Introduction

The following instructions for Sizes 2040 and 2050 FC/FZ gear drives also apply to Sizes M2040 and M2050 FC/FZ (metric shaft extensions) drives. This is a guide for inspection, disassembly, parts replacement and reassembly of concentric shaft drives. Drawings are representative of this series of drives and may not agree in exact detail with both drive sizes. When ordering parts or requesting information, specify the M.O. number, the drive size, model number, rpm, ratio and the date on the drive nameplate. Consult Factory before changing speed or ratio. Operate only at speeds shown on nameplate.

Recommendations

When replacing a pinion, replace the entire assembly (the pinion, bearings, shaft, spacers, etc.) and the mating gear. Parts will be assembled by the Factory at no extra charge to reduce your assembly and down time. Replace oil seals, shim-gaskets and gaskets when reassembling drives. **When replacing an internal backstop, the mating low speed pinion shaft also must be replaced.**

***CAUTION:** Remove all external loads from drive before servicing drive or accessories.*

Lifting Instructions

Disconnect all attached equipment, drain oil and lift the drive from its foundation by means of a sling wrapped around the shaft extensions. Protect the shaft extensions from damage.

Required Equipment

In addition to standard mechanic's tools, the following equipment is required: hoist, sling, arbor press, wheel puller, torque wrench, feeler gauges, dial indicator with stand, inside and outside micrometers and the appropriate Short Wrench specified in Table 1.

Figure 1 shown

Cut a standard wrench to the dimensions shown

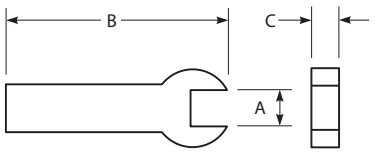


TABLE 1 — "Short Wrench" Dimensions

Dimensions	DRIVE SIZE			
	2040	2050	M2040	M2050
	Inches		mm	
A	1.625	1.625	41,28	41,28
B	7.000	7.750	177,80	196,85
C	.750	.750	19,05	19,05

General Instructions

1. **PRE-DISASSEMBLY** — To prevent dirt from falling into the drive, clean all external surfaces before disassembly. Record mounting dimensions of couplings and accessories for reference when reassembling.
2. **SEALS** — Replacement is recommended. However, if seals are not being replaced, refer to Steps 8A and 8H before starting disassembly.
3. **SHIM-GASKETS** — During disassembly, wire or tie all shim-gaskets and metal shims to their respective end covers or seal cages for reference when reassembling.
4. ***CAUTION:** A number of bored pinions and their mating shafts are keyless. The high interference fit makes these assemblies "solid on shaft" and, for all practical purposes, inseparable. If there is no evidence of a key or keyway, replace the assembly.*
5. **BEARINGS** — All bearings are single row tapered roller. Nomenclature referring to the various bearing parts is shown in Figure 2.

Figure 2

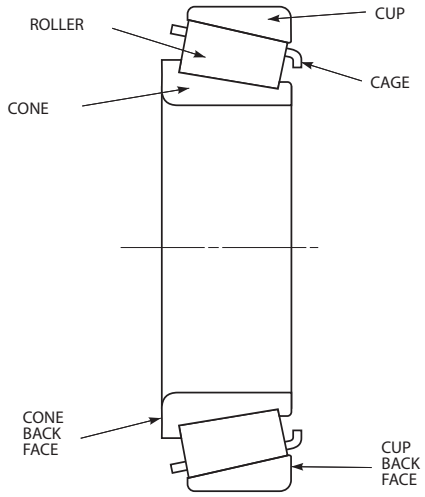
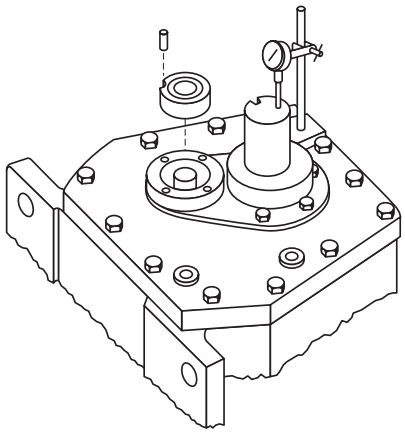


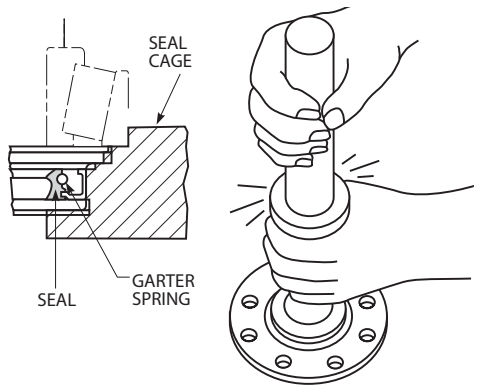
Figure 3



6. **INTERNAL BACKSTOP** — Figure 3.
   A. Remove low speed pinion end cover (backstop cover). Note the direction of shaft rotation for reassembly purposes. On Size 2040, remove metal shims (used for low speed pinion bearing adjustment) from between backstop and backstop cover and keep with cover.
   B. Remove backstop and backstop cage assembly from drive.
7. **HIGH SPEED HEAD INTERMEDIATE SHAFT END COVERS** — Triple and quadruple reduction drives.

