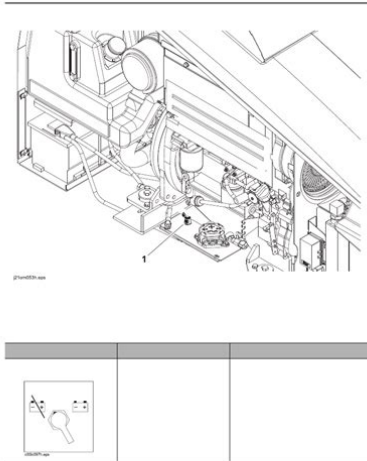


## Ditch Witch 922 Operators Manual

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# Ditch Witch 922 Operators Manual

See your Ditch Witch dealer for replacement parts. See your Ditch Witch dealer for replacement parts. Do not remove indexing dowels from spindle. Check sub for thread wear. If saver sub threads are more worn than pipe threads, saver sub is damaging the drill pipe. Drilling unit serial number is located as shown. Use in any other way is considered contrary to the intended use. The JT922 Mach 1 can be used with Ditch Witch drilling fluid units and Ditch Witch locating equipment. Page 5 JT922 Operator's Manual Overview 4 Unit Components Unit Components 1. Operator's station 6. Drill frame 2. Spindle 7. Tracks 3. Carriage 8. Vise wrenches 4. Drill pipe box 9. Anchoring system 5. Page 6 JT922 Operator's Manual Overview 5 Operator Orientation Operator Orientation IMPORTANT Top view of unit is shown. 1. Front of unit 2. Right side of unit 3. Rear of unit 4. Left side of unit About This Manual This manual contains information for the proper use of this machine. See the beige Operation Overview pages for basic operating procedures. Cross references such as "See page 50" will direct you to detailed procedures. Page 7 Overview 6 JT922 Operator's Manual About This Manual CMW Page 8 JT922 Operator's Manual Foreword 7 Foreword This manual is an important part of your equipment. It provides safety information and operation instructions to help you use and maintain your Ditch Witch equipment. Read this manual before using your equipment. Keep it with the equipment at all times for future reference. If you sell your equipment, be sure to give this manual to the new owner. If you need a replacement copy, contact your Ditch Witch dealer. Also contact any utilities that do not participate in the OneCall service.<http://www.96stone.ru/userfiles/canon-eos-10d-manual-free-download.xml>

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Page 14 JT922 Operator's Manual Safety 13 Safety Alert Classifications Safety Alert Classifications These classifications and the icons defined on the following pages work together to alert you to situations which could be harmful to you, jobsite bystanders or your equipment. When you see these words and icons in the book or on the machine, carefully read and follow all instructions. Learn what each level means. Page 15 JT922 Operator's Manual Safety 14 Safety Alerts Safety Alerts Turning shaft will kill you or crush arm or leg. Stay away. Electric shock. Contacting electric lines will cause death or serious injury. Know location of lines and stay away. Deadly gases. Lack of oxygen or presence of gas will cause sickness or death. Provide ventilation. Moving tools will kill or injure. Shut off drill string power when anyone can be struck by moving or thrown tools. Never use pipe wrenches on drill string. Page 16 JT922 Operator's Manual Safety 15 Safety Alerts Explosion possible. Serious injury or equipment damage could occur. Follow directions carefully. Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly. Improper control function could cause death or serious injury. If control does not work as described in instructions, stop machine and have it serviced. Looking into fiber optic cable could result in permanent vision damage. Page 17 JT922 Operator's Manual Safety 16 Safety Alerts Hot pressurized cooling system fluid could cause serious burns. Allow to cool before servicing. Flying objects may cause injury. Wear hard hat and safety glasses. Hot parts may cause burns. Do not touch until cool. Exposure to high noise levels may cause hearing loss. Wear hearing protection. Fall possible. Slips or trips may result in injury. Keep area clean. Battery acid may cause burns. Avoid contact.<http://deepcleanindia.com/userfiles/canon-eos-1000f-instruction-manual.xml>

