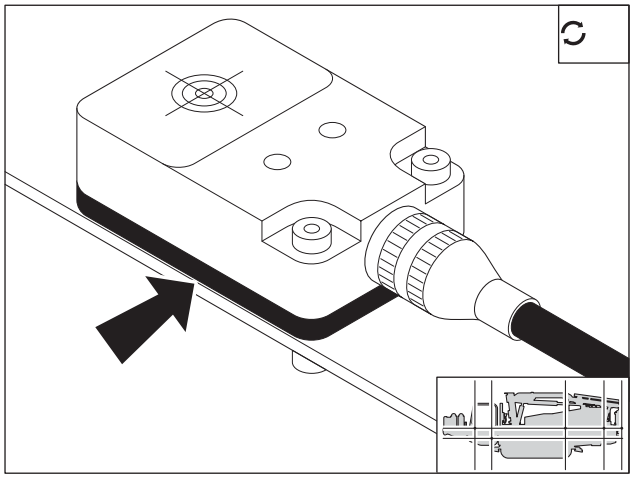
Check pipe auto lubricator TJC level before startup and every 10 hours of operation. Change pail (1) as needed. See "Change Auto Lubricator TJC Pail" on page 228 for procedure. Check pipe auto lubricator spray nozzles (2) every 10 hours. Ensure that nozzles are free of obstructions and operate properly. Clean as needed.

NOTICE: Ditch Witch tool joint compound is specially formulated to work with Ditch Witch pipe lubrication system. Use of other tool joint compounds will clog system. See "Recommended Lubricants/Service Key" on page 194 for more information.

Test Pipeloader Control Switches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Check control proximity switches before startup and every 10 hours of operation and clean or replace as needed.

To test

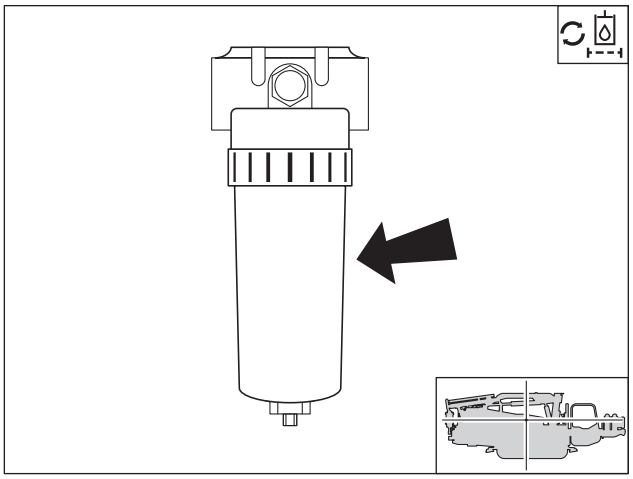
1. Turn ignition switch to ON. Do not start engine.
2. Place metal object above target on each switch.
3. If yellow LED on switch lights, switch sensor is working.

To adjust switch position

1. Remove two nuts and screws from switch.
2. Insert one or more shims (shown) under switch until yellow light comes on when switch passes under row select pin.
3. Reinstall screws and nuts.

Change Remote Charge Filter

Change after 50 hours.



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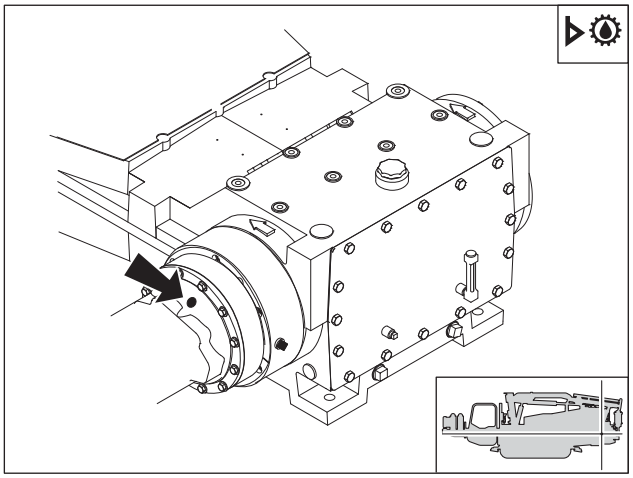
Check JT Drilling Fluid Planetary Oil Level

Check every 50 hours. Add MPL as needed.



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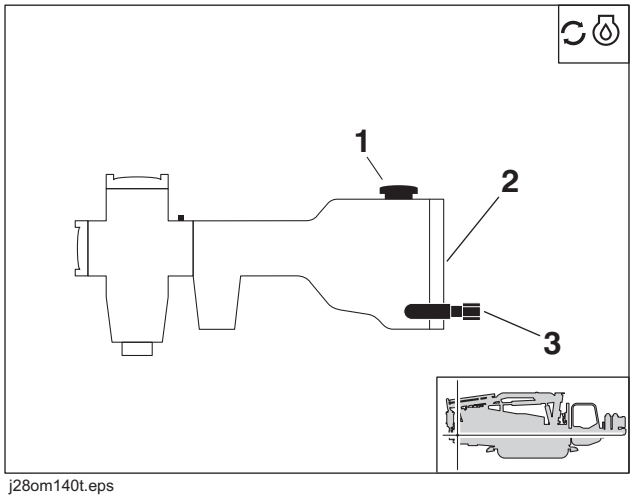
Change AT Fluid Pump Oil (initial)

Change fluid pump oil after first 50 hours and every 1000 hours thereafter. Maintain fluid level at halfway point on sight glass or at petcock level (2). Drain at plug (3). Add NDO at fill (1). Capacity for 70 gpm pump is 4 qt (3.8 L).



