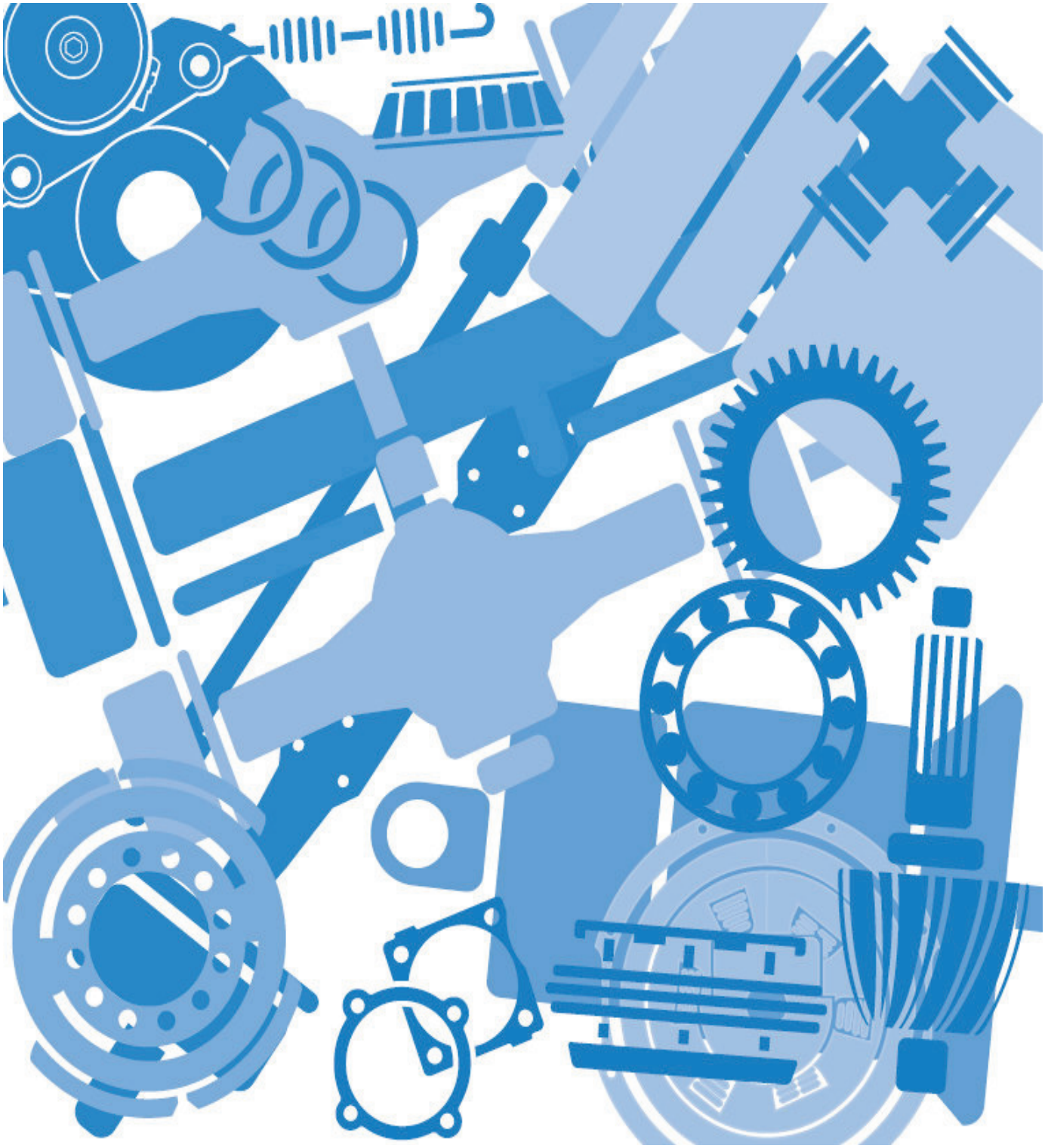
Dana® Spicer®

G170 / G171 / G190 - DRIVE HEAD



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Last Modification	Date	Approved by	Date	Level	Reference	Eng. Change
O. Maraña	12.06.06	V. Badiola	12.06.06	A	613509	NC06823
G.Gainza	06.09.06	V. Badiola	12.06.06	B	613509	NC06939
O. Maraña	22.01.07	V. Badiola	23.01.07	C	613509	NC06939A
O. Maraña	13.03.07	V. Badiola	13.03.07	D	613509	NC07524

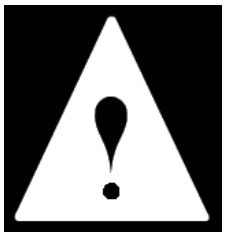
The description and specifications contained in this service publication are current at the time of printing.

Dana Spicer Corporation reserves the right to discontinue or to modify its models and/or procedures and to change specifications at any time without notice.

Any reference to brand names in this publication is made simply as an example of the types of tools and materials recommended for use and should not be considered an endorsement. Equivalents, if available, may be used.

Important Notice

This symbol is used throughout this manual to call attention to procedures where carelessness or failure to follow specific instructions may result in personal injury and/or component damage.



Departure from the instructions, choice of tools, materials and recommended parts mentioned in this publication may jeopardize the personal safety of the service technician or vehicle operator.

WARNING: Failure to follow indicated procedures creates a high risk of personal injury to the servicing technician.

CAUTION: Failure to follow indicated procedures may cause component damage or malfunction.

IMPORTANT: Highly recommended procedures for proper service of this unit.

NOTE: Additional service information is not covered in the service procedures.

TIP: Helpful removal and installation procedures to aid in the service of this unit.

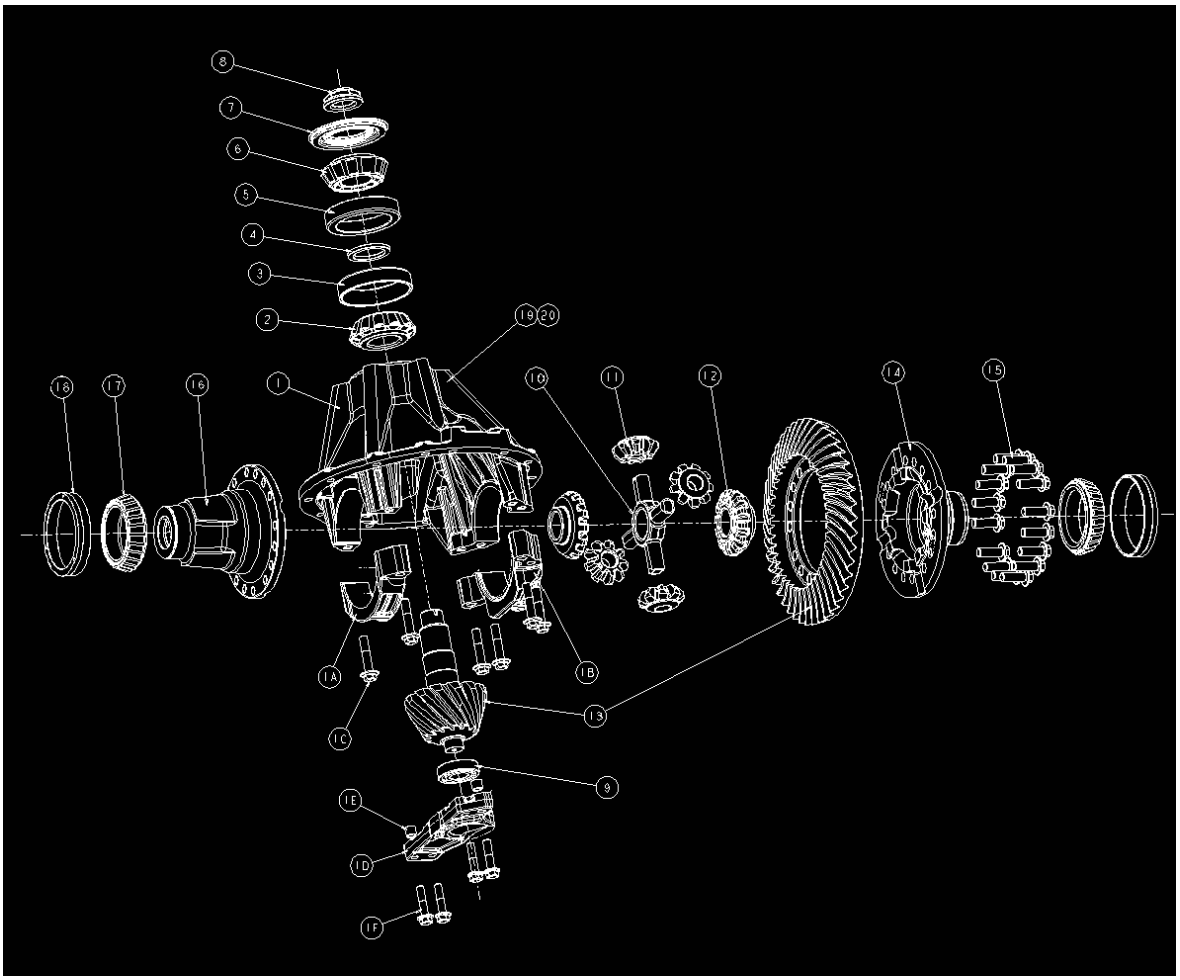
OEM: Refer to the OEM vehicle specifications

Always use genuine Dana Spicer replacement parts.

DRIVE HEAD INDEX

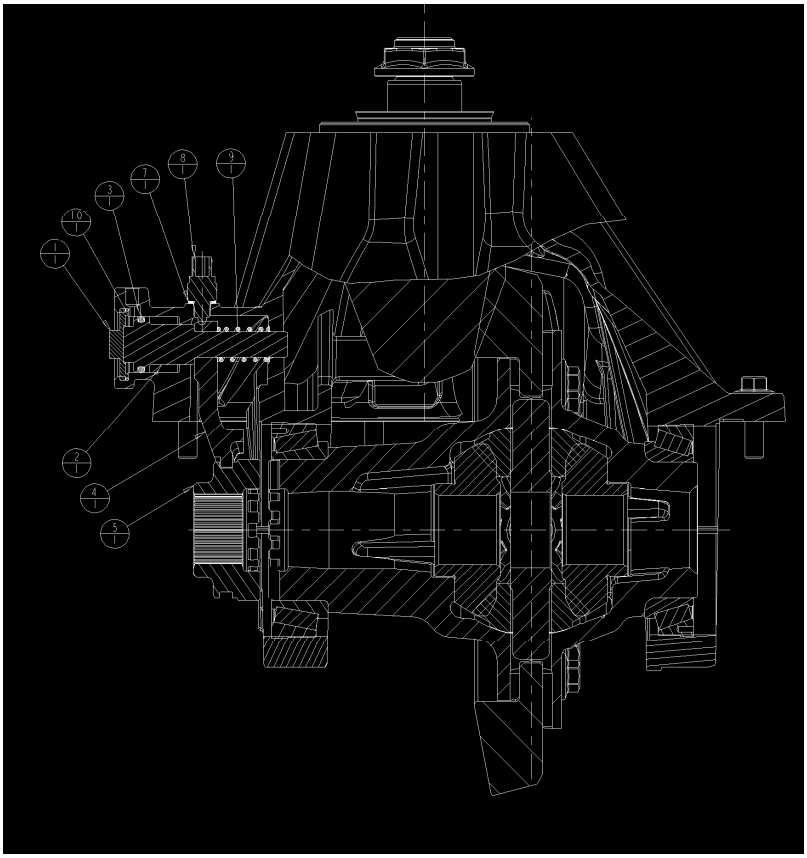
1. DRIVE HEAD – EXPLODED VIEW

- **Drive Head Assembly – Parts Exploded View**



1.- Carrier Sub-assembly	7.- Pinion Seal	19.- Identification Tag
1A.- Bearing Cap	8.- Pinion Nut	20.- Rivet
1B.- Bearing Cap	9.- Pilot Brg (Pinion)	21.- Loctite#518
1C.- Capscrew	10.- Diff. Spider	22.- Loctite#540
1D.- Pilot Bearing Web	11.- Diff. Pinion	23.- Loctite#510
1E.- Dowell sleeves	12.- Diff. Side Gear	
1F.- Capscrew	13.- Gearset	
2.- Brg Cone (Pinion Inner)	14.- Diff. Case, Flange Half	
3.- Brg Cup (Pinion Inner)	15.- Crownwheel Capscrew	
4.- Bearing Spacer	16.- Diff. Case, Plain Half	
5.- Brg Cup (Pinion Outer)	17.- Diff Bearing Cone	
6.- Brg Cone (Pinion Outer)	18.- Diff Bearing Cup	