Page 18 JT922 Operator's Manual Safety 17 Emergency Procedures Emergency Procedures Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment. Before operating any equipment, review emergency procedures and check that all safety precautions have been taken. EMERGENCY SHUTDOWN Turn ignition switch to stop position or push remote engine stop button if equipped. Electric Strike Description Electric shock. Page 19 Safety 18 JT922 Operator's Manual Emergency Procedures If an Electric Line is Damaged If you suspect an electric line has been damaged and you are on drilling unit or bonded equipment, DO NOT MOVE. Remain on drilling machine or mats and take the following actions. Page 20 JT922 Operator's Manual Safety 19 Emergency Procedures If a Gas Line is Damaged Fire or explosion possible. Fumes could ignite and cause burns. No smoking, no flame, no spark. Explosion possible. Serious injury or equipment damage could occur. If you suspect a gas line has been damaged, take the following actions. Page 21 Safety 20 JT922 Operator's Manual Emergency Procedures If a Fiber Optic Cable is Damaged Do not look into cut ends of fiber optic or unidentified cable. Vision damage can occur. If Machine Catches on Fire Perform emergency shutdown procedure and then take the following actions. To move backward, pull. To stop, move to center. c00ic147h. Page 24 JT922 Operator's Manual Controls 23 SetUp Console Item Description 2. Right track control To move forward, push. Notes To move backward, pull. To stop, move to center. c00ic148h.eps 3. Stabilizer and frame tilt control To raise stabilizer and increase frame tilt, push. Note Stabilizer control lowers the front of the drill frame along with the stabilizer. Power output is 12V, 5A. Page 26 JT922 Operator's Manual Controls 25 Left Control Console Item Description 2. Ignition switch To start engine, insert key and turn clockwise.

Notes To stop engine, turn key counterclockwise. 3. Engine throttle control To increase engine speed, push up. To decrease engine speed, pull down. 4. Wrench control To clamp front wrench and shut off drilling fluid, move toward pipe box. To unclamp front wrench, move away from pipebox. Page 27 Controls 26 JT922 Operator's Manual Gauge Cluster Gauge Cluster 1. Drilling fluid pressure gauge 6. Hydraulic fluid temperature indicator 2. Thrust pressure gauge 7. Hydraulic filter service indicator 3. Rotation pressure gauge 8. Hourmeter 4. High temperature indicator 9. Fuel gauge 5. Engine oil pressure indicator 10. Page 28 JT922 Operator's Manual Controls 27 Gauge Cluster Item Description 1. Drilling fluid pressure gauge Displays drilling fluid pressure supplied by drilling fluid pump. Notes c00ic157h.eps 2. Thrust pressure gauge Displays hydraulic fluid pressure to thrust motor during thrust and pullback. Estimates thrust and pullback force on lines outside gauge. 3. Rotation pressure gauge Displays hydraulic fluid pressure to rotation motor when spindle is turned clockwise. Page 29 JT922 Operator's Manual Controls 28 Gauge Cluster Item Description Notes 5. Engine oil pressure indicator Indicates engine oil pressure is too low. IMPORTANT Alarms will sound when engine oil pressure is too low. See page 137. 7. Hydraulic filter service indicator Indicates hydraulic fluid filter needs replacing. Page 30 JT922 Operator's Manual Controls 29 Gauge Cluster Item Description Notes 9. Fuel gauge Displays fuel level in tank. NOTICE Use low sulfur or ultra low sulfur fuel only. Refer to engine operator's manual for cold weather fuel recommendations. Tank holds 19 gal 72 L. 10. Cold start wait indicator Lights when intake air preheater is operating. Wait until light goes off before starting engine. Page 31 JT922 Operator's Manual Controls 30 Right Control Console Right Control Console 1. Carriage control 2. Pipe lubricator button optional Item Description 1.

