DANA SPICER®
Off-Highway Products

Service Manual

Industrial Planetary Axles - Heavy
Planetary Rigid
53R300

Allied Form # 80-853 Rev 2-2011

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CONTENTS

INTRODUCTION

Foreword

This manual has been prepared to provide the customer and maintenance personnel with information and instructions on the maintenance and repair of Dana Products.

Extreme care has been exercised in the design and selection of materials and manufacturing of these units. The slight outlay in personal attention and cost required to provide regular and proper lubrication, inspection at stated intervals, and such adjustments as may be indicated will be reimbursed many times in low cost operation and trouble free service.

In order to become familiar with the various parts of the product, its principle of operation, troubleshooting, and adjustments, it is urged that mechanics study the instructions in this manual carefully and use them as a reference when performing maintenance and repair operations.

Whenever repair or replacement of component parts is required, only Dana approved parts, as listed in the applicable parts manual, should be used. Use of “will fit” or non-approved parts may endanger proper operation and performance of the equipment. Dana does not warrant repair, replacement parts, or failures resulting from the use of parts, which are not supplied or approved by Dana. Important: Always furnish serial and model numbers when ordering parts.

Safety Precautions

To reduce the chance of personal injury and/or property damage, the following instructions must be carefully observed. Proper service and repair are important to the safety of the service technician and the safe, reliable operation of the machine. If replacement parts are required, the part must be replaced with a Dana specified replacement part. Do not use a replacement part of lesser quality.

The service procedures recommended in this manual are effective methods of performing service and repair. Some of these procedures require the use of purpose designed tools. Accordingly, anyone who intends to use a replacement part, service procedure, or tool, which is not recommended, must first determine that neither their safety or the safe operation of the machine will be jeopardized by the replacement part, service procedure, or tool selected.

It is important to note that this manual contains various “Cautions and Notices” that must be carefully observed in order to reduce the risk of personal injury during service or repair. Improper service or repair may damage the unit or render it unsafe. It is important to understand that these “Cautions and Notices” are not exhaustive. It is impossible to warn of all possible hazardous consequences that may result from following or failing to follow these instructions.

DESCRIPTION

The axle assembly has a bevel type ring gear and pinion with further reduction provided by a planetary gear set within the wheel hub.

Primary Reduction

The spiral bevel pinion and ring gear transmit power through the center differential pinions, side gears, and to the axle shaft. The spiral bevel differential assembly is mounted on tapered roller bearings, which are adjusted by the positioning of the two threaded adjusting nuts mounted in the differential carrier and cap assembly. The pinion bearing preload is adjusted and maintained by a hardened and precision ground spacer. The spacer is selected at assembly.

Secondary Reduction

In the wheel hub, a self-centering sun gear is spline fitted to the axle shaft and drives three planetary pinion gears. These gears, in turn, mesh with and react against a rigidly mounted internal ring gear. The planet gears rotate on needle roller bearings mounted on hardened and ground pins located in the planet carrier, which, in turn, drive the wheel hub. Positive lubrication keeps all moving parts bathed in lubricant to reduce friction, heat, and wear.

Liquid Cooled Brakes

The liquid cooled brake is ideal for use in contaminated or temperature sensitive environments and in machines where extra long maintenance intervals are required. Braking action is achieved through the application of the hydraulic piston with the rotating friction surfaces, which react with stationary stator plates. The stator plates are retained by scalloped tangs at the outside diameter, which, in turn, transfer the reaction torque to the rigid outside housing.

Hub splines are long enough to engage all friction discs before bearings or seals are set. This provides ease of service reassembly.

Wheel bearings are serviced as in any normal bearing service procedure.

Posi-Stop (LCB) Liquid Cooled Brakes

The liquid cooled brake is ideal for use in contaminated or temperature sensitive environments and in machines where extra long maintenance intervals are required. Braking action of the Posi-Stop LCB is achieved through the application of the hydraulic piston and brake apply springs with the rotating friction surfaces which react with stationary stator plates. The stator plates are retained by scalloped tangs at the outside diameter, which in turn transfer the reaction torque to the rigid outside housing.

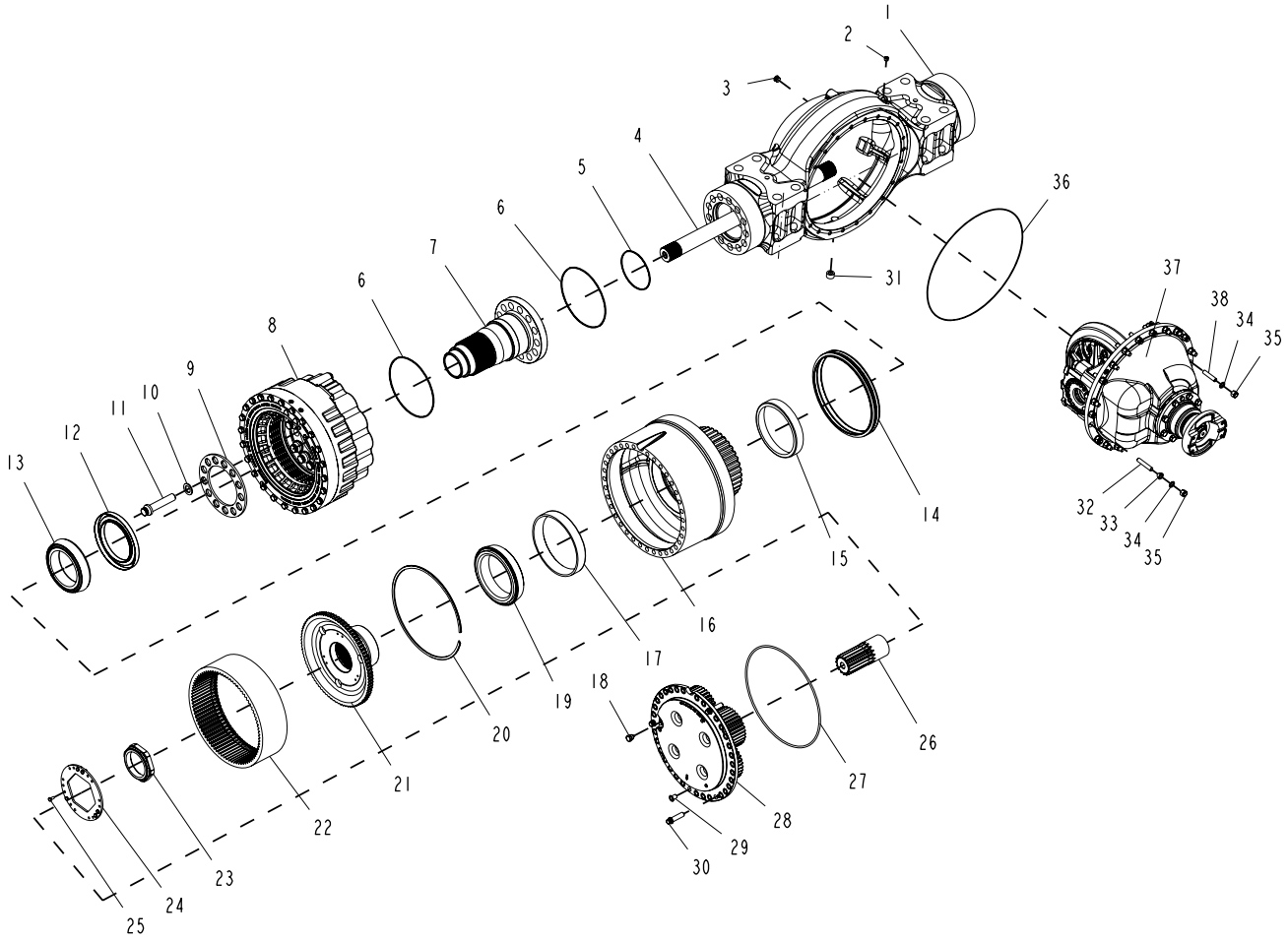
Hub splines are long enough to engage all friction discs before bearings or seals are set. This provides ease of service reassembly.

Wheel bearings are serviced as in any normal bearing service procedure.

EXPLODED VIEWS

Axle Assembly

Pad Mounting

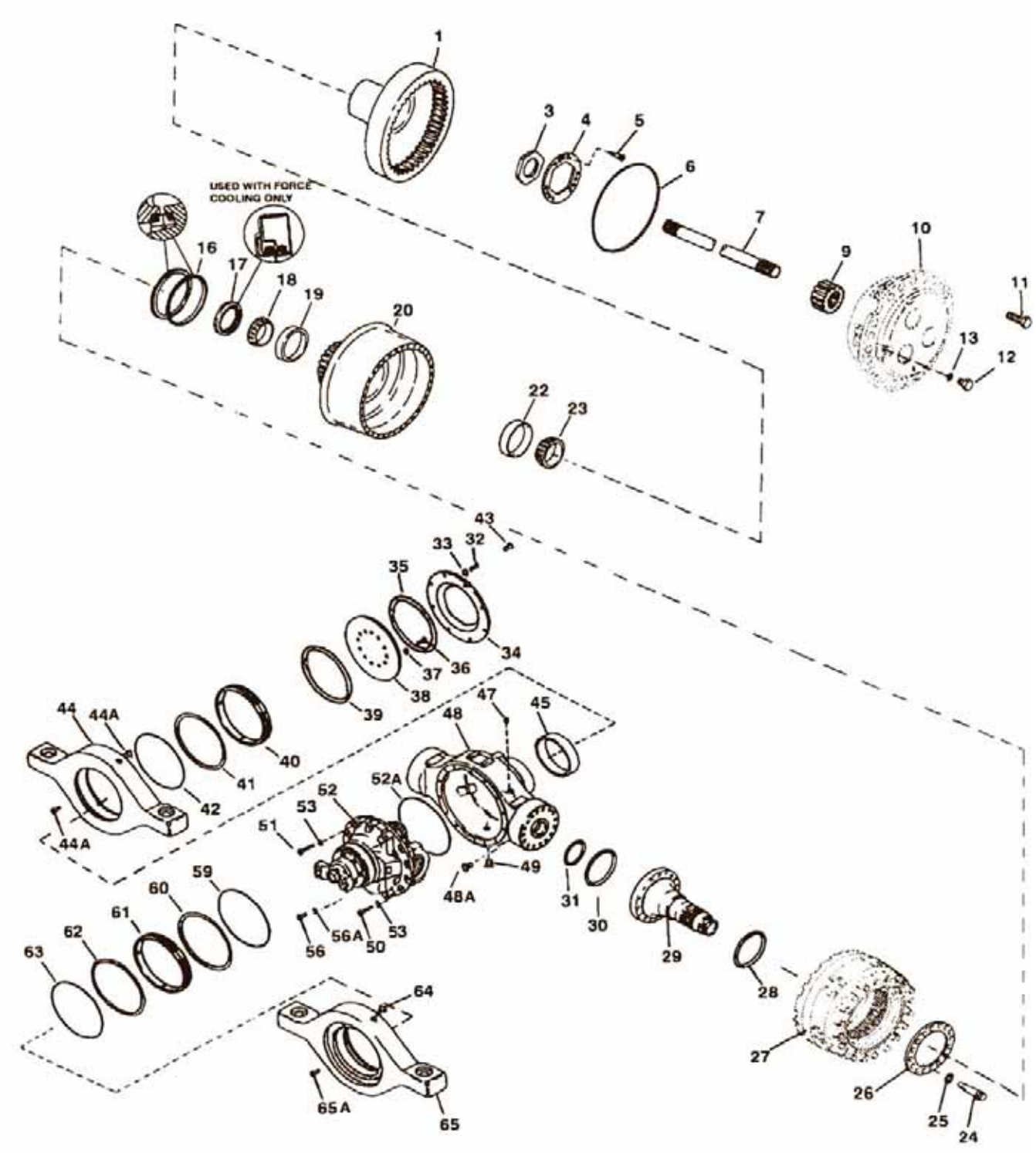


ITEM	DESCRIPTION	QTY
1	Axle Housing	1
2	Plug	1
3	Plug	1
4	Axle Shaft	2
5	Ring seal	2
6	Square Cut Seal	4
7	Spindle	2
8	Brake Assembly	2
9	Spindle Ring	2
10	Washer	26
11	Capscrew	26
12	Hub Oil Seal	2
13	Cone Bearing	2
14	Face Hub Seal	2
15	Bearing - Cup	1
16	Wheel Hub	1
17	Bearing Cup	1
18	Plug	2
19	Cone Bearing	2

ITEM	DESCRIPTION	QTY
20	Snap Ring	1
21	Internal Gear Hub	1
22	Internal Ring Gear	1
23	Nut	2
24	Lock Plate	2
25	Hex Bolt	12
26	Sun Gear	2
27	O-Ring Seal	2
28	Carrier Planet Assembly	2
29	Plug	64
30	Capscrew	6
31	Plug	1
32	Stud	12
33	Taper Dowel	12
34	Washer	22
35	Locknut	22
36	O-Ring	1
37	Differential and Carrier Assembly	1
38	Stud	10

Axle Assembly

Trunnion Mounting

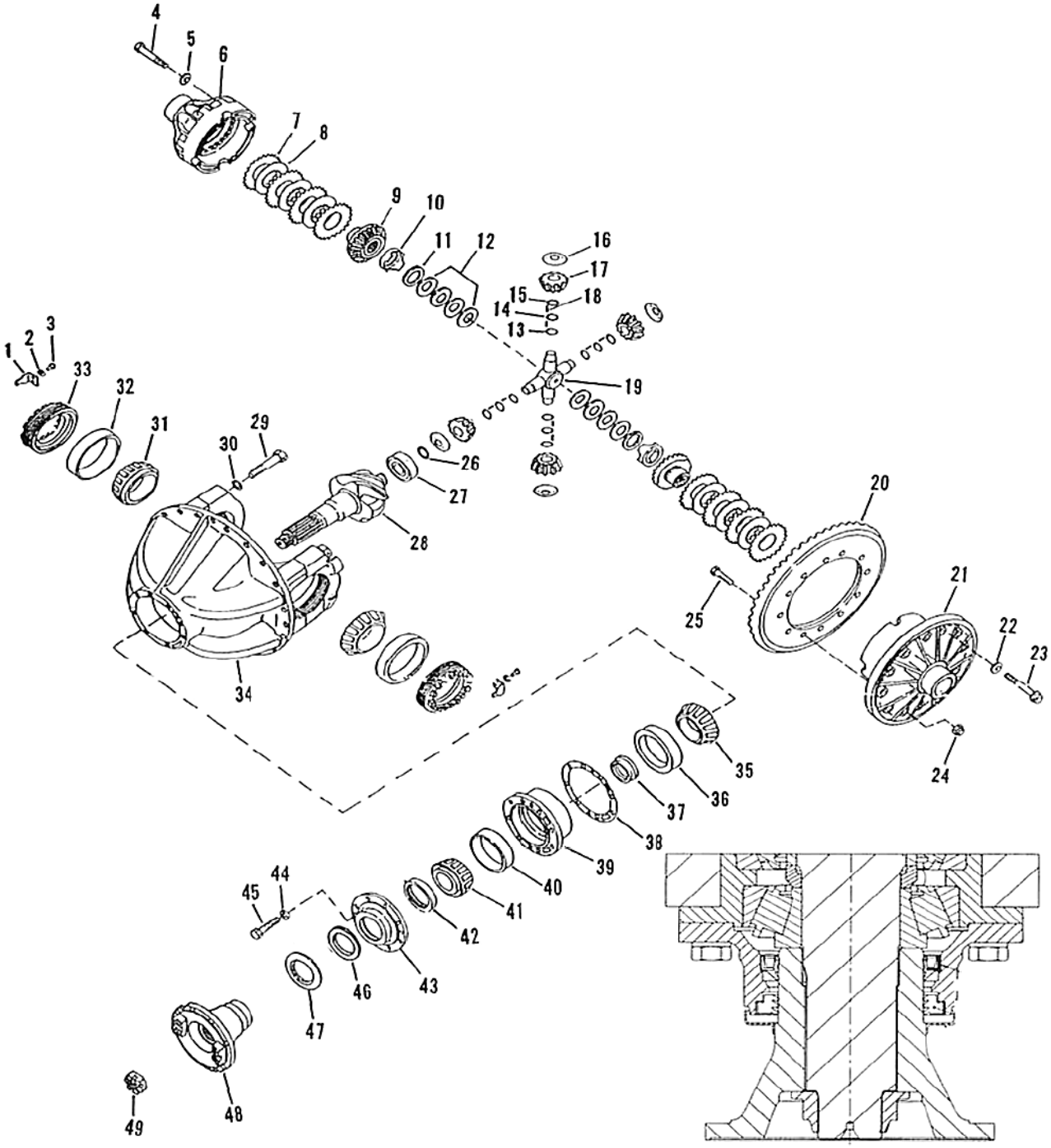


ITEM	DESCRIPTION	QTY
1	Internal Gear and Hub	2
3	Bearing Adjusting Nut	2
4	Bearing Adjusting Nut Lock	2
5	Bearing Adjusting Nut Lock Screw	12
6	Planetary O-Ring	2
7	Axle Shaft	2
9	Sun Gear	2
10	Planetary Assembly	2
11	Planetary Retaining Screw	6
12	Planetary Magnetic Plug	2
13	Planetary Magnetic Plug O-Ring	2
16	Hub Face Seal	2
17	Hub to Spindle Seal	2
18	Hub Inner Bearing Cone	2
19	Hub Inner Bearing Cup	2
20	Wheel Hub	2
22	Hub Outer Bearing Cup	2
23	Hub Outer Bearing Cone	2
24	Spindle Screw	26
25	Spindle Screw Washer	26
26	Spindle Reinforcing Ring	2
27	Brake Assembly	2
28	Brake to Spindle Seal Ring	2
29	Spindle	2
30	Spindle Outer Seal Ring	2
31	Spindle to Axle Housing Seal Ring	2
32	Retainer Screw	20
33	Retainer Screw Washer	20
34	Thrust Plate Retainer	1
35	Thrust Washer	1

ITEM	DESCRIPTION	QTY
36	Thrust Plate Screw	16
37	Thrust Plate Washer	16
38	Thrust Plate	1
39	Thrust Washer	1
40	Trunnion Bushing	1
41	Wiper Seal	1
42	O-Ring	1
43	Rear Trunnion Vent	1
44	Rear Trunnion Support	1
44A	Trunnion Plug	2
45	Axle Housing Rear Wear Sleeve	1
47	Vent Plug	1
48	Axle Housing	1
48A	Fill Plug and O-Ring	1
49	Drain Plug and O-Ring	1
50	Diff. and Carrier Attaching Screw	20
51	Diff. and Carrier Attaching Screw	2
52	Diff. and Carrier Attaching Screw	1
52A	Diff. and Carrier Seal Ring	1
53	Diff. and Carrier Screw Washer	22
56	Diff. Puller Hole Screw	4
56A	Diff. Puller Hole Screw Washer	4
59	Wiper Seal O-Ring	1
60	Wiper Seal	1
61	Trunnion Bushing	1
62	Wiper Seal	1
63	Wiper Seal O-Ring	1
64	Front Trunnion Support Vent	1
65	Front Trunnion Support	1
65A	Front Trunnion Support Plug	1

Differential and Carrier Assembly

Posi-Torq with Spring

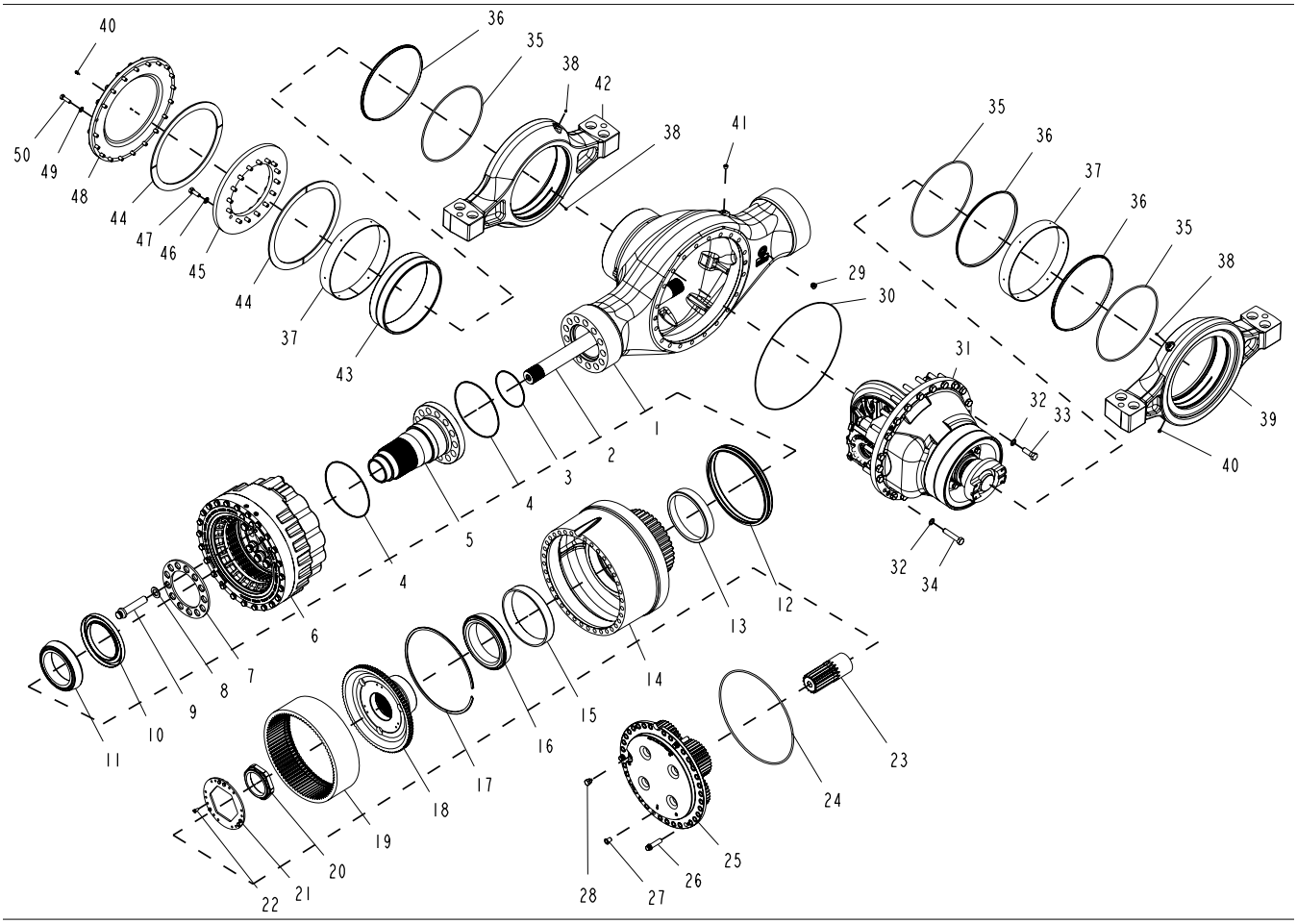


Differential and Carrier Assembly

ITEM	DESCRIPTION	QTY
1	Adjusting Nut Lock	2
2	Nut Lock Screw Lock Washer	2
3	Adjusting Nut Lock Screw	2
4	Differential Case Screw	4
5	Differential Case Screw Washer	4
6	Differential Case Plain Half	1
7	Outer Clutch Disc	8
9	Inner Clutch Disc	6
10	Thrust Plate	2
11	Spacer	2
12	Spring Pack Assembly	2
13	Needle Bearing Inner Spacer	4
14	Needle Bearing Center Spacer	4
15	Needle Bearing Outer Spacer	4
16	Pinion Gear Thrust Washer	4
17	Differential Pinion Gear	4
18	Needle Roller	216
19	Differential Spider	1
20	Ring Gear	1
21	Differential Case Flange Half	1
22	Differential Case Screw Washer	8
23	Differential Case Screw	8
24	Ring Gear Screw Nut	12
25	Ring Gear Screw	12

