Rimpull Axle Service Instructions

D200 STUB END REMOVAL

1. Pack stub end cavity with dry ice and allow outer surface to frost over before proceeding.

2. Heat outer 12" of housing as quickly as possible to 350 degrees with two rose buds, (weed burners), to allow for quick expansion of axle housing bores. The stub end to axle housing is approx. a .010 press fit so the heat needs to be applied very quickly. Try to avoid any heat directly on the stub end itself.

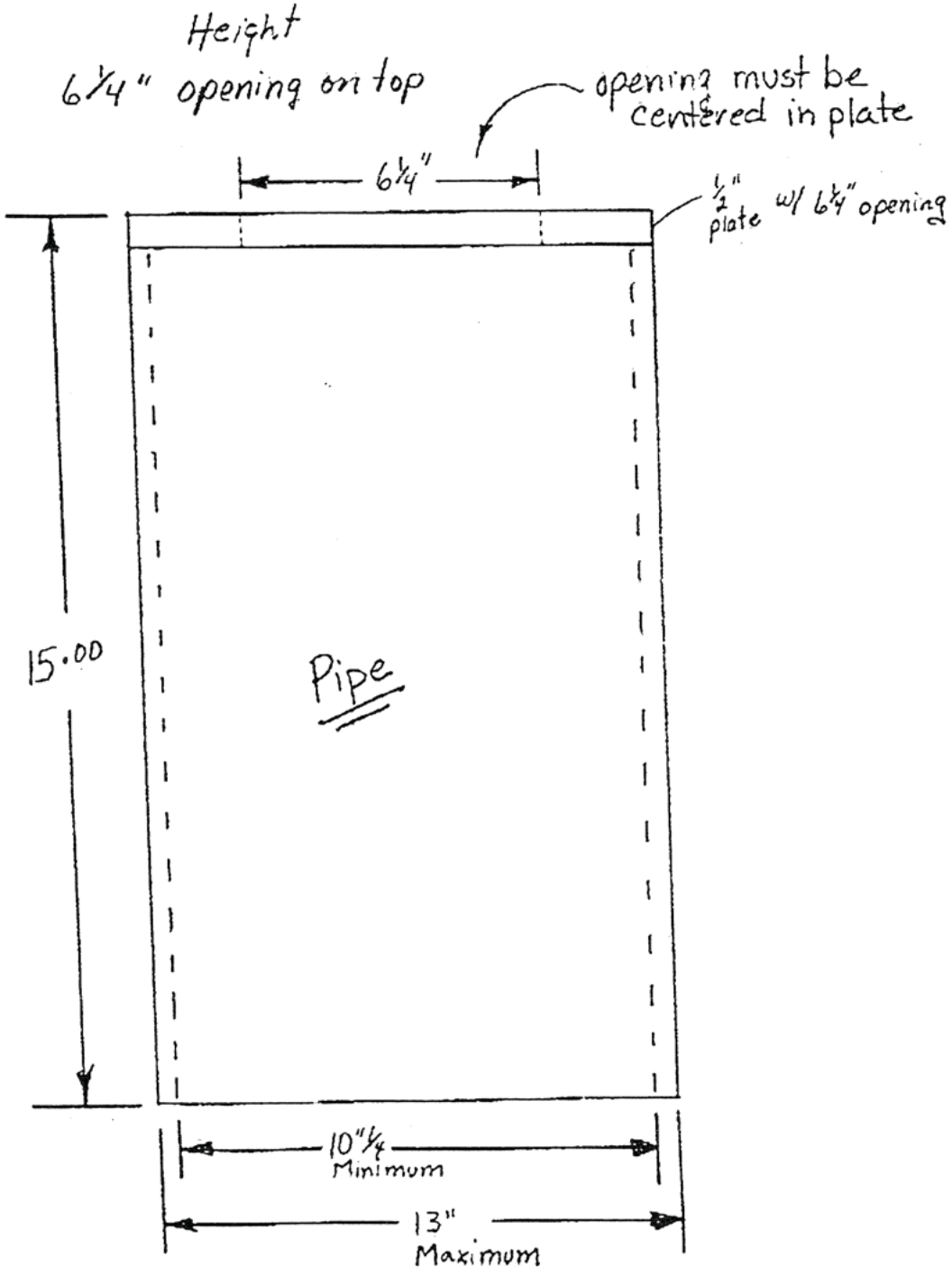
3. After reaching 350 degrees, install pusher bolts with anti seize. Tighten pusher bolts evenly until stub end starts to push away from axle housing bores.

4. Support stub end with an adequate lifting device to prevent stub from dropping out on to the floor.

STACKER AXLE
SEAL RING INSTALLATION PROCEDURE
180 077 REF B/M #189 602

	1. After stub end is installed and bolts and nuts torqued with Hytorc, clean stub end surface with Loctite cleaner. (The area where the o-ring and inside diameter of seal adapter contacts.)
	2. Clean inside diameter of seal adapter with Loctite cleaner #7070.
	3. Coat both surfaces with Loctite primer 7649 primer N – let dry for 30 seconds. Place in rod oven and heat to 100^0 F – Check with temperature gun to verify 100^0
	4. Install o-ring, p/n 225478 , over stub end and seat in the radius area.
	5. Coat inside diameter of seal adapter with Loctite 620, with an even film on the entire inside surface.
	6. Slide seal adapter over end of stub end and down to contact o-ring.
	7. Using the 620 Loctite, run a small bead around the top seal adapter in the chamfer. This will ensure an adequate amount has penetrated the interface surface.
	8. Install tube seating tool over stubend – contacting top of seal adapter.
	9. Install stubend nut and tighten against tool which applies pressure to seal adapter and seats o-ring.
	10. Measure gap between seal adapter and stub end flange with feeler gauge – record. _____ This dimension will be used to check for seating.
	11. Allow Loctite to cure for 30 to 45 minutes – wipe off excess.
	11.1 Clean inside of bearing with Loctite cleaner, heat to 150^0.
	12. Loosen nut after the cure and measure gap again to determine if seal adapter is going to stay seated. If gap is the same and adapter has not moved, install bearing.
	13. Coat inside surface of inner race with Loctite 620 and install over stubend against seated seal adapter.
	14. If gap opens, retighten fixture and allow to cure another 30 minutes.
	15. Check gap again and repeat until adapter does not move.
	16. Let cool to room temperature.
	17. Seat bearing with soft drift punch and then double check seal adapter to stubend gap. This should remain constant.
	18. Check bearing face to seal adapter face with .002 feeler gauge. If bearing is properly seated, feeler gauge will not insert.
	19. Install seal into seal adapter – do not use lubricant on rubber. Only if necessary use triclorethane or similar evaporative product.
	20. Apply thin coat of 10w oil to face of seal in the seal adapter and on the seal in the wheel.
	21. Pre-lube tapered bearing.
	22. SET WHEEL.

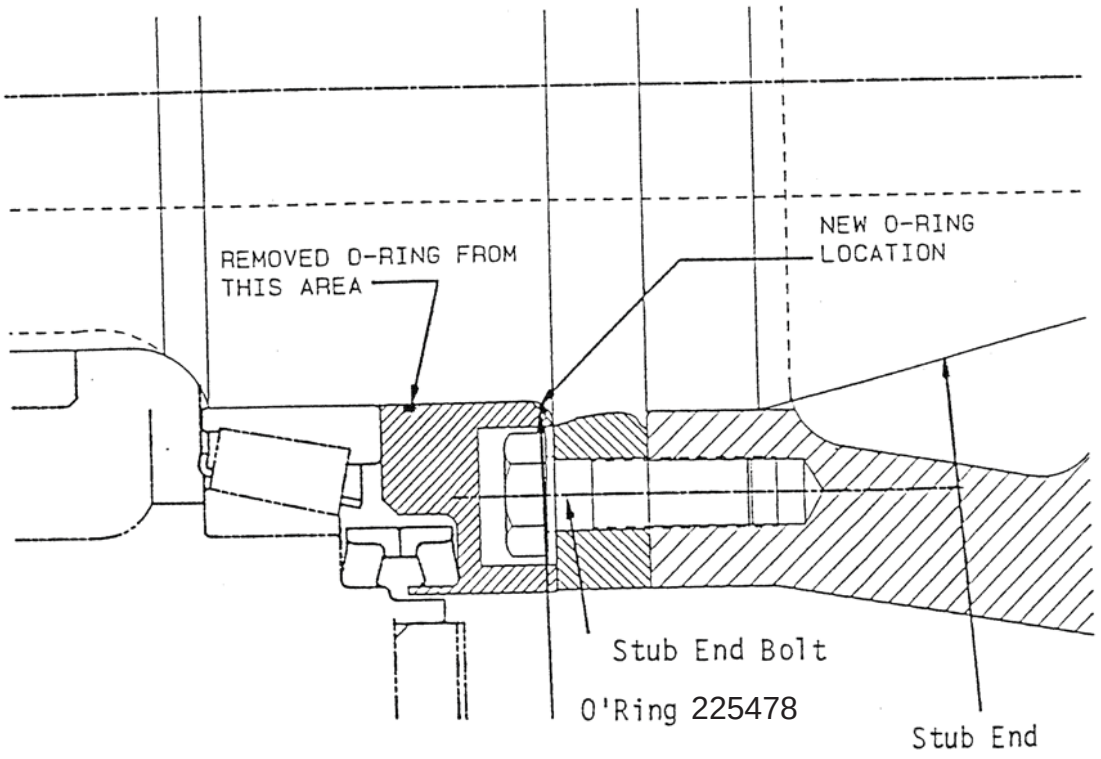
2.813 Thickness - seal adapter
10" ID to 13" OD Tubing



Tubing selection cannot exceed either dimension

PRODUCT IMPROVEMENT NOTICE

SUBJECT: O-Ring Seal Adapter
DATE: 3-31-87
BY: Wayne Mynatt
DEPT: Axle Engineering
RELEASE: 87-011
PURPOSE: Ease of Assembly



PROCEDURE -

For ease of assembly, the O-Ring for the seal adapter has been relocated from a groove in the seal adapter to the radius behind the seal adapter.

Assembly Procedure: slide O-Ring over stub end and then place seal adapter over stub end and down against O-Ring.

DA 202 DRIVE AXLE

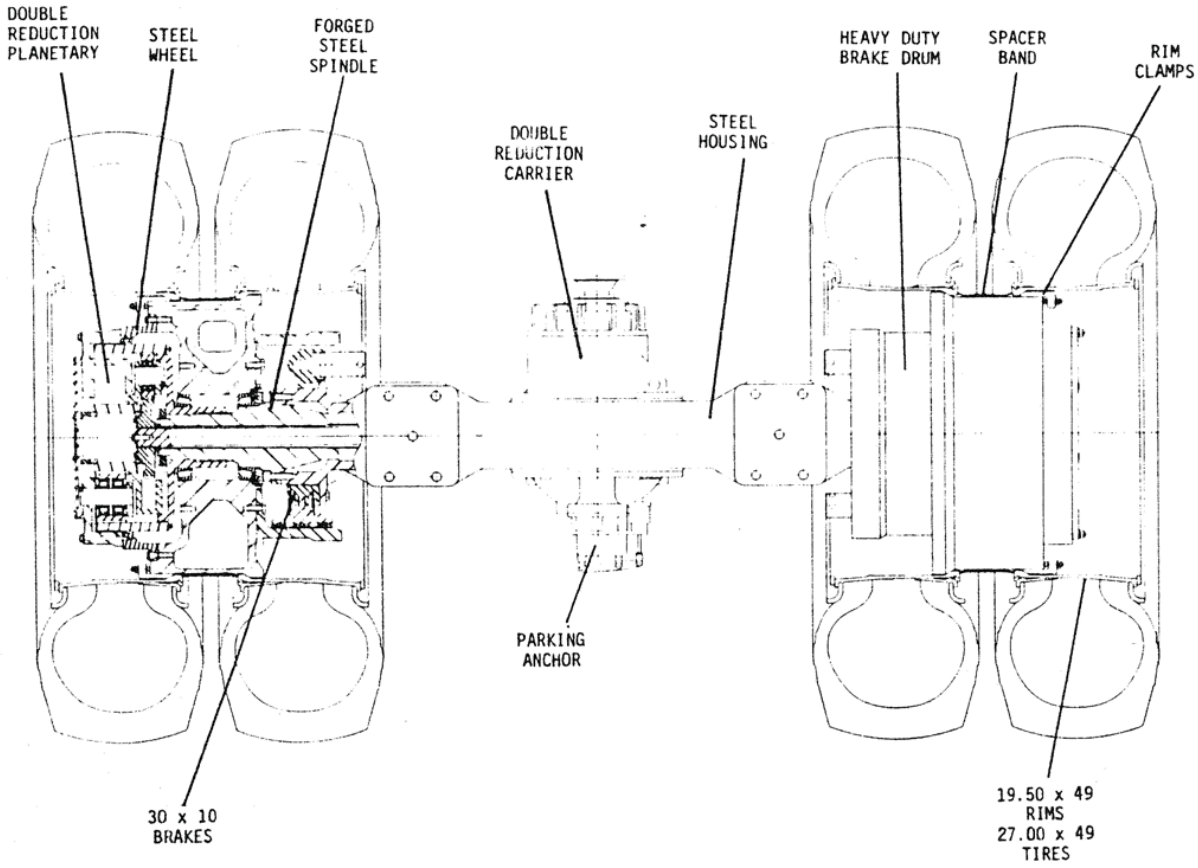


FIGURE 1

Description – Figures 1 and 2.

The Rimpull "QUAD-REDUCTION" drive axle features a double reduction differential carrier assembly and two-stage planetary wheel ends. The axle ratio can be varied by changing the primary gear set in the carrier. See chart for available ratios (Figure 3). The axle wheel will accept both 24.00X49 and 27.00X49 tires. The standard brake is a Rockwell Standard Stopmaster 30"X10". It also features equal size inner and outer wheel bearings and duo-cone metallic face seals. Both the first stage and second stage planet gears are mounted with straight roller bearing sets.

The truck parking brake is integral with the axle and is a mechanical lock type similar to a sliding jaw clutch, which actually locks the gear train to the axle housing. The brake is spring applied and air released.

