SPICER® AXLE

MAINTENANCE MANUAL

MODEL 44

ALUMINUM INDEPENDENT REAR SUSPENSION

SPICER®
DRIVETRAIN PRODUCTS

INDEX

IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all motor vehicles and their driving axles whether they be front or rear. The service procedures recommended and described in this service manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tool should be used when and as recommended.

It is impossible to know, evaluate, and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way.

Accordingly, anyone who uses a service procedure or tool which is not recommended must first satisfy himself thoroughly that neither his safety nor vehicle safety will be jeopardized by the service methods he selects.

Lith in U.S.A.

LUBRICATION

It is not our intent to recommend any particular brand or make of lubricant for the Spicer Hypoid Axles. However, an S.A.E. 90 or 80 W 90 multi-purpose gear lubricant meeting Mil. Spec. L-2105-C and suitable for A.P.I. Service Classification GL-5 is suggested as a minimum requirement. It must provide necessary and suitable load-carrying characteristics to prevent scoring and wear, good stability in storage and service, and give good resistance to corrosion. Suppliers should assure these characteristics and be responsible for the quality and satisfactory performance of their products.

IMPORTANT

Limited Slip Differentials impose additional requirements on lubricants which cannot be covered by the above specifications. Some otherwise good lubricants do not preclude "chatter" or "bumping" in turning corners with Limited Slip Differentials. Many vehicle manufacturers find it necessary to specify a special lubricant or lubricant additive for use with Limited Slip Differentials. Check the vehicle manufacturer's lubricant recommendations.

COLD WEATHER OPERATION

If the vehicle is operated below 0°F (-18°C), it is advisable to use S.A.E. 80 or 80 W 90 multi-purpose gear lubricant meeting Mil. Spec. L-2105-C and suitable for A.P.I. Service Classification GL-5.

SUBMERSION OR DEEP WATER FORDING

In the event the gear carrier housing should become submerged in water, particularly if over the breathers, it is recommended that the hypoid gear lubricant be drained and internal parts be inspected for water damage and/or contamination.

Clean, examine and replace damaged parts, if necessary, prior to assembling the cover housing and refilling with the specified hypoid lubricant.

NOTE

It is recommended that whenever bearings are removed they are to be replaced with new ones, regardless of mileage.

TRAC-LOK

OPERATION

A conventional differential transmits all of the ring gear torque through the differential side gears to the axle shafts. Torque is at all times equal on the axle shafts, and if one wheel slips, the other wheel can only put out as much torque as the slipping wheel.

The Trac-Lok differential is similar, except that part of the torque from the ring gear is transmitted through clutch packs between the side gears and differential case. The multiple disc clutches with radial grooves on the plates and concentric grooves on the discs are engaged by a preload from dished spacers, plus separating forces from the side gears.

The Trac-Lok construction permits differential action when required for turning corners and transmits equal torque to both wheels when driving straight ahead. However, when one wheel tries to spin due to leaving the ground, a patch of ice, etc., the clutch packs automatically provide more torque to the wheel which is not trying to spin.

The Trac-Lok differential resists wheel spin on bumpy roads and provides more pulling power when one wheel tries to slip. In many cases of differences in traction, pulling power will be automatically provided until both wheels start to slip.

In diagnosis of vehicle operators' complaints, it is important to recognize two things:

1. If, with unequal traction, both wheels slip, the Trac-Lok has done all it can possibly do.
2. In extreme cases of differences in traction, the wheel with the least traction may spin after the Trac-Lok has transferred as much torque as possible to the non-slipping wheel.

TROUBLE SYMPTOMS AND POSSIBLE CAUSES

If noises or roughness, such as chatter, are present in turning corners, the probable cause is incorrect or contaminated lubricant. (See Lubrication).

Before any differential is removed and disassembled for chatter complaints, the correctness of lubricant can and should be determined.

If the vehicle manufacturer recommends a lubricant additive for chatter complaints, add the specified type and amount of additive and recheck for chatter by warming the axle up, and then making a minimum of ten (10) figure eight turns.

If this is unsuccessful, or no lubricant additive is specified, a complete lubricant drain, flush, and refill with the specified Limited Slip Differential lubricant will usually correct chatter.

The following procedure is recommended to ensure flushing the system of old lubricant.

1. Warm the lubricant by vehicle road operation or five (5) minutes of operation in gear at 30 m.p.h. (48 K.P.H.) with both rear wheels off the ground on a hoist.

CAUTION

NEVER PLACE THE TRANSMISSION IN GEAR WITH THE ENGINE RUNNING WHEN ONLY ONE WHEEL OF A LIMITED SLIP DIFFERENTIAL EQUIPPED VEHICLE IS RAISED. THE VEHICLE MIGHT DRIVE ITSELF OFF THE JACK AND CAUSE DAMAGE OR INJURY.

2. Drain lubricant while warm. Remove drain plug or cover plate to drain completely. If cover plate is removed it may be necessary to replace gasket at this time.
3. Refill axle with specified Limited Slip Differential lubricant.
4. Operate the vehicle for approximately ten (10) miles (16.1 Km), making at least ten (10) figure 8 turns to flush the old lubricant out of the clutch packs.
5. If chatter persists then repeat steps 2, 3, and 4, making sure to replace the cover gasket, if required, in step 2.
6. It is possible that slight chatter, requiring additional vehicle operation may remain after Step 5. If chatter still persists after one hundred (100) miles (161 Km) of vehicle operation, or remains severe after Step 5 above, disassembly and repair will be necessary. Follow procedures for disassembly and assembly as illustrated in the manual.

UNIT INOPERATIVE

Proper performance and capabilities of Limited Slip Differentials are often misunderstood. If in doubt, read "Operation" above.

No precise method of measuring Limited Slip Differential performance is generally available in the field. A functioning unit can be determined by these relatively simple vehicle operational tests.

1. Place one wheel on good dry pavement, and the other on ice, mud, snow, etc.
2. Gradually open the throttle to obtain maximum traction prior to "break-away". The ability to move the vehicle effectively will demonstrate proper performance.
3. If an extremely slick surface, such as ice is used, some question may exist as to proper performance at Step 2. In these extreme cases, a properly performing Limited Slip Differential will provide greater "pulling power" by lightly applying the parking brake.

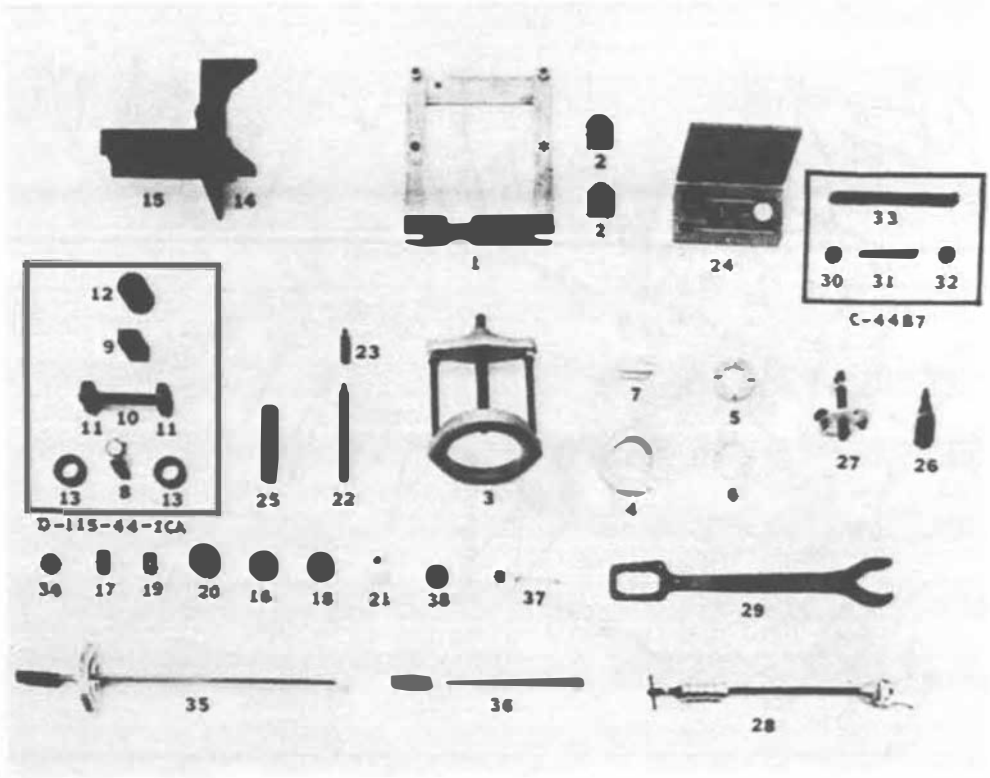

Figure 2

1018-2

The following is a detailed list of all special tools required to service the Model 44 Aluminum Independent Rear Suspension Assembly.

ITEM NO.	TOOL NO.	DESCRIPTION
1	D-113	Spreader
2	D-242	Spreader Adapters
3	DD-914-P	Press
4	DD-914-9	Adapter Ring
5	D-219	Adapter Set - Rear Pinion Bearing Cone
6	D-240	Adapter Set - Differential Bearing Cones
7	C-293-3	Adapter Plug - Differential Hub
* 8	D-115	Scooter Gage
* 9	D-236-1	Pinion Height Block
*10	D-115-3	Arbor
*11	D-236-2	Arbor Discs
*12	D-236-44-I.C.A.	Master Pinion Block
*13	D-235	Master Differential Bearing
14	D-244	Supporting Fixture
15	D-246	Vise Adapter
16	D-144	Installer - Inner Pinion Bearing Cup
17	D-147	Remover - Inner Pinion Bearing Cup
18	D-130	Installer - Outer Pinion Bearing Cup
19	D-102	Remover - Outer Pinion Bearing Cup
20	D-241	Installer - Differential Side Bearings
21	W-147-D	Installer - Pinion Oil Seal
22	C-4171	Handle - Universal
23	C-4291	Extension - Universal
24	D-128	Dial Indicator Set
25	W-262	Installer - Inner Pinion Bearing Cone
26	W-162	Installer - Flange or Yoke
27	C-452	Remover - Flange or Yoke
28	D-131	Puller - Slide Hammer
29	C-3281	Wrench - Flange or Yoke Holder
** 30	C-4487-1	Adapter
** 31	C-4487-2	Forcing Screw
** 32	C-4487-3	Threaded Adapter
** 33	C-4487-4	Turning Bar
34	D-239	Remover - Seal & Bearing
35	C-4053	Torque Wrench (300 Ft. Lb.)
36	C-3952-A	Torque Wrench (150 Ft. Lb.)
37	D-193	Torque Wrench (50 in. Lb.)
38	D-261	Installer - Seal & Bearing

* Pinion Setting Gauge and Master Differential Kit D-115-44-ICA.

** Trac-Lok Kit C-4487.

Torque Wrenches, C-4053, C-3952-A, and D-193 are optional and can be purchased separately. These Torque Wrenches are not included in the DW-44-ICA Axle Tool Kit.

