

ROTARY TABLE ASSEMBLY
OVERHAUL PROCEDURE

I. Ring Gear and Pinion - Removal and Replacement

A. Disassembly:

In order to replace ring gear and pinion, it will be necessary to remove the rotary table assembly from the drilling rig. Detach hydraulic transfer cylinder and universal joint drive shaft from the rotary table. The rotary table now can be slid to the rear to remove from the drilling rig. The rotary table assembly should be positioned on a working bench or fixture if one is available. Remove Item 27 (capscrew) which will allow the removal of Item 46 (master bushing). The oil should be drained through Item 31 (drain plug). Next remove Item 20 (capscrew) which will allow the removal of Items 1 through 26 complete, which is the pinion assembly. Next, remove Item 50 (mud rejector). This part is threaded to Item 41 (quill) and possibly will be difficult to remove since it is a left hand thread and could be subject to erosion. Probably the simplest method would be to remove Items 48 (capscrews) which hold the two halves of the mud rejector together. This will allow you to split the mud rejector and remove it easier. Item 51 (O ring) and 52 (seal) should be removable at the same time. Next remove Items 53 (capscrews) which will allow removal then of Item 55 (top plate) and Item 56 (shim). As these parts are removed, they should be put in a can or bucket for safekeeping since quite probably they can be cleaned up and reused if they are not lost or damaged in removal. Next remove Item 32 (capscrews) which will

