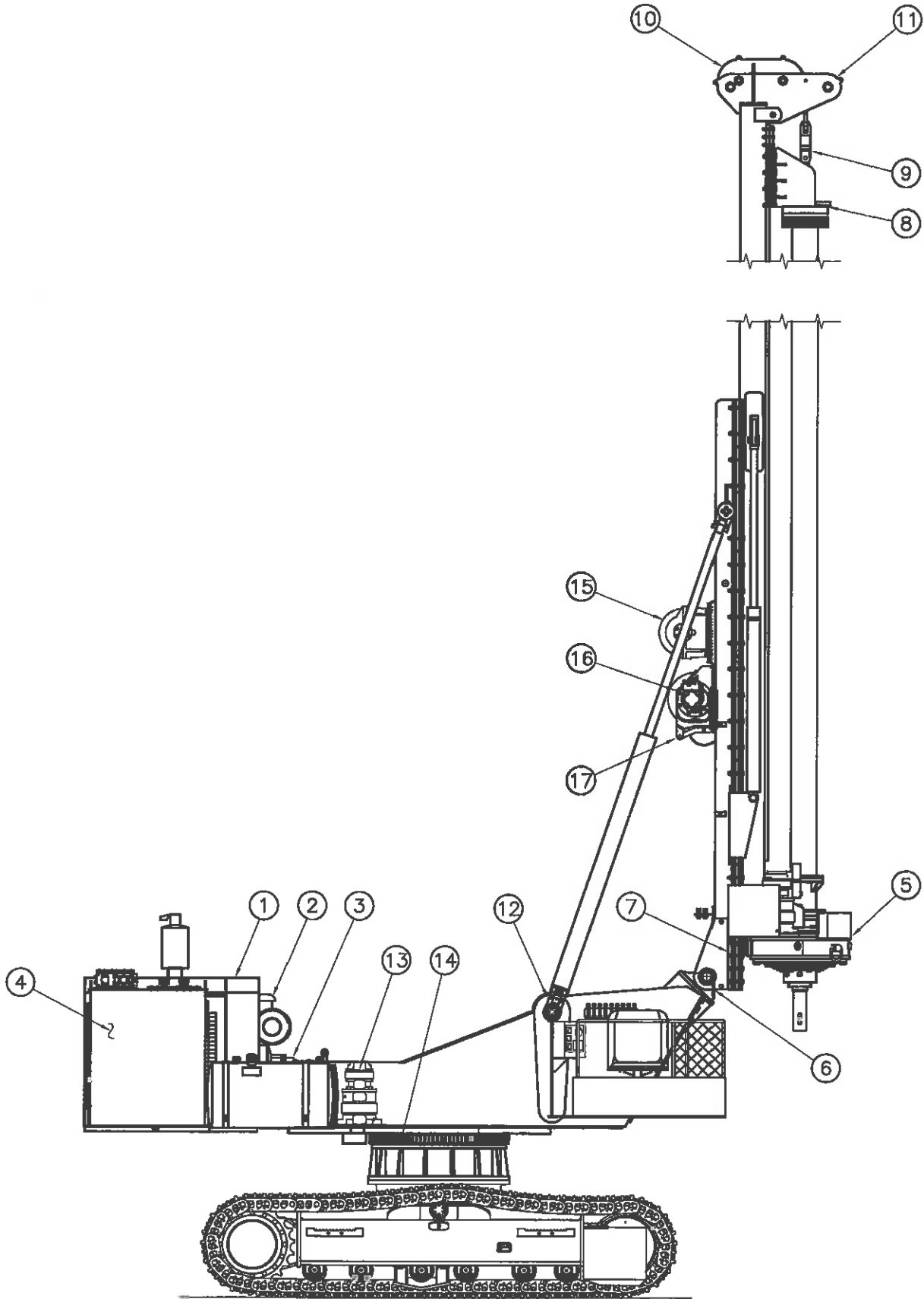
