LONE STAR DRILLS

Hydraulic Water Well Drilling Rig

LST1 · LST1+ · LST1A+ · LS300T+

OPERATOR'S MANUAL

1.800.227.7515

LONESTARDRILLS.COM

MFG BY: Little Beaver, Inc.
1017

LITTLE BEAVER®
EARTH DRILLS & AUGERS

littlebeaver.com sales@littlebeaver.com

P.O. Box 840, Livingston, Texas 77351

Phone: 936.327.3121 Fax: 936.327.4025

CUSTOMER SERVICE
Ph: 800/227-7515 or 936/327-3121 or Fax 936/327-4025

ORDERS...

Place your orders by telephone, fax, or mail. When calling, please have your parts manual handy for reference. Our hours are 8:00 am - 4:30 pm central time, Monday thru Friday. When ordering by mail or fax, include a description and LITTLE BEAVER part number for the items you are ordering, your return address, and payment or your authorization for COD shipment.
All orders are shipped UPS where possible. Freight charges will be added to your invoice. Some items are oversize, resulting in a higher shipping cost. Power units and larger augers are shipped via motor freight due to their weight.

PAYMENT TERMS...

COD, Cash in Advance, Visa, Mastercard or NET 30 with approved credit. COD limit for new accounts is $500.00. Personal or company checks on new accounts will be held until they clear the bank. To eliminate this delay, you may pay by wire transfer or send a certified or cashiers check. For a NET 30 open account, please call or write for a credit application.

SERVICE AND REPAIR...

Your Lone Star Hydraulic Water Well Drill Rig has been designed for user repair with ordinary hand tools. No special tools are required. Consult the appropriate section of the parts manual for instructions.

Service or technical consulation is available, free of charge, from the factory in Livingston, Texas. We will be pleased to help you with any problems or questions. Just write, fax, or call. Our hours are 8:00am - 4:30pm central time, Monday thru Friday.

Factory repair is available. If you return a part to the factory, please include the following information: Your name and return address, a description of the problem and payment or authorization to return the repaired item COD for the repair and shipping charges.

RETURNS...

Please call the factory for a return authorization. This will help to ensure that your parts are handled properly. Include your name and address, customer account #, invoice # under which the returned parts were ordered, and a brief description of the problem with the parts or the reason for returning them. Parts to be considered for warranty must be returned to the factory for inspection within 10 days after receipt of replacement parts. Be sure to prepay the shipping charges, we will not accept collect or COD packages.

Our mailing address...

LITTLE BEAVER, Inc.
P. O. Box 840
Livingston, Texas 77351

SAFETY ALERT SYMBOL 

The symbol shown above is used to call your attention to instructions concerning your personal safety**. WATCH THIS SYMBOL** — It points out important safety precautions. It means — **ATTENTION! BECOME ALERT! YOUR PERSONAL SAFETY IS INVOLVED!**

Read the message that follows and be alert to the possibility of *Personal Injury or Death!*

1 YEAR LIMITED WARRANTY

For 1 year from the date of original purchase, LITTLE BEAVER, INC. will replace for the original purchaser, free of charge, any part or parts, found upon examination by any factory authorized service center, or by the factory at Livingston, Texas, to be defective in material or workmanship or both. If your equipment can not be repaired, it will be replaced. All transportation charges on parts submitted for replacement under this warranty must be borne by purchaser.

The following parts are specifically excluded from this warranty: Belts, centrifugal clutches or components thereof and wear items such as auger flighting, point, blades or teeth.

There is no other express warranty.

Implied warranties, including those of merchantability and fitness for a particular purpose, are limited to 1 year from purchase and to the extent permitted by law. Any and all implied warranties are excluded. This is the exclusive remedy and liability for consequential damages under any and all warranties are excluded to the extent exclusion is permitted by law.

*Notice: Engines are warrantied by the manufacturer of the engine. See separate engine warranty enclosed.

MACHINE SERIAL NUMBER

The machine serial number for your Lone Star Hydraulic Water Well Drill Rig is located on the back side the mast, just below the draw-works bracket. For your convenience, when requiring service or parts information, refer to this number and your model number. Record the model number, machine serial number and date of purchase in the space provided below:

MODEL NUMBER _____

MACHINE SERIAL NUMBER _____

DATE OF PURCHASE _____

TABLE OF CONTENTS

OPERATORS MANUAL

Scope of Manual

This manual is intended to provide instruction in the safe operation of the drill rig. It is not a complete well drilling reference. Additional information on siting, drilling and completing a water well can be found in the LIFEWATER DRILLING AND WELL CONSTRUCTION REFERENCE MANUAL.

SAFETY INSTRUCTIONS

WARNING: Failure to observe safety instructions and reasonable safety practices can cause Property Damage Serious Bodily Injury and/or Death. BE CAREFUL!! WATCH OUT FOR BYSTANDERS!!