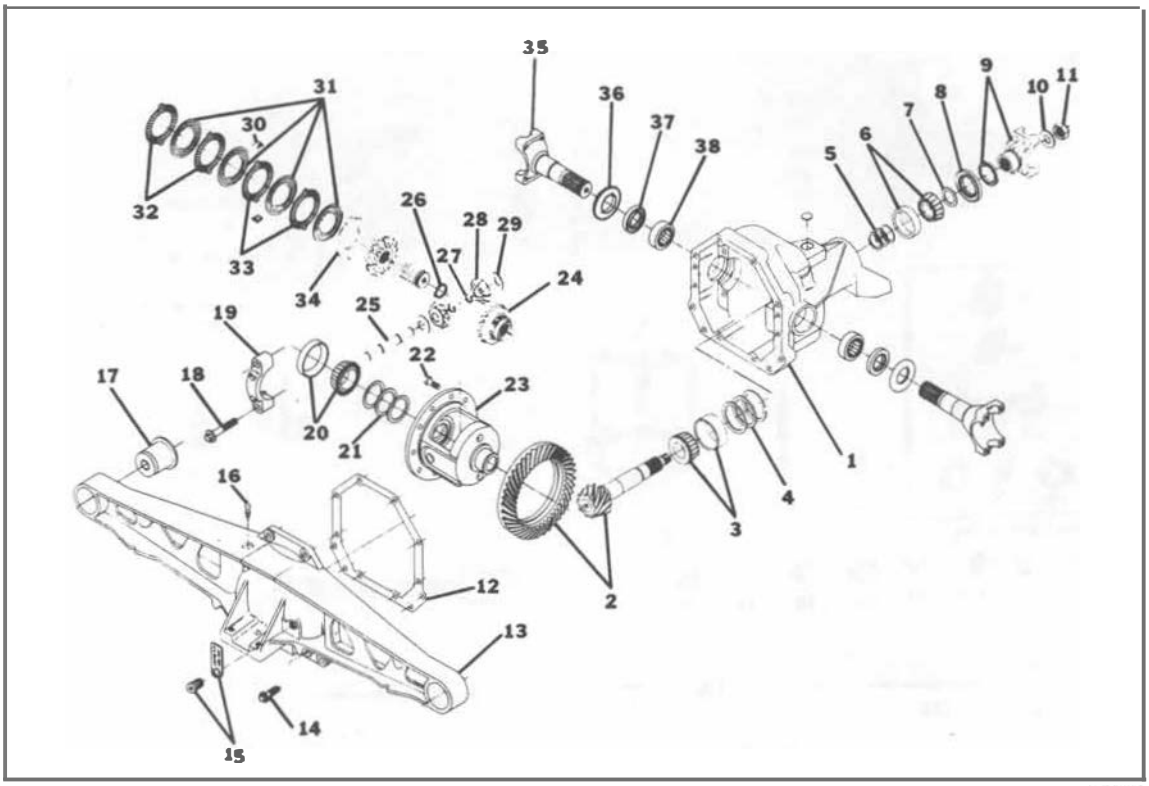

Figure 3 1018-3

IDENTIFICATION AND ARRANGEMENT OF COMPONENTS:

ITEM NO.	DESCRIPTION
1	Carrier
2	Drive Pinion & Gear Assembly
3	Bearing - Inner Pinion Position
4	Shims - Pinion Adjusting
5	Shims - Pinion Bearing Preload
6	Bearing - Outer Pinion Preload
7	Slinger - Pinion Outer
8	Seal - Pinion Oil
9	Assembly - End Yoke
10	Washer - Pinion Nut
11	Nut - Pinion
12	Gasket
13	Arm - Carrier Cover Support
14	Screw - Carrier Cover
15	Plug - Fill (W/Tag)
16	Vent - Breather
17	Bushing - Carrier Cover Support Arm
18	Screw - Bearing Cap
19	Cap - Bearing
20	Bearing - Differential
21	Shims - Differential Bearing Preload
22	Screw - Ring Gear
23	Case - Differential
24	Gear - Differential Side
25	Shaft - Differential
26	Ring - Snap
27	Ring - Snap
28	Pinion - Differential
29	Thrust Washer - Differential Pinion
30	Clip - Differential Clutch Retainer
31	Disc - Differential
32	Plate - Differential
33	Plate - Differential
34	Spacer - Dished
35	Shaft - Inner Yoke
36	Shield - Stone
37	Seal - Oil
38	Bearing - Inner Yoke Shaft

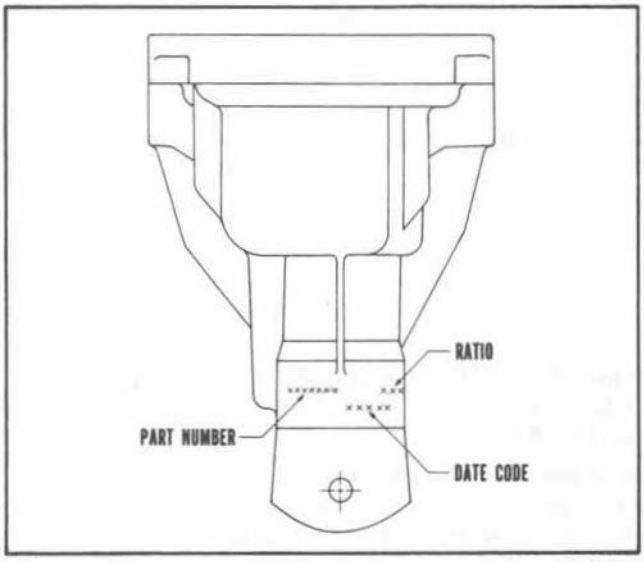

Figure 4 1018-4

AXLE IDENTIFICATION

All Spicer axles are identified with a manufacturing date and the complete part number. The Spicer Aluminum Independent Rear Suspension assembly is identified by numbers which are stamped on the underside of the carrier front support arm.

This axle is identified with 1/8" (3.17 mm) high stamped numbers. For example: The number 8 8 9 A5 is the manufacturing or build date of the axle and is interpreted as follows. The first number is the month, the second number is the day of the month, the third number is the year, the letter is the shift, and the last number is the line that built the axle. For example: Aug. 8, 1979, first shift, line 5.

AXLE IDENTIFICATION

The number 603967-1 is the Spicer part number for this particular assembly and is interpreted as follows: The number 603967 means this assembly is a Spicer Model 44 Aluminum Independent Rear Suspension. The 1 (dash 1) means this unit is equipped with a 3.54:1 gear ratio and a Spicer Limited Slip Differential assembly. Other dash numbers refer to other ratios and/or options.

When referring to the axle assembly, obtain the complete part number and build date. To do this, it may be necessary to wipe or scrape dirt, etc., from the assembly.

DIFFERENTIAL CARRIER ASSEMBLY

Remove drain plug and drain lubricant. Follow Vehicle Manufacturers recommendations to remove carrier from vehicle.

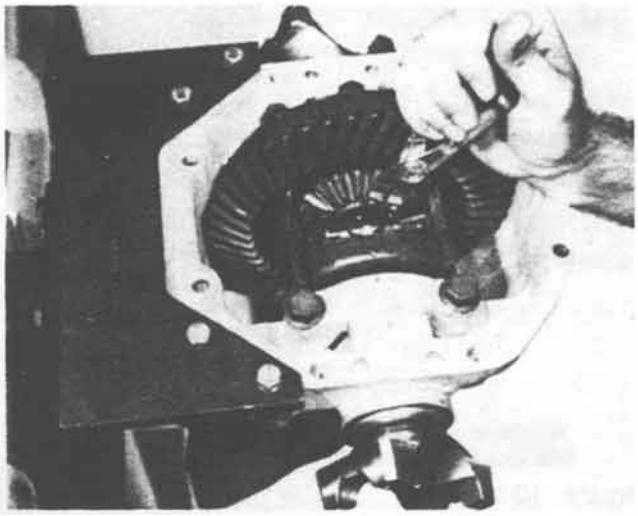

Figure 5 1018-5

Mount carrier in a fixture as shown. Remove snap rings that retain inner yoke shafts in position. Remove the inner yoke shafts.

Tools: D-244 Supporting Fixture, D-246 Vise Adapter.

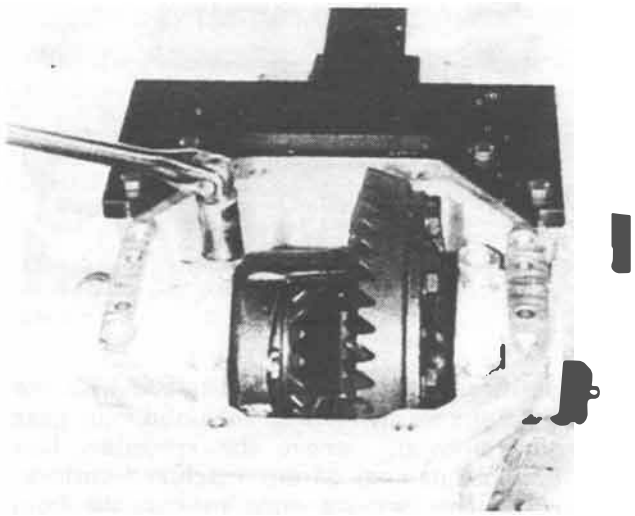

Figure 6 1018-6

Remove the bearing caps. Note the matched letters stamped on the caps and carrier. When assembled, the letters on the caps must agree in both the horizontal and vertical position with the letters on the carrier.

DIFFERENTIAL CARRIER ASSEMBLY

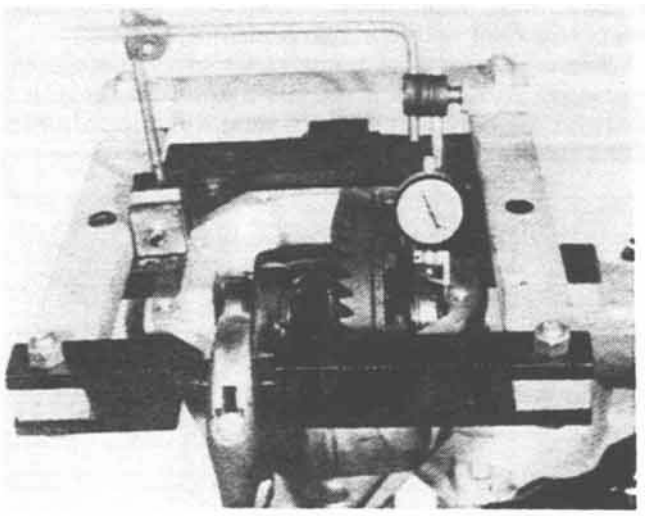

Figure 7 1018-7

Mount the spreader to the carrier. Use a dial indicator as shown. DO NOT SPREAD CARRIER OVER .010'' (.25 mm). Remove the indicator.

Tools: D-113 Spreader, D-128 Indicator Set, D-242 Spreader Adapters.

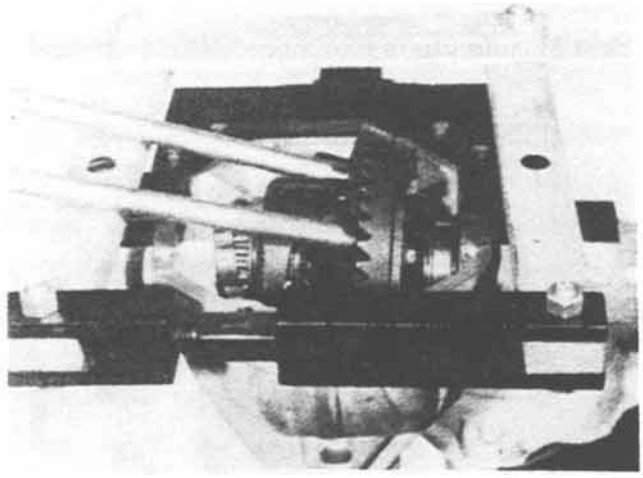

Figure 8 1018-8

Pry the differential case from the carrier with two pry bars. After the differential case and ring gear have been removed, remove the spreader. Use caution to avoid damage to any machined surface. Mark or tag the bearing cups to indicate from which side they were removed.

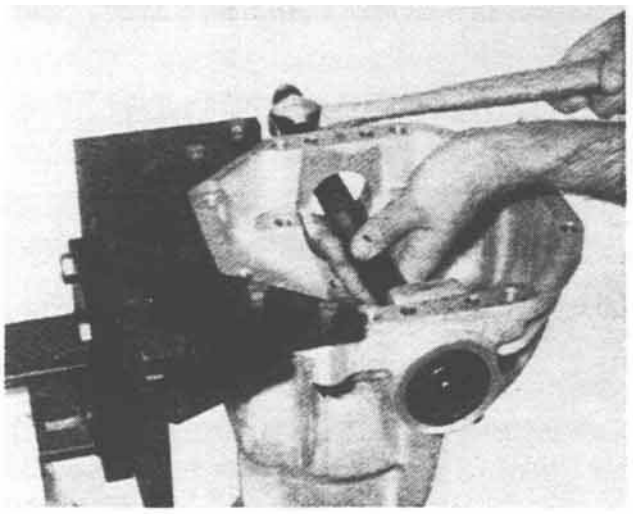

Figure 9 1018-9

Remove oil seal and bearing assembly. Discard seal and bearing and replace with new ones at time of assembly. Use a standard metal cleaning solvent to clean out the bearing and oil seal bore in the carrier.

Tool: D-239 Remover, C-4171 Handle.

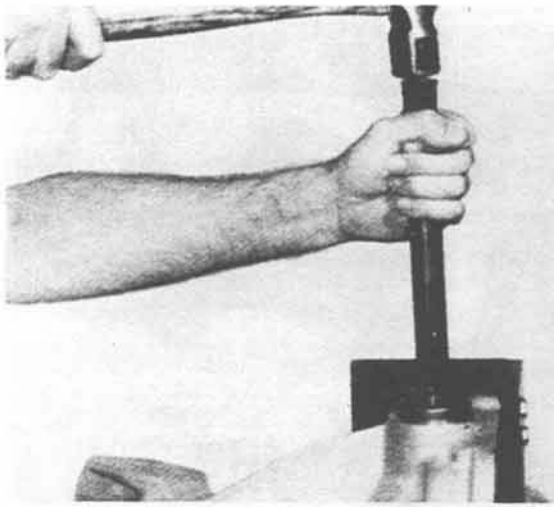

Figure 10 1018-10

Install new yoke shaft bearing assembly. Lubricate bearings with hypoid lubricant.

Tools: C-4171 Handle, D-261 Installer.