ITEM	DESCRIPTION	QTY
26	Pinion Inner Bearing Snap Ring	1
27	Pinion Inner Bearing	1
28	Pinion Gear	1
29	Carrier Cap Screw	4
30	Carrier Cap Screw Lock Washer	4
31	Differential Bearing Cone	2
32	Differential Bearing Cup	2
33	Differential Bearing Adjusting Nut	2
34	Differential Carrier and Cap Assy.	1
35	Pinion Inner Bearing Cone	1
36	Pinion Inner Bearing Cup	1
37	Pinion Bearing Spacer	1
38	Pinion Bearing Retainer Shim	AR
39	Pinion Bearing Retainer	1
40	Pinion Outer Bearing Cup	1
41	Pinion Outer Bearing Cone	1
42	Pinion Inner Oil Seal	1
43	Pinion Oil Seal Retainer	1
44	Oil Seal Retainer Lock Washer	8
45	Oil Seal Retainer Screw	8
46	Pinion Outer Oil Seal	1
47	Dust Shield	1
48	Flange	1
49	Flange Nut	1

Trunnion Mounting, No-Spin

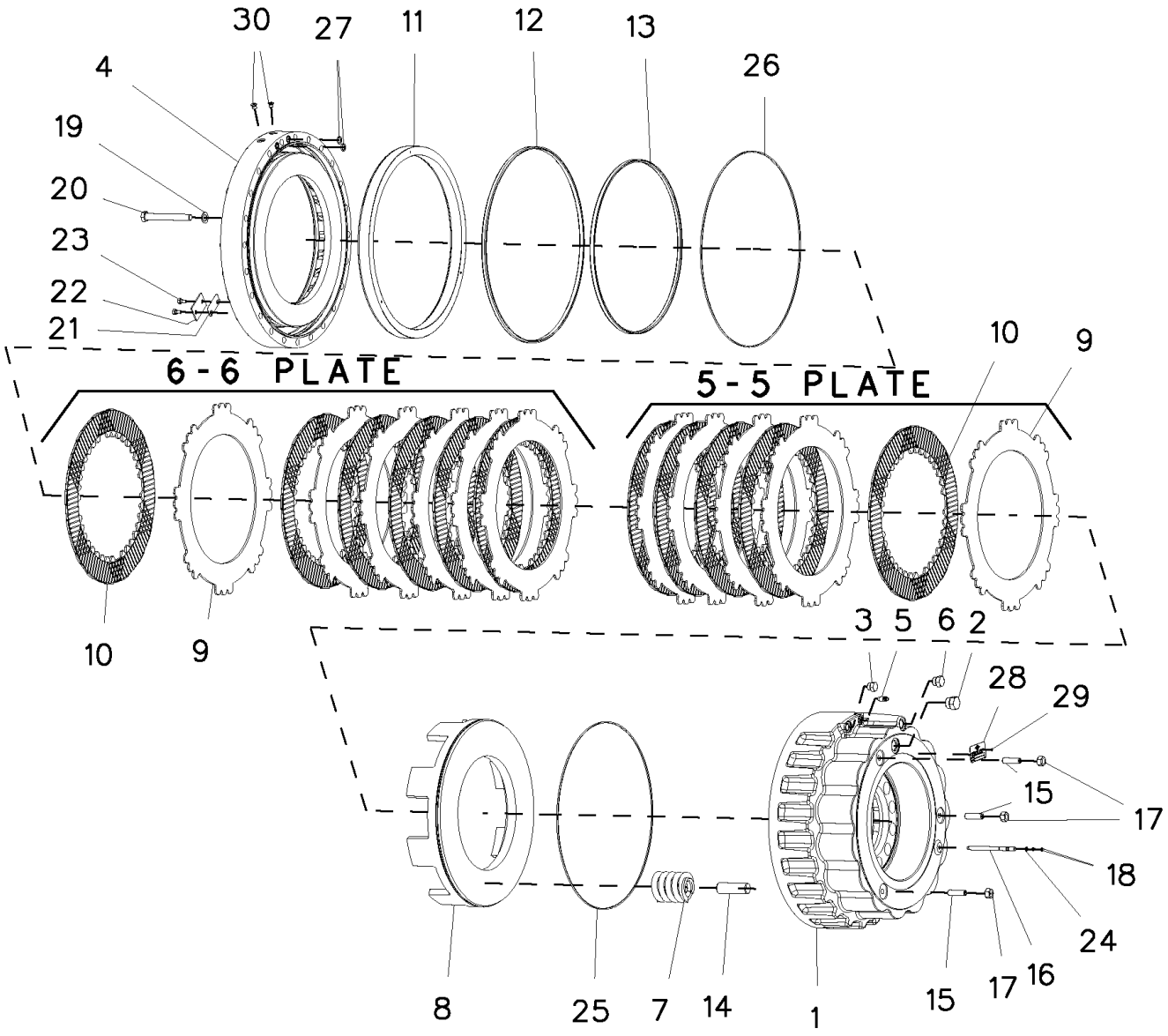


Differential and Carrier Assembly

ITEM	DESCRIPTION	QTY
1	53R Axle Housing	1
2	Axle Shaft	2
3	Ring Seal	2
4	Square Cut Seal	4
5	Spindle	2
6	Brake Assembly	2
7	Spindle Ring	2
8	Washer	26
9	Capscrew	26
10	Oil Hub Seal	2
11	Cone Bearing	2
12	Hub Face Seal	2
13	Cup Bearing	2
14	Wheel Hub	2
15	Cup Bearing (M241510	2
16	Cone Bearing (M241547A)	2
17	Snap Ring	1
18	Internal Gear Hub	1
19	Internal Ring Gear	1
20	Nut	2
21	Lock Plate	2
22	Bolt	12
23	Sun Gear	2
24	O-Ring Seal	2
25	Carrier Planet Assembly	2

ITEM	DESCRIPTION	QTY
26	Capscrew	6
27	Plug	64
28	Plug	3
29	Plug	1
30	O-Ring	1
31	Differential and Carrier Assembly	1
32	Washer	22
33	Capscrew	2
34	Capscrew	20
35	O-Ring Seal	3
36	Wiper Seal	3
37	Trunnion Bushing	2
38	Plug	3
39	Front Trunnion Support	1
40	Vent	2
41	Plug	1
42	Rear Trunnion Support	1
43	Wear Sleeve	1
44	Thrust Washer	2
45	Thrust Plate	1
46	Washer	16
47	Capscrew	16
48	Thrust Plate Retainer	1
49	Flat Washer	20
50	Capscrew	20

Posi-Stop (LCB) Brake



25150 Posi-Stop (LCB) Brake

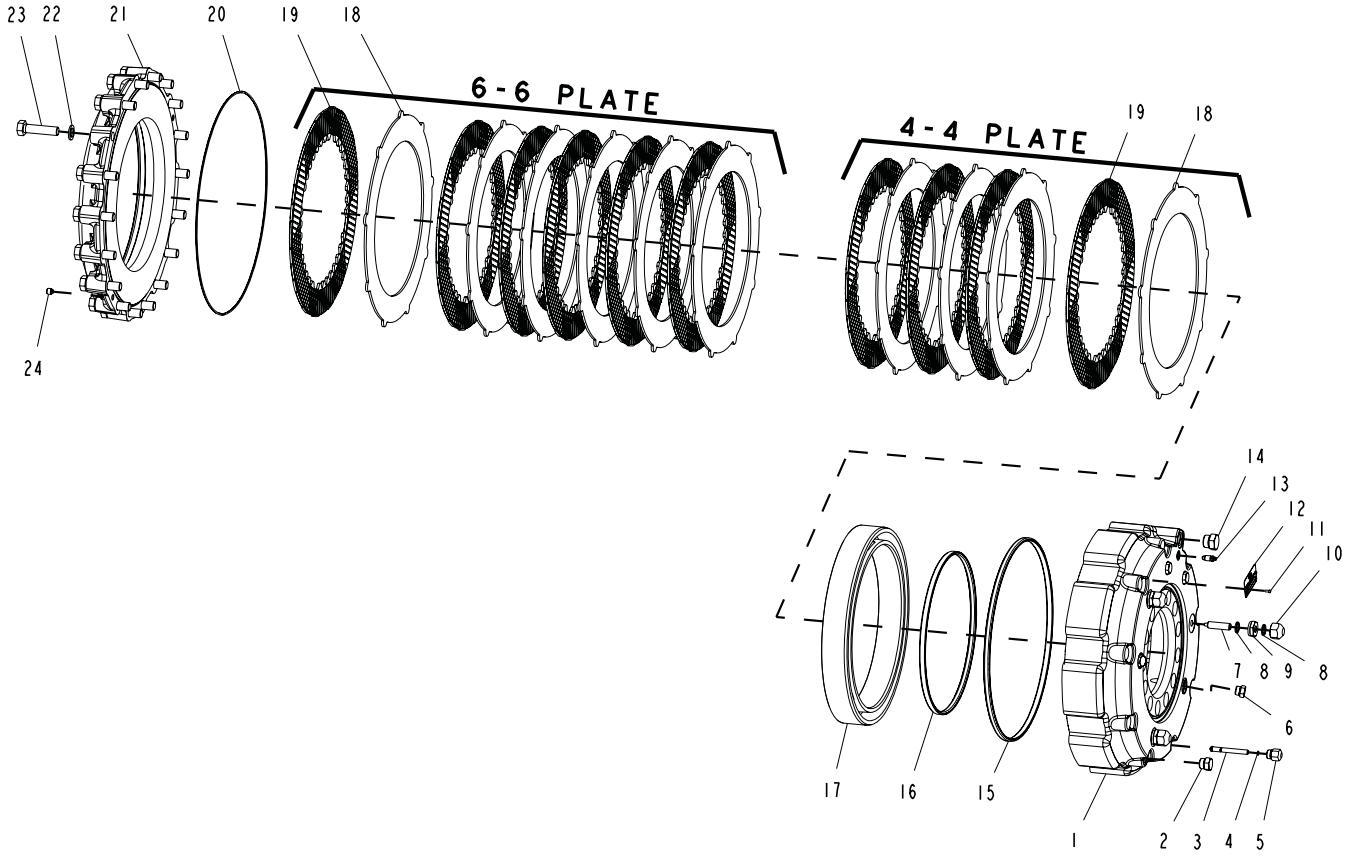
ITEM	DESCRIPTION	QTY
1	Brake Housing	1
2	Plug	1
3	Plug	1
4	Brake Cover	1
5	Bleeder Screw	1
6	Plug	1
7	Spring Set	15
8	Piston Pressure Ring	1
9	Reaction Plate	5
10	Disc and Lining Assembly	5
11	Brake Piston	1
12	Outer Piston Seal	1
13	Inner Piston Seal	1
14	Slack Adjuster Spacer	3
15	Slack Adjuster Screw	3
16	Pin Wear Indicator	1
17	Nut	3
18	O-Ring Seal	2
19	Washer	24
20	Capscrew	24
21	Warning Sticker	2
22	Sticker Cover Plate	2
23	Capscrew	4
24	Snap Ring	1
25	Seal Ring	1
26	Seal Ring	1
27	Seal Ring	2
28	Name Plate	1
29	Rivet	2
30	Plug	2

26150 Posi-Stop (LCB) Brake

ITEM	DESCRIPTION	QTY
1	Brake Housing	1
2	Plug	1
3	Plug	1
4	Brake Cover	1
5	Bleeder Screw	1
6	Plug	1
7	Spring Set	15
8	Piston Pressure Ring	1
9	Reaction Plate	6
10	Disc and Lining Assembly	6
11	Brake Piston	1
12	Outer Piston Seal	1
13	Inner Piston Seal	1
14	Slack Adjuster Spacer	3
15	Slack Adjuster Screw	3
16	Pin Wear Indicator	1
17	Nut	3
18	O-Ring Seal	2
19	Washer	24
20	Capscrew	24
21	Warning Sticker	2
22	Sticker Cover Plate	2
23	Capscrew	4
24	Snap Ring	1
25	Seal Ring	1
26	Seal Ring	1
27	Seal Ring	2
28	Name Plate	1
29	Rivet	2
30	Plug	2

LCB Brake

24100 and 26100 Models

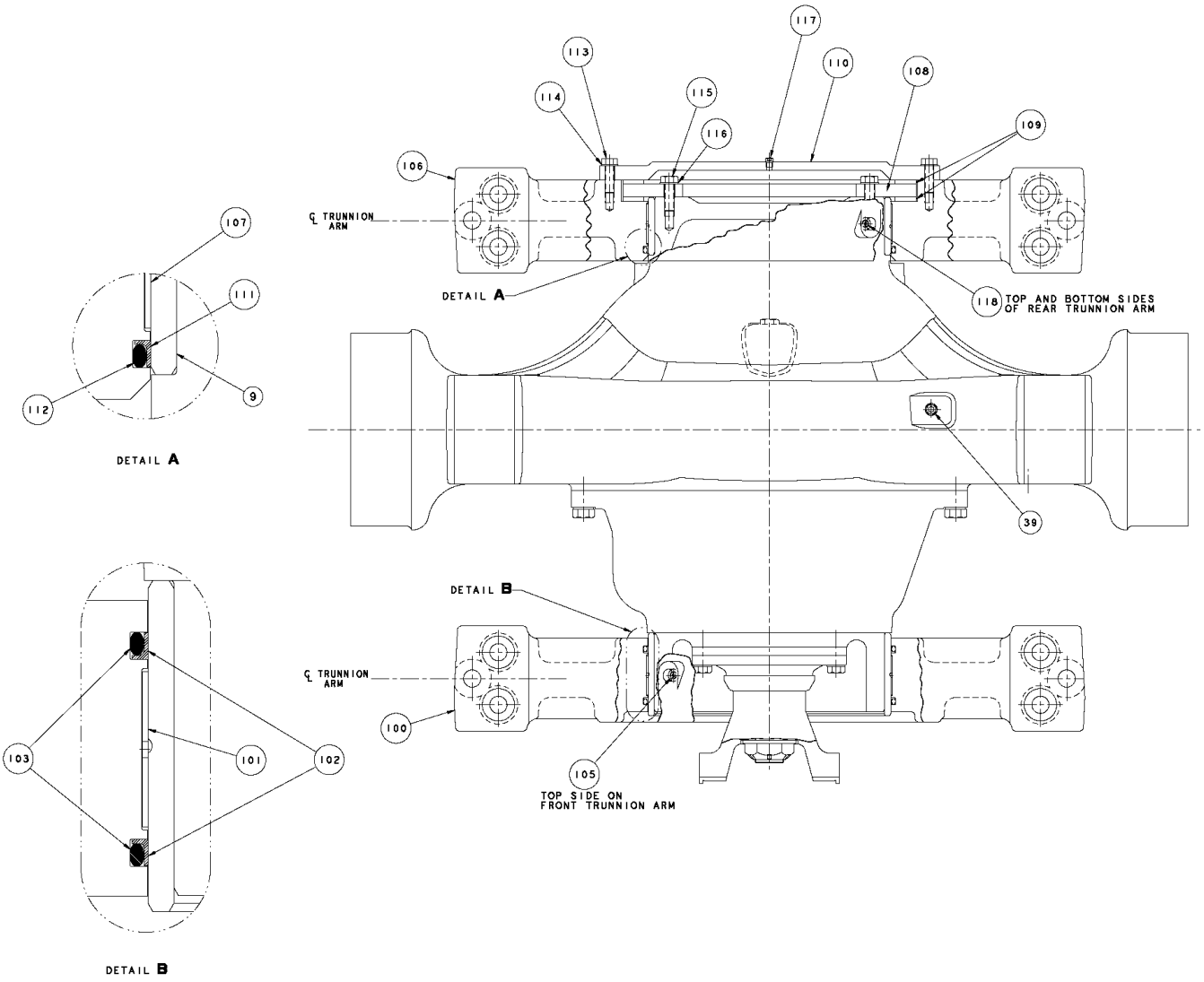


ITEM	DESCRIPTION	QTY
1	Brake Housing	1
2	Plug	1
3	Wear Indicator Pin	1
4	O-Ring Seal	1
5	Wear Indicator Cap	1
6	Plug	4
7	Slack Adjuster Screw	3
8	Ring Seal	6
9	Slack Adjuster Jam Nut	3
10	Slack Adjuster Acorn Nut	3
11	Name Plate Screw	2
12	Name Plate	1

ITEM	DESCRIPTION	QTY
13	Bleeder Screw	1
14	Plug	1
15	Outer Piston Seal	1
16	Inner Piston Seal	1
17	Brake Piston	1
18	Reaction Plate	10
19	Disc and Lining Assembly	10
20	O-Ring	1
21	Brake End Cover	1
22	Washer	18
23	Capscrew	18
24	Hex Socket Set Screw	2

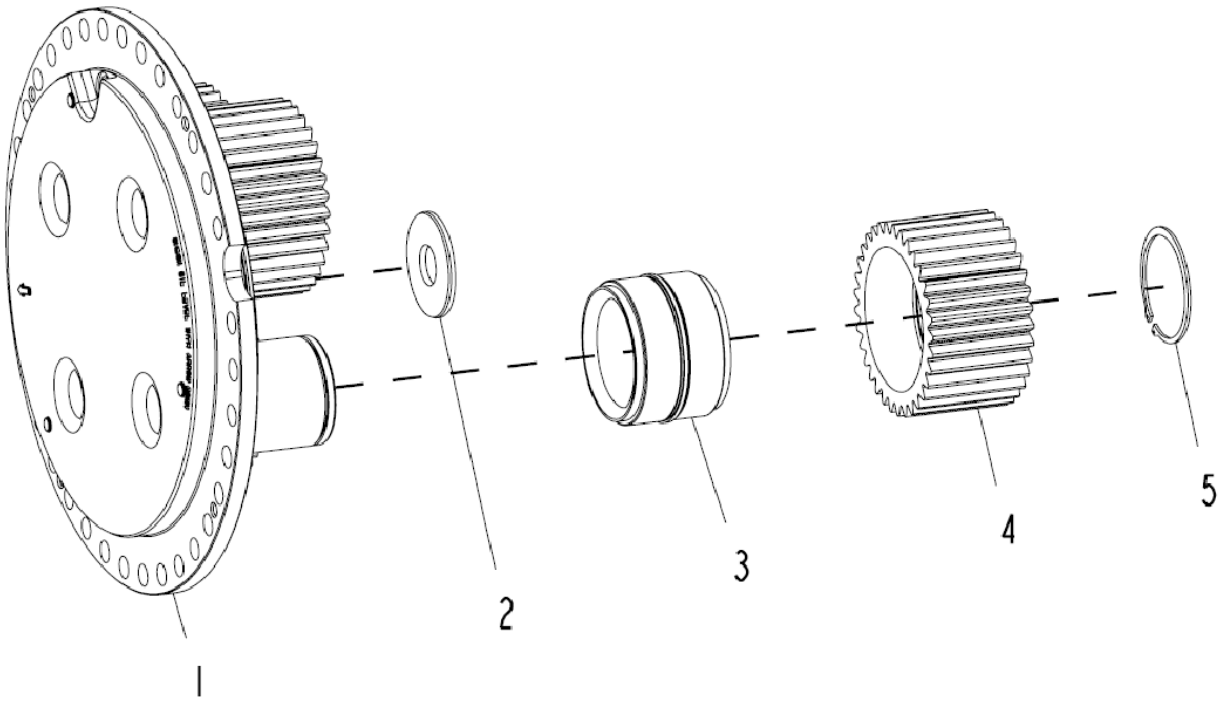
Trunnion

Cross Section



ITEM	DESCRIPTION	QTY	FASTENER TORQUE/COMMENTS
9	Housing Wear Sleeve	1	Grease O.D. during final assembly.
39	Plug - Vent	1	Tighten to 25-30 lbs. ft. (34 - 41N•m).
100	Front Trunnion Support	1	
101	Trunnion Bushing	1	Apply Loctite 620 or equivalent to O.D Grease I.D. during final assembly.
102	Front Trunnion Wiper Seal	2	Apply continuous coat of grease.
103	O-Ring	2	
104	Front Trunnion Lower Vent (not shown)	1	Apply Teflon thread sealant to threads.
105	Front Trunnion Support Top Plug	1	Apply Teflon thread sealant to threads. Tighten to 7-10 lbs. ft. (9.5-13.5 N•m)
106	Rear Trunnion Support	1	
107	Trunnion Bushing	1	Apply Loctite 620 or equivalent to O.D Grease I.D. during final assembly.
108	Thrust Plate	1	
109	Thrust Washer	2	Apply continuous coat of grease to both sides.
110	Thrust Washer Retainer	1	Apply RTV sealant to mounting face.
111	Rear Trunnion Wiper Seal	1	Apply continuous coat of grease.
112	O-Ring	1	
113	Thrust Washer Retainer Screw	20	Apply Loctite 262 or equivalent. to threads. Tighten to 128-141 lbs. ft. (174-191 N•m)
114	Thrust Washer Retainer Washer	20	
115	Thrust Plate Screw	16	Apply Loctite 262 or equivalent to threads. Tighten to 170-190 lbs. ft. (230-258 N•m)
116	Thrust Plate Washer	16	
117	Thrust Washer Retainer Vent	1	Apply Teflon thread sealant to threads.
118	Rear Trunnion Top and Bottom Plug	2	Apply Teflon thread sealant to threads. Tighten to 7-10 lbs. ft. (9.5-13.5 N•m)

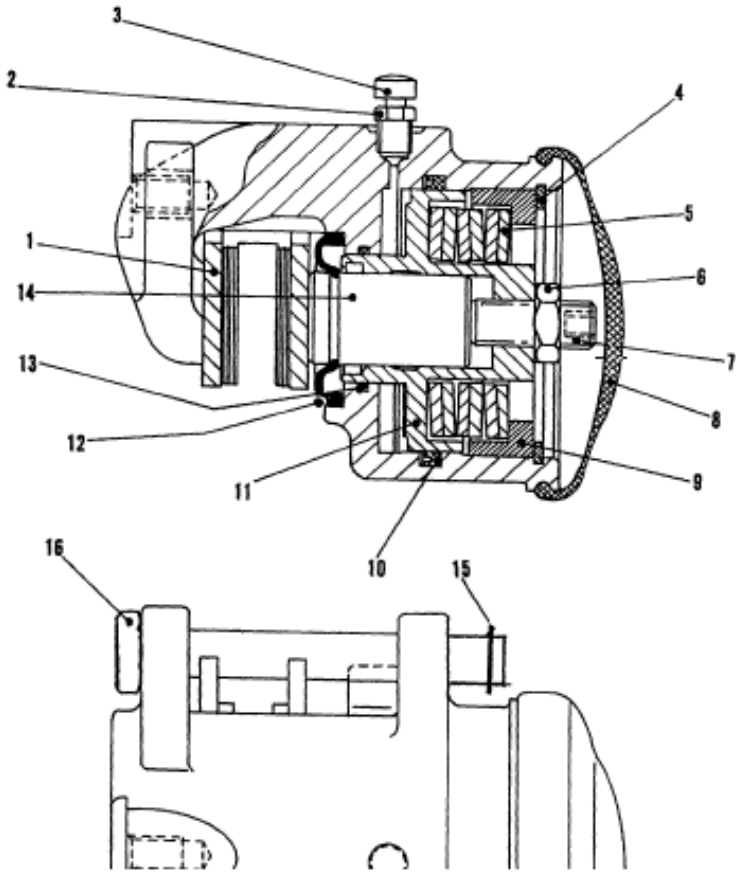
Planetary



ITEM	DESCRIPTION	QTY
1	Planetary Carrier	1
2	Thrust Washer	1
3	Bearing Cylinder	4
4	Planetary Gear	4
5	Planetary Gear Bearing Snap Ring	4