   Intermediate shaft end covers (bore plugs) are **NOT** reusable if removed, bore plugs must be removed for intermediate shaft bearing adjustment. If checking intermediate shaft bearing float without disassembly of high speed end, remove bore plug by drilling a 1/8" hole in the center of the plug and install a self threading screw. Remove bore plugs with pliers.

Figure 4



8. **SEAL REPLACEMENT ONLY** — Figure 4.

All shafts have single row tapered roller bearings which require specific shaft axial float or preload settings. Bearing adjustment is achieved with metal shims on the high speed and low speed pinion shafts and with fiber shim-gaskets on the low speed shaft. A .015" (0,38 mm) sealing shim-gasket is used at the high speed seal cage and low speed pinion cover. Bearing adjustment should not be required on the high speed shafts if the original metal shim pack is reused.

If the drive is to be totally disassembled, start with Step 9. If only the seals are to be replaced, proceed as follows:

A. Clean the shaft extensions, but DO NOT ALLOW abrasive material to mar the shaft surface polished by the seal.

B. To replace the low speed shaft seal on drives equipped with internal backstops, the backstop assembly must be removed before the low speed seal cage can be re moved; refer to Step 6.

C. Remove the seal cage assemblies, save the low speed shim-gaskets for reference when reassembling. Save the metal shims used for high speed shaft bearing adjustment as these will be reused at reassembly.

D. Drive out the seal and remove the old sealing compound and gasket material from the seal cages. Replace seal cages that are damaged or bent.

E. Coat seal OD with Permatex #3 or equivalent sealant.

F. Figure 4: Position seal squarely in seal cage with garter spring toward bearing. Place a square ended cylindrical tool against the seal and press or lightly tap the tool (not the seal) until the seal is seated in the seal cage.

G. Clean face of drive. Remove old gasket material. For high speed shafts, replace the old gasket with a new one of the same compressed thickness (bearings should not require adjustment with reuse of the metal shims). Low speed shaft and low speed pinion shaft bearings will require adjustment for preload or float with low speed shaft seal replacement. Replace old low speed shaft shim-gaskets with new ones of the same total thickness and add additional .007" (0,18 mm) and .009" (0,23 mm) shim-gaskets to assure low speed shaft axial float on initial check. See Table 2 for shim-gaskets avail able from Rexnord. Low speed shaft shim packs contain only one .031" (0,79 mm) shim-gasket, the .031" (0,79 mm) shim-gasket must be placed next to the stamped seal cage for positive sealing.

TABLE 2 — Shim-Gasket Compressibility

Falk Shim-Gaskets	Thickness – Inches		Thickness – mm	
	New	Compressed	New	Compressed
Black	.007	.006	0,18	0,15
Black	.009	.008	0,23	0,20
Gray	.015	.013	0,38	0,33
Gray	.031	.026	0,79	0,66

H. ***CAUTION**: Protect seal lips from the sharp edges of the keyway by wrapping thin strong paper around the shaft and coating the paper and seal lips with bearing grease before sliding the seal on or off the shaft. Do not expand the seal lips more than .03" (0,76 mm) larger than shaft diameter.*

J. Install seal cage. Install fasteners with lock washers and tighten finger tight.

K. The low speed seal cages and the high speed seal cage of the 2050F4 are unregistered and require centering on the shaft. Use a feeler gauge to check clearance at 90° intervals between the shaft and seal cage bore. Lightly tap the cage and center it within .004" (0,102 mm).