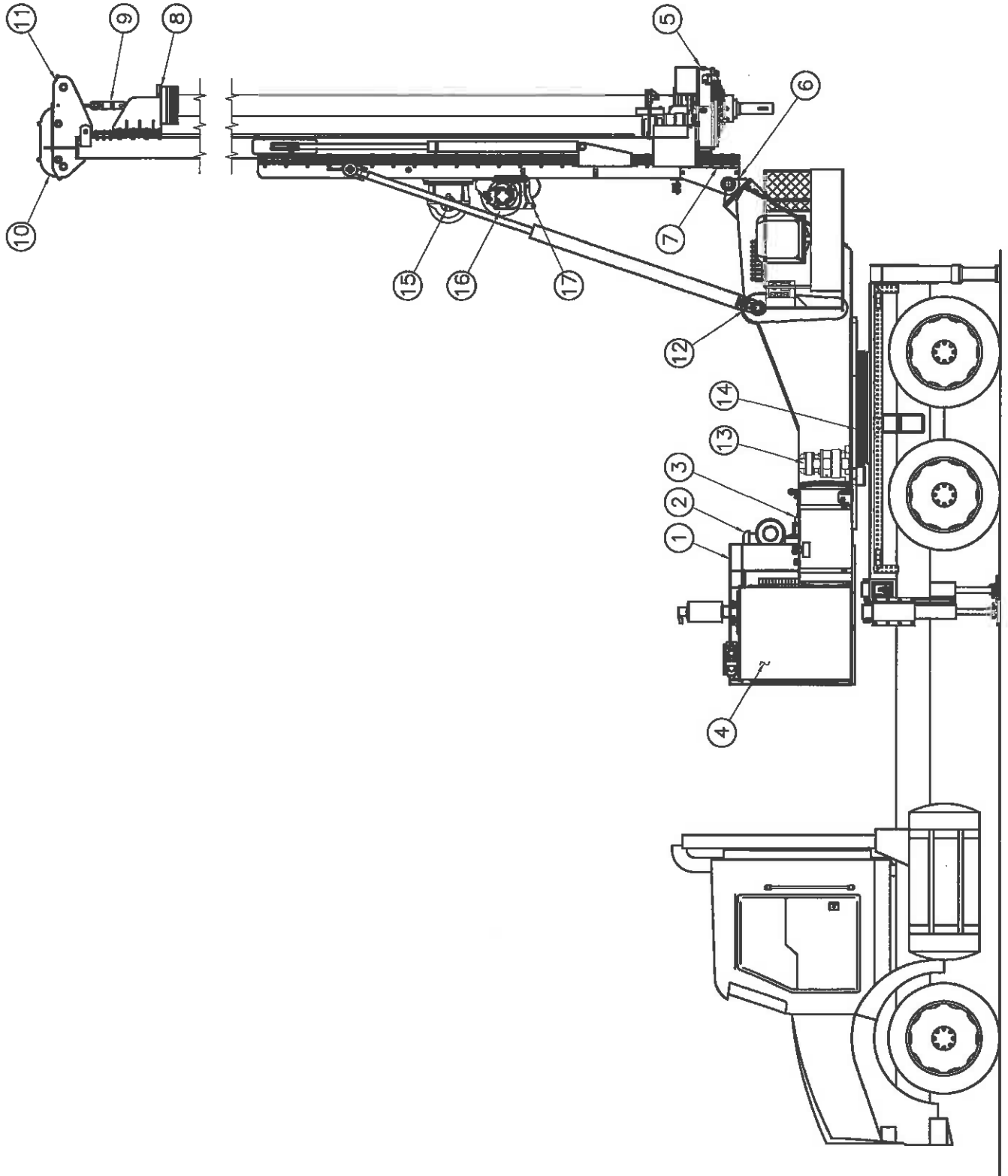