Pinion Brake

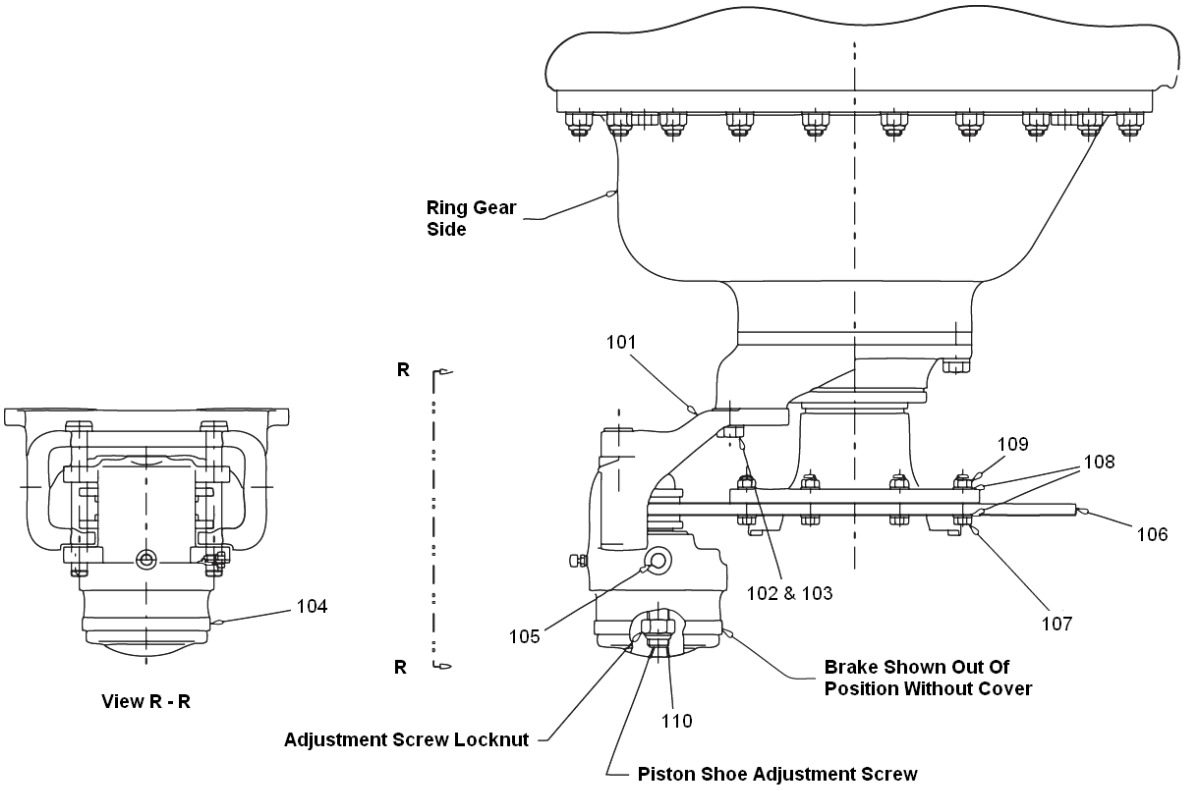
Cross Section



ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
1	Brake Lining	2	9	Spacer	1
2	Bleeder	1	10	Seal	1
3	Protective Cap	1	11	Piston	1
4	Retaining Ring	1	12	“U” Section Seal Ring	1
5	Disc Spring Pack	1	12	Seal	1
6	Adjustment Lock Nut	1	14	Push Rod	1
7	Adjustment Screw	1	15	Snap Ring	2
8	Cover	1	16	Screw	2

PINION BRAKE INSTALLATION AND ADJUSTMENT

1. Apply 1800-2100 PSI (12,410-14480 kPa) to brake assembly and hold.
2. Remove and discard adjustment screw lock nut item 110. Rotate adjustment screw clockwise until both brake pads make positive contact with disc. Rotate screw counter clockwise 180° (1/2 turn). Reassemble with new lock nut and tighten to 103-118 lbs. ft. (139-160 N•m) to lock position of screw.
3. Release pressure.
4. Actuate brake twice at 1800-2100 PSI (12,410-14480 kPa). Ensure disc rotates freely and check for a clearance, with shim stock, of 0.010 (0.254 mm) on both sides of disc.



ITEM	DESCRIPTION	QTY	FASTENER TORQUE
101	Bracket, Pinion Brake	1	
102	Capscrew	6	175-190 lbs. ft. (237-258 N•m)
103	Washer	6	
104	Pinion, Head Assembly	1	
105	Plug	1	7-10 lbs. ft. (9.5-13.5 N•m)
106	Disc, Brake	1	
107	Capscrew	14	
108	Washer	28	
109	Nut	14	60-65 lbs. ft. (81-88 N•m)
110	Nut, Brake Adjustment	1	103-118 lbs. ft. (140-160 N•m)

LUBRICATION

Recommended Lubricants

Recommendations:

Extreme pressure gear lubricant is recommended for use in all drive-steer and rigid drive axles except where explicitly stated differently by Spicer Off-Highway Products Engineering.

Mineral Based:

Acceptable lubricants must meet API GL-5/MT or MIL-PRF2105E qualifications. The highest viscosity grade must be used given the prevailing ambient temperatures from the chart below.

Synthetics:

Synthetic lubricants are recommended providing they meet API GL-5/MT-1 qualifications. The highest viscosity grade must be used given the prevailing ambient temperatures from the chart below. In general synthetic oils have a lower pressure viscosity response than mineral oil lubricants as the contact pressure between the gears increases. This produces a thickening of the mineral oil at the contact point. This increase in viscosity helps to maintain lubricant film thickness, reducing the possibility of surface and spalling fatigue. Synthetic lubricants do not thicken as much under pressure unless specifically formulated to do so. Before using a synthetic lubricant in heavy applications, the customer must check with the lubricant supplier on the issue of high-pressure lubricant applications.

Normal Oil Change Intervals:

Oil change intervals for mineral based lubricants in normal environmental and duty cycle conditions is 1000 hours in all off-highway applications and 10,000 miles in on-highway applications. Severe or sustained high operating temperature and very dusty atmospheric conditions will result in accelerated deterioration or contamination. Judgment must be used to determine the required change intervals for extreme conditions.

Extended Oil Change Interval:

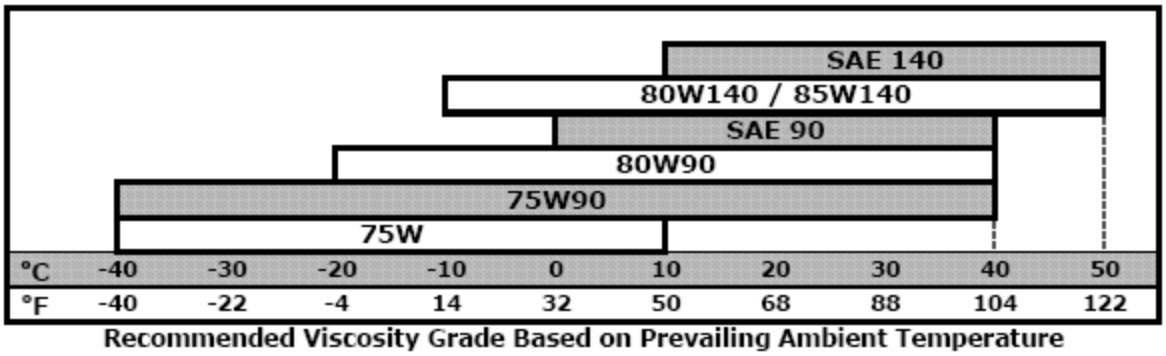
Extended oil service may result when using synthetic lubricants. Appropriate change intervals must be determined for each application by measuring oxidation and wear metals over time to determine a baseline. Wear metal analysis can provide useful information, but an axle should not be removed from service based solely on this analysis. Vehicles, which are prone to high levels of ingested water in the axle, or water as a result of condensation, should not use extended drain intervals.

Friction Modifiers:

Friction modifiers may be used with the lubricant to reduce Posi-Torq (limited slip) differential noise or liquid cooled brake noise. If friction modifiers are used, follow instructions on Product Service Bulletin PSB-278E.

⚠CAUTION

The use of aftermarket lubricant additives other than those specified is not recommended and may reduce the life of the axle and void the warranty!



Recommended Viscosity Grade Based on Prevailing Ambient Temperature

Checking the Oil Level

Axles

Check lubricant level after each 250 hours of operation. Always maintain lubricant level to bottom of filler plug hole. Drain oil every 2,500 hours or within one year. To check oil level in axles with differential drive and planetary wheel ends, the axle should be run first, then allowed to stand for a minimum of five minutes on level ground. This procedure will allow oil to drain back to its normal level. After the five-minute interval, remove oil filler plug at axle center and in the planetary wheel ends for oil level inspection. If oil level is not at the bottom of the filler hole, add necessary lubricant.

Planetary Wheel Ends

Always check lubricant in planetary wheel ends with arrow on the planetary carrier face in the 6:00 o'clock position. Remove oil level plug, if lubricant is below oil level hole add necessary lubricant.

Draining the Axle Center and Wheel Ends

Draining is best accomplished immediately after the vehicle has been operating. The lubricant is then warm and will flow freely allowing full drainage in minimum time. This is particularly desirable in cold weather. Remove plug at bottom of axle housing and the filler plug on the planetary wheel ends, making sure the planetary filler hole is down when draining. Allow sufficient time for the lubricant to drain, then replace plugs and refill with recommended lubricant. When refilling be sure the arrow on the planetary carrier face is in the 6:00 o'clock position; allow the lubricant time to drain back to its normal level.

NOTE:

When filling the axle housing, planetary wheel ends, and brakes, allow enough time for lubricant to flow through the various components in the differential, planetary housing, and the brake assembly. After filling is completed, allow a few minutes for lubricant to attain its level and recheck each wheel end and the axle center. Add lubricant if necessary.

BEARING HEATING AND FREEZING GUIDELINES

Bearings often must be cooled or heated to aid in assembly or removal. Since temperature extremes can cause permanent bearing metallurgical damage, it is important to take proper precautions and use correct methods when heating and cooling bearings.

Cups that are to be assembled in hubs or housings with a press fit may be shrunk in a deep freeze unit. Standard class bearings should not be cooled below -65°F (-54°C). In addition to cooling the bearing cup, in some instances it may be necessary to heat the housing.

To control temperature, is best to use a thermostat along with a freezer unit or a properly calibrated thermometer. If a suitable freezer or thermometer is not available, your Timken service representative can suggest liquid combinations that freeze the bearing cup at the optimal temperatures. Regardless of the method, check the cup's final seating against the housing shoulder with feeler gauges.

Take extreme care that standard product bearings are never heated above 300°F (149°C). If bearings are heated above this temperature, their metallurgical structure may soften, rendering them unsuitable for use. There are a number of recommended methods for heating bearings. Electric ovens or electrically heated oil baths may be used, but only when accompanied by proper thermostatic control. If you use a hot plate to heat the oil, never rest bearings directly on the bottom of the pan. Instead, protect bearings from the heat source with a simple wire screen holder or similar device.

Use heat-resistant gloves to handle heated cones. Hold the hot cone solid against the cold shoulder on the shaft until the cone grabs on to the shaft. The hot cone will pull away from the cold shoulder unless it is held in position. Use 0.002 in. (0.05 mm) feeler gages to make sure the cone is fully seated against the shoulder after the parts are cooled. Many loose bearing settings (excessive end play) are caused by an unseated cone working back against the shoulder in service.

CLEANING AND INSPECTION

DANGER

Care should be exercised to avoid skin rashes, fire hazards, and inhalation of vapors when using solvent type and alkali cleaners.

Cleaning

Clean all parts thoroughly using solvent type cleaning fluid. It is recommended that parts be immersed in cleaning fluid and agitated slowly until parts are thoroughly cleaned of all old lubricants and foreign materials.

Thoroughly dry all cleaned parts immediately by using moisture-free compressed air or soft lint-free absorbent wiping rags free of abrasive materials such as metal filings, contaminated oil, or lapping compound.

BEARINGS

Remove bearings from cleaning fluid and strike larger side of cone flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning fluid to flush out particles. Repeat above operation until bearings are thoroughly clean. Dry bearings using moisture free compressed air. Be careful to direct air stream across bearings to avoid spinning. Bearings may be rotated slowly by hand to facilitate the drying process.

HOUSINGS, COVERS AND CAPS

Clean interior and exterior of housings, bearing caps, etc., thoroughly. Cast parts may be cleaned in hot solution tanks with mild alkali solutions, providing these parts do not have ground or polished surfaces. Parts should remain in solution long enough to be thoroughly cleaned and heated. This will aid the evaporation of the cleaning solution and rinse water. Parts cleaned in solution tanks must be thoroughly rinsed with clean water to remove all traces of alkali. Cast parts may also be cleaned with steam cleaner.

Inspection

The importance of careful and thorough inspection of all parts cannot be overstressed. Replacement of all parts showing indication of wear or stress will eliminate costly and avoidable failures at a later date.

BEARINGS

Carefully inspect all rollers, cages, and cups for wear, chipping, or nicks to determine fitness of bearings for further use. Do not replace a bearing without replacing the mating cup or cone at the same time. After inspection, dip bearings in clean light oil and wrap in clean lint free cloth or paper to protect them until installed.

OIL SEALS, GASKETS AND RETAINING RINGS

Replacement of spring loaded oil seals, gaskets, and retaining rings is more economical when unit is disassembled than to risk premature overhaul to replace these parts at a future time. Loss of lubricant through a worn seal may result in failure of other more expensive parts of the assembly. Sealing member should be handled carefully, particularly when being installed. Cutting, scratching, or curling under lip of seal seriously impairs its efficiency. At reassembly, lubricate lips of oil seals with Multipurpose Lithium grease “Grade 2”.

GEARS AND SHAFTS

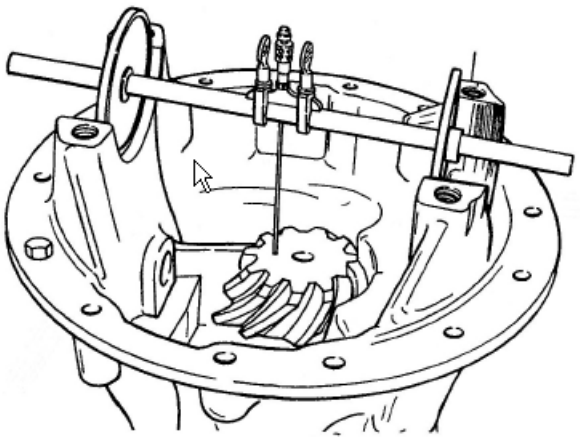
If Magna-Flux or a dye penetrant process is available, use this process to check parts. Examine teeth and the ground/polished surfaces of all gears and shafts carefully for wear, pitting, chipping, nicks, cracks, or scoring. If gear teeth are cracked or show spots where case hardening is worn through, replace with new gear. Small nicks may be removed with suitable hone stone. Inspect shafts to make certain they are not sprung, bent, or have twisted splines.

HOUSINGS, COVERS, AND CAPS

Inspect housings, covers, and caps to be certain they are thoroughly cleaned and that mating surfaces, bearing bores, etc. are free from nicks or burrs. Check all parts carefully for evidence of cracks or conditions which can cause oil leaks or failures.

PINION DEPTH SETTING PROCEDURE

The function of the pinion setting gauge is to measure the distance from the centerline of the differential bearing bores to the ground surface on the gear end of the pinion. This measurement when subtracted from the value etched on the ring gear will indicate the size of the shim pack required to position the pinion gear in proper relation to the ring gear.



A ring gear to pinion distance will be etched on the outer diameter of the ring gear, add 0.4649 in. (11.808 mm) to it. (0.4649 in. (11.808 mm) is half the thickness of the gauge bar). Record this value. This value may be different on each ring and pinion set due to manufacturing variations.

Use a file and emery cloth to remove all burrs and nicks from machined bearing surfaces of carrier housing.

Paint bearing surfaces with bearing contact checking compound.

Insert an extension depth micrometer (Starrett #44B-6RC and extension #99347 7 in. [178 mm] or equivalent is recommended) into the guide bore of the micrometer arbor and slide clamps over base of micrometer. With the thumb screws reacting on base, secure micrometer.

IMPORTANT:

The micrometer extension must pass freely through the micrometer bar guide bore and base of the micrometer must rest on the micrometer arbor when mounted. Mount adapter discs on micrometer arbor and set in position in carrier housing. Exercise care to be sure that micrometer and extension do not contact any part of the carrier in this operation. Apply pressure by hand and rotate adapter discs slightly to obtain a contact with bearing surfaces.

Remove checking gauge assembly and check for full bearing contact on bearing surfaces.

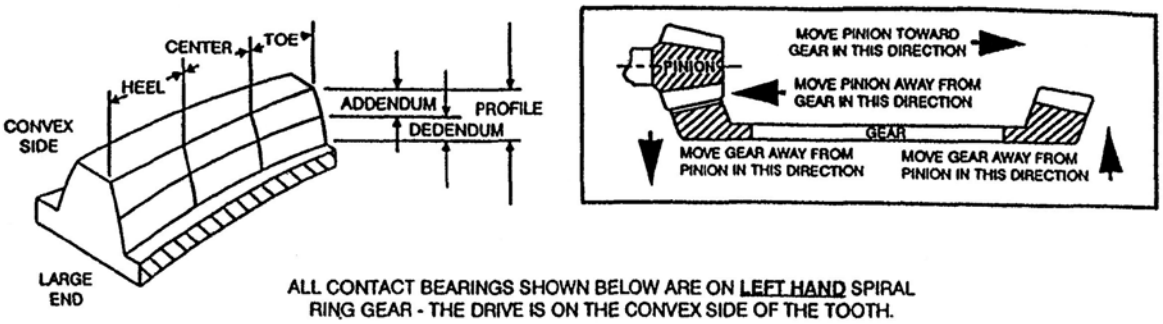
If contact is full and proper, again position checking gauge assembly in carrier and check distance to ground surface on pinion. Do not apply pressure to arbor or micrometer. Turn micrometer carefully and evenly until the flat tip of the micrometer extension contacts the ground surface of the pinion squarely. Subtract this reading from the value previously recorded. This equals the amount of shims to be added between the inner pinion bearing cup and the carrier housing.

EXAMPLE

in.	mm	
5.289	134.341	Value etched on ring gear
+ 0.469	+ 011.913	Add constant (1/2 thickness of gauge bar)
5.758	146.253	Total
- 5.728	- 145.491	Subtract initial micrometer reading
0.030	0.762	Add this value in shims under inner pinion bearing cup

GEAR TOOTH CONTACT

Gear Tooth Contact - Left-hand



ALL CONTACT BEARINGS SHOWN BELOW ARE ON LEFT HAND SPIRAL RING GEAR - THE DRIVE IS ON THE CONVEX SIDE OF THE TOOTH.

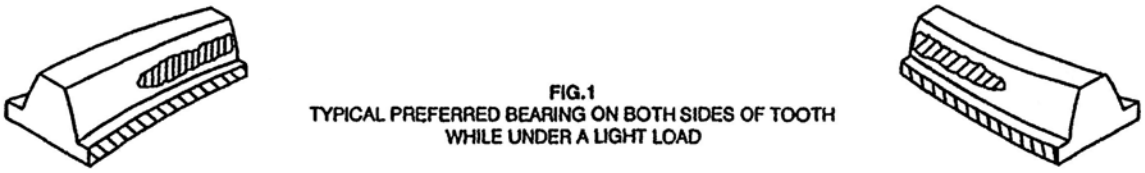


FIG.1
TYPICAL PREFERRED BEARING ON BOTH SIDES OF TOOTH WHILE UNDER A LIGHT LOAD

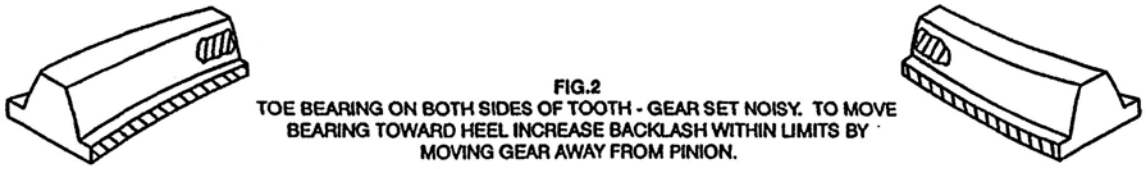


FIG.2
TOE BEARING ON BOTH SIDES OF TOOTH - GEAR SET NOISY. TO MOVE BEARING TOWARD HEEL INCREASE BACKLASH WITHIN LIMITS BY MOVING GEAR AWAY FROM PINION.

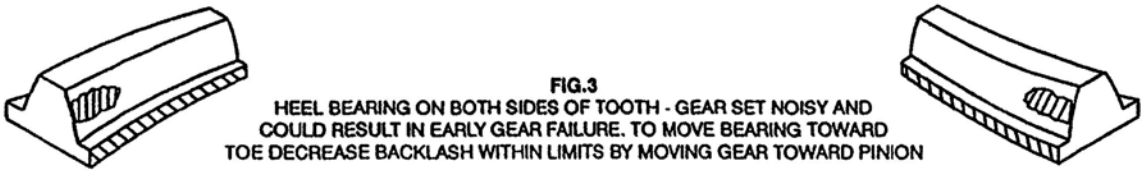


FIG.3
HEEL BEARING ON BOTH SIDES OF TOOTH - GEAR SET NOISY AND COULD RESULT IN EARLY GEAR FAILURE. TO MOVE BEARING TOWARD TOE DECREASE BACKLASH WITHIN LIMITS BY MOVING GEAR TOWARD PINION

FIG.4
LOW BEARING ON GEAR AND HIGH BEARING ON PINION. CORRECT BY PULLING PINION AWAY FROM GEAR (INCREASE MOUNTING DISTANCE)

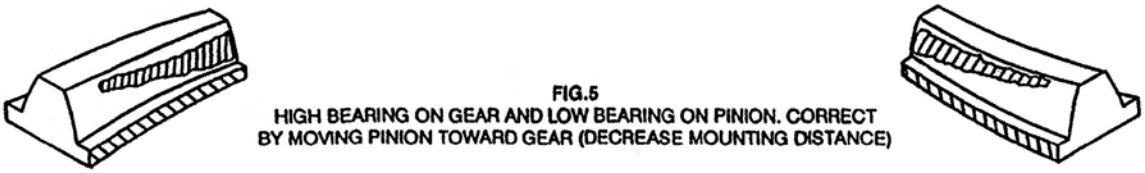
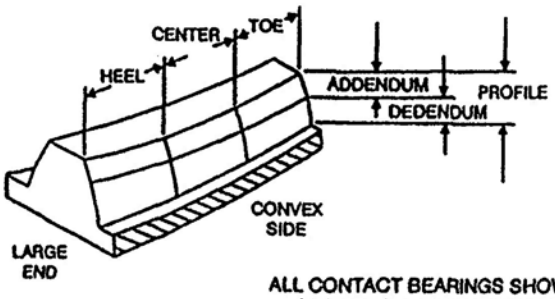


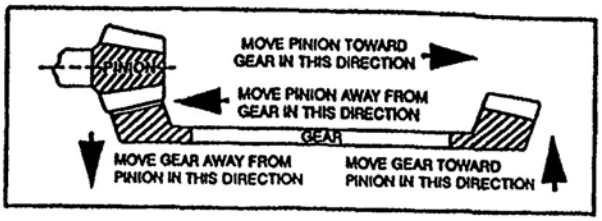
FIG.5
HIGH BEARING ON GEAR AND LOW BEARING ON PINION. CORRECT BY MOVING PINION TOWARD GEAR (DECREASE MOUNTING DISTANCE)

BACKLASH

BACKLASH SHOULD BE MEASURED WITH A DIAL INDICATOR RIGIDLY MOUNTED WITH THE STEM PERPENDICULAR TO THE TOOTH SURFACE AT THE EXTREME HEEL. SEE SHEET NO. 2 FOR BACKLASH VALUES.

Gear Tooth Contact - Right-hand





ALL CONTACT BEARINGS SHOWN BELOW ARE ON RIGHT HAND SPIRAL RING GEAR - THE DRIVE IS ON THE CONVEX SIDE OF THE TOOTH.