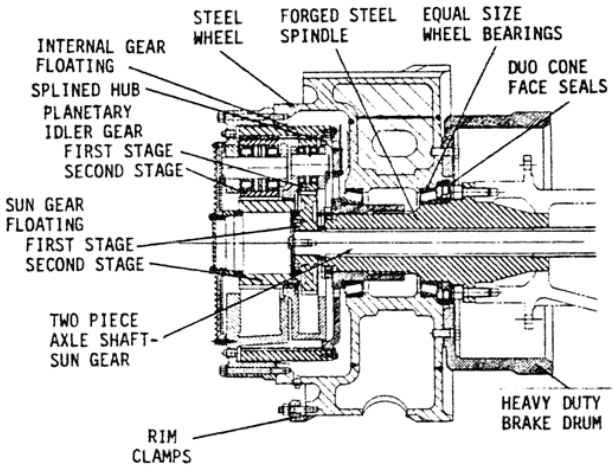
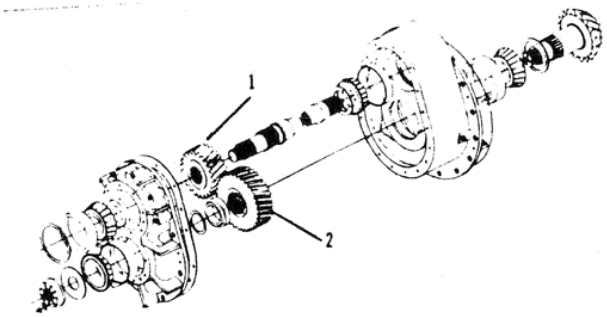


FIGURE 2



REF.	PART NO.	PRIMARY GEAR DESCRIPTION	NO. TEETH	PRIM GEAR	DIFF GEAR	TTL CARR	RP-3200 10.56
1	110 031	Drive	26	1.08	2.22	2.40	25.32
2	110 032	Driven	28				
1	110 008	Drive	23	1.35	2.22	3.00	31.65
2	110 009	Driven	31				
1	110 053	Drive	21	1.57	2.22	3.49	36.80
2	110 054	Driven	33				
1	110 063	Drive	20	1.70	2.22	3.78	39.85
2	110 064	Driven	34				
1	110 055	Drive	19	1.84	2.22	4.09	43.14
2	110 056	Driven	35				
1	110 167	Drive	33	1.30	2.39	3.11	32.87
2	110 168	Driven	43				

FIGURE 3

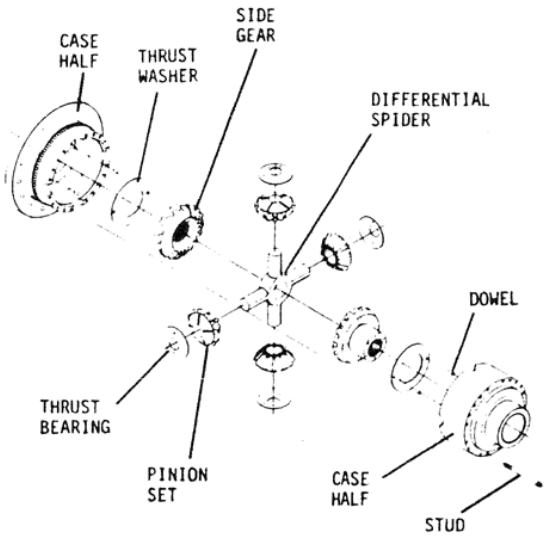


FIGURE 4

The following describes the assembly of the axle:

A. Preparation for Assembly – Figure 4.

1. With case split, clean well to remove any dirt or foreign material.
2. All internal and external parts should be sprayed with LPS #3 or a similar product.
3. After cleaning, pre-lube all machined wear surfaces with a light coat of Chevron Heavy Duty #1.

B. Differential Nest Assembly.

1. With case split, tongue and recess side up, install the two side gear thrust washers on wear surfaces aligning dowel pins in holes. Install brass wear surfaces up or facing the inside of cases.
2. Pre-lube brass thrust surfaces and install the differential side gears. Check the side gear fit to the case bores; both gears should turn freely.
3. Pre-lube pinion gears and install on the spider. Install the pinion thrust bearings. Install the spider assembly into the recess side of the case. Check the fit of spider assembly in case. Insure it fits all the way into the slot. If thrust washer is installed improperly, the spider assembly will not fully fit down into the recess.
4. After installing the spider assembly, use a lifting tool which will retain the side gear in the tongue side of the case half and set down on the recess side of case half. In this process, insure that the side gear does not slip down and move the side gear thrust washer from its proper location.
5. Install the twenty differential case half bolts and torque to 133 ± 6 foot pounds.

CAUTION: The Ferry head bolts cannot be reused. If they have been tightened to torque once, the heads are deformed and may fail.

6. After assembly, the differential should be turned to insure free and smooth rotation of all gears.

ASSEMBLY OF RD-3400 CARRIER

NOTE: The Carrier Assembly upon completion should be ready for axle housing installation. This unit uses a pre-assembled nest assembly. Nest assembly procedures are not included in Carrier Assembly procedure.

Standard Assembly Procedure – Figure 5.

1. All bolts to be tighted to torque specifications and lubricated with anti-seize compound.
2. All bolts or pipe plugs entering into oil filled areas require hydraulic sealant (Loctite) on threads.
3. Heat all bearings in an oven to 250°F for at least 30 minutes to insure slip fit.
4. Freeze bearing cups and cup adapters in dry ice for at least 30 minutes to insure slip fit.
5. Do not use a hardened steel hammer on parts during assembly. Use a soft punch or mallet. (Do not use brass punches as brass can chip off into bearings or cleaned areas).
6. Insure that the carrier housing and all parts used are well cleaned before installation and assembly.
7. Use a light coat of pre-lube grease (Chevron Heavy Duty #1) on all gears and bearings during assembly. Spray carrier housing and all internal parts with LPS #3 to prevent corrosion.
8. Use clean tools during assembly.
9. Do not cut, drill or grind in assembly area.

A. Prepare Housing for Assembly.

1. With housing in assembly stand, weld in suction tube and bracket. Position suction tube approximately 1/2 inch from the bottom of the carrier housing pilot surface.
2. Clean the housing using standard safety solvent.
3. Inspect for burrs and any foreign material.
4. Install 5/8 inch Allen head lifting bolts outside left and right.
5. Install input oil pocket in gear cover using two 5/16" x 1 1/2" NC drilled head bolts (wire bolts into position).

NOTE: A new housing would have the above items installed.

B. Install Sleeve and Bearing Cups in Carrier Housing and Cover – Item 1.

1. Sleeve and cups (Items 26 and 30) should be frozen in dry ice for at least 30 minutes before installing. Use guide bolts to install sleeve. After installing a sleeve in the housing, let it return to room temperature before installing bearing cups in it. Be sure the gasket (Item 8) is in place under the front sleeve.
2. Sleeve and cups should slip into proper fitting bores when frozen (if a sleeve or cup should fit snugly, a machined driver is used to knock it into place).
3. When installing bearing sleeve, use bolt "Loctite" between housing and sleeve.
4. After installing <u>all</u> sleeves and cups into proper fitting bores, check all cups with an approximately .002 shim at bottom of bore to be sure they are all the way down into the sleeve.
5. Dry off any moisture and spray with LPS and wipe clean.

C. Fit and Install Bearing Lube Tubes – Figure 6.

1. Using 3/8" tubing flared on one end, fit into rear pinion, front pinion and rear input bores with tube adapter.
2. Tubes should be fit in length to approximately 1/2 inch extending past the bearing cups with tube adapters screwed in tightly. (Use hydraulic Loctite on adapters.)
3. After fitting for length, crimp the open end of the tube shut and drill approximately 1/8" hole located to direct oil flow to bearing rollers.
4. Use 3/8" tube clip with 1/4" x 1/2" NC bolt to secure tube into position. Wire drilled head of bolt to tube. Bolt should be tighted to 9 foot pounds torque.
5. Using three 90° double flare #6 fittings, tighten them into tube adapter. Direct to manifold block

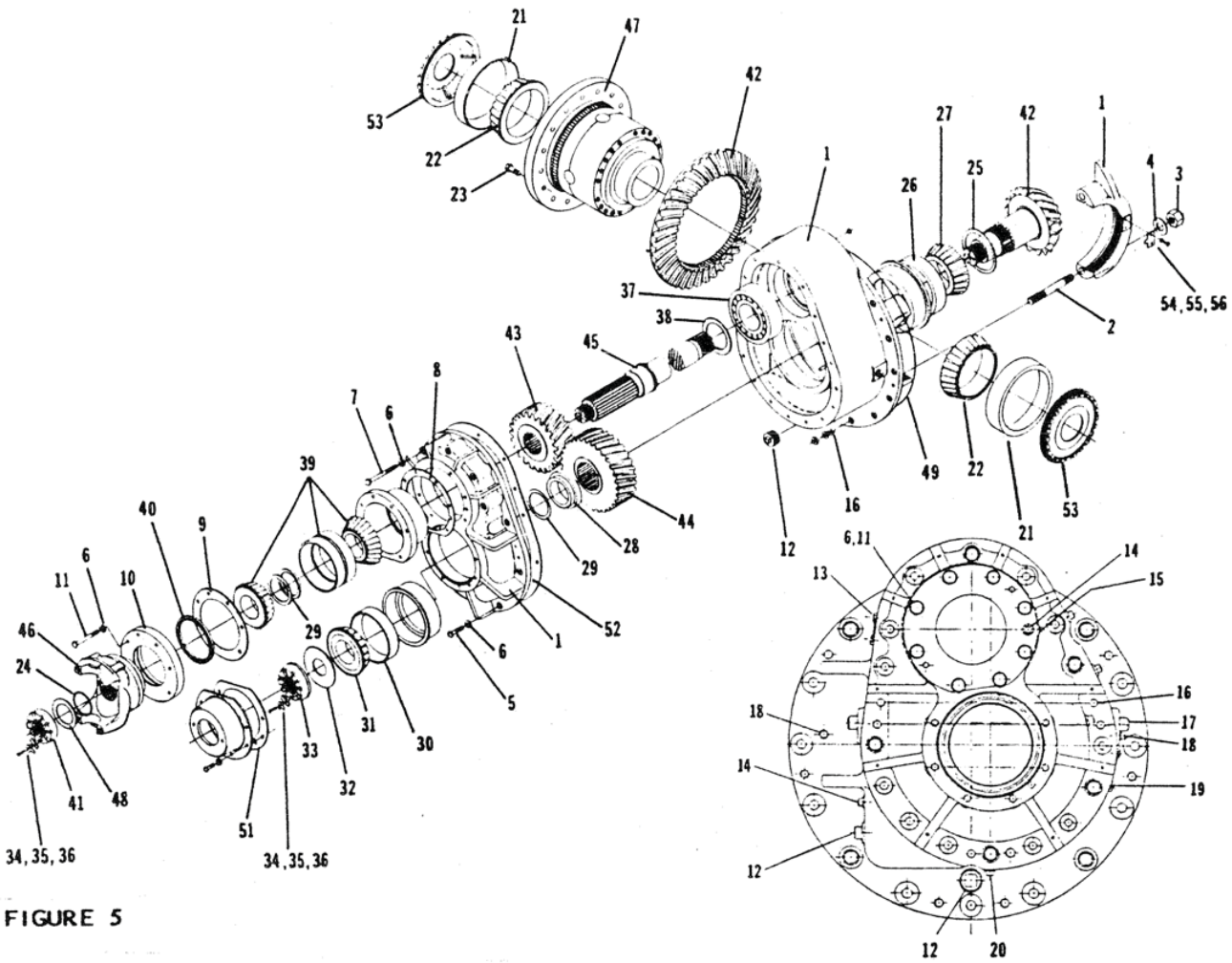


FIGURE 5

ITEM	DESCRIPTION	QTY.
-	Carrier Housing Group	1
1	Housing and Cover Assembly	1
2	Stud, Bearing Cup	4
3	Nut	4
4	Washer	4
5	Bolt (5/8"-11 x 1 3/4")	4
6	Lock Washer	5
7	Bolt (5/8"-11 x 5")	13
8	Gasket, Input	1
9	Gasket, Input	1
10	Cover, Input	1
11	Bolt (5/8"-11 x 3 3/4")	8
12	Plug	2
13	Bolt (1/2"-20 x 1 1/4")	3
14	Plug	2
15	Plug	1
16	Dowel	3
17	Bolt	2
18	Plug	2
19	Bolt (3/8"-16 x 1")	2
20	Plug	4
21	Cup, Differential Side Bearing	2
22	Cone, Differential Side Bearing	2
23	Bolt (3/4"-16 x 1")	16
24	O-Ring	1
25	Spacer, Pinion Adjustment	1
26	Cup, Pinion Rear Bearing	1
27	Cone, Pinion Rear Bearing	1
28	Spacer, Driven Gear	1
29	Shim Set	2
30	Cup, Pinion Front Bearing	1

ITEM	DESCRIPTION	QTY.
31	Cone, Pinion Front Bearing	1
32	Washer Pinion	1
33	Nut, Pinion	1
34	Lock	2
35	Bolt	2
36	Lock	2
37	Bearing, Spherical	1
38	Spacer	1
39	Bearing Assembly, Front Input	1
40	Seal	1
41	Nut, Input Shaft	1
42	Ring and Pinion Set	1
43	Gear, Drive	1
44	Gear, Driven	1
45	Input Shaft	1
46	Yoke	1
47	Differential Nest	1
48	Washer, Input Shaft	1
49	Seal, O-Ring	1
50	Gasket, Pump - See Figure 6	1
51	Gasket, Adapter	1
52	Gasket, Differential	1
53	Nut, Differential Adj.	2
54	Lock Bar	2
55	Bolt (5/16"-18 x 1/2")	4
56	Washer, Flat (5/16")	4
NS	Seal, O-Ring	3
NS	Dowel, Cone	4
NS	Washer, (3/4")	4
NS	Nut	13

NS - Not Shown

location for #6 hose routing. Mounting block location is two 3/8" NC holes tapped in housing.

NOTE: The above items should come with new housing.

D. Pre-Assembly (Figure 5) Input Shaft (Item 45).

1. Pre-heat spherical roller bearing (Item 37) in an oven to 250°F for at least 30 to 45 minutes.
2. With the input end of the shaft (Item 45) up, install the spherical roller bearing (Item 37) against machined shoulder of the input shaft.
3. Install bearing spacer (Item 38) on the inner race of the bearing.
4. Heat drive gear (Item 43) to 250°F for at least 30 to 45 minutes and install on splines to bottom out on bearing spacer. Gear P/N depends on desired ratio — see Ratio Chart in Figure 3.
5. Preheat to 250°F one bearing from present double cup and bearing assembly (Item 39) and install to seat on input drive gear with small diameter of tapered bearing up or to input end of shaft.
6. Install the pre-ground spacer (Item 29) of the bearing set to seat on bearing.

E. Stamp Serial Number.

1. Stamp the entire serial number at the top of the carrier housing.
2. Stamp the last four digits of the serial number on top of the cover.
3. Stamp the last four digits of the serial number on the bearing caps and the mating surface of the housing. Stamp one side with an A, the other B to prevent caps from being reversed. These caps are machined to each bore. Do not reverse caps or bearing adjusting nuts.
4. Remove bearing caps and nuts from housing.

F. Pinion Adjustment - Spacer Measurement Using Matched Set Ring Gear and Pinion.

1. To arrive at this measurement, put the pinion bearing cone (Item 27) into the rear pinion bearing cup (Item 26) previously installed into housing.
2. Measurement should be taken from bearing to a true machined shaft laying across the differential side bores of the housing. (Check for burrs on the shaft or in bores).
3. Add the bearing to shaft measurement to 5.125 which is the radius of the differential side bore. Subtract the mounting distance specified on the base of the pinion. The difference is the spacer-thickness required under the pinion bearing. If this measurement is not an even .005, go to next .005 greater spacer thickness. For example:

5.358 bearing to shaft measurement
\+ 5.125 differential side bore radius
10.473
\- 10.375 mounting distance specified
.098 (.100 spacer thickness required)

G. Pinion and Bearing Assembly.

1. Install pinion adjustment spacer (Item 25) arrived at in 3 above with chamfer side next to gear.
2. With pinion setting on flat surface, install same bearing used to take pinion spacer measurement onto shaft with small diameter of tapered bearing up. (Bearing should be heated to 250°F.)
3. Pre-lube bearing (Chevron Heavy Duty #1, or equal).
4. Set pinion assembly into housing. Retain with pinion restraining fixture mounted across differential studs. This is to prevent pinion from falling out when housing is turned.
5. Turn housing 180°.

H. Install Input Shaft Assembly.

Using lifting eye tool screwed on threads of the input shaft, set the assembly into place in input bore of housing.