- **Wheel Differential Lock**



1.- Diff Loc Cap	6.- Roll pin(not shown)
2.- Push Rod	7.- Washer
3.- O-ring	8.- Switch
4.- Shift Fork	9.- Compression Spring
5.- Sliding Clutch	10.- O-ring

2. DIFFERENTIAL CARRIER ASSEMBLY

▪ Remove Differential Carrier

Standard Differentials

1. Block the vehicle
2. Drain axle lubricant.
3. Disconnect driveline.
4. Disconnect lead wires to the selector switch and air line at shift cylinder.
5. Remove axle shaft.

WARNING: Do not lie under carrier after fasteners are removed. Use transmission jack to support differential carrier assembly prior to loosening fasteners.

6. To remove axle shaft, remove axle stud nuts. (If used, remove lock washers and taper dowels.)
7. Remove axle shafts.

NOTE: All models in this publication use axle shafts with unequal lengths. Axle shafts may also be location specific with various wheelequipment. Do not misplace axle shafts from their intended location. Identify left and right shafts for reference during reassembly.

TIP: If necessary, loosen dowels by holding a brass drift in the center of the shaft head and striking drift with a sharp blow with a hammer.

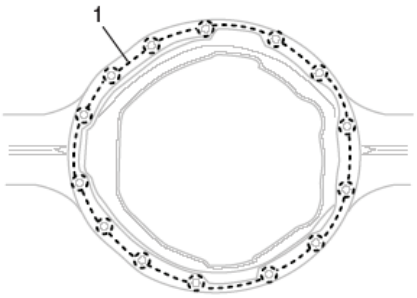
CAUTION: Do not strike the shaft head with a steel hammer. Do not use chisels or wedges to loosen shaft or dowels.

8. Remove carrier capscrews, nuts, and lock washers.
9. Remove differential carrier assembly.

▪ Install Differential Carrier

IMPORTANT: Before installing carrier assembly, inspect and thoroughly clean interior of axle housing using an appropiated solvent and clean rag.

1. Use silicone rubber gasket compound or Loctite#518 on axle housing mating surface as shown in the illustration. Gasket compound will set in 20 minutes. Install carrier before compound sets or reapply.



1 - Apply silicone gasket in this pattern

TIP: To assist in installing complete differential carrier use two pieces of threaded rod (M16 X 1.5) threaded into carrier capscrew holes. Rod should be approximately 6" long. Use these to pilot the carrier into the housing.

NOTE: Fasteners using self-locking thread "patches" may be reused if not damaged, but should be secured by a few drops of Loctite#518 on threaded surface of differential carrier.

Reused fasteners should be wiped clean of excess oil, but do not require special cleaning.

2. Install carrier to housing, lock washers, capscrews and nuts. Torque to proper specification. (see torque chart).
3. Install axle shafts and axle stud nuts. (If used, also install lock washers and tapered dowels.)
4. Add axle lubricant. Fill to bottom of filler hole.
5. Connect driveline, making sure all yokes are in phase. Lubricate u-joints.

NOTE: When axle has been disassembled or housing, gears, axle shafts or wheel equipment replaced, check axle assembly for proper differential action before operating vehicle. Wheels must rotate freely and independently.

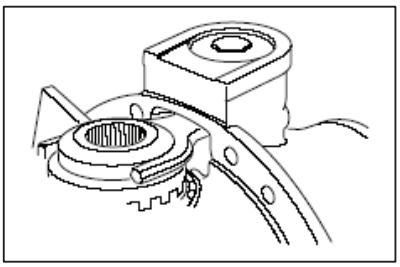
3. CARRIER ASSEMBLY

▪ Remove Wheel Differential (All Standard Models)

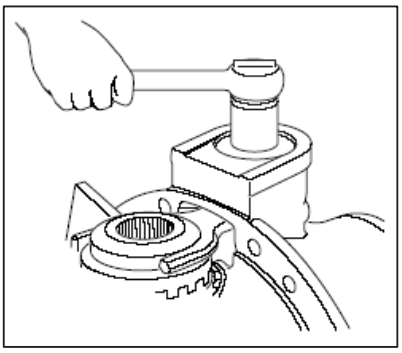
Carrier Disassembly

For models having the wheel differential lock option, refer to the following procedure. These parts must be removed first before further disassembly of the wheel differential can take place.

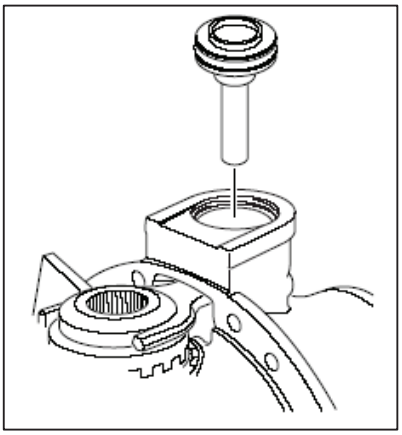
1. For ease of service, mount differential carrier in headstand with the differential lock facing up



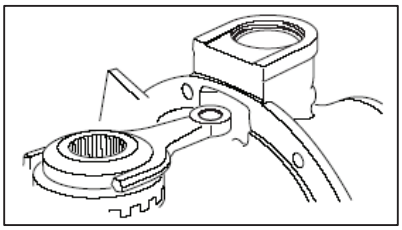
2. Remove the threaded cylinder cap.



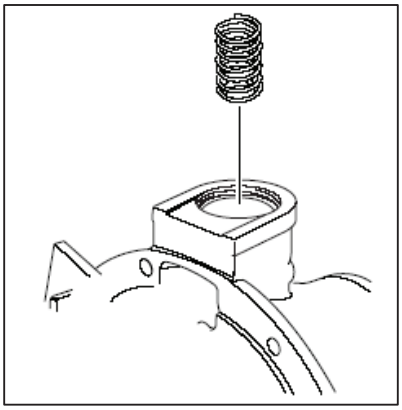
3. Remove the piston push rod from the shift fork



4. Remove the shift fork and sliding clutch assembly

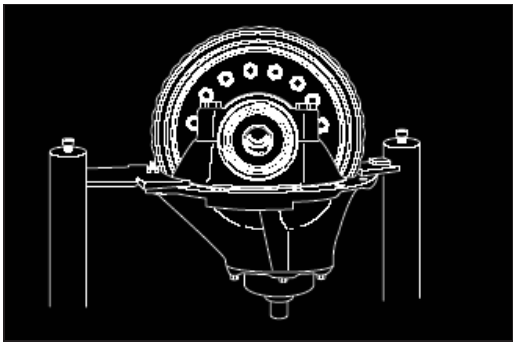


5. Remove the shift fork spring



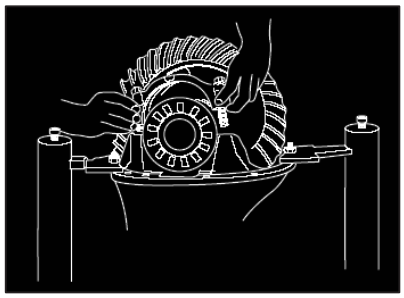
NOTE: If gear set is to be reused, check tooth contact pattern and ring gear backlash before disassembling differential carrier. Best results are obtained when established wear patterns are maintained in used gearing. Omit this step if the gear set is to be replaced.

6. Mount differential carrier in a head stand. With the wheel differential facing upward.

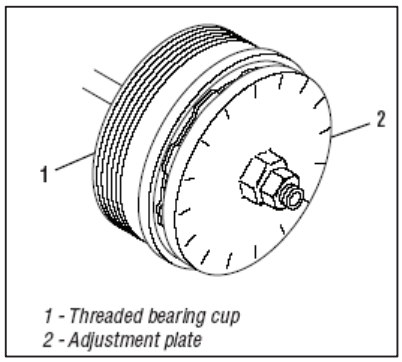


NOTE: For easier disassembly, loosen but do not remove the pinion nut.

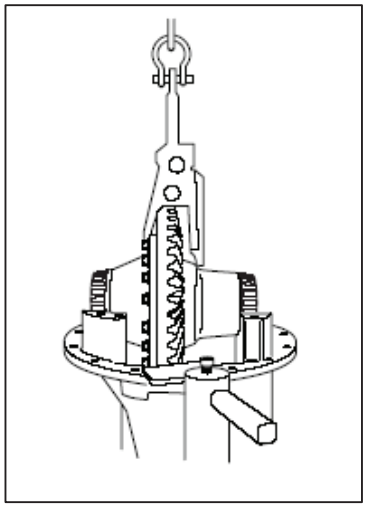
7. Remove the carrier differential bearing cap screws, flat washers and bearing caps.



8. Use Dana´s wheel diff. bearing adjustment tool (part number 130971) to back off the threaded cups and remove.



9. Using a chain hoist and the proper strap, lift the ring gear and wheel differential assembly carrier.

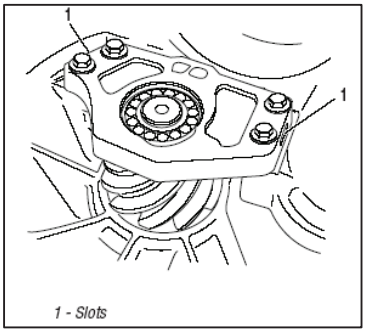


4. DRIVE PINION

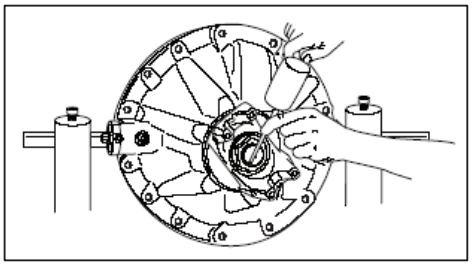
▪ Pinion Removal

CAUTION: During the following yoke removal procedure, do not allow pinion to drop on hard surface.