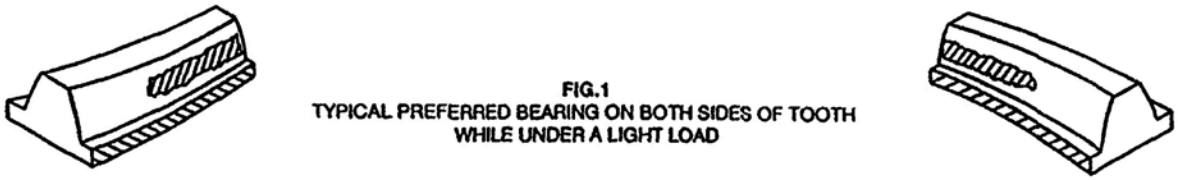


FIG.1
TYPICAL PREFERRED BEARING ON BOTH SIDES OF TOOTH WHILE UNDER A LIGHT LOAD

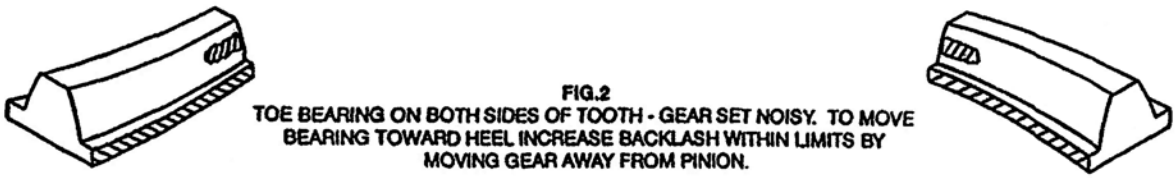


FIG.2
TOE BEARING ON BOTH SIDES OF TOOTH - GEAR SET NOISY. TO MOVE BEARING TOWARD HEEL INCREASE BACKLASH WITHIN LIMITS BY MOVING GEAR AWAY FROM PINION.

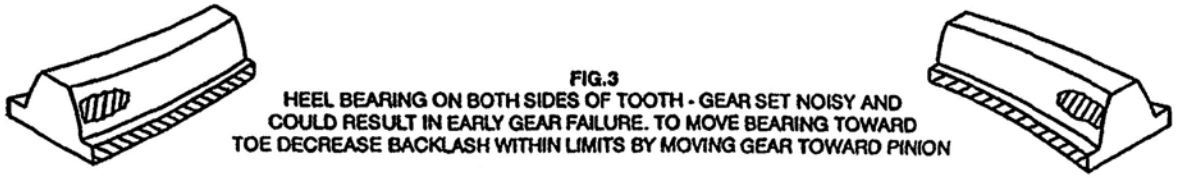


FIG.3
HEEL BEARING ON BOTH SIDES OF TOOTH - GEAR SET NOISY AND COULD RESULT IN EARLY GEAR FAILURE. TO MOVE BEARING TOWARD TOE DECREASE BACKLASH WITHIN LIMITS BY MOVING GEAR TOWARD PINION

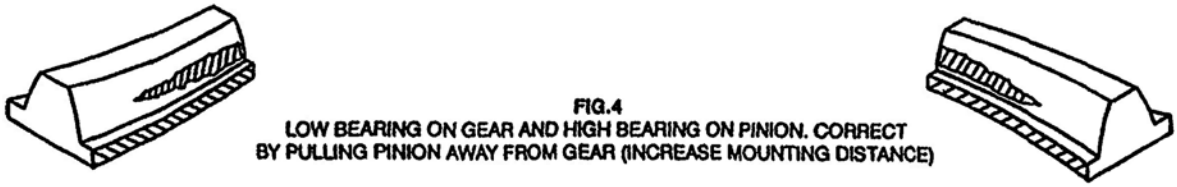


FIG.4
LOW BEARING ON GEAR AND HIGH BEARING ON PINION. CORRECT BY PULLING PINION AWAY FROM GEAR (INCREASE MOUNTING DISTANCE)

FIG.5
HIGH BEARING ON GEAR AND LOW BEARING ON PINION. CORRECT BY MOVING PINION TOWARD GEAR (DECREASE MOUNTING DISTANCE)

BACKLASH

BACKLASH SHOULD BE MEASURED WITH A DIAL INDICATOR RIGIDLY MOUNTED WITH THE STEM PERPENDICULAR TO THE TOOTH SURFACE AT THE EXTREME HEEL. SEE SHEET NO. 2 FOR BACKLASH VALUES.

HARDWARE INSTALLATION AND TORQUE SPECS

Class 8.8, 10.9, and 12.9, grade 5 and grade 8 fastening hardware has been used in the production of the axle assemblies covered in this manual. The class of hardware may be determined by the markings contained on the head of each capscrew. Class 12.9 or grade 8 torque values need to be used on all socket head capscrews used with this assembly. On all axles being overhauled, bolts and capscrews should be identified as described above and torque value charts on the following pages consulted for the correct torque.

Applying Thread Locking Compound

Always remove excess compound from mating parts after fastener installation.

Part	Application Location
Bolts and capscrews	coat the full length and circumference of thread engagement
Nuts	male thread of the mating fastener
Studs	anchor end

Torque Specifications

STANDARD FASTENERS				
Lubricated and Plated Bolts, Capscrews, and Studs				
	Grade 5		Grade 8	
	3 Radial Dashes on Bolt Head		6 Radial Dashes on Bolt Head	
Size	lbs. ft.	N•m	lbs. ft.	N•m
1/4-20	10	14	11	15
1/4-28	11	15	13	18
5/16-18	16	22	30	41
5/16-24	20	27	32	43
3/8-16	25	34	36	49
7/16-14	41	56	57	77
7/16-20	45	61	64	87
1/2-13	63	85	88	119
1/2-20	70	95	99	134
9/16-18	100	136	141	191
5/8-11	124	168	175	237
5/8-18	141	191	198	268
3/4-10	220	298	310	420
3/4-16	245	332	347	470

METRIC FASTENERS						
Lubricated and Plated Bolts, Capscrews, and Studs						
	Class 8.8		Class 10.9		Class 12.9	
	8.8 on Bolt Head		10.9 on Bolt Head		12.9 on Bolt Head	
Size	lbs. ft.	N•m	lbs. ft.	N•m	lbs. ft.	N•m
M4	2.2	3	3.2	4.4	7.4	10
M5	4.4	5.9	6.4	8.7	7.4	10
M6	7.4	10	11	15	13	18
M8	18	25	26	36	32	43
M10	36	49	51	72	62	84
M12	63	85	92	125	107	145
M14	100	135	147	200	173	235
M16	155	210	229	310	269	365
M18	221	300	317	430	369	500
M20	313	425	450	610	524	710
M22	428	580	605	820	708	960
M24	538	730	774	1050	900	1220

Torque Specifications

O-RING PLUGS			
Size	**P/N**	**lbs. ft.**	**N•m**
5/16-24	24K-1	5	7
3/8-24	24K-2	8	11
7/16-20	24K-3	10	14
1/2-20	24K-4	13	18
9/16-18	24K-5	15	20
3/4-16	24K-6	25	34
7/8-14	24K-7	35	47
1 1/16-12	24K-8	50	68
1 3/16-12	24K-9	60	81
1 5/16-12	24K-10	75	102
1 5/8-12	24K-11	85	115
1 7/8-12	24K-12	85	115

PIPE PLUGS		
Size (NPTF)	**lbs. ft.**	**N•m**
1/16-27	7	9
1/8-27	10	14
1/4-18	20	27
3/8/-18	30	41
1/2-14	35	47
3/4-14	45	61
1-11 1/2	55	75
1 1/4-11 1/2	65	88

ELASTIC STOP NUTS		
Size	**lbs. ft.**	**N•m**
1-20	200	270
1 1/4-18	250	340
1 1/2-18	350	475
1 3/4-12	450	610

DISASSEMBLY

Planetary Removal

FIGURE 1: Drain oil from wheel ends, brakes, and center section.

FIGURE 2: Remove (3) planetary carrier screws.

FIGURE 3: Pry planetary carrier out of wheel hub enough to install chain clevis.

⚠ DANGER

Use care not to overextend planetary carrier as serious injury can result.

FIGURE 4: Install chain clevis.

FIGURE 5: Attach chain.

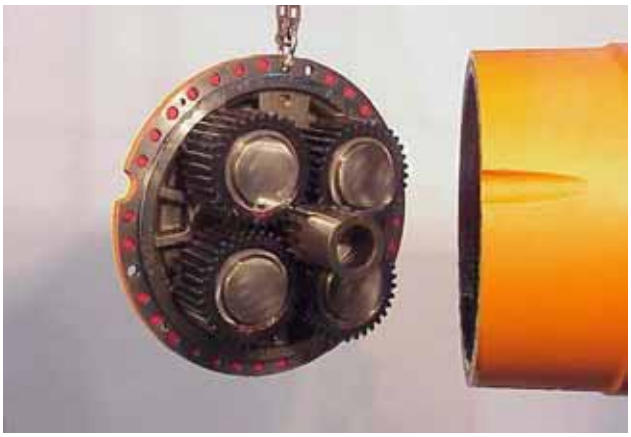


FIGURE 6: Remove planetary carrier from hub.

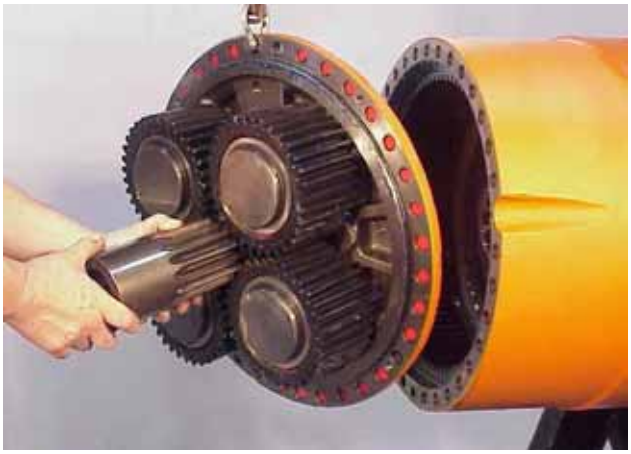


FIGURE 7: Remove sun gear.

FIGURE 8: Remove planetary carrier o-ring.

Axle Shaft and Hub Removal

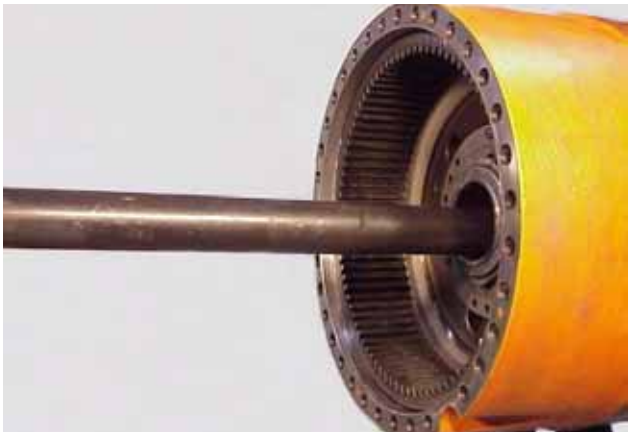


FIGURE 9: Remove axle shaft.

FIGURE 10: Remove (6) spindle nut lock plate screws.

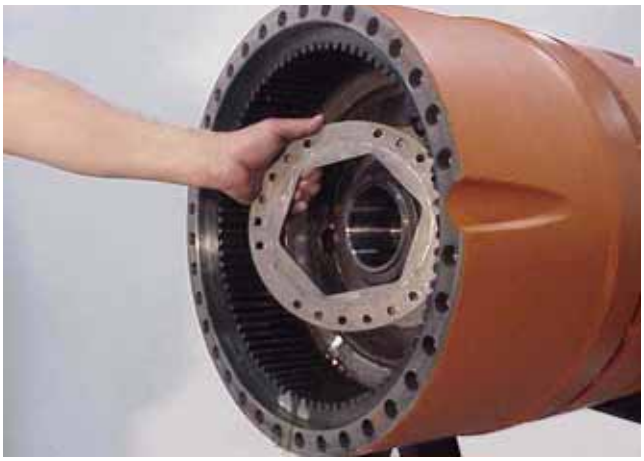


FIGURE 11: Remove spindle nut lock plate.

FIGURE 12: Remove spindle nut.

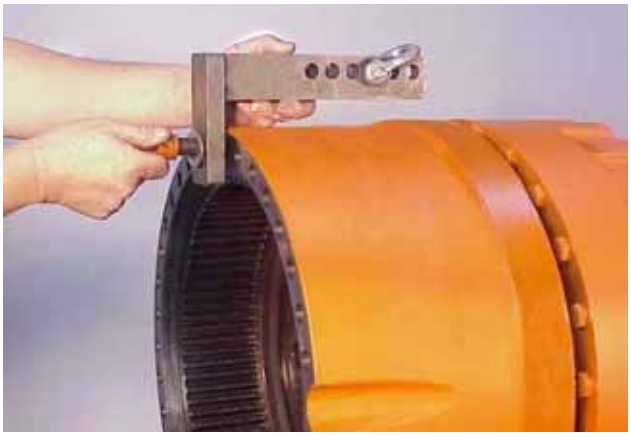


FIGURE 13: Install lifting device. (Refer to “Wheel Hub and Brake Lifting Tool”, on page 81.)

FIGURE 14: Install (2) screws with flat washers at 4:00 and 8:00 positions as shown to retain internal gear.

FIGURE 15: Remove hub assembly.

Face Seal Removal

FIGURE 16: Carefully pry face seal from hub. Avoid making contact with seal bore or sealing surfaces that could cause damage and leaks. (Refer to “Face Seal Installation”, on page 66.)

FIGURE 17: Remove face seal from hub.

FIGURE 18: Remove face seal from brake housing.

Brake and Spindle Removal

FIGURE 19: Remove (1) brake cover attaching screw at 12:00 position.

FIGURE 20: Install lifting device. (Refer to “Wheel Hub and Brake Lifting Tool”, on page 81.)

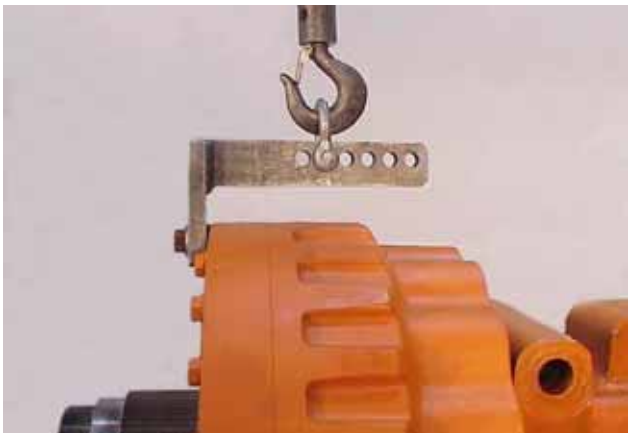


FIGURE 21: Attach chain. Approximate balance point is shown for posi-stop brake.

FIGURE 22: Loosen top mounting screw. An 18 to 1 torque multiplier is shown.

FIGURE 23: Remove spindle mounting screw as shown.

FIGURE 24: Install alignment pin.

FIGURE 25: Threaded end of pin must engage threads in axle housing a minimum of 1.5 times pin diameter or 2.0 (50.8 mm).

FIGURE 26: Remove remaining (12) brake and spindle mounting screws.

FIGURE 27: Remove spindle retaining ring.

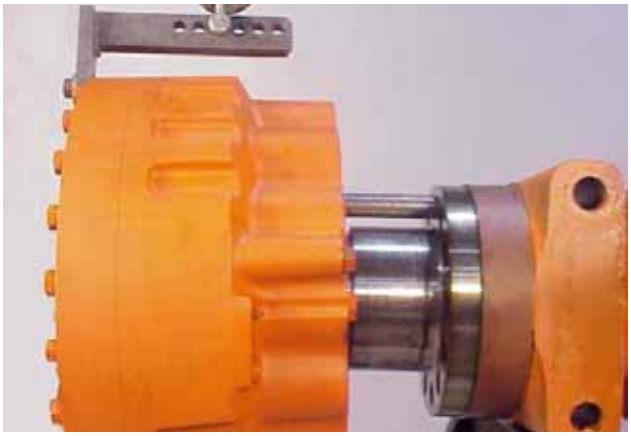


FIGURE 28: Carefully remove brake assembly.

NOTE:

Make a note of the bleeder orientation to facilitate reassembly.

FIGURE 29: Remove brake to spindle seal ring.

FIGURE 30: Remove spindle.

⚠WARNING

Spindle is weighted off center. Lifting spindle can cause back or other bodily injury.

FIGURE 31: Remove spindle to housing pilot seal ring.

FIGURE 32: Remove spindle outer seal ring.

Differential/Carrier Assembly Removal

Refer to 2050 Series Posi-Torq Limited Slip Differential Service Manual for differential and carrier servicing information.

FIGURE 33: Remove (22) differential mounting stud nuts, washers, and (12) tapered dowels. Remove differential and carrier assembly. Remove seal ring from carrier.

Planetary Disassembly

FIGURE 34: Remove (4) retaining rings.

FIGURE 35: OPTIONAL - Apply heat to inner bearing race to facilitate removal. (Refer to “Bearing Heating and Freezing Guidelines”, on page 22.)

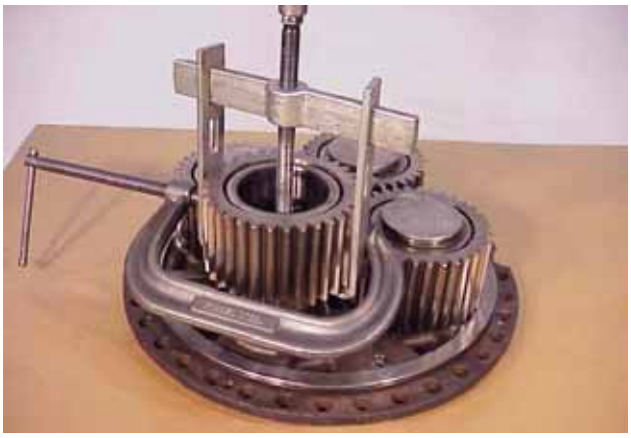


FIGURE 36: Remove (4) gear and bearing assemblies.

FIGURE 37: Remove thrust washer as shown.

Clean and inspect all components.
Repair or replace components as required.

Hub Disassembly

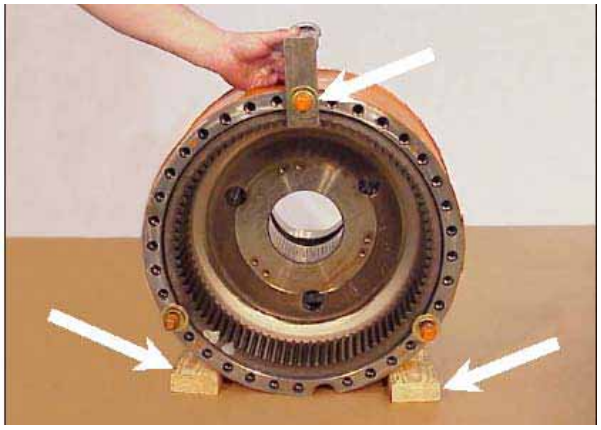


FIGURE 38: Block hub to secure as shown and then remove lifting device.

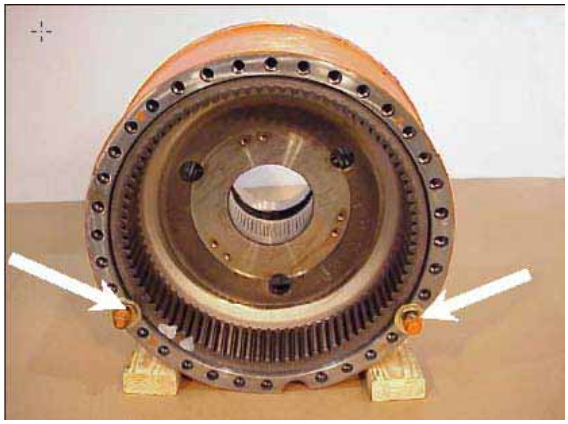


FIGURE 39: Remove (2) screws and flat washers.

FIGURE 40: Carefully remove ring gear from hub.

⚠WARNING

Ring gear is heavy. Lifting ring gear can cause back or other bodily injury.

FIGURE 41: OPTIONAL: Apply heat to inner race of bearing cone to facilitate removal. (Refer to “Bearing Heating and Freezing Guidelines”, on page 22.)

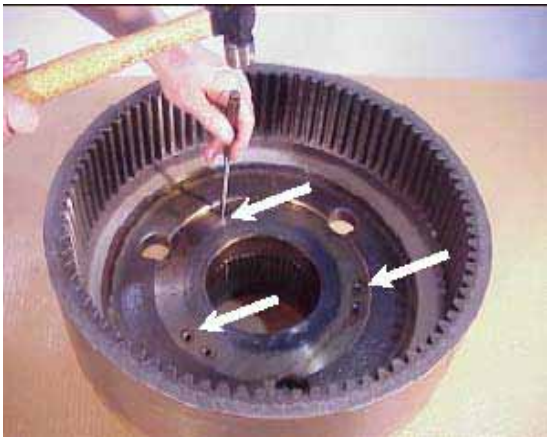


FIGURE 42: Remove bearing cone using punch as shown.

FIGURE 43: Remove hub seal as shown or drive bearing cone and seal out from other side.

FIGURE 44: Remove hub seal and bearing cone.

FIGURE 45: Remove outer wheel bearing cup.

FIGURE 46: Remove inner bearing cup.

FIGURE 47: Pry the ring gear retaining clip up and remove.

FIGURE 48: Lift the ring gear hub evenly and remove.

Clean and inspect all components.
Repair or replace components as required.

LCB Brake Disassembly

FIGURE 49: Remove (3) slack adjuster acorn nuts.

FIGURE 50: Remove (3) slack adjuster acorn nut seal rings.

FIGURE 51: Remove (3) slack adjuster jam nuts and seal rings.

FIGURE 52: Remove (3) slack adjuster screws.

FIGURE 53: Remove wear indicator cap.

FIGURE 54: Remove (5) cooling port and piston actuating inlet port plugs.

FIGURE 55: Remove temperature sensor port plug and seal washer.

FIGURE 56: Remove bleeder screw.

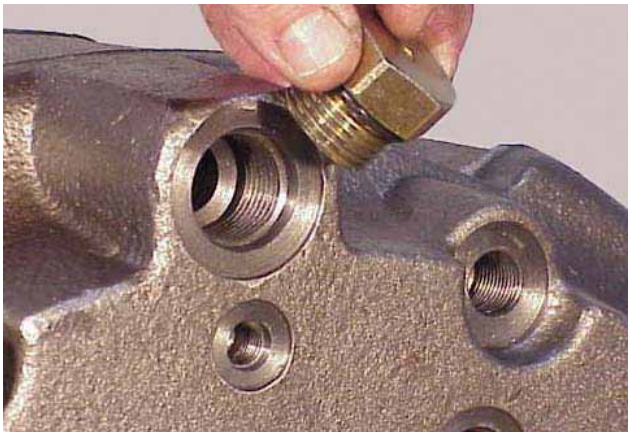


FIGURE 57: Remove cooling port plug.

Brake Cover and Disc Removal

FIGURE 58: Remove (18) brake cover screws and washers.

FIGURE 59: Mark brake cover and brake housing to insure proper alignment during reassembly.

FIGURE 60: Alternately tighten (2) pusher screws equally to separate brake cover from housing.

FIGURE 61: Remove brake cover.

