

3.19-1 DRAWWORKS & DRIVE ASSY (FIGURE 3-25)(CONT'D):

sides) and remove plates and discs from the clutches. Mark cover, drive plates and discs for proper angular relationship. A clutch puller will be required to remove these clutches from the shaft. The shaft end containing the rotor seal will need to be protected from damage by the puller and both clutches will need to be pulled from the shaft. Items 28 (capscrews) and Item 29 (drive ring) can now be removed. Items 42 (capscrews) and Item 43 (drive ring) can now be removed from the opposite end. Remove Item 27 and Item 41 (keys) from each end of the shaft. Remove Items 30 (capscrews) from Item 31 (retainer plate) and Items 44 (capscrews) from Item 45 (retainer plate). Item 36 and Item 50 (hoist and auxiliary drums) can now be pulled from the shaft. Remove Items 73 (capscrews) from Item 75 (retainer plate) which will allow the removal of Item 79 (grease seal), Item 77 (bearing cup), and Item 76 (shim). Remove Item 93 (drain plug) from bottom of Item 90 (bevel gear case). Remove Items 80 (capscrews) from Item 82 (retainer plate). This will allow removal of Item 83 (shim), Item 86 (grease seal) and Item 84 (bearing cup). Item 89 (shaft) can now be removed from the case with Item 87 (bevel gear). Remove Item 54 (cotter pin) and Item 55 (nut) from the pinion assembly. Using a puller, remove Item 56 (sheave) from the pinion tapered shaft. Remove Items 58 (capscrews) from Item 60 (seal assembly) and remove Item 60 (seal assembly). The pinion and bearing assembly can now be withdrawn from the bevel gear case. Item 62 (lock washers) will need to be opened to allow the unscrewing of Item 61 and 63 (locknuts). This will allow Item 70 (pinion) to be withdrawn from the bearing assembly. All parts should be clean and laid out in an orderly fashion

for inspection prior to any reassembly. The ring gear and pinion are again a matched set and must be replaced as a matched set. If there is damage present in the ring gear and pinion, this would indicate there is probably also contamination in the bearings and possibly some seal damage. It would probably be wise at this point to consider replacing all bearings and seals along with the ring gear and pinion. Since Item 87 (ring gear and hub) are riveted together and since hot riveting may be a difficult job in the field, it is recommended that the riveted assembly be replaced with another riveted assembly. This gear and hub assembly is placed onto the shaft and will need to either be pressed or pulled off making sure all burrs and nicks and any other damage to the parts being reused are corrected prior to attempting to reassemble.

B. Reassembly:

Press Item 87 (ring gear and hub assembly) onto Item 89 (shaft) until it bottoms against the shaft shoulder. Press Item 78 and 85 (bearings) on shaft. Slide shaft and ring gear through the case and assemble Item 84 (cup), Item 86 (seal), Item 83 (shim) and Item 82 (retainer plate) onto the shaft on the backside of the ring gear and assemble with Item 80 (capscrews). Torque to recommended requirements. Assemble Item 76 (shim), Item 77 (cup), Item 79 (grease seal) and Item 75 (retainer plate) over the opposite end of the shaft and attach to the bevel gear case with Items 73 (capscrews). Torque to recommended limits. Check for bearing preload or excess clearance and adjust shims for light drag. Install new Item 71 (bearing) onto hanger inside bevel gear case. Assemble Item 70 (pinion) with Item 65 (bearing), Item 66 (cup and cage assembly), Item 68 (spacer, Item 69 (shim) and Item 67 (bearing). Set