1. If a pilot web is used, for disassembly, use the pry slots provided at each end of the pilot web.

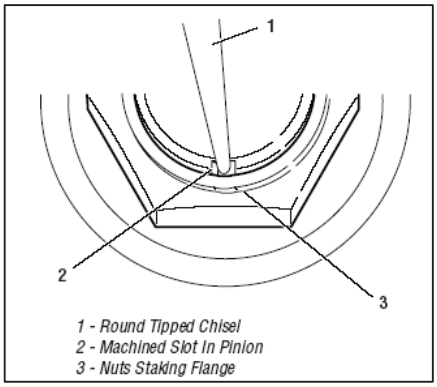


2. Before the pinion nut can be loosened, you must destake the nut from the slot of the pinion.



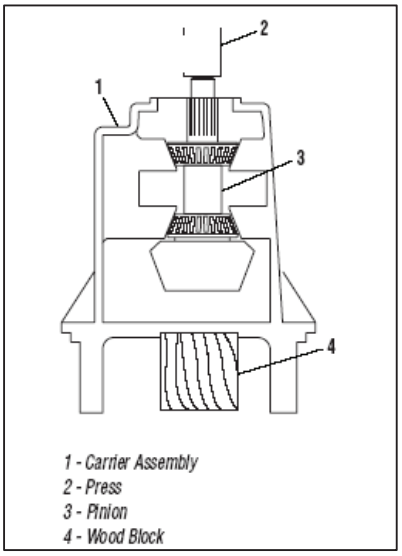
3. To de-stake the nut, use a chisel or drift with a round tip. The flange of the nut must be pushed far enough outward so that the staked area will not interfere with the pinion threads when the nut is removed. See diagram below.

CAUTION: Failure to de-stake the pinion nut will result in damage to the drive pinion threads when removed. The pinion nut should never be reused, always replace with new.

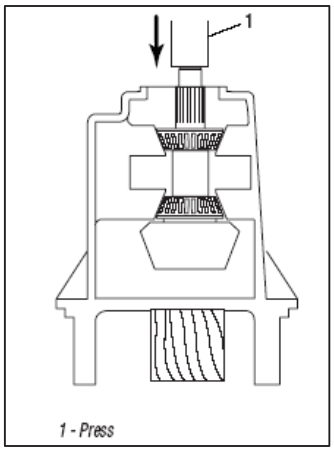


4. Remove the pinion nut

5. Place carrier assembly into a press, place a 2" x 6" x 6" wood block under the pinion. This will ensure that when the pinion is pressed free from the bearings the pinion will not be damaged.



6. Use a suitable pressing tool to press the end of the pinion until free from the pinion bearing



IMPORTANT: The bearing spacer will be reused or used as a starting point when resetting the pinion bearing preload. Do not discard this part.

CAUTION: Use the correctly sized spacer. Do not use shim stock or grind spacers. These practices can lead to loss of bearing preload and gear or bearing failure.

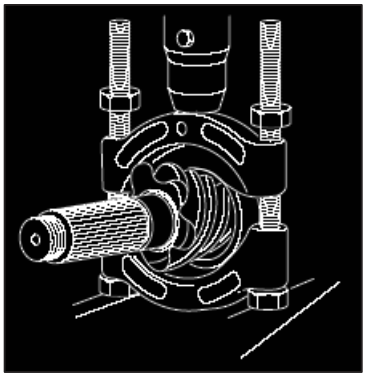
▪ Drive Pinion Overhaul and Assembly

The preload of the bearings on the drive pinion is adjusted by a spacer between the inner and outer bearing cones. The preload is adjusted by changing the thickness of the spacer. A thicker spacer will decrease the preload, a thinner spacer will increase the bearing preload.

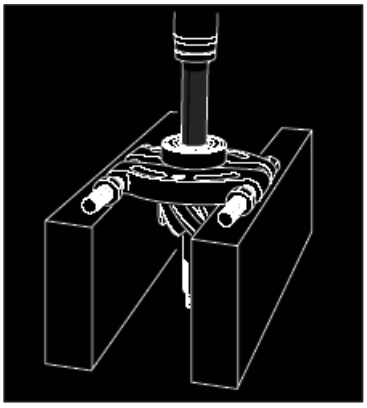
NOTE: See carrier disassembly for instructions on pinion and yoke removal.

1. If the model of axle uses a pilot bearing, remove the bearing using a split-type puller. Use two procedure steps to remove each bearing.

   a. Mount the puller vertically to separate the bearing from the pinion. This action will force the puller halves behind the bearing race and start moving the bearing from the pinion.

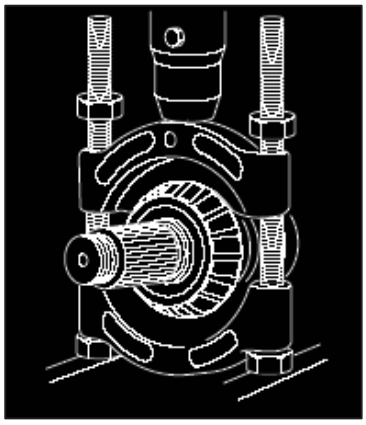


   b. Mount the puller horizontally to press the bearing from the pinion

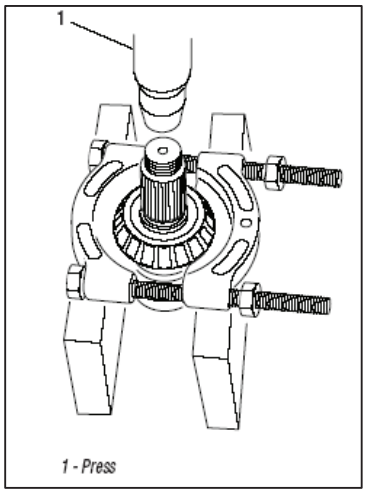


2. Remove the inner pinion bearing cone from the pinion using a split-type puller. Use two procedure steps to remove each bearing.

   a. Mount the puller vertically to separate the bearing from the pinion. This action will force the puller halves behind the bearing race and start moving the bearing from the pinion.



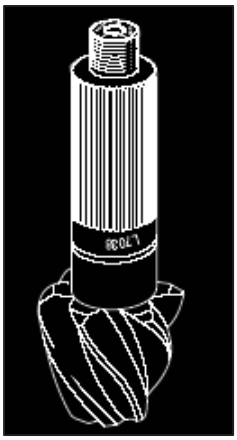
   b. Mount the puller horizontally to press the bearing from the pinion



IMPORTANT: **Use the correctly sized spacer. Do not use shim stock or grind spacers. These practices can lead to loss of bearing preload and gear or bearing failure.**

To prevent bearing damage, use suitable sleeve that only contacts the inner race of bearing cone.

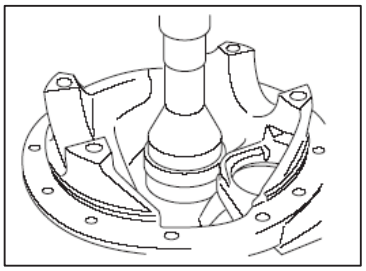
3. Use a press sleeve to install the inner bearing cone and pilot bearing, if used, onto the pinion. Apply pressure until the bottom of the cone touches the shoulder of the pinion. Apply lubricant to the cone of the bearing.



4. If removed, install the inner and outer bearing cups into the carrier.

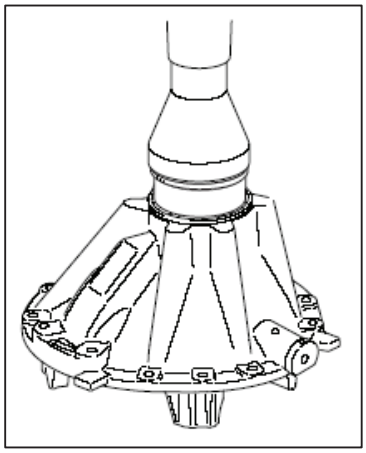
   a. To install the inner bearing cup, place the carrier in a press with the bottom of the carrier facing up.

   b. Place the cup in the bore. Use a sleeve or bearing driver tool to press the cup until it is fully seated. Use a feeler gage to make sure the cup is fully seated.



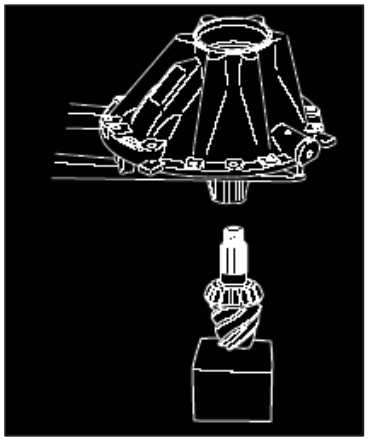
   c. To install the outer bearing cup, place the carrier in a press with the top of the carrier facing up.

d. Place the cup in the bore, use a sleeve or bearing driver tool to press the cup until it is fully seated. Use a feeler gage to make sure the cup is fully seated.

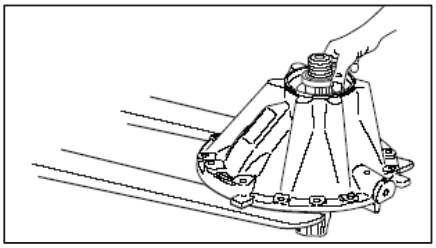


NOTE: If a press is not available, use a sleeve or bearing driver and a hammer to install the cups.

5. Place the pinion on a 150mm x 150mm x 150mm block of wood and lower the carrier over the pinion.

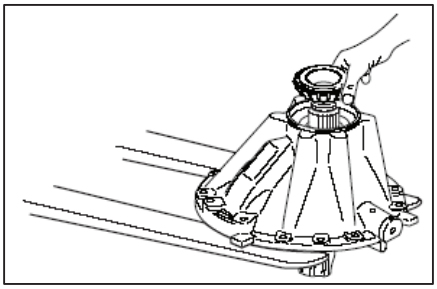


6. Install the pinion spacer

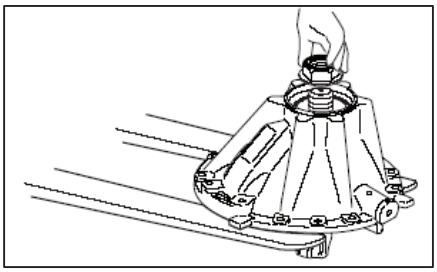


NOTE: If you are using the same drive pinion, use the same spacer that was originally installed in the assembly. If the drive pinion is to be replaced, the original spacer will be used as the starting point of adjustment.