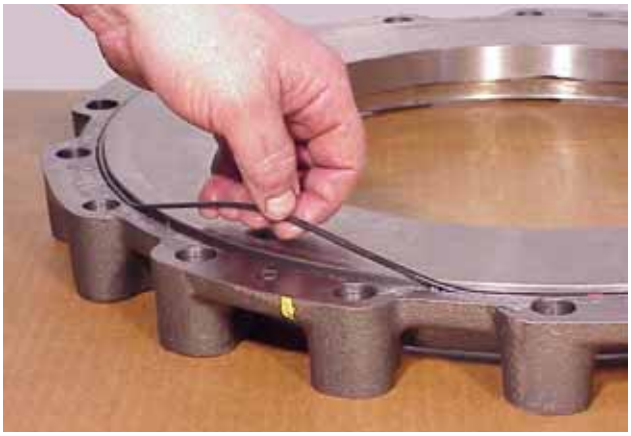


FIGURE 62: Remove brake cover seal ring and (2) pusher screws.

FIGURE 63: Remove brake friction and reaction discs.

NOTE:

If brake discs are to be reused, they need to be reinstalled in the same order and direction as removed.

Brake Piston Removal

FIGURE 64: Fabricate brake piston removal and installation device as shown or equivalent. (Refer to Figures 64, 65, and 66. Install piston removal device on brake housing with threaded rods engaging (3) threaded holes in piston.)

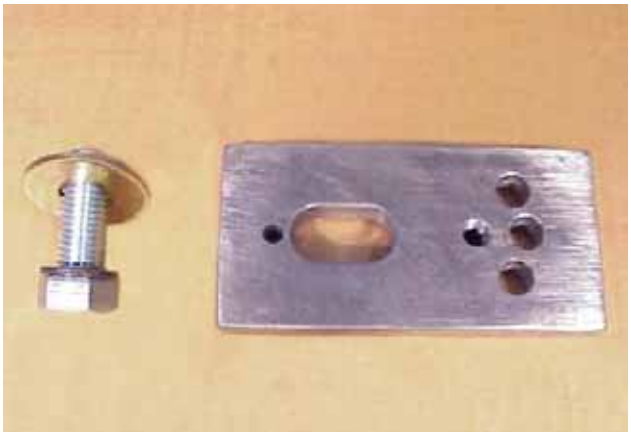


FIGURE 65: Puller block and mounting screw.

FIGURE 66: Puller threaded rod with nut and tee handle.

FIGURE 67: (1) of (3) puller screw blocks installed to pull piston.

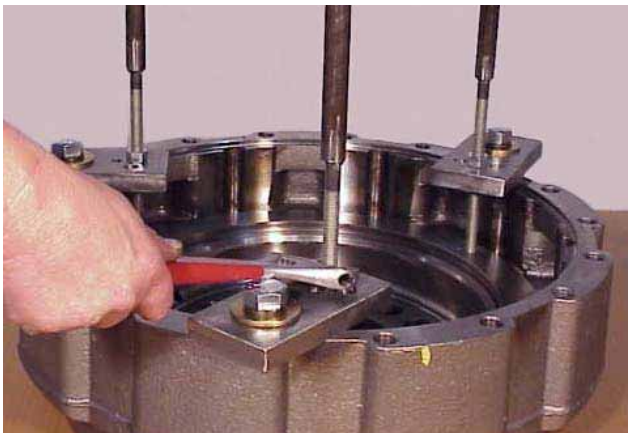


FIGURE 68: Tighten puller nuts in a crisscross pattern to pull piston evenly out of brake housing.

FIGURE 69: Remove piston device and piston.

Wear Indicator Pin Removal

FIGURE 70: Remove wear indicator pin.

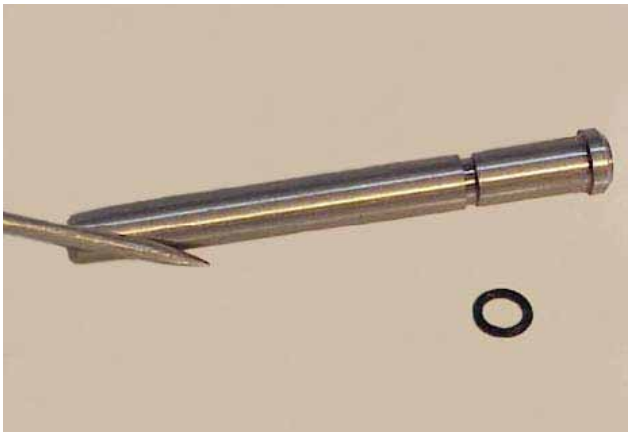


FIGURE 71: Remove wear indicator pin o-ring.

FIGURE 72: Remove piston inner and outer seal ring assemblies.

Clean and inspect all components.
Repair or replace components as required.

Posi-Stop (LCB) Brake Disassembly

FIGURE 73: Remove (4) warning sticker cover screws.

FIGURE 74: Remove (2) warning sticker covers.

⚠ DANGER

Follow all safety precautions and use the correct service tools when servicing the brakes. The brake cover is under 72,000 psi of pressure.

FIGURE 75: Note warning cast into brake cover.

FIGURE 76: Remove (2) pressure port plugs.

Brake Cover Removal

⚠ DANGER

Follow all safety precautions and use the correct service tools when servicing the brakes. The brake cover is under 72,000 psi of pressure.

This disassembly procedure is tedious and time consuming. Due to the potential for injury and damage, any shortcuts should be avoided. It is recommended the Brake Spring Compression Tool be used to disassemble and reassemble the brake. See the “Brake Spring Compression Tool”, on page 75.

IMPORTANT:

If the brake spring compression tool is not going to be used, the following procedure must be followed to avoid personal injury and component damage.

FIGURE 77: It is recommended that the capscrew heads be numbered to assist in following the loosening/tightening sequence. Refer to Figure 182. In a crossing or star pattern, loosen the (24) brake cover capscrews turning no more than one quarter (1/4) turn at a time in sequence. Continue this process until all pressure on the cover has been relieved.

FIGURE 78: After all spring force has been relieved from cover remove the (24) cover screws and washers.

FIGURE 79: Install (2) eye bolts to assist in handling the brake cover in opposite warning plate holes.

FIGURE 80: Remove brake cover.

Discs, Pressure Ring, and Spring Removal

FIGURE 81: Remove brake friction and reaction discs.

NOTE:

If discs are to be reused, they need to be reinstalled in the exact order and direction in which they were removed.

FIGURE 82: Remove brake piston pressure ring.

FIGURE 83: Remove brake springs.

NOTE:

Inner and outer springs are matched sets and must remain together. As each set is removed, it is recommended that they be wired together to prevent mixing sets.

FIGURE 84: Remove three slack adjuster spacers.

FIGURE 85: Remove brake cover seal ring.

FIGURE 86: Remove three slack adjuster jam nuts.

FIGURE 87: Remove three slack adjuster screws.

Wear Indicator Pin Removal

FIGURE 88: Tap out brake wear indicator pin.

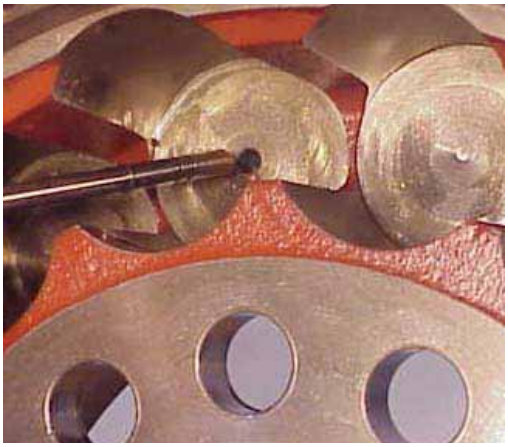


FIGURE 89: Remove brake wear indicator pin.

Brake Piston Removal

FIGURE 90: Place brake cover on flat surface face down and install three screws and flat washers in the brake piston puller holes.

⚠WARNING

Brake cover is heavy. Lifting ring gear can cause back or other bodily injury.

FIGURE 91: Piston with puller screws and washers installed.

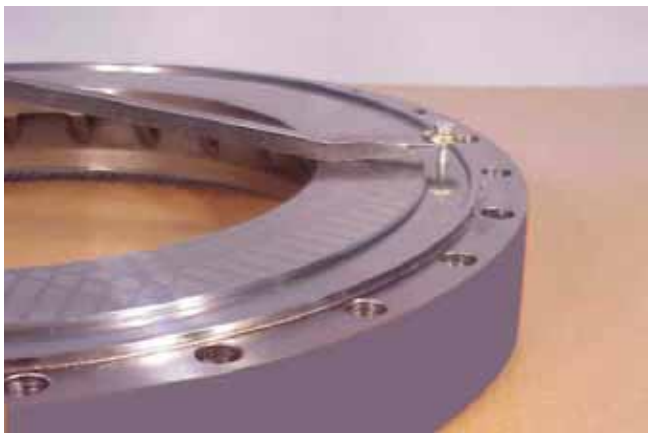


FIGURE 92: Using a pry bar, evenly pry piston out of the brake cover until it is no longer in contact with the piston seals.

FIGURE 93: Once the piston is pulled out of the seals it can be removed by hand.

FIGURE 94: Remove brake piston.

FIGURE 95: Remove outer piston seal assembly.

FIGURE 96: Remove inner piston seal assembly.

FIGURE 97: Remove two pressure port sealing rings.

FIGURE 98: Remove pressure ring seal ring.

FIGURE 99: Remove two brake wear indicator pin o-rings.

FIGURE 100: Remove brake wear indicator pin retaining ring.

NOTE:

Not necessary to remove unless replacement is required.

Clean and inspect all components.
Repair or replace components as required.

REASSEMBLY

The reassembly instructions describe the procedure to be followed when reassembling and installing components of the axle. Instructions covering reassembly of opposite side are identical unless otherwise noted.

Planetary Reassembly

FIGURE 101: Locate thrust washer chamfer as shown.

FIGURE 102: Using appropriate driver, install washer in planet carrier.

FIGURE 103: Identify large radius on bearing race as shown.

NOTE:

Gear and bearing assembly must be assembled with radius facing towards planet carrier.

FIGURE 104: Heat gear and bearing assembly to aid assembly and install with the bearing radius down. (Refer to “Bearing Heating and Freezing Guidelines”, on page 22.)

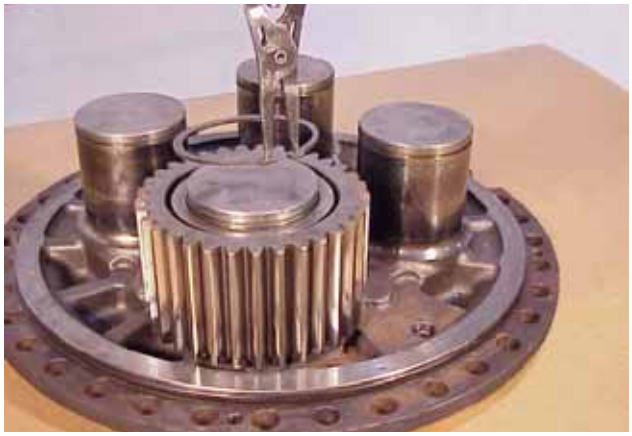


FIGURE 105: Install retaining ring.

FIGURE 106: Repeat steps in Figures 103, 104, and 105 for remaining (3) assemblies.

Hub Reassembly

FIGURE 107: Align the ring gear hub on ring gear and gently tap ring gear hub down evenly.

FIGURE 110: Using a 0.002 in. feeler gage, check that the bearing cups are seated against the shoulder. When cup is seated, feeler gage should not fit between cup and hub shoulder. Check in several locations.

FIGURE 108: Place the ring gear retaining clip into the groove on the ring gear.

FIGURE 111: Lubricate bearing cup with axle lubricant.

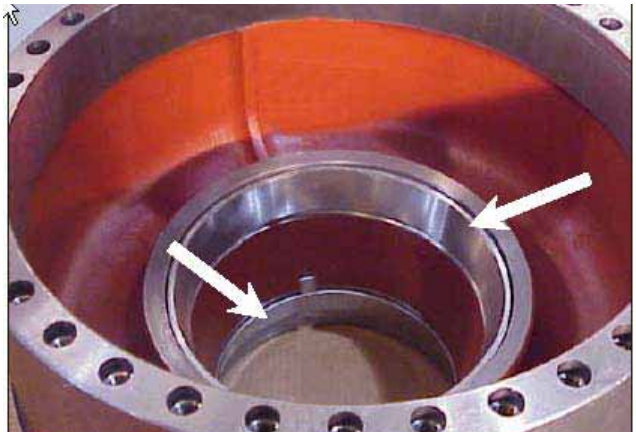


FIGURE 109: Install inner and outer bearing cups. (Refer to “Bearing Heating and Freezing Guidelines”, on page 22.)

FIGURE 112: Lubricate inner cone with axle lubricant and install.

FIGURE 113: Apply continuous coat of Loctite 262 or equivalent to outside diameter of hub seal. Insure entire surface is covered.

⚠CAUTION

Do not over apply Loctite.

FIGURE 114: Use seal driver to install seal. (Refer to “Hub Seal Driver Tool”, on page 83.)

FIGURE 115: Heat inner bearing cone and install on internal gear hub. (Refer to “Bearing Heating and Freezing Guidelines”, on page 22.)

Internal Gear Installation

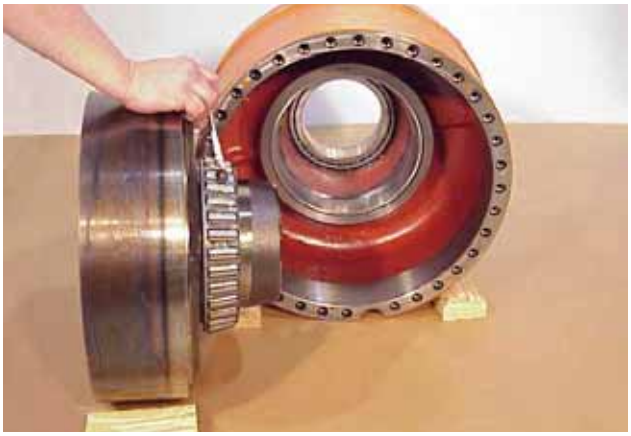


FIGURE 116: Lubricate inner bearing cone with axle lubricant.

FIGURE 117: Install internal ring gear in hub.

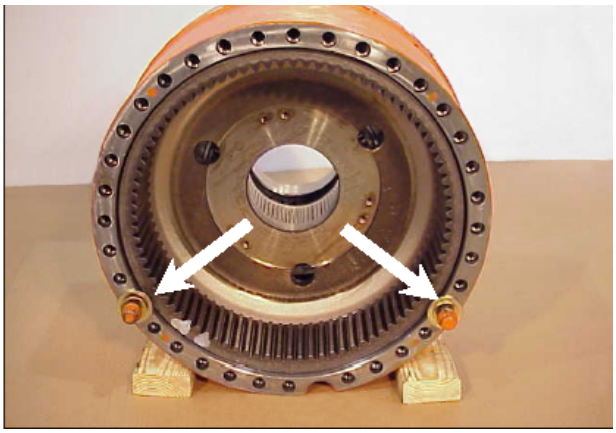


FIGURE 118: Install (2) screws with large flat washers as shown. Lightly tighten screws until washers contact hub.

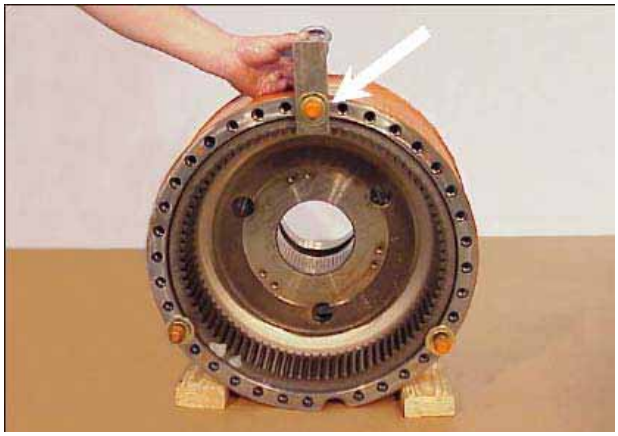


FIGURE 119: Install lifting device. (Refer to “Wheel Hub and Brake Lifting Tool”, on page 81.)

LCB Brake Piston Reassembly

FIGURE 120: To facilitate installation, size piston inner seal ring by temporarily installing ring on piston.

FIGURE 121: Install piston inner seal o-ring in brake housing groove.

FIGURE 122: Install piston inner seal ring over o-ring.

FIGURE 123: Install piston outer seal ring assembly in groove.

NOTE:

Applying grease to o-ring will help hold it to the seal ring as both are being installed.

FIGURE 124: Lubricate inner and outer seal rings and piston diameters with axle lubricant. Position piston in brake housing.

NOTE:

Threaded rod or screws installed in piston puller holes will aid in handling piston during this step.

FIGURE 125: Install piston removal and installation device. Refer to Figure 64.

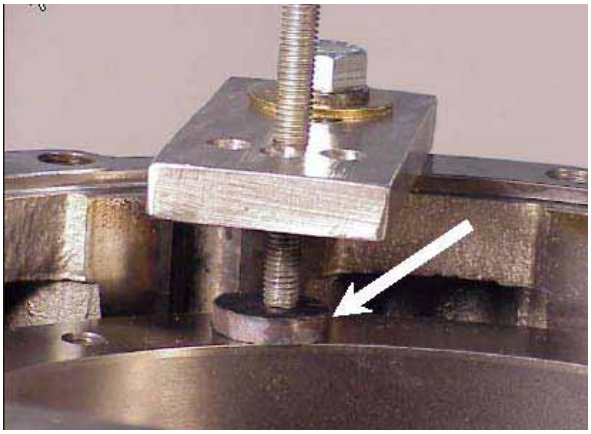


FIGURE 126: Insert washers or metal discs between ends of pusher screws and piston to protect piston surface.

FIGURE 127: Tighten pusher screws in a crisscross pattern to evenly push piston into brake housing until it bottoms out.

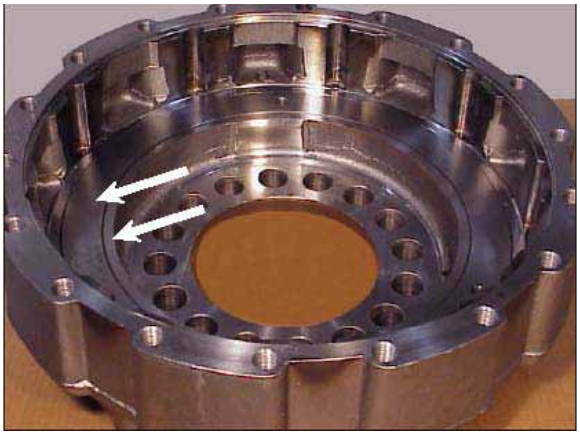


FIGURE 128: Remove piston removal and installation device. Top surface of piston should be flush with housing as shown.

LCB Brake Wear Indicator Pin Installation

FIGURE 129: Install o-ring on wear indicator pin.

FIGURE 130: Lubricate pin and o-ring with grease and install.

LCB Brake Disc Installation

FIGURE 131: Install brake reaction disc.

FIGURE 132: Install brake friction disc.

FIGURE 133: Alternately install remaining (five each) reaction and friction discs. Align wide tooth spaces on friction discs with each other as shown.

LCB Brake Cover Installation

FIGURE 134: Coat with grease, and install brake cover seal ring.

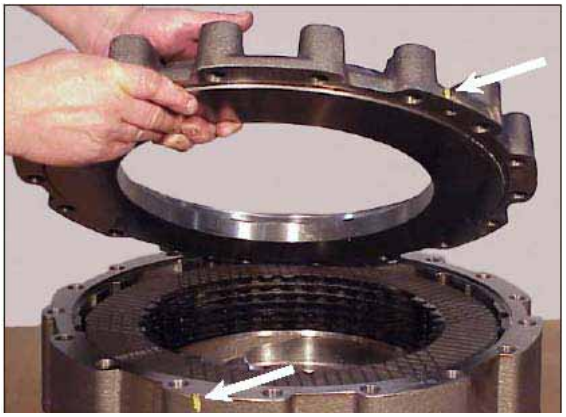


FIGURE 135: Install brake cover.

NOTE:

Align identification marks made during disassembly.

FIGURE 136: Apply Loctite 262 or equivalent to (18) cover screws. Install with washers.

LCB Brake Cover Installation

FIGURE 137: Tighten cover screws in a crisscross pattern to 300-330 lbs. ft. (410-450 N•m).

FIGURE 138: Install (2) cover pusher screws. Tighten until snug.

FIGURE 139: Install wear indicator cap and o-ring. Tighten to 20-25 lbs. ft. (27-34 N•m).

FIGURE 140: Install cooling port plug and o-ring. Tighten to 45-80 lbs. ft. (61-68 N•m).

FIGURE 141: Install (5) brake actuating and cooling port plugs and o-rings. Tighten to 20-25 lbs. ft. (27-34 N•m).

FIGURE 142: Install bleeder screw. Tighten to 10-12 lbs. ft. (14-16 N•m).

FIGURE 143: Install temperature sensor port plug and seal ring. Tighten to 15-20 lbs. ft. (20-27 N•m).

FIGURE 144: Install (3) slack adjuster screws.Tighten finger tight.

FIGURE 145: Install (3) slack adjuster seals in slack adjuster jam nuts.

FIGURE 146: Install (3) jam nuts and seals on adjuster screws. Tighten finger tight.

Slack Adjuster Adjustment

FIGURE 147: Remove piston actuating port plug and install air adapter fitting.

FIGURE 148: Install air pressure gauge, regulator, and shut off valve as shown.

FIGURE 149: Apply 100 PSI (689 kPa) air pressure to piston port and hold until slack adjuster adjustment is completed. Turn (3) slack adjuster screws inward until contact is made with piston.

FIGURE 150: Tighten (3) adjustment screws to 10 lbs. ft. (13.6 N•m) to seat piston.

FIGURE 151: Back (3) adjusting screws off (1.5) turns. While maintaining position of adjusting screws, tighten jam nuts.

FIGURE 152: Tighten (3) adjusting screw jam nuts to 50-75 lbs. ft. (67.8-101.7 N•m).

FIGURE 153: Install (3) seal rings and acorn nuts on adjustment screws.

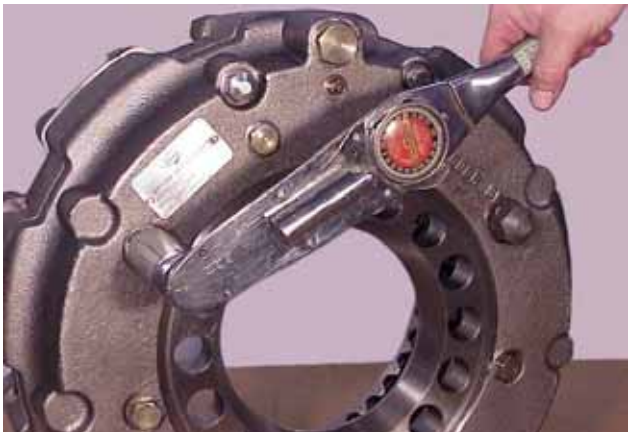


FIGURE 154: Tighten (3) adjustment screw acorn nuts to 50-75 lbs. ft. (67.8-101.7 N•m).

LCB Brake Air Pressure Test

FIGURE 155: Conduct the LCB Brake Air Pressure Test (see below).

1. After completing assembly and with bleeder plugged, apply 100 PSI (689 kPa) air pressure to the brake fluid actuation port.
2. Shut off air at inlet to hold pressure on brake until slack adjuster adjustments are completed.
3. After completing assembly and with bleeder plugged, apply 12 PSI (83 kPa) air pressure to the brake fluid actuation port.
4. Shut off air at inlet to hold pressure on brake.
5. Let pressure stabilize for 30 seconds. This is to compensate for temperature change, piston movement and seating of seal lips.
6. Repressurize to 12 PSI (83 kPa) if required and hold for 15 seconds with no pressure drop.
7. Repeat repressurizing until 12 PSI (83 kPa) holds for 15 seconds minimum, but not more than three times.
8. If, after repressurizing three times, the brake will still not hold pressure, tear down and determine cause of leak, rebuild, and retest.

LCB Brake Hydraulic Pressure Test

FIGURE 156: Conduct the LCB Brake Hydraulic Pressure Test (see below).

