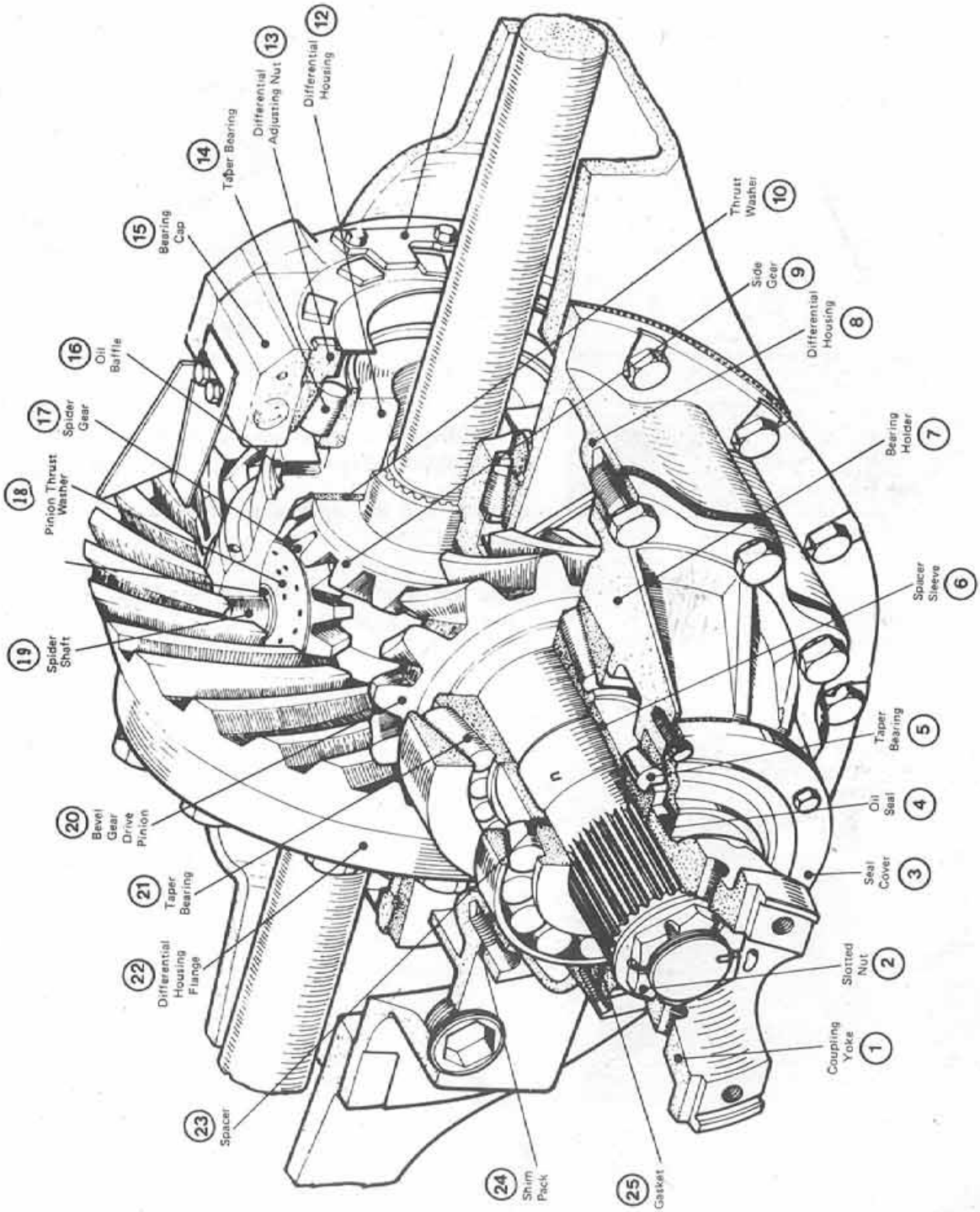
STEIGER/RABA AXLE
Differential Cutaway Illustration



Disassembly Of Differential Section

Step 16 Drain all oil from axle as outlined at beginning of Hub disassembly pp. CC-7.