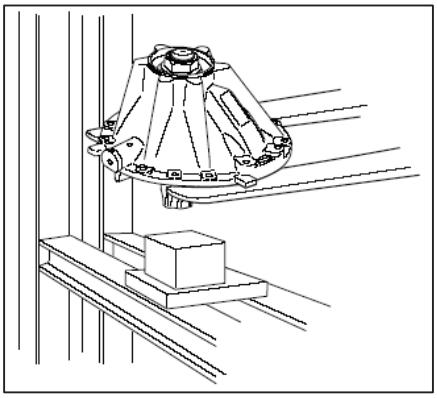
7. Install the outer bearing cone



8. Install a pinion nut finger tight. This will hold the pinion in place while it is positioned into the press

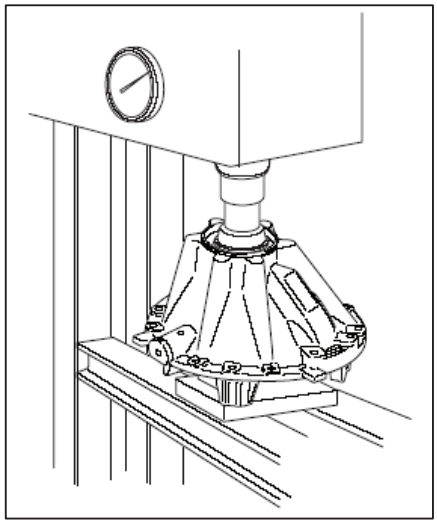


9. Align a 150mm x 150mm x 150mm wood block under the drive pinion, then lower the carrier and pinion assembly into a press so that it is supported by the block.

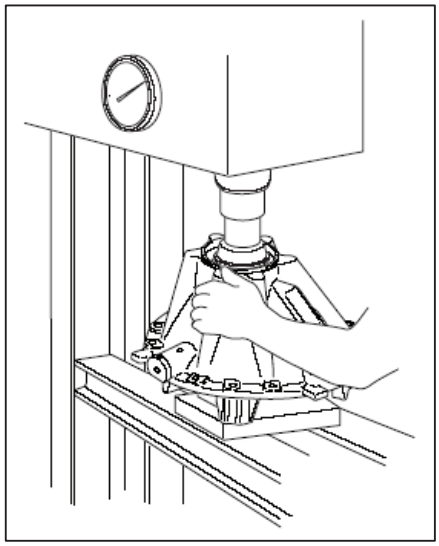


10. Remove the pinion nut.

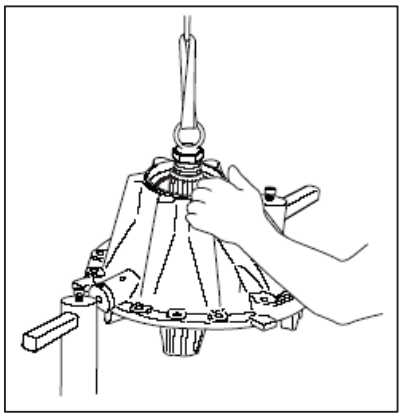
11. Place a press sleeve over the top of the outer bearing cone. Use the press to apply 5 tons of force. It is important to rotate the carrier slightly to make sure that the rollers of the bearing are properly seated.



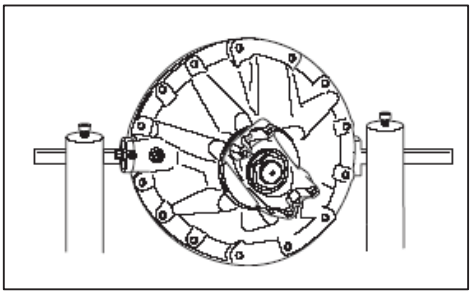
12. With 5 tons of force on the press, you should be able to feel a small amount of drag from the bearing as you rotate the carrier. If the carrier turns with no drag at all, the pinion spacer thickness should be decreased by using a thinner spacer. If the carrier is hard to turn, the spacer thickness must be increased.



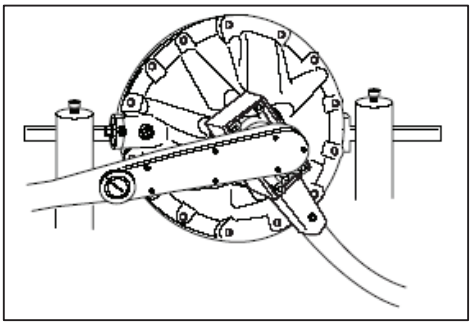
13. Remove the carrier from the press. Secure the carrier in a head stand.



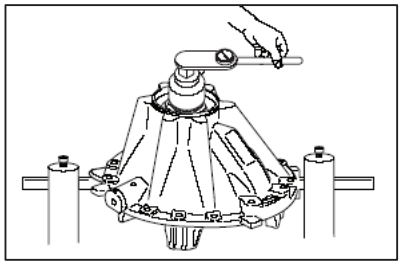
14. Install the drive yoke and pinion nut.



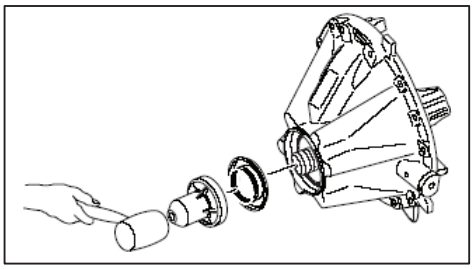
15. Torque the nut to corresponding torque. See torque chart.



16. Use a torque wrench and correct socket to check the rolling torque of the pinion. Read torque while rotating the assembly. Record the rotating torque, not the breakaway torque. Torque must be between in the range specified in the 2.03 – 5.64 Nm (18 to 50 lbs/inch). If the torque recorded is not within the specified torque, the pinion spacer must be changed. Repeat Steps 6-17.



17. Now remove the pinion nut and yoke and install the pinion seal. Use the suitable tooling for this operation. See "Service Kit" paragraph.



Dana Spicer strongly recommends using seal drivers when installing new seals. Use the proper driver to ensure that the seal is square and installed to the proper depth.

CAUTION: Oil seals can be easily damaged prior to installation. Use care when handling the new seal to prevent damage or contamination. Leave the seal in its package until installation. On new yokes, leave the protector on the yoke until it is installed on the shaft to prevent damage or contamination

18. Reinstall the yoke and pinion nut. Torque to corresponding torque. See torque chart.

CAUTION: Do not use the yoke if it has any damage on the seal surface (nicks or scratches).

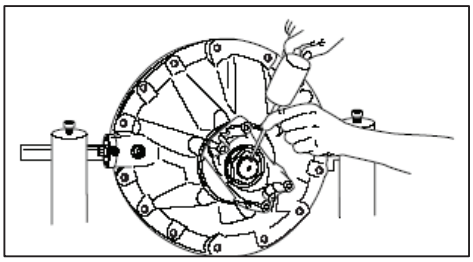
The surface of the yoke and the lips of the seal form a critical interface which retains the axle's lubricant while sealing the axle from outside contaminants. The condition of the yoke hub's surface is a very important factor in determining seal life.

Carefully inspect the seal surface area of the yoke hub for signs of wear and damage. Do not reuse the yoke if there is noticeable wear such as heavy grooving, beyond normal polishing from the seal lips.

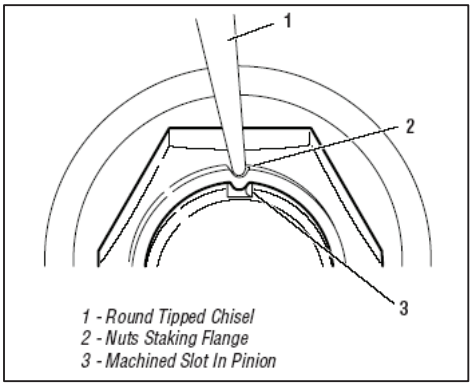
NOTE: Do not rework the yoke with abrasives such as emery paper or crocus cloth. Clean the surface of the yoke as necessary using chemical cleaners. Remove all trace of the chemicals from the yoke after cleaning.

Do not use wear sleeves. Wear sleeves increase the yoke hub surface diameter and cause premature seal wear and repeat seal failure.

19. Once the proper rolling torque is achieved, use a punch with a round tip to stake the pinion nuts flange into the machined slot in the pinion shaft. See diagram below.

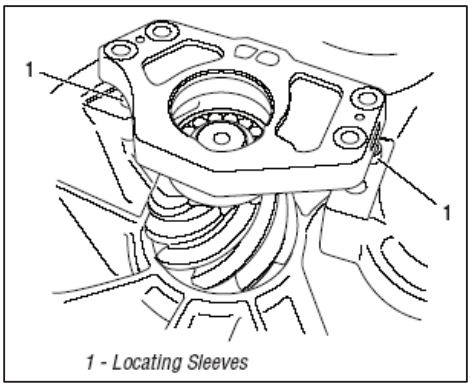


CAUTION: The stake must be deep enough to enter the machined slot of the pinion.



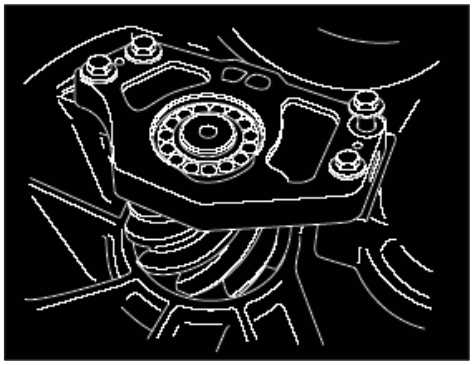
WARNING: Failure to stake the pinion nut properly may result in the nut coming loose during service. The pinion nut should never be reused, always replace with new.

20. If a pilot bearing web is used, line up the web to the dowell sleeves and tap in place with a rubber mallet.



1 - Locating Sleeves

21. Install capscrews and torque to the proper specifications. See the torque chart

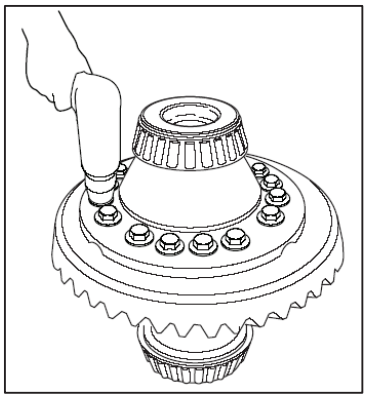


5. WHEEL DIFFERENTIAL

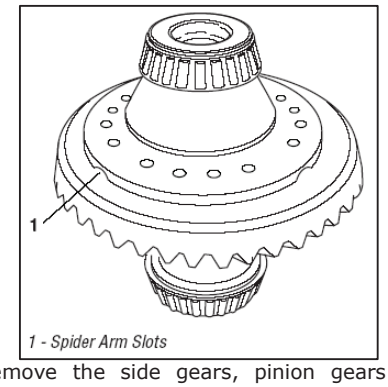
▪ Wheel Differential Disassembly –Carrier Assembly

IMPORTANT: During following procedure, place differential assembly on malleable surface to prevent damage when removing components.