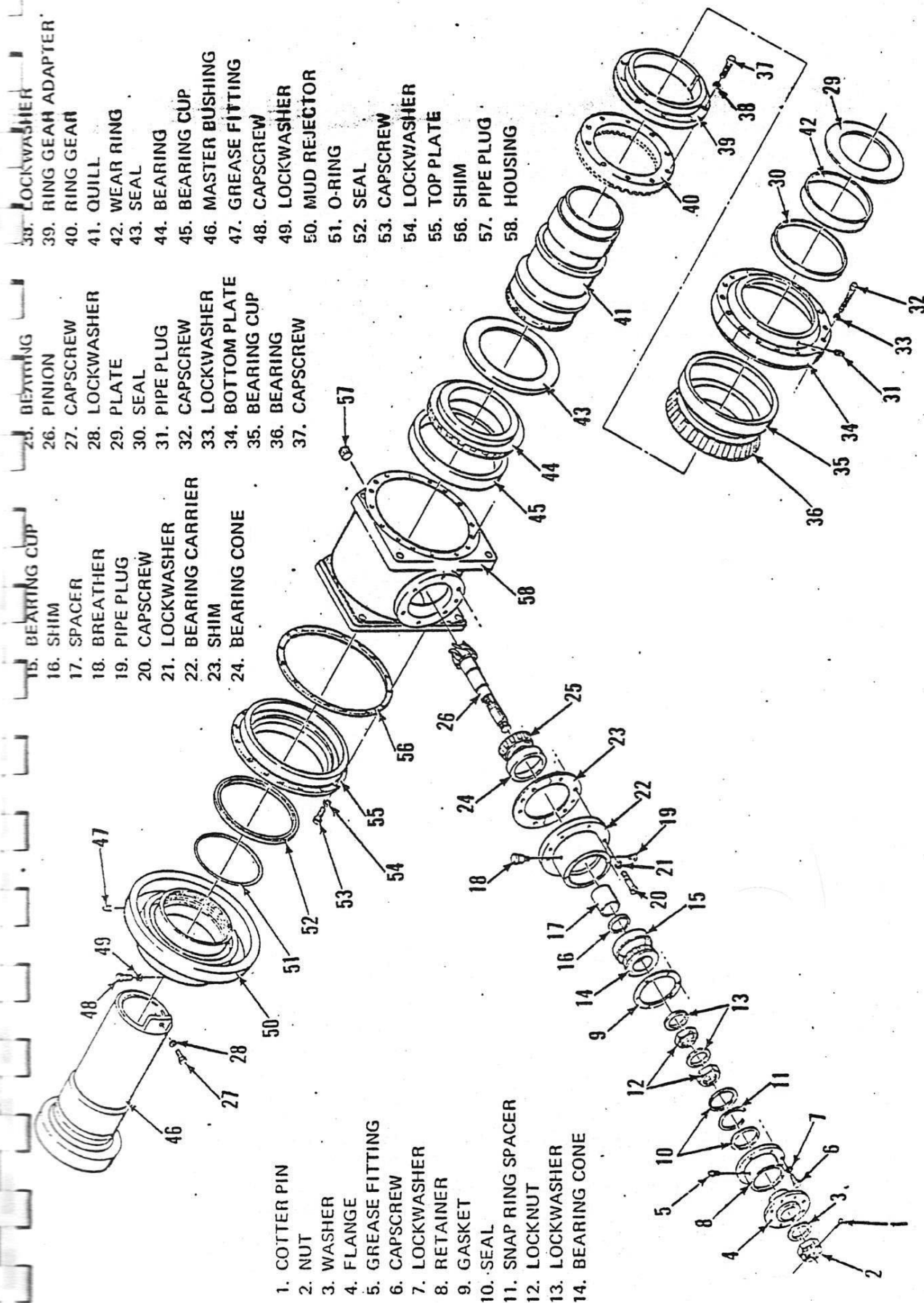


Figure 3-36. Rotary Table Assembly

then allow removal of Item 34 (bottom plate). At this point, use care because the quill, ring gear and bearing assemblies are likely to drop through the table housing. After you have removed the quill, it will be necessary to turn it upside down and press off Item 39 (ring gear adapter) and Item 40 (ring gear). Items 37 (capscrews) can now be removed which will allow Item 40 (ring gear) to be removed. Next, the pinion assembly will need to be disassembled. A vise will probably be required to hold the pinion and prevent rotation. First, remove Item 1 (cotter pin), Item 2 (nut) and Item 4 (flange). It may be necessary to utilize a flange puller since this is a taper fit and could be quite solidly attached. Tapping the puller draw bolt while tightening can sometimes assist in flange removal. Next, remove Items 6 (capscrews) which will allow the removal of Item 8 (retainer). This will expose Items 12 (lock nuts) and Item 13 (lock washers). These washers will need to be unlocked to permit the removal of two lock nuts. Removal of the lock nuts will allow the removal of Items 14 through 26 and complete the teardown of the rotary table. All parts should be cleaned with solvent and dried and laid out on a bench for close visual inspection. If there is bad wearing evident on the teeth of the ring gear and pinion, it will of course be necessary to replace these parts. Since the ring gear and pinion are matched sets, they must be replaced as a set. Usually when there is ring gear and pinion damage there is also upper and lower bearing damage and, unless strong evidence indicates otherwise, it would be prudent to replace the upper and lower bearings and seals at the time of the ring gear

and pinion replacement. Also, the bearings and the seals in the pinion assembly should be looked at very closely and, if there is any cause for doubt, these parts should also be replaced.

B. Reassembly:

All used parts should now be in a clean condition including housing, top and bottom plates, mud rejector, shims, quills, capscrews and all new parts should be checked for proper part number and condition and ready for reassembly. At this point, cleanliness becomes very important. A task of this magnitude cannot be completed properly in a short time so good mechanic's practices should be observed. All parts and assemblies throughout the assembly procedure should be covered with cloths to prevent their contamination by drifting dirt. The pinion assembly should be assembled utilizing Items 12 through 26. Pack Item 14 (cone) and Item 25 (bearing cone) with multi-purpose grease before reassembling. If using a vise to hold Item 26 (pinion) from rotating, be sure to use protection on vise jaws. Tighten Item 12 (locknut) as tight as possible by hand and rotate Item 22 (bearing carrier) while doing so. Check for slop in the bearing carrier. If there is obviously some clearance, use wrench and tighten lock nut until clearance is removed. If this does not remove the excess clearance, it will be necessary to remove some of Item 16 (shim). This shim is laminated and can be removed a few thousandth at a time. CAUTION: Do not remove too much shim since this shim determines your final bearing fit when the lock nuts are tight. Too little shim will result in excessive preload and overheating and probably failure on start-up. With the nuts tight, there should be a light drag felt on the pinion.

bearings. There should be no slip or clearance, only a light drag which can be felt by hand. After this adjustment has been successfully made, reassemble Items 1 through 11 and torque all bolts to recommended limits per attached torque requirements. Set this assembly aside and cover with a cloth to protect from contamination. Item 40 (ring gear) can be reassembled to Item 39 (ring gear adapter) using Item 37 (capscrews). Torque to requirements and lockwire. Make certain that the surfaces of the adapter and ring gear are clean and do assemble flush. Otherwise, probably gear setting will be impossible with Item 41 (quill) upside down. Check the mating surface between the quill and ring gear adapter to make sure they are not burred or rolled to prevent complete flush assembly of these parts. Failure to seat them completely will result in defective assembly. A hydraulic press will need to be utilized at this point and keys and keyways on the ring gear adapter will need to be lined up prior to attempting to press these parts together. Press parts together for solid bottoming fit and check to make certain this has been achieved. Inspect Item 42 (wear ring) for signs of damage. The surface needs to be smooth so it will not damage the mating lip on the grease seal. If it is damaged, it will need to be removed and replaced. Slight imperfections could be dressed out using a very fine emery tape. After packing Item 44 (bearing cone) with grease, assemble Item 43 (seal) and Item 44 (bearing cone) with Item 41 (quill). This should be a light press or a light drive fit. Make certain these parts seat on the gear shoulder. Pack Item 36 (bearing) with grease and press or drive carefully onto the quill below the ring gear. Make certain