L. Cross tighten fasteners to torque specified in Table 3.

Figure 5

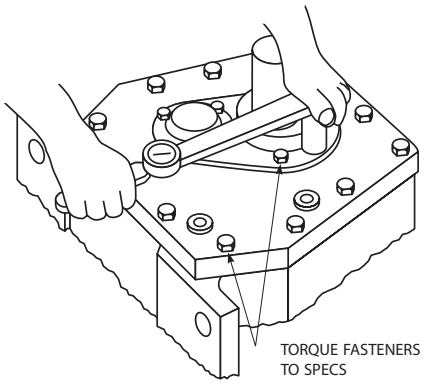


TABLE 3 — Fastener Tightening Torque★

Grade 5 Fasteners with UNC Threads						
Fastener Dia.	5/16	3/8	1/2	5/16	3/8	1/2
	Torque – lb-ft ±5%			Torque – Nm ±5%		
Seal Cages & L.S. Pinion End Cover w/o Backstop	12	22	54	16	30	73
H.S. & L.S. Heads & L.S. Pinion End Cover with Backstop	15	27	67	21	37	91

★DO NOT oil fastener threads or heads.

M. All shafts have single row tapered roller bearings that require specific axial float or preload settings after the seal cages have been installed with new shim-gaskets (gaskets on high speed seal cages) and fasteners tightened to specified torque. Refer to Table 4, Page 3, for bearing float and preload settings. To obtain accurate readings, turn the drive with the shaft being checked vertical and facing up. Attach a “C” clamp to the shaft extension to serve as a push-pull device and measure and adjust axial float or preload as instructed in Step 18 for low speed shafts.

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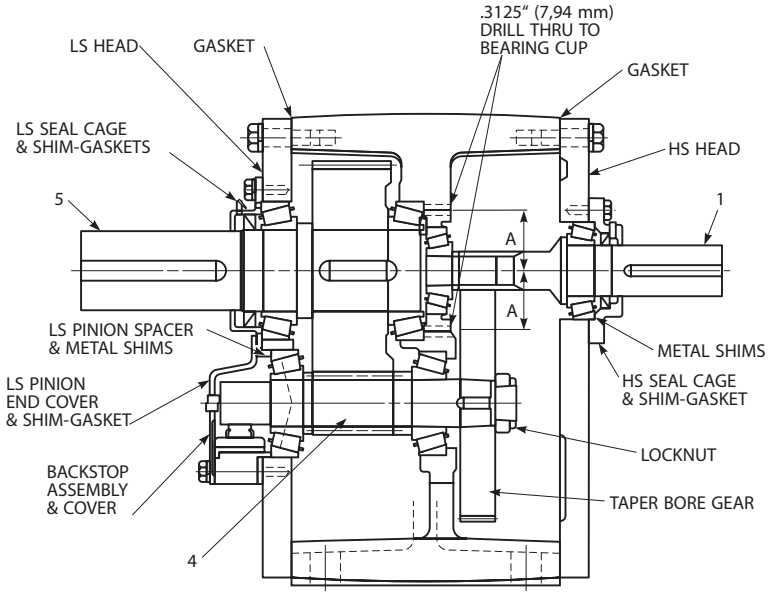
TABLE 4 — Bearing Settings

DRIVE SIZE	Axial Shaft Float: High Speed Double Reduction	High Speed Triple Reduction	High Speed Quadruple Reduction	1st Int. Quadruple Reduction	1st Int. Triple Red. & 2nd Int. Quadruple Red.	Low Speed Pinion†	Low Speed Shaft Axial Float: Preload Ratios 5:1 & Greater‡	Axial Float <5:1
Inches								
2040	.004 .006	.004 .006	.004 .006	.002 .004	.002 .004	.003 .005	.007 .009	.002 .005
2050	.004 .006	.004 .006	.004 .006	.002 .004	.002 .004	.003 .005	.008 .010	.002 .005
mm								
M2040	0,10 0,15	0,10 0,15	0,10 0,15	0,05 0,10	0,05 0,10	0,08 0,13	0,18 0,23	0,05 0,13
M2050	0,10 0,15	0,10 0,15	0,10 0,15	0,05 0,10	0,05 0,10	0,08 0,13	0,20 0,25	0,05 0,13

† .001–.003" (0,025–0,076 mm) float when backstop in on low speed pinion shaft.
‡ Preload values are in terms of shim removal from no-float, no-preload condition.

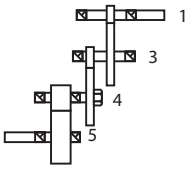
Figure 6



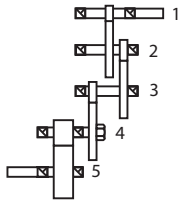
DOUBLE REDUCTION

ASSY. #	DESCRIPTION
1	H.S. PINION ASSY.
2	1ST INT. PINION ASSY.
3	2ND INT. PINION ASSY.
4	L.S. PINION ASSY.
5	L.S. GEAR ASSY.