1. Apply 1000 PSI (6895 kPa) hydraulic pressure using mineral oil to brake actuation port and shut off pressure at inlet to hold pressure on brake.
2. Maintain pressure for 30 seconds minimum without drop.
3. Repeat twice.
4. If brake will not maintain pressure, tear down and determine cause of leak, rebuild, and retest.

Posi-Stop (LCB) Brake Reassembly

FIGURE 157: Clean cured thread locking compound from holes with a 0.625-11 UNRC-2A tap. Use compressed air to remove residue from holes. Use appropriate eye protection when using compressed air.

FIGURE 158: Position brake housing on blocks as shown to allow clearance for the wear indicator pin. Pin will protrude through bottom of housing.

Posi-Stop (LCB) Brake Wear Indicator Pin Installation

FIGURE 159: Install wear indicator pin retaining ring.

FIGURE 160: Install two wear indicator pin o-rings and lubricate.

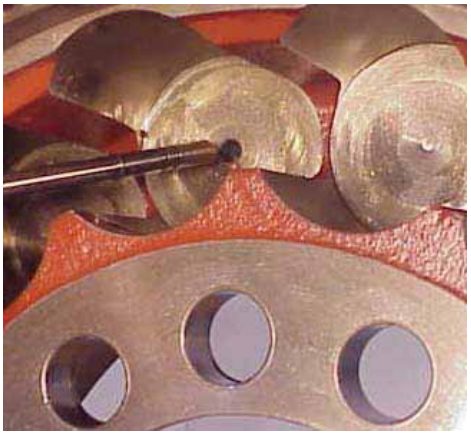


FIGURE 161: Install wear indicator pin in housing.

Posi-Stop (LCB) Brake Pressure Ring and Spring Installation

FIGURE 162: Lubricate pressure ring o-ring sealing surface with grease.

FIGURE 163: Install brake spring sets.

FIGURE 164: Install three slack adjuster spacers.

FIGURE 165: Lubricate brake cover seal ring with grease and install.

FIGURE 166: Lubricate seal ring with grease and install on pressure ring.

FIGURE 167: Set pressure ring into position. A lifting device similar to the one shown can ease installation. (Refer to “Brake Piston Pressure Ring Lifting Tool”, on page 82.)

Posi-Stop (LCB) Brake Disc Installation

FIGURE 168: Install reacting disc.

FIGURE 169: Identify the rounded edges on teeth of friction discs. Rounded edges should be installed facing “UP”.

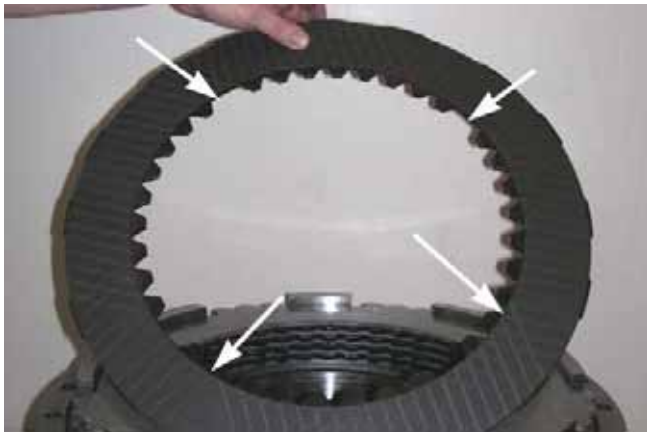


FIGURE 170: Install friction disc. Alternately install the remaining reaction and friction discs.

NOTE:

Align the friction disc oil grooves (missing teeth) with the previously installed friction disc. Alignment of friction disc teeth at this time will ease spline engagement during hub installation.

FIGURE 171: Line up the reaction disc teeth with the internal teeth in brake housing.

FIGURE 172: Install two alignment pins in brake housing 180° apart.

NOTE:

Alignment pins can be made by using bolts with heads cut off.

Posi-Stop (LCB) Brake Piston Installation

FIGURE 173: Install outer piston seal assembly.

FIGURE 174: Install inner piston seal assembly.

NOTE:

Use caution not to over stretch the inner o-ring and seal ring.

FIGURE 175: Lightly lubricate inner and outer piston seals and piston with grease, install piston in brake cover.

FIGURE 176: Evenly press piston into brake cover until it bottoms out. “C” clamps can be used, as shown, to ease this process.

Posi-Stop (LCB) Brake Cover Installation

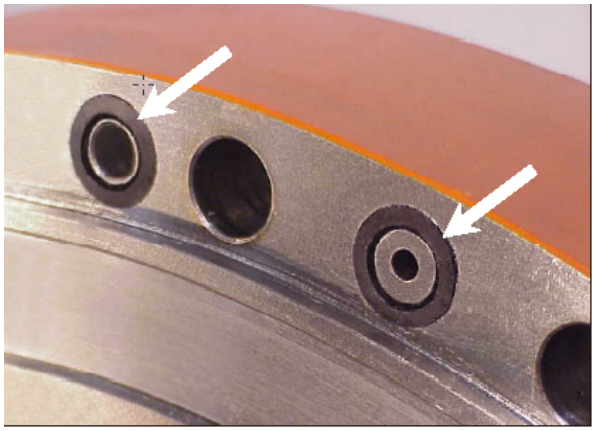


FIGURE 177: Install two pressure port seal rings.

NOTE:

Use grease to retain seal rings in grooves during handling and assembly.

FIGURE 178: Mark location of pressure ports on brake cover and housing. Align ports and install cover on alignment pins.

FIGURE 179: Remove two alignment pins and install 24 brake cover screws and washers.

NOTE:

Run screws down only “finger tight”.

FIGURE 180: Mark screws with numbers from 1 to 24 in a crisscross pattern.

FIGURE 181: Carefully recheck alignment of reaction disc teeth and teeth in the brake housing.

⚠CAUTION

This is a critical step. If the teeth are not properly aligned they will not enter the brake housing without damage as the springs are compressed.

⚠DANGER

Follow all safety precautions and use the correct service tools when servicing the brakes. The brake cover is under 72,000 psi of pressure.

Due to the potential for injury and damage, any shortcuts should be avoided. It is recommended the Brake Spring Compression Tool be used to reassemble the brake. See the “Brake Spring Compression Tool”, on page 75.

IMPORTANT:

If the brake spring compression tool is not going to be used, the following procedure must be followed to avoid personal injury and component damage.

FIGURE 182: Tighten the 24 brake outlet cover screws in a crisscross pattern by turning each screw ***NO MORE THAN 1/4 TURN.*** As springs are compressed, check alignment of reaction disc teeth as they enter the brake housing. When cover contacts brake housing the screws should be tightened to 175 to 190 lbs. ft. (240 to 260 N•m).

Posi-Stop (LCB) Brake Slack Adjuster Installation

FIGURE 183: Install three slack adjuster screws with silicone on threads.

FIGURE 184: Install three slack adjuster jam nuts. Refer to slack adjuster adjustment procedure for proper adjustment.

Posi-Stop (LCB) Brake Slack Adjuster Adjustment

FIGURE 185: Turn three slack adjuster screws inward until contact is made with piston.

FIGURE 186: Back three adjusting screws off (1.5) turns. While maintaining position of adjusting screws, tighten jam nuts.

FIGURE 187: Tighten three adjusting screw jam nuts to 50 to 75 lbs. ft. (67.8 to 101.7 N•m).

FIGURE 188: Install two pressure port plugs. Tighten to 84 to 120 LBF/IN (10 to 14 N•m).

Posi-Stop (LCB) Brake Air Pressure Test

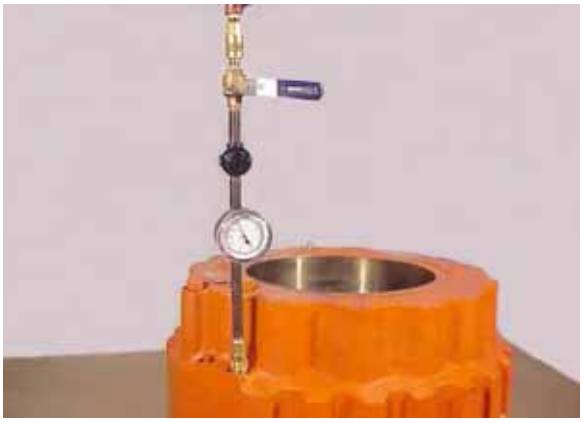


FIGURE 189: Conduct the Posi-Stop LCB Brake Air Pressure Test (see below).

1. After completing assembly and with bleeder plugged, apply 12 PSI (83 kPa) air pressure to the brake fluid actuation port.
2. Shut off air at inlet to hold pressure on brake.
3. Let pressure stabilize for 30 seconds. This is to compensate for temperature change, piston movement, and seating of seal lips.
4. Repressurize to 12 PSI (83 kPa) if required and hold for 15 seconds with no pressure drop.
5. Repeat repressurizing until 12 PSI (83 kPa) holds for 15 seconds minimum, but not more than three times.
6. If, after repressurizing three times, the brake will still not hold pressure, tear down and determine cause of leak, rebuild, and retest.

Posi-Stop (LCB) Brake Hydraulic Pressure Test

FIGURE 190: Conduct the LCB Brake Hydraulic Pressure Test (see below).

1. After completing assembly and with bleeder plugged, apply 100 PSI (689 kPa) air pressure to the brake fluid actuation port.
2. Shut off air at inlet to hold pressure on brake.
3. Brake should maintain pressure for 30 seconds without drop.
4. Apply 1500 +50/-00 PSI (10342 +344/-000 kPa) hydraulic pressure using mineral oil to brake actuation port, shut off pressure at inlet to hold pressure on brake.
5. Inspect to insure that pressure plate has moved against housing stop and that friction discs are released and free.
6. Maintain pressure for 30 seconds minimum without drop.
7. Repeat twice.
8. If brake will not maintain pressure, tear down and determine cause of leak, rebuild, and retest.

Posi-Stop (LCB) Brake Final Assembly

FIGURE 191: One at a time remove the 24 brake cover screws. Apply Loctite 262 or equivalent to the threads, reinstall and tighten to 175 to 190 lbs. ft. (240 to 260 N•m).

⚠WARNING

Do not remove more than one screw at a time.

FIGURE 192: Install two warning sticker covers with four screws and tighten to 215-240 LBF/IN. (24-27 N•m).

Spindle and Brake Installation

FIGURE 193: Apply grease to spindle housing seal ring and install.

FIGURE 194: Apply grease to spindle pilot seal ring and install.

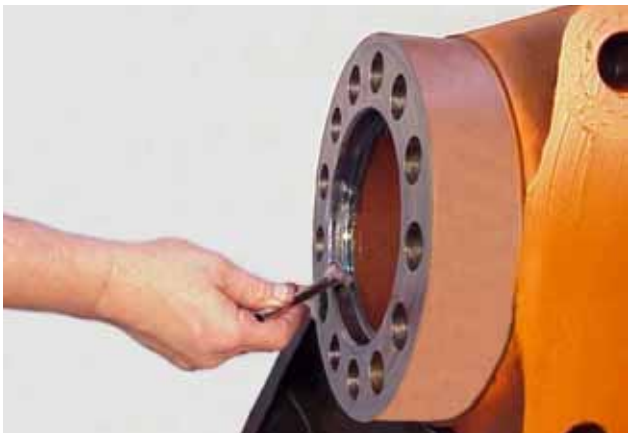


FIGURE 195: Apply grease to spindle pilot bore in axle housing.

FIGURE 196: Install alignment pin in upper spindle screw hole.

NOTE:

Threaded end of pin must engage threads in axle housing a minimum of 1.5 times pin diameter or 2.0 (50.8 mm).

FIGURE 197: Install spindle.

NOTE:

Spindle pilot needs to be fully engaged in axle housing. A soft mallet may be necessary to drive spindle into position.

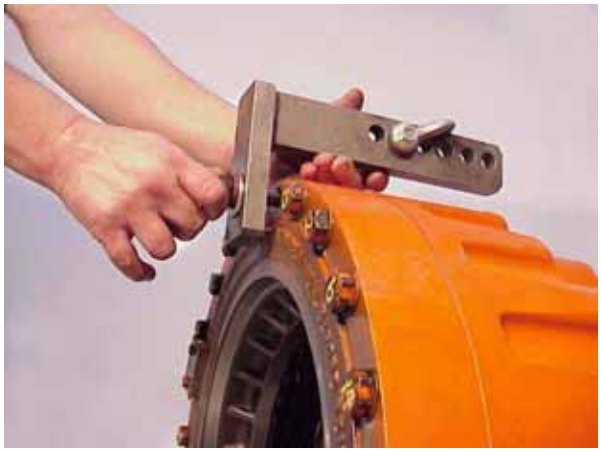


FIGURE 198: Remove top screw from brake and install lifting device. (Refer to “Wheel Hub and Brake Lifting Tool”, on page 81.)

NOTE:

Ensure the bleeder is in the correct orientation from disassembly as noted.

FIGURE 199: Remove lifting device from brake.

FIGURE 200: Apply Loctite 262 or equivalent to brake cover screw.

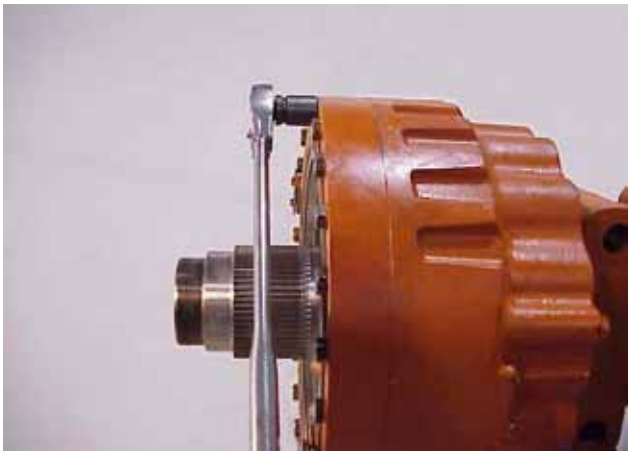


FIGURE 201: Install brake cover screw and washer. For Posi-Stop brakes, tighten to 175-190 lbs. ft. (240-260 N•m). For LCB brakes, tighten to 300-330 lbs. ft. (410-450 N•m).

FIGURE 202: Remove alignment pin. Apply oil to screw threads and install (1) spindle screw and washer. Tighten to approximately 100 lbs. ft. (136 N•m).

FIGURE 203: Number spindle screws, as shown, in a crisscross pattern to facilitate the final tightening procedure.

NOTE:

Figure 204 is for cooling purposes on sump cooled brake applications only.

FIGURE 204: Number of spindle screws, as shown in a crisscross pattern to facilitate the final tightening procedure. For brake cooling purposes, leave out one bolt at the top of the axle at the 12:00 position. For more information refer to your service parts list.

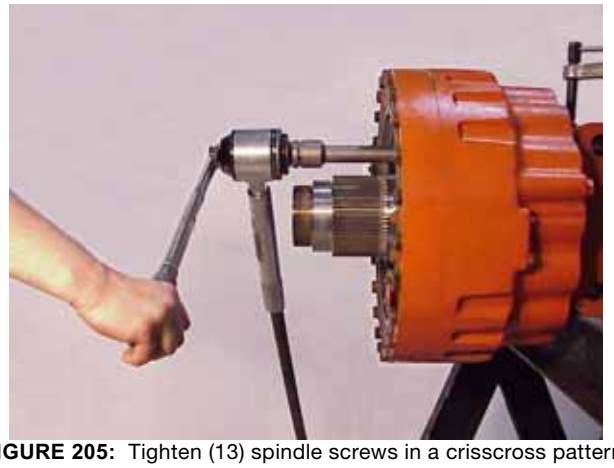


FIGURE 205: Tighten (13) spindle screws in a crisscross pattern to 1850-2000 lbs. ft. (2508-2712 N•m).

NOTICE

Spindle screws should be tightened in a crisscross pattern.

Hub Installation

FIGURE 206: Install lifting device on hub.

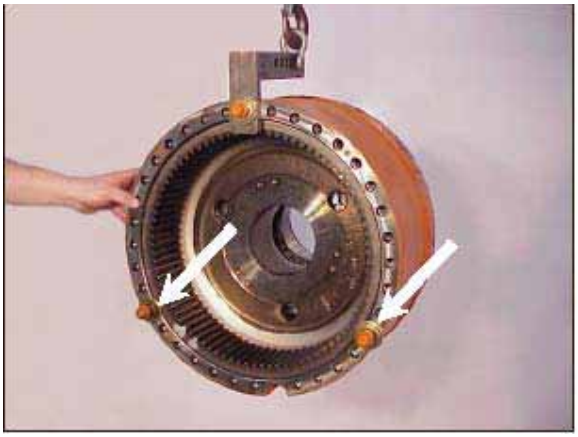


FIGURE 207: Screws and flat washers installed during hub reassembly should be in place as indicated above. If not they should be installed to hold internal gear in hub during handling.

Face Seal Installation

FIGURE 208: Clean face seal bore in brake housing with solvent.

FIGURE 209: Clean face seal bore in wheel hub with solvent.

NOTE:

Keep original mated metal sealing rings as a set for wheel hub and brake cover. (DO NOT INTERMIX METAL RINGS.)
All parts of seal should be free of grease, oil, dirt, and scale.
Sealing rings must be handled with care. Lapped sealing faces must not be damaged, scratched or contaminated with dirt or grease.

FIGURE 210: Install the toric ring making sure that it is uniformly seated on the retaining lip and not twisted. Place the face seal in the installation tool and locate the assembly squarely against the housing. Reference Caterpillar tool part number 8T7789-2.

FIGURE 211: Carefully press face seal into brake housing.

NOTE:

Use sudden and even pressure against the tool to push the toric under the retaining lip of the housing cavity. Insure the toric is uniformly captured under the housing cavity retaining lip and is not twisted or pinched. The seal ring face should be parallel to the housing within 0.040 in. (1.0 mm).

FIGURE 212: Carefully press 2nd half of face seal into wheel hub. After installing the seal halves into the wheel hub and brake housing, wipe both metal sealing surfaces clean with lint free cloth. Then apply a coat of clean MS8 oil to the metal seal faces with a lint free applicator. Oil must not wet surfaces other than sealing faces.

NOTE:

Use sudden and even pressure against the tool to push the toric ring into the housing.

Posi-Stop Brake Installation

FIGURE 213: Install hydraulic source to brake actuating port and pressurize to 1500 PSI (10342 kPa) to release brake.

FIGURE 214: Align brake friction so that the missing teeth (wide space) on all discs line up with each other.

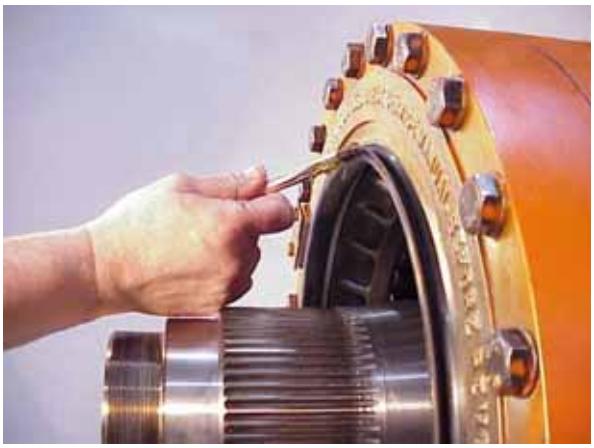


FIGURE 215: Apply oil to face seal contact surface.

FIGURE 216: Apply oil to face seal contact surface.

FIGURE 217: Lubricate inner diameter of hub seal with oil.

FIGURE 218: Apply Anti-Seize or Never-Seez lubricant to spindle splines. (Refer to “Wheel Bearing Preload Adjustment”, on page 69.)

FIGURE 219: Apply Anti-Seize or Never-Seez lubricant to face of spindle nut.

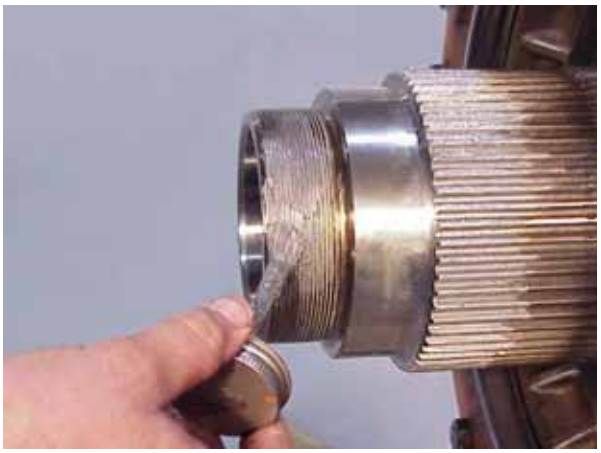


FIGURE 220: Apply Anti-Seize or Never-Seez lubricant to spindle threads.

FIGURE 221: Install hub assembly. It will be necessary to rotate wheel hub slightly to engage brake disc teeth. Do not force as damage to disc teeth could occur.

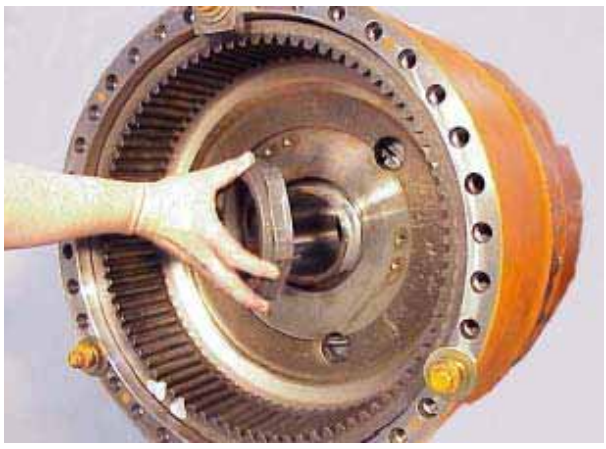


FIGURE 222: Install spindle nut. After nut is secure on spindle, remove lifting device and the screws and flat washers used for handling.

Wheel Bearing Preload Adjustment

Before wheel bearing adjustment is made, it is imperative all tapered bearing cones and cups be pressed to fully seated position. Do not depend on the wheel bearing adjusting nut to “shoulder” tapered bearings cups and cones.

NOTE:

If the adjusting nut has an undercut on the inner diameter, the undercut must go toward the internal gear hub.

On axles with Posi-Stop LCB brakes, release the pressure before continuing. (Any brake drag will affect obtaining correct rolling torque value).

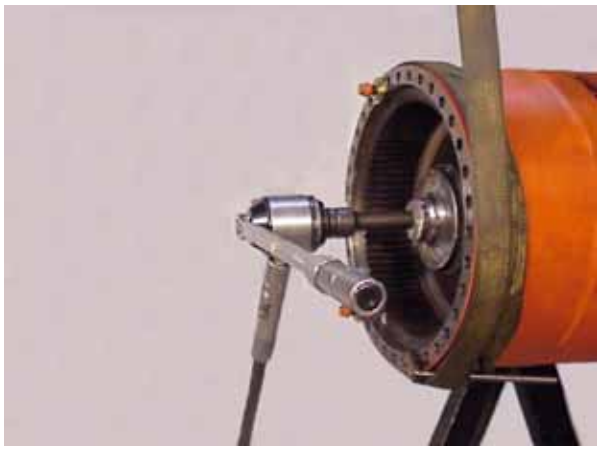


FIGURE 223: Coat face of spindle nut, threads, and splines with Anti-Seize or Never-Seez. Tighten spindle nut to 1200 lbs. ft. (1627 N•m) while rotating hub. Lifting strap and chain hoist are being used to rotate hub in the above photo.