pinion teeth in a vise with soft jaws to prevent damage to pinion teeth and tighten only sufficiently to prevent pinion from rotating. Install Item 63 (lock nut), Item 64 (spacer), Item 62 (lock washer), Item 61 (lock nut) and tighten hand tight. Rotate Item 66 (cup and cage assembly), while gradually tightening Item 63 (lock nut). Check bearing makeup for excessive play. There should be a slight drag when making up tapered roller bearings. If excessive clearance is obvious, remove some laminations from Item 69 (shim) until proper light drag is felt on the assembly with Item 63 (lock nut) tight. Tighten Item 61 (lock nut) and bend over tang on Item 62 (lock washer) to provide positive locking. Hold Item 72 (shim) in place and insert pinion nose into outboard bearing inside bevel gear case. Install Item 60 (seal assembly) and attach with Items 58 (capscrews). Torque to recommended limits. Check pinion shaft for excess backlash. Some slight clearance should be noted between the teeth of the ring gear and pinion. If none is evident, laminations will need to be added to Item 83 (shim) and removed from Item 78 (shim) until some slight backlash can be felt between the gear and pinion. The mounting distance of the pinion can be checked as described under the rotary table assembly section. The pinion can be moved in or out by adding or removing lamination from Item 72 (shim). Reinstall Item 56 (sheave) and tighten Item 55 (nut) to recommended torque and secure with Item 54 (cotter pin). Replace Item 93 (drain plug) in the bevel gear case and fill with recommended lubricant through Item 91 (cap) up to Item 92 (level plug). Install Item 51 (bearing) and Item 52 (spacer) over rotor seal end of shaft. Slide Item 50 (drum) over same end and set on Item 51 (bearing).

Install Item 45 (retainer), Item 46 (seal), Item 47 (spacer), Item 48 (bearing) and Item 49 (O ring) into the other end of the drum and secure with Items 44 (capscrews). Install Item 41 (key) and press on Item 40 (clutch) until clutch bottoms against shoulder. Slide Item 43 (drive ring) over clutch and attach to Item 50 (drum) with Items 42 (capscrews). Reassemble clutch plates and discs and install cover plate and torque to recommended limits. Reinstall air liner from clutch to shaft. Perform same operations on the opposite end of the shaft. The drawworks drum assembly is now ready to re-install into the frame. Set shaft ends through the openings in the drawworks side frame and lower bevel gear case mounts astride the member in the drill frame. Reinstall Items 24 (mounting studs) and Items 22 (nuts) and torque to recommended limits. On the shaft end which supports the rotor seal, install Item 13 (spacer), Item 14 (bearing) and Item 12 (bearing retainer) with Items 11 (capscrews). Torque to recommended limits. On the opposite end, install Item 20 (spacer), Item 21 (bearing) to Item 19 (end plate with Items 18 (capscrews) and torque to recommended limits. On opposite shaft end, press on Item 8 (sprocket) and secure with Item 7 (set screw). Insert Item 6 (bayonet). Install Item 5 (O ring), Item 4 (adaptor) and attach to shaft with Items 3 (capscrews). Torque to recommended limits. Attach Item 2 (rotor seal) with Items 1 (screws) and torque to recommended limits. Reassemble brake bands over clutch drive rings and attach to anchor bolts and actuating rods. Remove Items 39 and 53 (pipe plugs) and lubricate both drums per recommendations. The drawworks assembly is now ready to reinstall on the drilling rig. Secure the frame with mounting bolts and torque to recommended limits. Re-attach brake and clutch controls and make sure of proper action. Insert

wire line ends back into anchor hole on the inner flanges of the drums and tighten set screws to retain the wire line. Power may now be used to rethread the wire line onto the drums. This should be done carefully to prevent injury to personnel or damage to the wire line.

C. Tools Required:

- 1 - 2-1/2" special open end wrench x 5/16" thick for pinion nuts
- 1 - 1/16" open end wrench
- 1 - pr. side cutter pliers
- 1 - pr. standard pliers
- 1 - set 1/2" drive sockets 3/8" to 1-1/2" capacity
- 1 - 3/4" box to open end wrench combination
- 1 - 12" adjustable wrench
- 1 - set Allen wrenches
- 1 - 15/16" box to open end wrench combination
- 1 - Porto power set to remove clutch hubs
- 1 - 8" pulley for bearings
- 1 - set feeler gauges .003" to .025"
- 1 - 1/8" round end drift punch
- 1 - 1/4" round end drift punch
- 1 - 2# ball pein hammer
- 1 - 3/8" wide x 5" min. length chisel
- 1 - knifeblade for peeling laminated shims
- 1 - can #3 Permetex
- 1 - tube #1 Permetex
- 1 - 4" bench vise
- 1 - 12" std. slot screwdriver
- 1 - 2 ft. pry bar
- 1 - 6 ft. length lock wire
- 1 - 9/16" box to open end wrench combination
- 1 - 20 ton press to remove ring gear hub

D. Estimated Time Required to Complete Repair:

24 to 30 hours.