

Rear axle

Repairs and
Maintenance

Section
4

Group
46

Rear axle
1976-

VOLVO

Contents

	<i>Page</i>
Specifications	1
Special tools	2
Spare parts illustrations	
Rear axle assembly	6
Differential	7
Limited slip differential	8
Descriptions	
Rear axle	9
Differential	10
Limited slip differential	11
Service procedures	<i>Op. No.</i>
On vehicle repairs	
– Checking limited slip differential	A1–A4 12
– Checking end float of axle shaft bearing	B1–B3 13
– Replacing pinion seal	C1–C7 14
– Replacing axle shaft bearing and seal	D1–D21 16
Removing rear axle	E1–E17 21
Disassembling rear axle	F1–F13 25
– Differential without limited slip	F14–F17 28
– Differential with limited slip	F18–F22 29
– Cleaning, inspection	F23 30
Assembling differential	
– Differential without limited slip	G1–G7 32
– Differential with limited slip	G8–G9 34
– Installing pinion	G10–G27 35
Installing differential	H1–H20 40
Installing rear axle	I1–I17 44

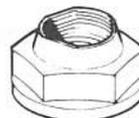
TP 30039/2

3000.06.81

Printed in USA

Specifications

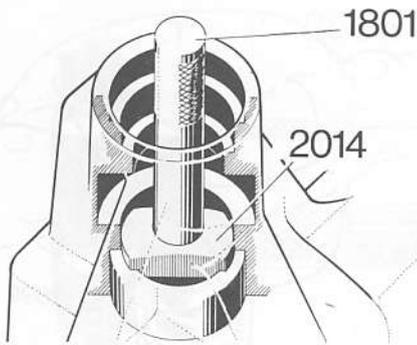
	<i>Metric</i>	<i>US measurements</i>
Rear axle		
Rear axle, type	Semi-floating	
Track	1350 mm	53.15"
Final drive		
Type	Hypoid	
Reduction ratio		
Type 1030	3.73:1, 3.91:1, 4.10:1	
Type 1031	3.54:1, 3.73:1	
Warp, ring gear	max. 0.08 mm	0.0032"
Backlash	0.13–0.18 mm	0.005–0.007"
Pre-loading on pinion bearings		
new bearings	250–450 Ncm	21–39 in.lbs.
used bearings	60–110 Ncm	5–10 in.lbs.
Pre-loading on differential bearings	0.13–0.20 mm	0.005–0.008"
Lubricant		
Quality, standard differential	API GL-5 (Mil L-2105-B)	
limited slip differential	API GL-5 (Mil L-2105-B) with additive for limited slip differential	
Viscosity normal operating conditions	SAE 90	
when temperature is steadily below 15°F = –10°C use	SAE 80	
Capacity: Type 1030	1.3 liters	1.35 US qts
Type 1031	1.6 liters	1.7 US qts
Tightening torques	Nm	ft.lbs.
Caps	50–70	35–50
Ring gear: standard bolt heads	70–80	50–58
flanged bolt heads	90–110	65–80
Wheel nuts	100–140	70–100
Flange nuts: 88626 (3/4" UNF)	240–300	175–220
946831 (3/4" UNF)	200–250	145–180
947855 (M20x15)	200–250	145–180



947855

Special tools

- 1801 **Standard handle**
- 1845 **Press tool 3/4"-16 UNF**
installing drive flange
- 2261 **Puller**
round drive flange
- 2284 **Dial gauge holder**
adjusting final drive
- 2337 **Tool**
removing carrier
- 2392 **Puller**
rear pinion bearing
- 2393 **Measuring tool**
adjusting pinion (ill. at 2284)
- 2394 **Expanding tool**
removing/installing limited slip differential
- 2395 **Drift**
installing rear pinion bearing
- 2404 **Wrench**
installing front pinion bearing
(ill. at 1845)
- 2483 **Puller**
differential carrier bearings
- 2520 **Work stand**
- 2522 **Fixture**
- 2595 **Adjusting rings**
differential
- 2598 **Drift**
removing rear pinion bearing outer ring (ill. at 1801)
- 2599 **Drift**
removing front pinion bearing outer ring and installing differential carrier bearings
- 2600 **Measuring fixture**
for adjusting rings 2595, 2685, 2687, 2689 and 2840
- 2601 **Retainer**
for expanding tool 2394 (ill. at 2394)
- 2685 **Adjusting ring**
pinion
- 2686 **Press tool**
installing pinion bearing outer rings
- 2709 **Extractor**
drive shaft
- 2714 **Fixture**
removing/installing rear axle
- 2779 **Socket**
removing propeller shaft
- 2806 **Drift**
installing seal on drive flange
- 2809 **Holder**
plate and dial gauge
- 2838 **Press tool**
removing/installing drive shaft bearing and snap ring
- 2840 **Adjusting ring**
pinion height (ill. at 2685)
- 2841 **Wrench**
for adjusting rings 2840, 2685 and 2689 (ill. at 2685)
- 2842 **Sleeve**
installing rear pinion bearing outer ring (ill. at 2395)
- 2843 **Drift**
removing rear pinion bearing outer ring (ill. at 1801)
- 2844 **Puller**
rear pinion bearing (ill. at 2392)
- 2845 **Press tool**
installing pinion bearing outer rings (ill. at 2686)
- 2846 **Socket**
removing propeller shaft (ill. at 2779)
- 2917 **Extractor**
brake pads
- 4112 **Drift**
installing differential carrier bearings
- 5009 **Drift**
installing drive shaft inner seal
- 5010 **Ring**
installing bearing and snap ring on drive shaft (ill. at 2838)
- 5069 **Puller**
Pinion seal
- 5149 **Wrench**
installing/removing drive flange
- 5156 **Press tool**
installing drive flange (ill. at 1845)
- 5157 **Wrench**
for adjusting ring (ill. at 2685)
- 5214 **Ring**
(for tool 5215/5216)
- 5215 **Puller**
pinion bearing (1030 axle)
- 5216 **Puller**
pinion bearing (1031 axle)



101 793

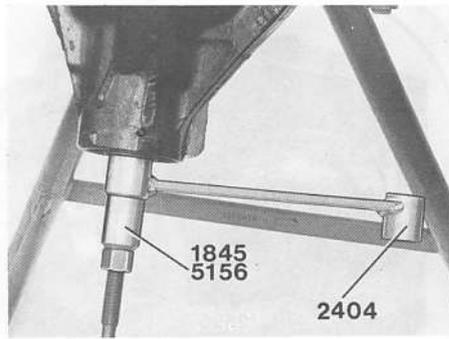
1801 **Standard handle**

2598 **Drift**

removing rear pinion bearing
outer ring

2843 **Drift**

removing rear pinion bearing
outer ring



128 840

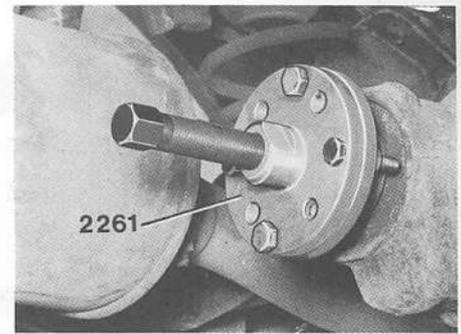
1845 **Press tool 3/4"-16 UNF**
installing drive flange

2404 **Wrench**

installing front pinion
bearing

5156 **Press tool**

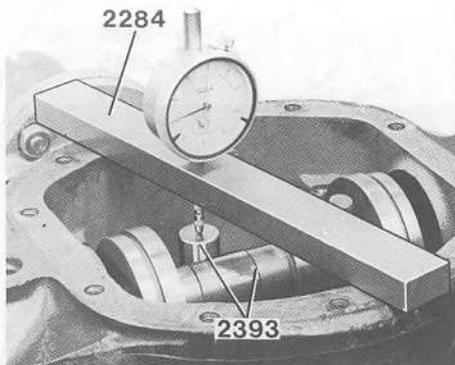
installing drive flange



128 809

2261 **Puller**

round drive flange

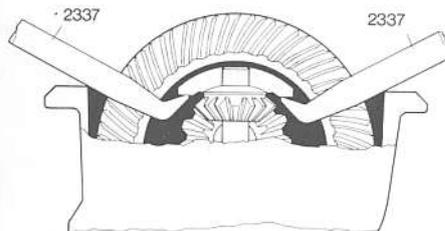


128 838

2284 **Dial gauge holder**
adjusting final drive

2393 **Measuring tool**

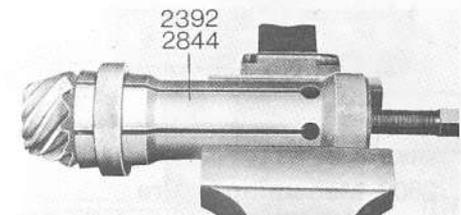
adjusting pinion



118 781

2337 **Tool**

removing carrier

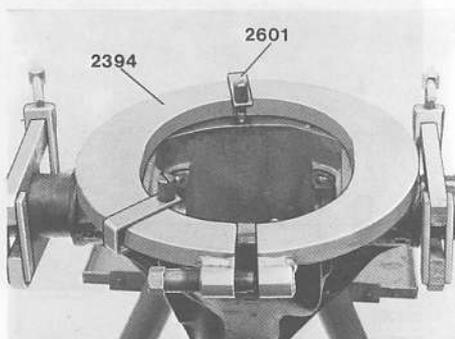


24 532

5215 **Puller (1030) new**
rear pinion bearing

5216 **Puller (1031) new**
rear pinion bearing

5214 **Ring new**



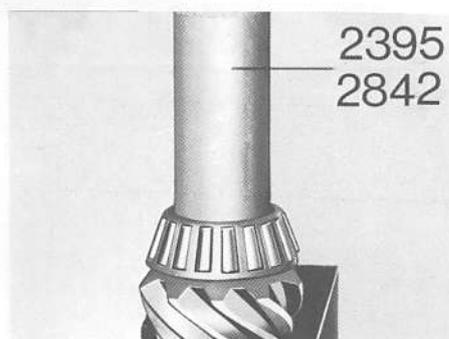
128 847

2394 **Expanding tool**

removing/installing limited
slip differential

2601 **Holder**

for expanding tool 2394



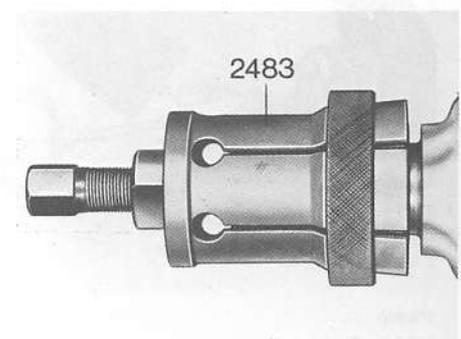
24 533

2395 **Drift**

installing rear pinion
bearing

2842 **Sleeve**

installing rear pinion bearing
outer ring

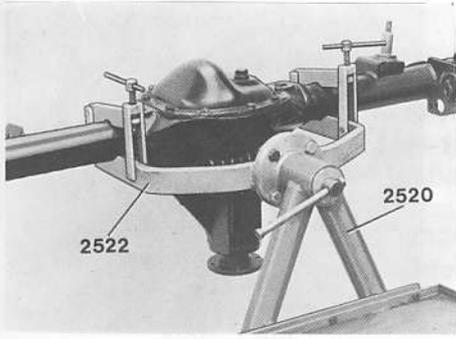


100 652

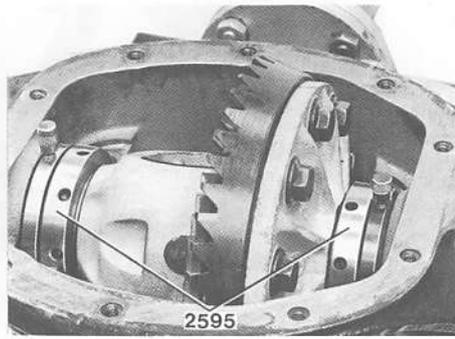
2483 **Puller**

differential carrier bearings

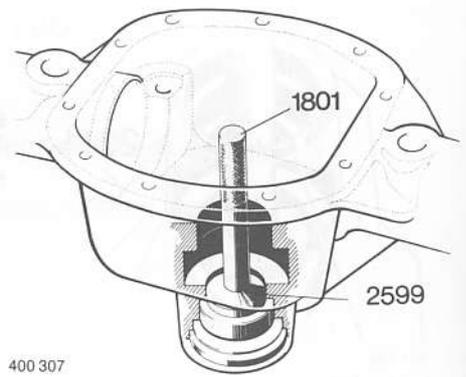
Special tools



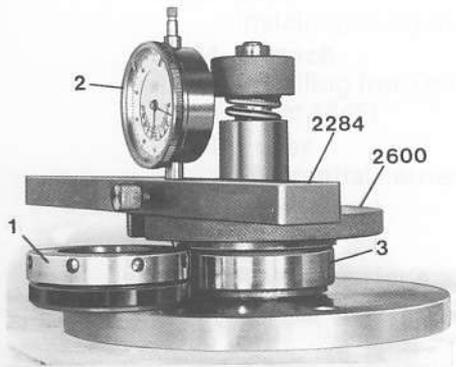
128 829
2520 **Work stand**
2522 **Fixture**



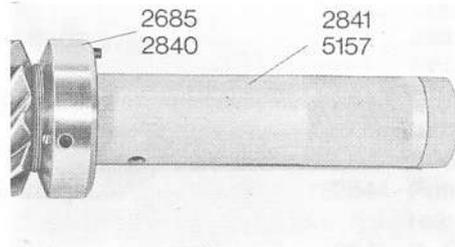
128 844
2595 **Adjusting rings**
differential



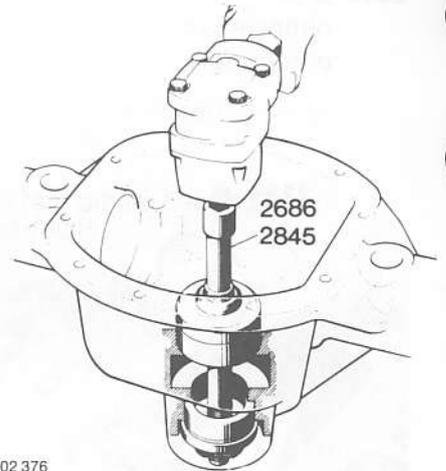
400 307
2599 **Drift**
removing front pinion bearing
outer ring and installing
differential carrier bearings



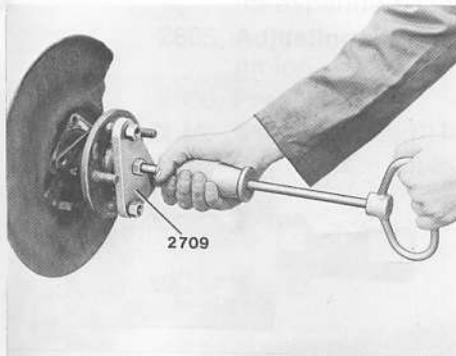
101 796
2600 **Measuring fixture**
for adjusting rings 2595, 2685,
2687, 2689 and 2840



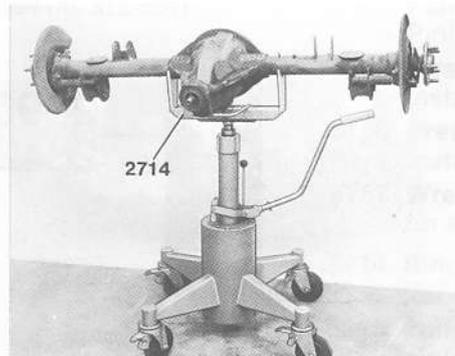
107 192
2685 **Adjusting ring**
pinion
2840 **Adjusting ring**
pinion height
2841 **Wrench**
for adjusting rings 2840, 2685
and 2689
5157 **Wrench**
for adjusting ring



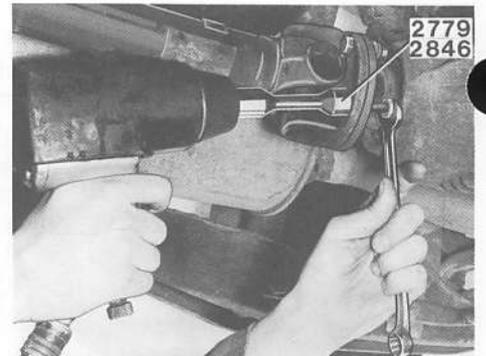
102 376
2686 **Press tool**
installing pinion bearing outer
rings
2845 **Press tool**
installing pinion bearing outer
rings



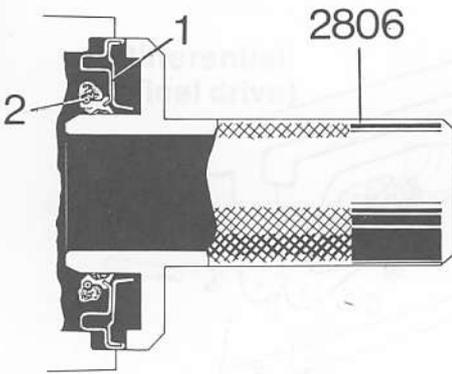
128 830
2709 **Extractor**
drive shaft



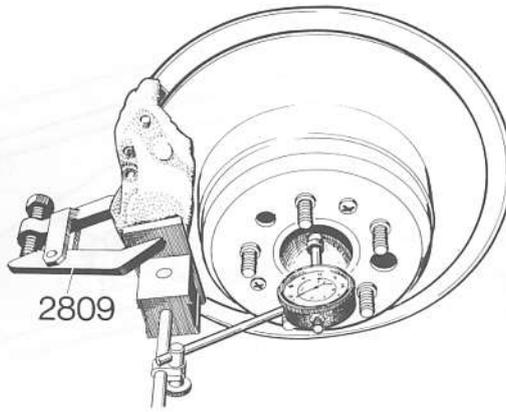
128 828
2714 **Fixture**
removing/installing rear axle



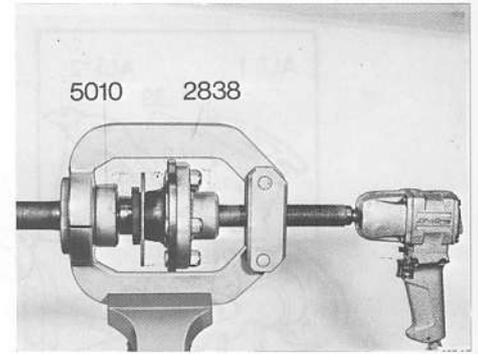
128 807
2779 **Socket**
removing propeller shaft
2846 **Socket**
removing propeller shaft



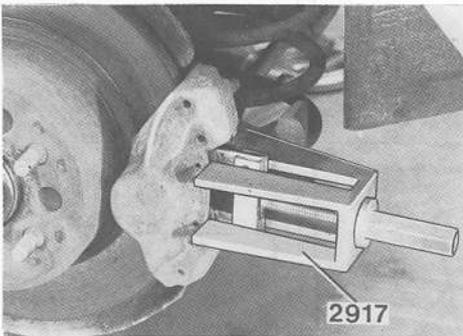
103 031
2806 **Drift**
installing seal on drive flange



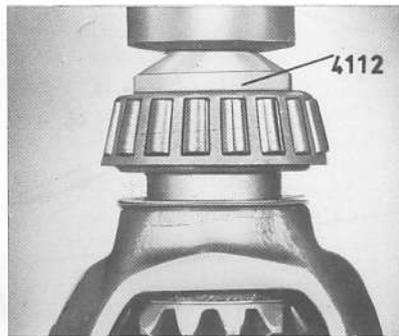
118 414
2809 **Holder**
plate and dial gauge