IMPORTANT: *If breakage of metal particles are found in differential area drain all oil from entire axle. Flush with fuel oil and remove all contamination. Fill with fresh oil.*

Follow steps 1 through 5 to disassemble hubs and pull left and right axle shafts from differential section.

Figure 16

Step 17 Remove bolts from differential housing holder and axle housing. Place chain lift in place in threaded holes on opposite sides of the differential housing.

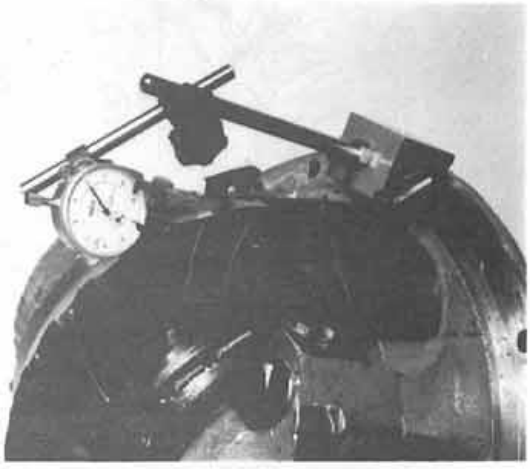


Figure 17

NOTE: *Check the backlash of the ring gear and pinion before disassembly of the differential assembly. Backlash should be reset the same if the original gears are replaced.* [*See figure 17*]

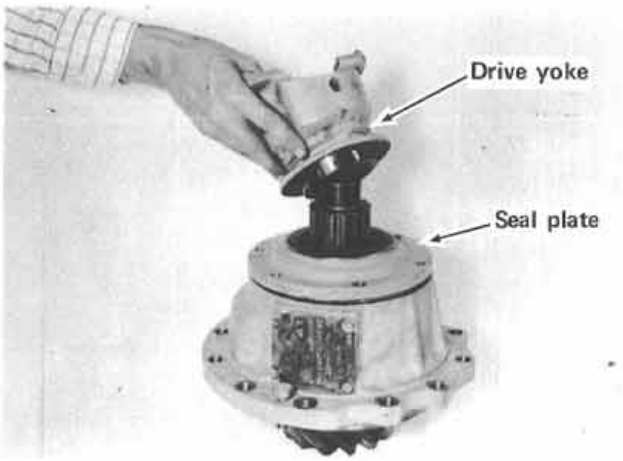


Figure 18

Step 18 Remove the cotter pin from the pinion shaft nut. Remove the castle nut from the pinion shaft.

Step 19 Pull the drive yoke from pinion shaft. (see figure 18)

Step 20 Remove the seal plate from the pinion shaft. (see figure 18)

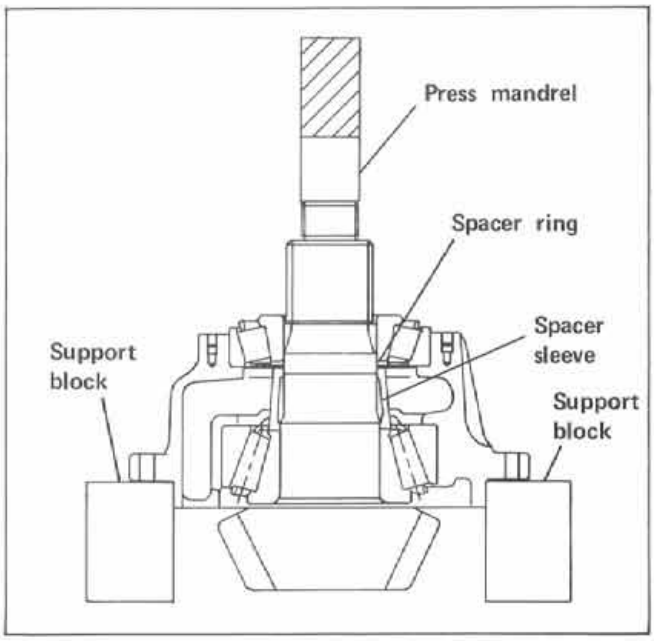


Figure 19

Step 21 Press out the pinion shaft from the bearing holder.