<http://superbia.lgbt/flotaganis/1653221602>

Carriage control To move carriage forward, push. To move carriage backward, pull. To rotate spindle counterclockwise breakout, move right. To rotate spindle clockwise makeup, move left. 2. Pipe lubricator button optional CMW To apply joint compound to threads at wrenches, press button. Page 32 JT922 Operator's Manual Controls 31 Anchoring System Console Anchoring System Console 1. Left rotation control 3. Right rotation control 2. Left thrust control 4. Right thrust control Item

Description Notes 1. Left rotation control To drive anchor, push down. IMPORTANT Stand on platform when operating anchor controls. To remove anchor, pull up. Page 33 JT922 Operator's Manual Controls 32 Anchoring System Console Item Description Notes 2. Left thrust control To move anchor down, push down. To move anchor up, pull up. 3. Right rotation control To drive anchor, push down. To remove anchor, pull up. 4. Right thrust control To move anchor down, push down. To move anchor up, pull up. Notes To lower seat for operation, pull knob. 2. Seat leveling wheel To level seat when the unit is set up on a side slope, turn wheel. Page 35 JT922 Operator's Manual Controls 34 Battery Battery 1. Battery disconnect switch Item Description 1. Battery disconnect switch To disable battery power, move switch to the disconnect position. To enable battery power, move switch to the connect position. Page 36 JT922 Operator's Manual Controls 35 ESID ESID 2 3 1 4 5 6 7 8 j07om042h.eps 1. Alphanumeric display 5. Current problem indicator 2. Strike indicator 6. OK indicator 3. Alarm interrupt button 7. Electrical power supply indicator 4. Voltage problem indicator 8. Self test button Item Description 1. Alphanumeric display Display amount of current and voltage being detected as a percentage of strike condition. Page 37 JT922 Operator's Manual Controls 36 ESID Item Description 3. Alarm interrupt button To turn off strike alarm at drilling unit, press. 4.

Voltage problem indicator Blinking red light indicates a voltage indicator problem. See "Troubleshoot Strike System" on page 97. 5. Current problem indicator Blinking red light indicates a current indicator problem. See "Troubleshoot Strike System" on page 97. 6. OK indicator Green light means system self test detected no problems. Page 38 JT922 Operator's Manual Controls 37 ESID Item Description 7. Electrical power supply indicator Green light means control box has sufficient electrical power for operation. Notes Strike system is ready to operate if OK indicator is also on. 8. Self test button To start manual self test, press. Checks all systems and circuits. To reset system after a strike has been detected, press. NOTICE See "If an Electric Line is Damaged" on page 18. Internal refers to pipe data being saved to 750 Display memory. Internal shows pipe label and stored pitch. External shows desired pitch. 3. Roll indicator Indicates beacon roll angle. 4. Target identifier indicator Indicates approximate beacon location. Only one set of arrows is active at a time. 5. Depth estimate Indicates beacon depth estimate. If all bars are not showing, check display power connections. 7. Beacon battery status indicator Indicates beacon battery status. See beacon instruction sheet. 8. Beacon temperature indicator Indicates beacon temperature. See beacon instruction sheet. External refers to pipe data being sent to a properly connected laptop computer running a version of Trac Management System software. Notes To turn off, press again. 3. Channel select button To display current channel, press and release. Unit defaults to last channel used each time unit is turned on. To switch channels, press and hold. IMPORTANT Make sure display and tracker are set to the same channel. Pipe number will appear in numeric display when data is stored. To store current pipe data, press. IMPORTANT Pipe data cannot be stored without a valid depth estimate. See page 51. 2. Inspect jobsite.