I. Install Driven Gear.

1. Install driven gear (Item 44) onto splines of pinion shaft. Gear is a slip fit, not requiring heat.

2. Install the pinion spacer (Item 28) on the driven gear. Spacer is a slip fit.

J. Install Housing Gear Cover

1. Install gear cover gasket (Item 52) on housing face.
2. Set gear cover into place on installed carrier housing guide dowel pins (Item 16).
3. Bolt cover using six 5/8" x 5" NC, ten 5/8" X 1 3/4" NC bolts as required along with sixteen 5/8" lock washers.
4. Torque bolts to 170 ± 10 foot pounds.

K. Pinion Shaft End – Play Adjustment.

1. Pinion adjustment should be .000 end play with a rolling torque of 50 to 75 inch pounds.
2. To arrive at this adjustment, start with a pinion shim pack (Item 29) thickness of .150. Install shim pack on the pinion shaft. Install front pinion bearing cone (Item 31), pinion washer (Item 32) and pinion nut (Item 33) using anti-seize compound on pinion threads. Tighten the pinion nut to 1000 ± 50 foot pounds using a 1" impact wrench and multiplier torque wrench. Set up a dial indicator on the nut end of the pinion shaft and use hydraulic jack against the gear end to raise for reading end play. Remove the amount of shims equal to the end play reading shown on the dial indicator and re-install remaining pack. Pre-lube bearing and install with washer and nut. Again torque pinion nut, check end play to .000 and check rolling torque to 50 to 75 inch pounds turning the pinion with inch pound torque wrench in slot on pinion shaft. If the correct reading is not indicated, disassemble and reassemble from Paragraph 2.
3. After reaching adjustment, secure the nut on pinion with bar lock (Item 34), clip (Item 36) and 5/16" x 1" NC bolt. Torque bolts to 18 foot pounds before bending clip to lock bolt in position.
4. Install pinion cover gasket (Item 49), and cover (Item 50) and secure with six 5/6" x 1 3/4" NC bolts with lock washers. Torque bolts to 170 ± 10 foot pounds.
5. Install lock in slot of pinion nut to secure pinion for backlash measurement.

L. Check Input Shaft (Item 45) Adjustment.

1. Install input cover gasket (Item 9) and cover (Item 10) with seal (Item 40) pre-installed in cover. Lube seal. Cover requires eight 5/8" x 3 3/4" NC bolts and lock washers. Torque to 170 foot pounds.
2. Install yoke on shaft. This is a slip fit input shaft nut (Item 41). Torque to 1000 ± 50 foot pounds using a 1" impact wrench and multiplier torque wrench.
3. Install o-ring (Item 24), washer (Item 48) and input shaft nut (Item 41). Torque to 1000 ± 50 foot pounds using 1" impact wrench and multiplier torque wrench.
4. Check end play using dial indicator on top end and hydraulic jack on bottom end. Reading should not exceed .005.
5. As the double cup and bearing used on the shaft assembly are preset, there is no adjustment. If the reading is in excess of .005, check with factory.
6. Turn carrier housing assembly 180° for differential assembly.

M. Differential Assembly.

1. Using a pre-assembled differential nest assembly (Item 47), install the ring gear (Item 42) on the differential. Align the punch marks on both the differential housing and the ring gear. Restrain the differential and torque the sixteen 3/4" x 1 3/4" NF ring gear bolts to 320 ± 15 foot pounds.
2. Heat the two differential side bearing cones (Item 22) in an oven for at least 30 minutes to 250°F and install them on the differential, taper out.

N. Differential Installation.

1. Pre-lube bearing cones (Item 22) and install differential bearing cups (Item 21) on bearings.
2. Use lifting tool extending through differential (tool should hold cups in place). Place differential into bores.

DA 202 DRIVE AXLE (CON'T.)

Install differential bearing caps, washers (Item 4) and nuts (Item 3).

CAUTION: Do not tighten nuts at this time, snug to bearing caps only.

O. Ring Gear and Pinion Backlash Adjustment.

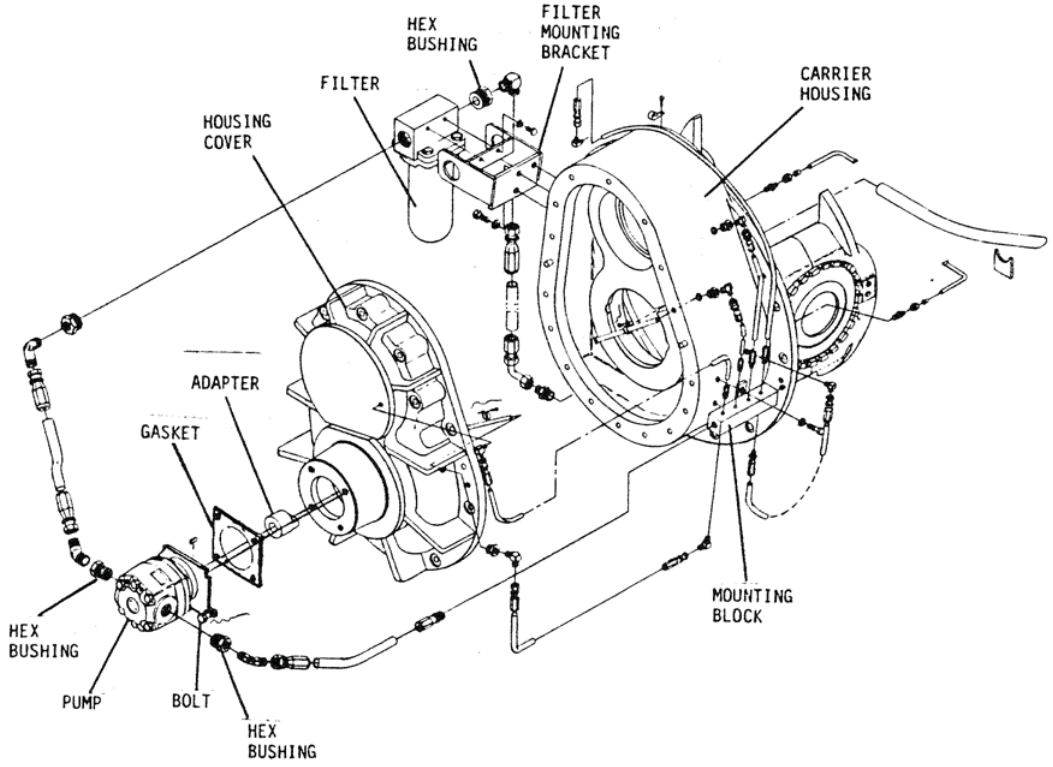
1. Backlash adjustment will be found marked on base of pinion gear, i.e. "BL.014". Figure may vary from .012 to .015.
2. Backlash is measured against a tooth on the ring gear. Use a dial indicator set at 90° to tooth face.
3. Use differential bearing adjusting nuts (Item 53) to adjust backlash by screwing in or out as required.
4. Determine differential end play using a dial indicator set against ring gear flange. End play should be .000. Tighten side nuts (Item 53) to get adjustment.
5. After backlash and end play has been set, torque the four bearing cap nuts (Item 3) to 1000 ± 50 foot pounds.
6. Secure both differential side bore adjusting nuts into place with the two T-shape locks and four 5/16" x 1/2" NC bolts (torque bolts to 18 foot pounds).
7. Install differential lube tube fitting and 90° 3/8" differential lube tubes with flare nuts. The tubes should be bent at 90° with 1/8" hole drilled to direct oil down to bearing rollers. Crimp the end of the tube 2/3 shut to direct oil to differential.

NOTE: Install tubes to insure clearance for the axle shafts to enter differential side gears.

8. Pre-lube ring and pinion with a light coat (Chevron Heavy Duty #1).
9. Spray all internal parts with LPS.

P. External Pressure Lube Parts Installation - Figure 6.

1. Install pump with adapter on the shaft to the pinion pump mounting cover, using gasket and four 1/2" x 1 1/4" NC drilled head bolts (wire bolts in position). Mount the pump suction side facing the filter location.
2. Install hex bushings in pump using hydraulic sealant (pump suction and pump pressure hex bushings).
3. Install filter mounting bracket to the



carrier housing using three 1/2" x 1 1/4" NC bolts with flat washers (wire bolt heads in position and use hydraulic sealant on bolts).

4. Mount the filter to bracket using two 3/8" x 1" NC drilled head bolts with flat washers (use hydraulic sealant on bolts and wire in position).
5. Install the hex bushing into the filter (use hydraulic sealant).
6. Bolt the manifold block to the housing using two 3/8" x 1" NC drilled head bolts with flat washers (use hydraulic sealant and wire bolts into position). Mount manifold block with the 3/4" NPT hole facing the pump. Plug the other end of the manifold with 3/8" pipe plug using hydraulic sealant.
7. Install the three 90° flare number 6 fittings, manifold bottom front and differential lube, left and right (use hydraulic sealant).
8. Install 1/4"–6 45° fitting input front (use hydraulic sealant).
9. Install 20–16S fitting adapter – suction housing (use hydraulic sealant).
10. Install two 16–16S 45° fittings (filter and pump suction).
11. Install 16–16S 90° fitting (filter and pump suction).
12. Install 12–12S 45° fitting (pressure pump).
13. Plug bottom drain hole (1 1/4"), bottom drain hole (3/4") and 1/2" hole suction side of housing with standard pipe plugs.

Q. Hose Routing (use hydraulic sealant on all hose connections).

1. #6 42 1/2" long starting from the top rear of the manifold to differential lube right side.
2. #6 10 3/4" long manifold to rear input lube fitting.
3. #6 6" long manifold to rear pinion lube fitting.
4. #6 15 1/2" long manifold to front input lube fitting.
5. #6 12" long manifold bottom rear to differential lube fitting left side.
6. #6 9" long manifold bottom front to front pinion lube fitting.
7. #16 12 1/2" long housing suction to filter.
8. #16 12" long filter to pump.
9. #12 12 1/2" long pump to manifold.

INTERNAL GEAR ASSEMBLY

A. Assembly Preparation – Figure 7.

1. Clean all parts well with standard safety solvent.
2. Inspect all parts for burrs or any foreign material.

B. Internal Gear Hub Installation.

1. With the internal gear laying with 1/2" tapered holes up, insert the hub aligning gear teeth. Align oil deflector mounting holes between the set of two 1/2" lock holes in ring gear.
2. Install the retainer locks on the internal gear using 1/2" X 1 1/4" NC drilled head bolts.
3. Torque the 1/2" bolts to 80 foot pounds lubed.
4. Wire bolts in groups of two.
5. Install the oil deflector using two 5/16" x 1" NC drilled head bolts.
6. Torque to 18 foot pounds and wire bolt heads.
7. If the internal gear assembly is to be packaged for shipment, coat it with Cosmolien to prevent corrosion.

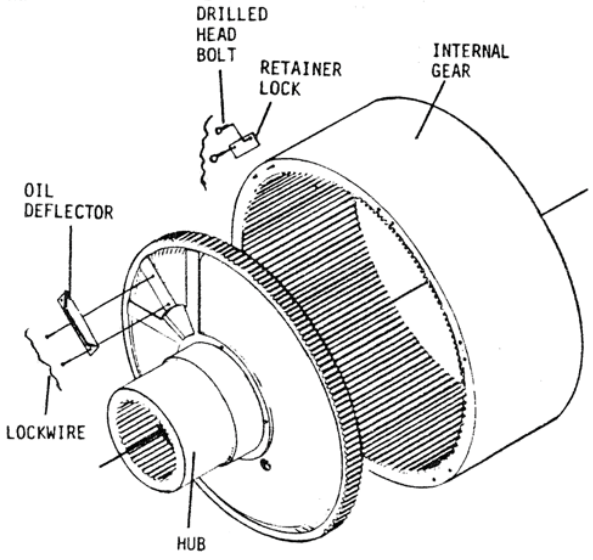


FIGURE 7

DA 202 DRIVE AXLE (CON'T.)

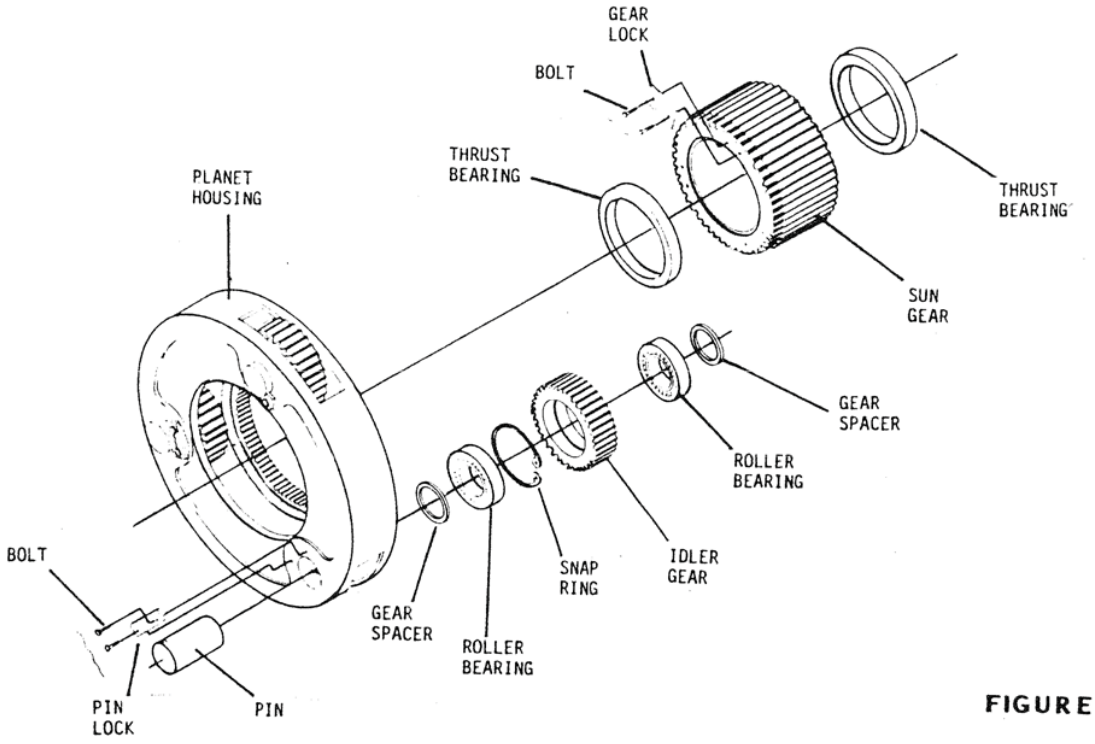


FIGURE 8

FIRST STAGE PLANET ASSEMBLY

A. Housing and Parts Preparation.

1. Clean the planet housing and parts well using a standard safety solvent.
2. Inspect the housing, pins, pin bores, gears and all parts for burrs or any foreign material.

B. Pre-Assembly Preparation – Figure 8.

1. Install the center snap ring into planet gears and heat the gears in an oven to 250°F.
2. Freeze planet pins in dry ice for at least 30 minutes.
3. When gears are heated install the bearings against the snap rings. Insure that the bearings are still all the way down after the gear and bearing reach normal temperature. Pre-lube bearing rollers.
4. Install the inner bearing race with shoulder to outside of gear on both sides.
5. Freeze the two thrust bearings in dry ice for at least 30 minutes and install them in second stage sun gear.
6. Stamp the planet serial number beside one of the pin bores on the sun gear side of the planet.