NOTE: *Keep the spacer ring and spacer sleeve in one assembly for reassembly. Use the same spacer ring and spacer sleeve for trial reassembly. After trial test of preload on the pinion bearings change the spacer sleeves as necessary to set correct preload.* [*See steps 38 to 41, differential reassembly.*]

Step 22 Press out the bearing cups from the bearing holder. This is necessary only when new bearings are being installed.

NOTE: *If pinion bevel gear is damaged or worn, it must be replaced with a new ring and pinion gear. Both gears must have the same "wear in" pattern.*

Disassembly Of Ring Gear/ Differential Housing

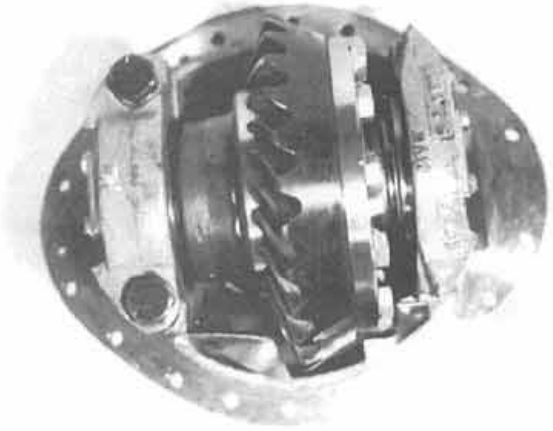


Figure 20

NOTE: *Mark the adjusting nuts at each side of the differential for position. This is necessary to position the differential upon reassembly, if the same gear set is being reused.* [*See figure 21*].

Step 23 Remove the lock plate from each adjuster nut and mark the nut and housing with a center punch or chisel for position. (see figure 20)

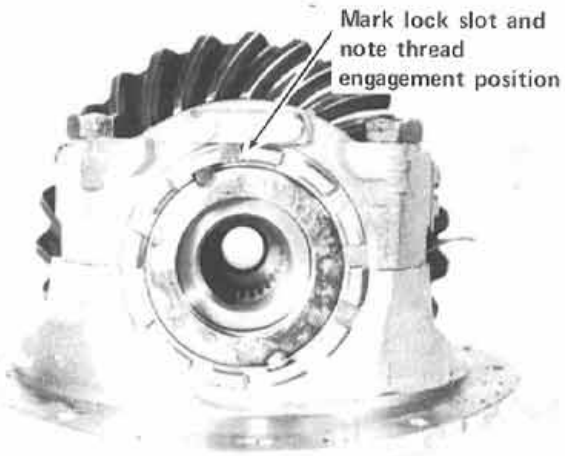


Figure 21

Step 24 Remove the carrier cap and bearing cup.

Step 25 Lift the differential housing from the carrier housing.

NOTE: Before disassembly of the differential housing, mark the halves with a center punch or chisel for identical realignment upon reassembly. Mark end of spider shaft to case also. [*Case halves are numbered, numbers may be used as reference.*]

Step 26 Remove the 12mm bolts from the ring gear side of differential housing and separate the differential housing.

Step 27 Remove side gear and spacer. Remove the spider gear assembly. Keep all thrust washers and spider gears on the same shaft ends as they originally are when disassembled.

NOTE: *The side gears have a thrust washer on the axle side. Be sure to replace the same washer or a washer of correct thickness to remove play from cluster gear assembly. These washers are available in thickness of 4.6 mm to 5.3 mm in 1 mm steps. Follow step 30 of reassembly procedure.*

Step 28 Remove 18 mm bolts from ring gear and housing flange to remove ring gear.

NOTE: *Ring gear and drive pinion must be replaced in a set to obtain correct wear pattern.*

Step 29 Bearings may be pulled from differential housing with a bearing puller of correct dimension.

Assembly

After each part has been inspected for damage or wear and all parts have been throughly cleaned reassemble all component parts using the following proceedure.