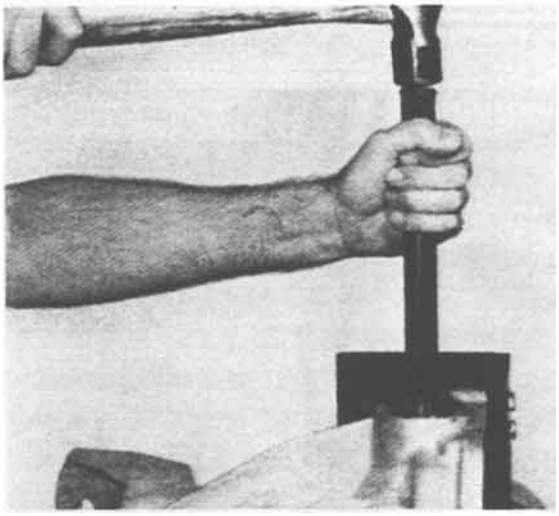

Figure 11 1018-11

Apply a light coat of hypoid lubricant on the lip of the yoke shaft oil seal and assemble into carrier.

Tools: C-4171 Handle, D-261 Installer.

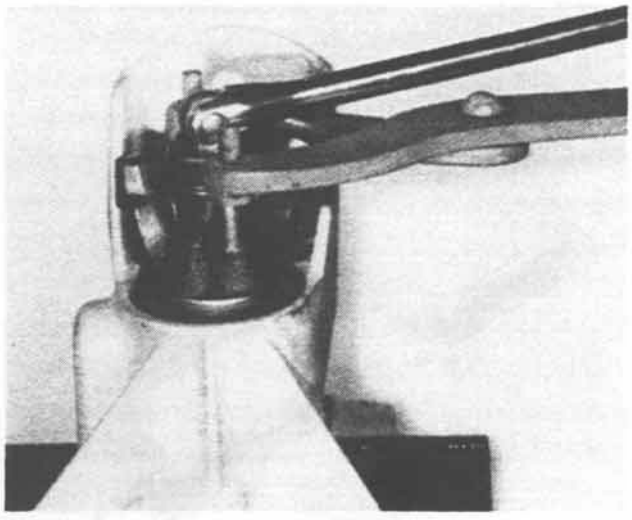

Figure 12 1018-12

Hold the end yoke or flange with a tool similar to the one shown and remove the pinion nut and washer.

Tool: C-3281 Holding Wrench.

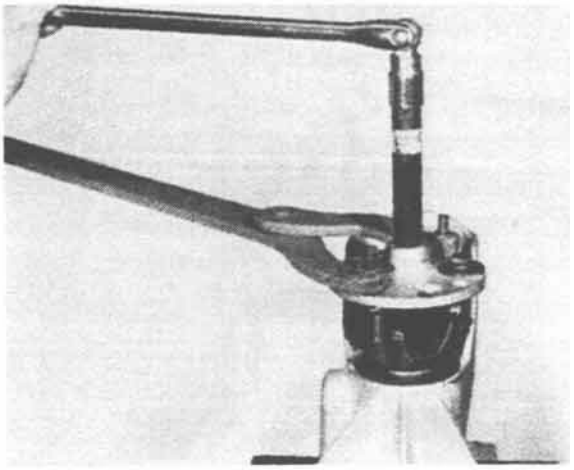

Figure 13 1018-13

Remove the end yoke or flange with tools as shown. If the yoke or flange shows wear in the area of the seal contact, it should be replaced.

Tool: C-452 Remover-Yoke.

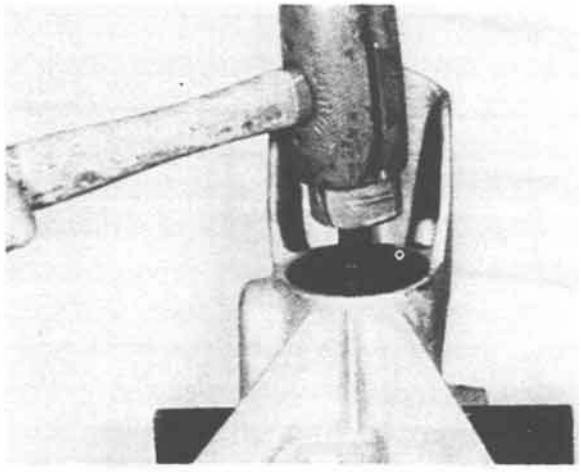

Figure 14 1018-14

Remove the pinion by tapping with a rawhide or heavy duty plastic hammer. Catch the pinion with your hand to prevent it from falling and being damaged.

NOTE

On the spline end of the pinion, there are bearing preload shims. These shims may stick to the outer bearing and then fall to the floor. Be sure to collect all these shims and keep them together since they will be used later in assembly. If shims are mutilated, replace with new ones. Shims are available in thicknesses of .003", .005", .010", and .030" (mm. .08, .13, .25 and .76).

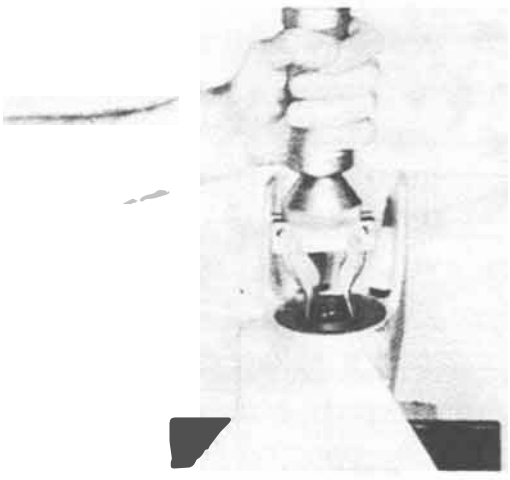

Figure 15 1018-15

Pull out the pinion oil seal with a puller as shown. Discard the seal and replace with a new seal at the time of assembly. Remove the outer pinion bearing cone and outer pinion oil slinger.

Tool: D-131 Slide Hammer.

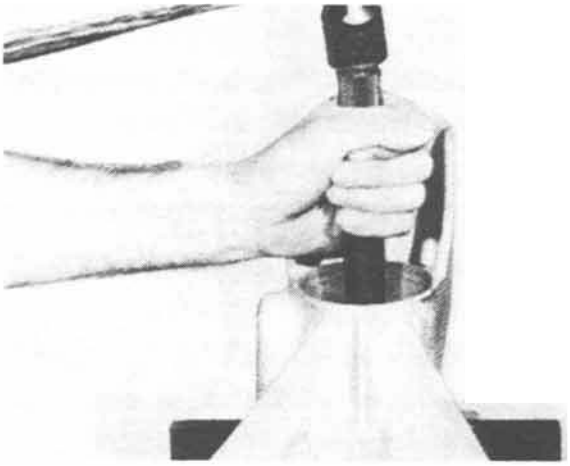

Figure 16 1018-16

Remove the inner pinion bearing cup with tools as shown. Caution: Do not nick carrier bore.

Tools: D-149 Remover, C-4171 Handle.

NOTE

Shims are located between the inner bearing cup and carrier bore. If the shims are bent or nicked, they should be replaced at time of assembly. Measure each shim individually and wire the shim stack together. If the stack has to be replaced, replace it with the same thickness.

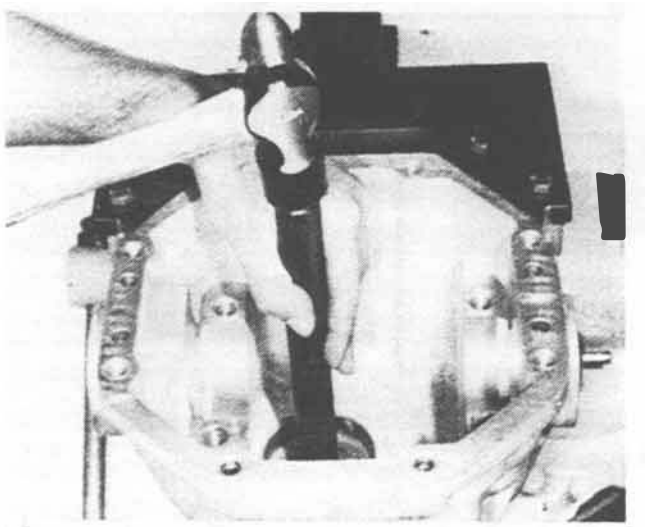

Figure 17 1018-17

Turn the nose of the carrier down. Remove the outer pinion bearing cup as shown. Caution: Do not nick the carrier bore.

Tools: D-147 Remover, C-4171 Handle, C-4291 Extension.

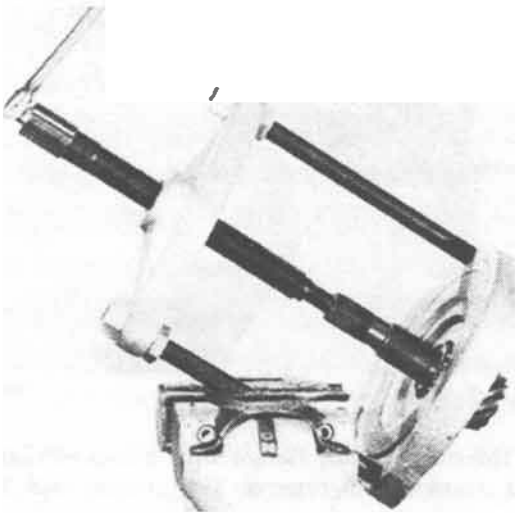

Figure 18 1018-18

Remove the inner pinion bearing cone with tools as shown.

Tools: DD-914-P Press, DD-914-9 Adapter Ring, C-293-39 Adapter Set.

DIFFERENTIAL CARRIER ASSEMBLY

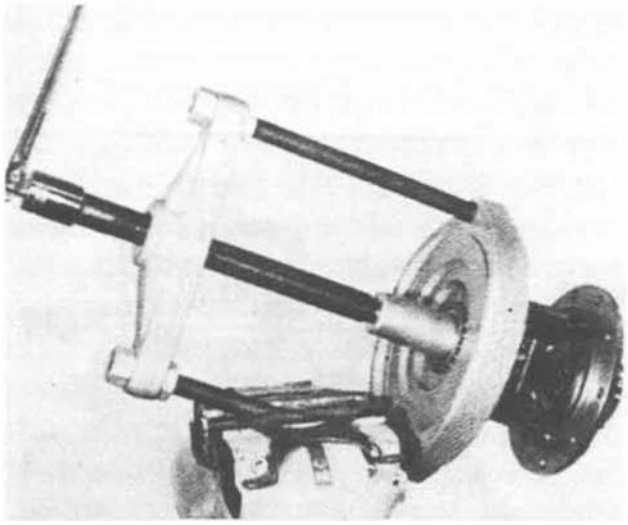

Figure 19 1018-19

Remove the differential bearings with a puller as shown. Wire the shims, bearing cup and bearing cone together, and identify from which side they were removed (ring gear side or opposite side). If the shims are mutilated, replace with new ones at time of assembly. Shims are available in thicknesses of .003", .005", .010", and .030" (mm. .08, .13, .25, and .76). Reposition the case in the puller and remove the other bearing cone as described above:

Tools: DD-914-P Press, D-240 Adapter, DD-914-9 Adapter Ring, C-293-3 Adapter Plug.

See note this page.

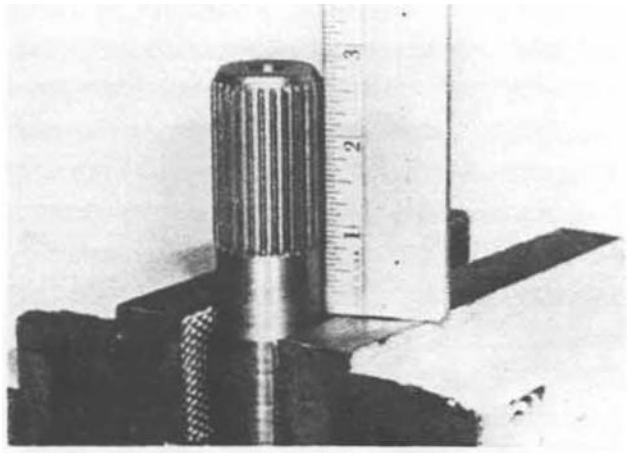

Figure 20 1018-20

Place one of the axle shafts, which was removed from the assembly, into a vise. Tighten the shaft in the vise firmly. The spline end of the shaft is not to exceed 2.750" (69.85 mm) above the top of the vise. This will prevent the shaft from fully entering into the side gear and causing interference with the step plate during disassembly of the pinion mate gears, etc. Caution should be used that the vise jaws do not locate on the axle splines or any machined surfaces.

NOTE

It is recommended that whenever bearings are removed, they are (regardless of mileage) to be replaced with new ones.