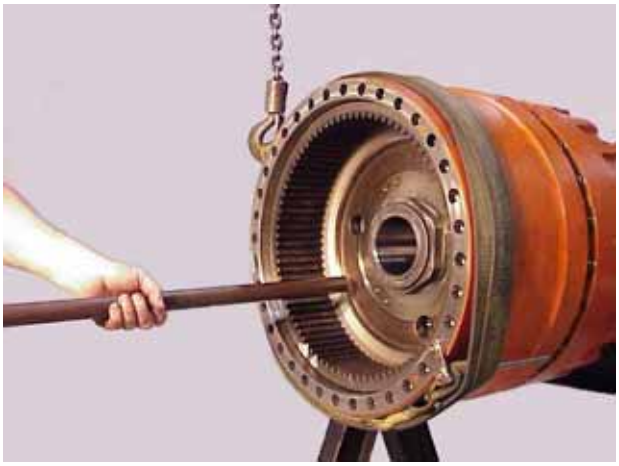


FIGURE 224: Shock internal gear hub with heavy bar while rotating wheel hub a minimum of 2 revolutions.

Recheck nut torque. If spindle nut moves, retighten to 1200 lbs. ft. (1627 N•m).

Repeat steps in Figures 223 and 224 as many times as necessary until the spindle nut does not advance when tightened.

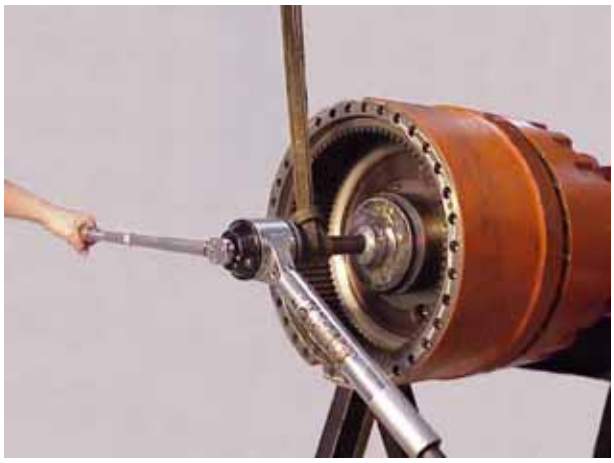


FIGURE 225: Loosen the spindle nut 1/4 to 1/2 turn and shock the wheel hub until a slight amount of bearing end play is achieved and the wheel hub rotates freely.

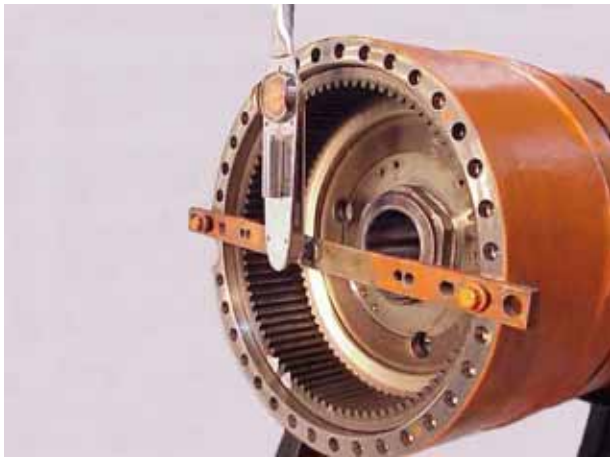


FIGURE 226: Check no-load rolling torque of hub using a torque wrench and adapter bar or other appropriate measuring device. Rolling torque should be between 10-50 lbs. ft. (14-68 N•m).

Record no-load value.

LCB BRAKE ONLY

If higher than specification, open brake bleeder, rotate hub, and shock brake to release brake.

If brake does not release, apply 3 PSI (21 kPa) to cooling cavity of brake with bleeder open.

NOTE:

The specifications given are for axles using new parts. For service on axles with used parts the procedure is the same except the minimum allowable rolling torque can be as low as 5 lbs. ft. (7 N•m).

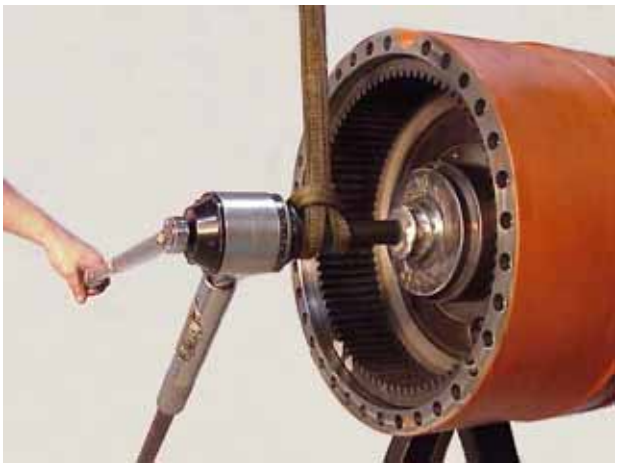


FIGURE 227: Tighten spindle nut to 600 lbs. ft. (813 N•m).

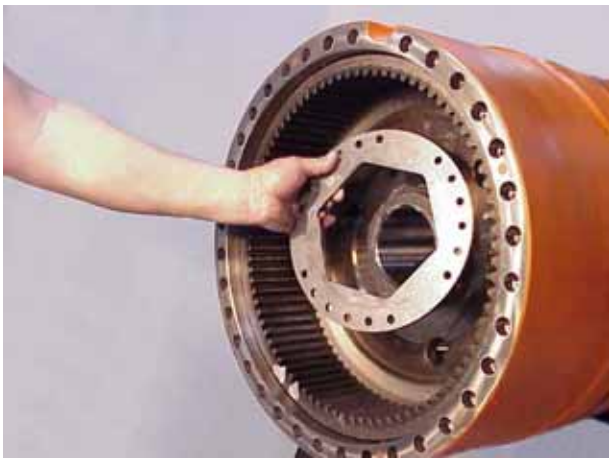


FIGURE 228: Install spindle nut lock plate.

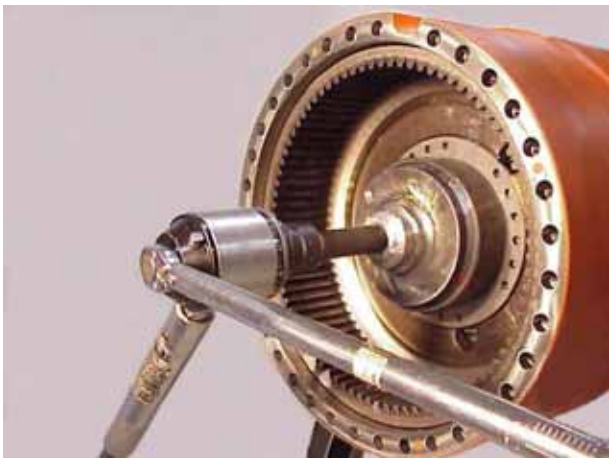


FIGURE 229: Tighten spindle nut until the 1st of 3 pairs of holes in the lock plate line up with the holes in the internal gear hub.

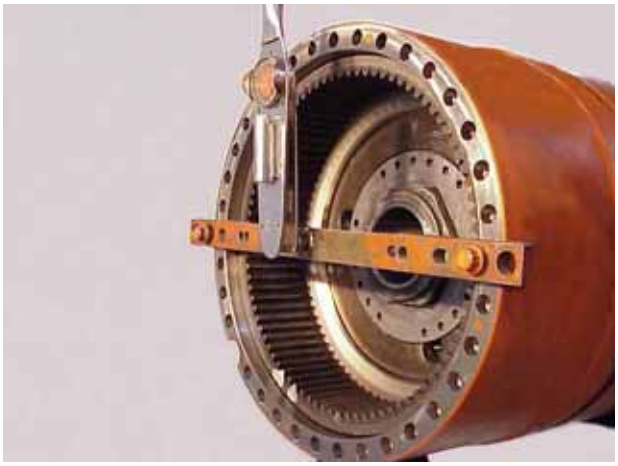


FIGURE 230: Check rolling torque of wheel hub. This value should be 50-80 lbs. ft. (68-108 N•m) over the no-load reading recorded in Figure 226, on page 70.

If the rolling torque is higher than specified, reduce the nut torque to obtain an acceptable reading, but not less than 400 lbs. ft. (542 N•m). If the spindle nut torque must be reduced below 400 lbs. ft. there is likely a concentricity or alignment issue in the hub assembly and it should be disassembled, inspected, and reassembled as required.

If the rolling torque is lower than specified, increase nut torque until preload is in the specified range the lock plate holes aligned. NEVER torque to more than 1400 lbs. ft. (1898 N•m).

Recheck rolling torque after rotating wheel hub at least 5 times.

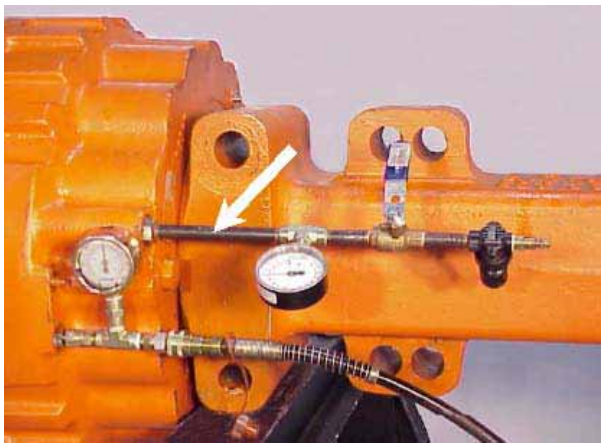


FIGURE 231: Perform brake cavity and seal air test using a gauge, shut off valve, and regulator as shown or equivalent.

Apply 12 PSI (83 kPa) to brake through the cooling port close valve and disconnect air supply. Brake must hold 12 PSI (83 kPa) for 15 seconds with no drop in pressure.

If leaks occur, determine cause, repair, and retest.

FIGURE 232: Remove air test plumbing and install brake cooling port plug.

NOTE:

Refer to appropriate brake section for usage and tightening of plugs.

FIGURE 233: Release hydraulic pressure to brake actuating port and remove hydraulic plumbing. Install brake actuating port plug and tighten to 20-25 lbs. ft. (27-34 N•m).

FIGURE 234: Apply Loctite 262 or equivalent to (6) spindle nut lock plate screws and install.

FIGURE 235: Tighten spindle nut lock plate screws to 25-28 lbs. ft. (34-38 N•m).

Differential/Carrier Installation

Refer to 2050 Series Posi-Torq Limited Slip Differential Service Manual for differential and carrier servicing information.

FIGURE 236: Install seal ring on carrier. Install differential and carrier assembly. Install (12) tapered dowels. Apply Loctite 262 or equivalent to (22) stud nuts and install with washers. Tighten nuts to 175-190 lbs. ft. (240-260 N•m).

FIGURE 237: Apply teflon thread sealer to axle drain plug, install and tighten to 50-55 lbs. ft. (68-74 N•m). Install fill plug and o-ring, tighten to 30-35 lbs. ft. (41-48 N•m).

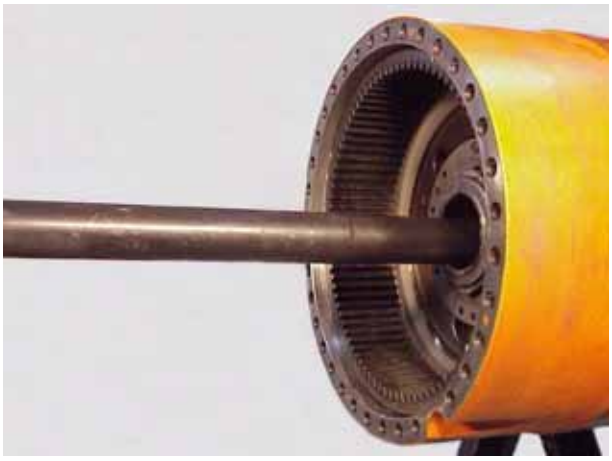


FIGURE 238: Install axle shaft.

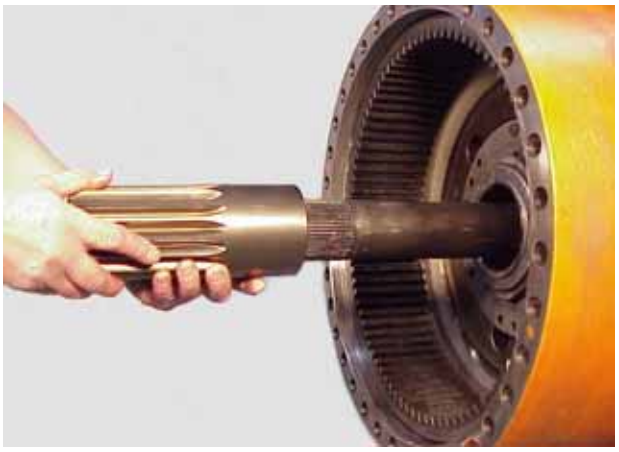


FIGURE 239: Install sun gear on axle shaft.

Planetary Installation

FIGURE 240: Apply grease to planetary sealing ring surface in wheel hub.

FIGURE 241: Apply grease and install planetary o-ring.

FIGURE 242: Install planetary assembly.

FIGURE 243: Apply Loctite 262 or equivalent to (3) mounting screws.

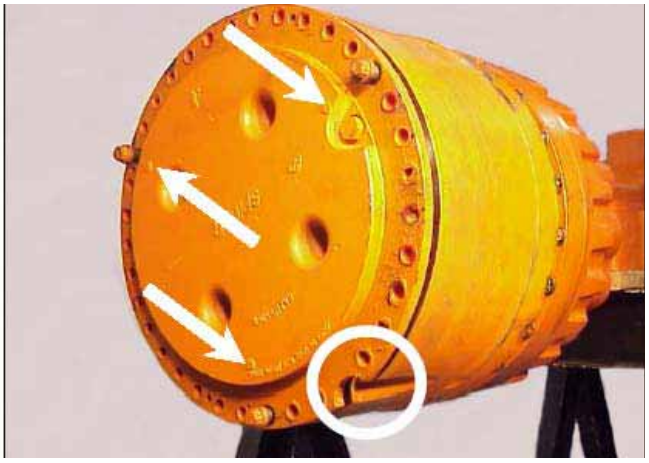


FIGURE 244: Install (3) planetary mounting screws.

NOTE:

Align casting eye brows with each other as shown. The (3) screw locations are identified by small cast buttons on the face of the planet carrier.

FIGURE 245: Tighten planetary mounting screws to 380-400 lbs. ft. (515-542 N•m).

FIGURE 246: Install planetary oil level and drain plugs and tighten to 30-35 lbs. ft. (41-47 N•m).

Axle Air Pressure Test

If the brake assembly is disassembled, first perform the both the Air Pressure and Hydraulic Pressure Test on page 56 for LCB Brakes or on page 62 for Posi-Stop Brakes.

If the brake assembly is not disassembled before mounting to the axle, no brake pressure tests are required.

If the brakes are not sealed off from the main axle cavity (common brake and axle oil sump) make sure cooling and drain ports are plugged and apply 12 PSI (83 kPa) air pressure to the axle (normally through the axle housing breather hole) shut air off at the inlet to lock pressure on axle. Axle must hold 12 PSI (83 kPa) for 15 seconds with no drop in pressure. If leaks occur, determine cause, rebuild and retest.

If the brakes are sealed off from the main axle with seals between the hub and spindle (for purposes of either forced oil cooling or separate brake sump) proceed as follows:

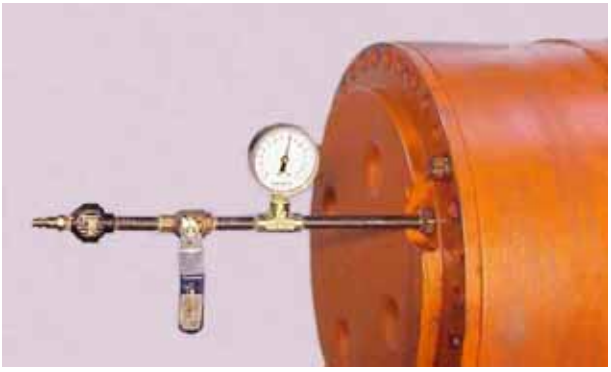


FIGURE 247: Conduct the Axle Air Pressure Test (see below).

1. Remove drain plugs from both brakes.
2. Remove (1) planetary or axle housing plug and install a gauge, shut off valve, and regulator or equivalent.
3. Apply 12 PSI (83 kPa) air pressure to complete axle (normally through axle housing breather hole) and shut air off at inlet to lock pressure on axle.
4. Axle must hold 12 PSI (83 kPa) for 15 seconds with no drop in pressure.
5. If leaks occur, determine cause, rebuild, and retest.
6. If no leaks occur, make sure cooling ports are plugged, apply 12 PSI (83 kPa) air pressure to drain port of **each** brake, and shut off air at inlet to lock pressure on brake cavity.
7. Each brake cavity must hold 12 PSI (83 kPa) for 15 seconds with no drop in pressure.
8. If leaks occur, determine cause, rebuild, and retest.
9. Remove air test plumbing and reinstall plugs.

Brake Spring Compression Tool

⚠ DANGER

For your safety, and the safety of others, read this manual thoroughly before performing brake repairs. Failure to properly follow all instructions and precautions could result in serious injury or death.

Disassembly

Special Tools:

- Brake Spring Compression Tool (see pages 77-80 for tool drawings)

1. Disassemble the wheel end from the spindle up to and including the removal of the wheel hub from the brake discs.

NOTE:

If the axle spindle or axle housing is to be replaced, remove the brake as an assembly by removing the brake to spindle screws and washers. Remove brake assembly from spindle.

2. Install the Brake Spring Compression Tool main section over the axle spindle through the brake discs and against the piston pressure ring.
3. Install the bolt plate and bolts (grade 5 minimum) over the spindle.
4. Back the bolts out until below flush with bolt plate face to ensure full nut engagement with spindle threads.
5. Install the spindle nut and tighten securely against Brake Spring Compression Tool. Torque to 136 N•m (100 lbs. ft.)
6. Tighten the four (4) Brake Spring Compression Tool bolts against the compression tool cylinder. This will hold the springs in position while removing the brake cover and brake discs.

⚠ DANGER

- Do not exceed 542 N•m (400 lbs. ft.) torque on compression bolts.
- The outer brake housing cover is under 72,000 lbs. compressed spring pressure. Extreme caution must be taken in removing this cover by removing brake cover bolts evenly. NEVER remove brake cover bolts one (1) at a time.

7. With the Brake Spring Compression Tool securely in place, remove the brake cover bolts evenly. NEVER remove brake cover bolts one (1) at a time.
8. Remove the brake cover and piston from the brake housing.
9. Remove the friction and reaction discs.
10. Loosen the Brake Spring Compression Tool bolts evenly one thread at a time using caution. The compression springs will push the piston pressure ring out of the brake housing.

⚠ DANGER

Before removing the Brake Spring Compression Tool from the spindle, ensure all spring force is off of the pressure ring and that the ring moves freely in the brake housing.

11. Remove the spindle nut and the two pieces of the Brake Spring Compression Tool.

Reassembly

Special Tools:

- Brake Spring Compression Tool (see pages 77-80 for tool drawings)

1. Install the brake housing on the axle.
2. Install all spring sets.
3. Position the piston pressure ring in the brake housing.
4. Install Brake Spring Compression Tool main section over the axle spindle and center in the pressure ring.
5. Install the bolt plate and bolts over the spindle.
6. Back the bolts out until below flush with bolt plate face to ensure full nut engagement with spindle threads.
7. Install the spindle nut and tighten securely against Brake Spring Compression Tool. Torque to 136 N•m (100 lbs. ft.)
8. Turn the four (4) Brake Spring Compression Tool bolts against the compression tool cylinder.
9. Tighten the Brake Spring Compression Tool bolts evenly a thread or two at a time in a crisscross pattern using caution. This will compress the spring sets and push the pressure ring into the brake housing. The springs are compressed far enough when the tangs on the pressure ring are approximately 1/8” from being flush with the brake housing face.

⚠ DANGER

Do not exceed 542 N•m (400 lbs. ft.) torque on compression bolts.

10. Install the first steel reaction plate in the pressure ring.
11. Install the first friction disc and lining assembly in the pressure ring and against the first steel reaction plate.
12. Install the second steel reaction plate.
13. Install the second friction disc and align the four (4) oil grooves in the second disc with the oil grooves in the first friction disc.
14. Continue alternating steel plates and friction discs until all five (5) or six (6) plates and discs are installed.

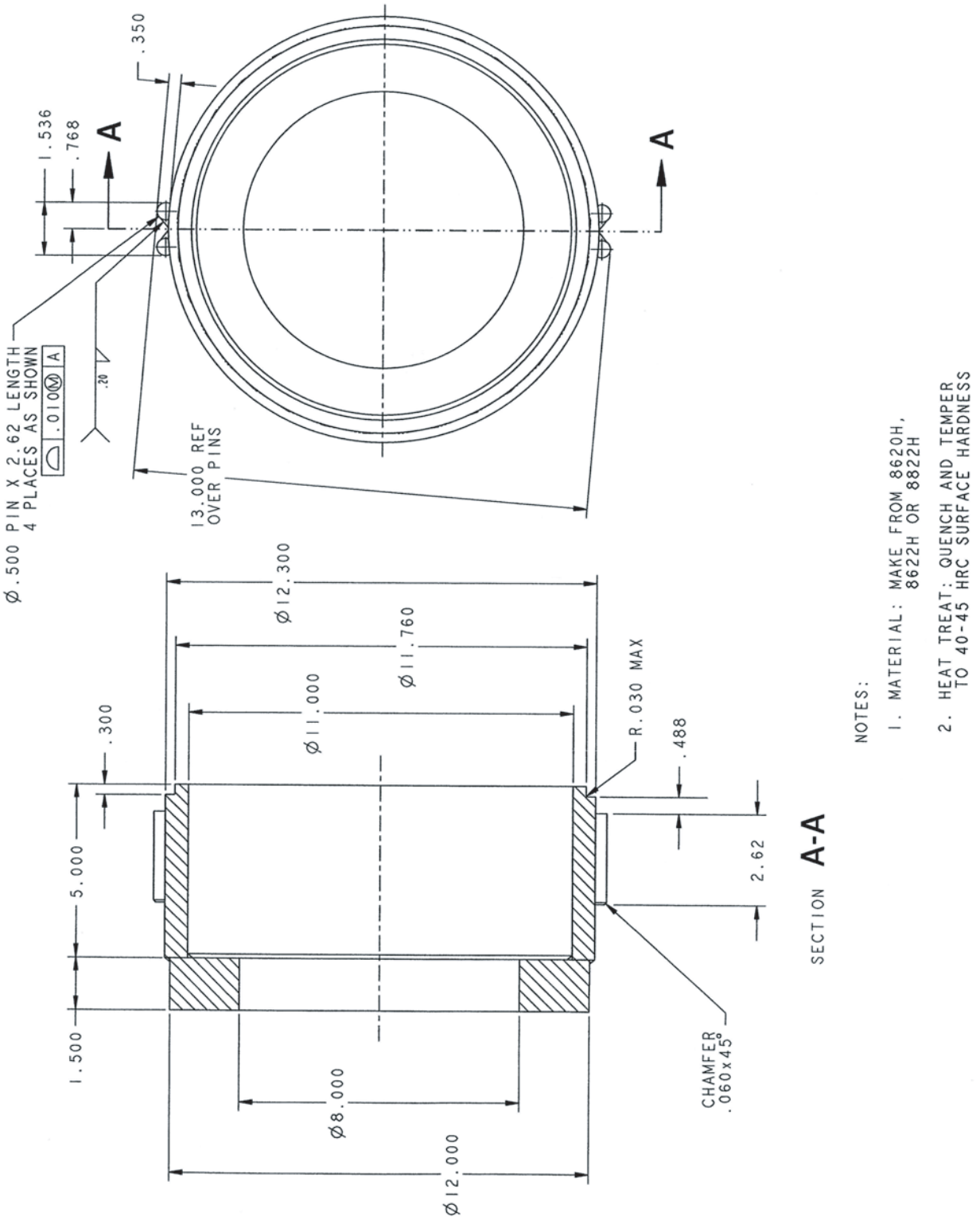
NOTE:

Aligning the friction disc oil grooves and teeth at this time will facilitate wheel hub spline alignment in discs at wheel hub assembly in brake.