Step 30 Reassemble the spider gears in the differential case.

NOTE: *The side gear thrust washers will determine the side play within the differential. Part D of this step explains thrust washer tolerance.*

A. Place thrustwasher and side gear into differential case. (side gear tolerance)

B. Assemble spider, pinion gears and pinion thrust spacers and place in differential case.

C. Place thrustwasher and side gear in place on the spider-pinion gear assembly and place the other half of the differential case in place.

D. Secure the case together with four bolts placed at 90 degree intervals. If the side gear (s) turn without play, clearance is correct. If gear does not turn or if there is play in the gear, the thrust spacers must be changed behind the side gears. They range in size from 4.6 mm to 5.3 mm in steps of 0.1 mm.

E. When the side gears turn without play, spacers are correct. Assemble the differential and tighten to 72 ft. lbs. with a torque wrench.

Step 31 Assemble the oil baffle to the differential housing. Secure it with a center punch by placing a punch mark in four places 90 degrees apart. This will keep the baffle from turning.

Step 32 Bolt the ring gear to the differential and tighten the bolts to 220-250 ft. lbs. with a torque wrench.

NOTE: *If a new ring gear is installed the bevel pinion gear must also be replaced. Ring and pinion gears are replaced in matched sets to obtain correct run-in wear pattern. See Step 45 for bevel pinion gear installation and correct backlash.*

Step 33 If bearings are replaced, press a new bearing cup into the bearing seat on full cast side of the differential drive housing.

Step 34 Press bearings on the differential housing bearing seat.

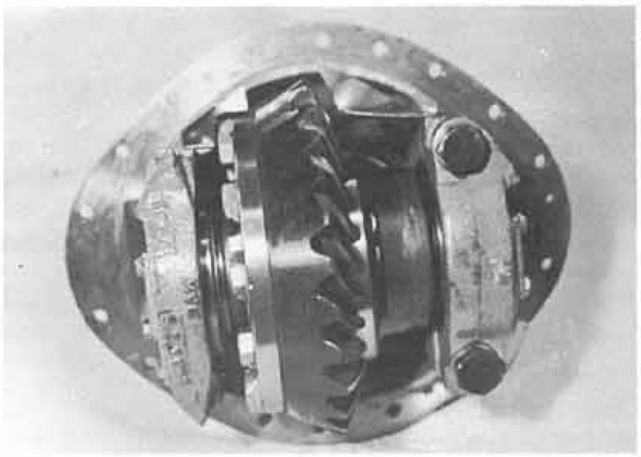


Figure 22

Step 35 Seat the ring gear differential assembly into the differential drive housing and prepare to set side play and bearing prelaod. Place the bearing cup, and bearing cap in place and fasten finger tight with both bolts. Turn the side adjustment nut into the bearing till finger tight. Reset both side adjustment nuts as close to their original position as possible. Adjust the side play out of the differential assembly.

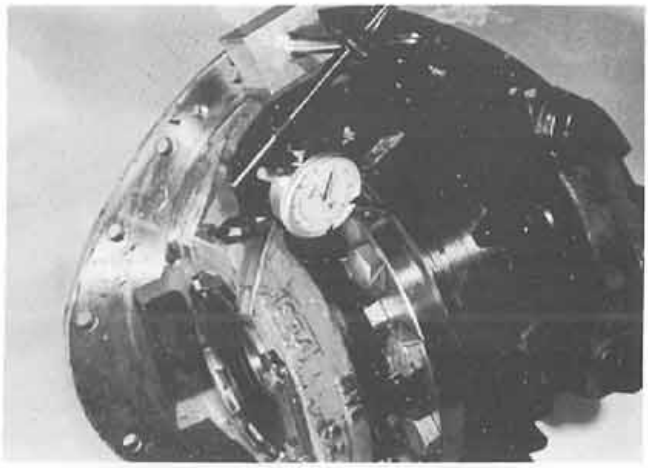


Figure 23

Step 36 Use dial indicator check back face of ring gear. Rotate at least one full turn. Runout must not exceed .003 total indicator reading. If runout is excessive, remove assembly and check for burrs or dirt under mounting surface of ring gear. Reassemble and recheck.