Figure 21 1018-21

Place a few shop towels over the vise to prevent any damage during disassembly of the ring gear. Assemble the differential on the axle shaft with the ring gear screw heads up. Assembling the differential onto the shaft will serve as a holding device to remove the ring gear and the internal parts of the case. Remove the ring gear screws.

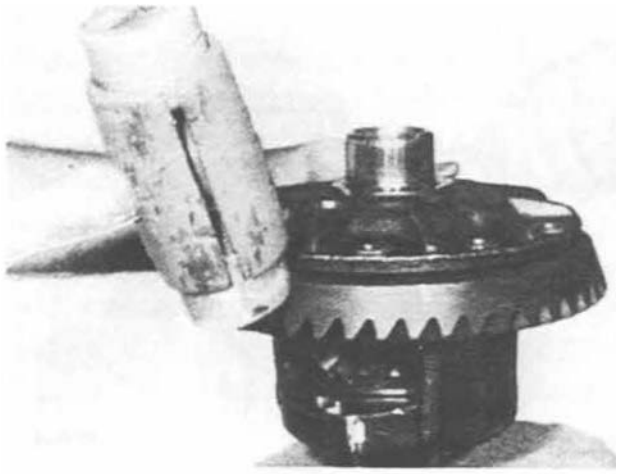

Figure 22 1018-22

Remove the ring gear. It will be necessary to remove the ring gear to allow clearance for the removal of the cross pin. Tap the ring gear with a rawhide or heavy duty plastic hammer to free it from the case.

DIFFERENTIAL CARRIER ASSEMBLY

NOTE

IT IS RECOMMENDED THAT ON SPICER AXLES, WHENEVER THE RING GEAR SCREWS ARE REMOVED, THEY SHOULD BE REPLACED WITH NEW ONES.

Remove the differential case from the axle shaft and remove the ring gear.

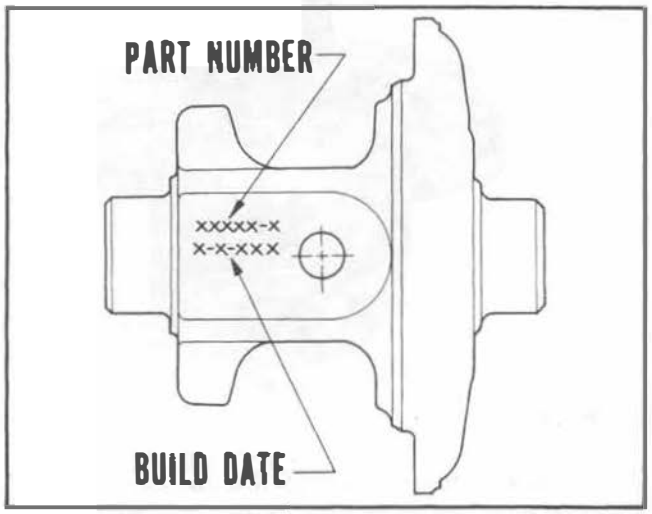

Figure 23 1018-23

The Trac-Lok is identified with .125" (3.17 mm) high numbers stamped on the case. When referring to the Trac-Lok, obtain the complete part number and build date. To do this, it may be necessary to wipe the lubricant off the case.

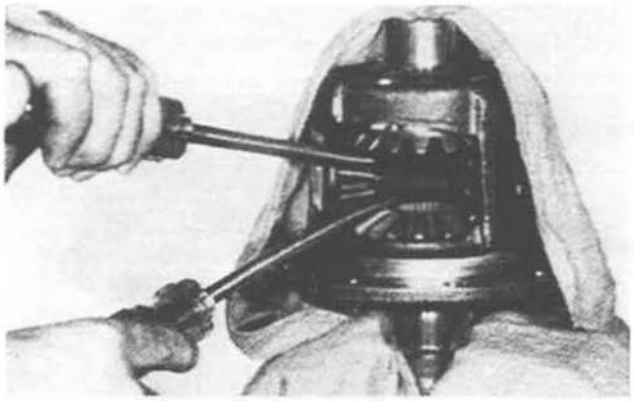

Figure 24 1018-24

Reposition the differential case onto the axle shaft as shown. Remove the two snap rings from the cross pin. Use two screwdrivers and push the ring free from the cross pin. Place a shop towel behind the case to prevent the snap rings from flying out of the case.

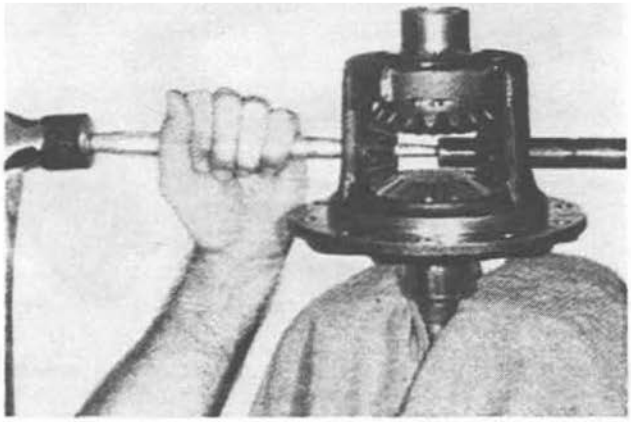

Figure 25 1018-25

Remove the cross pin. Use a hammer and a punch as shown to remove the cross pin from the case.

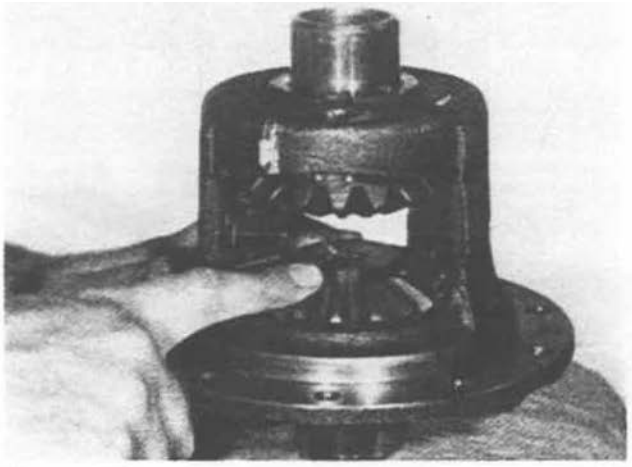

Figure 26 1018-26

Assemble the adapter plate into the bottom side gear. Apply a small amount of grease to the centering hole of the adapter plate.

Tool: C-4487-1 Adapter.

Lubricate the threads of the threaded adapter and the forcing screw.

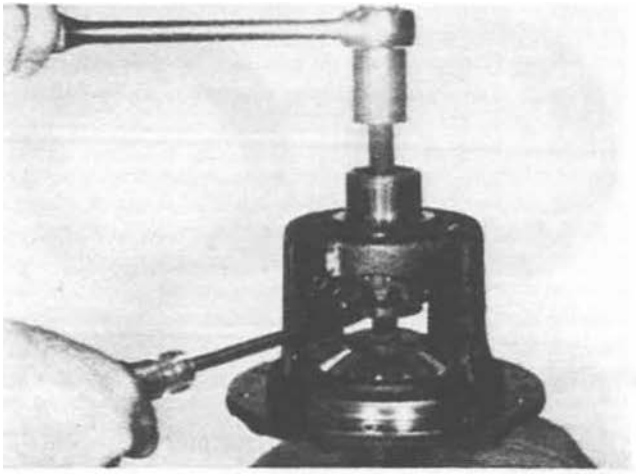

Figure 27 1018-27

Assemble the threaded adapter into the top side gear. Thread the forcing screws into the threaded adapter until it becomes centered into the adapter plate.

USE A SMALL SCREWDRIVER AND POSITION IT IN THE SLOT OF THE THREADED ADAPTER. This will prevent the adapter from turning.

Tools: C-4487-3 Threaded Adapter, C-4487-2 Forcing Screw.

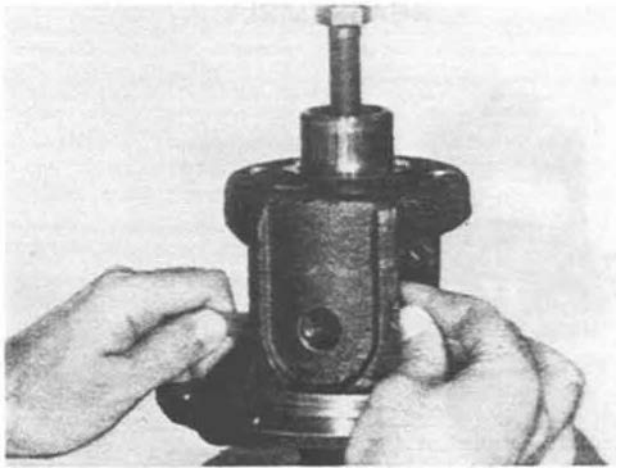

Figure 28 1018-28

Torque the forcing screw until it becomes slightly tight. This will collapse the dished spacers and allow a loose condition between the side gears and pinion mate gears.

Remove both pinion mate spherical washers. Use a shim stock of .020" (.51 mm) thickness or an equivalent tool to push out the spherical washers.

Relieve the tension of the dished spacers by loosening the forcing screw.

Figure 29 1018-29

Insert the small O.D. end of the turning bar into the cross pin hole of the case. Pull on the bar and the case will rotate until the pinion mate gears can be removed from the opening.

It might be necessary to adjust the forcing screw slightly to allow the case to rotate.

Tool: C-4487-4 Turning Bar.

Hold the top clutch pack with one hand and remove the tools. It might be necessary to hold the threaded adapter with a screwdriver as shown in Figure 27.

Figure 30 1018-30

Remove the top side gear and clutch pack. Keep the stack of plates and discs intact in exactly the same position while they are being removed.

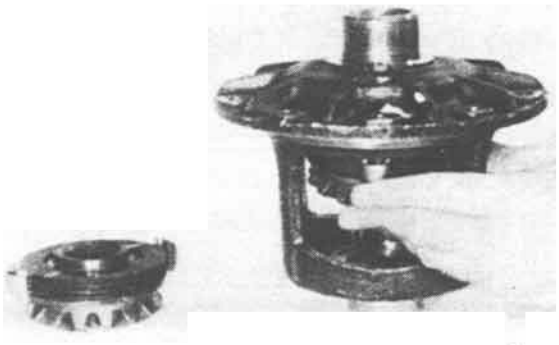

Figure 31 1018-31

Remove the case from the axle shaft. Turn the case with the flange or ring gear side up and allow the step plate, side gear and clutch pack to be removed from the case. Remove the retainer clips from both clutch packs to allow separation of the plates and discs. Keep the stack of plates and discs exactly as they were removed.

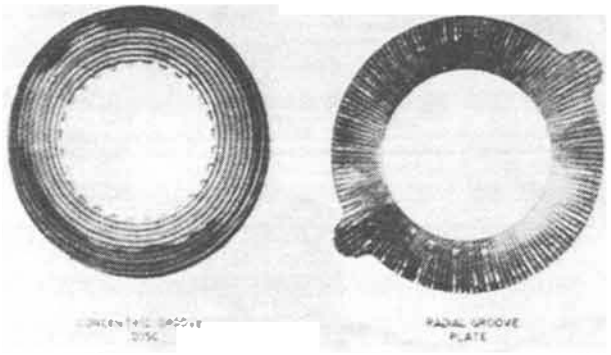

Figure 32 1018-32

Example of a radial groove plate and a concentric groove disc.

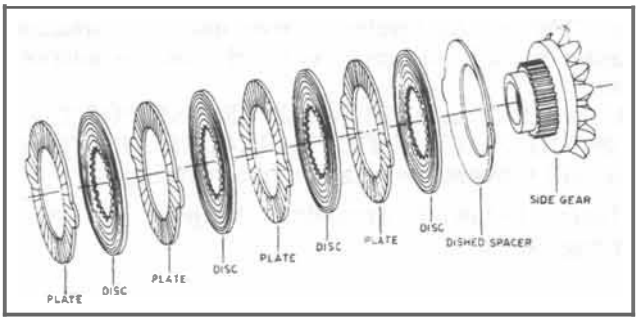

Figure 33 1018-33

Identification and arrangement of clutch pack.

INSPECTION OF ALL PARTS FOR WEAR, SCORE, ETC.

Plates and Discs - If any one member of either stack shows evidence of excessive wear or scoring, the complete stack is to be replaced on both sides.

Side Gears and Pinion Mate Gears - The gear teeth of these parts should be checked for extreme wear and possible cracks. The external teeth of the side gear, which retain the concentric groove discs, should also be checked for wear or cracks.

If replacement of one gear is required due to wear, etc., then both side gears, pinion mate gears, and washers are to be replaced.

Cross Pin - If excessive wear is evident, the cross pin should be replaced.