C. Planet Assembly.

1. Set second stage sun gear on flat surface, spline side up. Install the three sun gear locks and bolts. Torque lock bolts to 80 ± 5 foot pounds. Wire bolts in groups of two.
2. Position the three planet gears and six bearing spacers into the housing, aligning with pin bores.
3. Use guide pins in pin lock holes to install the planet pin into housing bores. Insert the planet pin lock into the pin slot and slide down over guide pins until seated. This insures the proper location of the pin to the pin lock. Remove guide pins and install lock bolts. Torque bolts to 80 ± 5 foot pounds. Wire the bolts in groups of two.
4. After gear pin installation, turn each gear to insure that they turn smoothly and freely.
5. Pre-lube all gear and spray the entire planet with LPS. At this point, the

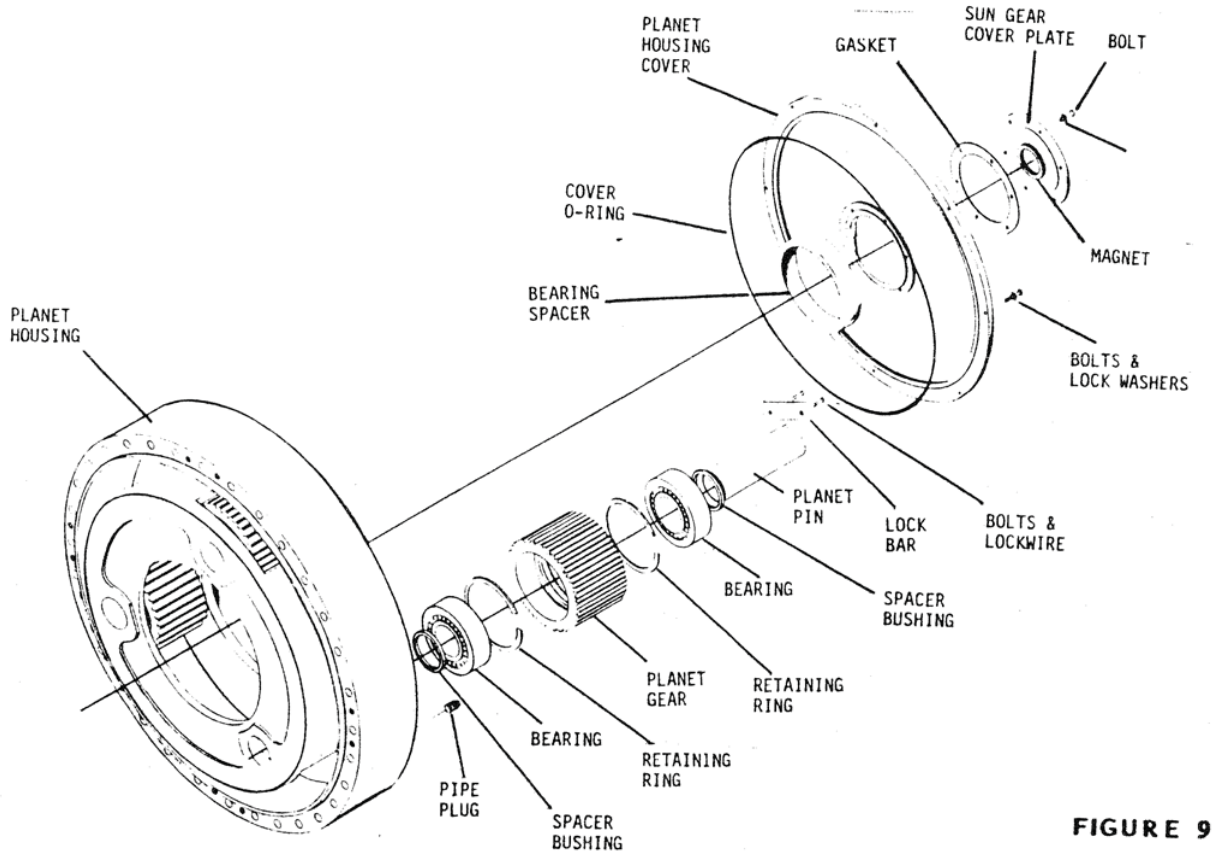


FIGURE 9

assembly should be complete and ready for packing or installation.

SECOND STAGE PLANET ASSEMBLY

A. Housing and Parts Preparation.

1. Clean the housing and all parts well using a standard safety solvent.
2. Inspect the housing, pins, pin bores, gears and all parts for burrs or any foreign material.

B. Pre-assembly and Preparation – Figure 9.

1. Install the two retaining rings into each gear and heat the gears in an oven to 250°F.
2. Freeze planet pins in dry ice at least 30 minutes.
3. When gears are heated, install the bearings to bottom on the snap rings, making sure the inner race of the bearings is shoulder out. Insure that the bearings are still all the way down after the gear and bearings reach normal temperature. Pre-lube the bearing rollers with a light coat of Chevron Heavy Duty #1 or equivalent.
4. Heat the spacer bushing and install it on the planet housing cover.
5. Stamp the planet serial number beside one of the 3/4" pipe plug holes on the planet housing.

C. Planet Assembly.

1. Place the gear and bearing spacers into the planet housing, aligning with the pin bores.
2. Using guide pins in pin lock holes, install the planet pins into the bores holding the lock bar in the pin slot. Slide down over guide pins. This insures the proper location of the

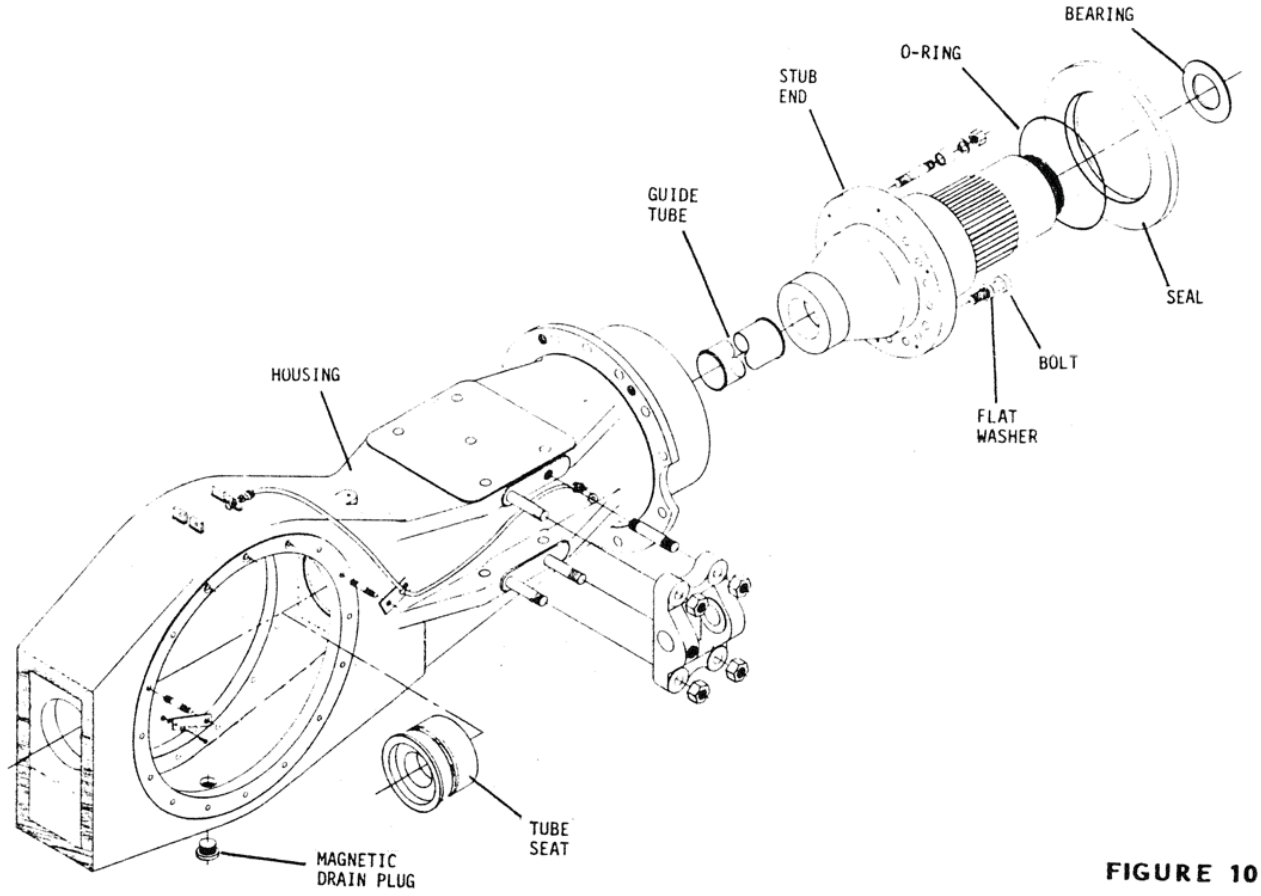


FIGURE 10

planet pin for lock installation. Torque bolts to 80 ± 5 foot pounds. Wire the bolts in groups of two.

3. After gear and pin installation, turn each gear to insure that they turn smoothly and freely.
4. Install the two 3/4" pipe plugs using hydraulic sealant (Loctite).
5. Install the planet housing cover o–ring with a coat of grease to hold it in position. Install the planet housing cover with eight 3/8" NC cover bolts and lock washers. Use hydraulic sealant on the bolts. Torque bolts to 35 ± 2 foot pounds.
6. Install the sun gear cover plate with the magnet centered on the inside using the six 3/8" NC bolts with lock washers. Torque bolts to 35 ± 2 foot pounds.
7. Spray the internal parts of the planet with LPS.
8. Paint the outside of the planet housing.
9. After the paint has dried, install the data stickers (oil level) at center of cover and the two fill stickers beside each 3/4" pipe plug.
10. At this point, the assembly should be complete and ready for packing or axle installation.

STUB END INSTALLATION

A. Drive Axle Housing Preparation – Figure 10.

1. Clean the drive axle housing well and be sure it is free of any foreign material.
2. Inspect all machined surfaces for burrs.
3. Freeze the drive axle housing tube seats in dry ice for 30 to 45 minutes.
4. When the tube seats are ready, install them into the housing with the machined flange to seat in housing bores through the banjo opening.

5. Weld the tube seats into position with two one inch welds 180° apart. The welds should be from the tube seat flange to the axle housing.
6. Install the bottom magnetic drain plug and the three breathers in the 3/8" NPT holes at the top of the housing.

B. Stud End Preparation.

1. Clean and inspect the stub end for burrs. The two inside machined surfaces must be smooth and free of burrs for installation. Break and remove all sharp edges.
2. Install axle shaft guide tube into stub end. This is a drive fit and can be seated with a piece of wood and hammer.
3. Using a lifting eye in one of the 5/8" NC pusher bolt holes, lift the stub end to align with the drive axle housing bore.
4. Apply a light coat of Loctite retaining compound on the two inside machined surfaces of the stub end.
5. Install two 1 1/8" NF guide studs 180° apart in the drive axle housing to align the stub end during installation.

C. Stub End Installation.

1. Heat the drive axle housing in the location of the outside and inside stub end contact bores to 250°F. Check the temperature of the housing with a temperature stick with a melting point of 250°F.
2. After reaching temperature, guide the stub end into the housing bores and bolt into position using the 1 1/8" NF Allen head bolts with flat washers. Use anti-seize compound on threads.
3. Torque the stub end bolts to 1080 ± 100 foot pounds.

NOTE: Reverse the stub end installation procedure for stub end removal using 5/8" NC pusher bolts in the six pusher bolt holes provided in the stub end.

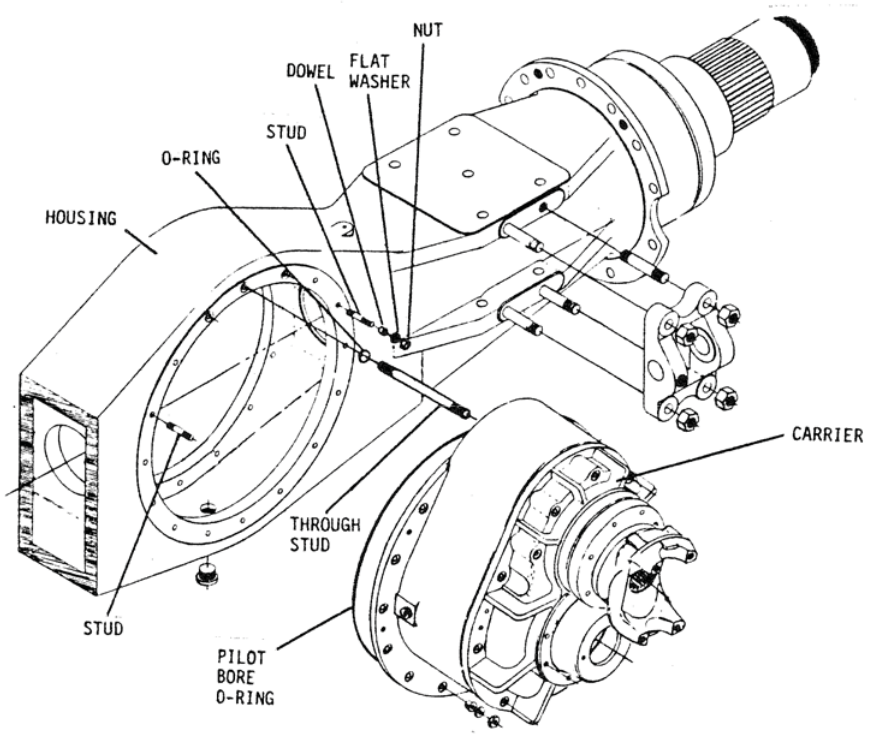


FIGURE 11

DIFFERENTIAL CARRIER INSTALLATION

A. Drive Axle Housing Preparation – Figure 11.

1. Clean and inspect the machined surfaces.
2. Inspect the housing o–ring groove for burrs.
3. Install the 3/4" studs short threaded end into axle housing using hydraulic sealant on threads. Torque the studs to 70 foot pounds.

B. Differential Carrier Preparation – Figure 11.

1. Inspect the machine surfaces for burrs.
2. Using a lifting chain or strap, lift the carrier to align with the drive axle housing pilot bores.
3. Install the pilot bore o–rings, the three 3/4" x 15 1/4" through studs and through stud o–rings. Torque the three through studs to 70 foot pounds.
4. Put a light coat of grease on the carrier pilot.

C. Differential Carrier Installation – Figure 11.

1. Guide the differential carrier into the drive axle housing using the three through studs as guides.
2. Install the tapered dowels, flat washers and the 3/4" NF nuts.
3. Tighten the nuts to seat the differential carrier mounting flange to the drive axle housing.
4. Torque the nuts to 260 ± 25 foot pounds.

NOTE: To remove the differential carrier, reverse paragraph C. Use pusher bolts in the 3/4" NF threaded holes provided and a lifting strap or chain to support the differential carrier while removing it from the axle housing.

A. Rear Cover and Drive Axle Housing Preparation – Figure 12.

1. Clean the rear cover to be sure it is free of any foreign material.
2. Install the cover to housing o–ring seal on the pilot flange of the cover with a light coat of grease.
3. Clean the rear cover surfaces of the drive axle housing.
4. Install the studs, short threaded end into the axle housing.
5. Install the three through stud o–rings on the through studs on rear cover side of axle housing.