1. Remove cap screws fastening ring gear to differential case.

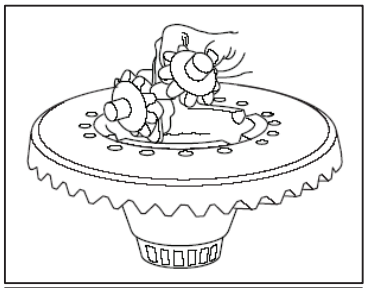


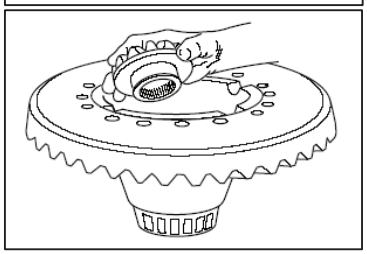
2. Remove the flange half differential case and bearing assembly. Use a screwdriver at the spider arm machined slots of the case to loosen the flange from the ring gear.



1 - Spider Arm Slots

3. Remove the side gears, pinion gears and differential spider from the plain half case.



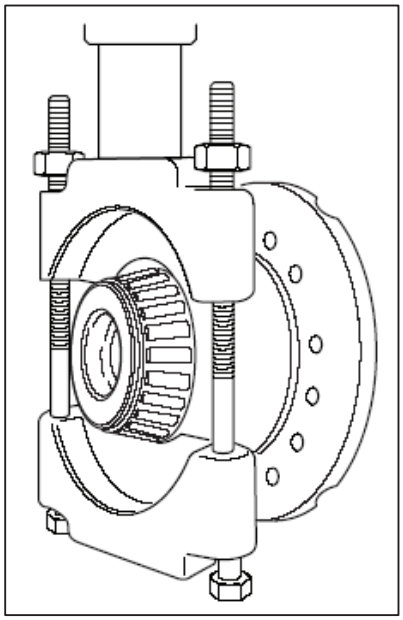


4. Place a block under the plain half, use a rubber mallet to remove the ring gear.

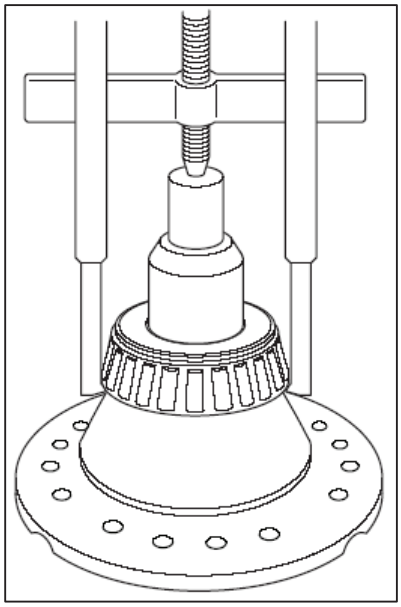
5. Remove the bearing cones from the case halves using suitable pullers

6. Remove the bearing cones from the plain and flange halves in two steps:

   a. Mount the puller vertically to split the bearing. This action will start the bearing moving off the differential case.



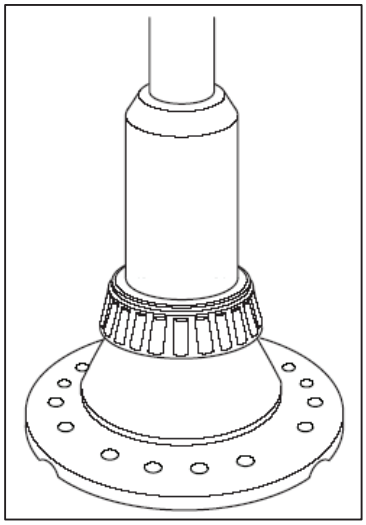
   b. Mount the puller horizontally to remove the cone.



▪ Wheel Differential Assembly – Carrier Assembly

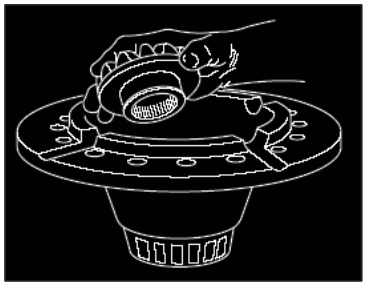
IMPORTANT: To prevent bearing damage, use suitable sleeve that only contacts the inner race of the cone. A used bearing race would be a suitable tool. This tool should have a slit cut if the ID is the same as the flange OD.

1. Press the new bearing cone on the plain half and flange half bearing boss using the proper press sleeve or bearing installation tool.

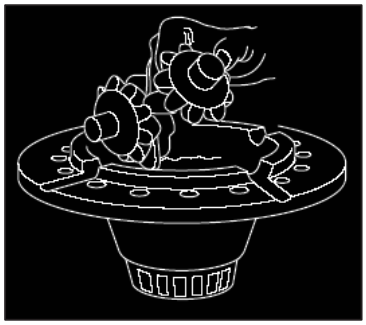


2. Place the plain half side of the differential case on a malleable surface.

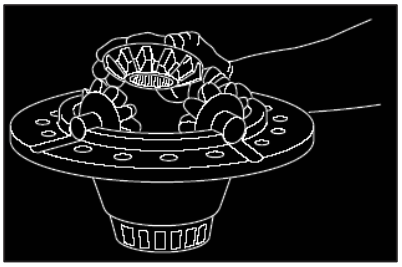
3. Install the side gear. Apply a thin coat of oil to the mating surface of the side gear and plain half.



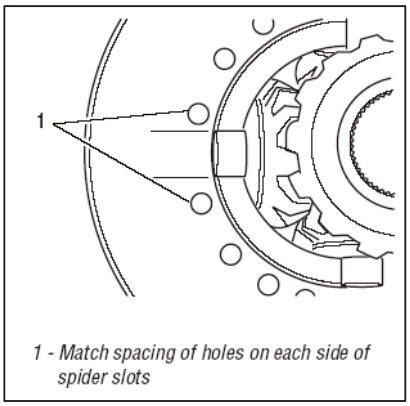
4. Assemble the pinion gears onto the differential spider. Apply a thin coat of oil to the mating surfaces of the pinion gears and differential spider. Install the differential nest on top of the side gear.



5. Install the flange half side gear. Apply a thin coat of oil to the mating surfaces

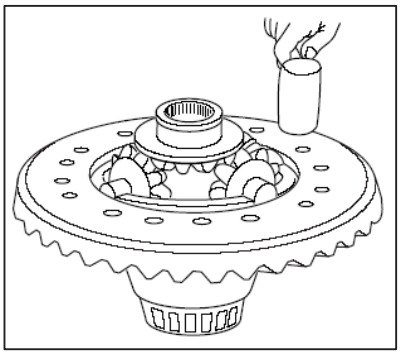


6. Install the ring gear. Align the capscrew holes.

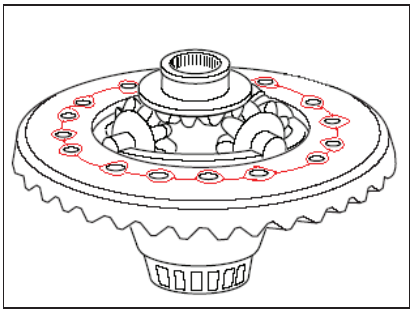


1 - Match spacing of holes on each side of spider slots

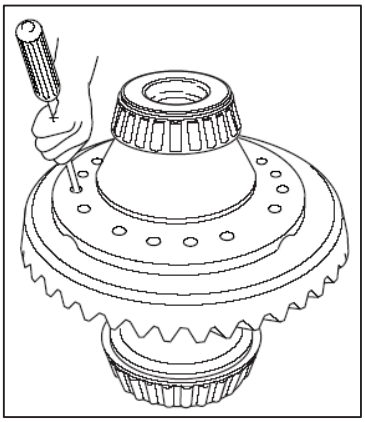
7. Use a rubber mallet to seat the ring gear to the plain half.



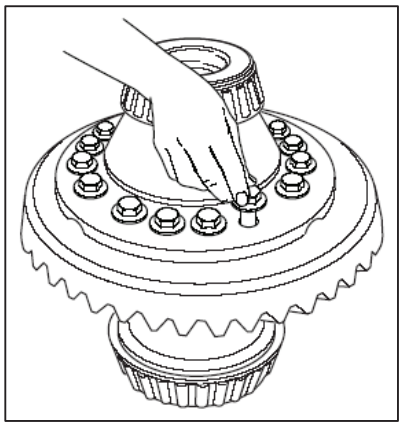
8. Apply Loctite#510 around the ring ring gear bolt junction.



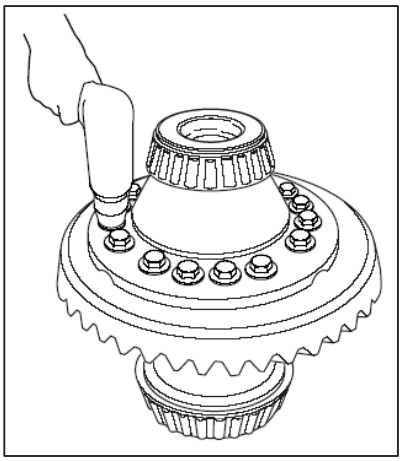
9. Install the flange half of the case. Align the capscrew holes.



10. Install the ring gear capscrew.



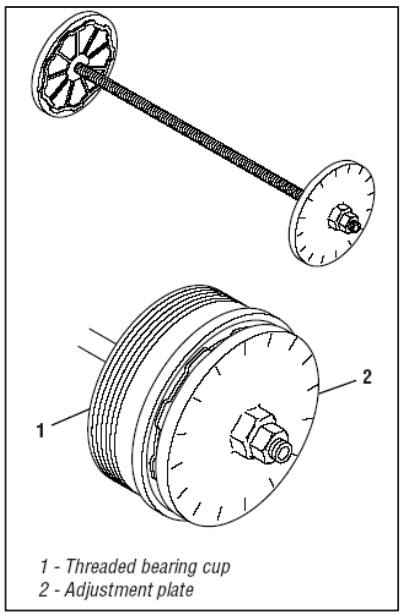
11. Tighten the ring gear capscrew with an impact gun and then use a torque wrench to torque to the proper specification. See the torque chart.



▪ Install Wheel Differential Assembly –Carrier Assembly

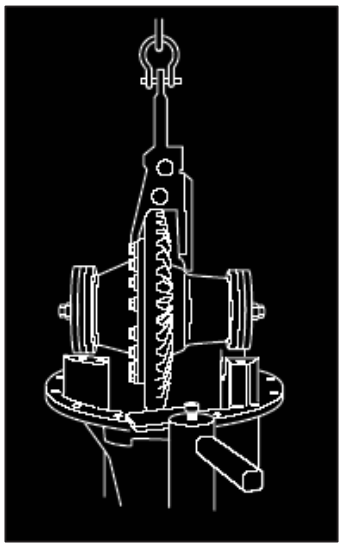
NOTE: To install the wheel differential assembly, properly setup the gear pattern and set the differential bearing preload. This will require the use of the following Dana tools or equivalent. These tools will allow you to align the bearing adjuster assembly to the carrier. This tool (part number 130971) will also gauge the adjustment for the differential bearing preload and assist in setting the backlash. Below you will find detailed instructions explaining each procedure.

1. The bearing adjustment tool is made up of a threaded rod, two nuts, two washers and two adjustment plates. Fit one adjustment plate to the plain half threaded cup. Fit the other adjustment plate to the flange half cup. The adjustment rings will fit into slots of the threaded bearing cups stamped adjustment ring.