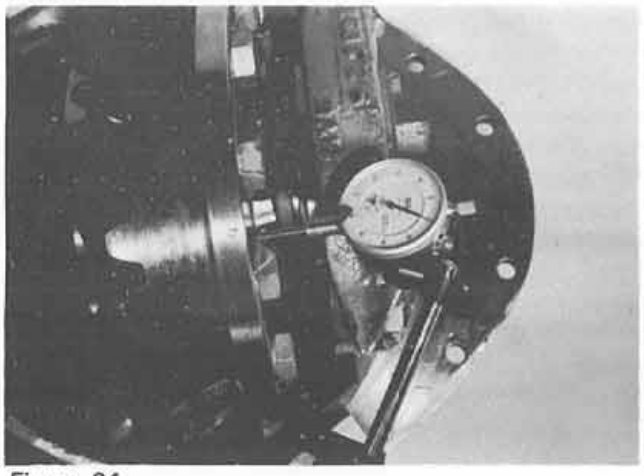


Figure 24

Step 37 With the dial indicator in place on the side of the ring gear, adjust the nuts until the differential assembly has approximately .010-.015 side play. Then adjust to a point where there is 0 side play.

NOTE: *Furthur lateral adjustment of the differential will require that one adjusting nut be loosened the same amount that the opposite nut is to be tightened. This will maintain 0 side play in the bearing[s].*

The bearing on the pinion shaft must be set at the correct preload. The preload is correct when the bearings turn when exerting a torque of 86-172 in.lbs. Step 39 and 40 will explain how this is done.

Assembly Of The Pinion Gear Shaft

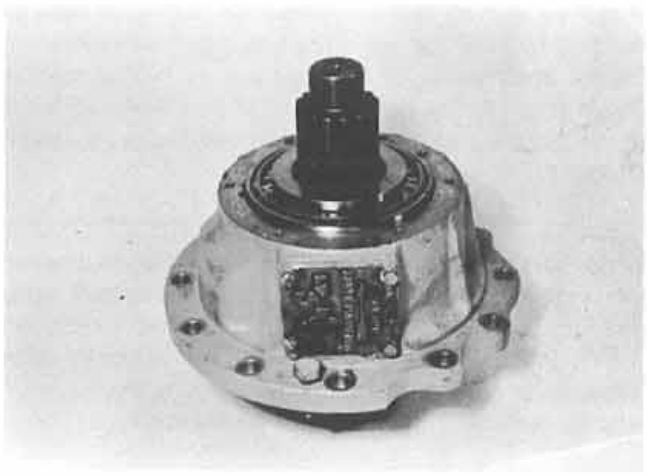


Figure 25

Step 38 Press the bearing cups into the bearing case.

NOTE: *It will be easier and save time if a fitting shaft is used to set preload rather than the pinion shaft. Machine a shaft that will allow the bearing to slide on and off without the use of a press. Machine a discarded pinion shaft down till bearings can be slid on and off with ease. When correct preload has been adjusted, place bearings on the shaft to be used and apply correct torque.*

Step 39 Place rear bearing on pinion shaft (or fitting shaft) and place the original spacer and shim washers on shaft. Place shaft in bearing case, install outer bearing and nut. Tighten the nut and check the tightness or loosness of the bearing. Change shim washers till the approximate preload is achieved (shaft should turn by hand but with resistance.)