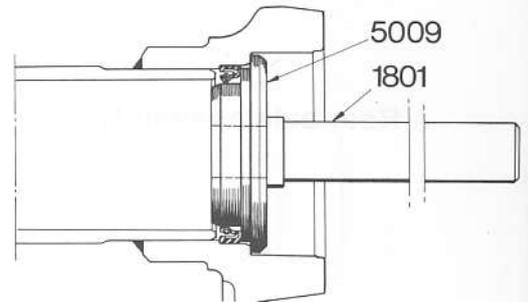
103 176
2838 **Press tool**
removing/installing drive shaft
bearing and snap ring
5010 **Ring**
installing bearing and snap ring
on drive shaft



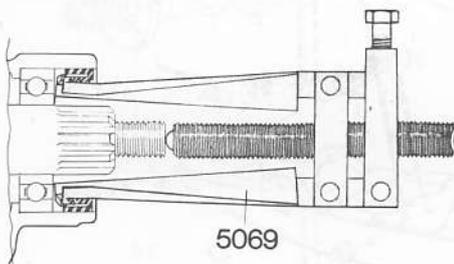
128 806
2917 **Extractor**
brake pads



22 044
4112 **Drift**
installing differential carrier
bearings



108 161
5009 **Drift**
installing drive shaft inner
seal



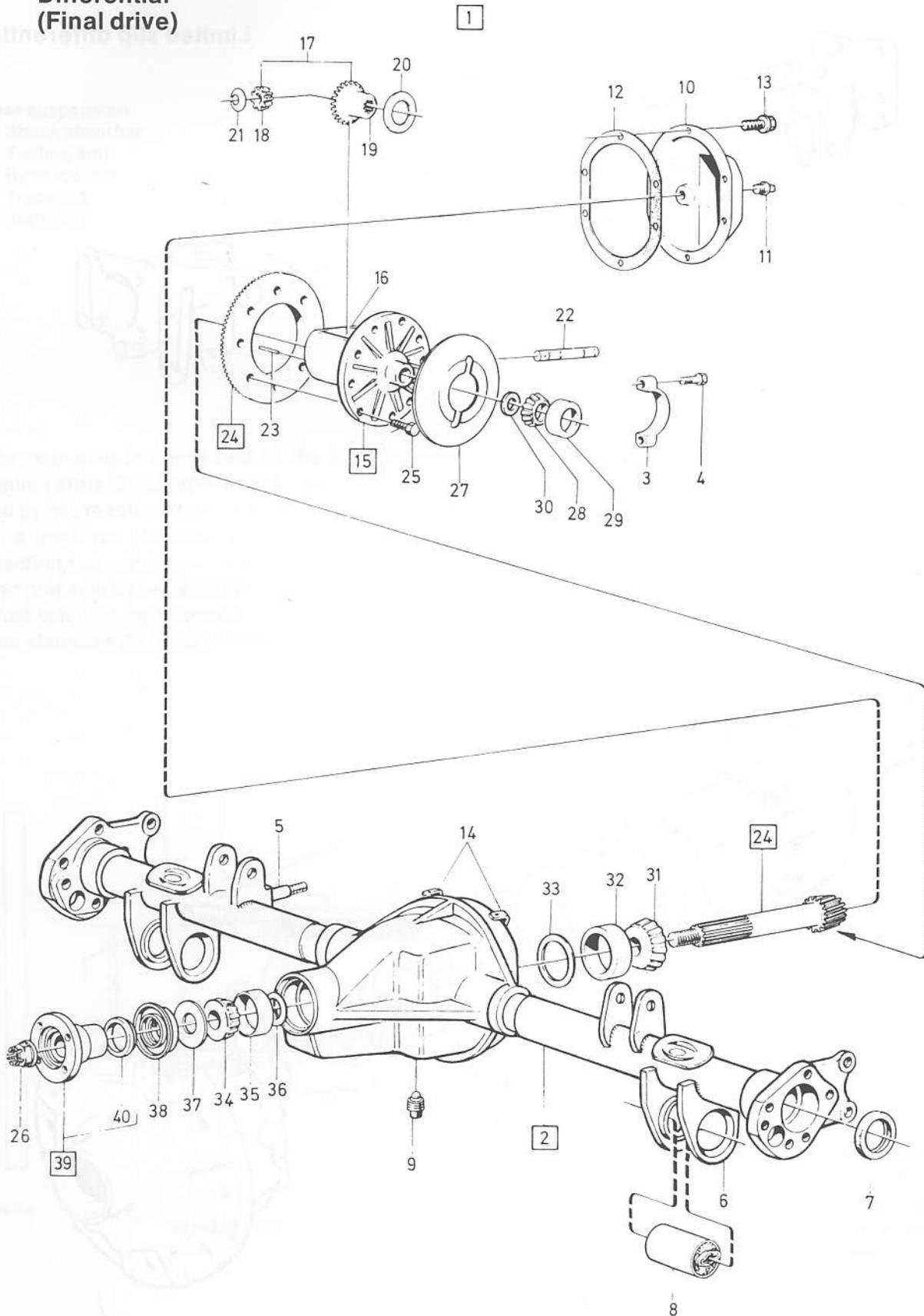
109 245
5069 **Puller**
pinion seal



128 808
5149 **Wrench**
installing/removing drive flange

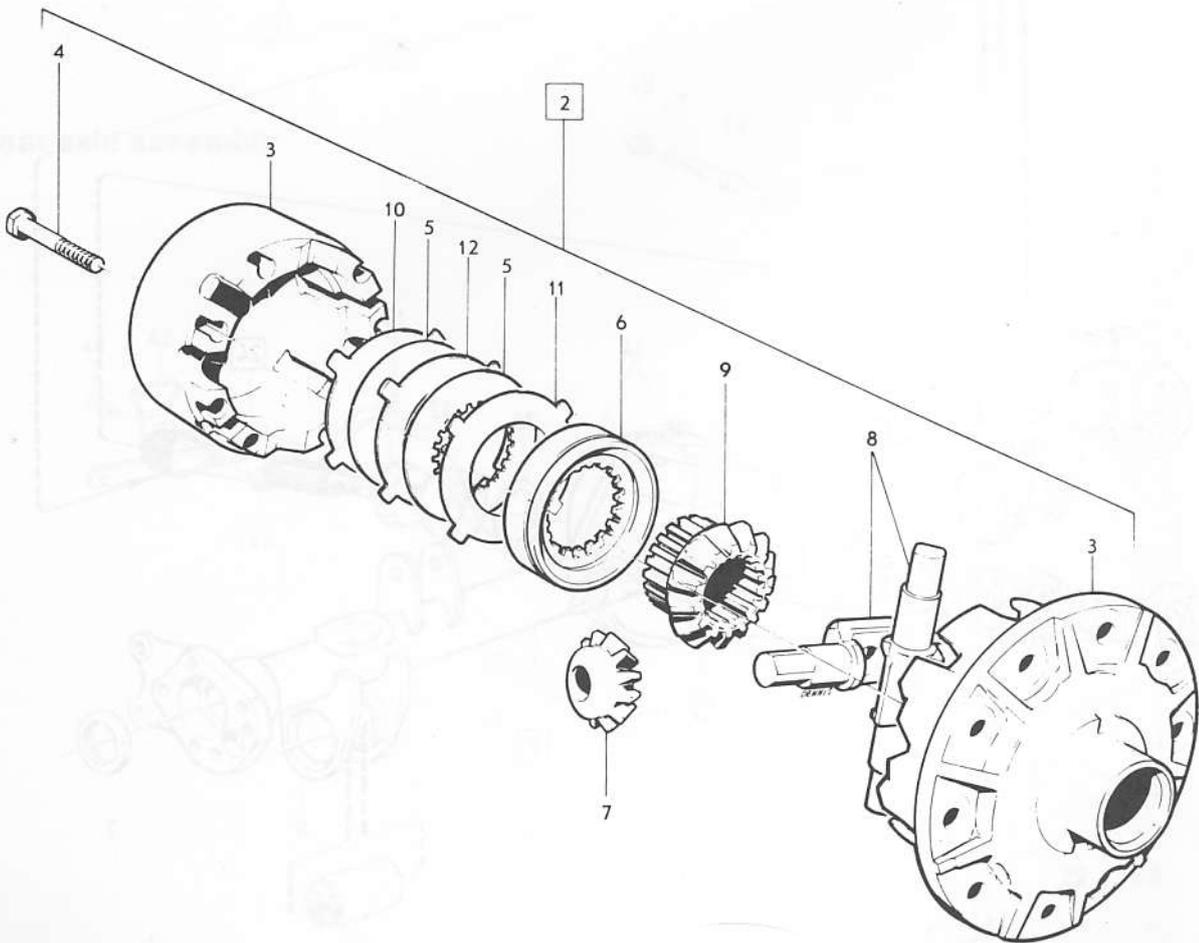
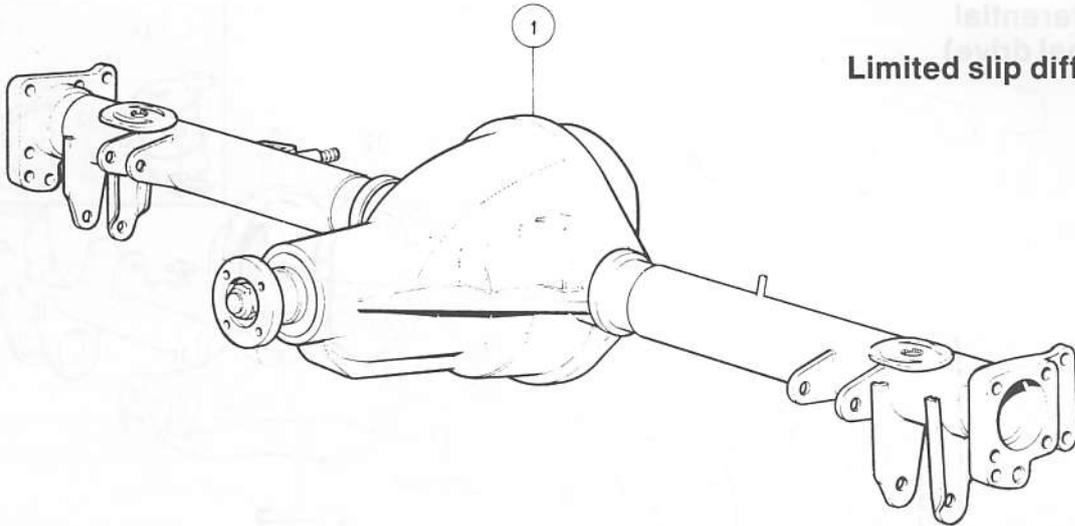
Description, rear axle

Differential
(Final drive)



Differential

Limited slip differential

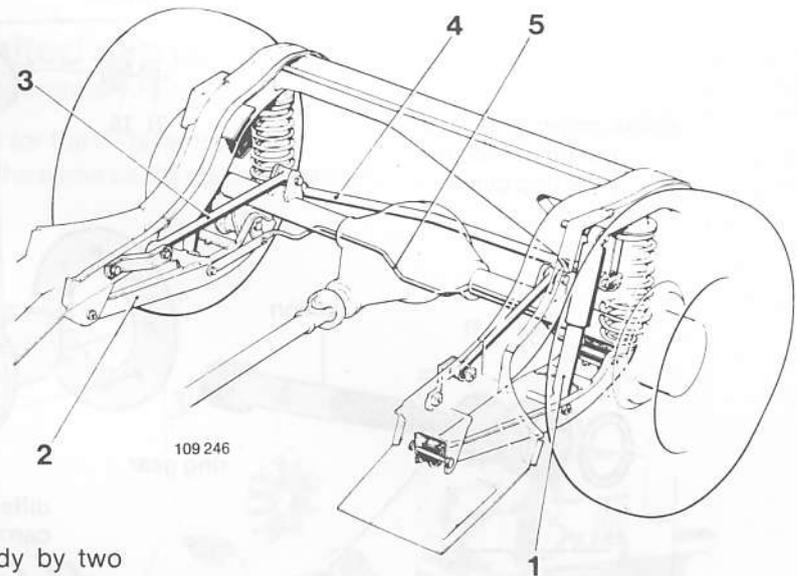


129 342

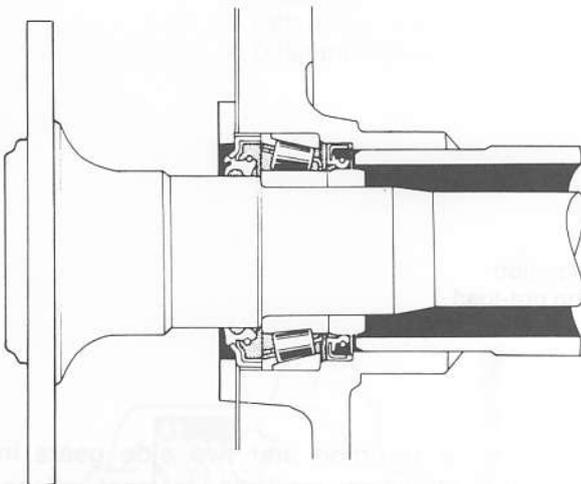
Description, rear axle

Rear suspension

1. Shock absorber
2. Trailing arm
3. Reaction rod
4. Track rod
5. Stabilizer



The rear axle is connected to the body by two trailing arms (2). Longitudinal forces are transferred by two reaction rods (3) and transversal forces by a track rod (Panhard rod) (4). Trailing arms, reaction rods and track rod are attached to body and rear axle by replaceable rubber bushings. Most vehicles (not wagons), are equipped with a rear stabilizer (5) fitted between the trailing arms.

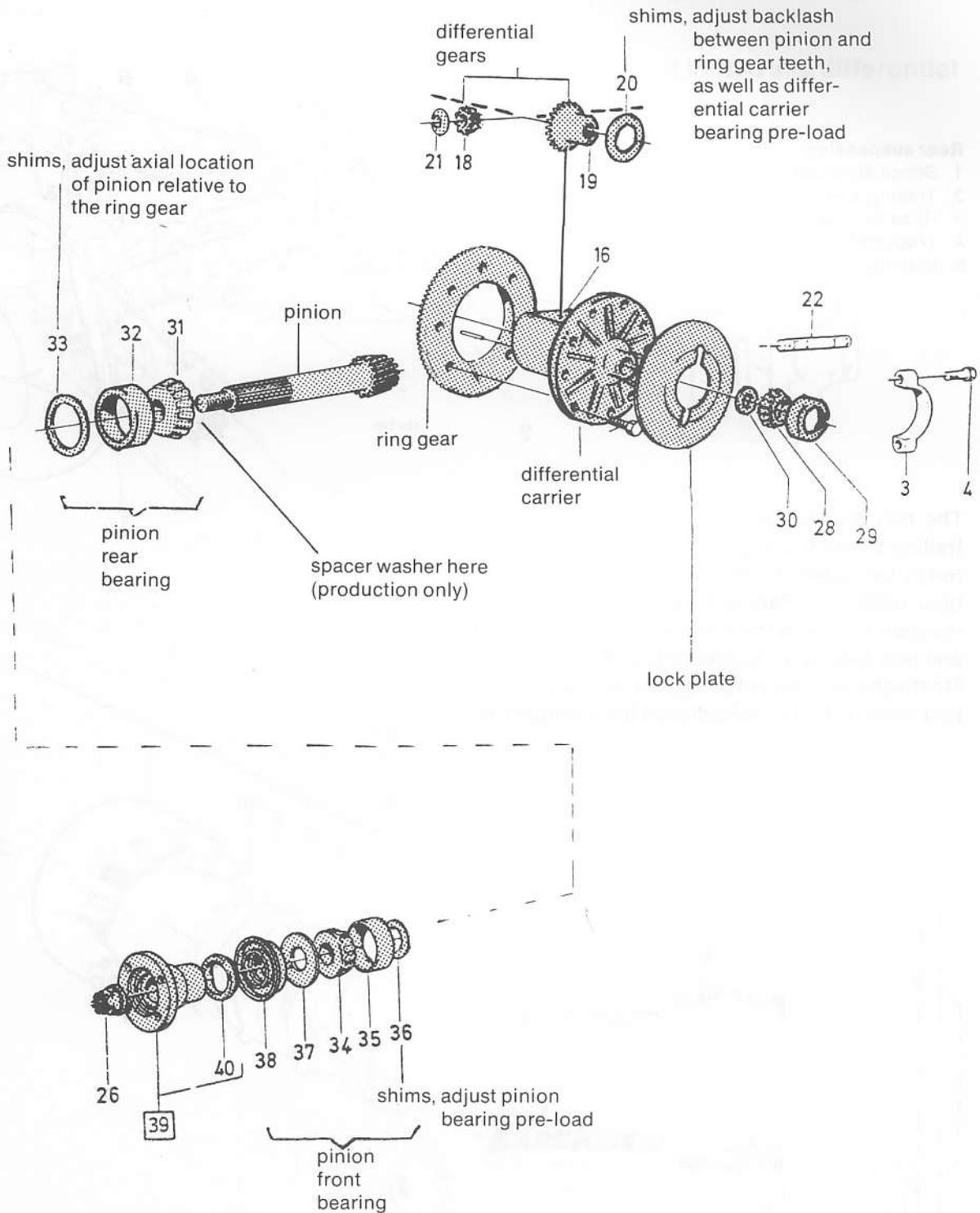


108 159

Drive shaft journaling

The outer ends of the drive shafts are journaled in taper roller bearings. Bearing clearance is not adjustable and is determined by bearing design, see Fig. left. Oil seals are provided on the outside of the drive shaft bearings.

Description, differential



129 339

The final drive is of the hypoid type, which means that the drive pinion lies below the center of the ring gear. It consists of pinion, ring gear and differential gear. Gear backlash and differential carrier bearing tension are adjusted by shims inside the differential carrier bearings. Differential carrier and ring gear assembly are journaled in the final drive housing by two taper roller bearings. The ring gear is attached to the differential carrier by bolts. The differential gears in the differential carrier consist of two bevel

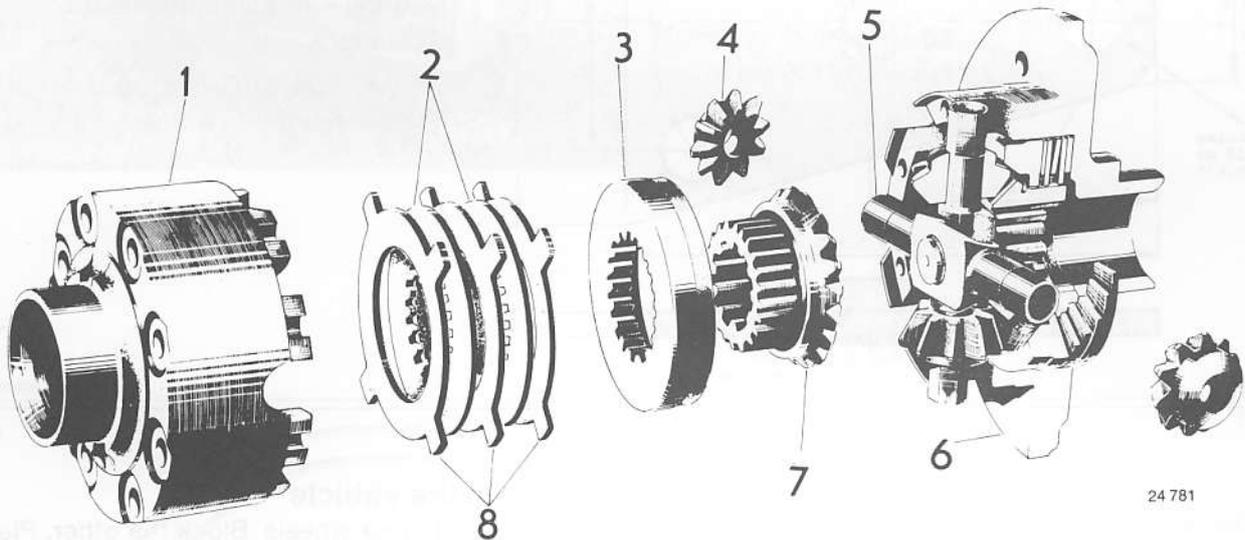
pinions on a trunnion and two side gears in which drive shafts are carried by internal splines. The differential gears are journaled so that they can rotate and permit the drive shafts to rotate at different speeds when the car is being driven in curves. There is a thrust washer under each of the differential gears. The pinion bearings are taper roller bearings. The axial location of the pinion relative to the ring gear is adjusted by shims under the outer race of the rear pinion bearings.