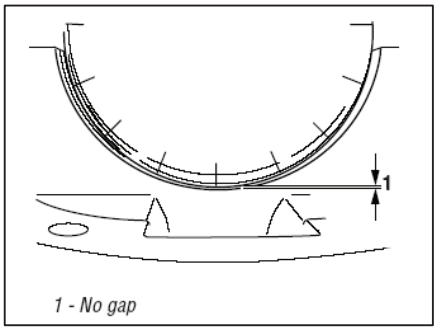
1 - Threaded bearing cup
2 - Adjustment plate

2. Connect the adjuster plates using the threaded rod, washers and nuts. Tighten the nuts on the rod to hold the threaded cups in place. Carefully lower the wheel differential and ring gear assembly into the carrier.



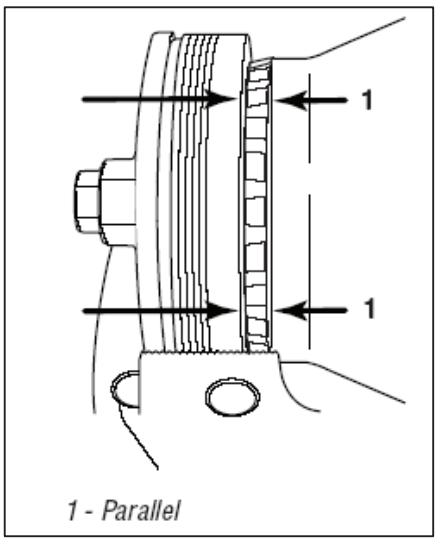
NOTE: There are two ways to make sure that the threaded cups are seated properly (see diagrams). If there is a misalignment, reinstall the differential assembly at a slightly different angle.

3. Make sure there is no gap between the carrier threads and the cup threads.



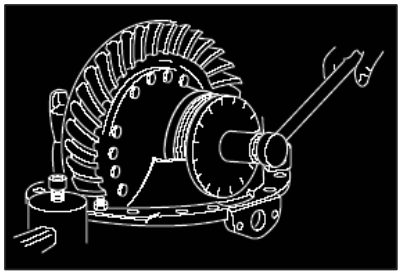
1 - No gap

4. Make sure that bearings cage is parallel to the edge of the threaded cup.

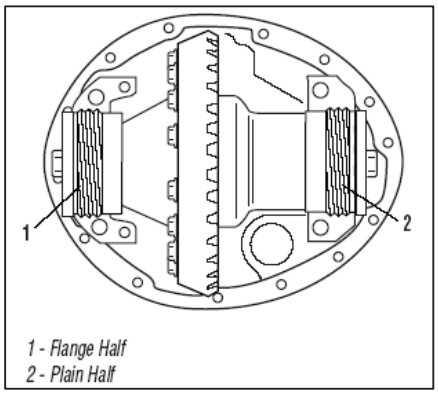


1 - Parallel

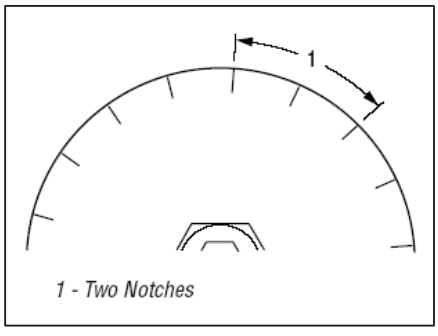
5. Use a ratchet or breaker bar and a 1 ¼" deep wall socket to turn the flange half threaded bearing cup in until the ring gear contacts the pinion (zero backlash). Back the cup out two notches of the adjustment plate.



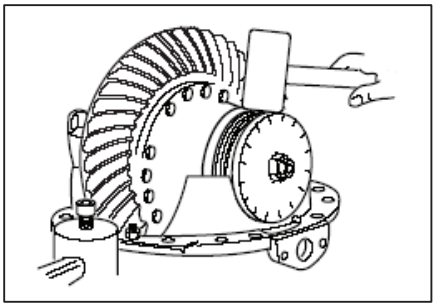
6. Turn the plain half adjuster ring until there is zero preload on the bearings. This is done by turning the adjuster plate clockwise until you feel the threaded cup gain resistance. The threaded bearing cup should only be slightly snugged to achieve a zero preload condition.



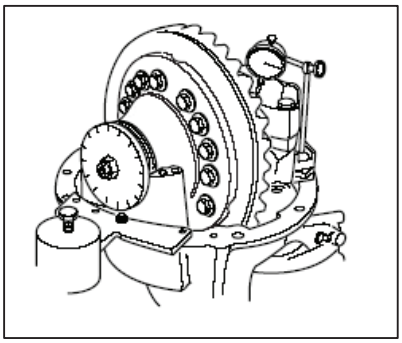
7. Obtain two notches of preload by tightening the plain half adjustment ring two notches. Start with the notch at the top, count two notches counter-clockwise on the adjuster ring, turn the adjuster ring so that the notch is facing straight up.



8. Use a rubber mallet to fully seat the threaded bearing cups.



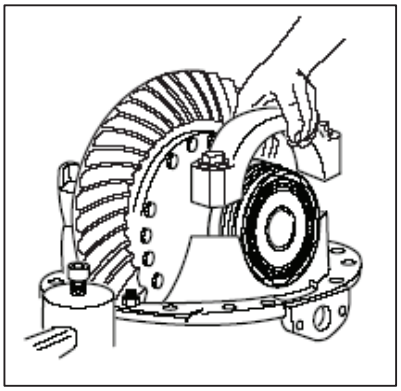
9. With a dial indicator, check the ring gear and pinion backlash. Set the backlash from 0.20 – 0.46 mm (0.008" to 0.018") for lapped gears and from 0.30 – 0.40 mm (0.012" to 0.016") for ground gears. This will give sufficient tolerance to adjust the contact pattern, if necessary.



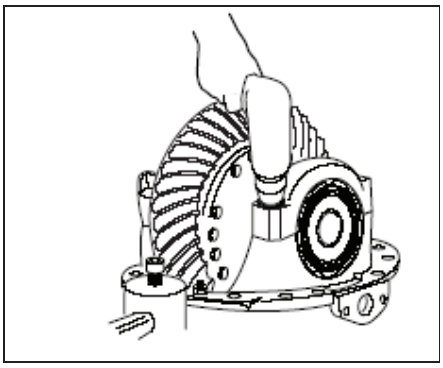
10. Remove the adjuster plates and threaded rod assembly.

11. Apply Loctite#540 to the threaded cups before installing the differential bearing caps. Start applying an 1/8" (3mm) wide bead around one half of the bearing cup centred in the threaded section

12. Install the carrier differential bearing caps and capscrews. Make certain there is no gap between the carrier cap and the carrier surface.



13. Use an impact gun to snug all carrier differential bearing cap fasteners.



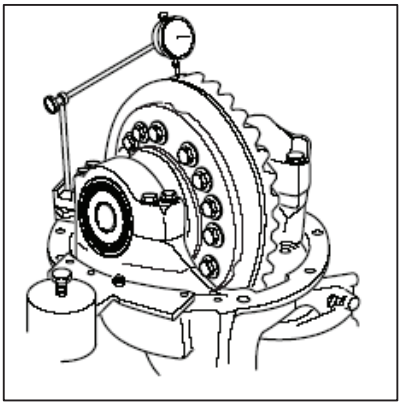
14. Recheck the backlash. For new gearing, the backlash should be between 0.20 and 0.46 mm (0.008" - 0.018").

NOTE: For used gearing, the backlash should be reset to what it was at the time of disassembly.

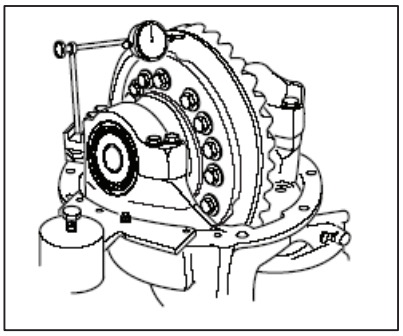
NOTE: If you have too much backlash, move the ring gear closer to the pinion. Count the number of notches you back off the plain half threaded cup. Each notch equals about 0.003" (0.08 mm) of backlash.

IMPORTANT: In order to maintain the differential bearing preload, you will need to turn the flange half threaded cup the same amount in the same direction. If you need more backlash, reverse the procedure.

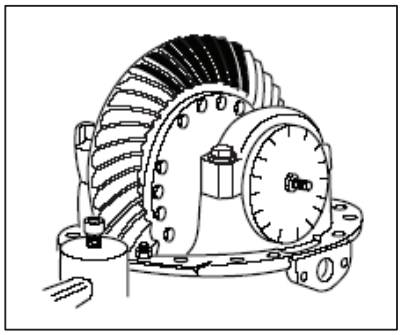
15. Measure the ring gear total radial runout. Indicator reading should not exceed 0.010" (0.25 mm).



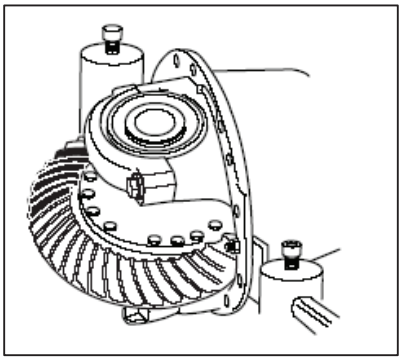
16. Measure the ring gear total backface runout. Indicator reading should not exceed 0.010" (0.25 mm).



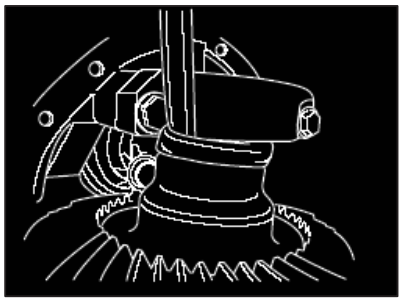
17. Check the ring gear tooth pattern. Paint 5 or 6 ring gear teeth 180 degrees apart on the ring gear.



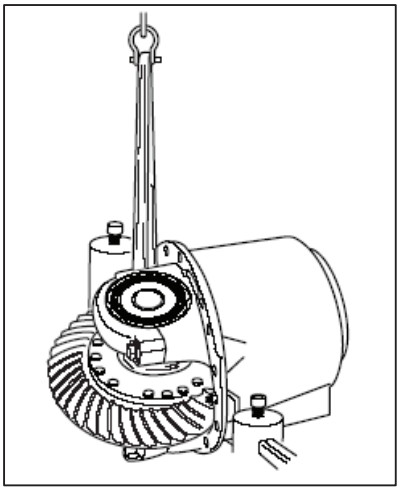
18. With the carrier mounted in a head stand, roll the carrier in its side.