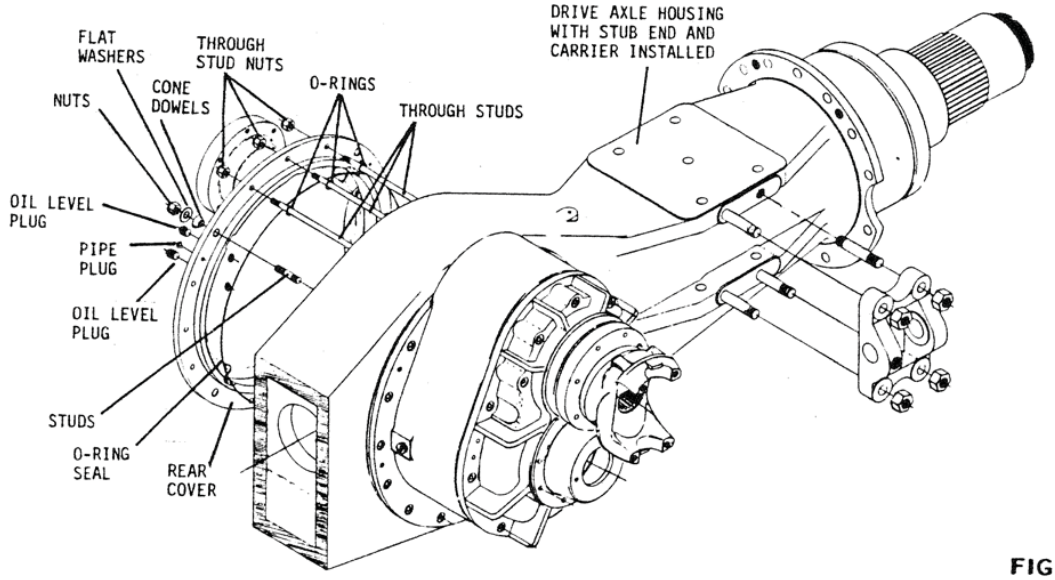
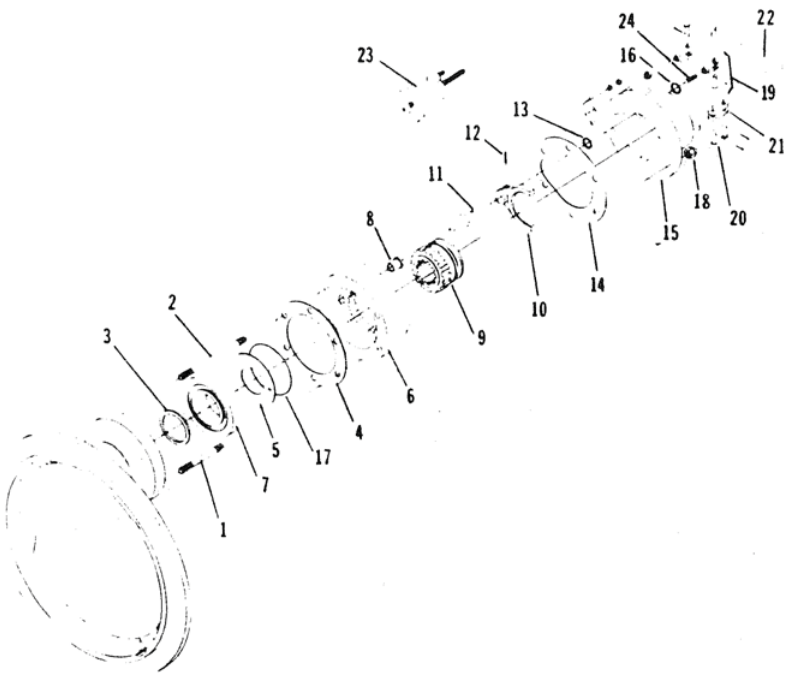


FIGURE 12



ITEM	DESCRIPTION	QTY.
-	Parking Brake Assembly	1
1	Stud	3
2	Stud	2
3	Spacer, Output Bearing	1
4	Gasket, Clutch Internal	1
5	Plate, Baffle	1
6	Gear, Clutch Internal	1
7	Bearing, Output	1
8	Bushing, Parking Brake Shaft	1
9	Gear, Sliding Clutch	1
10	Fork, Sliding Gear	1
11	Shaft, Shifting Fork	1
12	Roll Pin	1
13	O-Ring	1
14	Gasket, Anchor Cover	1
15	Cover, Truck Anchor	1
16	Seal, Cover	1
17	Seal Ring, Baffle Plate	1
18	Nut (3/4"-16)	5
19	Yoke Assembly	1
NS	Yoke Body	1
NS	Yoke Pin	1
NS	Cotter Pin	1
20	Yoke Pin with Cotter Pin	2
21	Link, Shifting Lever	2
22	Lever, Shifting	1
23	Cylinder Assembly	1
24	Rod	1
NS	Microswitch	1

· NS - Not Shown

FIGURE 13

B. Rear Cover Installation – Figure 12.

1. Install the rear cover to the axle housing using four cone dowels, three 3/4" NC nuts and thirteen 3/4" NF nuts with flat washers. Torque 3/4" NC nuts to 380 foot pounds and the 3/4" NF nuts to 230 foot pounds.
2. Install three 1" pipe plugs in rear cover using hydraulic sealant.
3. Install fill decal beside the top pipe plug and lube level plate beside the lower pipe plug.

C. Parking Brake Installation – Figure 13.

NOTE: Pre-lube parking brake bearings prior to installation.

1. Heat the output bearing spacer (Item 3) and the inner race of the output bearings (Item 7) to 250° F. Install the output bearing spacer on the through shaft with the inner race of the output bearing behind it.
2. Install the five gear cover studs (Items 1 and 2), short threaded end in, with the two longest studs (Item 1) to the right side. Torque the studs to 80 foot pounds.
3. Install the internal clutch gasket (Item 4) over the studs.
4. Install the baffle plate o-ring seal (Item 17) and baffle plate (Item 5) into the internal clutch gear (Item 6). Freeze the output bearing (Item 7) in dry ice and install it in the internal clutch, seating on the baffle plate. Freeze the parking shaft bushing (Item 8) and install in into the internal clutch gear (Item 6). Pre-lube parking brake bearing prior to installation.
5. Position the internal clutch gear (Item 6) on the gear cover studs with the parking brake shaft bushing located between the two long studs.
6. Install gasket (Item 14).
7. With the shoulder of the parking brake shaft (Item 11) against the longer end of the shifting fork (Item 10), match drill a 1/4 inch hole through the shaft and install the 1/4 inch serrated drive pin (Item 12).
8. Install the fork with shaft on the sliding gear (Item 9) and slip over splines of output shaft. Align the shaft (Item 11) with the bushing (Item 8) and the gear splines (Item 9) with the clutch internal gear (Item 6). The unit should slide freely on the output shaft

splines.

9. Install the shifting fork shaft o–ring seal (Item 13) on the shaft to seat against the fork.
10. Install the gear cover (Item 15) with five 3/4" NF nuts (Item 18) and flat washers. Torque to 3200 foot pounds.
11. Install the gear cover seal (Item 16) into the gear cover (Item 15). Do not damage the seal lip.
12. Install the parking brake linkage and shifting lever to the gear cover.
13. Install the shifting cylinder (Item 23) to the gear cover and connect into the linkage. Adjust the cylinder to have a light load against the linkage to remove all looseness while disengaged.

D. Drive Axle Service Brake Installation (Also refer to Brake Section).

1. To determine the right hand and left hand brake assembly, check the part number. An even number goes on the right side and the odd number on the left (Figure 14). To insure proper installation, standing behind the axle, the brakes should install with the adjuster to the top of at the back of the axle.

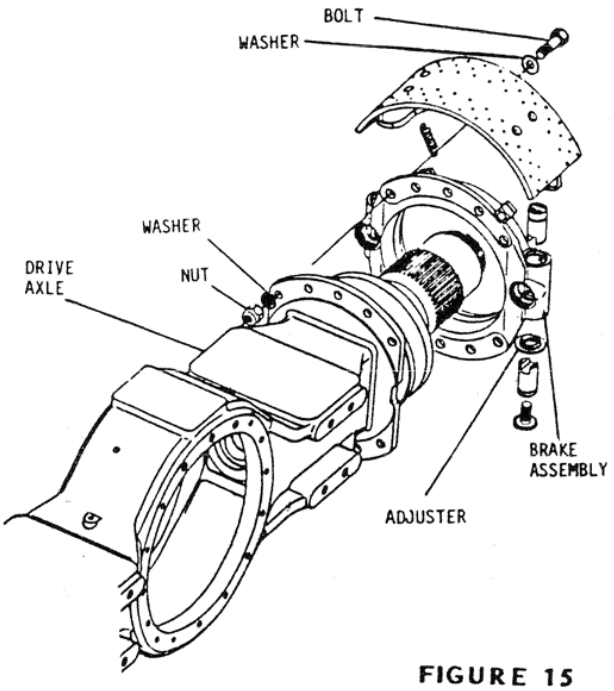


FIGURE 15

4. Install the bleeder screw, brass seat, and brake line fitting into the brake cylinder. The bleeder screw should always be point up, the brake line fitting slightly towards the axle. (See Figure 16).

145 031 → designates L.H. BRAKE ASSEMBLY

145 032 → designates R.H. BRAKE ASSEMBLY

FIGURE 14

2. After you have established right and left brakes, install them on the pilot diameter of the housing. The brakes are a slip fit over the pilot and should seat against the mounting flange. See Figure 15.
3. Install the 1 1/8" body fit brake bolts with a flat washer on the head of the bolt and the nut side. Put the bolt with the head inside and install the 1 1/8" NF nuts to the brake spider. Torque the 1 1/8" NF nuts to 1080 foot pounds lubed.

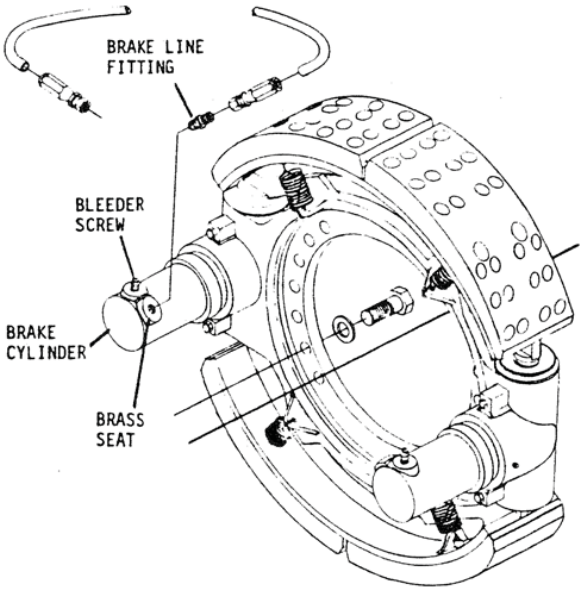


FIGURE 16

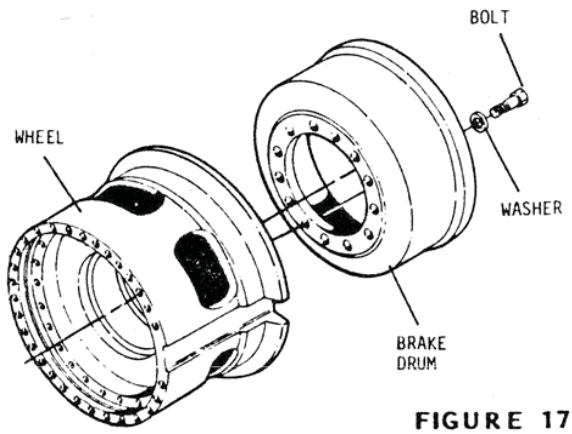


FIGURE 17

5. Mount the brake drum (Figure 17) to the drive wheel. The mounting surface of the brake drum and mating surface of the wheel should be clean and free of paint.
6. Bolt the brake drum to the wheel using 1" NC bolts with flat washer. Torque to 680 foot pounds lubed.

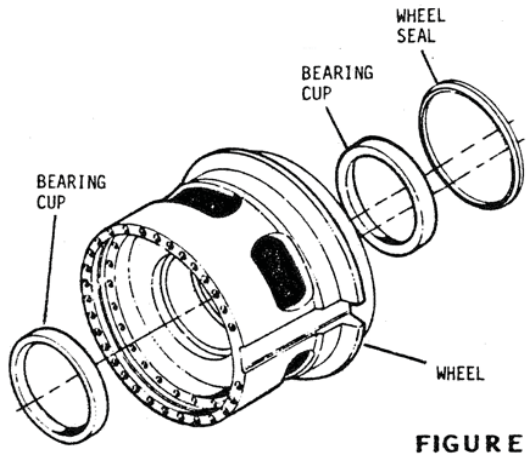


FIGURE 18

E. Drive Wheel Assembly – Figure 18.

1. Clean the inside of the wheel and bearing bores.
2. Freeze the bearing cups in dry ice for 30 to 45 minutes and install them into bearing cup bores.
3. Install the duo-cone seal into the drive wheel. Seals are in matched sets, so do not mix them.
4. Install o-ring (Figure 19) onto stub end against flange taper.

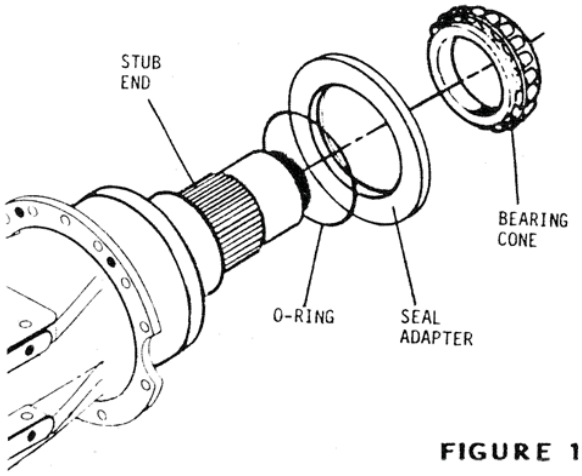


FIGURE 19

5. Heat the stub end seal adapter to 250°F and install it on the stub end. The taper of the adapter should seat flush to the taper of the stub end.
6. Heat the inner wheel bearing to 250°F and install it on the stub end to seat against the seal adapter.
7. Install the seal, mating the one previously installed into the wheel in the stub end seal adapter. Coat both seal surfaces with light oil.

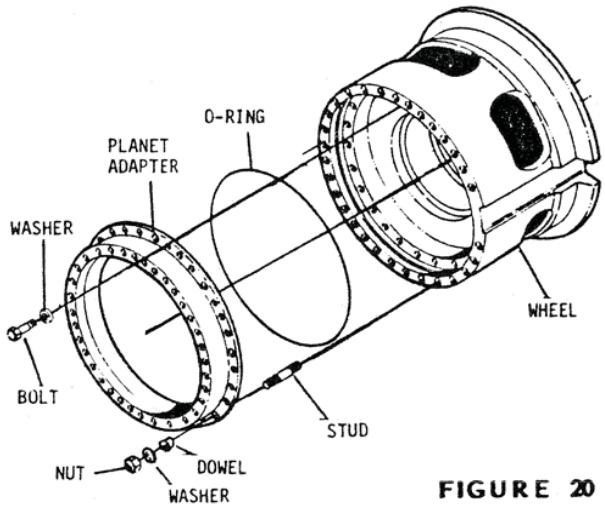


FIGURE 20

8. Install the planet adapter (Figure 20) to the wheel using a light coat of grease on the o-ring seal to hold it in place. Torque the 3/4" studs to 70 foot pounds. Install tapered dowels, washers, nuts and mounting bolts. Torque the 3/4 NF nuts and bolts to 280 foot pounds lubed. Install the 3/4" drain plug into the planet after using hydraulic sealant on the threads.