Clutch Retainer Clips - If wear is evident on any one of the retainer clips, all four clips must be replaced.

Differential Case - If scoring, wear or metal pickup is evident on the machined surfaces, then replacement of the case is necessary.

REASSEMBLY

Figure 34 1018-34

Prelubricate the thrust face of the side gears, and the plates and discs with the specified limited slip differential lubricant.

Assemble the plates and discs in exactly the same position as they were removed, regardless of whether they are new parts or the original parts.

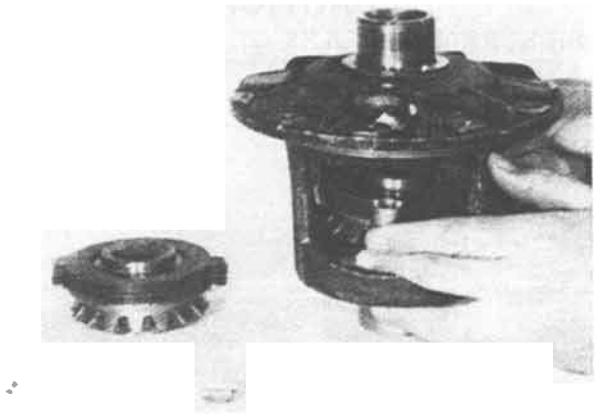

Figure 35 1018-35

Assemble the retainer clips to the ears of the plates. Make sure both clips are completely assembled or seated onto the ears of the plates.

With the differential case positioned as shown, assemble the clutch pack and side gear into the case. Make sure the clutch pack stays assembled to the side gear splines, and that the retainer clips are completely seated into the pockets of the case. To prevent pack from falling out of the case, it will be necessary to hold them in place by hand while repositioning the case on bench.

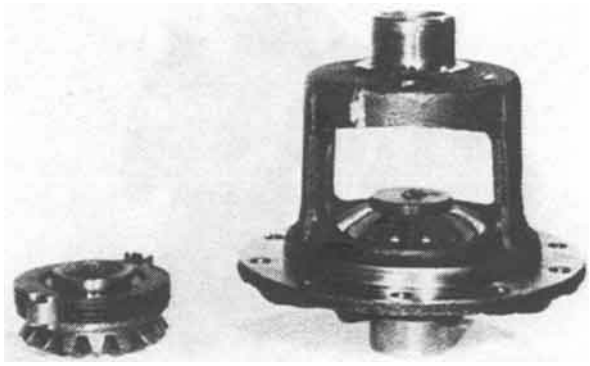

Figure 36 1018-36

Reposition the case on bench as shown. Assemble the adapter plate into the side gear. Apply a small amount of grease into the centering hole of the adapter.

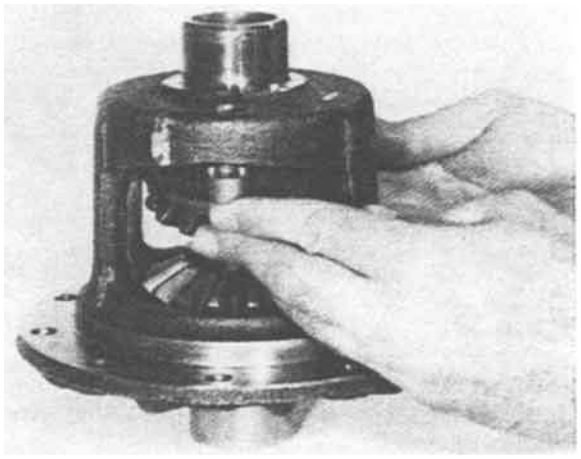

Figure 37 1018-37

Assemble the other clutch pack and side gear as shown. Make sure the clutch pack stays assembled to the side gear splines, and that the retainer clips are completely seated into the pockets of the case.

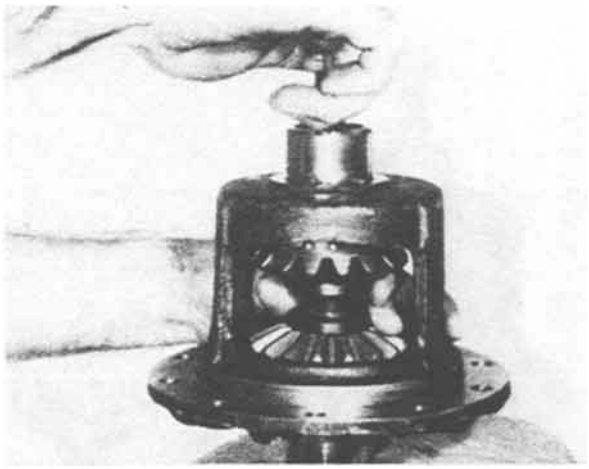

Figure 38 1018-38

Hold the clutch pack in position and insert the threaded adapter into the top side gear, insert the forcing screw. Tighten the forcing screw into the bottom adapter. This will hold both clutch packs in position.

With tools assembled into the case, position case onto the axle shaft by aligning the splines of the side gear with those of the shaft.

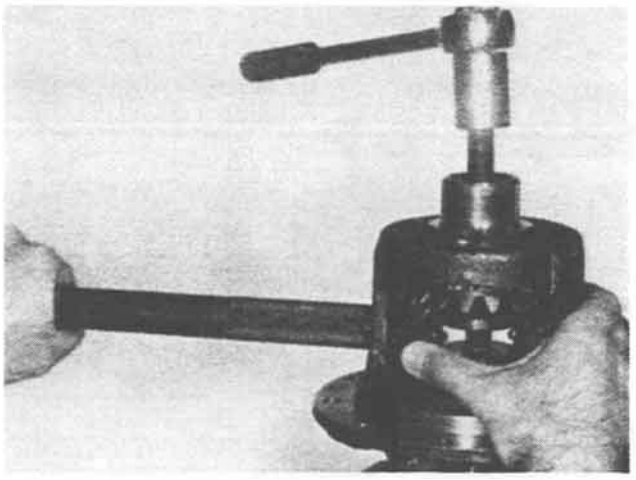

Figure 39 1018-39

Loosen the forcing screw slightly. Assemble both pinion mate gears as shown. Hold the gears in position by hand.

While holding the gears in place, insert the turning bar into case. Pull on the bar to rotate the case allowing the gears to turn. Make absolutely sure that the holes of the pinion mate gears are in alignment with holes of the case. It may be necessary to adjust the tension on the forcing screw to rotate the case.

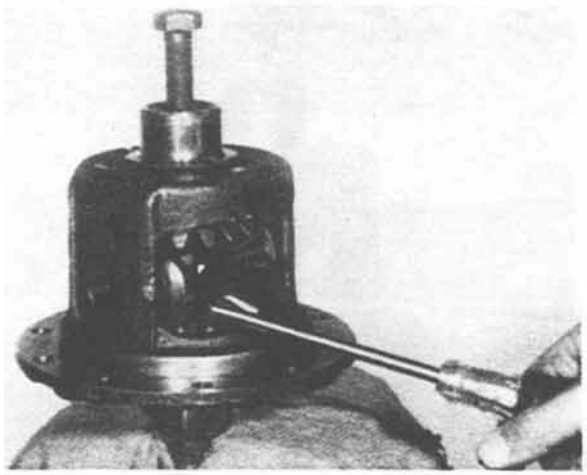

Figure 40 1018-40

Prelubricate the spherical washers with the specified limited slip differential lubricant. Torque the forcing screw until it is tight. This will collapse the dished spacers and allow clearance between the gears. Assemble the spherical washers into case. Use a small screwdriver to push the washers into place.

CAUTION

BE SURE THE HOLES OF THE WASHERS AND GEARS ARE LINED UP EXACTLY WITH THOSE OF THE CASE.

Remove the tools.

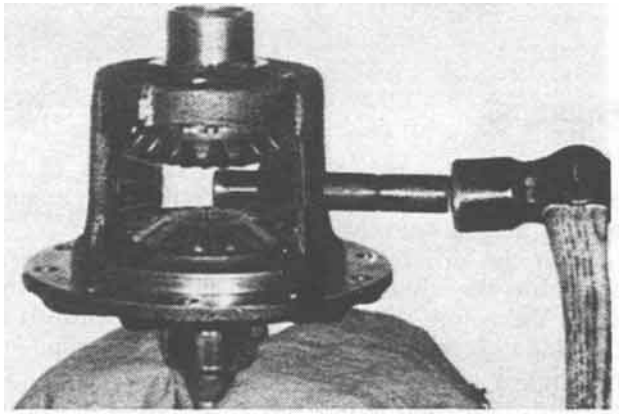

Figure 41 1018-41

Assemble the cross pin shaft and drive in with a hammer. Be sure the snap ring grooves of the cross pin shaft are exposed to allow assembly of the snap rings. Assemble the snap rings.

REASSEMBLY

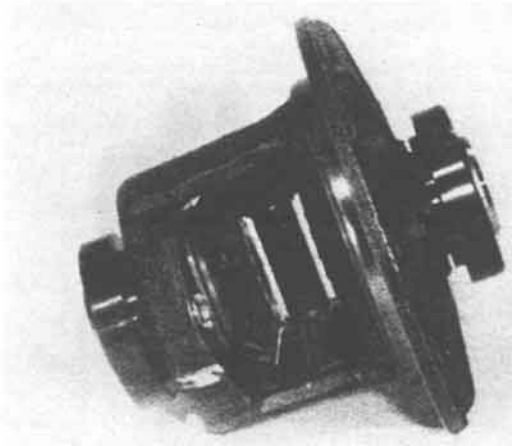

Figure 42 1018-42

Install the master differential bearings onto the case. Remove all nicks, burrs, dirt, etc., from the hubs to allow the master bearings to rotate freely.

Tool: D-235 Master Bearings.

DIFFERENTIAL CARRIER ASSEMBLY

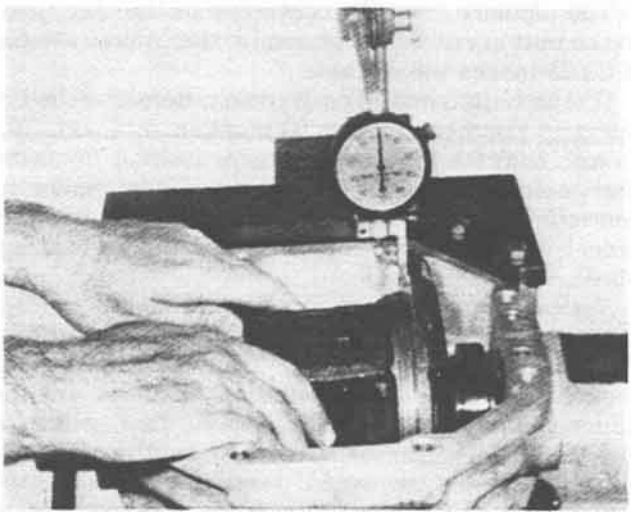

Figure 43 1018-43

Assemble the differential case into the carrier (less pinion). Mount a dial indicator with a magnetic base to the supporting fixture and indicate on the flange face as shown. Locate the tip of the indicator on the machined surface of the flange face. Force the differential assembly as far as possible in the direction towards the indicator. With force still applied, set indicator at zero (0).

Tool: D-128 Indicator.

> **NOTE**
>
> If another indicator is used (other than D-128), it should be capable of a minimum of .200" (5.08 mm) travel.

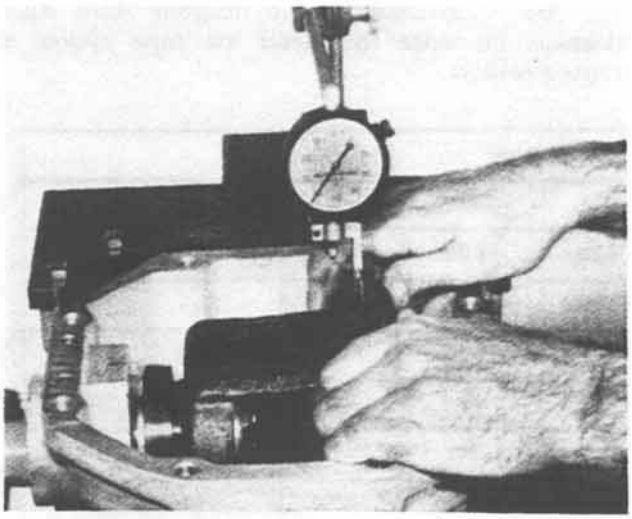

Figure 44 1018-44

Force the differential assembly as far as it will go in the opposite direction. Repeat these steps until the same reading is obtained.

Record the reading of the indicator. This amount, in shims, will be included in the final assembly shim stack to establish differential bearing preload and ring gear backlash.

After making sure the readings are correct, remove the indicator and differential assembly from the carrier.