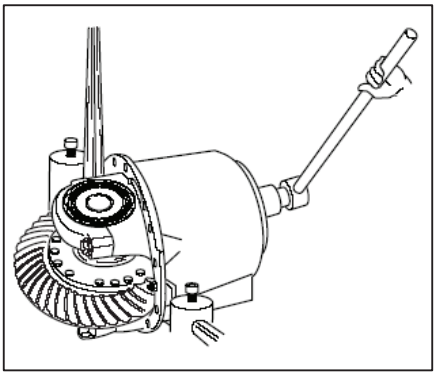
19. Make a sling out of a strap and position around the plain half of the wheel differential.



20. Connect the end of the strap to a hoist and apply pressure to the sling

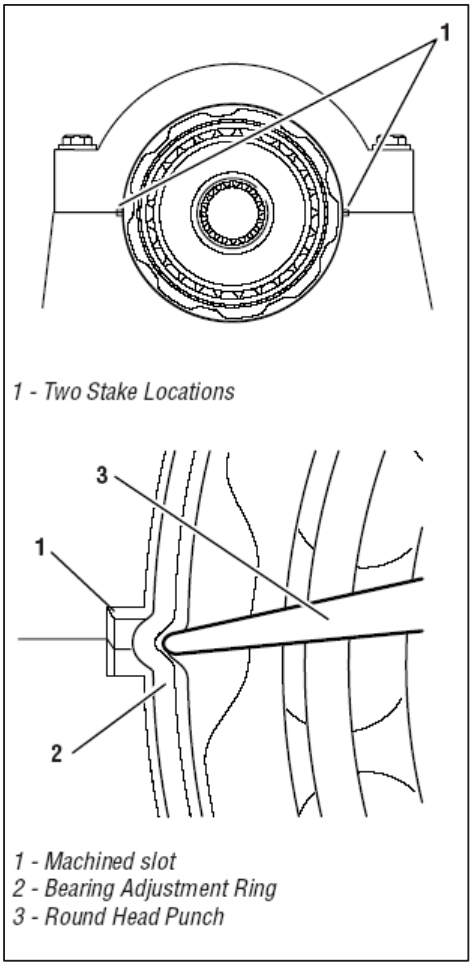


21. Use the correct socket and a breaker bar to rotate the differential. The differential should be hard to turn. Rotate the pinion until the ring gear rotates 3 or 4 times in both directions. **See next pages for descriptions of correct pattern position for new and used gearing.**



22. When contact pattern and backlash are correct. Using a torque wrench tighten both carrier differential bearing caps to the specified torque. See the torque chart. Recheck backlash and contact pattern.

23. Use a punch with a round head to stake the threaded bearing cups in place. Stake the outer edge of the bearing adjustment ring into the machined slots in the carrier bearing bore on both sides. Must be staked at two locations. Rotate cup if necessary to provide surfaces for staking.



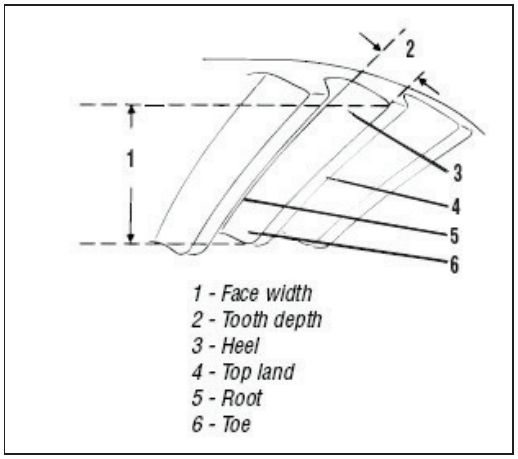
1 - Two Stake Locations

1 - Machined slot
2 - Bearing Adjustment Ring
3 - Round Head Punch

6. RING GEAR

▪ Adjust Ring And Pinion Tooth Contact Pattern

NOTE: Rear axle gearing is shown in the following instructions.



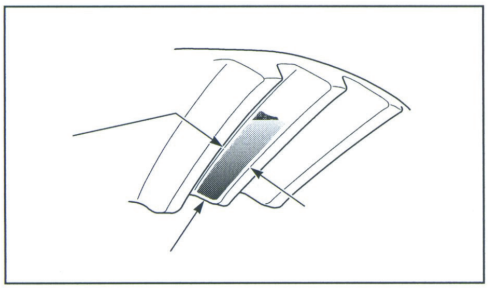
1.- Identify if new or used gearings

2.- Check tooth contact pattern (new or used gearings)

▪ New Gearing - Correct Pattern

Paint six ring gear teeth 180° apart with marking compound and roll the gear to obtain a contact pattern. The correct pattern is slightly below center on the ring gear tooth with lengthwise contact up off the toe. The length of the pattern in an unloaded condition is approximately one-half to two-thirds of the ring gear tooth in most models and ratios.

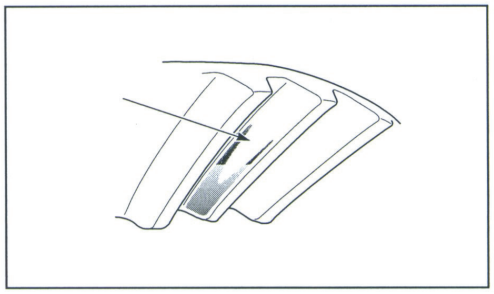
The pattern could vary in length and should cover 1/2 tooth or more (face width). The pattern should be evenly centered between tooth top land and root and should be up off the tooth toe.



▪ Used Gearing - Correct Pattern

Used gearing will not usually display the square, even contact pattern found in new gear sets. The gear will normally have a "pocket" at the heal end of the gear tooth. The more use a gear has had, the more the line becomes the dominant characteristic of the pattern.

Adjust used gear sets to display the same contact pattern observed before disassembly. A correct pattern is up off the toe and centers evenly along the face width between the top land and root. Otherwise, the length and shape of the pattern are highly variable and is considered acceptable as long as it does not run off the tooth at any point.



1. Pattern along the face width could be longer.

▪ Adjust Contact Pattern

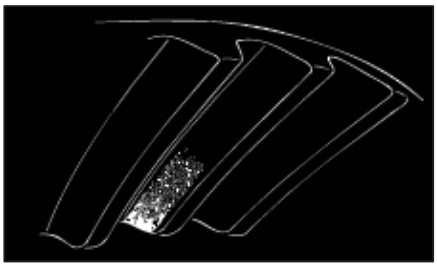
If necessary, adjust the contact pattern by moving the ring gear.

- Ring gear position controls the backlash. This adjustment also moves the contact pattern along the face width of the gear tooth.

▪ Adjust Ring Gear Position (Backlash)

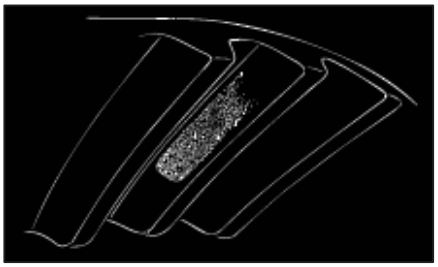
If the gear pattern shows incorrect face width contact, change backlash by adjusting the ring gear.

If the pattern is too close to the edge of the tooth toe, move the ring gear away from the pinion to increase backlash.



1. Loosen the bearing adjuster on the flange side of the ring gear several notches.
2. Tighten the opposite adjuster one notch
3. Return to adjuster on flange side of ring gear and tighten adjuster until it contacts the bearing cup.
4. Continue tightening the same adjuster two or three notches and recheck backlash.

If the pattern is concentrated at the heel (too far up the tooth), move the ring gear toward the pinion to decrease backlash.



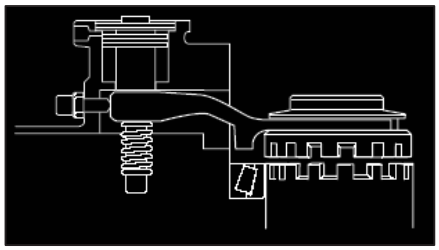
1. Loosen the bearing adjuster on the teeth side of the ring gear several notches.
2. Tighten the opposite adjuster one notch
3. Return to adjuster on teeth side of ring gear and tighten adjuster until it contacts the bearing cup.
4. Continue tightening the same adjuster two or three notches and recheck backlash.

7. WHEEL DIFFERENTIAL LOCK

▪ Install and Adjust Wheel Differential Lock

NOTE: With differential carrier completely assembled and adjusted, install differential lock as follows:

1. If shift fork and sliding clutch are disassembled, engage fork with the clutch hub and install roll pin in the fork leg. See illustration below for fork mounting position on clutch.
2. Position compression spring, shift fork and clutch in shift opening of the carrier. Align pilot hole of shift fork with the pilot hole of carrier
3. Install pushrod through shift fork, compression spring and carrier pilot hole



4. Lubricate piston and o-ring with Lubriplate No. 110. Install shift piston assembly into cylinder. Position piston with small diameter hub toward closed end of cylinder.
5. Install piston cover o-ring.
6. Install piston cover and tighten according with torque chart
7. Install selector switch and and tighten according with torque chart
8. Check selector switch operation. Check switch electrically with an ohm meter. Switch should be closed when clutches are engaged and open when disengaged.

Theory of Operation

The Dana Wheel Differential Lock is an optional feature for Dana Axles. In operation, it positively locks the wheel differential, to provide improved traction under adverse road conditions.

The differential lock is driver-controlled through an electric switch or air valve mounted in the cab. The locking mechanism is air-operated to engage a mechanical clutch and lock the wheel differential. It is spring-operated to disengage the lock and permit the wheel differential to function normally.

The wheel differential lock consists of three major assemblies:

• **Shift Cylinder Assembly**: Operates a shift fork and push rod assembly.

• **Shift Fork and Push Rod Assembly**: Engages and disengages the differential lock curvic clutch assembly.

• **Curvic Clutch Assembly**: Consists of a sliding clutch splined to an axle shaft and a fixed clutch which is splined to the differential case hub.

The differential lock also includes a selector switch (electric) which senses clutch engagement and sends an electrical signal to a cab mounted indicator light (or an audible signal device).

Differential Lock Engaged

Air pressure applied to the shift cylinder moves the piston, push rod, shift fork and the sliding curvic clutch engages the fixed curvic clutch. The sliding clutch is splined to the axle shaft. The fixed clutch is splined to the differential case hub. Engaging the two clutches locks the wheel differential thus preventing wheel differential action.

Differential Lock Disengaged

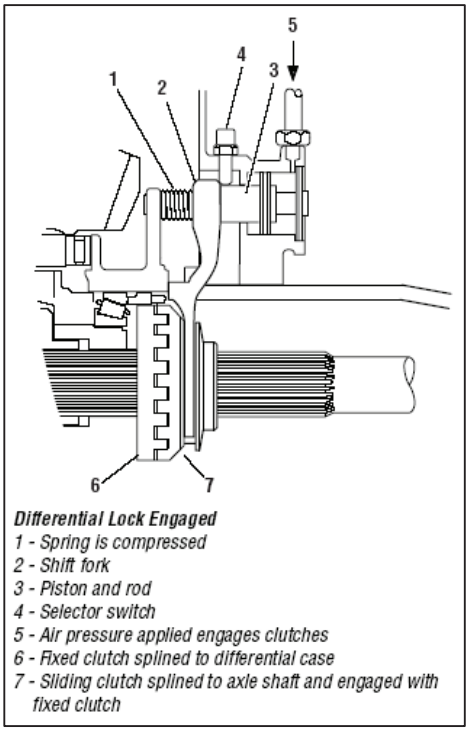
When air pressure at the shift cylinder is released, a compression spring (mounted on the push rod) moves the push rod, shift fork and sliding clutch as an assembly. The sliding clutch moves out of engagement with the fixed clutch. The wheel differential is unlocked and operates normally.