See page 52. 3. Classify jobsite. See page 54. 4. Plan bore path. See page 57. 5. Check supplies and prepare equipment. See page 63. 6. Load equipment. See page 70. Setting Up at Jobsite 1. Prepare jobsite. See page 62. 2. Unload drilling unit from trailer. See page 73. 3. Position drilling unit and frame. See page 77. 4. Assemble strike system. See page 95. 5. Page 48 JT922 Operator's Manual Operation Overview 47 Backreaming Backreaming 1. Assemble backream string. See page 87. 2. Start drilling unit and adjust throttle. 3. Set drilling fluid flow. Check that fluid flows through all nozzles. 4. Remove pipe from bore. See page 89. 5. Remove pullback device. Plan bore path as straight as possible. Check bend limits of pullback material. Check that appropriate pullback devices are on hand. The first step in planning is reviewing information already available about the job and jobsite. Review Job Plan Review blueprints or other plans and make sure you have taken bore enlargement during backreaming and pullback into account. Check for information about existing or

planned structures, elevations, or proposed work that may be taking place at the same time. Page 53 Manual Prepare 52 Inspect Site Inspect Site Inspect jobsite before transporting equipment. Page 54 Manual Prepare 53 Inspect Site Select Start and End Points Select one end to use as a starting point. Consider the following when selecting a starting point Slope Fluid system should be parked on a level site. Consider how slope will affect drilling unit setup, bending pipe, and fluid flow out of hole. Traffic Vehicle and pedestrian traffic must be a safe distance from drilling equipment. Allow at least 10' 3 m buffer zone around equipment. Page 56 Manual Prepare 55 Classify Jobsite Apply Precautions Once classified, precautions appropriate for jobsite must be taken. Electric Jobsite Precautions Electric shock. Contacting electric lines will cause death or serious injury. Use beacon to track bore path.

Page 57 Manual Prepare 56 Classify Jobsite Crystalline Silica Quartz Dust Precautions Jobsite hazards could cause death or serious injury. NOTICE Cutting, drilling, or working materials such as concrete, sand, or rock containing quartz may result in exposure to silica dust. Use water spray or other means to control dust. If workers are exposed to dust they must wear appropriate breathing protection. Page 58 Manual Prepare 57 Plan Bore Path Plan Bore Path Plan the bore path, from entry to end, before drilling begins. The Ditch Witch Trac Management System Plus is available for planning your bore path. See your Ditch Witch dealer for details. Page 59 Prepare 58 Manual Plan Bore Path 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 Ditch Witch drill pipe is tested to bend at a maximum percent pitch. Page 62 Manual Prepare 61 Plan Bore Path Minimum Depth Because you must bend pipe gradually, entry pitch and bend limits determine how deep the pipe will be when it becomes horizontal. This also increases setback. Bore Path Calculator Entry pitch, setback, and minimum depth work together with bend limits to determine the bore path. Page 63 Manual Prepare 62 Prepare Jobsite Prepare Jobsite Jobsite hazards could cause death or serious injury. Steer Unit To steer drilling unit, follow instructions for type of steering desired. See page 22 for more information. To steer while moving forward, move one control slightly more than the other to turn in the desired direction. Drilling unit will gradually turn to left or right. Page 68 JT922 Operator's Manual Drive 67 Shut Down Unit Shut Down Unit 1. Stop track movement. 2.