Group 46
Rear axle

Limited slip differential

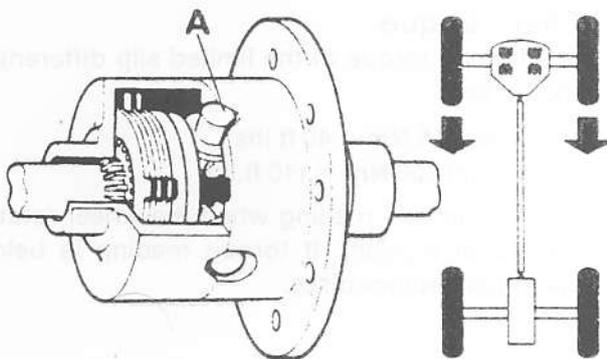
("Differential brake", "anti-spin")

Except for the differential assembly, the design is the same as for standard differential.



24 781

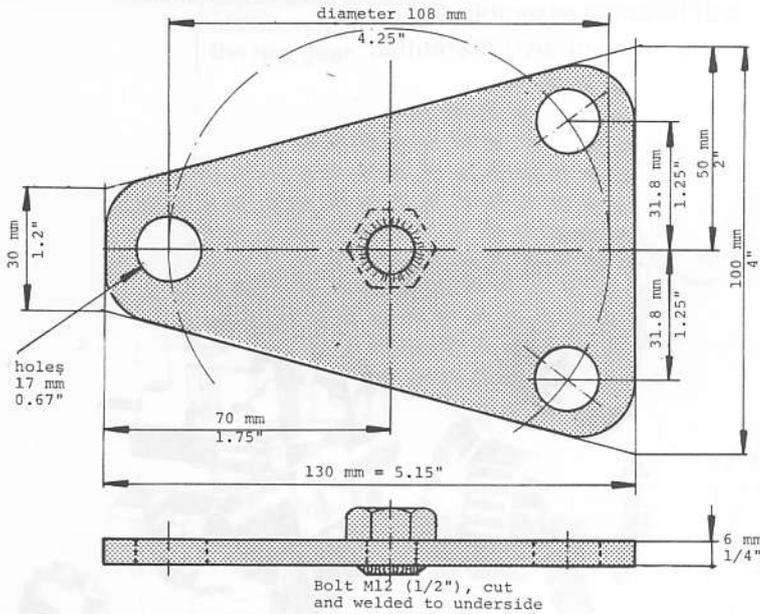
- | | |
|---|--|
| 1 Differential carrier, smaller section | 5 Spider |
| 2 Discs internal teeth | 6 Differential carrier, larger section |
| 3 Differential side gear retainer | 7 Differential side gear |
| 4 Differential pinion gear | 8 Discs, external, teeth |



Two shafts make up the spider for the differential pinion gears. On the side where it is against the differential carrier, each shaft has a V-shaped bevel. The differential carrier is correspondingly designed. When power from the engine starts to drive the vehicle, the shafts (A) glide up the beveled recess in the differential carrier. This compresses the friction plates behind the differential side gears so that the differential assembly brakes. The bevel angle on the differential carrier is designed and chosen in such a way that the differential gears are not entirely locked, but max. 75% of engine torque can be transmitted to a drive shaft.

On vehicle repairs

Checking limited slip differential



A1

Fabricate tool

As shown in illustration out of 3/16" steel stock.

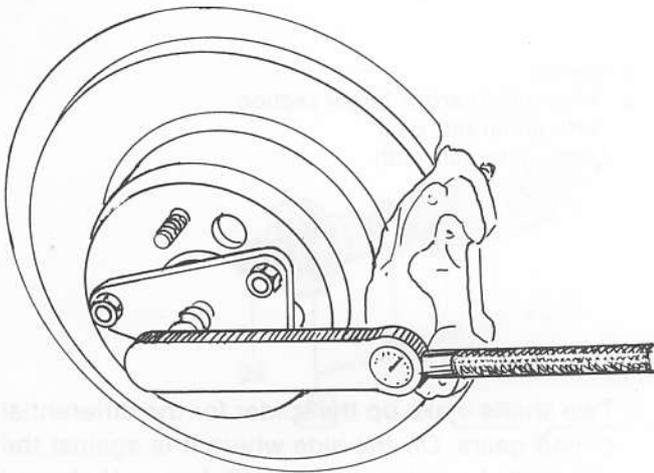
Special tool 2709 can be used after necessary modifications.

129 391

A2

Jack up the vehicle

At one of the rear wheels. Block the other. Place gear lever in neutral. Release parking brake. Remove the wheel.



A3

Place tool over wheel studs

A4

Check torque

The friction torque of the limited slip differential should be:

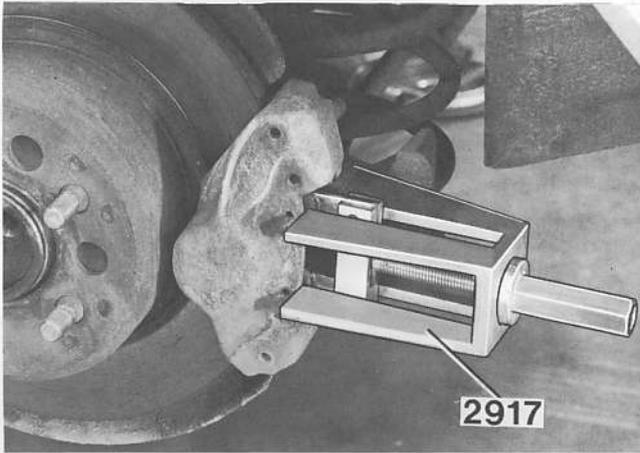
minimum **55 Nm** = 40 ft.lbs

maximum **150 Nm** = 110 ft.lbs

Note the torque reading when the wheel rotates (rotational friction). If torque reading is below minimum, replace discs.

128 802

Checking end float on axle shaft bearing



The end float for the axle shafts cannot be adjusted. However, it may be necessary to determine whether the end float is within acceptable limits.

B1

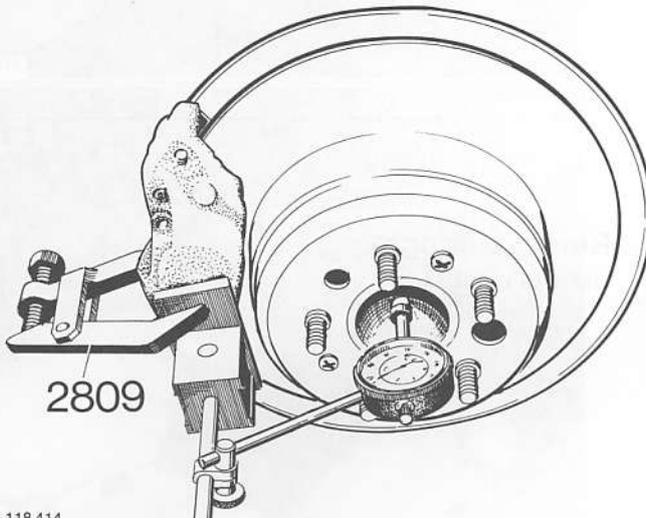
Jack up vehicle and remove wheel.

Remove brake pads.

Use puller 2917 if necessary.

128 806

B2



Install measuring equipment.

- Use tool 2809 to clamp an iron plate against the brake caliper's boss.
- Use a dab of grease to place a steel ball in the center hole of the axle shaft.
- Place the stand for the dial gauge on the iron plate. Place the dial gauge measuring point (which must have a flat surface) against the steel ball.

118 414

B3

Measure end float.

The end float should be $0.01\text{--}0.35\text{ mm} = 0.004\text{--}0.014\text{''}$.

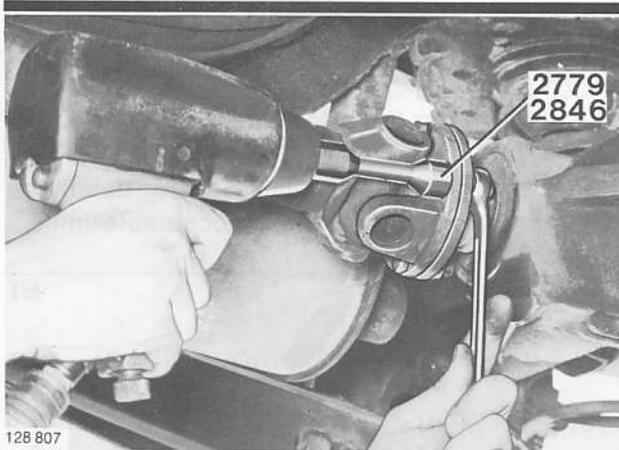
To obtain total end float, the axle shaft must be rotated at least one revolution in both directions.

NOTE:

Prior to installation, bearings for the axle shafts have considerably greater clearance. It is reduced at installation.

Repeat procedure for other axle shaft.

Replacing pinion seal (on vehicle)



C1

Disconnect drive shaft at pinion

Use socket 2779 or 2846.

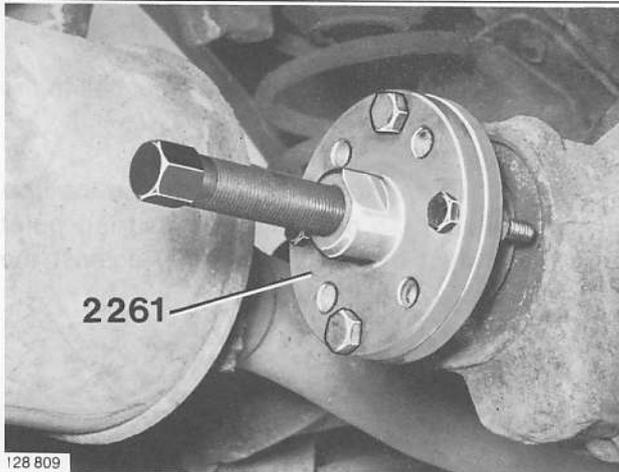
Check condition of pinion and bearings. If found to be loose, the final drive is to be removed and overhauled.



C2

Remove flange nut.

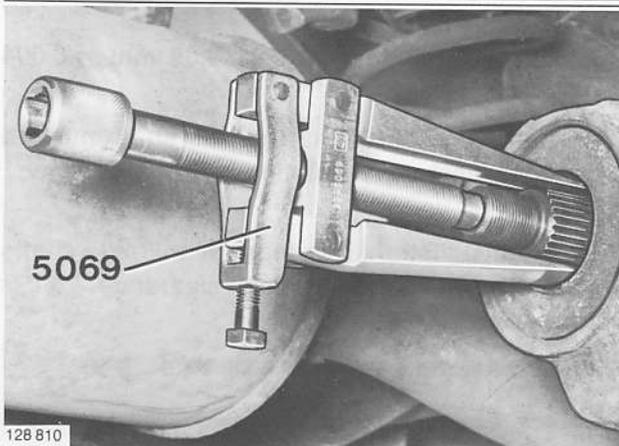
Use wrench 5149.



C3

Remove flange.

Use puller 2261.



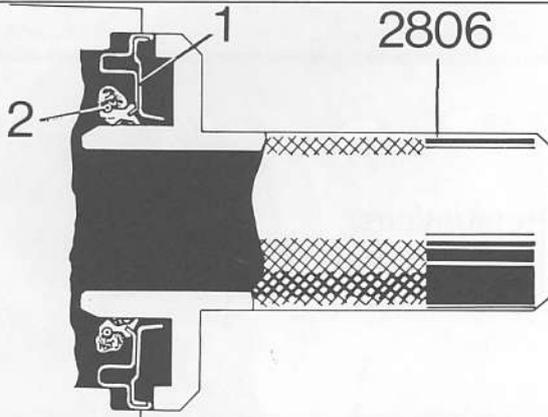
C4

Remove seal.

Use extractor 5069.

Also remove protecting shield.

C5



Install new seal

Use drift 2806.

Pack the new seal spring with grease. Otherwise the spring might jump out of position during installation. Also grease the seal lips.

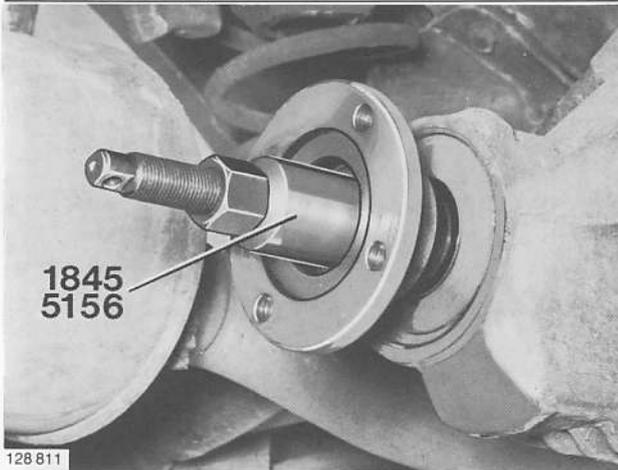
Illustration:

1 = seal

2 = spring with layer of grease

103 031

C6



Install flange.

Use tool 1845 or 5156.

Torques:

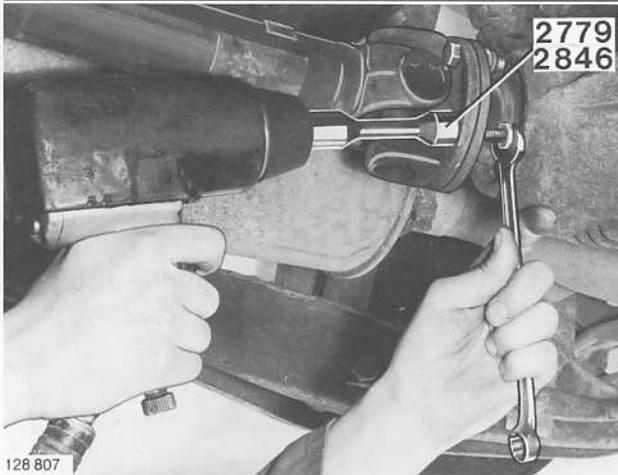
nut 88626 (3/4" UNF): 240-300 Nm
= 175-220 ft.lbs.

nut 946831 (3/4" UNF): 200-250 Nm
= 150-185 ft.lbs.

nut 947855 (M20 x 1.5): 200-250 Nm
= 150-185 ft.lbs.

128 811

C7

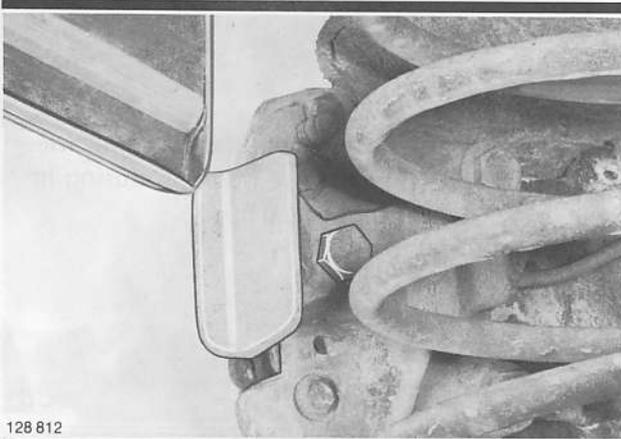


Reconnect drive shaft.

Use tool 2779 or 2846.

128 807

Replacing axle shaft bearing and seal

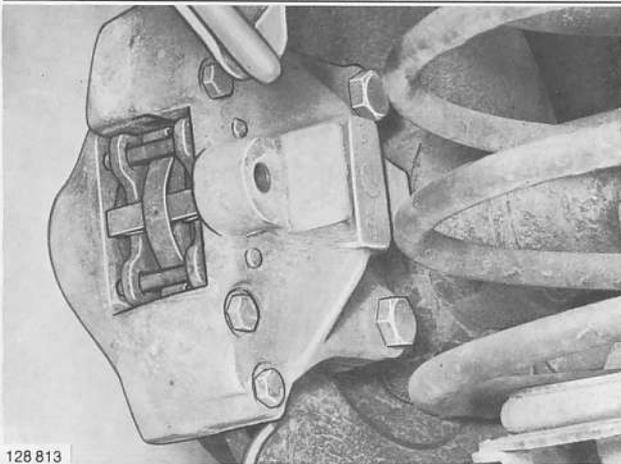


D1

Preparations.

Jack up vehicle. Remove rear wheel.
USA Models: remove collision guard.

128 812

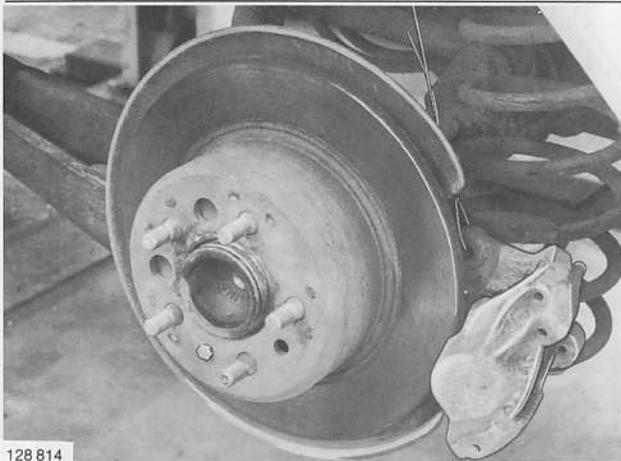


D2

Remove brake parts.

Detach brake line and bracket from rear axle.
Remove brake caliper. Hang it out of way with a length of steel wire to prevent damage to brake pipe.

128 813



D3

Remove brake discs.

Parking brake must be in the full release position.
Remove the two Phillips head screws and lift off the brake discs. Tap on the inside of the disc with a plastic hammer or similar tool if necessary.

128 814



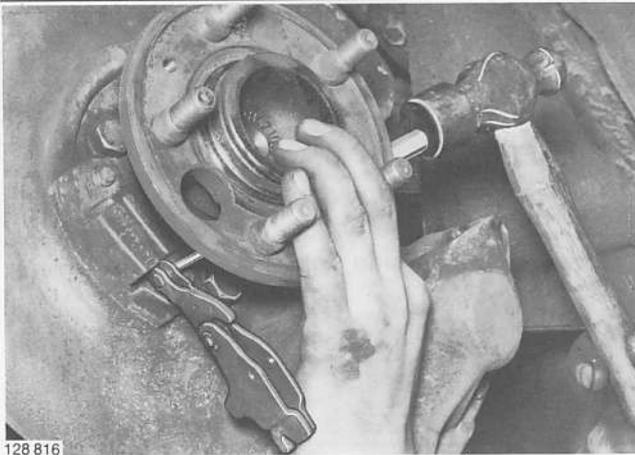
D4

Remove parking brake shoes

Unhook and remove the springs using brake spring pliers.

128 815

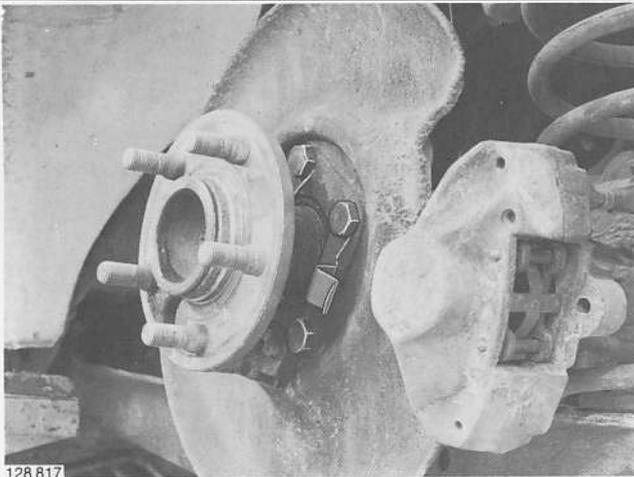
D5



Disconnect parking brake cables.