DANGER: NEVER drill holes where there is a possibility of underground power cables or other hazards. The exact location of underground services must be determined prior to drilling. Inadvertent severing of telephone, fiber optic or CATV transmission cable, or damage to sewer pipe is costly; RUPTURING OF GAS OR WATER LINES CAN CAUSE SERIOUS BODILY INJURY AND/OR DEATH. COMING INTO CONTACT WITH BURIED POWER LINES CAN CAUSE SERIOUS BODILY INJURY, SEVERE BURNS, AND/OR ELECTROCUTION. Call local utility companies or call 811 at least 48 hours before digging and have underground utilities marked.

DANGER: NEVER run engine inside building or enclosed area. Exhaust gases contain carbon monoxide, an odorless and deadly poison.

DANGER: Keep the machine and drilling tools away from overhead electric wires and devices. Electrocution can occur without direct contact. Failure to keep away will result in Serious Injury and/or Death.

WARNING: Never use hands to search for leaks. Instead, use a piece of cardboard or wood. Escaping hydraulic fluid under pressure can have sufficient force to penetrate the skin, causing serious injury. Before disconnecting lines, be sure to relieve pressure. Before applying pressure, be sure connections are tight and fittings and hoses are not damaged. If injured by escaping fluid, see a doctor at once. Serious infection and/or reaction can develop if proper medical treatment is not administered immediately.

CAUTION:

1. Read and understand this operator's manual before operating.
2. Read and understand the operator's manual for the Hydraulic Power Source.
3. Read and understand the operator's manual for the Mud Pump.
4. Keep all safety shields and devices in place.
5. Make sure everyone is clear before operating.
6. Keep hands, feet and clothing away from moving parts.
7. Shut off engine to adjust, service, clean or re-fuel.
8. Relieve hydraulic pressure before disconnecting hoses or fittings.
9. Lower rotary head before moving the machine.
10. Never operate drill with damaged or missing parts.
11. Do not leave machine unattended with engine running.
12. Wear safety glasses.

NOTICE

It is the responsibility of the contractor, owner and user to maintain and operate the Lone Star Hydraulic Water Well Drill Rig in compliance with operating instructions provided. Observe all listed safety instructions and other reasonable safety practices. LITTLE BEAVER, INC. accepts no responsibility for damages to this machine, and other property damage and/or bodily injury due to careless or improper operations.

LITTLE BEAVER, INC. does not recommend or condone any unauthorized modifications to the Lone Star Hydraulic Water Well Drill Rig

LITTLE BEAVER, INC. reserves the right to make changes in design and changes for improvements upon its product without imposing any obligation upon itself to install the same upon its products theretofore manufactured.

Your operator's manual offers recommendations for prolonged and satisfactory service

MAINTENANCE AND LUBRICATION

CAUTION: **Shut off power** to adjust, service, or clean the machine.

CAUTION: **Keep** all safety shields and devices in place.

IMPORTANT: Keep all nuts, fasteners, and fittings properly torqued. Refer to torque chart (inside back cover)for proper assembly torque.

WARNING: **NEVER** use hands to search for leaks, instead, use a piece of cardboard or wood. Escaping hydraulic fluid under pressure can have sufficient force to penetrate the skin, causing serious injury. Before disconnecting lines, be sure to relieve pressure. Before applying pressure, be sure connections are tight and fittings and hoses are not damaged.

If injured by escaping fluid, see a doctor at once. Serious infection and/or reaction can develop if proper medical treatment is not administered immediately.

HYDRAULIC OIL LEAKAGE: If any hydraulic oil leakage is encountered, check and properly tighten the associated fitting. (Refer to torque chart for proper assembly torque). If the leakage persists, it may be necessary to replace the associated fitting or hose assembly. If one of the quick disconnect fittings is the source of leakage, the leaking quick disconnect fitting should be replaced.

IMPORTANT: All nuts, fasteners, and fittings must be kept tightened. Refer to Torque Chart (inside back cover) for proper assembly torque.

RECOMMENDED GREASE: Mobilgrease XHP 462 Moly
or equivalent grease containing molybdenum
NLGI No. 2 Grade

NOTE: If rig is equipped for auger drilling only, disregard references to mud rotary equipment such as mud pump, water swivel and drill pipe.

MAINTENANCE AND LUBRICATION CONT...

GREASE BOLTS:

The 4 grease bolts should be greased every 8 hours of operation using the trecommended grease. Apply grease through the grease fittings which are accessible from the side of the mast, top and bottom, and the side of the draw-works drive bracket. See Figure 1.

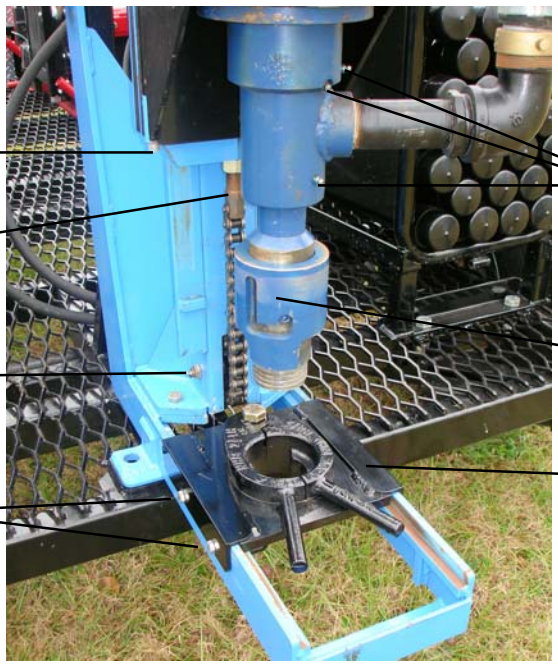


Figure 1

SLIDE PADS AND RAILS:

The slide pads and rails should be kept clean and free of dirt and grease build-up. The pads are made of UHMW plastic and do not require lubrication.