DIMENSION "A"
SIZE 2040 = 1.60" (40,6 mm)
SIZE 2050 = 1.96" (49,8 mm)



TRIPLE REDUCTION



QUAD REDUCTION

High Speed End Disassembly

9. **ALL REDUCTIONS** — Figure 6.
   A. Support the drive on its low speed face with the high speed shaft extension up. Remove all fasteners from the high speed shaft seal cage and all fasteners from the high speed head.
   B. Protect the seal lips per Steps 8A and 8H if seal is to be reused. Remove the high speed shaft seal cage and exposed metal shims, keep with seal cage.
   C. Install two eyebolts where the two lower high speed seal cage fasteners were removed. Sling head from eyebolts and while lifting, tap edges of high speed head with a brass bar to free the head from the housing gasket and dowels. ***CAUTION****: bearing cups and metal shims are free to and may fall out of the head.*
   D. Secure the taper bore gear locknut (on low speed pinion) with the "short wrench" from Table 1, Page 1. Loosely reassemble the high speed head (with outer bearing cups and metal shims) and the high speed seal cage to the housing. Wrap shim stock or protective material around the high speed shaft extension and turn the shaft with a spanner wrench to loosen the taper bore gear locknut. Turn shaft counterclockwise (when facing end of shaft) on double and quadruple reduction drives and clockwise on triple reduction drives to loosen locknut.
   E. Remove the high speed seal cage, high speed head and "short wrench" from the housing. Remove the high speed and intermediate shaft assemblies; on some drive ratios it is necessary to remove the taper bore gear before the other shaft assemblies can be removed.

F. Remove taper bore gear — Figure 6, Page 3.

The bearing on the outboard end of the low speed pinion is held in place by the low speed pinion cover and can be damaged by striking the shaft to loosen the taper bore gear. Leave the locknut loosely threaded on the shaft to prevent the taper bore gear from popping out of the drive when released from the shaft. If the gear is to be reused, protect the gear teeth with brass or copper sheets. Using wedges or pry bar, tap wedges behind gear or pry gear away from housing inner wall. While holding pressure on gear, lightly tap around the gear web area with a hammer until gear breaks loose.

G. Remove locknut and taper bore gear.

H. Remove bearing cups, metal shims, bore plugs, and retaining rings from the high speed head, keep bearing cups and metal shims together for reference when reassembling. The bore plugs cannot be reused.

Low Speed End Disassembly

10. **ALL REDUCTIONS** — Figure 6, Page 3.

A. Support the drive on its high speed face with the low speed shaft vertical with extension up. Remove the low speed seal cage and low speed head fasteners. On backstop equipped drives remove the backstop and cage assembly; refer to Step 6.

B. If the low speed seal is to be reused, protect the seal lips per Steps 8A and 8H. Remove the low speed pinion shaft end cover and low speed shaft seal cage.

C. Install two eyebolts in two centrally located seal cage fastener tapped holes in the low speed head. Sling head from eyebolts and, while lifting, tap the edge of the head with a brass bar to loosen the head from the housing gasket and dowels.

D. Remove the low speed pinion assembly from the housing, keep the metal shims with the outer bearing cup for reference at reassembly.

E. Remove the low speed shaft assembly.

Cleaning, Inspection & Replacement of Parts

11. **CLEAN HOUSING, HEADS & ATTACHMENTS.**

A. Remove gasket material from sealing surfaces.

B. Clean oil chamber and all internal revolving elements with kerosene or solvent.

C. Remove all burrs.

D. Coat pipe plugs with Permatex #3 or equivalent sealant before installing.

12. **SEALS**.

Drive out old seals and remove old sealing compound from seal cage bores. DO NOT replace seals at this time.

13. **BEARINGS**.

A. Wash the bearings in clean kerosene or solvent and then dry. Do not spin the bearing cones for they may score due to lack of lubricant.

B. Inspect bearings carefully and replace all that are worn or damaged.

C. If bearings need replacement, use a wheel puller or press to remove them. Apply force to cup and cone back faces only. Refer to Figure 6, Page 3, for a method of removing the low speed bearing cup from the housing center wall (drilled holes in housing wall for drift punch access to bearing cup back face).

D. To mount bearing cones on their respective shafts, heat in a bearing oven or oil bath to a maximum temperature of 275°F (135°C).

CAUTION: Do not apply flame directly to bearing cones or rest them on the bottom of the heated container.

E. Thoroughly coat all bearings with lubricating oil after they have cooled.

14. **GEAR AND PINION REPLACEMENT**

A. Wash the pinions and gears in clean kerosene or solvent and inspect for damaged or worn teeth.

B. **KEYED ELEMENTS** — Assemble straight bored pinions and gears (with keys) to their respective shafts with the chamfered side toward the shaft gear seat shoulder. Preheat pinions and gears to 325°F (163°C) maximum and then assemble to shaft, seat tight against shaft shoulder with press.