Lower drill frame and stabilizer to the ground. IMPORTANT If frame and stabilizer cannot be lowered, use cylinder locks or other suitable material to block the tracks. If the machine must be lifted, load machine into a container or onto a platform appropriate for lifting. See "Specifications" for weight of machine. Haul Load Crushing weight. If load falls or moves it could kill or crush you. Use proper procedures and equipment or stay away. Page 72 JT922 Operator's Manual Transport 71 Haul Tie Down Points Tiedown points are identified by tiedown decals. Securing to trailer at other points is unsafe and can damage machinery. Procedure Incorrect procedures could result in death, injury, or property damage. NOTICE Wrenches can open after engine shutdown. Ensure that any downhole tool or pipe in tool joint vises is attached to spindle or removed before transport. Page 73 Transport 72 JT922 Operator's Manual Haul Attach chains at front and rear tiedown points shown. Make sure chains are tight before transporting unit. IMPORTANT Drill frame must be lowered to trailer floor before attaching chains. Page 74 JT922 Operator's Manual Transport 73 Haul Unload Crushing weight. Page 75 Transport 74 JT922 Operator's Manual Tow Tow Under normal conditions, drilling unit should not be towed. IMPORTANT When hydraulics are disengaged, unit has no brakes. See "Select Start and End Points" on page 53. 2. Move equipment into selected positions. Start System 1. Start drilling unit and remote fluid unit. Allow both engines to warm up. IMPORTANT Ensure that mixture of drilling fluid matches drilling conditions. 2. Enable tracker control mode if desired. The chart below summarizes functions that occur when control is put at a combined

position. Operator must be in seat for control to function. Page 80 JT922 Operator's Manual Conduct a Bore 79 Clamp Pipe Clamp Pipe 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. Page 81 Conduct a Bore 80 JT922 Operator's Manual Assemble Drill String Assemble Drill String Prepare Beacon Housing 1. Select nozzles and bit. IMPORTANT A variety of nozzles and bits are available to suit your particular job conditions. See "Clamp Pipe" on page 79. 4. Lift pipe box latches. Forcing can bend string. Do not use bent rod or pipe. Jobsite hazards could cause death or serious injury. Use and maintain proper safety equipment. 1. Turn on drilling fluid. 2. Visually check for drilling fluid flow. 3. Page 84 JT922 Operator's Manual Conduct a Bore 83 Add Pipe Add Pipe 1. Set engine throttle to full speed. 2. Clamp pipe joint. See "Clamp Pipe" on page 79. 3. Locate drill head. 4. Engage front wrench until pipe is clamped and pressure develops. 5. Slowly rotate spindle counterclockwise. Move carriage back as threads unscrew. 6. After threads are fully unscrewed, stop rotation and move carriage to back of frame, slowing down as carriage approaches rear end. 7. Connect Pipe. See "Connect Drill Pipe" on page 81. Page 85 Conduct a Bore 84 JT922 Operator's Manual Correct Direction Correct Direction Correcting direction is a skill operators gain with experience and knowledge of equipment and soil conditions. These instructions cover only basic procedures. For information about specific equipment or jobsites, contact your Ditch Witch dealer. To track progress and make corrections, one crew member locates the drill head and sends instructions to the operator. Page 86 JT922 Operator's Manual Conduct a Bore 85 Record Bore Path Drill Head Position The drill head position is determined by reading beacon roll. Roll is displayed as a clock face position. 1. Read beacon roll. 2. Slowly rotate pipe until locator displays desired beacon roll. To change direction 1. Rotate pipe to clock position you intend to travel. 2. Push pipe into ground. To move forward without changing direction Rotate pipe into ground.

Record Bore Path Locate drill head every half length of pipe. Page 87 JT922 Operator's Manual Conduct a Bore 86 Surface Drill Head Surface Drill Head Moving tools will kill or injure. Page 88 JT922 Operator's Manual Conduct a Bore 87 Assemble Backream String Assemble Backream String Sometimes it is necessary to enlarge the pilot hole to accommodate larger product. As a general rule, the final hole should be 1.5 times larger than the diameter of the product being installed. The number of passes needed depends on soil conditions. Do not try to increase hole size too much in one pass. Several passes using successively larger reamers will save wear on machine. Page 89 Conduct a Bore 88 JT922 Operator's Manual Assemble Backream String 1. Select backreaming devices. See "Backreamers" on page 111. 2. Determine fluid rate requirements and install appropriate nozzles to provide sufficient flow. Page 90 JT922 Operator's Manual Conduct a Bore 89 Remove Pipe Remove Pipe NOTICE If engine is shut off during backreaming, drill pipe clamped by wrenches but not connected to saver sub can be pulled downhole as vise wrenches loosen. 1. Stop carriage when pipes are aligned in wrenches. 2. Clamp pipe in front wrench. See page 79. 3. Clamp and rotate rear wrench to break front joint. See "Wrench control" on page 25. 4. Disengage rear wrench. 5. Unscrew front joint. Page 91 Conduct a Bore 90 JT922 Operator's Manual Remove Pullback Device Remove Pullback Device The pullback device can be removed when the last pipe is on the frame. It can also be removed when a target pit along the bore path has been reached. Remaining pipe is then pulled back and removed. If load falls or moves, it could kill or crush you. Page 95 Systems and Equipment 94 JT922 Operator's Manual Anchor System Drive Anchors IMPORTANT Carefully time anchor rotation with anchor movement. Properly driven anchors should thread into soil and should not auger up soil. 1.