Press out the lock pin securing the brake cables to the levers. Use 3mm punch if the pin does not fall out.

D6



Free bearing retainers.

Remove four bolts (hex 15mm) to free bearing retainers.

D7



Remove axle shafts.

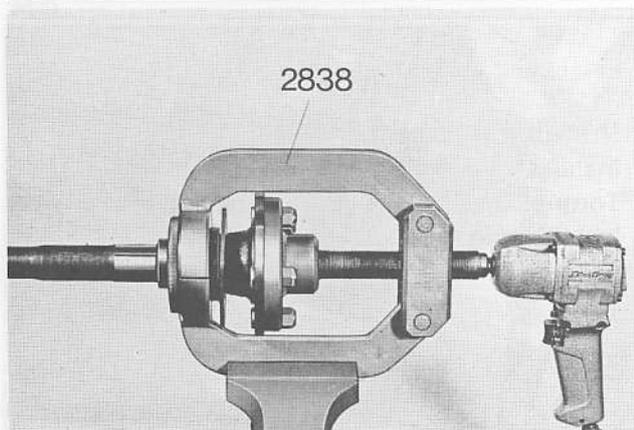
Pull axle shafts out of rear axle assembly using puller tool 2709.

D8

Remove inner seal.

Use tool 2337.

D9

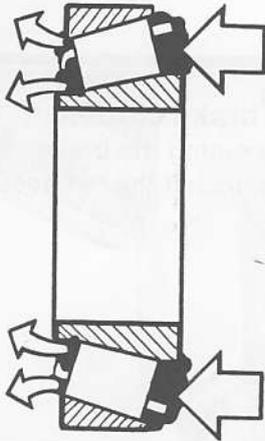


Removing circlip, bearing and bearing retainer plate.

- Place tool 2838 in a vise. Fix shaft in tool.
- Adjust tool so that jaws come between bearing and seal. The seal **MUST NOT** come between tool and bearing.
- Press off circlip and bearing.
- Open tool. Remove parts.
- Discard circlip. It **MUST NOT** be reused.

Replacing axle shaft bearing and seal

D10



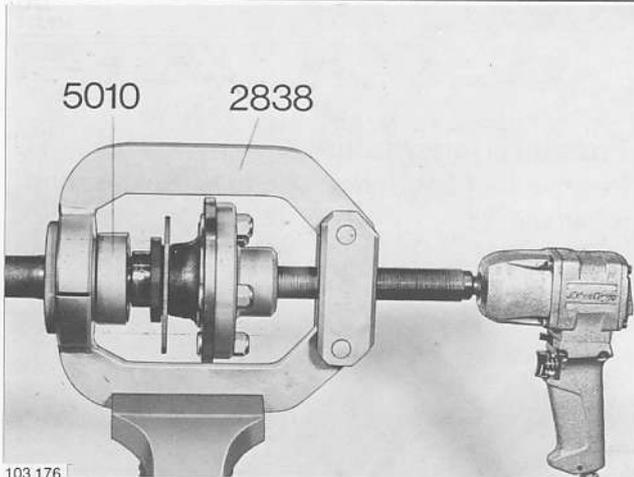
129 392

Prepare bearing and seals for installation.

The new bearing should be completely filled with high quality wheel bearing grease. Press in grease from one side until grease comes out on the other.

Also grease the new seals. Fill the space between the lips with grease.

D11

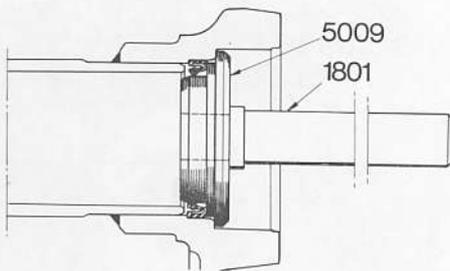


103 176

Installing bearing retainer, bearing and circlip.

Use tool 5010 to press on the bearing.

D12



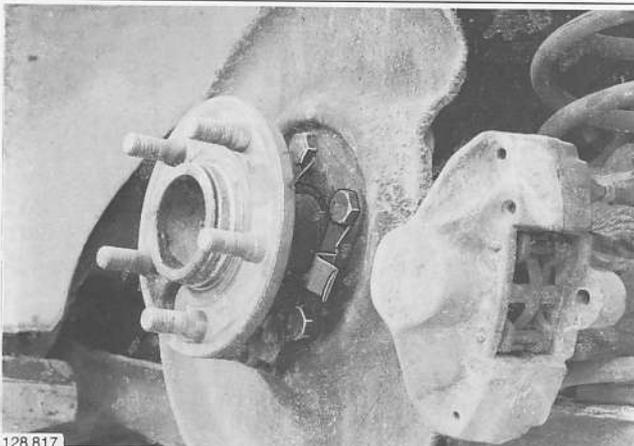
Clean the interior of the rear axle tube.

D13

Install inner seal.

Use tools 5009 and 1801.

108 161



128 817

D14

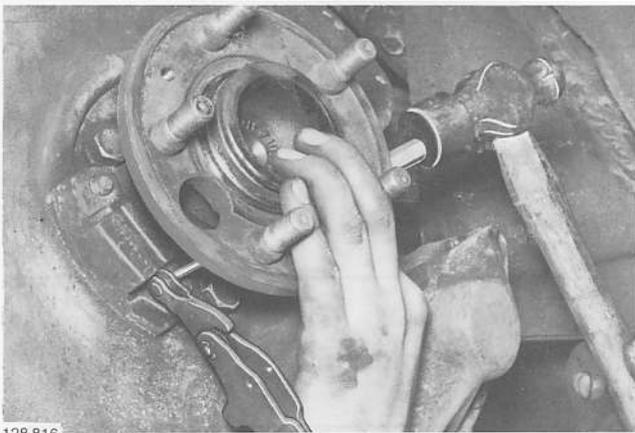
Install axle shaft.

Install screws for bearing retainer.

Torque: 30-50 Nm = 22-36 ft.lbs.

Install brake shoe retaining springs.

D15



128 816

Attach brake cables to levers.

Lubricate all joints and shoe contact surfaces with heat resistant graphite grease.

Press in pin securing brake cables to levers.

D16



128 815

Install parking brake shoes.

Inspect brake lining. Reference appropriate manual for detailed procedures as necessary.

D17

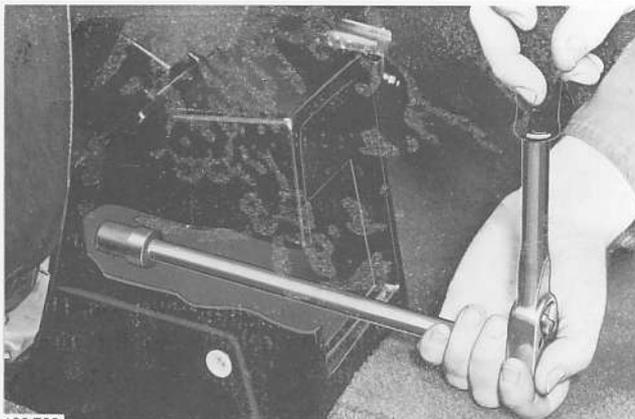


128 814

Install brake discs.

Install discs and secure with two Phillips head screws.

D18



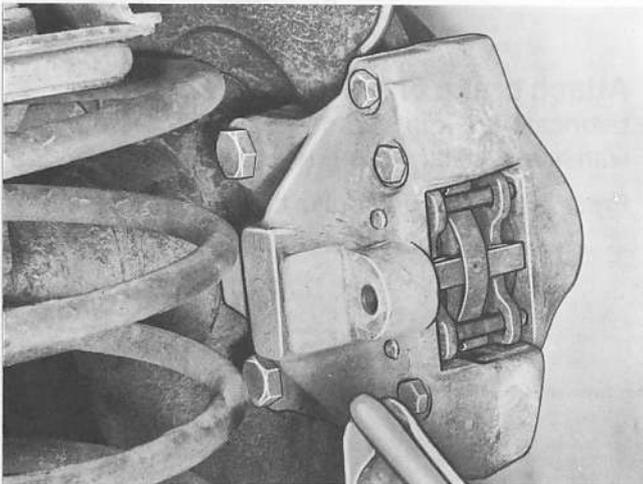
109 700

Adjust parking brake.

Loosen cable at parking brake lever to remove any tension on cables.

The adjusting screw is accessible through ash tray housing.

Use 17 mm socket and extension. Adjust so that brake is fully applied between 2-3 notches of brake lever movement.



128813

D19

Install brake caliper.

Attach brake line and bracket to rear axle.
Use new screws for brake caliper.

D20

Install collision guard.

USA models.

D21

Install wheels.

Torque: $120 \pm 20 \text{ Nm} = 87 \pm 9 \text{ ft.lbs.}$

Removing rear axle

E1

Raise vehicle on lift and remove rear wheels.

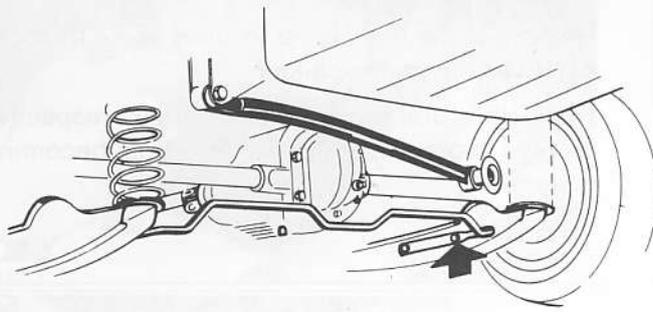
With exhaust pipe below the rear axle, remove intermediate exhaust pipe from front to rear muffler.

E2

Trailing arm front ends.

Loosen the retaining bolts slightly (to allow the trailing arms to rotate freely at the front ends when removing the rear axle).

E3



Remove stabilizer bar.

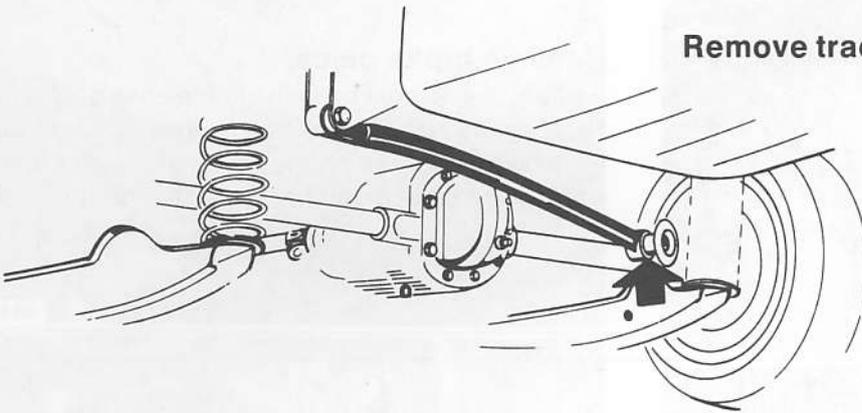
Remove rear retaining bolts (hex 19mm) on each side of bar.

Remove front bolts (hex 17mm) on each side and let stabilizer bar down.

129 328

E4

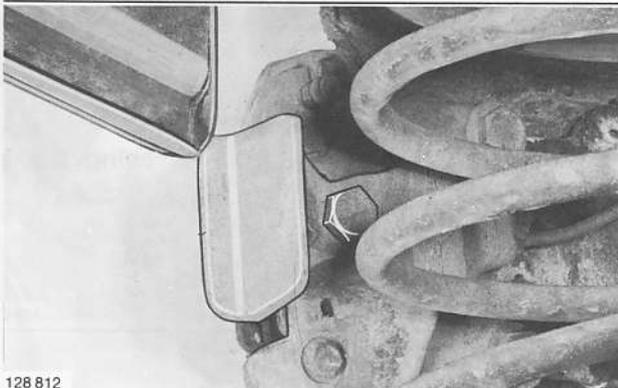
Remove track rod (Panhard rod).



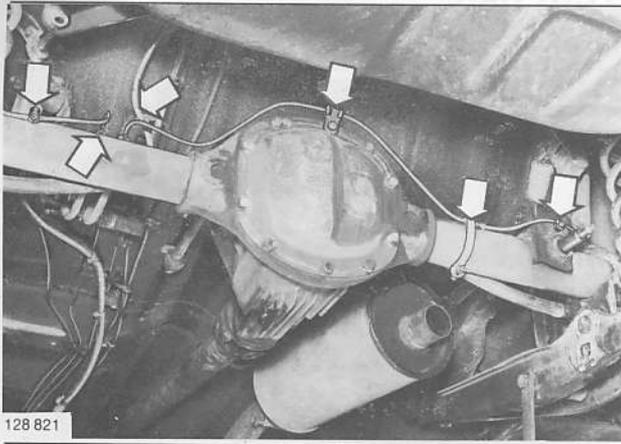
129 329

E5

Remove collision guards.



128 812



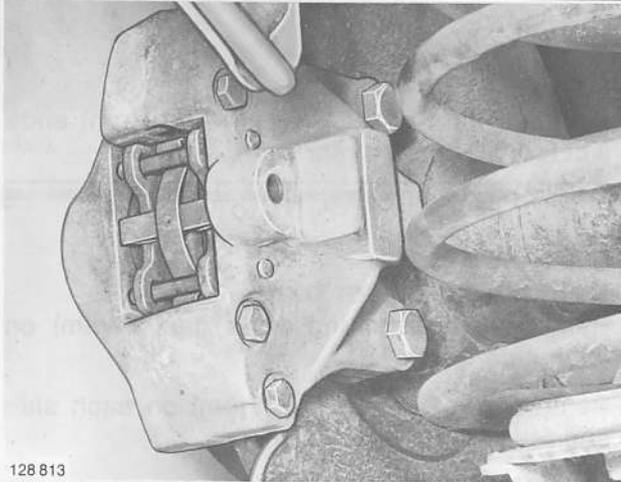
E6

On rear axle.

Disconnect the ventilation hose.

Remove clamps holding brake pipes.

Disconnect the brake pipes from rear axle and secure out of way to prevent damage to pipes.



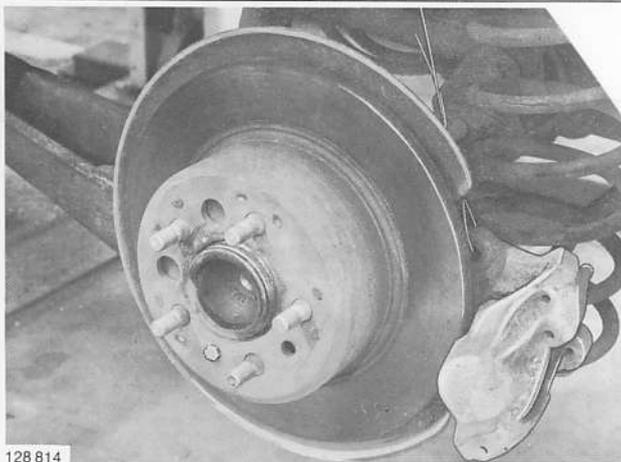
E7

Remove brake calipers.

Remove two bolts (hex 17mm) and free the brake calipers (left and right).

Remove brake line clamp to allow some freedom of movement for the caliper.

Hook the brake calipers to their respective springs to prevent the brake lines from becoming distorted.



E8

Remove brake discs.

Parking brake must be in the full release position. Remove the two Phillips head screws and lift off the brake discs. Tap on the inside of the disc with a plastic hammer or similar tool if necessary.

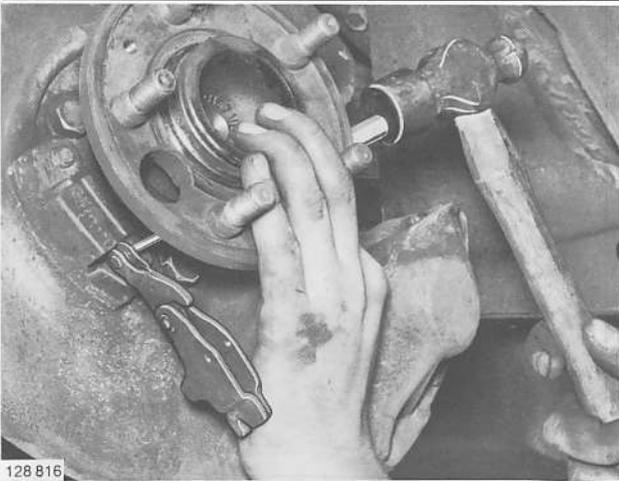


E9

Remove parking brake shoes.

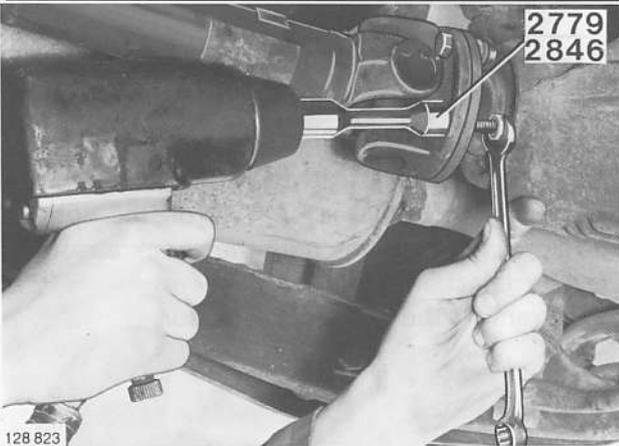
Unhook and remove the springs using brake spring pliers.

E10



Disconnect parking brake cables.

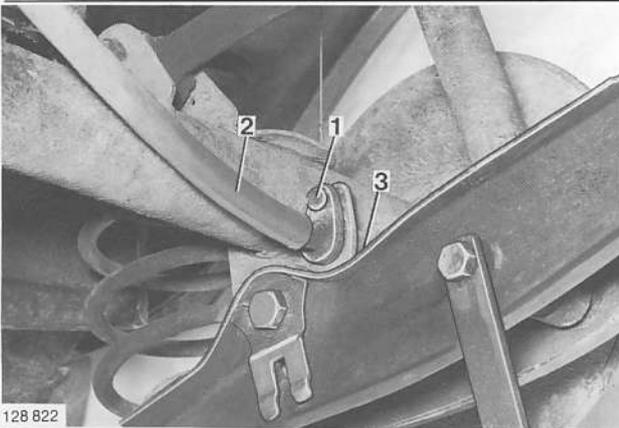
Press out the lock pin securing the brake cables to the levers. Use 3 mm punch if the pin does not fall out.



E11

Disconnect drive shaft from pinion flange.

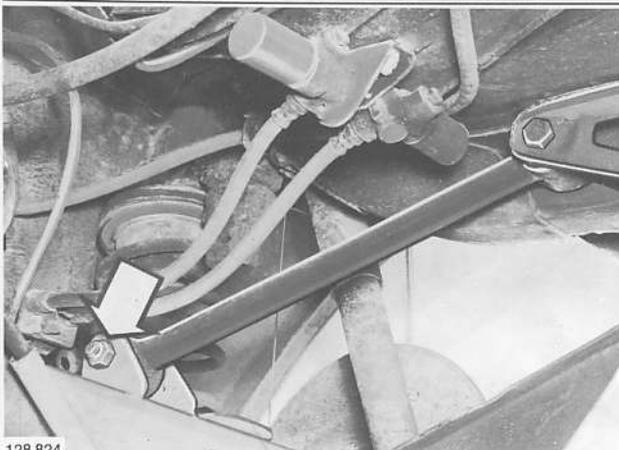
Use tool 2779 or 2846.



E12

Detach parking brake cables from rear axle.