DRIVE CHAIN:

The drive chain should be checked for tightness every 4 hours of operation and lubricated if necessary. To adjust, open the Rotary Drive assembly by removing one of the 1/2" x 8" bolts, then swing the drive head aside. While holding the adjustment screw from turning, loosen the locking nut. See Figure 1. Then tighten the adjustment nut until the chain has very little slack. If the slack cannot be taken up completely, remove a link from the chain. After adjustment is made, tighten both the adjusting and locking nuts. If the chain becomes dry, lubricate the chain with a heavy weight oil or grease.

IMPORTANT: Check the base of the drill mast periodically, around the bottom sprocket, to determine if dirt build-up is present. Clean away the dirt build-up if present.

MAINTENANCE AND LUBRICATION CONT...

WATER SWIVEL:

This machine is equipped with a load bearing swivel with a J-latch manual breakout sleeve. With proper care and maintenance it should last the life of the drill rig. Please follow the instructions below to ensure best operation.

GREASING:

Do not lubricate the swivel for the first four (4) hours of running time. The swivel is pre-loaded with grease and will not accept lubrication.

After the initial four (4) hours of run time, the swivel should be lubricated approximately every four (4) hours of operation.

Lubricate while the unit is rotating slowly (less than 10 rpm). Also, lubricate swivel immediately after operating while it is still warm and will accept grease.

IMPORTANT: Do not over-grease. Do not over-pressurize. Apply grease to all three (3) grease fittings using a grease gun. See Figure 1. Pump until resistance is felt, then remove the grease gun. **Release pressure from the swivel and packing by depressing the ball check in all three (3) grease fittings with a sharp object such as a screwdriver blade.**
NOTE: If pressure is not properly released, excessive and undue wear of the swivel shaft will result. If swivel should bind up while lubricating and will not rotate, release pressure by depressing the ball check in all three (3) grease fittings.

PACKING:

The packing should be replaced if the swivel begins to leak excessively. Refer to the diagram for proper placement of the packing rings.

MOUNTING BOLTS:

Check both the swivel mounting and hydraulic motor mounting bolts daily to ensure that they are properly tightened. Loose bolts can lead to damage to the motor shaft or the swivel.

J-LATCH

The sleeve should slide and rotate freely. Clean if necessary to remove dirt and grease build-up. Check bolts daily to ensure that they are properly tightened. Loose bolts can break off and be difficult to remove.

SLIP PLATE:

The slip plate is held in position by two side angle brackets that are mounted to the breakout table base. These angles have slotted holes to allow for adjustment to center the slip to the swivel stem. See Figure 1.

To adjust: Slip Plate:
With the rig over an open borehole, raise the rotary head and screw a drill pipe onto the swivel stem.
Put the slip plate in place and loosen the mounting bolts.
Lower the pipe partially through the hole in the slip plate.
Close the jaws and make sure they are fully seated.
Continue to lower the rotary head until the upper tool joint enters the slip. Rotate as necessary to allow the breakout lugs to pass through.
With the slip plate centered, tighten the 4 mounting bolts.

DRILL PIPE:

Always lubricate the drill pipe threads with pipe joint compound before making up each connection. After use, clean both male (pin) and female (box) threads with a wire brush to remove dirt and grease residue. Replace the cap on the pin end. Clean all foreign matter from the pipe before storing.

DRILL BITS:

After use, clean the female (box) threads with a wire brush to remove dirt and grease residue. Clean all foreign matter from the bit before storing.

⚠ **CAUTION: NEVER** operate drill rig with damaged or missing parts.

⚠ **CAUTION: MAKE SURE EVERYONE IS CLEAR BEFORE OPERATING**.

⚠ **CAUTION:** Read and understand your operator's manual for the mud pump.

OPERATING INSTRUCTIONS

⚠ **DANGER: NEVER** drill holes where there is a possibility of underground power cables or other hazards. The exact location of underground services must be determined prior to drilling. Inadvertent severing of telephone, fiber optic or CATV transmission cable, or damage to sewer pipe is costly; RUPTURING OF GAS OR WATER LINES CAN CAUSE SERIOUS BODILY INJURY AND/OR DEATH. COMING INTO CONTACT WITH BURIED POWER LINES CAN CAUSE SERIOUS BODILY INJURY, SEVERE BURNS, AND/OR ELECTROCUTION. Call local utility companies or call 811 at least 48 hours before digging and have underground utilities marked.

⚠ **DANGER: NEVER** run engine inside building or enclosed area. Exhaust gases contain carbon monxide, an odorless and deadly poison.

PRE-DRILLING SETUP:

DANGER: Keep the machine and drilling tools away from overhead electric wires and devices. Electrocution can occur without direct contact. Failure to keep away will result in serious injury and/or death.