Use anchor rotation and thrust controls to drive anchor into ground. 2. Anchor is set when cap top plate 1 rests firmly on centering tube 2. 3. Repeat process for other anchor. Remove Anchors 1. Use anchor rotation and thrust controls to slowly remove anchor shaft from ground. 2. Page 96 JT922

Operator's Manual Systems and Equipment 95 Electric Strike System Electric Strike System Any time you drill in an electric jobsite, electric strike system must be properly set up, tested, and used. Tuck legs of pants completely inside boots. Page 97 Systems and Equipment 96 JT922 Operator's Manual Electric Strike System 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. Test Strike System If system fails any part of this test, see "Troubleshoot Strike System" on page 97 on the following page. Do not drill until test is completed successfully. 1. Turn on drilling unit. 2. Page 98 JT922 Operator's Manual Systems and Equipment 97 Electric Strike System Troubleshoot Strike System When strike system detects a problem, an error code will be displayed. Anytime this happens, press self test button to retest. If error code is still displayed and does not appear in this chart, have control module checked or replaced. Other problem situations and their possible causes and solutions are listed in the chart below. Page 99 JT922 Operator's Manual Systems and Equipment 98 Electric Strike System Problem Possible cause Possible solution Strobe light on drilling unit does not work during total test Improper connections with control module Check connections and wiring harness Defective strobe light 1. Disconnect strobe and connect to external 12V power source. 2. If strobe does not work, replace it. Page 103 Systems and Equipment 102 JT922 Operator's Manual Drilling Fluid Bentonite Bentonite is a dry powder.

When properly mixed with water, it forms a thin cake on bore walls, lubricating the bore, keeping it open, and holding fluid in the bore. If pH is below 9. Page 106 JT922 Operator's Manual Systems and Equipment 105 Drilling Fluid Funnel Viscosity Viscosity is the measure of internal resistance of a fluid to flow; the greater the resistance, the higher the viscosity. Viscosity of drilling fluids must be controlled. Page 107 Systems and Equipment 106 JT922 Operator's Manual Tracker Control Tracker Control Overview Incorrect procedures could result in death, injury, or property damage. This mode allows the 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. Page 108 JT922 Operator's Manual Systems and Equipment 107 Tracker Control 4. Turn on 750 Tracker and check fourdigit code. If codes on tracker and display match, thrust and rotation hydraulics on the drilling unit are enabled. Page 109 Systems and Equipment 108 JT922 Operator's Manual Tracker Control Disable Thrust and Rotation 1. When drill head enters target pit or exits the ground, turn off tracker. After 816 seconds, green tracker control light shown, located on drilling unit anchoring console, will come on. Hydraulic power to thrust and rotation will be disabled. 2. Turn engine off. Page 110 JT922 Operator's Manual Systems and Equipment 109 Downhole Tools Downhole Tools Nozzles Nozzles control fluid flow from the pipe to the bore. Select nozzles that will supply at least the amount of fluid per minute needed for the flow and pressure you will be using. A nozzle that will supply more fluid per minute is recommended. See your Ditch Witch dealer for nozzle recommendations. Bits Selection These charts are meant as a guideline only. No one bit works well in all conditions.