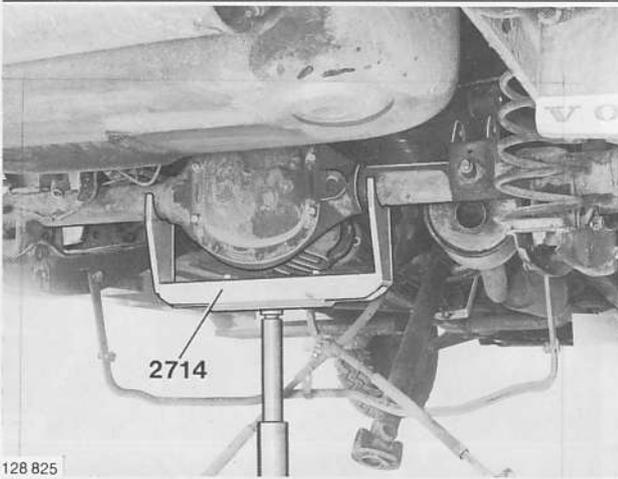
1. Screw
2. Cable
3. Plastic tube (only remove if the rear axle is to be replaced).



E13

Disconnect the reaction rods at the rear axle.

E14

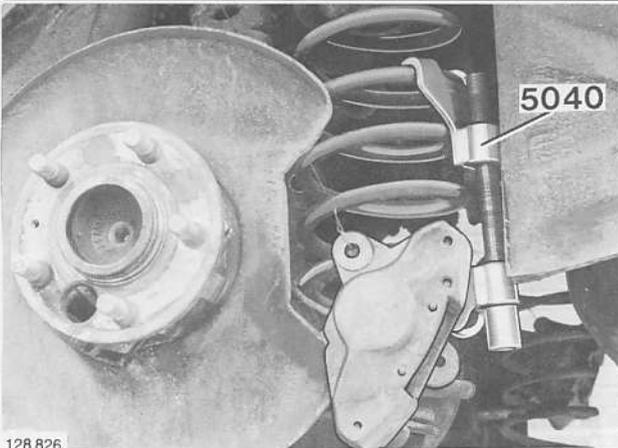


128 825

Place fixture 2714 under rear axle.

The rear axle boss should rest on the fixture loop.

E15



128 826

Disconnect the rear shock absorbers at the upper attachments.

Install spring compressor 5040 on the springs. Compress the springs until the shock absorbers can be detached.

Then remove the spring compressor.

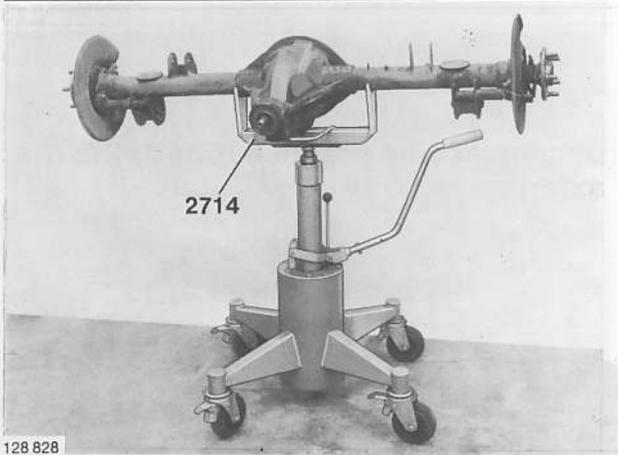
E16



128 827

Remove the screws holding the rear axle to the trailing arms.

E17

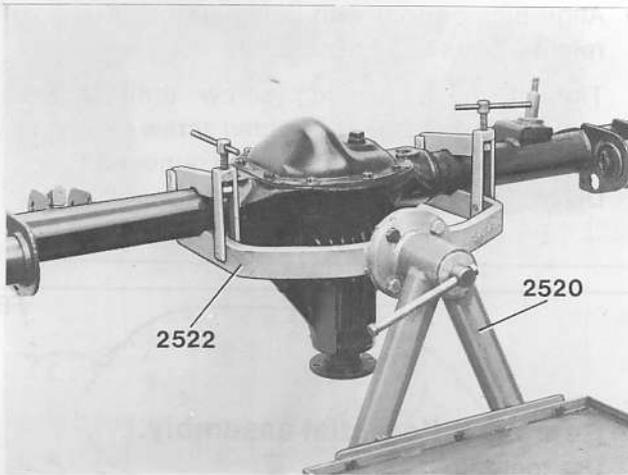


128 828

Remove the rear axle.

Disassembling rear axle

F1

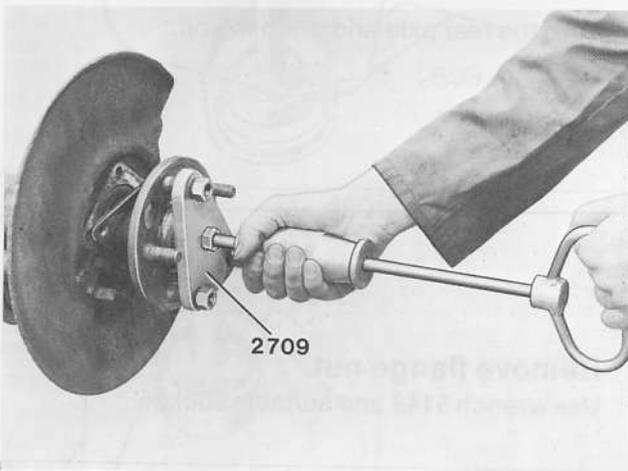


128 829

Place rear axle and fixture 2522 on work stand 2520.

Bottom of final drive housing toward stand and pinion down.

F2

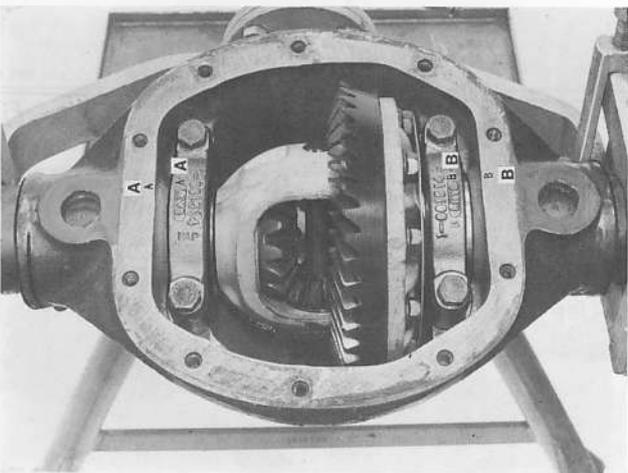


128 830

Remove axle shafts.

- Use tool 2709 to pull out axle shafts.
- Use tool 2337 to remove inner seals.

F3



128 831

Remove differential housing cover.

Remove ten screws (hex 13 mm) to free cover. Remove cover.

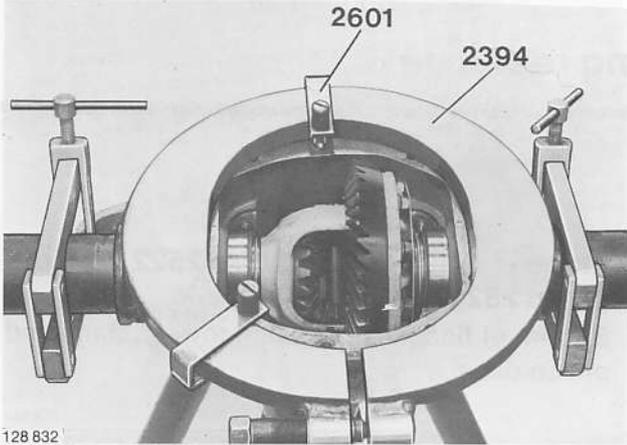
F4

Bearing caps.

Check that bearing caps are marked for proper alignment with carrier. If marks are missing or difficult to see, mark both sides to ensure correct reinstallation.

Remove four screws (hex 16 mm) to free bearing caps.

F5



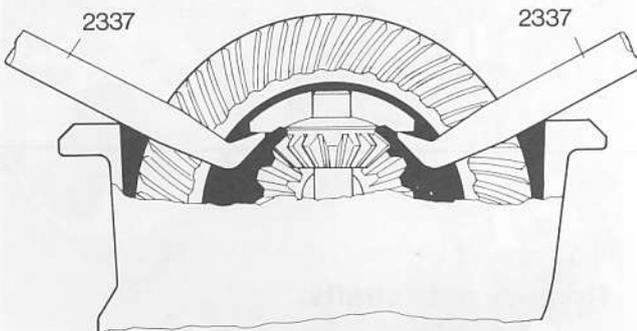
128 832

Install tool 2394.

Place tool 2394 with retainers 2601 on housing. Align pins on tool with holes in housing. Screw retainer bolts into housing.

Tighten the tensioning screw until tool fits securely in holes. Then tighten screw slowly until the differential assembly can be removed. DO NOT exceed 3 1/2 turns on the screw.

F6



118 781

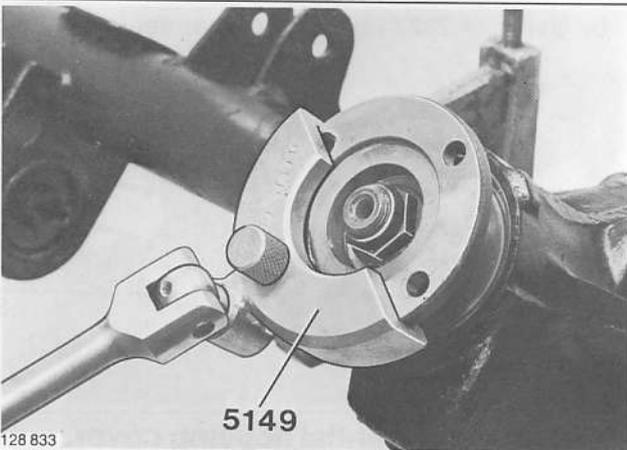
Remove differential assembly.

Use tool 2337.

Release tension on tool 2394 to prevent carrier distortion. Then remove tool 2394.

Turn the rear axle and drain the oil.

F7

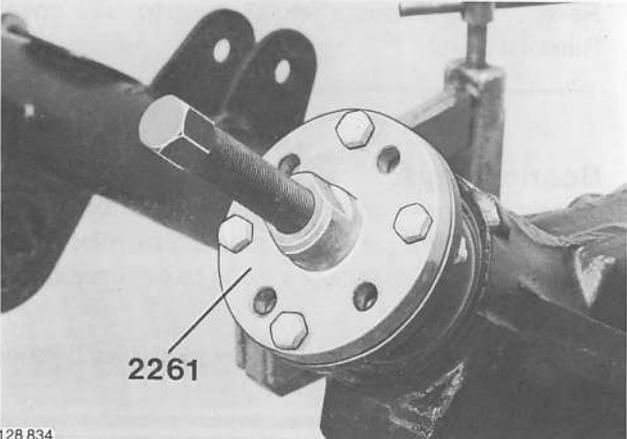


128 833

Remove flange nut.

Use wrench 5149 and suitable socket.

F8

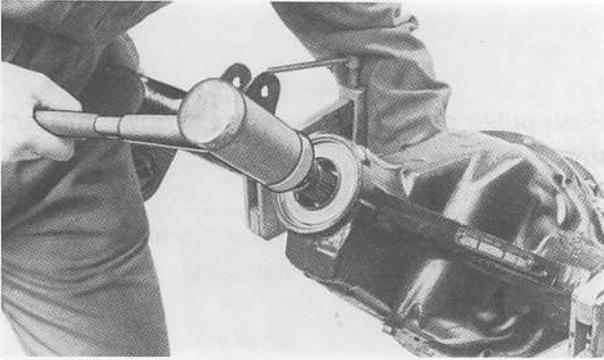


128 834

Remove flange.

Use tool 2261.

F9

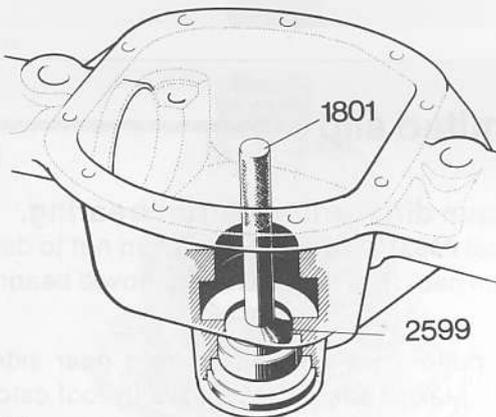


128 835

Remove pinion.

Use a plastic hammer to knock out the pinion. To prevent damage, hold the pinion with one hand as it is driven out.

F10

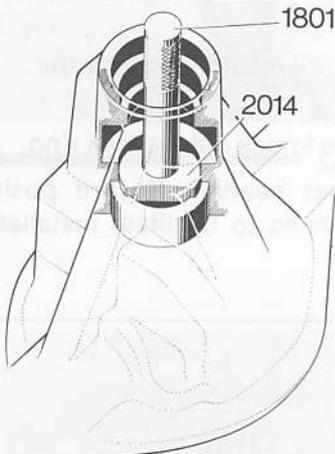


400 207

Remove pinion bearing.

Use standard handle 1801 and 2599 to remove front pinion bearing, washer and seal.

F11



101 793

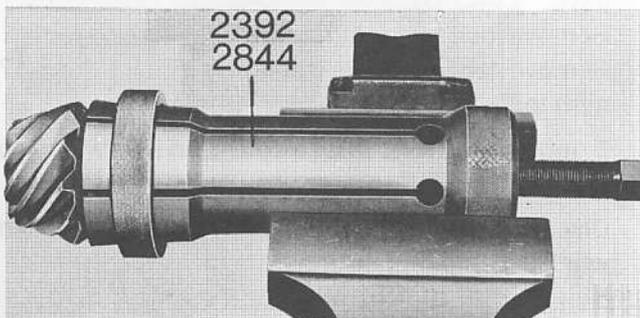
If necessary:

Remove rear pinion bearing outer ring.

Rear axle type 1030: use standard handle 1801 and tool 2598.

Rear axle type 1031: use standard handle 1801 and tool 2843.

F12



24 532

If necessary:

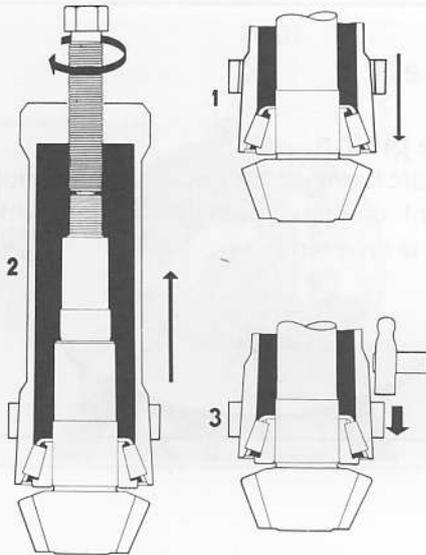
Remove rear pinion bearing.

Rear axle type 1030: use tool 5215

Rear axle type 1031: use tool 5216 and tool 5214.

See next page for instructions on how to apply the tool. (Superseded tool illustrated).

F13

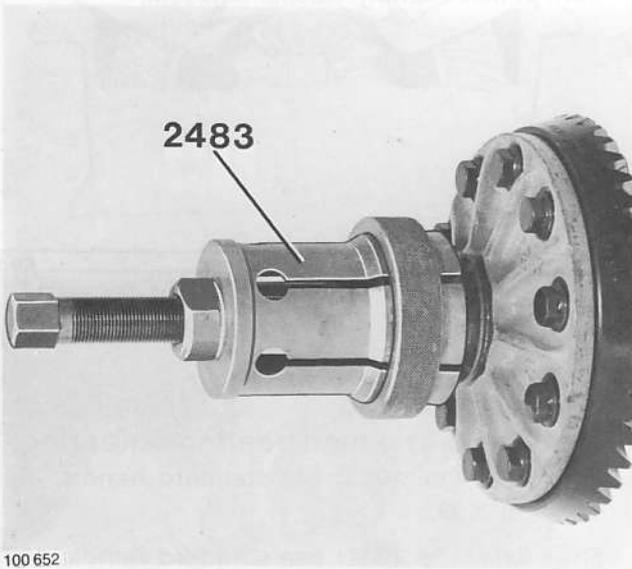


1. Push puller over rollers and press down the lock ring.
2. Tighten puller screws until rollers are flush with edge of inner race and puller.
3. Drive out lock ring.

102 436

Differential without limited slip

F14



Remove differential carrier bearing:

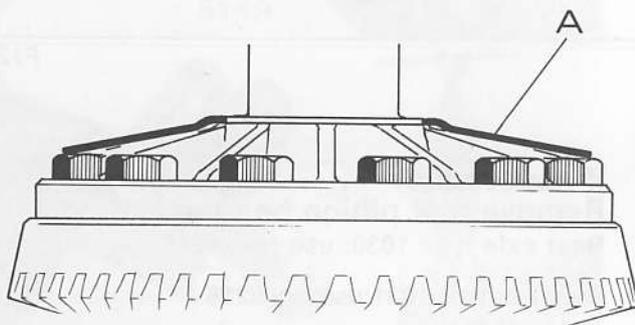
Use tool 2483. Care should be taken not to damage shim pack. Put it aside with removed bearing.

1. Place puller over bearing on ring gear side of carrier. Make certain that groove in tool catches on rollers. Press lock ring down on tool.
2. Tighten puller until bearing is off carrier.
3. Use a hammer to knock out the lock ring.

Repeat for other bearing. Record position of bearings and shims to facilitate installation on new carrier.

100 652

F15



Remove ring gear.

Place differential assembly in vise with protected jaws.

Remove lock plate (A) for ring gear screws.

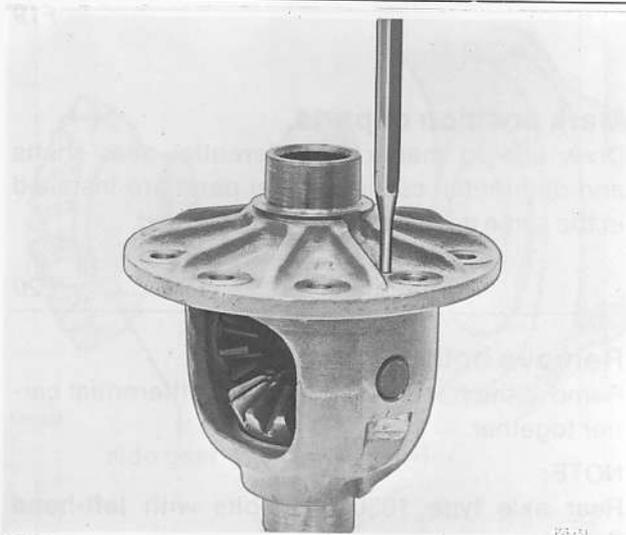
Remove ten ring gear retaining screws (hex 17 mm) to free ring gear.

If ring gear is tight, thread screws in part way. Tap screws to push ring gear off.

Discard the screws. New screws **MUST** be used when assembling.

120 827

F16

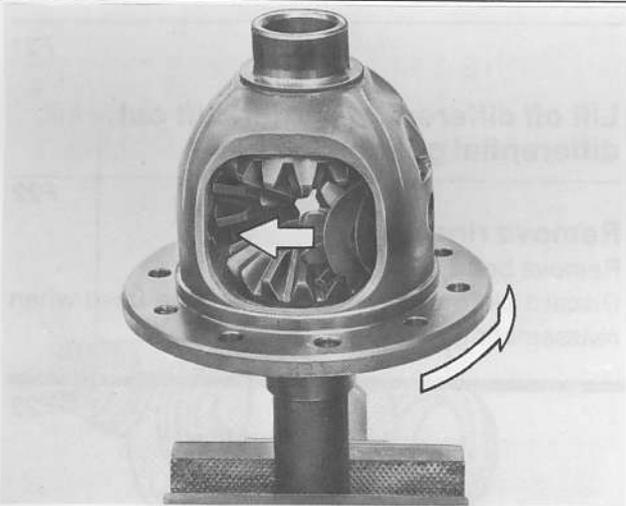


108 163

Remove differential gear shaft.