Site Preparation:

Select a site that is suitable to safe operation of the equipment. It should be as level as possible so that the rig can be set up and leveled with minimal cribbing and the operator and helpers will have safe footing at all times. The mud pits should be positioned down-slope from the rig.

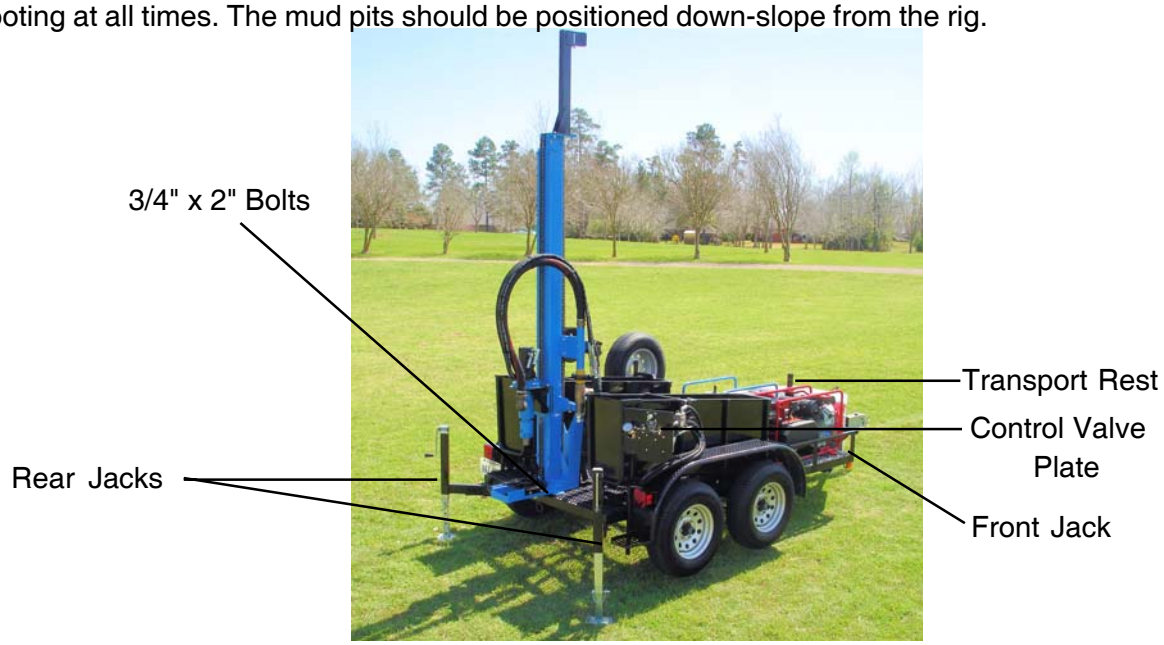


Figure 2

Rig Assembly:

Pull the mast hold-down pin and raise the mast to the full upright position. Replace the pin in the transport rest. See Figure 2. Install and tighten the two 3/4" bolts at the base of the mast. Level the trailer and mast using the three (3) jackstands (two at rear of trailer and one on tongue). Lower the control valve plate and connect the hydraulic hoses from the power source to the quick diconnects on the sides of the valves. Connect the rotary drive hydraulic hoses to the quick disconnects on top of the rotary control valve. See Figure 3. Remove the mud pump from the trailer and place it near the pit. Connect the mud hoses. The hose from the center of the 3-way valve connects to the mud pump discharge; the hose from the bottom of the 3-way valve connects to the mud mixer. The suction hose with foot valve connects to the mud pump suction inlet.

Rig Leveling: Use the front and rear jacks to stabilze and level the rig. With the aid of a bubble level applied to the front and side of mast, use jacks to level the mast from front-to-rear and side-to-side.

CAUTION: **Read** and understand the operator's manual for the hydraulic power source you are using.

Figure 3

DRILL HEAD CONTROLS:

The left-hand valve controls the rotary drive motor and the right-hand valve controls the draw works drive motor.

Pulling the left-hand valve lever down or toward the operator will cause the rotary drive motor to turn in the normal clockwise direction for drilling. Pushing the lever up or away from the operator will cause the rotary drive motor to turn in the reverse direction for "breaking out" the thread connection. The rotary should only be reversed when the drill pipe slip plate is in place, to prevent loss of the drill string down the hole. This valve is detented on mud rotary rigs, so that the lever will remain in the position to which it is placed. It must be pulled back to the neutral position to stop rotation.

Pulling the right-hand valve lever down or toward the operator will cause the rotary and swivel assembly to move downward. Pushing the lever up or away from the operator will cause the rotary and swivel assembly to move up. This valve is spring centered so that movement will stop if the operator lets go of the lever and to prevent unexpected movement when the power source is started.

A bypass flow control is fitted to the downward side of the draw-works hydraulic circuit and functions as a pressure control valve. This valve can be adjusted to control the downward force on the bit. Turning the knob clockwise will increase the force, turning the knob counter-clockwise will decrease the force. The pressure gauge will provide a relative indication of the amount of force.