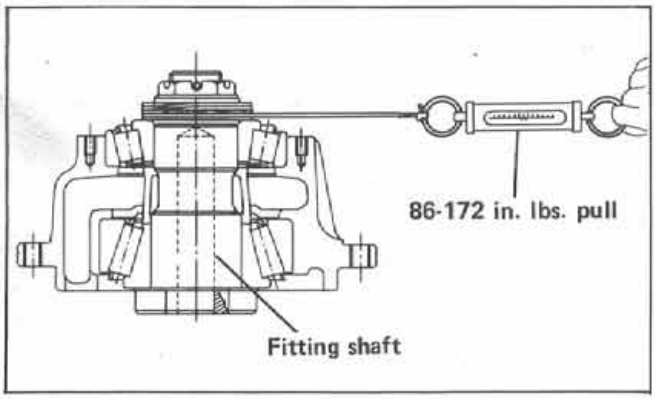


Figure 26

Step 40 To check correct preload, fasten a 36" string or flexible wire to the pinion shaft nut and wind it around the washer behind the nut. Connect a spring scale and rotate the shaft. Correct preload will require a pull of 5-9 lbs.

Step 41 When correct bearing preload is set, tighten the lock nut to 400-435 ft. lbs. with a torque wrench, after completing Step 42 and 43.

Step 42 Place a new seal in the pinion shaft seal plate and install.

Step 43 Press yoke on pinion shaft.

Step 44 Place pinion bearing holder into differ-housing holder and tighten the hexagon cap screws to 87-101 ft. lbs. with a torque wrench.

Reassembly Of Differential Section

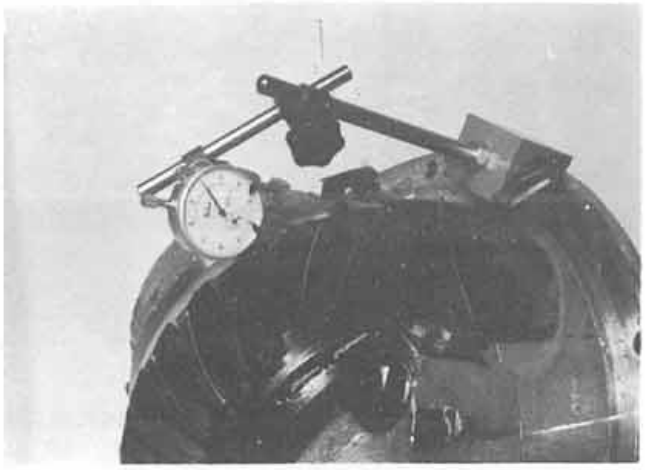


Figure 27

Step 45 Use a dial indicator to check backlash between ring gear and pinion shaft gear. Backlash is adjusted by moving ring gear toward or away from pinion shaft gear. Move ring gear by loosening one adjusting nut and tightening opposit lock nut. When loosening one lock nut and tightening opposite, move each lock nut same distance so that bearing adjustment made in previous paragraph is not disturbed. Adjust position until gear backlash is between .007" and .020" if new gear set is used, or adjust to backlash noted at disassembly for old gears.

Step 46 Check ring and pinion gear for proper tooth contact. Paint ring gear with a mixture of red lead and linseed oil. When ring and pinion gears are rotated, the red lead is squeezed away by the contact of the teeth, leaving bear areas the exact size, shape and location of the contacts. As a rule, painting about 10 or 12 teeth is sufficient for checking purposes.

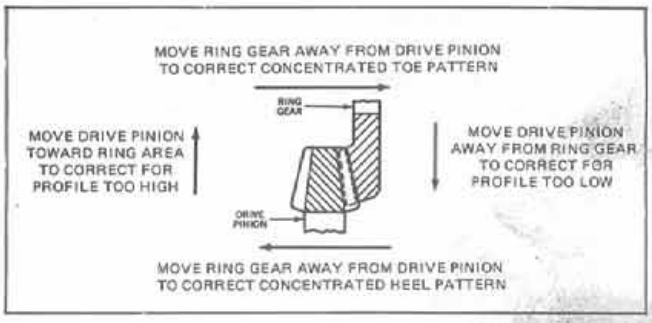


Figure 28

Adjust to obtain correct tooth contact on drive side of teeth.