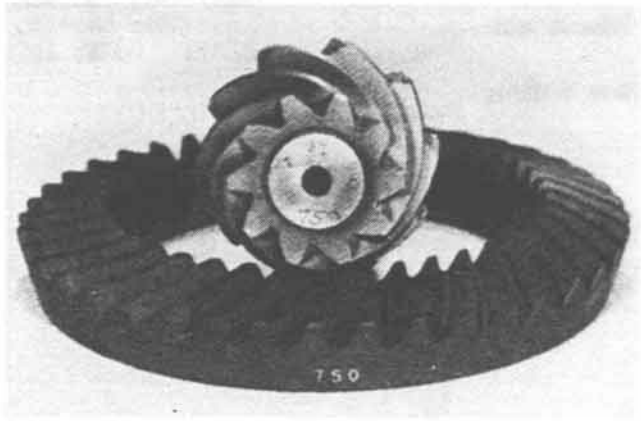

Figure 45 1018-45

View of ring and pinion etched with inch identification.

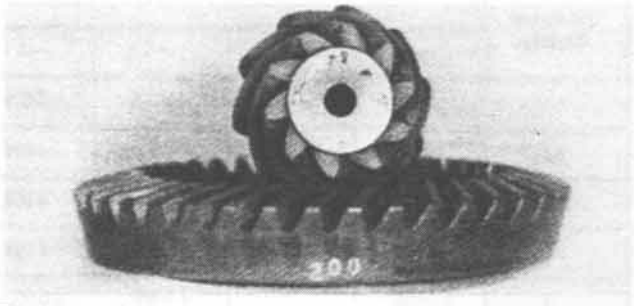

Figure 46 1018-46

View of ring and pinion etched with metric identification.

Ring gear and pinions are supplied in matched sets only. Matching numbers on both pinion and ring gear are etched for verification. If a new gear set is being used, verify the numbers on each pinion and ring gear before proceeding with the assembly.

DIFFERENTIAL CARRIER ASSEMBLY

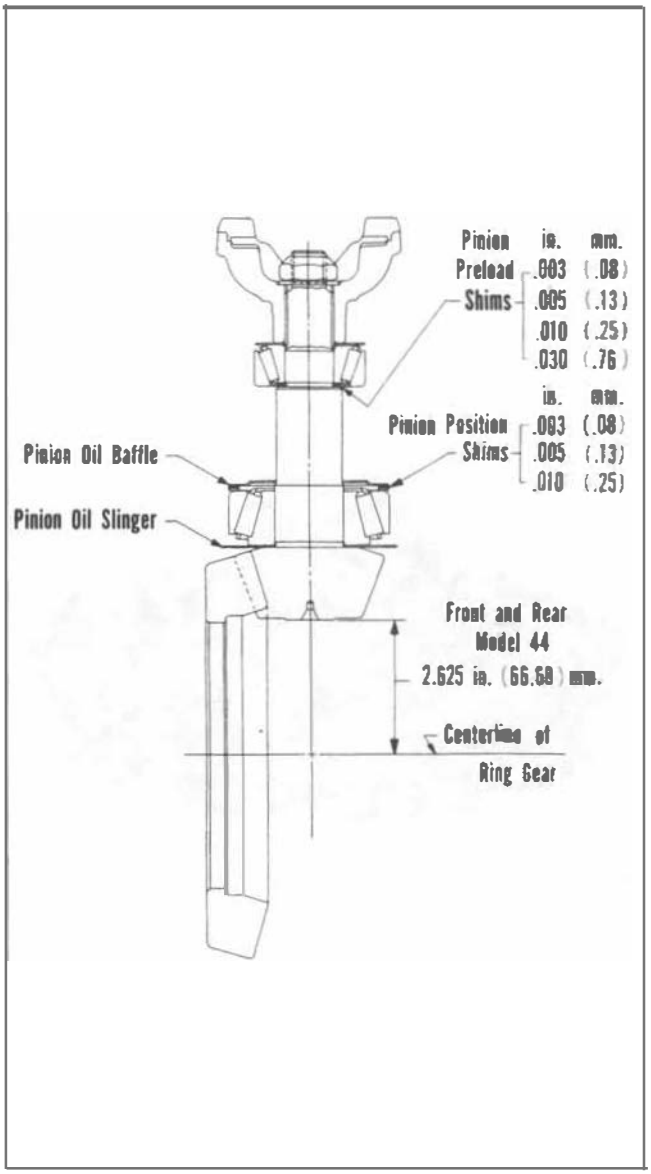

Figure 47 1018-47

The distance from the centerline of the ring gear to the button end of the pinion for the Model 44 axle is 2.625 inches (66.68 mm).

On the button end of each pinion there is etched a plus (+) number, a minus (-) number, or a zero (0), which indicates the best running position for each particular gear set. The position of the pinion is controlled by the amount of shims between the inner pinion bearing cup and the carrier bearing bore.

For example - If a pinion is etched +3 (m+8), this pinion would require .003" (.08 mm) less shims than a pinion etched "0". This means that by removing shims, the mounting distance of the pinion is increased to 2.628" (66.75 mm), which is just what a +3 (m+8) indicates. Or if a pinion is etched -3 (m-8), we would want to add .003" (.08 mm) more shims than would be required by a pinion that is etched "0". By adding .003" (.08 mm) shims the mounting distance of the pinion was decreased to 2.622" (66.60 mm) which is just what a -3 (m-8) etching indicates.

If the old ring and pinion set is to be reused, measure the old shim stack and build a new shim stack to this same dimension. It is recommended that each shim be measured individually and then added together to obtain the shim stack total. To change the pinion position shims are available in thicknesses of .003", .005", and .010" (mm .08, .13, and .25).

If a new gear set is used, notice the plus (+), minus (-), or zero (0) etching on both the old and new pinion and adjust the thickness of the new shim pack to compensate for the difference between these two pinion etchings. The chart in Figure 48 or 49 is helpful for determining this change.

For example: If the old pinion is etched +2 (m+5) and the new pinion is etched -2 (m-5), then add .004" (.10 mm) to the original shim stack thickness in order to install the new pinion at proper position.

Old Pinion Marking	New Pinion Marking								
	−4	−3	−2	−1	0	+1	+2	+3	+4
+4	+0.008	+0 007	+0 006	+0 005	+0 004	+0 003	+0 002	+0 001	0
+3	+0 007	+0 006	+0 005	+0 004	+0 003	+0 002	+0 001	0	−0 001
+2	+0.006	+0 005	+0.004	+0 003	+0 002	+0.001	0	−0.001	−0.002
+1	+0 005	+0 004	+0.003	+0.002	+0 001	0	−0.001	−0 002	−0 003
0	+0 004	+0 003	+0 002	+0 001	0	−0.001	−0.002	−0 003	−0 004
−1	+0 003	+0 002	+0 001	0	−0.001	−0.002	−0 003	−0 004	−0 005
−2	+0 002	+0 001	0	−0 001	−0 002	−0 003	−0 004	−0 005	−0 006
−3	+0 001	0	−0 001	−0 002	−0.003	−0.004	−0 005	−0 006	−0 007
−4	0	−0 001	−0.002	−0 003	−0 004	−0.005	−0 006	−0 007	−0 008

Figure 48 Pinion setting chart (inch). 1018-48

DIFFERENTIAL CARRIER ASSEMBLY

Old Pinion Marking	New Pinion Marking								
	-10	-8	-5	-3	0	+3	+5	+8	+10
+10	+.20	+.18	+.15	+.13	+.10	+.08	+.05	+.03	0
+8	+.18	+.15	+.13	+.10	+.08	+.05	+.03	0	-.03
+5	+.15	+.13	+.10	+.08	+.05	+.03	0	-.03	-.05
+3	+.13	+.10	+.08	+.05	+.03	0	-.03	-.05	-.08
0	+.10	+.08	+.05	+.03	0	-.03	-.05	-.08	-.10
-3	+.08	+.05	+.03	0	-.03	-.05	-.08	-.10	-.13
-5	+.05	+.03	0	-.03	-.05	-.08	-.10	-.13	-.15
-8	+.03	0	-.03	-.05	-.08	-.10	-.13	-.15	-.18
-10	0	-.03	-.05	-.08	-.10	-.13	-.15	-.18	-.20

Figure 49 Pinion setting chart (metric). 1018-49

Use these charts as a guideline to set pinion position.

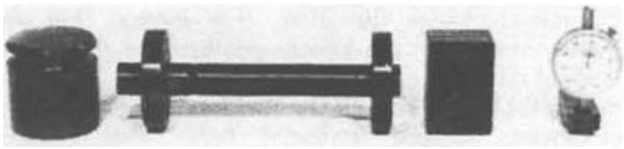

Figure 50 1018-50

View of master pinion block, pinion height block, scooter gage, cross arbor and arbor discs.

> **NOTE**
>
> Be sure that all carrier bores are free from all nicks, dirt or any other contamination.

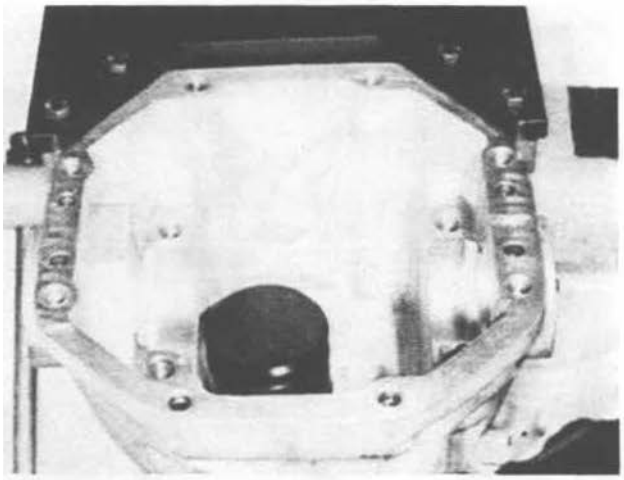

Figure 51 1018-51

Place the master pinion block into the inner pinion bearing bore of the carrier as shown.

Tool: D-236-44-1.C.A. Master Pinion Block.

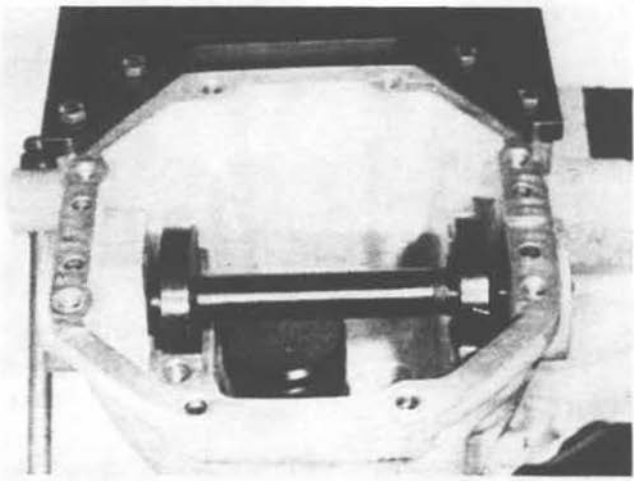

Figure 52 1018-52

Place the arbor discs and arbor into the cross bores of the carrier as shown.

Tools: D-115-3 Arbor, D-236-2 Arbor Discs.

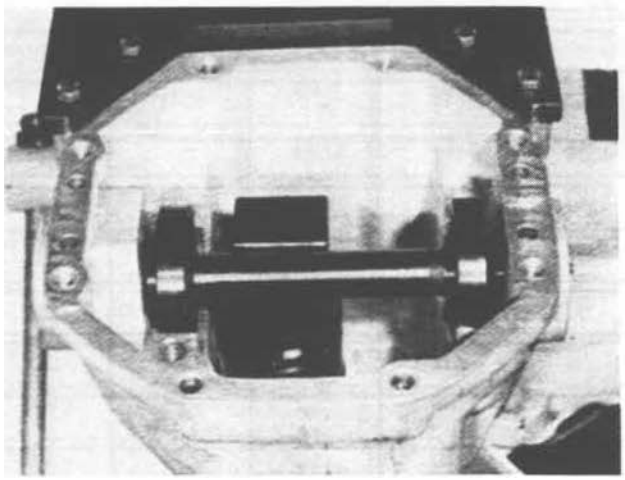

Figure 53 1018-53

Place the pinion height block on top of the master pinion block and against the arbor as shown.

Tool: D-236-1 Pinion Height Block.