PROCEDURE FOR MUD ROTARY DRILLING:

⚠ **CAUTION:** Keep all safety shields and devices in place.

⚠ **CAUTION:** Make certain everyone is clear before operating.

⚠ **CAUTION:** Read and understand the operator's manual for the mud pump.

IMPORTANT: Reverse rotation of the rotary should only be used momentarily and in limited circumstances. Continued rotation in the reverse direction can unscrew the drill pipe and/or bit and lead to loss of these items down the borehole.

Before starting the mud pump, place the 3-way valve in the bypass position. Fill the pits, prime the mud pump and start the mud pump by following the procedures found in the mud pump operator's manual. Let it run until good circulation is established.

Raise the rotary head to within 6" of the top stops. Be careful not to jam the shuttle plate into the stops, either top or bottom, as this can cause undue stress on the draw-works drive components and the mast. Apply pipe joint compound to the threads of the swivel stem, the first drill pipe, and the bit. Screw the drill pipe onto the swivel stem by hand, then slowly lower the pipe through the slip plate. Screw the bit onto the end of the pipe by hand.

PROCEDURE FOR MUD ROTARY DRILLING Cont...:

To start drilling, lower the rotary drive head until the bit just contacts the ground. Place the 3-way valve in the drilling position so that drilling fluid flows out the bit. Move the rotary valve lever to start the bit rotating in the clockwise direction.

Turn the pressure control valve knob to the fully counter-clockwise (open) position. Move the draw-works valve lever in the down direction and hold it open. The rotary drive head should not move at this time. Turn the pressure control valve knob slowly clockwise until the rotary drive head starts to move down. Use the pressure control to control the rate of feed of the drill bit. Be careful not to move it too fast or the bit can be plugged. Monitor the cuttings to make sure the feed rate is correct for the type of soil being cut. Harder soils will require more feed force. The pressure gauge will give a relative indication of the downward force.

Continue drilling the pipe down until the rotary head comes to the bottom of its travel. The pipe slip jaws may be closed around the pipe as a guide. Be sure to open the jaws before the breakout lugs on the pipe come into contact with them. Let the rotary drive head remain at the bottom for a short time to allow the cuttings to clear. Monitor the up-hole flow to determine when all the cuttings have been removed. Failure to adequately clear the cuttings may result in the bit being trapped as the cuttings fall to the bottom of the hole when the fluid flow is diverted.

Place the 3-way valve in the bypass position to divert the flow of drilling fluid back to the pits. Raise the rotary drive head far enough to allow the slip plate jaws to be closed around the drill pipe. Turn the rotary to position the breakout lugs in line with the opening in the slip, then lower the rotary drive head so that the bottom of the tool joint is 1-1/2"above the slip jaws.

Reverse the rotary by pushing the valve lever sharply to the reverse direction and holding it there. The swivel stem pin (male thread)will "break out" of the drill pipe and when the pipe is completely unscrewed it will drop free and fall into the slip jaws. Carefully following this procedure will ensure that the threads of the swivel stem and drill pipe remain undamaged.

NOTE: If the drill pipe fails to drop free of the swivel stem pin then the cuttings were not completely removed from the hole.

ADDING PIPE:

- Raise the rotary drive head to the top of the mast, stopping at least 1" below the top stop.
- Apply pipe joint compound to the threads of the swivel stem and the drill pipe.
- Screw the new pipe into the box threads of the pipe resting in the slip jaws. Don't completely tighten. Position the swivel stem threads about 1/2" above the top of the new pipe.
- Open the pressure control valve by turning the knob completely counter-clockwise.
- Pull the rotary valve lever partially downward to start the swivel stem turning slowly in the direction that will tighten the threads. Pull the draw-works valve lever in the down direction. The rotary drive head should not move at this time.
- While holding the valve lever open, turn the pressure control knob clockwise until the rotary drive head starts to move downward slowly. Use the knob and/or the lever to control the rate of movement as the threads start to engage. It may be necessary to have a helper hold the pipe to position it in alignment with the swivel stem threads.

ADDING PIPE Cont...:

- Continue to let the rotary drive head move downward as the threads, both top and bottom set, "make up".
- Just as the threads begin to tighten (both top and bottom sets) return the valve levers to the neutral position to stop all movement.
- Push the draw-works valve lever up to raise the rotary drive head and pipe string so that the slip jaws can be opened .
- Place the 3-way valve in the drilling position, wait to make sure circulation is re-established and fluid comes out the borehole, and continue as above.

COMPLETING THE BOREHOLE:

When the borehole is completed to the required depth the drill pipe should be removed. Be sure to allow time for the drilling fluid to circulate and completely clear the hole of cuttings. Monitor the outflow to determine when the hole is clear.

COMING OUT:

NOTE: Coming out of the borehole should be done quickly to minimize the possibility of the borehole collapsing.

NOTE: This is the time when drill pipe is most likely to be dropped down the hole. Follow these steps carefully to prevent this from happening.