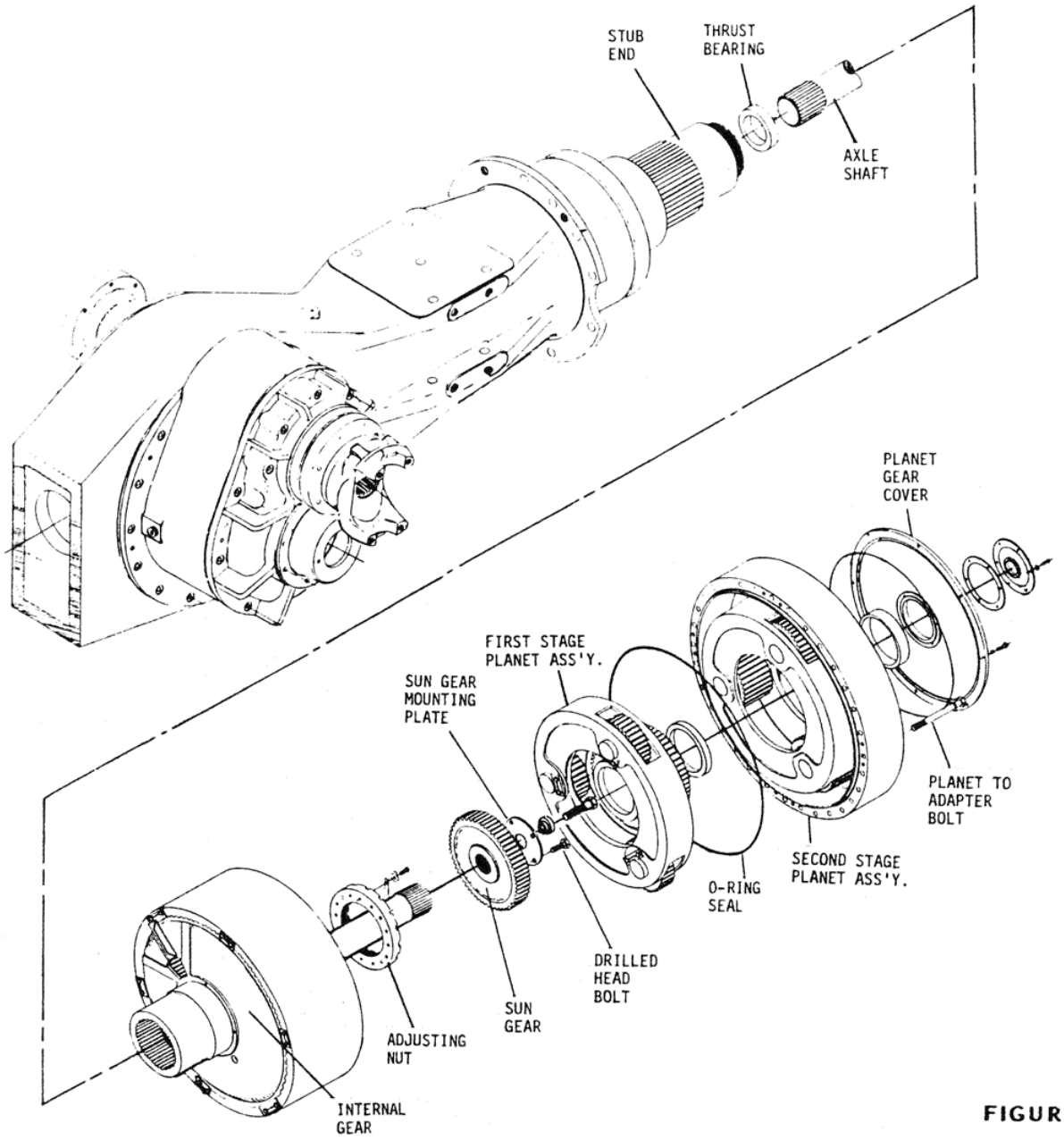


FIGURE 21

9. At this point, pre-lube the inner wheel bearing with a light coat of Chevron Heavy Duty #1 grease. Guide the drive wheel into position to seat against the wheel bearing. The brakes should serve as a guide in installing the wheel. The brake adjustment may need to be backed off for clearance to the brake drum. After aligning the drive wheel into position, block the wheel. The wheel should be blocked at the bottom outer end level with the axle housing.

F. Internal Gear Installation – Figure 21.

1. Screw the internal gear guide tool on the threads of the stub end.
2. Heat the outer wheel bearing to 250°F and install it on the internal gear. Coat the bearing with a light coat of Chevron Heavy Duty #1.
3. With a light chain through the top of the internal gear, lift it into position on the internal gear guide tool. Removing the lifting chain, push the

internal gear into place on the splines of the stub end. The internal gear should be marked at the top for location so that the bearing adjustment sight hole is to the bottom. A light coat of oil on the guide tool and splines of the stub end will help for ease of installation.

4. Remove the internal gear guide tool after positioning the internal gear and screw the stub end bearing nut hand tight against the internal gear.

G. Wheel Bearing Adjustment – Figure 21.

1. Install a wheel bearing adjusting tool in the slots of the stub end nut and bolt it on the wheel.
2. Rotate the wheel to tighten the wheel bearing. For adjustment, tighten the wheel bearing tight to seat the bearing to the bearing cups. Loosen the nut and re-tighten it, lining up a slot in the nut to a slot in the stub end. The bearing adjustment is correct when all of the bottom bearing rollers turn when rotating the wheel 360° and there is a slight side to side movement in the roller when checking them with a screwdriver. The sight rotation check and the movement check are done through the round hole in the internal gear located just below the stud end nut. If the bearing is not adjusted tight enough, the bottom rollers will skip during rotation. If the adjustment is too tight, there will be no movement in the bottom bearing rollers using the screwdriver check.
3. After making the wheel bearing adjustment, secure the stub end nut using bar lock, clip and 5/16" x 1" NC bolt. Torque the bolt to 18 foot pounds and bend the tabs of the clip. Two tabs of the clip should bevel up to secure the bolt head and the other down against the bar lock.

H. Axle Shaft and Axle Shaft Sun Gear Installation – Figure 21.

1. Freeze the axle shaft thrust bearing for 30 to 45 mintues in dry ice. Install it into the surface of the stub end with one slot straight up.
2. Clean the axle shaft. Install it into the

2. Install the planet o-ring seal using a light coat of grease to hold it in position.
3. The planet gear teeth should be lubricated with a light coat of Chevron Heavy Duty #1 pre-lube grease.
4. Install the second stage planet aligning the planet gear teeth with the internal gear and the first stage planet sun gear. To align the gear teeth, it is necessary to remove the second stage planet gear cover.
5. After aligning the gear teeth, remove the installation tool holding the planet in position using some of the 3/4" planet to adapter bolts.
6. Install the remaining 3/4" NC planet bolts with flat washers; and torque them to 280 foot pounds lubed. Be sure stub end with the long splined end in. Using a threaded axle shaft installation tool, slide the shaft into alignment with the splines of the differential side gear.
3. Install the axle shaft sun gear on the axle shaft using the sun gear mounting plate with bushing installed, four 1/2" x 1 1/4" drilled bolts and a 7/8" x 2" drilled head bolt. Torque the 1/2" NC bolts to 80 foot pounds and the 7/8" NC bolt to 460 foot pounds lubed. Wire the bolts in position as shown.

I. First Stage Planet Installation – Figure 21.

1. The gears of the planet should have a light coat of Chevron Heavy Duty #1 pre-lube.
2. Using the first stage planet installation tool and a lifting chain, position the planet against the internal gear. Line the planet gear teeth with the teeth of the internal gear, work it into contact with the thrust surface of the axle shaft sun gear. In the procedure the axle shaft sun gear may need to be lined with the planet gear teeth. This can be done with a slight rotation of the planet.

J. Second Stage Planet Installation.

1. Using the second stage planet lifting tool and a lifting chain, lift the planet into position for installation.

DA 202 DRIVE AXLE (CON'T.)

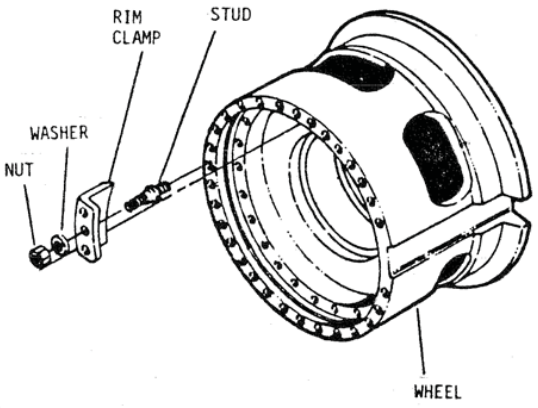


FIGURE 22

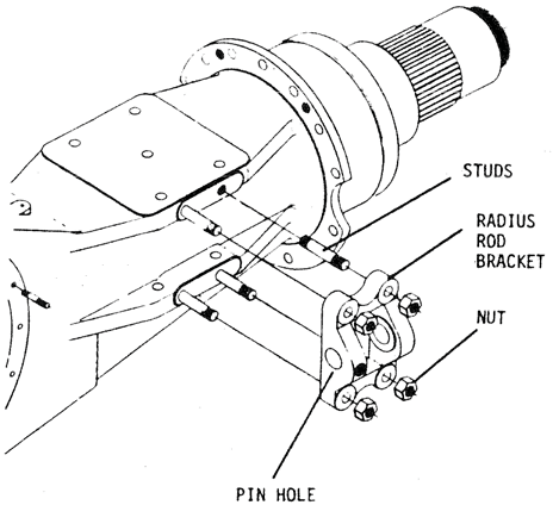


FIGURE 23

to tighten the planet bolts evenly working around the planet so the gear teeth do not end. Rotation of the wheel end is recommended using tightening of the bolts to torque to insure self-alignment.

K. Rim Clamp Stud Installation – Figure 22.

1. Lube the threads of the studs and install them into the wheels. Torque the 3/4" NC shoulder studs to 140 foot pounds.

L. Radius Rod Bracket Installation – Figure 23.

1. Screw all 1 1/8" NF studs short threaded end into the drive axle housing with threads lubed. Torque the studs to 240 foot pounds.
2. Install the radius rod brackets to the studs using the eight 1 1/8" NF nuts Torque the nuts to 1080 foot pounds lubed.
3. Clean the radius rod pin holes and check the pin fit.

M. Drive Axle Lube.

1. Insure all pipe plugs are installed using hydraulic sealant.
2. With 40W gear oil (see LUBRICATION Section), fill the drive axle housing through the top pipe plug opening in the rear cover until the oil level is at the lower plug in the rear cover.
3. Fill each of the wheel end assemblies through one of the 3/4" pipe plug openings of the second stage planet. The oil level should be to the bottom 3/8" bolt of the planet inspection cover.

DIFFERENTIAL

Maintenance

Inspect entire axle assembly and input driveline for loose bolts, nuts or oil leaks. Retighten if necessary. Replace any stripped or broken mounting studs.

Jack and block up the drive axle and test run the unit. Both wheels must be lifted off the ground during the test run, and the brakes should be free to allow both wheels to rotate at the same speed. A noisy differential will indicate the need for adjustment or replacement of worn parts.

NOTE: Never test run with one wheel jacked up. Excessive operation in this manner will cause overheating of the differential spider and galling or shearing of the spider journals.

Make sure lubrication levels are correct. The fill-level plugs are located in the rear center of the banjo housing.

Every 1,000 hours, remove the magnetic drain plug in the bottom of the banjo housing and drain the differential. Remove any particles adhering to the magnetic drain plug. Refill the differential as outlined in LUBRICATION Section.

Planet Field Replacement

The extent of the planet failure should determine the extent of the disassembly of the axle. If the planet has been run to destruction with large quantities of trash in the oil and throughout the assembly, the entire axle should be torn down, inspected and cleaned.

If the oil in the housing at the time of failure does not appear to be full of foreign particles and there is not an excessive amount of trash in the wheel end, the oil in the center section of the axle housing and the other wheel end should be drained and checked for trash and other foreign substances. If foreign substances are found in the oil, a complete rebuild of the axle is recommended. If there is no evidence of trash in the opposite wheel end or in the center section of the axle, the wheel end with the failed planet needs to be the only section torn down, cleaned, inspected and rebuilt.

Disassembly

A. Tear Down.

The axle assembly should be torn down to a bare housing taking particular caution to see that each individual piece be marked for the right or left side, fore and aft position.

It is very important to insure that any used part being put back on to the axle be assembled on the same side as or near to the original position. This will eliminate any new and unnecessary wear patterns.

B. Cleaning.

Each part should be thoroughly cleaned before inspection of the parts begins, so that wear or damage can be spotted.

Clean both the inside and outside of each part. This will make for easier inspection and will also help keep the assembly cleaner during reassembly.

C. Inspection.

Each part should be inspected for damage and wear, particular attention should be paid in the following areas:

1. Check wheels for cracks, broken or bent rim clamp studs, pulled threads in the brake drum or planet mounting holes.
2. Check brake drums for cracks and/or excessive wear. Check mounting hole area for cracks or egg shaped holes.
3. On brake assembly, check shoes for excessive wear or cracks. Inspect cylinder for internal rust or score marks, cracks or any signs of leakage. Brake spider – check mounting bolts for torque. Also look for cracks in the spider. An inspection of the wedge assembly in the spider should also be

made to insure proper operation.

4. A visible check of the stub end radius should be made, and if possible, a more formal check to determine if cracks exist is recommended. The seal wear ring should be replaced, and an inspection of the spline for wear is recommended. Bearing pilots should also be measured to insure tolerance.
5. The axle thrust bearing in the end of the stub end should be replaced if there is any sign of excessive wear.
6. Both the splined end and the sun gear end of axle shafts should be inspected for breakage, cracks, spalling and excessive wear.
7. Inspect internal gear assembly, gear teeth and spline for breakage, cracks, spalling or wear. The bearing pilot should be measured to insure proper fit.
8. Each bearing should be inspected for extensive wear, bruising, or spalling. If any abnormal wear is apparent, the bearing should be replaced.
9. All seals, o-rings and gaskets should be replaced.
10. The carrier should be inspected for any deficiencies while it has been removed from the axle housing.
11. Any parking brake parts that are worn or damaged should also be replaced at this time.
12. Inner axle tubes should be inspected to insure there can be no oil transfer from either wheel end into the center section.

REASSEMBLY

At this point, assembly can be started keeping in mind at all times that cleanliness to all internal parts is one of the most important aspects to insure minimum wear and a long life.

Axle assembly should be handled in a normal fashion using good assembly techniques. All bolts and nuts should be torqued to Rimpull specifications and care should be taken to insure that no part is installed in a fashion that leaves it in a bind.

A 1 1/4" diameter hole has been drilled in the face of the internal gear trunion. This hole is for use in the wheel bearing adjustment and should be positioned in line with the lowest roller on the wheel bearings. The stub end nut should be tightened when the wheel is being rotated and the bearing rollers must be observed through this hole. You must tighten the nut until all of the rollers are turning in the bearing cage as they go past this hole. At this point you should be able (with the wheel stopped from rotating) to move the bottom roller with a screwdriver with slight friction against the roller. At this point you have .000 end play in the bearing. You should then move the nut tighter to the next locking notch and lock the nut.

After the assembly is completed, the axle should be filled to the proper level with 40 weight motor oil (oil level is explained on each planet inspection cover).

The axle assembly is now ready for break in and should be run with no load for 10 to 15 minutes. At this point, you should recheck the oil level and again tighten the lug nuts.

After the assembly is completed, the axle should be filled to the proper level with 40 weight motor oil (oil level is explained on each planet inspection cover).

The axle assembly is now ready for break in and should be run with no load for 10 to 15 minutes. At this point, you should recheck the oil level and again tighten the lug nuts.

If at all possible, the vehicle should be run with empty trailer through one complete cycle – pit to hopper. This cycle should be repeated with one light load or half load. At this time the oil levels and lug nut torques should be rechecked and if all is to specification, the vehicle should be operated for six (6) to eight (8) hours under normal conditions.