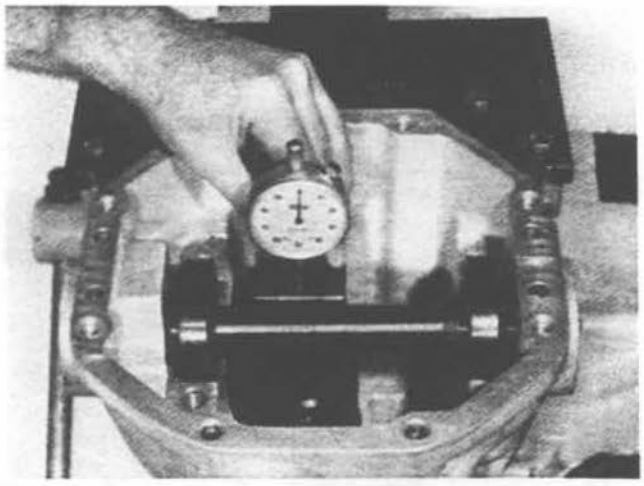

Figure 54 1018-54

Place the scooter gage on the pinion height block. Apply light pressure with fingers at the back side of the scooter gage. Make sure the scooter gage is flat on the pinion height block, then set the indicator at zero (0).

Tool: D-115 Scooter Gage.

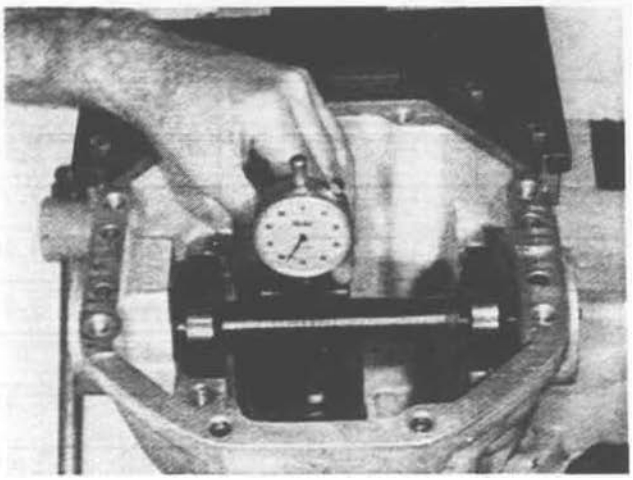

Figure 55 1018-55

Slide the scooter gage towards the arbor. As the indicator moves over the top of the arbor, the dial will move in a clockwise direction across the face of the indicator. When the indicator is at the top center of the arbor, the dial will stop traveling in a clockwise direction. If the dial starts to move in a counter-clockwise direction, this means that you have passed the top center position on the arbor. Record only the reading when the indicator is at top center on the arbor and the dial has stopped moving clockwise on the indicator face. This reading indicates the thickness of the shim stack that is required to install a pinion that is etched with a zero (0) at a zero (0) position. If the pinion being installed has a plus (+) or a minus (-) etching, then an adjustment of this shim stack is required.

For example: If a pinion is etched +3 (m+8), then this pinion would require .003'' (.08 mm) less shims than a pinion etched zero (0). If a pinion is etched -3, we would want to add .003'' (.08 mm) more shims to the shim stack then would be required in the pinion were etched zero (0).

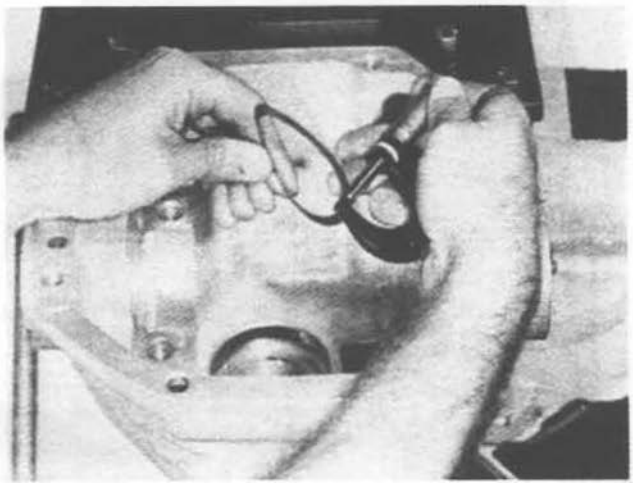

Figure 56 1018-56

Measure each shim separately with a micrometer and add together to get the total shim stack thickness.

DIFFERENTIAL CARRIER ASSEMBLY

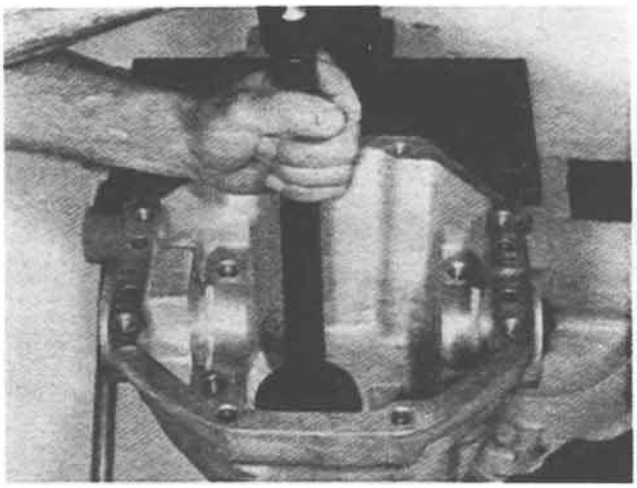

Figure 57 1018-57

Place the required amount of shims in the inner pinion bearing bore. Drive the inner pinion bearing cup into the carrier with tools as shown.

Tools: D-146 Installer, C-4171 Handle.

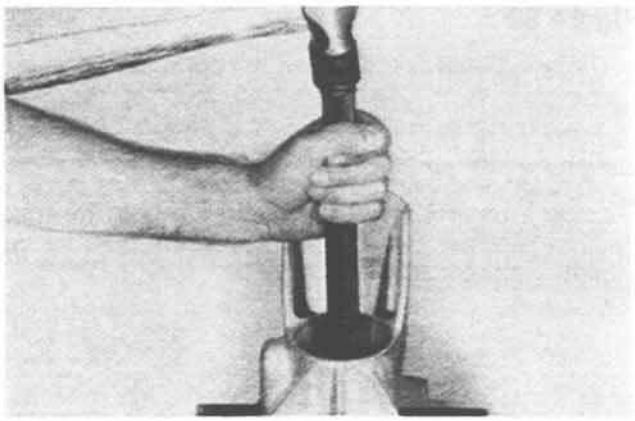

Figure 58 1018-58

Assemble the outer pinion bearing cup into carrier as shown.

Tools: D-144 Installer, C-4171 Handle.

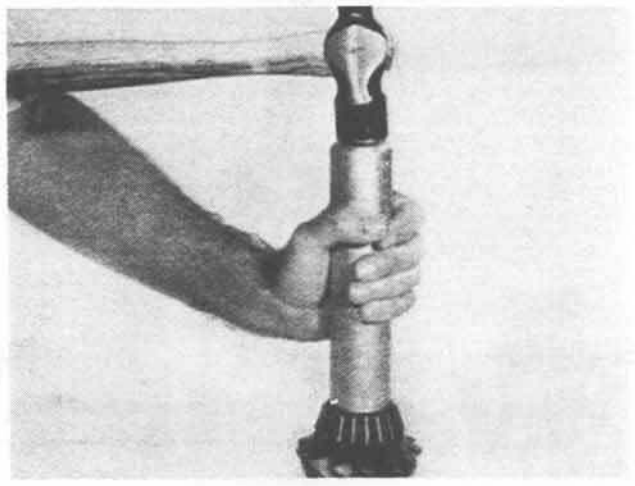

Figure 59 1018-59

Assemble the inner pinion bearing cone on the pinion. Place the bearing installer over pinion shaft as shown. Drive the bearing on the shaft until it is completely seated against the thrust face of pinion.

Tool: W-262 Installer.

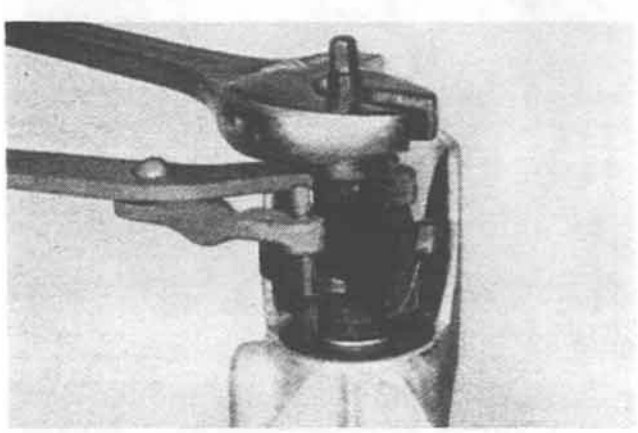

Figure 60 1018-60

Insert the pinion into the carrier.

Assemble the outer pinion bearing cone, slinger and end yoke onto pinion spline (do not assemble the oil seal and pinion bearing preload shims at this time).

Use the yoke installer (as shown) to draw the end yoke onto the pinion spline.

Tools: W-162 Installer, C-3281 Holder.

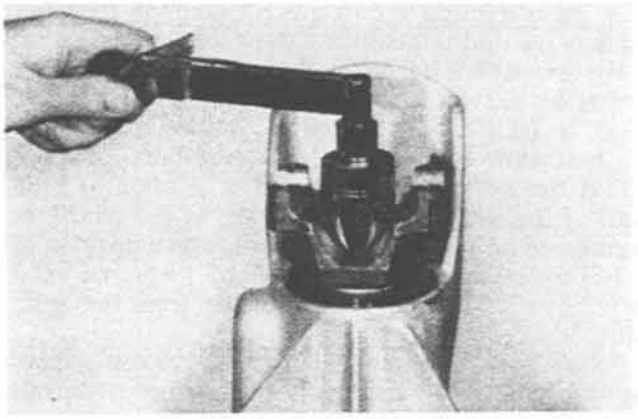

Figure 61 1018-61

Assemble the washer and pinion nut. Torque the nut until it requires 10 lbs. in. (1.13 N·m) to rotate the pinion. Rotate the pinion several revolutions before checking pinion position. This is done to seat the bearings and assure a more accurate reading.

NOTE

The reason for not assembling the pinion oil seal and preload shims at this time is due to the possibility of having to adjust pinion bearing preload or pinion position. It would be necessary to again remove the oil seal; and as mentioned, whenever seals are removed, they are to be replaced with new ones.

DIFFERENTIAL CARRIER ASSEMBLY

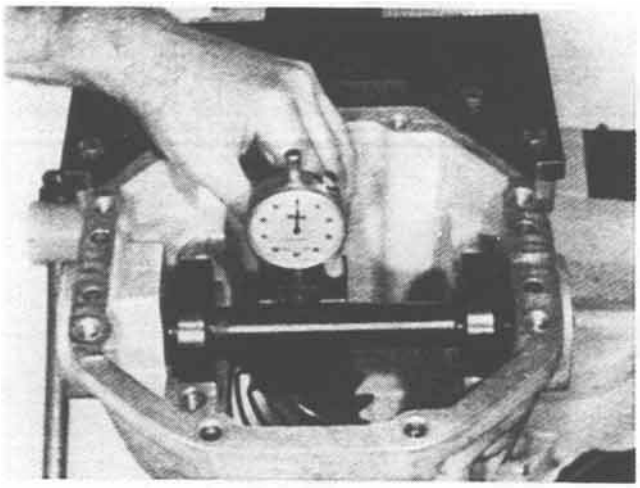

Figure 62 1018-62

Place the arbor discs and arbor into the cross bore of the carrier. Place the pinion height block on the button end of the pinion. Set dial indicator of scooter gage at zero (0). Slide the scooter gage towards the arbor. As discussed in Figure 55, the indicator will show the greatest clockwise reading when it is at the top center of arbor. This reading indicates the position of the pinion.

An indicator reading within .002" (.05 mm) of the etching on the pinion is considered acceptable. If pinion position is not within plus or minus (±) .002" (.05 mm) of the etching on the button of the pinion, refer to the pinion setting charts in Figures 48 or 49 as a guide to how much change in the shim stack is needed to position the pinion properly.

For example: If the etch on the button of the pinion is +2 (m+5) and the indicator reading is -.003" (-.08 mm), the pinion is installed too close to the centerline of the differential crossbore. It is not within the acceptable tolerance of ± .002" (±.05 mm) of the pinion etch. Referring to the charts in Figures 48 or 49, in order to move from a position of -3 (-8) to the correct position of +2 (+5), we need to remove .005" (.13 mm) of shims from the shim stack.

Follow the recommended procedures for removing the shim stack and make the change. Reinstall the pinion according to Figure 60 to 61.

Tools: D-115-3 Arbor, D-236-2 Arbor Discs, D-236-1 Pinion Height Block, D-115 Scooter Gage.