- Place the 3-way valve in the bypass position. The mud pump is no longer needed and can be shut off.
- Raise the rotary drive head far enough to allow the slip jaws to be closed around the drill pipe. Turn the rotary to position the breakout lugs in line with the opening in the slip, then lower the rotary drive head so that the larger end of the pipe is at least 1" above the slip jaws.
- Reverse the rotary by pushing the valve lever sharply to the reverse direction but do not hold it. As soon as the threads start to unscrew return the lever to neutral. Leave no more than a 1/8" gap between the edges of the tool joints. Engage the j-latch by lifting, turning and letting it fall down around the drill pipe. It may be necessary to rotate the swivel stem to allow the j-latch sleeve to engage completely.
- Push the draw-works valve lever to raise the rotary power head. The slip jaws should remain closed as the pipe rises. When the next joint appears, quickly open the jaws and then close them after the joint passes.
- Raise the rotary drive head far enough to allow the slip plate jaws to be closed around the drill pipe.Turn the rotary to position the breakout lugs in line with the opening in the slip, then lower the rotary drive head so that the bottom of the tool joint is 1 1/2" above the slip jaws.
- Reverse the rotary to break out the bottom set of threads, continue reversing until the bottom pipe drops free and the drill string is suspended in the slip jaws.

NOTE: At this point it is very important not to "jam" the pipe between the swivel stem and slip jaws. As the threads are unscrewed, either the rotary drive head must be raised or the pipe must be allowed to drop. It is preferable that the procedure be started with adequate room below the bottom tool joint so that the pipe can drop free.

- Disengage the j-latch by lifting and turning. The drill pipe can now be unscrewed, removed and placed in the pipe rack.
- Lower the rotary drive head and engage the swivel stem threads into the pipe that remains in the slip.
- Do not tighten the threads, but leave a 1/8" gap between the tool joints.

NOTE: Make sure the threads are adequately engaged. Failure to do so can result in the pipe dropping off the swivel stem.

- Engage the j-latch by lifting, turning and letting it fall down around the drill pipe.
- Repeat the process until the last pipe reaches the surface. If possible, bring the bit up through the slip plate and then replace the slip underneath before unscrewing the last pipe and bit. Place a cover over the borehole to protect it from falling objects until the casing is ready to be placed.

PROCEDURE FOR AUGER DRILLING:

⚠ **CAUTION:** Keep all safety shields and devices in place.

⚠ **CAUTION:** Make certain everyone is clear before operating.

IMPORTANT: Reverse rotation of the rotary drive should only be used in limited circumstances, such as dislodging auger from large roots, rocks, or other underground obstructions. Continued rotation in the reverse direction, without raising rotary head, can compact material around auger causing auger string to become stuck.

Raise rotary head and attach auger to rotary drive adapter with pin. Lower auger bit to the ground and apply pressure. Begin rotating auger forward while maintaining pressure on the bit.

IMPORTANT: Make sure auger is started in parallel with the mast to avoid binding.

After auger is started, operate rotary drive motor at full speed while maintaining downward pressure with draw-works drive motor.

NOTE: When drilling in soft soil, allow soil to work up to surface without forcefully screwing auger into the ground and overloading auger.

If greater hole depths are required, auger extensions may be used with the auger. After the auger has reached its maximum depth, stop auger and disconnect drive adaptor from auger which remains in hole. Raise drill head and connect an auger extension to the auger with drive pin. Lower drill head to connect drive adaptor to auger extension and continue to drill hole. Repeat this

procedure until desired depth is reached.

When the desired depth is reached, raise drill head completely. Insert auger fork around the auger (or extension) barrel approximately 6 to 8 inches above surface of the ground. Be sure base of the auger fork is against auger (or extension) barrel (not flighting).

Lower rotary head until the weight of auger and extension(s) are resting on auger fork. Disconnect extension just above table base. Raise rotary head and disconnect extension from drive adaptor. Next, connect retrieval ring to drive adaptor. Lower rotary head and retrieve remaining extension(s) and auger using retrieval ring and 9 inch long pin as shown in figure 4. Repeat this procedure until extension(s) and auger have been removed from hole.

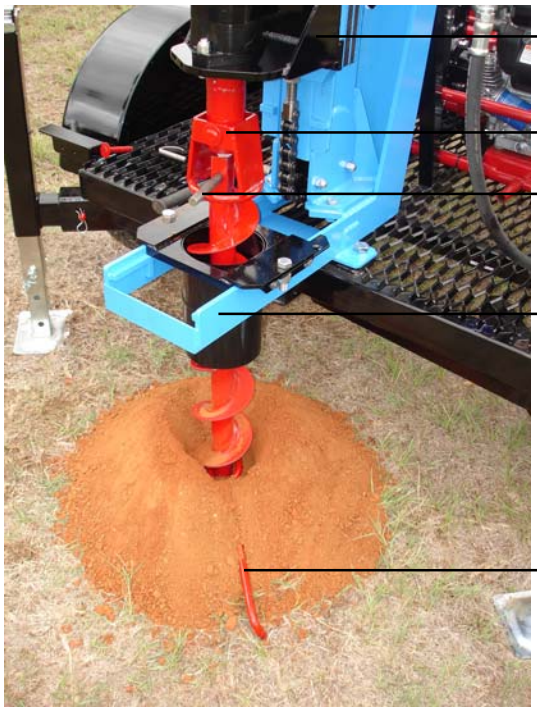


Figure 4

NOTE: It may be beneficial to rotate (forward) auger and extension(s) when raising out of hole to remove soil from flighting and to ease removal. However, do not rotate with auger fork in place.