C. **KEYLESS ELEMENTS** — Replace keyless pinion assemblies (low ratio F2 low speed pinions) and shaft assemblies with keyless straight bore gears (Quadruple reduction first intermediate shafts) as a factory assembly if the pinion, gear, or shaft is worn or damaged.

D. Do not mount taper bore gear at this time.

15. **FASTENERS**

A. Remount lock washers on external fasteners during reassembly. When replacing fasteners, use the identical grade and type as furnished in the original assembly.

B. Replace used locknuts with new ones to assure maximum holding capacity. Before installing, dip the locknut in SAE 20 or heavier oil.

16. **GASKETS, SHIM-GASKETS & METAL SHIMS**

A. Use new large housing gaskets and new gaskets under the high speed seal cage and low speed pinion end cover. New gaskets are available from the Factory.

B. Use all new shim-gaskets under the low speed seal cage. Shim-gaskets in thicknesses of .007" (0,18 mm), .009" (0,23 mm) and .031" (0,79 mm) (Table 2, Page 2) are available from the Factory. Always place the .031" (0,79 mm) shim-gasket next to the low speed seal cage for positive sealing.

C. Metal shims are used for bearing adjustment on all shafts except the low speed shaft. Metal shims are reusable if not damaged, new metal shims in thicknesses of .002" (0,05 mm), .005" (0,13 mm), .010" (0,25 mm) and .030" (0,76 mm) are available from the Factory.

D. Intermediate shaft bore plugs must be removed from the high speed head for intermediate shaft bearing adjustment and cannot be reused, new bore plugs are available from the Factory.

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Drive Assembly

17. **PRELIMINARY.**

All parts must be clean. Pay particular attention to the inside of the housing to see that all foreign matter has been removed. Check to see that all worn or damaged parts have been replaced and that all gears and bearings are coated with oil. Mount lock washers on all fasteners during reassembly.

18. **ALL REDUCTIONS** — Figure 6, Page 3.

A. Support the housing on its high speed face with the low speed face up. Install the low speed shaft and low speed pinion inner bearing cups in the housing inner wall, seat against housing bore back faces.

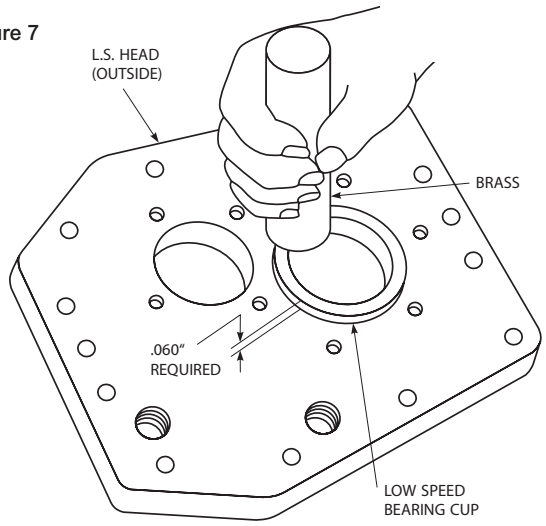
B. Assemble low speed shaft subassembly and low speed pinion subassembly into the housing.

C. Position one gasket on the housing flange

D. Install the low speed shaft and low speed pinion shaft bearing cups in the low speed head, leave the low speed shaft bearing cup back face extending .060" (1,52 mm) protruding from the low speed head outside face per Figure 7 and leave the low speed pinion bearing cup flush with the inside face of the low speed head.

E. Place the low speed head onto the housing cover over the shaft assemblies and tap into position onto the housing dowels.

Figure 7



F. Install the low speed head mounting fasteners with lock washers and cross tighten to torque specified in Table 3, Page 2.

G. Lightly tap low speed shaft and low speed pinion bearing cups inward to reduce shaft float to a minimal value. Install low speed shaft seal cage (without seal) with a shimpack of sufficient thickness to assure shaft float on initial check. Install seal cage fasteners with lock washers and cross tighten to torque specified in Table 3, Page 2.

19. **LOW SPEED SHAFT BEARING ADJUSTMENT (PRELOAD)** — Figure 3, Page 1.

NOTE: F2 drives with gear ratios less than 4.9:1 have low speed shaft bearings set with axial float.

A. Determine the total low speed shaft axial float with a dial indicator. Rotate and apply force to shaft in both directions to obtain accurate float measurements, be sure outer bearing cone is seated against seal cage face.

B. Add the measured axial float to the preload limits shown in Table 4, Page 3. Remove shims that will total to a value within the above preload limit. DO NOT remove the one .031" (.79 mm) shim-gasket that is next to the low speed seal cage.