LHD SERIES

OPERATION & LUBRICATION MANUAL





LUBRICATION CHART LHD SERIES

1. **ENGINE:**
LUBRICATION TYPE: JOHN DEERE PLUS 50
LUBRICATION PERIOD: CHECK DAILY
LUBRICANT CAPACITY: 20 QTS
* CHANGE EVERY 100 HOURS
* OIL FILTER: RE504836 (JOHN DEERE)
* FUEL FILTER: RE541922 (JOHN DEERE)
* FUEL FILTER: RE522878 (JOHN DEERE)

2. **AIR CLEANER:**
P182035 (DONALDSON)
* SCHEDULED SERVICE FILTER: SMP18-1035
* FOLLOW MAINTENANCE PROCEDURES AS SPECIFIED IN MANUFACTURES MANUAL.

3. **PUMP DRIVE:**
LUBRICANT TYPE: 80W90 GEARLUBE
LUBRICATION PERIOD: CHECK EVERY 40 HOURS
LUBRICANT CAPACITY: 3 QTS. APPX.
* CHANGE EVERY 500 HOURS

4. **HYDRAULIC SYSTEM:**
LUBRICANT TYPE: SEE CHECKOUT SHEET
LUBRICATION PERIOD: CHECK DAILY
SYSTEM CAPACITY: 160 GAL. APPX.
RETURN FILTER: HD2225-37E, 2-REQ'D
SUCTION STRAINER: SS-2.5-100H-5
PILOT FILTER: 934983Q

5. **ROTARY DRIVE GEARBOX:**
LUBRICANT TYPE: 80W90 GEARLUBE
LUBRICATION PERIOD: CHECK EVERY 40 HOURS
* CHANGE EVERY 1000 HOURS.
UPPER BEARING: GREASE EVERY 40 HOURS
LUBRICANT TYPE: BRG & CHASSIS LUBE

6. **MAST PIVOT:**
LUBRICANT TYPE: BRG & CHASSIS LUBE
LUBRICATION PERIOD: EVERY 40 HOURS

7. **MAST SLIDE HOUSING:**
LUBRICANT TYPE: BRG & CHASSIS LUBE
LUBRICATION PERIOD: EVERY 40 HOURS

LUBRICATION CHART (CONT.)

- | | | |
|-----|--------------------------|--|
| 8. | OUTER KELLY SWIVEL: | LUBRICANT TYPE: BRG & CHASSIS LUBE
LUBRICATION PERIOD: EVERY 40 HOURS |
| 9. | INNER KELLY SWIVEL: | LUBRICANT TYPE: BRG & CHASSIS LUBE
LUBRICATION PERIOD: EVERY 40 HOURS |
| 10. | INNER KELLY SHEAVES: | LUBRICANT TYPE: BRG & CHASSIS LUBE
LUBRICATION PERIOD: EVERY 40 HOURS |
| 11. | AUXILIARY CABLE SHEAVES: | LUBRICANT TYPE: BRG & CHASSIS LUBE
LUBRICATION PERIOD: EVERY 40 HOURS |
| 12. | MAST CYLINDER ENDS: | LUBRICANT TYPE: BRG & CHASSIS LUBE
LUBRICATION PERIOD: EVERY 40 HOURS |
| 13. | SWING DRIVE: | LUBRICANT TYPE: 80W90 GEARLUBE
LUBRICATION PERIOD: CHECK EVERY 200 HOURS
*CHANGE EVERY 1000 HOURS. |
| 14. | SLEWING RING BEARING: | LUBRICANT TYPE: BRG & CHASSIS LUBE
LUBRICATION PERIOD: EVERY 40 HOURS |
| 15. | AUXILIARY WINCH: | LUBRICANT TYPE: MIROPA 150
LUBRICATION PERIOD: EVERY 200 HOURS
*FOLLOW MAINTENANCE PROCEDURES AS
SPECIFIED IN MANUFACTURERS MANUAL. |
| 16. | MAIN WINCH: | LUBRICANT TYPE: MIROPA 150
LUBRICATION PERIOD: EVERY 200 HOURS
*FOLLOW MAINTENANCE PROCEDURES AS
SPECIFIED IN MANUFACTURERS MANUAL. |
| 17. | MAIN WINCH TENSIONER: | LUBRICANT TYPE: BRG & CHASSIS LUBE
LUBRICATION PERIOD: EVERY 40 HOURS |

SPIRADRILL MODEL LHD OPERATORS MANUAL

NOTICE

DO NOT ATTEMPT TO OPERATE THIS DRILLING RIG UNLESS YOU HAVE RECEIVED PROPER INSTRUCTION AND COMPLETELY UNDERSTAND THE OPERATION, LIMITATIONS AND MAINTENANCE OF THIS MACHINE.