NOTE: Auger and extension(s) may also be manually removed from hole by pivoting drive head clear. However, this procedure should only by used with sufficient overhead clearance and when lifting requirements are not prohibitive.

⚠ **DANGER:** Keep the machine and drilling tools away from overhead electric wires and devices. Electrocution can occur without direct contact. Failure to keep away will result in Serious Injury and/or Death.

⚠ **CAUTION:** Keep your back as vertical as possible by bending the legs, as required, when lifting to avoid injury.

CAUTION: WHEN WORKING WITH CUTTING BLADE, Point and Auger Flighting, be careful not to be cut by sharp edges.

STANDARD CUTTING BLADE & POINT

Check the cutting blade (item A, Figure 5) on the auger frequently. If it becomes dull, it may be reversed to use the other cutting edge. If the outside of the blade wears even with the auger flighting, replace the blade or rebuild it with a hardsurfacing rod. This is very important to reduce auger flighting wear and damage. The point (Item B, Figure 5) should be replaced when it loses its cutting shape.

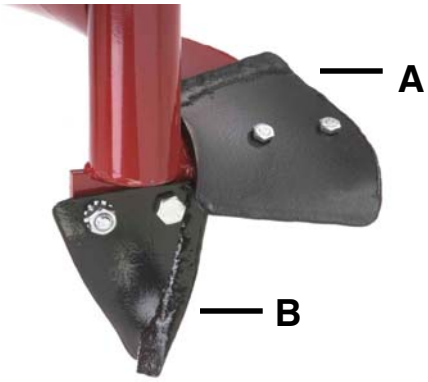
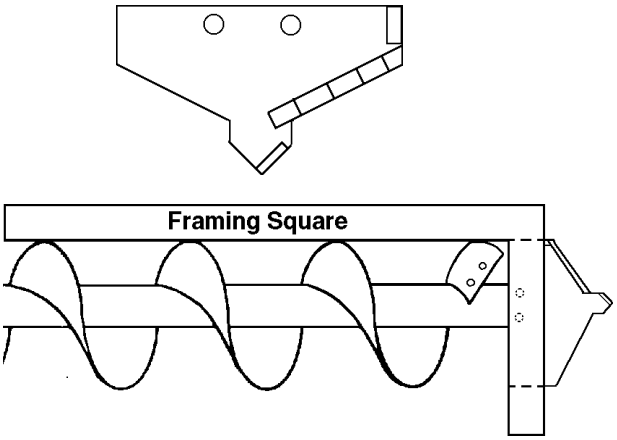


FIGURE 5

OPTIONAL CARBIDE BLADE:

An optional carbide blade is available for auger sizes 1-1/2" thru 12". It is designed for use in smooth hard-pan soils, asphalt or frost. It is not recommended for use in rocky soils. The 4" thru 12" carbide blade bolts on to the auger in place of the standard point. The standard blade is not used.



(4-12")
Mount the blade to the auger using the included 3/8" x 1-1/4" bolts and nylon lock-nuts. Use a framing square to carefully align the blade at 90 degrees to the auger. Tighten the nuts slowly until snug, then re-check alignment and adjust if necessary. Torque the bolts to 45 ft. lbs.

CAUTION: If the blade is not installed properly, mis-alignmant may cause the auger to vibrate and "walk" in use.

IMPORTANT: All nuts, fasteners, and fittings must be kept tightened. Refer to torque chart for proper assembly torque.

	HEX HEAD				
TYPE / SIZE	GRADE 5	GRADE 8	WRENCH SIZE		WRENCH SIZE
			inch		
No. 4	8 in lb	12 in lb	1/4"	12 in lb	3/32"
No. 6	16 in lb	23 in lb	5/16"	21 in lb	7/64"
No. 8	30 in lb	41 in lb	11/32"	42 in lb	9/64"
No.10	43 in lb	60 in lb	3/8"	60 in lb	5/32"
1/4"	8 ft lb	12 ft lb	7/16"	12 ft lb	3/16"
5/16"	17 ft lb	25 ft lb	1/2"	24 ft lb	1/4"
3/8"	30 ft lb	45 ft lb	9/16"	43 ft lb	5/16"
7/16"	50 ft lb	70 ft lb	5/8"	69 ft lb	3/8"
1/2"	75 ft lb	110 ft lb	3/4"	105 ft lb	3/8"
9/16"	110 ft lb	150 ft lb	13/16"	158 ft lb	-----
5/8"	150 ft lb	220 ft lb	15/16"	195 ft lb	1/2"
3/4"	260 ft lb	380 ft lb	1-1/8"	353 ft lb	5/8"

HYDRAULIC FITTINGS

SIZE	TORQUE	SIZE	TORQUE
1/4 NPT	25 ft.lb.	7/16-20 SAE O-Ring	12 ft.lb.
3/8 NPT	50 ft.lb	9/16-18 SAE O-Ring	20 ft.lb.
1/2 NPT	75 ft.lb.	3/4-16 SAE O-Ring	35 ft.lb.
3/4 NPT	110 ft.lb.	7/8-14 SAE O-Ring	50 ft.lb.
		1-1/16-12 SAE O-Ring	70 ft.lb.