C. **EXAMPLE IN INCHES**:

1 A size 2040F low speed shaft has a measured axial float of .006". From Table 4, Page 3, the specified preload is .007" to .009".

2. Total required shim removal is .013" to .015" or (.006" + .007") to (.006" + .009").

3. Assuming shim pack is composed of: (2) .007" (.006" compressed) = .012"
(2) .009" (.008" compressed) = .016"
(1) .031" (.026" compressed) = .026"
TOTAL = .054" compressed

4. Remove:
(1) .007" (.006" compressed) = .006"
(1) .009" (.008" compressed) = .008"
TOTAL = .014" compressed

5. Therefore, .006" axial float minus .014" shim removal results in .008" preload.

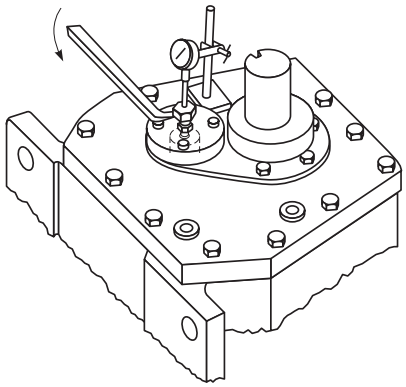
D. Install seal in seal cage and reassemble seal cage to drive per steps 8E through 8L.

20. **LOW SPEED PINION BEARING ADJUSTMENT (FLOAT) — DRIVES WITHOUT BACKSTOPS**

A. Install spacer in housing low speed pinion bore. Assemble low speed pinion cover with one .015" (0,38 mm) gasket (two .015" (0,38 mm) gaskets on low ratio drives with flat pinion covers) to housing. Install fasteners with lock washers and tighten to torque specified in Table 3, Page 2.

B. Thread a .375-16UNC hex head fastener into the low speed pinion through the tapped hole in the pinion cover, tighten until fastener threads bottom in pinion tapped hole (Figure 8).

Figure 8



C. Lightly tap shaft assembly on fastener head to seat inner bearing. Place dial indicator tip on fastener head (Figure 8, Page 5) and pry up on underside of fastener head to measure shaft axial float, be sure outer bearing cup is seated against spacer and shaft cover.

D. Remove fastener from pinion and remove end cover and spacer. Subtract axial float specified in Table 3, Page 2, from the measured axial float and add metal shims to make up the difference between the measured and specified axial float, place the metal shims between the bearing cup and spacer.

E. Repeat Steps 20A through 20D until low speed pinion shaft float setting is within the range specified in Table 3, Page 2.

21. **LOW SPEED PINION BEARING ADJUSTMENT — SIZE 2040 DRIVE WITH INTERNAL BACKSTOP.**

A. Coat outside diameter of backstop with SAE 20 or heavier oil and assemble backstop into cage without key in correct direction of shaft free rotation.

B. Assemble spacer into housing low speed pinion bore. Assemble backstop cage assembly with one .015" (0,38 mm) shim-gasket onto housing, rotate shaft while sliding backstop onto pinion extension. Place one .030" (0,76 mm) metal shim onto the outboard face of the backstop. Install backstop cover with two .015" (0,38 mm) shim-gaskets, install fasteners with lock washers and tighten to torque specified in Table 3, Page 2.

C. Thread a .375-16UNC hex head fastener into the low speed pinion through the tapped hole in the backstop cover, tighten until fastener threads bottom in pinion tapped hole (Figure 8, Page 5).

D. Lightly tap shaft assembly on fastener head to seat inner bearing. Place dial indicator tip on fastener head and pry up on underside of fastener head to measure shaft axial float, be sure outer bearing cup is seated against spacer, backstop and backstop cover.

E. Remove fastener from pinion and remove backstop cover. Subtract axial float specified in Table 4, Page 3, from the measured axial float and add metal shims to make up the difference between the measured and specified axial float, place the metal shims between the backstop and backstop cover with a .030" (0,76 mm) shim next to the cover.

F. Reinstall backstop cover with the two shimgaskets per Step 21B and repeat Steps 21C through 21E until low speed pinion shaft float setting is within the range specified in Table 3, Page 2. The backstop key cannot be installed until after the drive high speed end is completely assembled.

22. **LOW SPEED PINION BEARING ADJUSTMENT — SIZE 2050 WITH INTERNAL BACKSTOP.**

On the Size 2050F drive with backstop, the low speed pinion axial float is set without the backstop installed in the backstop cage. The backstop is installed after drive assembly is complete.

A. Assemble backstop cage to housing with one .015" (0,38 mm) shim-gasket on the inboard side. Assemble backstop cover with two .015" (0,38 mm) shim-gaskets to drive. Install cage fasteners with lock washers and tighten to torque specified in Table 3, Page 2.