Drive out lock pin. Drive out differential gear shaft.

F17



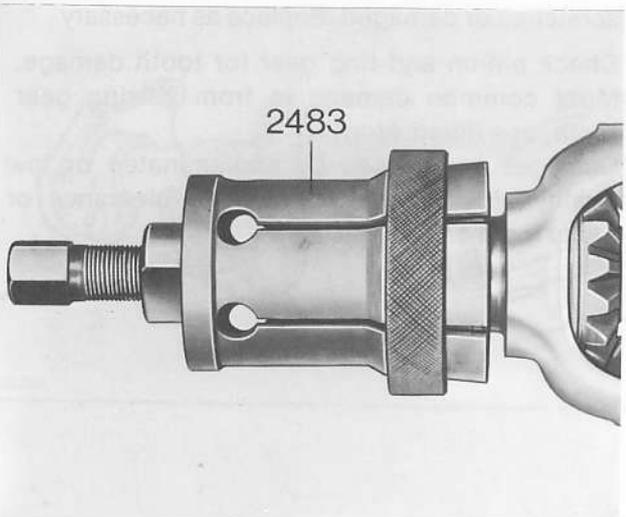
120 454

Remove differential gears.

Place the differential assembly on stub drive shaft. Roll out the small differential gears. Lift out the large differential gears.

Differential with limited slip

F18



Remove differential carrier bearings.

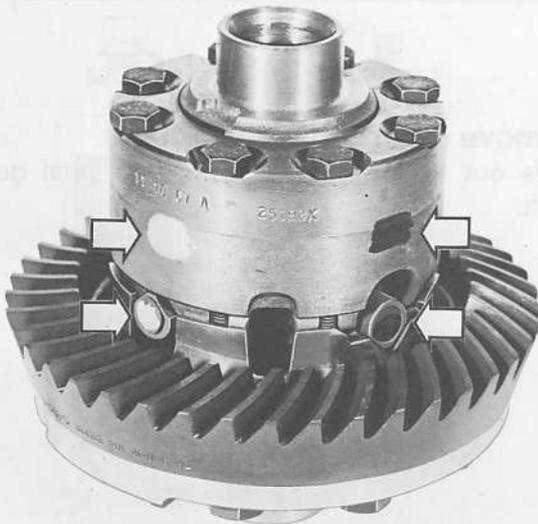
Use tool 2483. Care should be taken not to damage shim pack. Put it aside with removed bearing.

1. Place puller over bearing on ring gear side of carrier. Make certain that groove in tool catches on rollers. Press lock ring down on tool.
2. Tighten puller until bearing is off carrier.
3. Use a hammer to knock out the lock ring.

Repeat for other bearing. Record position of bearings and shims to facilitate installation on new carrier.

128 836

F19



110 742

Mark position of parts.

Draw line-up marks on differential gear shafts and differential carrier so that parts are installed in the same position when reassembled.

F20

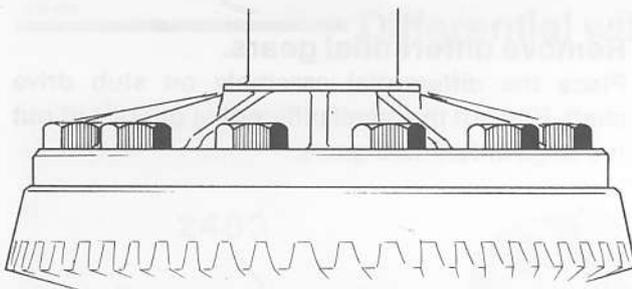
Remove bolts.

Remove the bolts which hold the differential carrier together.

NOTE:

Rear axle type 1030 has bolts with **left-hand** threads.

F21



120 828

Lift off differential carrier. Lift out differential gear plates.

F22

Remove ring gear.

Remove bolts. Lift out ring gear.

Discard old bolts. New ones must be used when reassembling.

F23



102 465

Cleaning, inspection of parts.

Clean all parts thoroughly.

Check all bearing races and bearings.

Races, rollers or roller retainers must not be scratched or damaged. Replace as necessary.

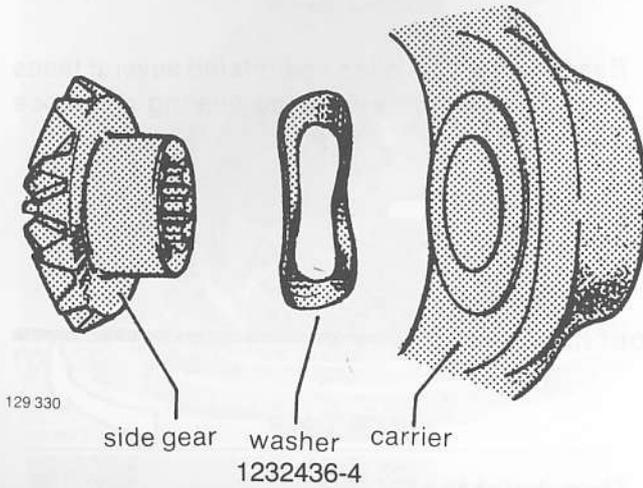
Check pinion and ring gear for tooth damage. Most common damage is from seizing gear teeth, see illustration.

Damages are caused by contaminated or low quality oil, incorrect tooth flank clearance or faulty tooth contact.

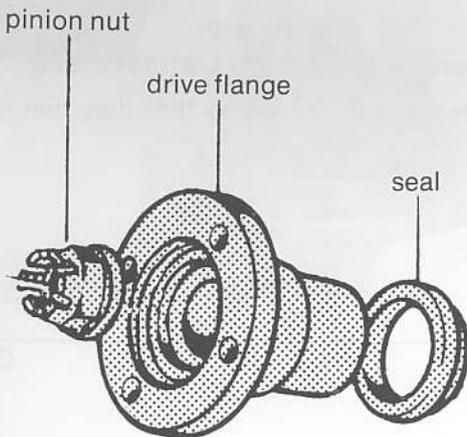


VOLVO
102496

Gear seizure



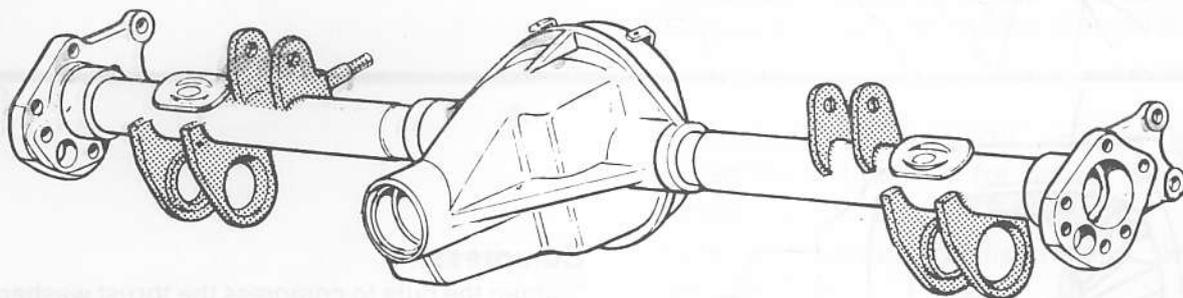
Check the differential gears for tooth damage. If any gear is damaged, the complete set of four matched gears must be replaced. Washers for the differential gears (flat or thrust) should be replaced. For the large differential side gears only thrust washers, P/N 1232436-4, are used.



Check the drive flange section which goes into the seal. Replace if worn or scored.

The pinion nut loses its self-locking capacity after being removed a couple of times. Replace as necessary.

All seals should be replaced any time the differential is disassembled.



Check the rear axle carrier for cracks. Check brackets for trailing arms and track rod for broken welds and/or damages.

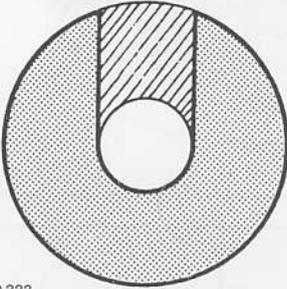
Assembling differential

The utmost cleanliness must be observed when assembling the final drive. Dirt in a tapered roller bearing can result in entirely incorrect measurements.

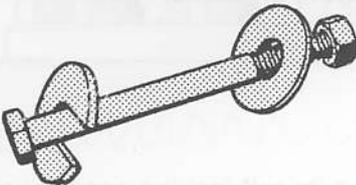
Bearings must be oiled and rotated several times under load before measuring bearing clearance or preload.

Differential without limited slip

G1



129 333



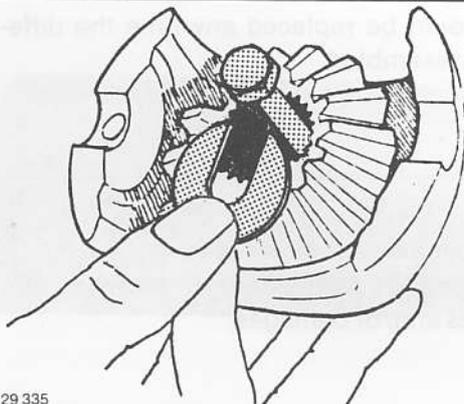
129 334

Construct tool.

Bolts, nuts and washers according to the following listing are recommended to help install the differential gears.

Two bolts	1/2"x3-1/2" (M12x90)
Two nuts	1/2" (M12)
Four washers	1-3/8"x1/8" (34x3 mm)

Cut two washers as shown so that they can be fitted over the bolts.

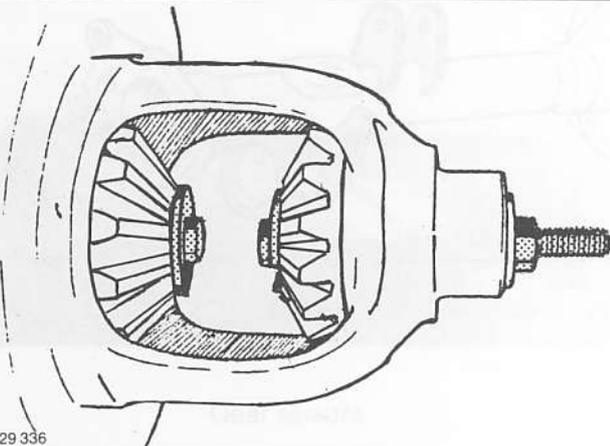


129 335

G2

Fit thrust washers and large differential gears.

Place one washer and nut on each bolt.
Push in the bolt with the head first.
Install the slotted washer.



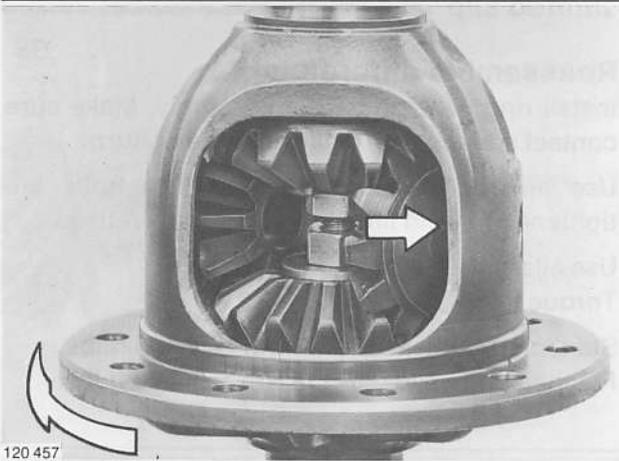
129 336

G3

Compress.

Tighten the nuts to compress the thrust washers.

G4



Install small differential gears and thrust washers.

Roll in small differential gears and thrust washers as an assembly.

G5

Remove bolt tools.

G6



Install differential gear shaft.

Install shaft and lock pin. Punch to lock the lock pin.

G7

Reassemble differential.

Install ring gear on carrier assembly. Make sure contact surfaces are free of burrs.

Use new bolts. The bolts are tightened to yield limit and cannot be reused.

Use alternate side pattern for tightening bolts. Torque to:

Standard bolt head: **70–80 Nm** = 50–58 ft.lbs.

Flanged bolt head: **90–110 Nm** = 65–80 ft.lbs.

Operations G8 and G9 contain special assembly instructions for limited slip differential.

Common installation instructions continue with op. G10.

Differential with limited slip

Inspecting

Before inspecting, wash all parts thoroughly in solvent. Then check the parts carefully for wear, cracks or other damage. Faulty parts should be replaced. If any of the discs require replacement because of abnormal wear, all the discs should be replaced at the same time.

Reassemble differential

G8

Install ring gear on carrier assembly. Make sure contact surfaces are clean and free of burrs.

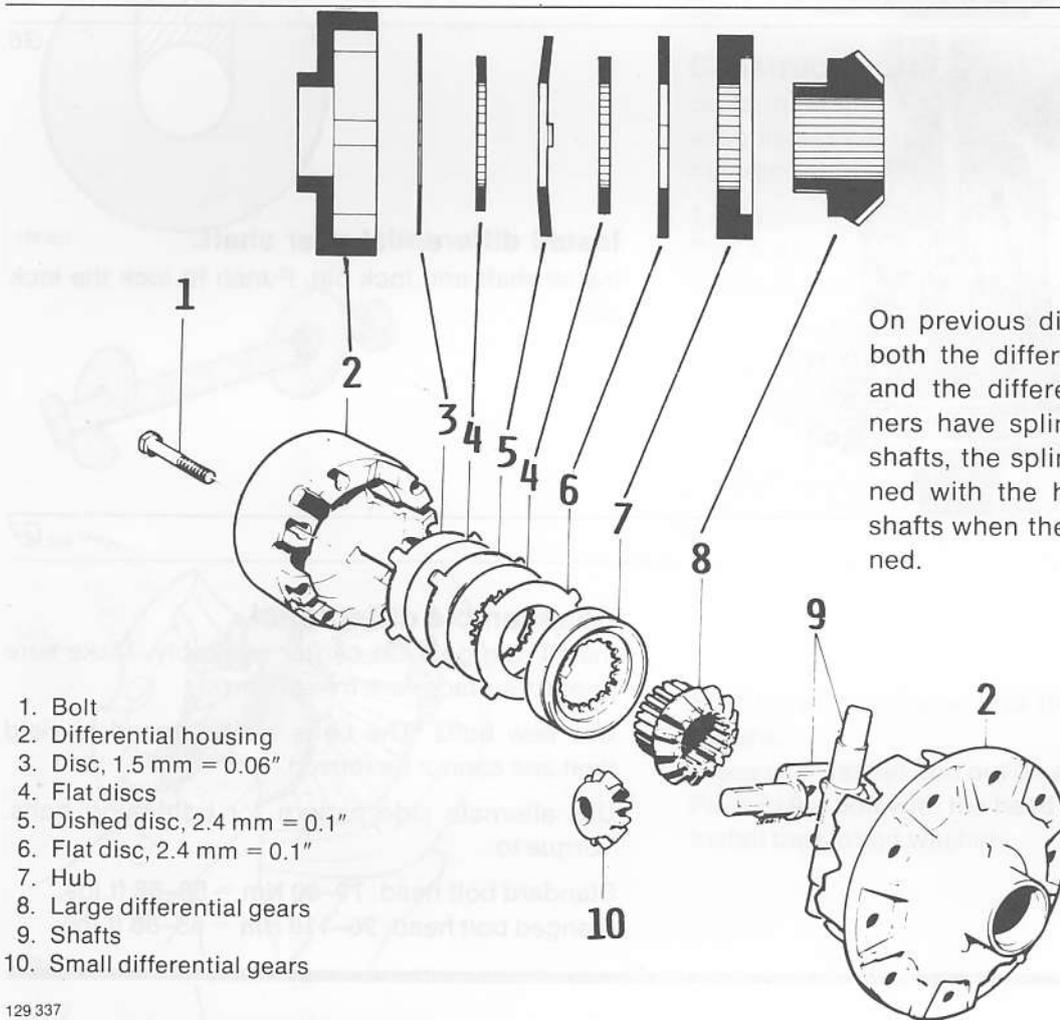
Use new bolts and lock fluid. The bolts are tightened to yield limits and cannot be reused.

Use alternate side tightening pattern.

Torque to:

Standard bolt head: **70–80 Nm** = 50–58 ft.lbs.

Flanged bolt head: **90–110 Nm** = 65–80 ft.lbs.



129 337

G9



Install shafts, gears and discs

Lubricate each part before installation.

Place the discs and other parts in the order shown in illustration in the ring gear half of the differential housing.

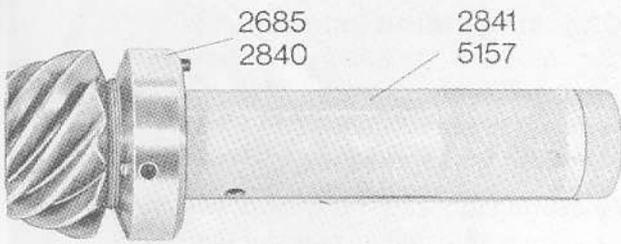
Align the discs and fit the smaller half of the differential carrier.

Install the bolts. Torque to:

60–75 Nm = 44–55 ft.lbs.

Installing pinion

G10

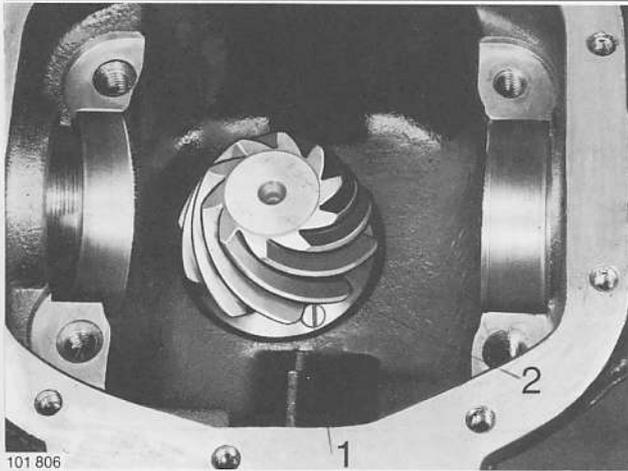


Install tools on pinion

Use extremely fine emery cloth to clean the pinion shoulder.
Install adjusting ring and wrench. Make sure the locking screw of the adjusting ring is in open position.

Final drive	1030	1031
Adjusting ring	2685	2840
Wrench	2841	2841
or	(5157)	(5157)

107 192



Position pinion in carrier

Screw (1) on the adjusting ring (2) must face the large part of the carrier.

Make sure the pin on the adjusting ring is in the carrier recess.

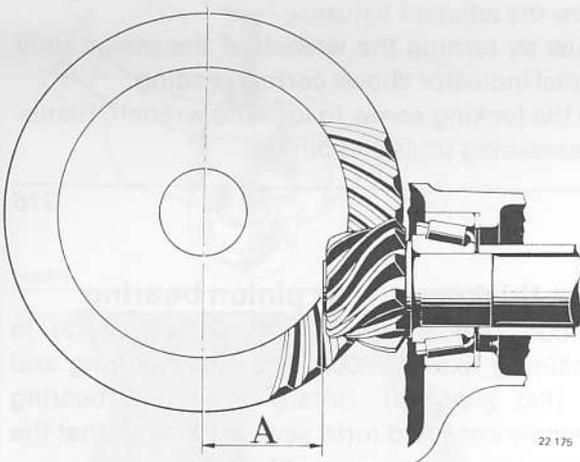
G11

101 806

G12

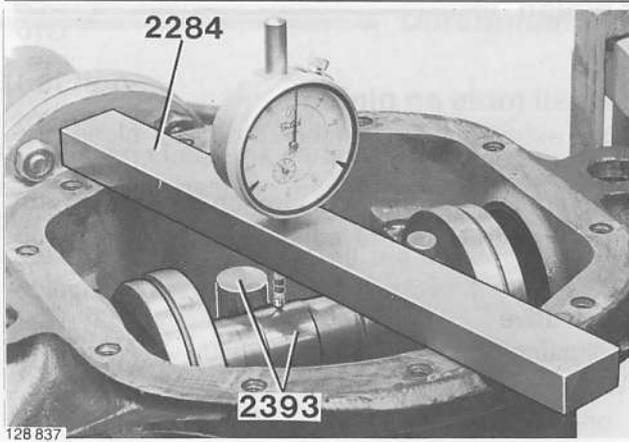
Measurement A

The pinion must have a set distance (A) to the ring gear center line. Due to tolerances in the manufacturing, there are deviations from the set distance. These deviations are indicated on the pinion. The deviation is always plus and in hundredths of a millimeter. The plus sign is omitted.