NOTE: *Sharper impressions may be obtained by applying a small amount of resistance to the ring gear with a flat steel bar and using a wrench to rotate the pinion. Gears should be rotated, under slight load, until ring gear has turned at least one revolution in both directions.*

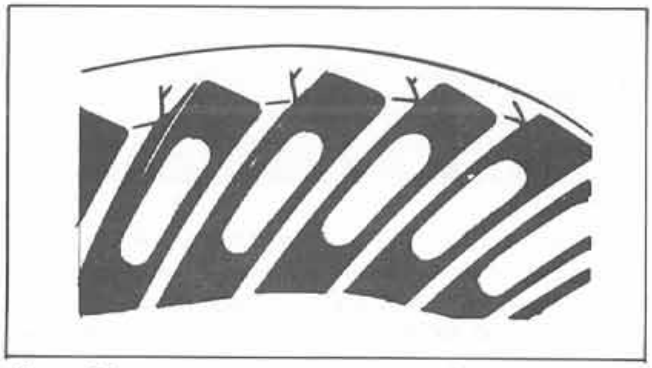


Figure 29

Step 47 Check tooth contact pattern on drive side (convex side) of ring gear teeth. Coast side will automatically correct when drive side pattern is correct. If proper tooth contact pattern is not obtained, readjust backlash or add or subtract from shim pack between pinion bearing, case flange and differential housing. Addition of or subtraction of shims should be made in small increments until proper contact is established.

Step 48 Tighten bearing cap bolts to specified torque. With dial indicator, recheck ring gear and pinion backlash. Recheck differential bearings for end play.

Reassembly Of Hub

All disassembled parts should be completely cleaned and inspected. Replace damaged or worn parts with new parts in complete assemblies.

Step 49 Assemble the hub ring gear support-bearing assembly by pressing the support to the largest taper bearing. (No. 7 p. CC-8 see figure 14)

Step 50 Place the bearing and ring gear support into the hub. Support the ring gear in a press so all pressure is placed on the center flange of the ring gear support. See illustration. Press the rear taper bearing to the ring gear support.

Step 51 Press the oil seal shoulder ring on the ring gear support.

Step 52 Press the oil seal into the oil seal ring. Use a mandrel or press ring of same diameter as the oil seal.

NOTE: *If a mandrel for pressing the oil seal into the seal ring is not available, use the seal shoulder ring No. 42 p. CC-8 placed in the center of the oil seal to prevent distortion.*

Step 53 Press the assembled oil seal ring into the hub.

IMPORTANT: *Do not distort or damage the oil seal upon assembly. Damage during assembly will cause leakage when placed in service.*

Step 54 Turn the hub over after removing from press and reinstall the stationary ring gears. The outer ring gear is locked to the inner gear with an I.D. snap ring. (See No. 33 p. CC-8). Bolt the ring gear assembly to the ring gear support within the hub. Tighten the 13 mm bolts to 130 ft. lbs. with a torque wrench. (See fig. 10 p. CC-11).

Step 55 Mount the stud axle by placing the O ring on the inside flange and the oil baffle in the axle housing, then secure the stub axle to the flange of the axle housing with 20 mm bolts. (See fig. 15 & 43 & 44)

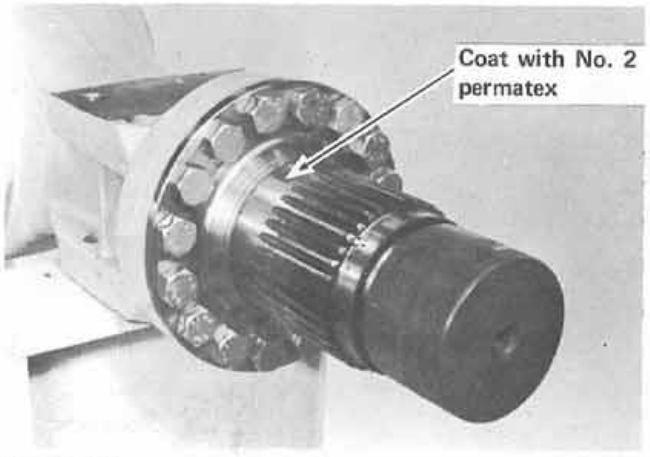


Figure 30