B. Thread a .375-16UNC hex head fastener into the low speed pinion through the tapped hole in the backstop cover, tighten until fastener threads bottom in pinion tapped hole (Figure 8, Page 5).

C. Lightly tap shaft assembly on fastener head to seat inner bearing. Place dial indicator tip on fastener head and pry up on underside of fastener head to measure shaft axial float, be sure outer bearing cup is seated against the backstop cage.

D. Remove fastener from pinion and remove backstop cover and cage. Subtract axial float specified in Table 4, Page 3, from the measured axial float and add metal shims to make up the difference between the measured and specified axial float, place the metal shims between the outer bearing cup and the backstop cage.

E. Reinstall backstop cage and cover with the shimgaskets per Step 22A and repeat Steps 22B through 22D until low speed pinion shaft float setting is within the range specified in Table 4, Page 3. The back stop and backstop key cannot be installed until after the drive high speed end is completely assembled.

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High Speed End Assembly

23. ALL REDUCTIONS

In the following steps, the high speed and intermediate shafts are temporarily installed in the drive and bearings adjusted before the taper bore gear is installed on the low speed pinion shaft and the nut tightened via the "short wrench" method through the gear train. On double reduction drives where the high speed pinion assembly inner bearing cone clears the taper bore gear in its final position, the gear may be installed and nut directly tightened before the high speed shaft and high speed head are installed.

Refer to Table 5 (direct torque on nut) and Table 6 (torque at high speed shaft to tighten nut) for taper bore gear locknut tightening torques.

A. Support the drive on its low face with the high speed face up.

B. Install high speed shaft and intermediate shaft inner bearing cups in the housing inner wall, seat against housing bore shoulders. Simultaneously assemble the high speed and intermediate shaft subassemblies into the housing.

C. Place high speed head gasket onto housing high speed face. Sling high speed head from eyebolts in high speed seal cage fastener holes and assemble to housing, tap into place over housing dowels. Install head fasteners with lock washers and tighten to torque specified in Table 3, Page 2.

D. Install high speed and intermediate shaft outer bearing cups into head bores, tap into place — be careful not to damage bearing cone roller cages. Install spacer next to 2050F4 high speed shaft bearing cup. Install one .030" (0,76 mm) metal shim and a bearing cup retaining ring in each intermediate shaft bore. Assemble high speed seal cage (without seal and metal shims) to drive with one .015" (0,38 mm) sealing shim-gasket. Install seal cage fasteners with lock washers and tighten to torque specified in Table 3, Page 2.

24. HIGH SPEED & INTERMEDIATE SHAFT BEARING ADJUSTMENT.

Bearing adjustment is via metal shims located between the outer bearing cup back face and retaining ring on intermediate shafts and between the outer bearing cup and seal cage (spacer on 2050F4) on high speed shafts.

A. On intermediate shafts, thread a hex head fastener (.375-16UNC and .250-20UNC used) into the shaft end, tighten until fastener threads bottom in shaft tapped hole. Tap shaft assembly on fastener head to seat on inner bearing. Place dial indicator tip on fastener head and pry up on underside of fastener head to measure shaft axial float, be sure that outer bearing cup is seated tight against shim and retaining ring. Subtract axial float specified in Table 4, Page 3, from the measured float and add that amount of metal shims between the bearing cup and retaining ring, the .030" (0,76 mm) shim must remain next to the retaining ring.

TABLE 5 — Locknut TighteningTorque ●

DRIVE SIZE	lb-ft ±5%	Nm ±5%
2040	132	179
2050	150	203

● The complete nut must be coated with SAE 20 or heavier mineral oil.

TABLE 6 — Taper Shaft Locknut ■

Ratio	Torque at High Speed Shaft			
	lb-ft ±5%		Nm ±5%	
	2040	2050	M2040	M2050
1.50	107	122	145	165
1.84	86	99	117	134
2.03	86	122	117	165
2.25	71	80	96	108
2.49	71	99	96	134
2.76	58	67	79	91
3.05	58	80	79	108
3.38	48	55	65	75
3.74	48	67	65	91
4.13	38	45	51	61
4.57	38	55	51	75
5.06	107	122	145	165
6.20	86	99	117	134
7.59	71	80	96	108
9.30	58	67	79	91
11.39	48	55	65	75
13.95	38	45	51	61
17.09	31	37	42	50
20.93	27	30	37	41
25.63	21	24	28	33
31.39	18	20	24	27
38.44	14.4	16.2	19,5	22
47.08	11.9	13.4	16,1	18,2
57.66	9.5	11.0	12,9	14,9
70.62	7.8	8.9	10,6	12,1
86.50	6.6	7.2	8,9	9,8
105.9	5.2	5.9	7,0	8,0
129.7	4.4	4.8	6,0	6,5
158.9	3.4	3.9	4,6	5,3
194.6	2.9	3.3	3,9	4,5
238.4	2.3	2.6	3,1	3,5
291.9	1.9	2.1	2,6	2,8
357.5	1.56	1.78	2,10	2,41
437.9	1.29	1.46	1,75	1,98
536.3	1.03	1.20	1,40	1,63
656.8	.85	.97	1,15	1,31
804.5	.72	.79	0,98	1,07
985.3	.56	.64	0,78	0,87