After this operation, the vehicle should be pulled in, oil drained, any and all filters or magnetic drain plugs should be cleaned and new oil (40 weight motor oil) installed. Check the oil for any large amount of foreign particles. If none is found, check the axle for any deficiencies (loose bolts,

studs or nuts, gasket leaks or hot spots). If everything is in order, the vehicle should be put back into normal operation.

If any deficiences are found in this final inspection, they should be corrected if possible. If you are not able to correct them, your nearest Rimpull service parts center should be contacted.

Troubleshooting

Noises and vibrations originating in the tires, transmission, planetaries, and drivelines are easily transmitted to the differential and may be erroneously attributed to the differential. Therefore, all possible sources of noise should be thoroughly investigated.

Differential noises may be located by jacking up the drive axle of the vehicle with all the tires off the ground. Run the power train in fourth gear at a moderate engine speed. Be sure to jack up both drive wheels to prevent damage to the differential.

If noises, such as a grating or rattle, are heard in the differential, stop the vehicle immediately. One broken gear tooth can cause damage to all gears and bearings. If the differential is definitely at fault, the axle shafts should be removed before the vehicle is moved.

DA 202 DRIVE AXLE (CON'T.)

REAR AXLE PLANETARY

Maintenance

Proper lubrication of the entire rear axle assembly is essential if the axle is to deliver the service built into it. See LUBRICATION for full information on the proper lubrication intervals and the correct lubricant usage.

TROUBLESHOOTING

TROUBLE	CAUSE	REMEDY
Noise	Insufficient or incorrect lubricant.	Check level; fill with proper type and grade of lubricant.
	Gear teeth in planetary chipped.	Replace gear(s).
Loss of Lubricant	Lubricant foams excessively.	Drain and fill with correct type and grade of lubricant.
	Worn or broken oil seal (o–ring).	Replace oil seal.
	Loose nuts or bolts.	Tighten nuts or bolts to specified torque.
Planet Running Hot	Insufficient or incorrect lubricant.	Check level; fill with proper type and grade of lubricant.
	Pinion bearings seized.	Replace bearings.

DIFFERENTIAL

TROUBLE SHOOTING

TROUBLE	CAUSE	REMEDY
Vibration	Broken gear teeth.	Replace damaged gear.
	Excessive run-out of pinion or flanged case.	Disassemble, correct or replace faulty part.
	Driveline out of balance.	Replace driveline.
Continual Noise	Bearing worn.	Replace worn parts.
	Gears damaged or worn.	Replace gears.
	Insufficient or incorrect lubricant.	Check levels; fill with proper type and grade of lubricant.
Noise on Drive	Ring and pinion gear adjusted too tightly.	Readjust.
Noise on Coast	Bearings damaged.	Replace bearings.
	Loose ring and pinion gear adjustment.	Readjust gears.
	Excessive pinion gear end play.	Readjust end play.
Noise on Turns	Worn spider gear or side gear.	Replace gears.
	Worn or damaged spider bushings.	Replace bushings.
Loss of Lubricant	Oil seals worn.	Replace seal.
	Loose nut(s).	Tighten nuts to correct torque.

LUBRICATION SPECIFICATION

CLIMATE: Arctic Ambient - 65°F/-20°F

DRIVE AXLE: Rimpull Spec ES-597 031

SAE No.	75W-90
Pour Point	-60°F/-65°F
Flash Point	325°F/395°
Viscosity	
SUS @ 100°F	487/146
SUS @ 210°F	74/43
cST @ 40°F	95/28
cST @ 100°F	13/5
Mil. Spec.	MIL-L-2105C and MIL-L-10324A

BRAKE FLUIDS: Rimpull Spec ES-597 032

BRAKE FLUID TYPE

SAE Spec.	J1702f
Boiling Point	302°F
Viscosity	
cST @ -55°C	1500
cST @ 50°C	3.5

MINERAL OIL TYPE

SAE No.	10W-20W-30
Gravity,API	30
Pour Point	-55°F
Flash Point	400°F
Viscosity	
SUS @ 100°F	274
SUS @ 210°F	60
cST @ 40°C	53
cST @ 100°C	9.9
Viscosity Index	173
Mil. Spec.	MIL-L-46152
Bronze Corrosion	Pass

LUBRICATION SPECIFICATION CON'T.

CLIMATE: Non-Arctic -20°F and Above

FACTORY FILL OR FIELD REPLACEMENT BREAKIN OIL FOR DRIVE AXLE OR COMPONENTS

Rimpull Spec ES-597 037

	SCL	*EUTECTIC
SAE No.	90	80/90
Gravity, API	15	N/A
Pour Point	-10°F	-22°F
Flash Point	425°F	452°F
Viscosity		
SUS @ 100°F	1000	937
SUS @ 210°F	92	86
cST @ 38°C	216	202
cST @ 99°C	18.6	17
Timken Ok Load	80 lb.	100 lb.
Mil. Spec.	MIL-L-2105B	Mil-l-2105B
Bronze Corrosion	Pass	Pass

Approved Source Ref.: Mobil (Mobilube 46, SCL)
* United Lubricants (Uniflux 5EP, Eutectic

* Preferred

To be used when an axle component is replaced with a new component to insure proper wearin characteristics.

The breakin oil should be changed at 600 hours.

LUBRICATION SPECIFICATION

CLIMATE: Cold Warm Ambient - 20°F/+80°F

DRIVE AXLE: Rimpull Spec ES-597 031

SAE No.	80
Gravity, API	28
Pour Point	-10°F
Flash Point	415°
Viscosity	
SUS @ 100°F	710/790
SUS @ 210°F	75
cST @ 40°F	35/150
cST @ 100°F	13.8
Timken Ok Load	70 lb.
Mil. Spec.	MIL-L-2105B
Bronze Corrosion	Pass

BRAKE FLUIDS: Rimpull Spec ES-597 032

BRAKE FLUID TYPE

SAE Spec.	J1703f
Boiling Point	401°F
Viscosity	
cST @ -40°C	1800
cST @ 100°C	1.5

MINERAL OIL TYPE

SAE No.	10W-20W-30
Gravity, API	30
Pour Point	-55°F
Flash Point	400°F
Viscosity	
SUS @ 100°F	274
SUS @ 210°F	60
cST @ 40°C	53
cST @ 100°C	919
Viscosity Index	173
Mil. Spec.	MIL-L-46152
Bronze Corrosion	Pass

Rimpull Axle Service Instructions

Drive Component
Rebuild Procedures

CARRIER (225033) REBUILD PROCEDURE

Housing and Parts Preparation

1. Dip housing to remove all dirt and oil. Rinse thoroughly and dry completely.

2. Move to paint for primer.

Pre-Assembly Preparation

3. Put housing in carrier rack.

4. Stamp S/N on housing top side approximately 1/4" away from gear cover mounting surface. Stamp last three digits on edge of gear cover just below same digits on housing.

5. Stamp last three digits of S/N and A,B on top side of end cap then stamp same 3 digits and letters just below end cap.

6. Put one 225385 and three 225391 bearing cups in dry ice for a minimum time of 30 minutes.

7. Install pipe plugs in all ports on outside of housing and cover. Install 5/8" Allen head bolts left and right.

8. While cups are in ice, remove end caps and side nuts. Place them on same side of rack as they were removed from housing. Clean up any trapped fluid from dip tank with damp rag and wipe dry.

9. Remove gear cover. Clean as above, if necessary, wipe dry.

10. Install bearing cup 225385 in rear pinion. Install 225391 bearing cups. One in front pinion, one in rear input. When these cups have returned to room temperature, check to see if they are down against their seat (seated). If cup does not fall into bore while frozen or cup is not seated use cup driver to install or set cup.

11. Dry condensation that forms on cups as they warm to room temperature. Apply LPS oil and wipe with clean rag.

12. Place last 225391 cup in front input bore. This bore has no seat. Install this cup with taper toward inside of housing. Hold it flush with outer machined surface of gear cover until front begins to melt. At that time cup should stay in place.

13. Install oil collector 239149 inside gear cover. Use two 225377 bolts and flat washers. Use RC680 Loctite on threads. Tighten bolts securely and wire tie.

Proper Pinion Adjustment Spacer.

14. Be sure rear pinion bearing cup is seated as described previously in bearing cup installation step.

15. Place rear pinion bearing 225386 in bearings cup already installed in housing. Lie a true, machined shaft across side bores. Check for burrs on shaft and side bores. Measure distance from flat surface of bearing race to bottom side of shaft.

16. Add distance measured from bearing to shaft to 5.125 which is the radius of the side bore. Then subtract the mounting distance marked on base of pinion. The difference is the pinion space 225384 thickness required for proper pinion height. If the calculated spaces thickness is not an even .005, round off to the nearest .005" thickness.

    Calculation example:
    5.355 - bearing to shaft measurement
    +5.125 - side bore radius
    10.480 - sum
    -10.370 - mounting distance (M.D.) on pinion
    .110 - spacer thickness

17. After measurement is taken, place 225386 bearing in oven preheated to 250° F for a minimum time of 45 minutes.

18. Place pinion adjustment spacer on pinion shaft with inside chamfer against gear.

19. Take hot 225386 bearing from oven, place on pinion shaft with cone of bearing facing away from pinion gear.

20. After assembly returns to room temperature use a .002 feeler to see if bearing is seated tightly against spacer. If not, use soft drift and mallet to seat.

21. Prelube rear pinion cup with Chevron EPNLGI1 grease. Place pinion, pinion spacer and 225386 bearing assembly in rear pinion cup. Use pinion holding fixture to hold pinion in place during continued assembly.

22. Roll housing over. Place driven gear on pinion shafts (machined recess toward housing). Align splines so gear drops all the way onto shaft. Apply prelube to gear teeth. **DO NOT** get fingers under gear.

23. Preheat oven to 250° F.

24. Place 225400 and 225403 input bearings in hot oven for a minimum time of 45 minutes.

25. Stand input shaft 225399 against table and secure with chain, input end up.

26. Set drive gear on shaft with machined recess side down. Be sure splines align and gear is setting on shoulder of shaft.

27. Place drive gear spacer 225402 on top of drive gear.

28. Take heated 225403 input bearing from oven. Quickly place on shaft seated against drive gear spacer.

29. When front input bearing 225403 is tight on shaft and will not fall off, invert shaft assembly.

30. Place input shaft spacer 225401 on shaft around shoulder and against gears.

31. Take heated 225400 input bearing from oven and quickly place on shaft seated against input shaft spacer.

32. After assembly returns to room temperature check to see if both bearings are seated tight against spacer. If not, seat them using a soft drift punch and mallet.

33. Spray bare machined components and surfaces with LPS oil throughout entire assembly into housing.

34. Prelube rear input cup with Chevron EPNLGI1 grease. Install input shaft assembly long end first setting rear input bearing 225400 into rear input cup. Prelube drive gear teeth.

35. Install gear cover onto housing using 225376 gasket, six 239147, ten 239148 bolts and sixteen 00103325 lock washers. Use Loctite anti-seize on threads.

36. Leave sixteen gear cover bolts loose and drive in three dowels in gear cover locating dowels using mallet and soft drift punch.

37. Tighten and torque sixteen gear cover bolts to 170 ft. lbs.

38. Install input shaft seal 225407 into input shaft cover 225406 until seal is flush with boss on cover.

39. Put input cover on housing using 225405 gasket, eight 239148 bolts, and 00103325 lock washers. Use Loctite anti seize on threads. Tighten and torque to 170 ft. lbs. Install 38 pipe plug in port on input shaft cover . Use Loctite 592 thread sealer.

40. Once input shaft cover is in place and torqued, set up dial indicator on input end of shaft (reading 0) and a bottle jack under end of shaft toward floor. Jack up shaft until movement stops , be careful not to load bearings.

41. Read indicator. Lower jack completely away from shaft. Move indicator and hit input end three times with rubber mallet.

42. Repeat step #1 and #2 twice. You should get like readings the 2nd and 3rd times. Use the most consistent reading.

43. Input shaft cover needs to be removed and shims put in place. To determine shim stack take your reading (0.050") and deduct the high limit (0.008"). This equals 0.042". Put 225404 shims to equal the 0.042" on top of the bearing cup. Reinstall input cover, gasket and hardware. Torque to 170 ft. lbs.

44. Repeat step #1 and read indicator. If reading is not .004 to .008 continue with above steps until end play is correct.

45. Once end play is set put 225408 yoke on input shaft. Apply light coating of pre-lube grease to input seal to allow yoke to slide into seal without damage. Use 225409 as in input nut washer. Anit seize threads on shaft and install 225410. Heat treat lock nut with 1" air impact.

46. Check input shaft end play. Adjust if necessary. Record end play reading and shim stack thickness. Pinion end is .000 after final adjustment.

47. Put 225389 driven gear spacer on pinion shaft with flat surface against gears.

48. Put a combination of 225390 pinion shims totaling approximately 0.150" on pinion shaft on top of 225389 spacer.

49. Put 225381 bearing on top of shim stack. Use 225394 slotted nut with 225393 washer between nut and bearing. Use anti seize on threads.

50. Tighten nut 225394 with special adapter and 1" air impact.

51. At this point the input and pinion assemblies are in alignment with each other. Pinion is loose because adjustment is not finished. This should let the input shaft roll freely and is the time to check input rolling resistance. Refer to input rolling resistance.

52. Use inch pound torque wrench, necessary adapters and 3 1/2" socket and torque wrench on input shaft.

53. Place socket and torque wrench on input shaft nut and take reading while shaft is rotating consistently. Do not take reading at start of rotation.

54. Record reading.

55. Place small stand and bottle jack under shaft on pinion holding fixture. Set up dial indicator on top of pinion shaft.

56. Lift pinion with jack. Do not load bearings take reading. Release jack, hit pinion nut with rubber mallet three times. Take another reading.

57. Remove pinion nut, washer, and bearings.

58. Remove shims to equal reading on indicator. Prelube bearing.

59. Reassemble with remaining shims. Repeat steps 6 and 7. If reading is not 0.00" repeat necessary steps. Record shim stack thickness when 0.000" end play is reached.

60. Tighten pinion nut to 1000 ft. lbs. with one air impact. Align slot in nut with a slot in pinion shaft. Install 100 004 lock bar in aligned slots. Use 225396 cap screw lock, 234871 5/16" x 1" bolt and Loctite RC/680 on bolt threads. Torque bolt to 18 ft. lbs. Bend long tab on lock over end of lockbar and two remaining tabs up against bolt head.

61. Use inch pound torque wrench. With adapter in slot on pinion shaft rotate in a consistent manner and take readings.

62. Spray pinion nut etc. with LPS oil. Install 225398 pinion cover with 225397 gasket, six 239148 bolts and 00103325 lock washers. Use anti-seize on bolts and torque them to 170 ft. lbs.

63. Prelube bearings with bearing cups 225380 in place use through the nest lifting tool to lift and set nest in carrier housing.

64. Remove lifting tool and assemble end caps and different adj. nuts 225378 to carrier. Do not tighten end cap nuts.

65. Set black lash at predetermined setting marked on edge of ring gear. Example BL.016.

66. Tighten 225378 nuts and rotate nest assembly in housing to set bearings.

67. Set up dial indicator on a ring gear tooth to read black lash. Rotate nest assembly until ring gear bumps against pinion gear head. Set indicator at .000".

68. Now rotate nest in opposite direction until ring gear bumps against pinion head. Read indicator.

69. Use different adj. nuts to set back lash. Once back lash is set check to see if both 225378 nuts are tight. If one or both are loose, tighten and check back lash again.