Differential Lock Engagement Indicator

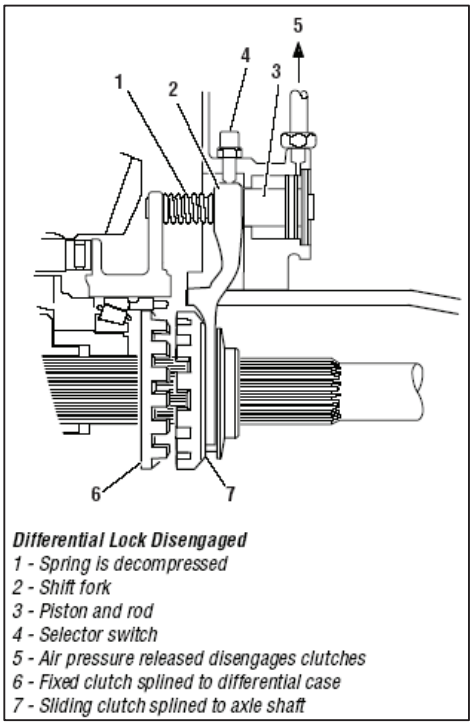
Differential lock engagement is detected by a switch (electric) mounted on the differential carrier.

When the shift fork moves to engage the differential lock, the push rod actuator moves away from the switch, allows the switch to close and send an electrical signal to turn on a cabmounted indicator light (or an audible signal).

When the shift fork moves to disengage the differential lock, the compression spring also moves the push rod actuator to contact the switch. The switch is opened and turns off the cab-mounted indicator light (or the audible signal).



Differential Lock Engaged
1 - Spring is compressed
2 - Shift fork
3 - Piston and rod
4 - Selector switch
5 - Air pressure applied engages clutches
6 - Fixed clutch splined to differential case
7 - Sliding clutch splined to axle shaft and engaged with fixed clutch



Differential Lock Disengaged
1 - Spring is decompressed
2 - Shift fork
3 - Piston and rod
4 - Selector switch
5 - Air pressure released disengages clutches
6 - Fixed clutch splined to differential case
7 - Sliding clutch splined to axle shaft

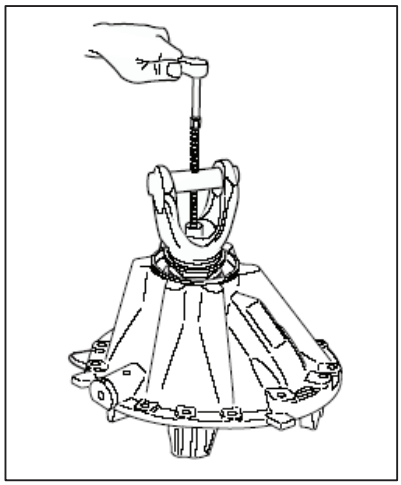
8. SEAL - REPLACE

▪ Replace Seal

Dana strongly recommends using seal drivers when installing new seals. Use the proper driver to make sure that the seal is square and installed to the proper depth.

CAUTION: Oil seals can be easily damaged prior to installation. Use care when handling the new seal to prevent damage or contamination. Leave the seal in its package until installation. On new yokes, leave the protector on the yoke until it is installed on the shaft to prevent damage or contamination.

1. Remove the old yoke using appropriate tool. A yoke puller tool may be made from the centre section of most gear puller tools, or may be purchased from your local tool distributor.



2. Remove seal. Use care when removing the old seal to prevent damage to the housing seal bore.

3. Inspect the seal bore area for any damage (nicks, gouges, corrosion). Carefully remove any slight damage with a crocus cloth. Clean the bore area to remove any loose debris.

4. Remove the new seal from its package and install with the proper driver:

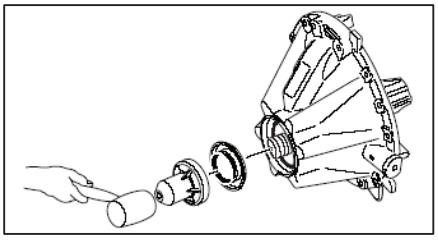
   R - Pinion Driver - 210749
   R - Pinion Insert – 131472

WARNING: Due to the resiliency of the plastic driver, hammer rebound may occur when the seal is seated. Keep clear of the hammer rebound path!

5. Handle the seal by its outside diameter avoiding any contact with the seal lips. During installation, use the proper driver to make sure that the seal is mounted properly.

6. Use a rubber mallet to drive the seal tool in until the flange bottoms on the housing cover bore face. The flange will locate the seal at the proper depth.

7. Apply Loctite#518 in seal outer diameter.



Guidelines for Reusing Yoke

CAUTION: Do not use the yoke if it has any damage on the seal surface (nicks or scratches).

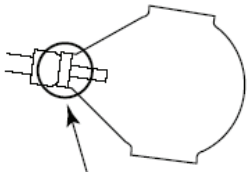
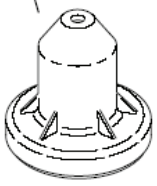
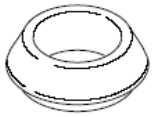
The surface of the yoke and the lips of the seal form a critical interface which retains the axle's lubricant while sealing the axle from outside contaminants. The condition of the yoke hub's surface is a very important factor in determining seal life.

Carefully inspect the seal surface area of the yoke hub for signs of wear and damage. Do not reuse the yoke if there is noticeable wear, such as heavy grooving, beyond normal polishing from the seal lips.

NOTE: Do not rework the yoke with abrasives such as emery paper or crocus cloth. Clean the surface of the yoke as necessary using chemical cleaners. Remove all trace of the chemicals from the yoke after cleaning.

CAUTION: Do not use wear sleeves. Wear sleeves increase the yoke hub surface diameter and cause premature seal wear and repeat seal failure.

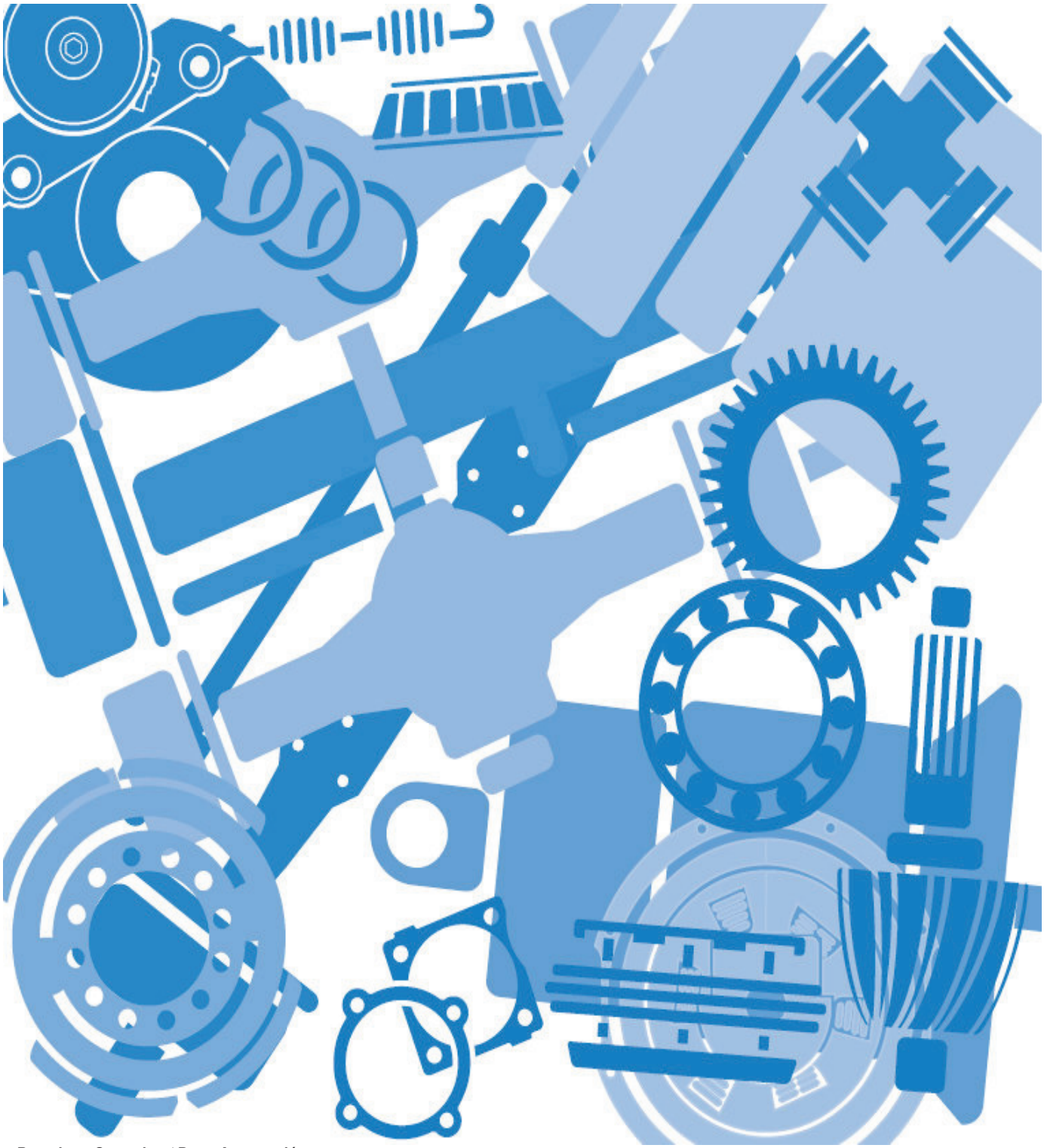
- **Service Kit**

	R-Pinion
Location	
Tool	 210749  131472

TORQUE CHART

FASTENER TORQUE SPECIFICATIONS

Location	Size	Lbs. Ft.	Nm
WHEEL DIFFERENTIAL AND GEARING			
Drive Pinion Nut	M48 x 1.5	900 ± 100	1220 ± 135
Ring Gear, Diff. Case Bolts	M20 x 1.5 x 55	500 ± 25	675 ± 30
CARRIER			
Carrier Diff. Bearing Cap	M18 x 1.5 x 85	265 ± 15	360 ± 20
Carrier to Housing Capscrews	M16 x 1.5 x 85	250 ± 15	335 ± 20
	M16 x 1.5 x 55	250 ± 15	335 ± 20
Carrier to Housing Nuts	M16 x 1.5	250 ± 15	335 ± 20
Pilot Bearing Web	M16 x 1.5 x 70	210 ± 10	285 ± 15
Differential Lock Switch	M14 x 1.5	11 ± 2	15 ± 3
Differential Lock End Cap	2.375 - 16 UN - 2A	65 ± 10	85 ± 15



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