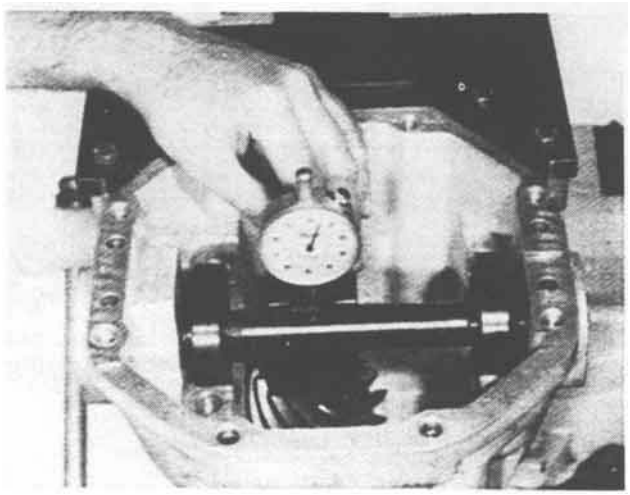

Figure 63 1018-63

When the pinion position is within the acceptable tolerance of ± .002" (± .05 mm) of the pinion etch, remove the pinion nut, washer, end yoke, slinger, outer pinion bearing cone and the pinion. Lubricate the inner and outer bearings by applying a small amount of the specified lube on the rollers of the bearing cone. Install the outer bearing cone and oil slinger into the carrier.

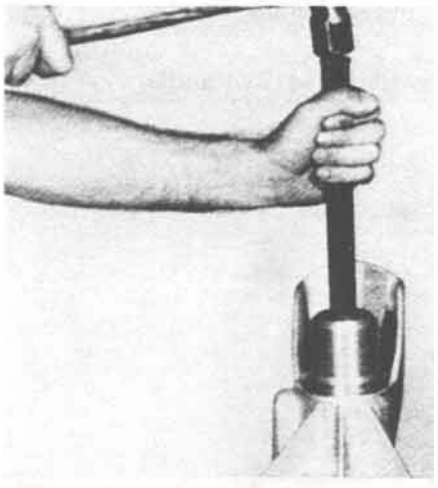

Figure 64 1018-64

Apply a light coat of oil to the lip of a new pinion oil seal, and assemble the seal into the carrier as shown.

Tools: W-147-D Seal Installer, C-4171 Handle.

DIFFERENTIAL CARRIER ASSEMBLY

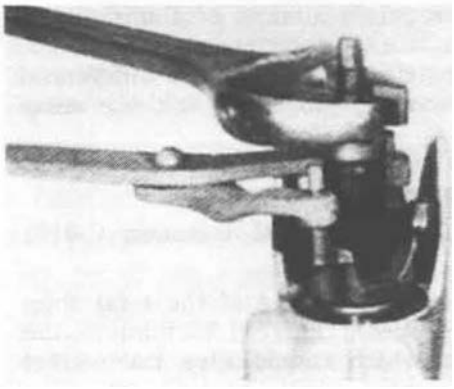

Figure 65 1018-65

Assemble the preload shims, which are equal in thickness to the original shim stack, onto the pinion. Insert the pinion into the carrier. Assemble the end yoke onto the spline of the pinion.

Tools: W-162 Installer, C-3281 Holder.

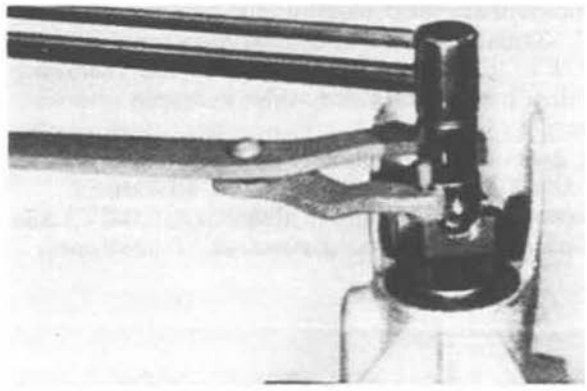

Figure 66 1018-66

Assemble the pinion washer and the new pinion nut. Torque the pinion nut to 200-220 lbs. ft. (271-298 N·m).

Tools: C-3281 Holder, C-4053 Torque Wrench.

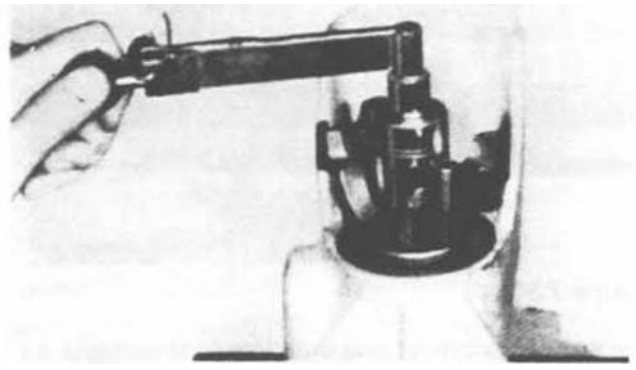

Figure 67 1018-67

Using an inch-pound torque wrench as shown, the pinion rotating torque should read 15-35 lbs. in. (1.69-3.95 N·m) with new bearings. To increase the preload, remove shims, to decrease the preload, add shims.

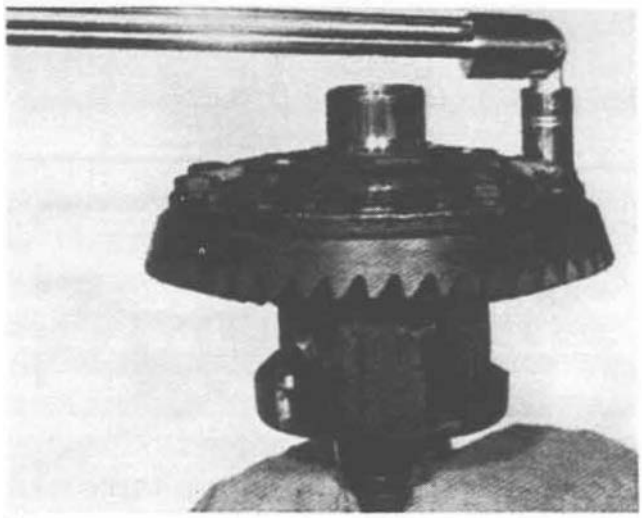

Figure 68 1018-68

Be sure the flange face of the differential case is free of nicks or burrs. Assemble the ring gear to the differential case using new ring gear screws. Draw the screws up alternately and evenly.

Torque the screws to 45-60 lbs. ft. (61-81 N·m).

Tool: C-3952-A Torque Wrench.

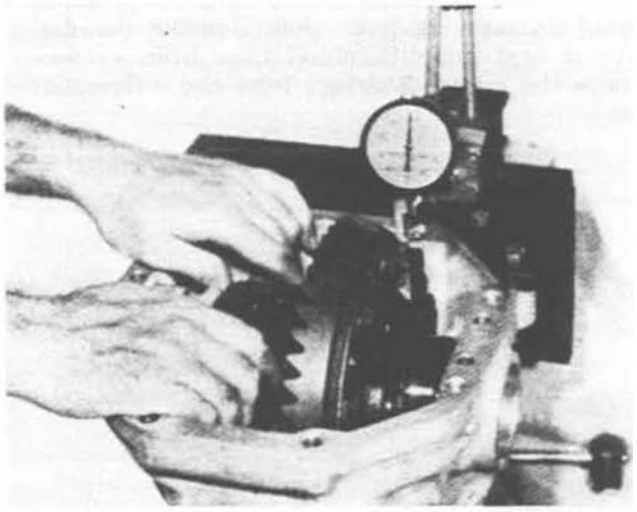

Figure 69 1018-69

Install the master differential bearings onto the case. Remove all nicks, burrs, dirt, etc., from the hubs to allow the master bearings to rotate freely.

Place the differential assembly into the carrier. Set up the dial indicator as shown. Force the differential assembly away from the pinion gear until it is completely seated against the cross bore face of the carrier. With force still applied to the differential case, place the tip of dial indicator on a flat machined surface of the differential case, if available, or on the head of a ring gear screw, and set the indicator at zero (0).

Tools: D-128 Dial Indicator, D-235 Master Bearings.

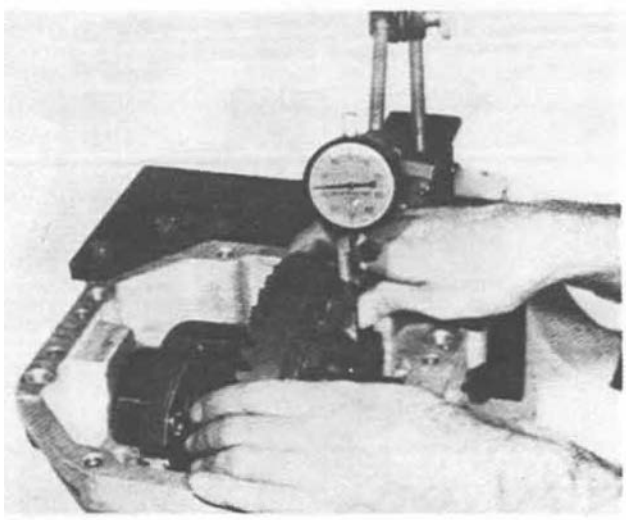

Figure 70 1018-70

Force the ring gear to mesh with the pinion gear. Rock the ring gear slightly to make sure the gear teeth are meshed. Repeat this procedure several times until the same reading is obtained each time. Be sure the indicator reads zero (0) each time the ring gear is forced back into contact with the cross bore face. This reading, minus .005" (.13 mm) for adjustments, will be the necessary amount of shims between the differential case and differential bearing on the ring gear side. Remove the dial indicator and the differential case from carrier. Remove the master bearings from the differential case.

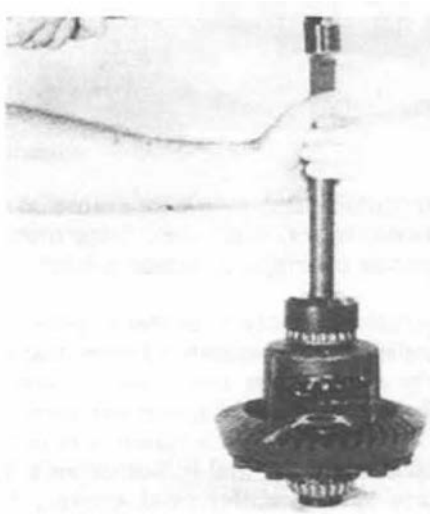

Figure 71 1018-71

Place the differential case onto the adapter as shown.

Assemble the required amount of shims to the ring gear side hub as determined in Figure 70. Place the bearing cone on the hub of the differential case. Use the bearing installer to seat the bearing cone as shown.

The adapter is used to prevent possible damage to hubs while assembling bearing cones.

Tools: C-4487-1 Adapter, D-241 Installer, C-4171 Handle.

Assemble the remaining shims of the total shim pack. Add an additional .009" (.23 mm) to the remaining shims, which should give the correct backlash and differential bearing preload. Assemble the opposite side differential bearing cone as described above.

EXAMPLE: In figure 44 a total of .060" (1.52 mm) was recorded. In figure 70 a total of .026" (.66 mm) was recorded.

This leaves a balance of .034" (.86 mm) for the opposite side of ring gear, and adds up to .060" (1.52 mm) which was obtained at the start.

To compensate for preload and backlash, subtract .005" (.13 mm) from the ring gear side reading and add .009" (.23 mm) to the opposite side reading. The shim pack totals for this example are as follows:

Ring gear side: Original .026" (.66 mm) reading minus .005" (.13 mm) gives .021 " (.53 mm).

Opposite side: Original Balance of .034" (.86 mm) plus .009" (.23 mm) gives .043" (1.09 mm).

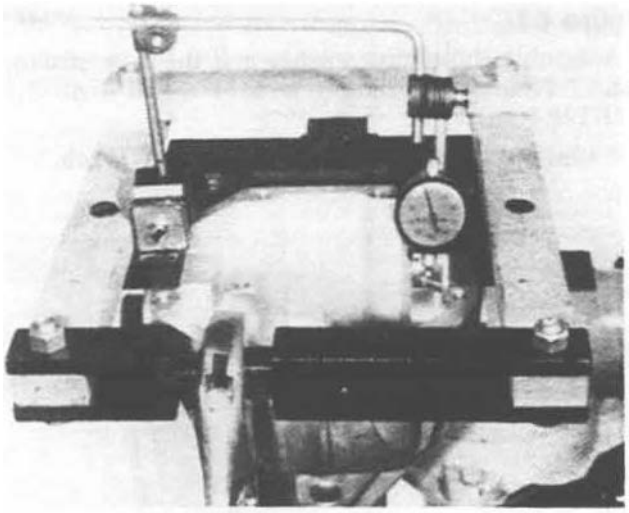

Figure 72 1018-72

Install the spreader and indicator to the carrier as shown.

DO NOT SPREAD THE CARRIER OVER .010" (.25 mm).

Tools: D-113 Spreader, D-242 Spreader Adapters, D-128 Dial Indicator Set.

Remove the indicator.