THIS EQUIPMENT IS NOT DESIGNED NOR INTENDED FOR USE AS A CRANE OR OTHER SIMILAR LIFTING DEVICE.

THIS EQUIPMENT IS NOT DESIGNED NOR INTENDED FOR LIFTING ANY PERSON.

IT IS UNDERSTOOD THAT ANY DAMAGE AND/OR INJURIES CAUSED BY INADEQUATE MAINTENANCE OR MODIFICATION IS THE RESPONSIBILITY OF THE USER.

WHEN THIS EQUIPMENT IS IN OPERATION, IT IS AT THE SOLE RISK OF THE USER.

DO NOT ATTEMPT TO GET OUT OF THE OPERATORS SEAT WHILE THE PILOT SYSTEM IS ENGAGED.

THEORY OF OPERATION

Position the drill rig on solid ground and extend the outriggers to stabilize the drill unit. Raise the derrick by manipulating the derrick cylinder controls staying within the limits noted on the derrick pivot housing until the mast is vertical. You may slide the unit out as required up to 24". The unit is most stable when drilling off of the rear of the unit, use caution when drilling on either side of the unit; this may undermine the soil under the outriggers supporting the unit. **Use caution when setting up to avoid obstructions and utility and power lines!**

Operation of the rotary and crowd controls on a single joystick allows for smooth control of both rotary and crowd speeds. By simply maneuvering the joystick forward or back will begin the kelly rotation (adjust engine throttle to achieve the desired RPM). After the RPM desired is achieved move the joystick left to begin to crowd the drilling tool. Please note as soon as the kelly rotation begins the drive lugs will engage. Crowd at a rate that the drilling tool is penetrating. Attempting to crowd at a faster rate will cause the drive lugs to slip causing excessive wear. When rotating the drilling tool and crowding, the entire derrick assembly travels (winches, cables, kelly, and rotary gearbox travel together). Once the drilling tool is full, reverse rotation slightly to unlock the kelly elements and the rotary drive. Hoist the kelly bar, if the winch will not raise the kelly, reverse rotary rotation until the load drops enough for the winch to raise the load. After the kelly begins to come up you may operate the crowd to raise the derrick at the same time until the stroke cylinder stops. Raise the drilling tool to clear the ground. You may spin-off the cuttings at the rear of the unit or swing the unit to either side as long as the ground is stable. Reposition over the hole and repeat the process until the desired depth is achieved. Be aware of your surroundings and personnel when operating this unit. **Use extreme caution and observe warning labels on the drill unit while operating.**

When preparing the unit for travel swing the unit inline with the drill rig base frame and truck, slide the unit in completely, lower the derrick into the cradle behind the truck, raise all of the outriggers and retract the front outriggers completely.

All of the controls for operation are within easy reach of the operator. Manual control valves are provided for the operation of the auxiliary winch, slide cylinder, derrick raising cylinders and all outrigger cylinders. Pilot control valves are provided for the operation of the swing, main kelly winch, rotary table, derrick crowd and undercarriage. A pilot system lockout device is provided to disable the pilot system so the operator may safely get in and out of the operators console. An engine monitoring console and hydraulic pressure gauges are provided to monitor appropriate functions. Each of these functions is labeled as to their function.

The engine-monitoring console displays all of the engine temperatures and pressures. The ignition switch and emergency shutdown are also provided. A toggle switch is provided to select a constant RPM, toggle up to increase RPM or toggle down to decrease RPM. A foot throttle pedal is also provided to manually control the RPM of the engine.

Located on the body panel of the operators' station are hydraulic control handles that operate the auxiliary winch, slide, derrick cylinders and outrigger cylinders. All controls are labeled as to their position function as indicated below.

- * Auxiliary winch
 - Push handle down to lower load
 - Push handle up to raise load

NOTE: THE AUXILIARY HOIST IS NOT INTENDED FOR THE USE OF LIFTING ANY PERSON(S)!