the bearing bottoms against the adapter shoulder. Press or tap Item 45 (bearing cup) into Item 55 (top plate) and make sure it bottoms out. Press or tap Item 35 (bearing cup) into Item 34 (bottom plate) and make certain it also bottoms. Assemble Items 31 through 53 into Item 58 (housing). Tighten Items 37 (capscrews) and Item 53 (capscrew) to recommended torque limits. Check the gear assembly for excessive clearance or possible bearing drag. If excessive clearance (no drag is observed, remove small amounts of lamination from Item 56 (shim) until a slight drag is felt on rotation of the gear. Assuming excess, in other words, difficulty of rotation gear by hand would indicate insufficient clearance and lamination will need to be added to Item 56 (shim) until proper bearing fit is attained. Next, assemble the pinion assembly to the housing assembly using Items 20 (capscrews) and Item 25 (shim) and torque up to recommended torque limits. Rotate Item 4 (flange) back and forth to determine backlash between the ring gear and pinion teeth. Some small backlash must be present to prevent excess tooth wear. If you can feel a very light clearance between the teeth, (.008" - .010"), this is sufficient. If excessive clearance is evident between the pinion and ring gear, Item 56 (shim) will need to be removed from the bottom plate and placed under the top plate. Shifting shim locations should not change the bearing fit but will raise the ring gear to cause a decrease in backlash. Laminations can be removed or added to Item 53 (shim) to cause the pinion to achieve the correct mounting distance with the ring gear. Using a suitable

marking compound, the bearing pattern can be checked as shown on the attached sheet. These are the only settings which can be made to the ring gear and pinion and, assuming they have been done correctly, all bolts need to be rechecked for correct tightness and items 30 (seal), 52 (seal), 50 (O ring), 50 (mud rejector), 46 (master bushing, 29 (plate) and 27 (capscrew) can be installed. The rotary table should be filled through item 57 (level block) until the oil level reaches the opening per the lubrication chart. Lubricate items 5 and 47 (grease fittings) per the lubrication chart. The rotary table is now ready to reassemble to the drilling rig in reverse order to which it was removed.

C. Tools Required:

	12" Heavy screwdriver
pr.	Side cutters
	1/2" drive impact wrench
	Allen socket 3/8" Allen to 1/2" drive
	Allen socket 1/2" Allen to 1/2" drive
	Allen socket 5/8" Allen to 1/2" drive
	Adjustable wrench 10"
	Adjustable wrench 15"
	2# ball peen hammer
	Chisel 3/8" width x min. 5" length
	Chisel 5/8" width x min. 7" length
	Punch 1/8" round x min. 5" length (inc. body)
	Punch 1/4" round x min. 7" length (inc. body)
	20 ton capacity hydraulic press
pr.	Snap ring pliers
	1/2" ton hoist or equivalent capacity to remove
	table from rig and hold quill
	Spanner wrench, sized to fit N-9 lock nut
	Knife blade for peeling shims
pr.	Standard pliers
	tube or can #3 Permatex

D. Estimated Time Required to Complete Repair:

12 to 16 hours depending on condition of table.

2. Upper and Lower Bearing - Remove and Replace:

See Items 1-A and 1-B above.

C. Tools Required:

Requires same tools as ring gear and pinion repair.

D. Estimated Time Required to Complete Repair:

10 to 14 hours.

3. Bottom Seal Replacement

A. Disassembly:

Remove Item 27 (capscrew and Item 29 (plate). Drain oil from Item 31 (pipe lug). Seal can probably be removed without removing Item 34 (bottom plate) by skillful use of punch chisel, screwdriver and hammer. Caution should be exercised not to damage the seal housing or the Item 42 (wear ring). After defective seal has been removed, inspect the wear ring and housing bore for damage. Assuming none is present, start the reassembly.

B. Reassembly:

Seal can be tapped in from the bottom side and Item 29 (plate) and Item 27 (capscrew) can be replaced. Refill with oil to Item 57 (plug) level. Assuming the seal cannot be replaced from the bottom side or the wear ring is damaged, the Item 34 (bottom plate) will need to be removed as in 1-A above in order to replace the seal and wear ring.

C. Tools Required:

	Small punch
	Small chisel
	2# hammer
	Large screwdriver
pr.	Standard pliers
	Adjustable wrench
	tube or can #2 Permatex

D. Estimated Time Required to Complete Repair:

45 minutes to 3 hours.

4. Remove and Replace Pinion Bearings

A. Disassembly:

Procedure as in 1-A above.

B. Reassembly:

Procedure as in 1-B above.

C. Tools Required:

- | pr. Side cutters
- | 20 ton press
- | Spanner wrench
- | Adjustable wrench 10"
- | Adjustable wrench 15"
- | Small punch
- | 2# hammer
- | pr. Snap ring pliers
- | 1/2" Drive impact wrench
- | 1/2 Allen socket to 1/2" sq. drive
- | Knife Blade
- | Tube or can #3 Permatex

D. Estimated Time Required to Complete Repair:

1 to 3 hours.