Conversion table, millimeters to inches			
mm	inches	mm	inches
0.20	0.0079	0.31	0.0122
0.21	0.0083	0.32	0.0126
0.22	0.0087	0.33	0.0130
0.23	0.0091	0.34	0.0134
0.24	0.0094	0.35	0.0138
0.25	0.0098	0.36	0.0142
0.26	0.0102	0.37	0.0146
0.27	0.0106	0.38	0.0150
0.28	0.0110	0.39	0.0154
0.29	0.0114	0.40	0.0157
0.30	0.0118		

22 175



G13

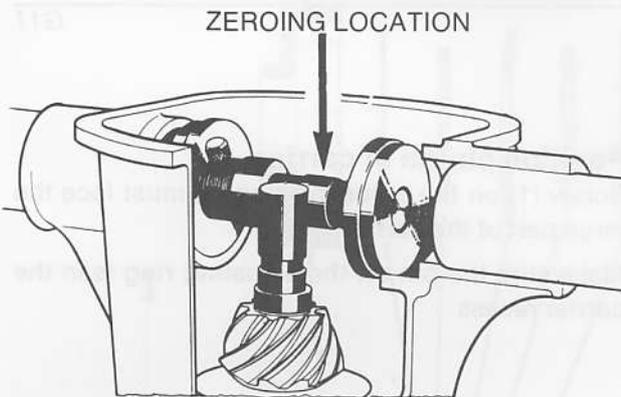
Checking pinion location

Use:

- dial indicator
- indicator retainer 2284
- measuring tool 2393

Measuring tool 2393 consists of two parts: a pinion gauge and an adjuster fixture.

128 837

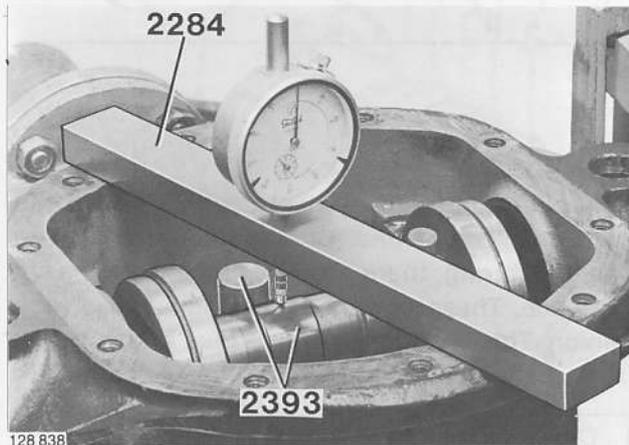


G14

Align measuring tools

Locate the indicator retainer so that the dial indicator tip touches the adjuster fixture.

129 338



G15

Measure distance to pinion gauge

Move the indicator retainer so that the dial indicator tip touches the pinion gauge.

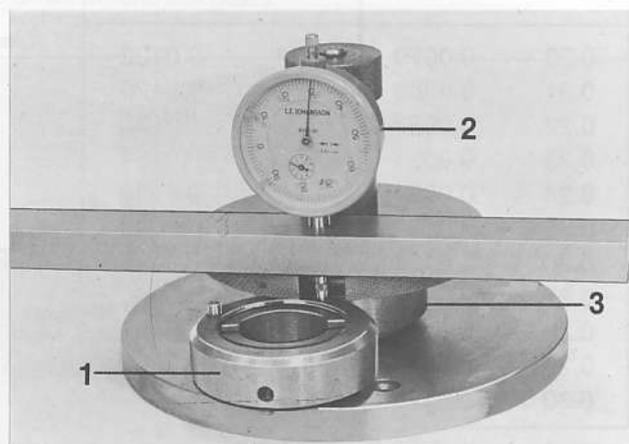
The pinion gauge should reflect the figure indicated on the pinion. For example: if the pinion is marked 0.33, the pinion gauge should lie 0.33 mm below the adjuster fixture.

Adjust by turning the wrench of the pinion until the dial indicator shows correct reading.

Use the locking screw to lock the wrench. Remove measuring tools and pinion.

128 838

G16



Shim thickness, rear pinion bearing

Position rear pinion bearing assembly (3) in measuring fixture 2600. Install plate, spring and nut (flat side up). Rotate plate and bearing assembly back and forth several times so that the rollers assume correct positions.

Position adjusting ring (1) in the measuring fixture. Use retainer 2284 and dial indicator (2).

Position the dial indicator tip against the adjusting ring (1) and set to zero. Then change the tip location to the bearing outer ring. The dial indicator now shows required thickness of shims.

Remove bearing and measuring fixture 2600.

128 839

G17



Measure shim thickness

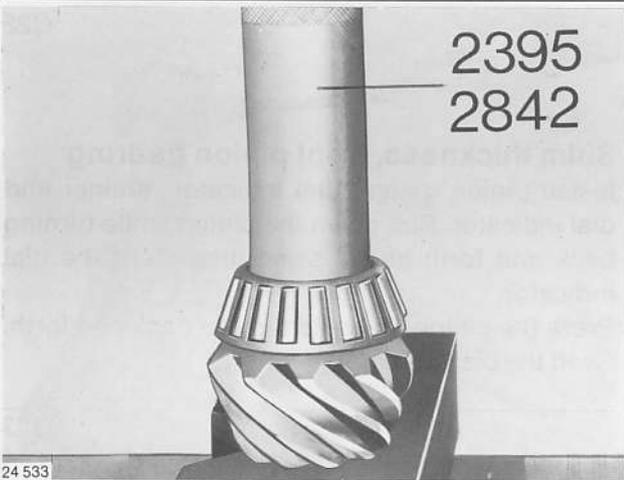
Use micrometer.

NOTE:

It is very difficult to obtain absolutely correct shim thickness. Following deviations are permitted:

- 0.02 mm = 0.0008"
- + 0.05 mm = 0.002"

G18



Install rear pinion bearing on pinion

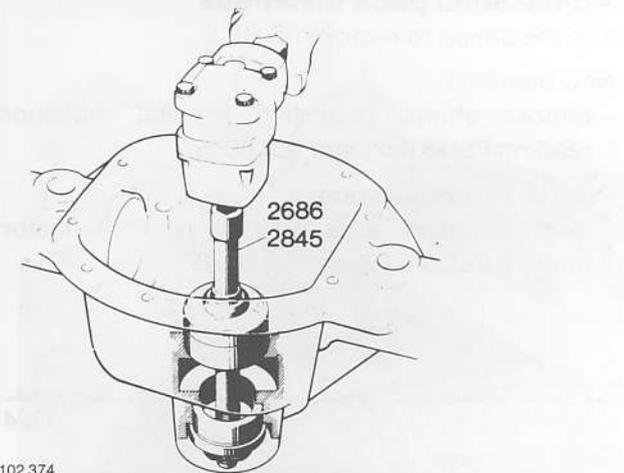
Use tools:

- 2395 for Type 1030
- 2842 for Type 1031

NOTE:

First time a rear pinion bearing is removed, there is a spacer washer under the rear pinion bearing inner ring. It must NOT be reinstalled.

G19



Install pinion bearing rings

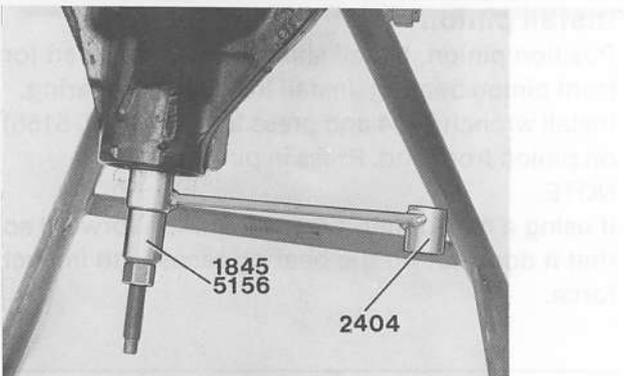
Position shim just determined for rear pinion bearing.

Install outer rings for pinion rear and front bearings.

Use tools:

- 2686 for Type 1030
- 2845 for Type 1031

G20



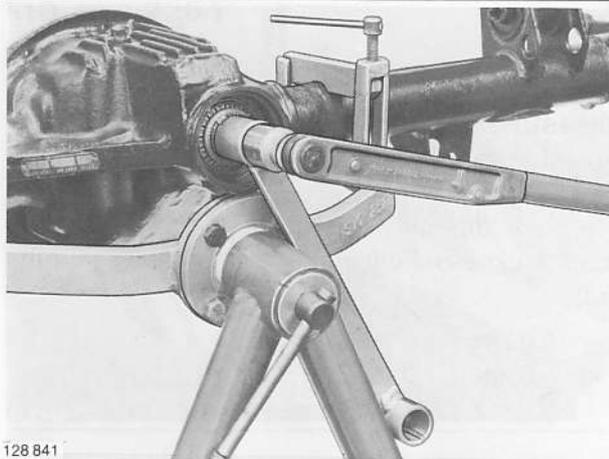
Install pinion

Position pinion. Install three shims 0.75 mm = 0.03" thick and front pinion bearing.

Install wrench 2404 and press tool 1845 (alt. 5156) on pinion front end. Press in pinion.

NOTE:

If using a nut runner, press the pinion forward so that it does not hit the bearing races with impact force.



128 841

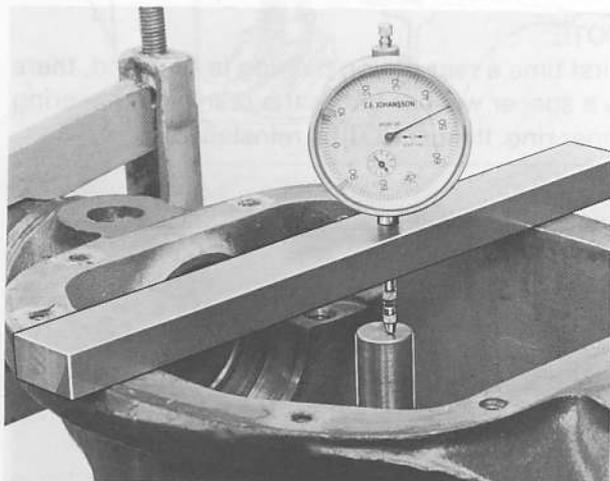
G21

Install pinion nut

Remove tool **1845**. Let wrench **2404** remain in place.

Install pinion nut. Torque to **250 Nm = 185 ft.lbs.**

G22



128 842

Shim thickness, front pinion bearing

Install pinion gauge, dial indicator retainer and dial indicator. Pull down the pinion while turning back and forth at the same time. Zero the dial indicator.

Press the pinion up while turning back and forth. Read the dial indicator.

G23

Adjust shim pack thickness

Tap the pinion to remove it.

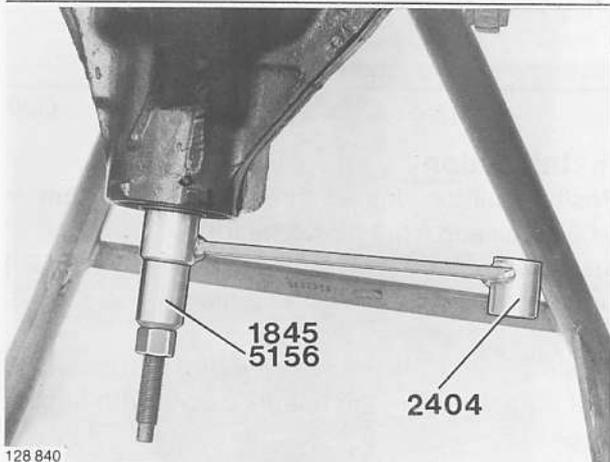
New bearings:

– remove shims according to dial indicator reading **PLUS 0.09 mm = 0.0035"**.

Previously used bearing:

– remove shims according to dial indicator reading **PLUS 0.07 mm = 0.0028"**.

G24



128 840

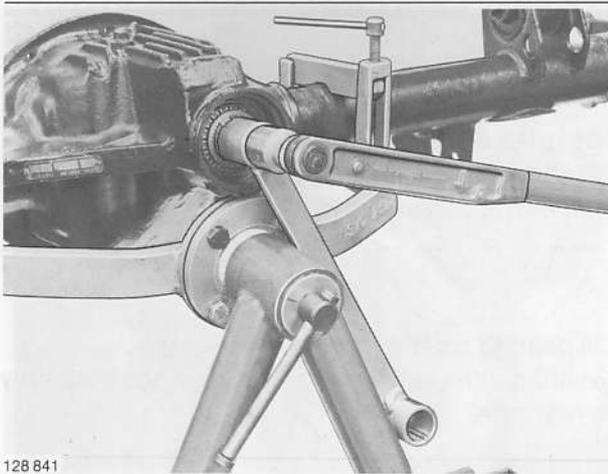
Install pinion

Position pinion. Install shim pack determined for front pinion bearing. Install front pinion bearing. Install wrench **2404** and press tool **1845** (alt. 5156) on pinion front end. Press in pinion.

NOTE:

If using a nut runner, press the pinion forward so that it does not hit the bearing races with impact force.

G25

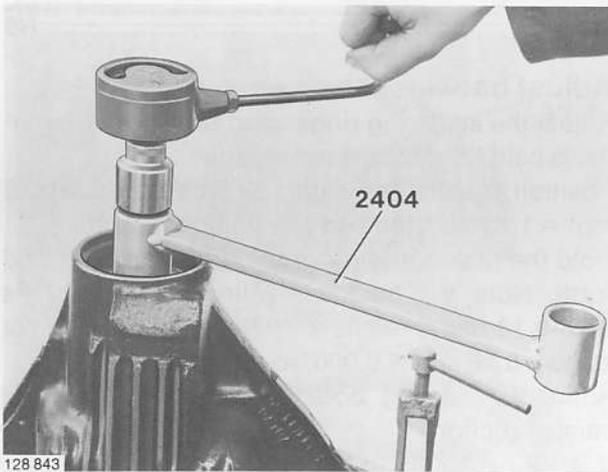


Install pinion nut

Remove tool 1845. Let wrench 2404 remain in place.

Install washer and nut. Torque nut to:
250 Nm = 185 ft.lbs.

G26



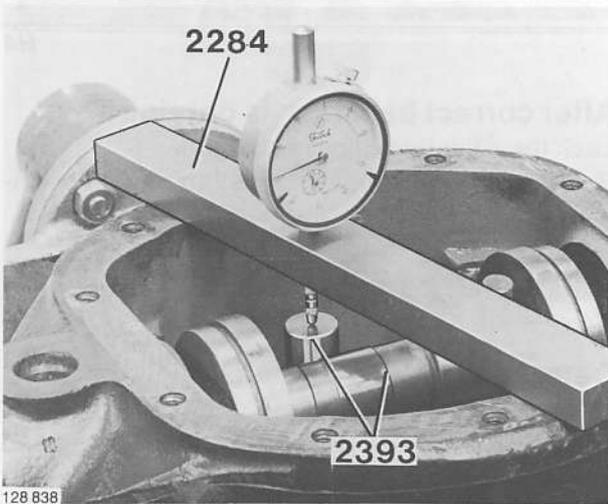
Check pinion bearing preload

Use torque gauge. Correct preload:

New bearings: **250–450 Ncm = 21–39 in.lbs.**

Used bearings: **60–110 Ncm = 5–10 in.lbs.**

G27



Check pinion location

Use dial indicator, retainer 2284 and measuring tool 2393.

Zero-set the dial indicator against the adjuster fixture.

Shift the dial indicator to the pinion gauge and check the pinion bearing.

Pinion location must not deviate from correct position more than:

- 0.02 mm = 0.0008"

+ 0.05 mm = 0.002"

Installing differential

H1



128 844

Install adjusting rings

Oil adjusting rings **2595**. Install on differential. Black-oxidized adjusting ring on ring gear side.

H2

Oil bearing seats in rear axle.

Position differential and adjusting rings assembly in rear axle.

H3

Adjust backlash

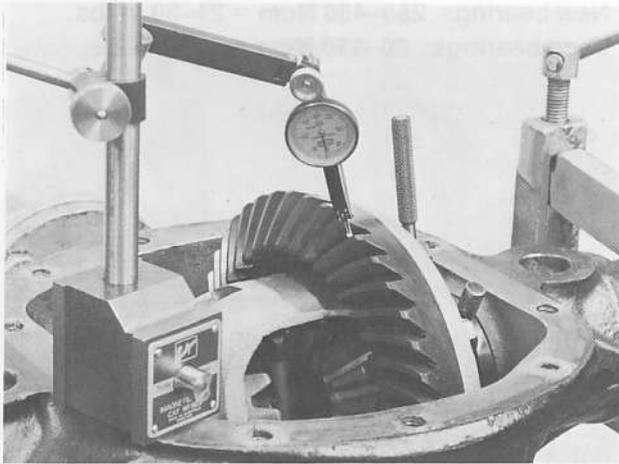
Adjust the adjusting rings apart until the differential is held firmly but not preloaded.

Position the dial indicator. Set the tip approx. 3 mm = 1/8" from the end of a ring gear tooth.

Hold the pinion and move the ring gear back and forth. Note the backlash. Allowed backlash is **0.12–0.18 mm = 0.005–0.007"**, but should be set as near **0.15 mm = 0.006"** as possible.

Adjust by turning both adjusting rings in the same direction.

H4



128 845

After correct backlash is obtained

Lock the adjusting rings in position.

Remove differential and adjusting rings assembly.

H5

Determine shim thickness

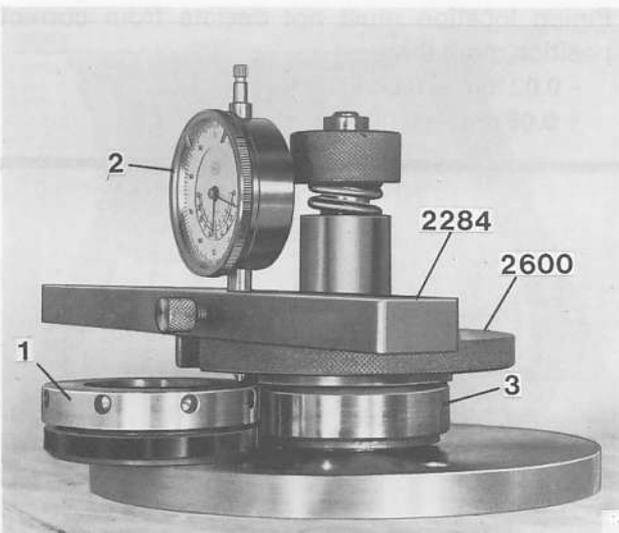
NOTE:

Always remember the side on which bearings and shims are to be installed.

Position the centering plate on measuring fixture **2600**. Position a bearing (3) in the measuring fixture. Install plate, spring and nut (flat side up). Rotate plate and bearing assembly back and forth several times so that the rollers assume correct position.

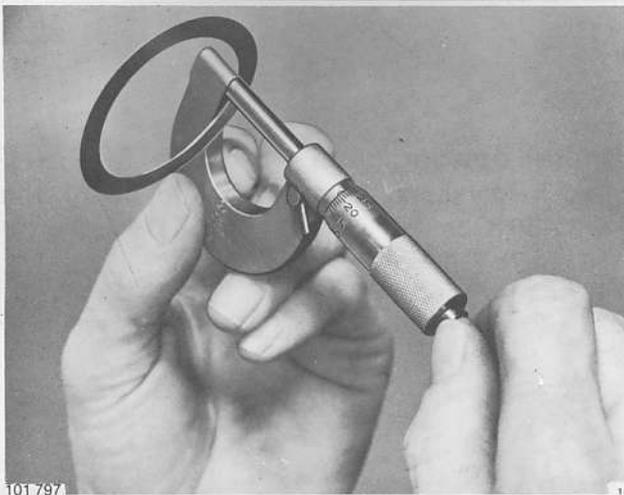
Position adjusting ring (1) on measuring fixture. Install retainer **2284** and dial indicator (2).