70. Now check end play. Set up dial indicator against ring gear flange. Use a pry bar to see if there is end play. With proper back lash adjustment, end play should be good. End play is to be .000".

Put side adj. nuts in position so T-shaped locks 225379 can be installed with 2239146 5/16 x 1/2 bolt and Loctite RC/680. Torque to 18 ft. lbs. Prelube ring gear and pinion. Spray bare interior surfaces with LPS oil.

Nest Assembly

71. Installation of ring gear 225383 on case half 225413. Find alignment mark on ring gear and case half. Mark each with a yellow marker for easy visibility.

72. Set case half with splines up and alignment mark toward you. Pick up ring gear with alignment mark toward you and set it on case half splines with alignment marks matching each other.

73. Once alignment is made use a rubber mallot to drive ring gear down over splines. **Note: Be aware you need to keep ring gear straight while driving it down.

74. Strike ring gear solidly evenly side to side with rubber mallot. Once ring gear is down to proper position install two 237061 bolts with Loctite RC/680 on thread.

75. Turn case half over and install remaining 080-485 bolts with RC/680 Loctite and run them down with 1/2 inch air impact.

76. Set case half with ring gear teeth down on ring gear holding fixture.

77. Torque the sixteen 237061 bolts to 320 ft. lbs and wire tie.

78. Set both case halves 225413 on table with large I.D. up. Drive in four 225414 dowels, two in each half with soft drift and hammer until dowel is just below flush with 225416 side gear thrust washer.

79. Place 225416 thrust washer brass wear surface against gear over dowels in 225413 case half with ring gear. Prelube thrust washer to gear surface. Spray LPS on inside of 225413.

80. Drop 225417 side gear in place machined surface to thrust washer. Be careful not to get fingers in the way. Prelube side gear teeth.

81. Assemble four 225402 pinion gears onto 225418 different spider. Prelubing spider to gear surface.

82. Place four 225421 pinion gear thrust washer onto spider, prelube between gear and thrust washer. One against each gear bearing surface.

83. Set pinion gear spider assembly onto 225413 case half aligning spider with four cut outs in 225413 and meshing gears.

84. Be sure spider is setting all the way down in cut outs. Prelube pinion gears. Spray LPS over inside of assembly.

85. Prelube thrust washer surface in 225413 case half. Place 225416 thrust washer over dowels with brass wear surface toward gear and press firmly into prelube grease so it will stick and not drop out during assembly. Prelube 225416 bearing to gear surface. Spray LPS inside 225413.

86. Drop 225417 side gear into place and prelube gear teeth. Turn this case half upon it's side and pick up with lifting device so that side gear and 225416 washer stay in place.

87. Set this assembly down onto spider assembly meshing gear teeth so that case half mating surfaces come together.

88. Remove lifting device and install twenty 225415 bolts and 230960 special washers with anti seize on threads.

89. Secure nest assembly and torque the twenty 225415 bolts to 133 ft lbs.

90. Use special tool to make sure assembly rotates freely inside case halves.

91. Heat two 225381 bearings in oven for 45 minutes and install them on case halves cone out.

FIRST STAGE PLANET ASSEMBLY

Housing and Parts Preparation

1. Clean the planet housing and parts well using a standard safety solvent.

2. Inspect the housing, pins, pin bores, gears and all parts for burrs or any foreign material.

Pre-Assembly Preparation

3. Install the center snap ring into planet gears and heat the gears in an oven to 250° F.

4. Freeze planet pins in dry ice for at lease 30 minutes.

5. When gears are heated install the bearings against the snap rings. Insure that the bearings are still all the way down after the gear and bearing reach normal temperature. Pre-lube bearing rollers.

6. Install the inner bearing race with shoulder to outside of gear on both sides.

7. Freeze the two thrust bearings in dry ice for at lease 30 minutes and install them in second stage sun gear.

8. Stamp the planet serial number beside one of the pin bores on the sun gear side of the planet.

Planet Assembly

9. Set second stage sun gear on flat surface, spline side up. Install the three sun gear locks and bolts. Torque lock bolts to 80 ± 5 foot pounds. Wire bolts in groups of two.

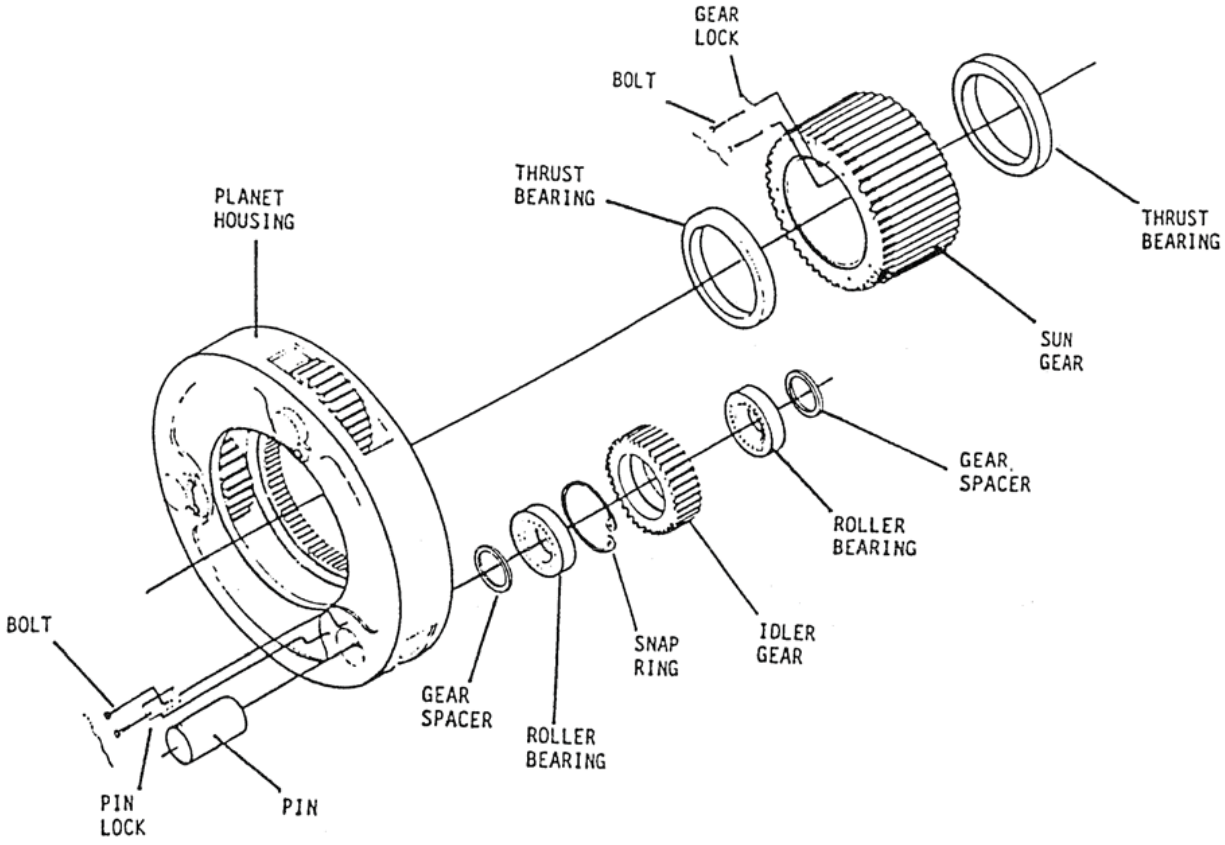
10. Position the three planet gears and six bearing spacers into the housing, aligning with pin bores.

11. Use guide pins in pin lock holes to install the planet pin into housing bores. Insert the planet pin lock into the pin slot and slide down over guide pins until seated. This insures the proper location of the pin to the pin lock. Remove guide pins and install lock bolts. Torque bolts to 80 ± 5 foot pounds. Wire the bolts in groups of two.

12. After gear pin installation, turn each gear to insure that they turn smoothly and freely.

13. Pre-lube all gears and spray the entire planet with LPS. At this point, assembly should be complete and ready for packing or installation.

FIRST STAGE PLANET ASSEMBLY



SECOND STAGE PLANET ASSEMBLY

Housing and Parts Preparation.

1. Clean the housing and all parts well using a standard safety solvent.

2. Inspect the housing, pins, pin bores, gears and all parts for burrs or any foreign material.

Pre-assembly and Preparation

3. Install the two retaining rings into each gear and heat the gears in an oven to 250° F.

4. Freeze planet pins in dry ice at lease 30 minutes.

5. When gears are heated, install the bearings to bottom on the snap rings, making sure the inner race of the bearings is shoulder out. Insure that the bearings are still all the way down after the gear and bearings reach normal temperature. Pre-lube the bearing rollers with a light coat of Chevron Heavy Duty #1 or equivalent.

Planet Assembly

6. Place the gear and bearing spacers into the planet housing, aligning with the pin bores.

7. Using guide pins in pin lock holes, install the planet pins into the bores holding the lock bar in the pin slots. Slide down over guide pins. This insures the proper location of the planet pin for lock installation. Torque bolts to 80 $\pm$ 5 foot pounds. Wire the bolts in groups of two.

8. After gear and pin installation, turn each gear to insure that they turn smoothly and freely.

9. Install the two 3/4" pipe plugs using hydraulic sealant (Loctite).

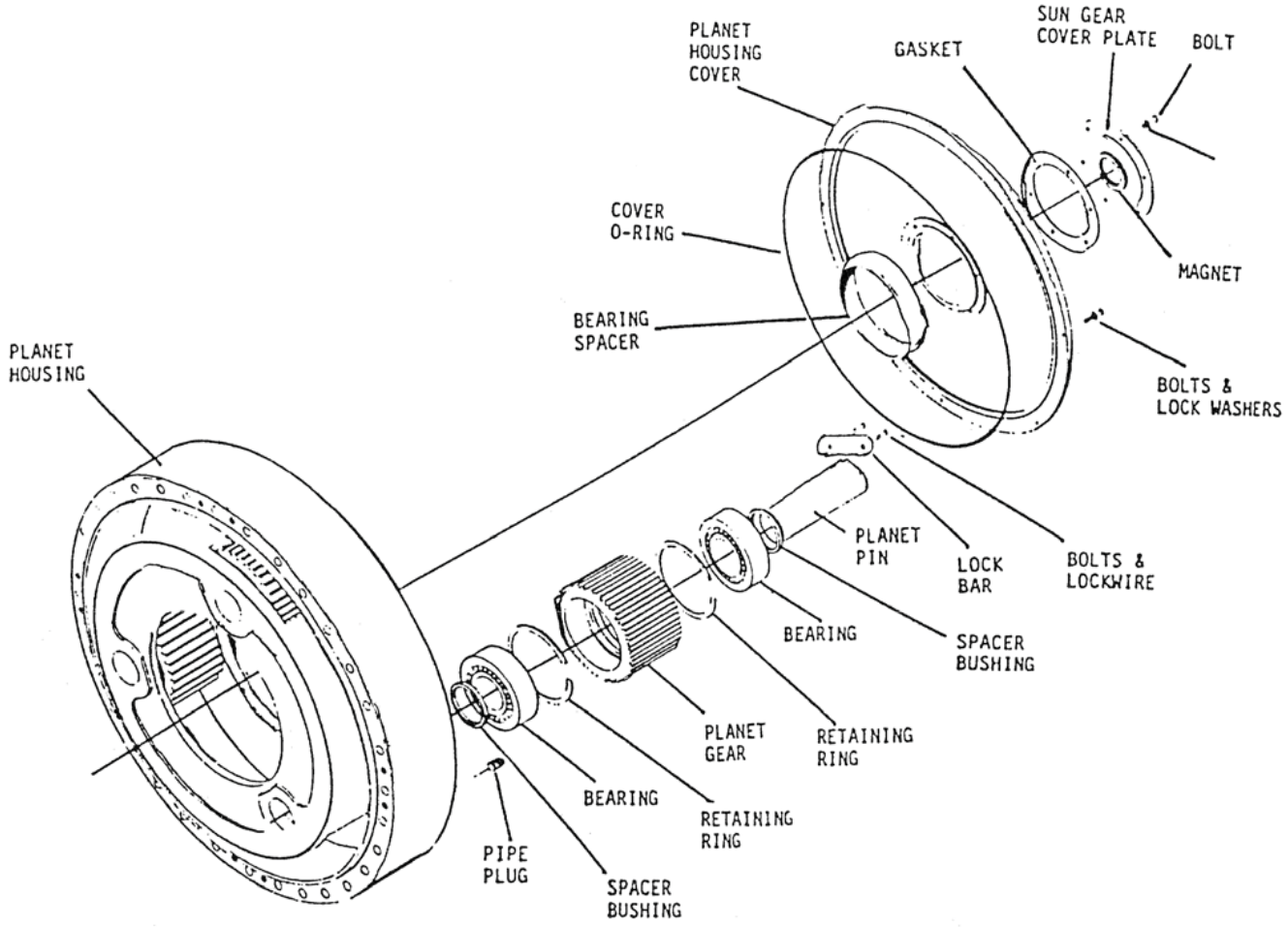
10. Install the planet housing cover O-Ring with a coat of grease to hold it in position. Install the planet housing cover with eight 3/8" NC cover bolts and lock washers. Use hydraulic sealant on the bolts. Torque bolts to 35 $\pm$ 2 foot pounds.

11. Spray the internal parts of the planet with LPS.

12. Paint the outside of the planet housing.

13. After the paint has dried, install the data stickers (oil Level) at center of cover and the two fill stickers beside each 3/4" pipe plug. At this point, the assembly should be complete and ready for packing or axle installation.

SECOND STAGE PLANET ASSEMBLY



INTERNAL GEAR ASSEMBLY

Assembly Preparation

1. Clean all parts well with standard safety solvent.

2. Inspect all parts for burrs or any foreign material.

Internal Gear Hub Installation

3. With the internal gear laying with 1/2" tapered holes up, insert the hub aligning gear teeth. Align oil deflector mounting holes between the set of two 1/2" lock holes in ring gear.

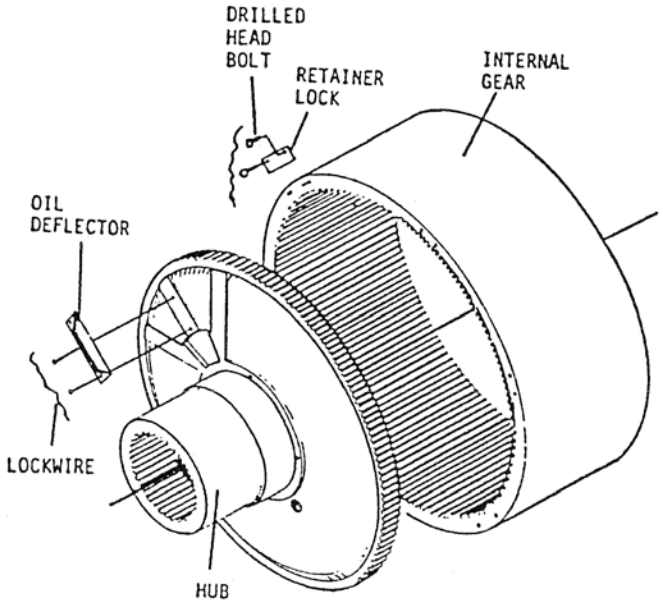
4. Install the retainer locks on the internal gear using 1/2" x 1 1/4" NC drilled head bolts.

5. Torque the 1/2" bolts to 80 foot pounds lubed.

6. Wire bolts in groups of two.

7. If the internal gear assembly is to be packaged for shipment, coat it with Cosmollen to prevent corrosion.

INTERNAL GEAR ASSEMBLY



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