15. Install a new square cut sealing ring in brake housing groove.
16. Position the brake cover on the brake housing aligning the fluid hole marks on the cover with the holes in the housing. See “Posi-Stop (LCB) Brake Reassembly”, on page 56.
17. Install the cover to housing bolts and washers. If there is a slight gap between the cover and the housing, carefully and evenly tighten the bolts to the specified torque.
18. Loosen the Brake Spring Compression Tool bolts evenly one thread at a time using caution. When bolts are away from the compression tool cylinder, remove the spindle nut. Remove the Brake Spring Compression Tool and cylinder from the spindle and brake.

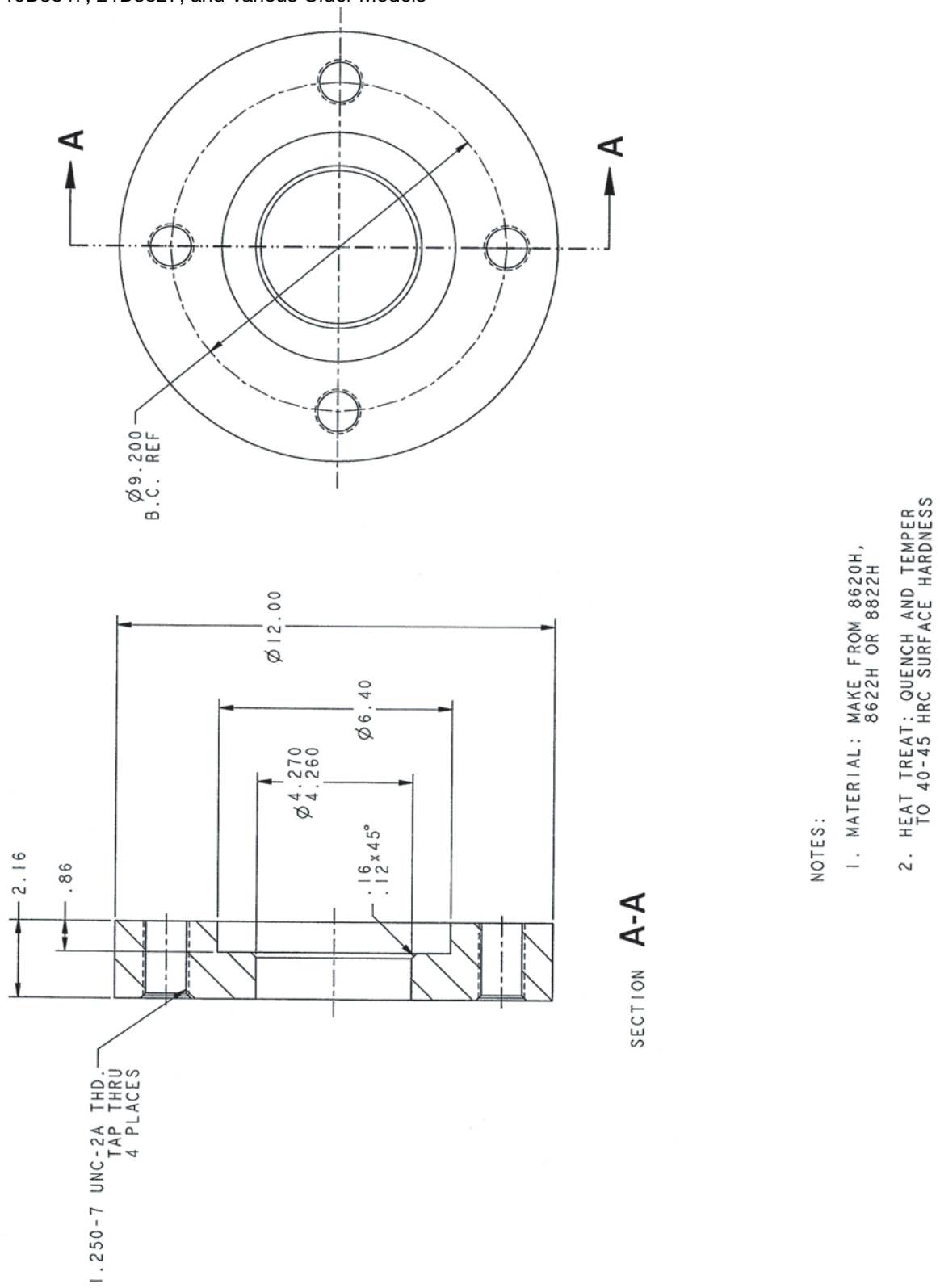
Brake Spring Compression Tool

Brake Spring Compression Tool Weldment (Dana P/N 2116191)



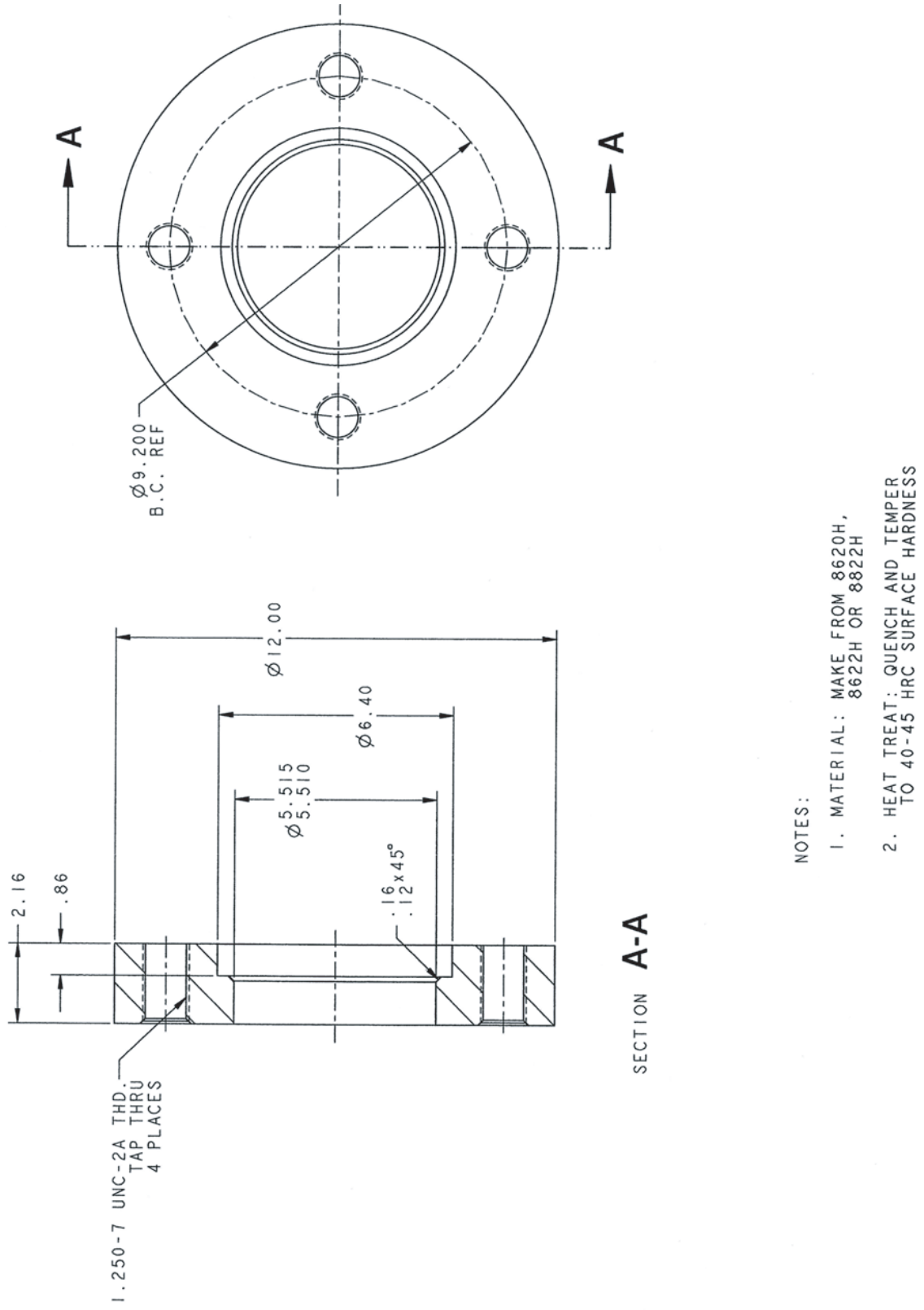
Brake Spring Compression Tool Bolt Plate (Dana P/N 2116192)

Axle Models 19D3847, 21D3827, and Various Older Models

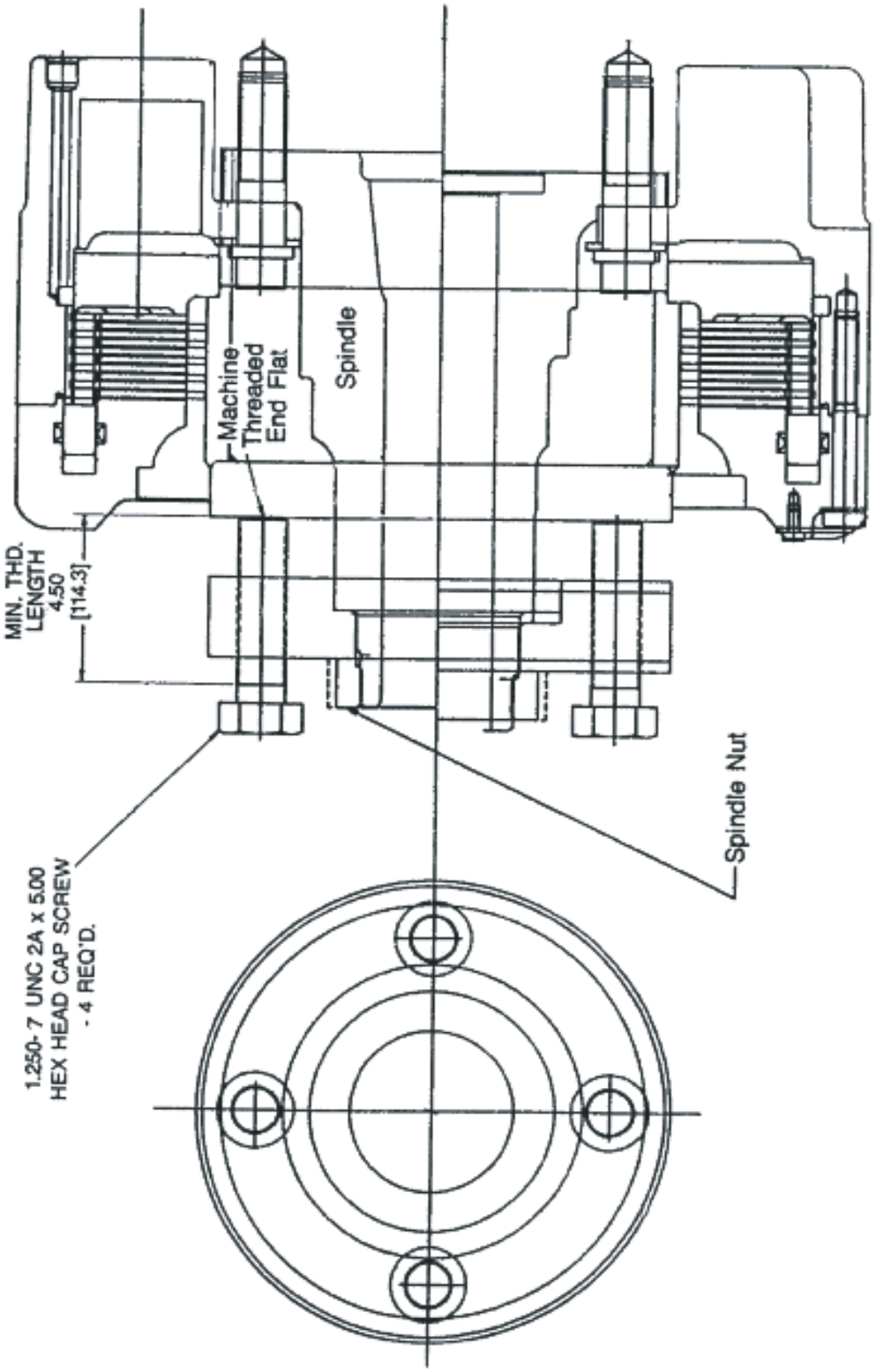


Brake Spring Compression Tool Bolt Plate (Dana P/N 2116193)

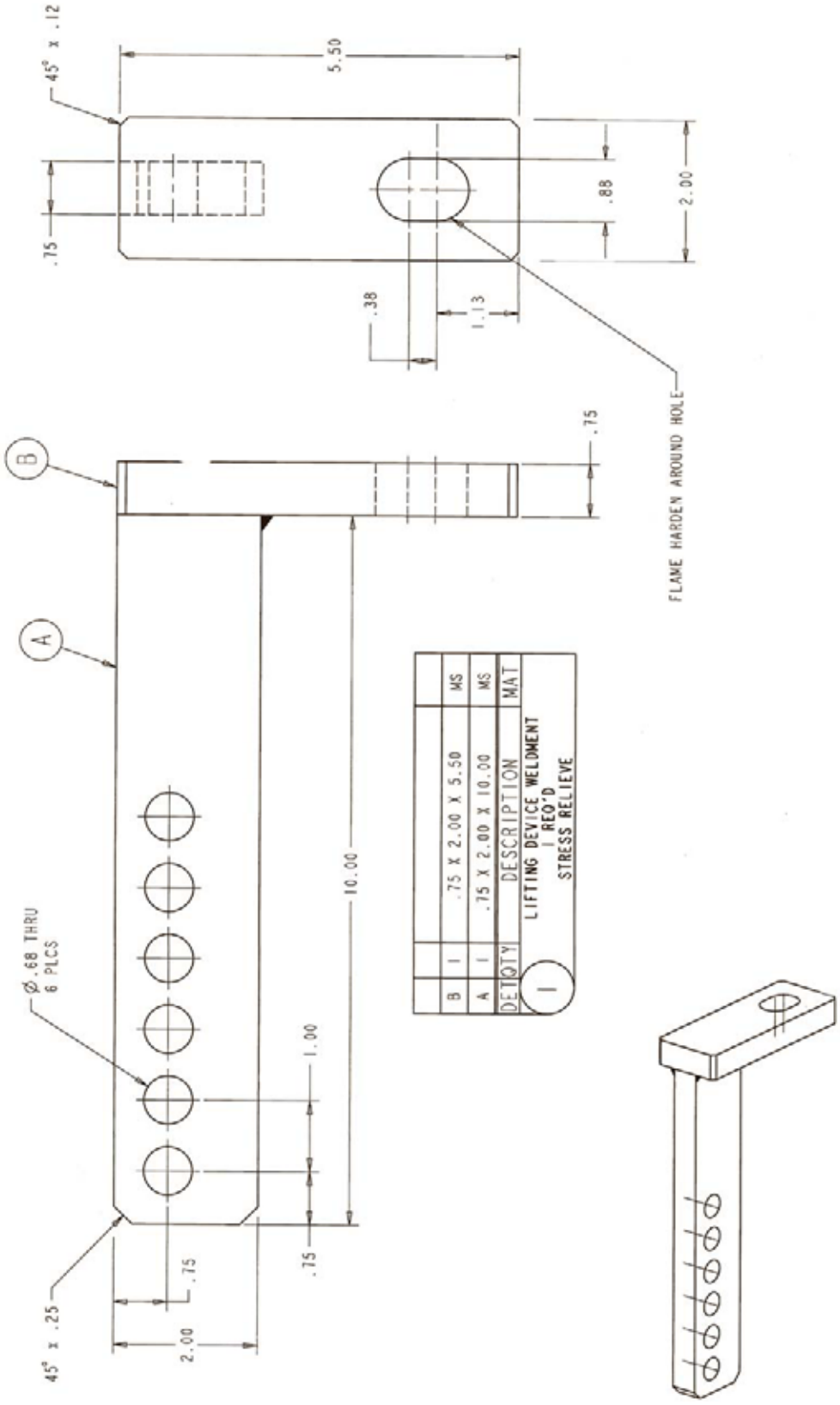
Axle Models 19D4354, 21D4354, 48T, and 53R Models



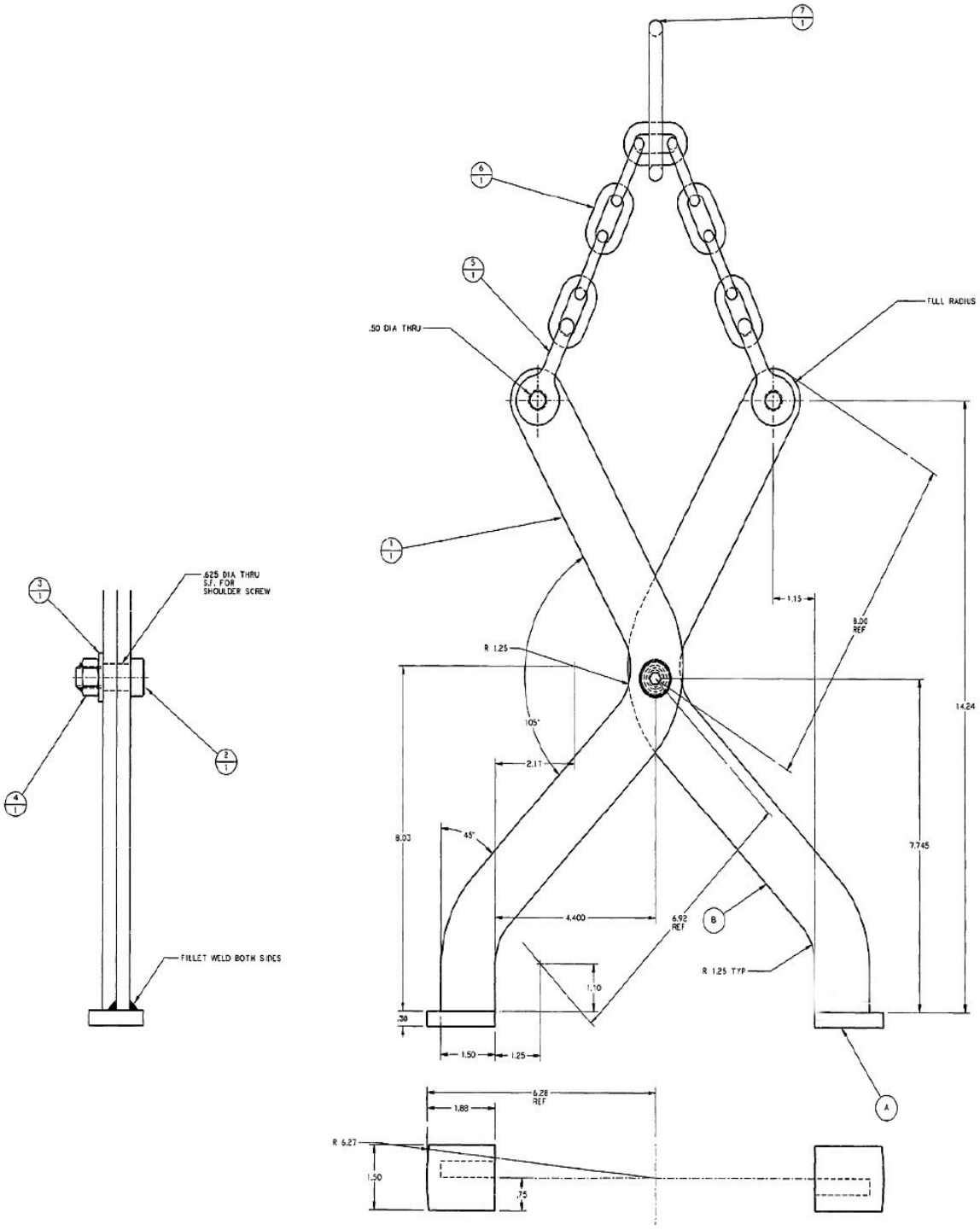
Brake Spring Compression Tool Installation (Dana P/N L3958)



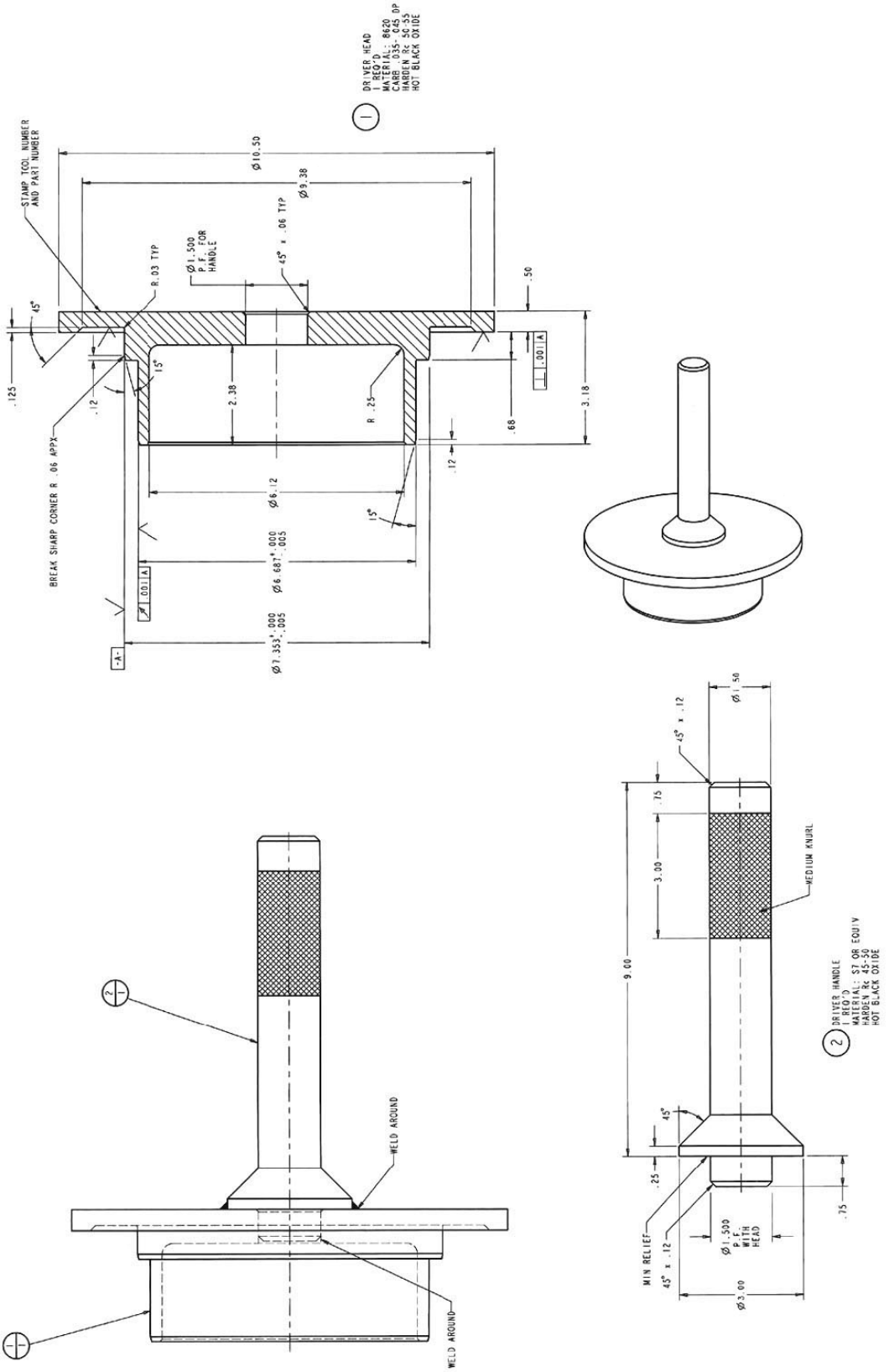
Wheel Hub and Brake Lifting Tool



Brake Piston Pressure Ring Lifting Tool



Hub Seal Driver Tool



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