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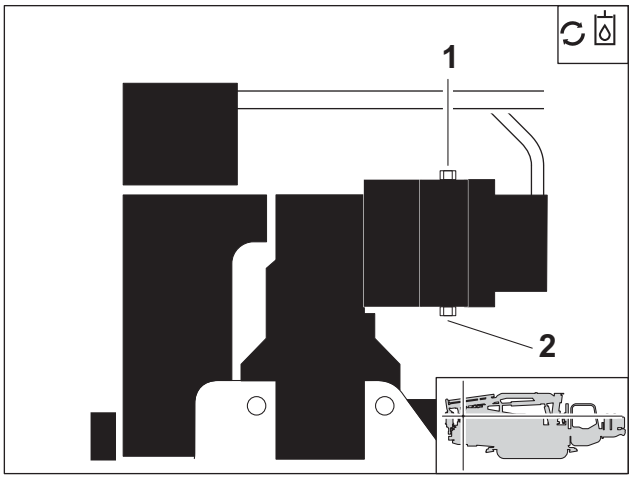
Change Spindle Brake Oil

Drain (2) oil at brake every 1000 hours. Add THF at fill (1). Capacity is 5 oz (148 mL).



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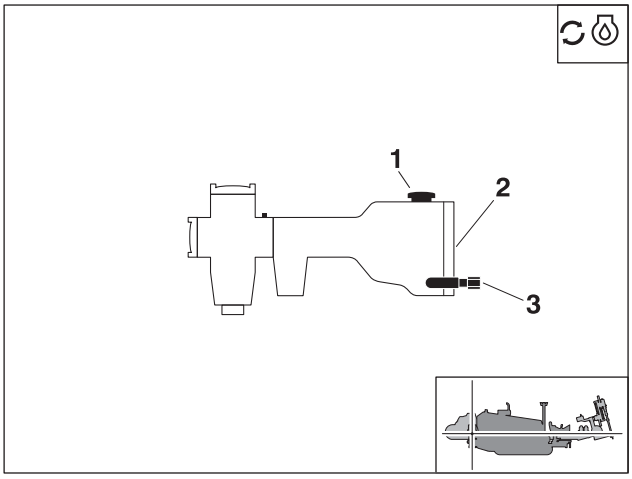
Change AT Fluid Pump Oil

Change oil after first 50 hours and every 1000 hours thereafter. Maintain fluid level at halfway point on sight glass or at petcock level (2). Drain at plug (3). Add NDO at fill (1). Capacity for 70 gpm pump is 4 qt (3.8 L).



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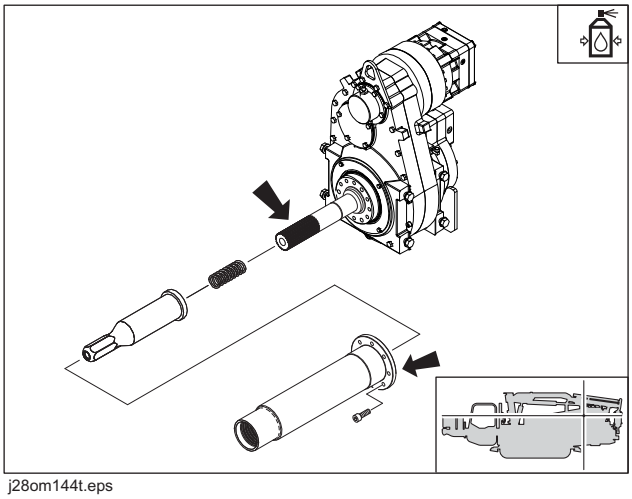
Lube AT Saver Sub Wrench Collar and Sliding Output Shaft

Lube with EPS every 1000 hours.



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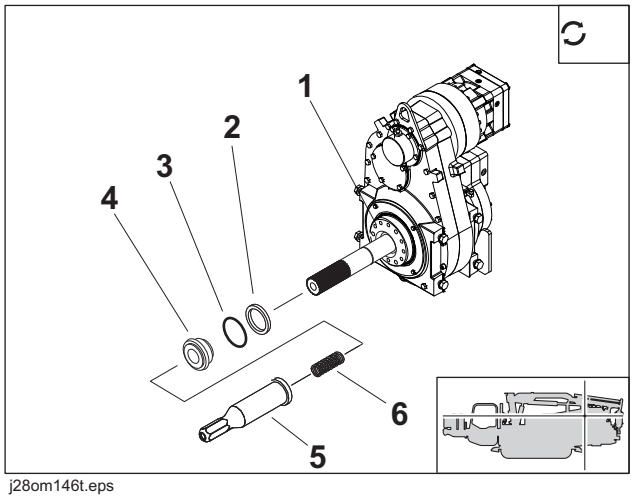
Change Inner Water Swivel (Seal Kit)

Replace inner water swivel (seal kit) as needed. See your Ditch Witch dealer for replacement parts.

To replace:

1. Remove saver sub. Do not remove indexing dowels from spindle.
2. Remove hex (6) and spring (7) from drive shaft.
3. Remove snap ring (5).
4. Remove seal (4) and main body (2).



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IMPORTANT: Use care when handling main body to avoid seal contamination. Do not allow grease to touch inner seals during installation.

5. Inspect dowel pin (1). To replace, drive new pin into different hole until top of pin is flush with shaft larger diameter.
6. Slide new main body (1) onto drive shaft. Check o-ring (3) and replace if needed.
7. Lightly coat seal (3) with THF and install onto main body.

NOTICE: Do not run seals without lubrication. Damage will occur.

8. Slide snap ring (4) onto main body.
9. Compress seal kit until snap ring is properly seated.
10. Install hex (5) and spring (6).
11. Install saver sub. See page 223.