THINK SAFETY FIRST!

LITTLE BEAVER, INC.
P.O. BOX 840 ● LIVINGSTON, TEXAS 77351
PHONE 936/327-3121 ● FAX 936/327-4025
Web: www.littlebeaver.com ● E-Mail: sales@littlebeaver.com

SOIL SAMPLING WITH CATHEAD

This drill rig with optional soil sampling attachment is designed to safely sample soil in accordance with ASTM D 1586 Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils. This test method is generally known as the Standard Penetration Test (SPT). Be sure to carefully read and understand the following instructions before attempting to use drill rig with cathead to sample soil.

⚠ **DANGER:** Keep away from overhead electric wires and devices. Electrocution can occur without direct contact. FAILURE TO KEEP AWAY WILL RESULT IN SERIOUS INJURY OR DEATH.

⚠ **WARNING:** Be sure to properly secure cathead tower before raising, lowering, or operating the drill rig. FAILURE TO SECURE MAY RESULT IN SERIOUS INJURY OR DEATH.

⚠ **CAUTION:**

- Keep cathead clean and free of rust, oil and grease. Use a wire brush (with handle) to remove rust from cathead.
- Periodically check cathead for rope wear grooves. Replace cathead if rope grooves become deeper than 1/8 inch.
- Always use dry, clean, sound rope. A wet or oily rope may "grab" cathead and cause connected tools to be rapidly hoisted to top of the mast.
- If you experience the rope "grab" the cathead or become tangled in drum, release the rope and sound an appropriate alarm for all personnel, including operator, to quickly back away and stay clear. After the rope "grabs" the cathead and tools are hoisted to top of mast, the rope will often break, releasing the tools. However, if rope does not break, stay clear of drill rig until operator cautiously and safely returns to turn off cathead or drill rig engine and appropriate action is taken to release tools. Be aware that suspended tools will fall after power to cathead is turned off.
- Always protect rope from contact with chemicals. Chemical can cause deterioration of rope which may not be visibly detectable.
- Never wrap rope from cathead around a hand, wrist, arm, foot, ankle, leg, or any other body part.
- Always maintain at least 18 inches of clearance between operating hand and cathead drum when utilizing cathead and rope.
- Never operate cathead with loose fitting or unfastened clothing.
- Never use a rope that is any longer than necessary. A rope which is too long may form a ground loop and become entangled with the operator's legs.
- Do not use more rope wraps than are required to hoist load.
- Do not leave cathead unattended with rope wrapped on drum.
- When using cathead and rope for driving or back-driving, make sure all threaded connections are tight. Stay as far away as possible from impact point of hammer.
- Only operate cathead while standing on a level surface with good, firm footing without distraction or disturbance.

SET-UP

⚠ **DANGER:** Keep away from overhead electric wires and devices. Electrocution can occur without direct contact. FAILURE TO KEEP AWAY WILL RESULT IN SERIOUS INJURY OR DEATH.

⚠ **WARNING:** Be sure to properly secure cathead tower before raising, lowering, or operating the drill rig. FAILURE TO SECURE MAY RESULT IN SERIOUS INJURY OR DEATH.
Unfold and secure cathead tower on top of drill mast prior to raising drill mast to vertical, operating position. Secure cathead tower to top of drill mast using two (2) ½ x 2-1/2 cap screws and nuts as shown in figure 1. Also, thread rope around cathead tower pulley prior to raising drill mast to vertical, operating position. It may be necessary to temporarily tie ends of rope together to prevent rope from unthreading from pulley as drill mast is raised into position.

Figure 1

Use a level to ensure the drill mast is plumb from front-to-rear and side-to-side.

Raise drill head to a position which will allow it to pivot clear. Remove pin from side opposite hydraulic hose connections. Pivot head clear from above hole and secure with rope or elastic cord. See figure 2.

Figure 2

OPERATION

⚠ **CAUTION:** Be sure everyone and everything is clear before turning on cathead.

The cathead should be operated from left side of the trailer and with rope coming off top of cathead (approximately 1-3/4 rope turns around cathead). Turn on cathead by pulling up knob of the 2-position, 3-way valve at front of trailer.

⚠ **CAUTION:** The cathead may be turned off from three locations around the trailer: by pushing knob down of 2-position, 3-way valve at front of trailer, by pushing knob down of 2-position, 3-way valve at right, rear of trailer, or by turning key off of hydraulic power source. Great care should be taken if turning cathead off while a load is suspended. A suspended load will fall when cathead is turned off.

For proper sampling technique, refer to ASTM D 1586 Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils.

Use cathead, rope, and pipe pull ring to handle pipe and sampler. For greater depths, a pipe clamp may be necessary.

Typically, the cathead and rope is used to remove sampler by back-driving. Retainer baskets may be used in conjunction with sampler to aid in retaining soil sample within sampler. If back-driving is not desirable, a hydraulic post-puller may be necessary if drill head pull capacity is not sufficient to remove sampler from hole.