Page 111 Systems and Equipment 110 JT922 Operator's Manual Downhole Tools Soil Description sandy soil sugar sand, blow sand, or other soils where sand is the predominant component soft soil sandy loam medium soil loams, loamy clays hard soil packed clays, gumbo, all compacted soils rocky soil chunk rock, glacial till, cobble, rip rap, gravel soft rock soft limestone, sandstone, shale, coral, caliche hard rock granite, schist, marble, hard limestone Installation Remove all paint from mating surfac Page 112 JT922 Operator's Manual Systems and Equipment 111 Downhole Tools Backreamers A backreamer enlarges the hole as pipe is pulled back through the bore. No one backreamer works well in all conditions. These charts are meant as a guideline only. See your local Ditch Witch dealer for soil conditions and backreamer recommendations for your area. Page 113 JT922 Operator's Manual Systems and Equipment 112 Downhole Tools Backream Fluid Requirements Backreaming is only successful when enough fluid reaches the bore. The amount of fluid needed depends on size of bore and soil condition. Follow these steps to find the minimum

amount of fluid needed in perfect conditions. **IMPORTANT** Use more fluid than recommended or the backream might be dry and unsuccessful. Instructions Example 1. Find amount of fluid needed for your size of backreamer. **IMPORTANT** Apply TJC to threads and handtighten joint before attaching quick wrench components to tighten joint. Attach quick wrench in either the join or break position. See page 130 for correct lubricant. 2. Join pipe and tighten joint. 3. Break joint. **NOTICE** Failure to follow this procedure could result in fused joints. Page 118 JT922 Operator's Manual Systems and Equipment 117 Drill Pipe Use Caps and Plugs Install plug on saver sub before transporting. Cap and plug male and female ends of drill pipe during prolonged storage. Replace Worn Saver Sub Because each pipe comes in contact with the saver sub, check saver sub regularly for wear.

Replace it when it is worn, or it will damage your drill pipe. See page 147 for replacement procedure. Precondition a new saver sub the same way you do new pipe. Page 119 Systems and Equipment 118 JT922 Operator's Manual Drill Pipe Use Drill Pipe Correctly Align the Joints Always carefully align the male and female ends of pipe before screwing them together. Poor alignment can damage the threads and destroy the usefulness of the joint. **IMPORTANT** The first pipe drilled must be in a straight line with the unit. A misaligned pipe can damage threads on each pipe that is added. Clamp Pipe Correctly Clamp on pipe when joint is centered between wrenches. Do not ram pipes together during makeup or force them apart during breakout. Carefully time rotation with carriage travel speed, and always connect and disconnect joints slowly and deliberately. Page 125 JT922 Operator's Manual Complete the Job 124 Rinse Equipment Rinse Equipment Using Optional Washwand Connect the washwand at quick connect 1 at rear of unit. Open valve 2 to start water flow. Close valve to stop water flow. Procedure See "Prime Drilling Fluid Pump" on page 77. Page 130 JT922 Operator's Manual Service 129 Service Precautions Working Under Drilling Unit Crushing weight could cause death or serious injury. Use only high quality fuel meeting ASTM D975 No. 2D, EN590, or equivalent. See the engine operation manual for more information. Add DEO at fill 2 as necessary to keep oil level at highest line on dipstick. Check Hydraulic Hoses Pressurized fluid or air could pierce skin and cause injury or death. Stay away. **NOTICE** Escaping pressurized fluid can cause injury or pierce skin and poison. Maintain fluid level at halfway point on sight glass 2 when engine is off and fluid is cool. Refill with THF at hydraulic fluid fill 1 as necessary. Change pail as needed. See "Change Auto Lubricator TJC Pail" on page 146 for procedure.

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