- * Slide cylinder
 - Push handle down to slide the unit out
 - Push handle up to slide the unit in
- * L. Derrick cylinder (use in conjunction with R. derrick cylinder)
 - Push handle down to lower derrick
 - Push handle up to raise derrick

- * R. Derrick cylinder (Use in conjunction with L. derrick cylinder)
Push handle down to lower derrick
Push handle up to raise derrick

Note: Raising and lowering of the derrick is accomplished by manipulating both of the cylinder control valves simultaneously. The pivot area allows for the manipulation of the derrick to achieve the desired level or angle. **DO NOT EXCEED THE LIMIT INDICATORS ON THE PIVOT HOUSING OR DAMAGE BY CONTACT BETWEEN THE DERRICK CYLINDERS AND THE HYDRAULIC WINCHES MAY OCCUR.**

- * Right rear outrigger cylinder
Push handle down to lower cylinder
Push handle up to raise cylinder
- * Left rear outrigger cylinder
Push handle down to lower cylinder
Push handle up to raise cylinder
- * Right front outrigger cylinder
Push handle down to lower cylinder
Push handle up to raise cylinder
- * Left front outrigger cylinder
Push handle down to lower cylinder
Push handle up to raise cylinder
- * Front outrigger position cylinders
Push handle down to position front outriggers (out)
Push handle up to position front outriggers (in)
- * Left and right track pilot control valves
Push down to move forward
Push up to move reverse

NOTE: USE EXTREME CAUTION WHEN MANEUVERING THIS UNIT ON ANY TERRAIN. DERRICK SHOULD BE LOWERED AND THE UNIT SLID IN WITH THE TRAVEL POSITION BEFORE MANEUVERING AROUND TERRAIN.

Located on the operators pedistal are joysticks, which operate the swing, main winch, rotary, and crowd. Note: Pilot system lockout must be engaged for these controls to work.

- * Left hand joystick operates main winch and swing
 - Push handle forward to lower kelly bar
 - Pull handle back to raise kelly bar
 - Push handle left to swing left (when facing the drilling tool)
 - Push handle right to swing right (when facing the drilling tool)

Note: Main winch does not stop automatically when lowering the kelly. The operator must **STOP** lowering the kelly when it reaches the bottom of the hole to prevent cable from spooling the winch. If excess cable is spooled off of the drum when lowering, wind up the cable until it has tension on it before starting rotary rotation.

- * Right hand joystick operates the rotary and crowd
 - Push handle left to crowd down
 - Pull handle right to crowd up
 - Push handle forward to rotate kelly forward
 - Pull handle back to rotate kelly reverse
 - Button on top of handle shifts rotary drive into high speed
 - Toggle switch located at the base of the joystick pedestal allows for switching rotary drive into low and mid ranges.

Crowding notes:

- 1) Reverse rotation to unlock bars before attempting to hoist the kelly bar elements.
- 2) Allow the drive lugs on the kelly elements to engage before applying large amounts of crowd pressure. Do not crowd through the drive lugs on the kelly elements as this will cause excessive wear on the drive lugs.



- 3) When crowding up, do not pull against the kelly cable, make sure the tool is free by hoisting the kelly with the main winch. Failure to do so can exceed the cable capacity. When trying to break suction with the drilling tool, you may crowd up and rotate in the forward direction at the same time therefore applying no stress to the inner kelly cable.

Rotary notes:

- 1) Rotary speeds are achieved by selecting low range, mid range and high speed.
- 2) Rotary low and mid ranges are used for drilling. You may manipulate the handle from forward to reverse as you desire in these ranges.
- 3) High speed is to be only used for spin-off (if is not intended for drilling). **Do not attempt to quickly shift from forward to reverse in high range or release spin-off button before rotation stops. Damage to rotary motor cartridge may occur.**

When spinning off cuttings, switch the toggle for the rotary first, then move the handle forward to spin-off.

Stop spin-off rotation **before** switching the spin-off toggle back to drilling mode.