■ The complete nut must be coated with SAE 20 or heavier mineral oil.

B. On high speed shafts, attach a "C" clamp to the shaft extension as a push-pull device to measure shaft float. Place dial indicator tip on shaft extension end and apply force to shaft in both directions to measure shaft float, be sure the outer bearing cup is seated against the seal cage. Subtract the shaft float specified in Table 4, Page 3, from the measured float and add that amount of metal shims, place the metal shims between the bearing cup and seal cage or spacer.

C. On intermediate shafts, remove the retaining ring and .030" (0,76 mm) shim, install the added shims and reinstall the .030" (0,76 mm) shim and retaining ring.

On high speed shafts, remove the seal cage (and spacer on the 2050F4), install the shims from Step B and reinstall the seal cage.

Repeat Steps A and B until the measured shaft axial float is within the range specified in Table 4, Page 3.

25. **INSTALLATION OF TAPER BORE GEAR**.

A. Remove high speed head. Remove shaft assemblies if required to place taper bore gear on low speed pinion shaft. Install taper bore gear key and gear; gear may require simultaneous assembly with other shafts. Install taper bore gear locknut and tighten until locking collar engages shaft threads; place "short wrench" on locknut. Reinstall other shafts (if not previously installed) and reassemble the high speed head to the drive. Tighten taper bore gear locknut through the gear train by rotating the high speed shaft clockwise on double and quadruple drives and counterclockwise on triple reduction drives. Nut tightening torques referred to the high speed shaft are listed in Table 6, Page 7.

B. Remove high speed head and remove "short wrench." Reinstall head and tighten head fasteners to specified torque. Recheck high speed and intermediate shaft axial floats and reshim if necessary. Remove high speed seal cage. Install bore plugs. Install rubber covered plug with flat surface out, locate flat surface flush with high speed head outside face. Install metal expansion plug (used in quadruple reduction first intermediate shaft bore), tap center flat to seat and seal. Install seal in high speed seal cage, reinstall seal cage and tighten fasteners to specified torque, refer to Steps 8E through 8L.

26. **BACKSTOP EQUIPPED DRIVES**.

Place drive on its feet with the low speed end tilted slightly up.

A. On Size 2040, remove backstop cover, shim-gaskets and metal shims. Install backstop key, rotate high speed shaft in backstopping direction to align back stop keyslots (be sure backstop is installed for correct direction of free shaft rotation). Reinstall metal shims and backstop cover with the two .015" (0,38 mm) shim-gaskets. Install and tighten fasteners to torque specified in Table 3, Page 2.

B. On Size 2050, remove backstop cover, backstop cage and shim-gaskets from drive (metal shims remain in place next to bearing). Install retaining ring on out board side of backstop (after determining desired direction of free shaft rotation as indicated by arrow on backstop — low speed shaft rotates in opposite direction). Install backstop and backstop key into backstop cage. Reassemble backstop cage with backstop to drive with the same .015" (0,38 mm) shim-gasket at the inboard side, rotate drive shafts in the overrunning direction while sliding the backstop assembly onto the low speed pinion shaft. Install the backstop cover with the two .015" (0,38 mm) shim-gaskets. Install and tighten fasteners to torque specified in Table 3, Page 2.

26. **GREASE LUBRICATED SEALS**

Refer to manual 318-100.

Installation

27. **DRIVE INSTALLATION**

A. Turn gear train over by hand as a final check.

B. Re-install drive and accessories per installation and maintenance Manual 318-100.

C. Fill drive with oil to the level indicated on the dipstick, stand pipe or oil level plug. Refer to Manual 318-100 for recommended lubricants

***CAUTION**: Consult applicable local and national safety codes for proper guarding of rotating members.*

D. Run drive without load. If drive temperature rises more than 65°F (36°C) above ambient temperature in four hours, recheck shimming of bearings.

E. After drive runs satisfactorily, apply load. Inspect periodically until operation is deemed satisfactory. Fol low preventive maintenance instructions in Manual 318-100.

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