Position the dial indicator tip against the adjusting ring (1) and set to zero. Then change the tip location to the bearing. Note the dial indicator reading.



101 796

H6



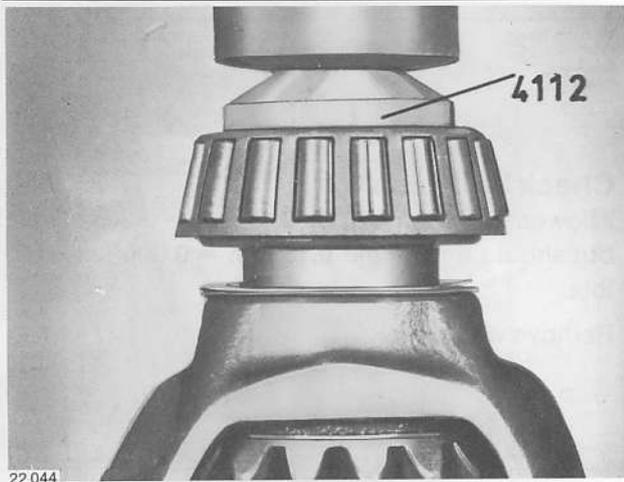
Measure shim thickness

Use micrometer. Total shim thickness should be noted value **PLUS 0.07 mm = 0.0028"**.

H7

Repeat procedure for other side

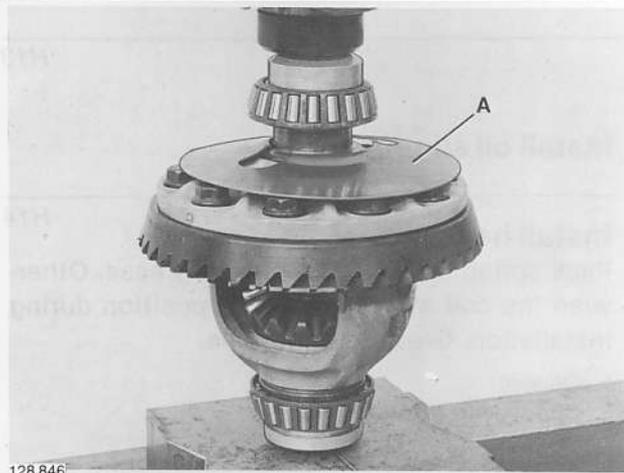
H8



Install bearing opposite ring gear

Install determined shim pack. Use drift 4112 when pressing on the bearing.

H9



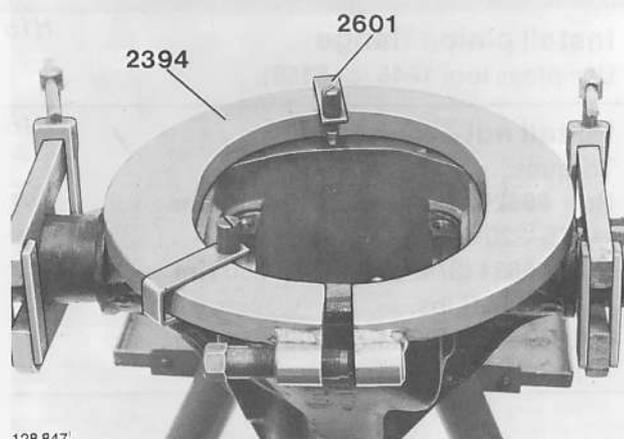
Install bearing, ring gear side

Install lock plate (A) for ring gear bolts, determined shim pack and bearing.

Use drift 4112 to press on the bearing.

Use drift 2599 on the bearing opposite side to prevent damages.

H10



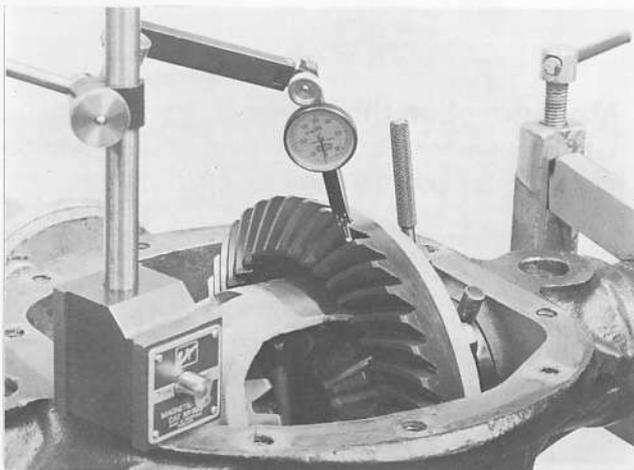
Install differential assembly

Use retainers 2601 to position expanding tool 2394 on rear axle housing. Expand tool until it fits securely in holes in housing. Then tighten the screw an additional 3–3.5 turns.

Position differential with bearing outer rings in rear axle housing.

Remove expanding tool 2394.

H11

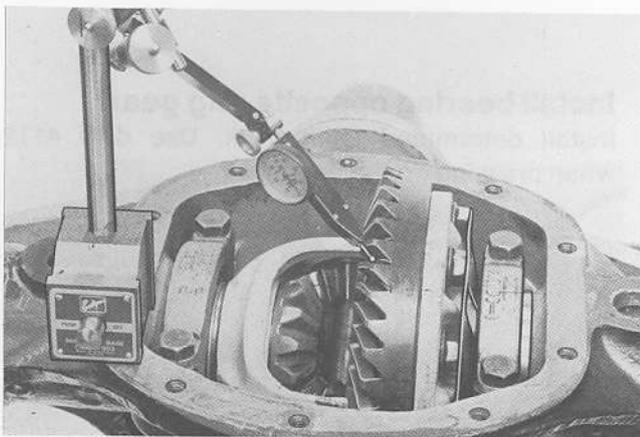


128 845

Install bearing caps

Check markings. Torque bolts to **50–70 Nm**
= 35–50 ft.lbs.

H12



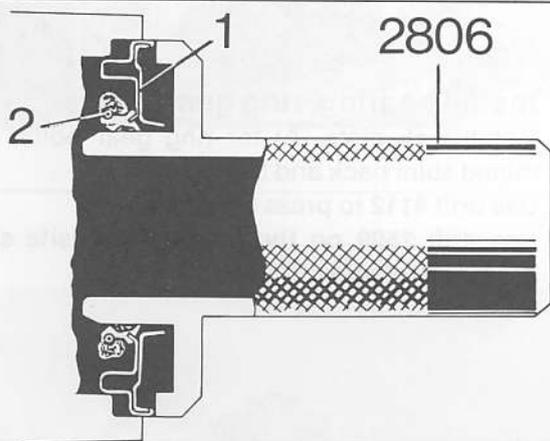
128 848

Check backlash

Allowed backlash is **0.12–0.18 mm** = 0.005–0.007"
but should be as near **0.15 mm** = 0.006" as possible.

Remove wrench 2402.

H13



103 031

Install oil slinger

Install new oil seal

Pack spring of new oil seal with grease. Otherwise the coil may jump out of position during installation. Grease sealing lips.

1. Oil seal
2. Spring with grease

Use drift **2806** to install the oil seal.

H14

H15

Install pinion flange

Use press tool **1845** (or **5156**).

H16

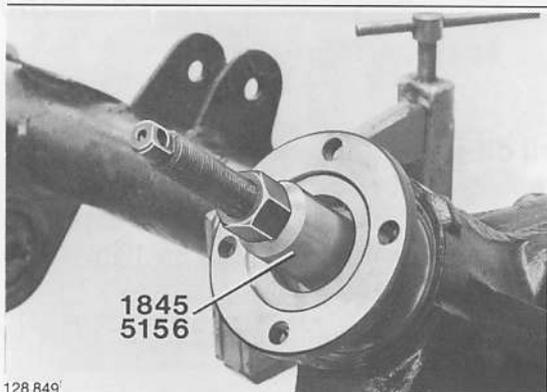
Install nut

Torques:

Nut **88626** (3/4" UNF) **240–300 Nm**
= 175–220 ft.lbs.

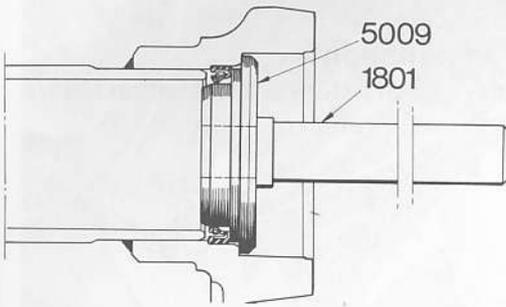
Nut **946831** (3/4" UNF) **200–250 Nm**
= 145–185 ft.lbs.

Nut **947855** (M20 x 1.5) **200–250 Nm**
= 145–185 ft.lbs.



128 849

H17



Install gasket and cover

H18

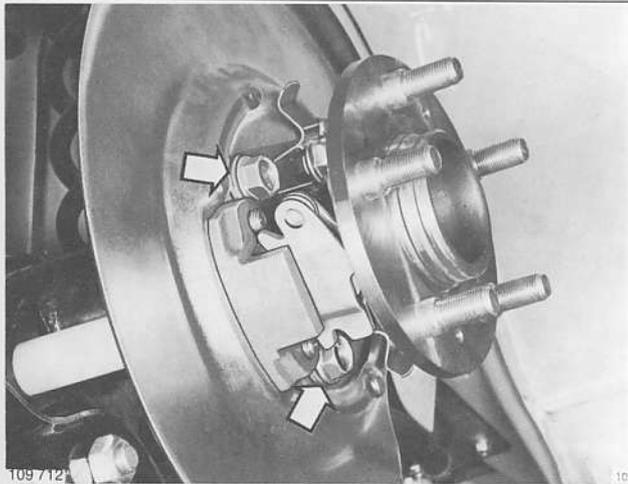
Install drive shaft seals

Use drift 5009 and handle 1801.

NOTE:

Fill space between sealing lips with grease.
 Also fill space between roller retainer and bearing inner ring with grease.

108 161



H19

Install drive shafts

Torque bolts for bearing retainer to **30–50 Nm**
 = 22–40 ft.lbs.

H20

Fill with correct lubricant

Capacity:

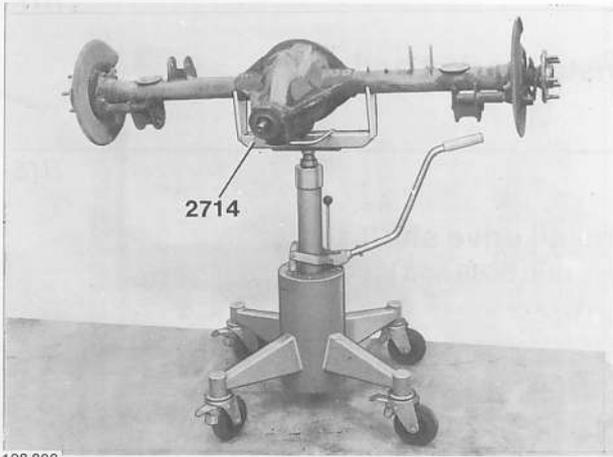
1030: 1.3 liters = 1.35 US qts.

1031: 1.6 liters = 1.7 US qts.

Final drive oil SAE 90, API GL-5 (MIL L-2105B or C).

Installing rear axle

I1

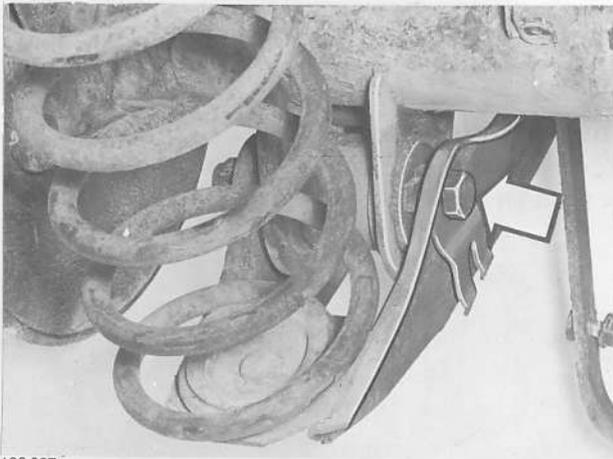


128 828

Prepare installation

Position rear axle in fixture 2714. Position fixture and rear axle under vehicle.

I2



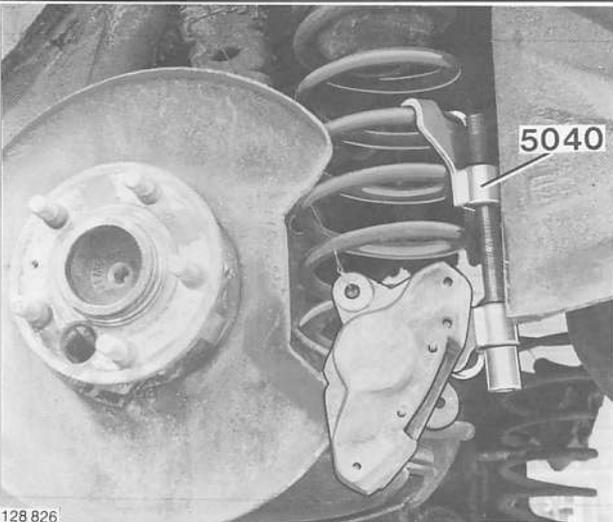
128 827

Attach trailing arms

Install the bolts finger tight.

Also install the brackets for the stabilizer bar rear attachments.

I3



128 826

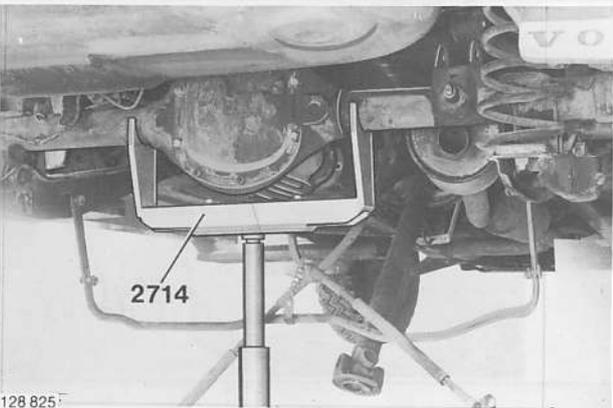
Attach the rear shock absorbers at the upper attachments

Install spring compressors 5040 and compress the springs so that the shock absorbers can be installed.

Make sure the wires holding the brake calipers do not become involved.

Remove the spring compressors.

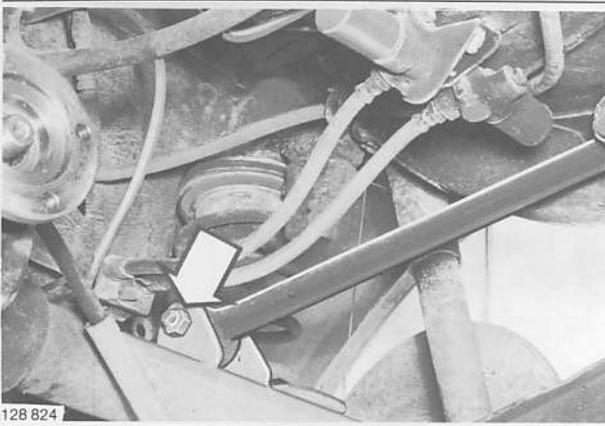
I4



128 825

Remove the fixture

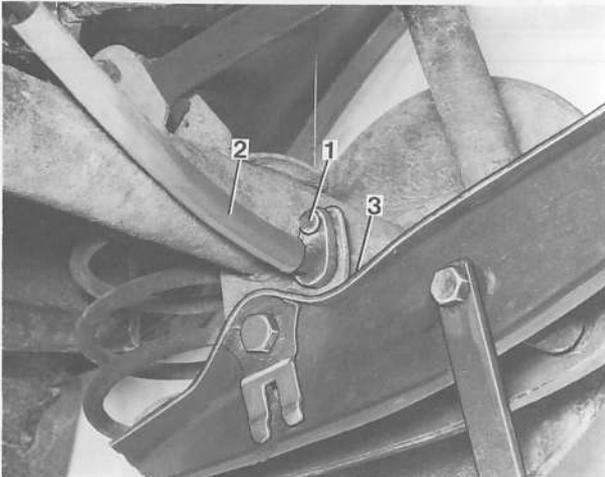
I5



Attach reaction rods

Do not tighten.

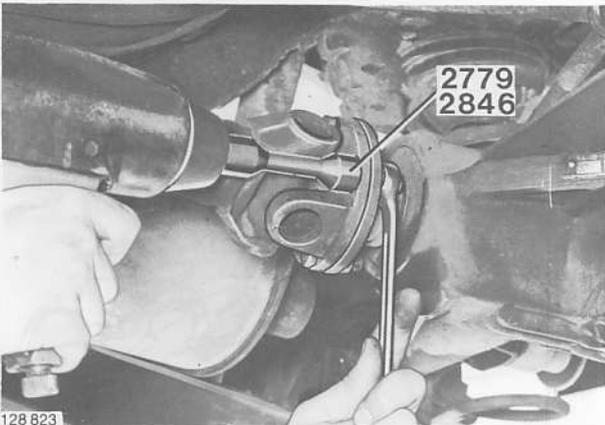
I6



Attach parking brake cables at the rear axle

- 1. Screw
- 2. Cable
- 3. Plastic tube

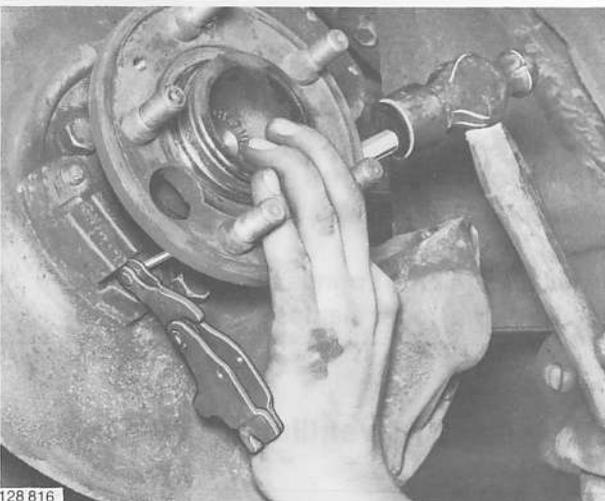
I7



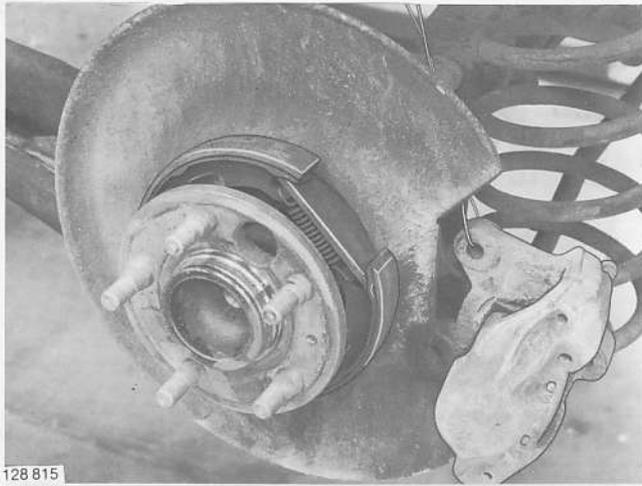
Connect drive shaft to flange

Use socket 2779 or 2846.

I8



Connect parking brake cables



128 815

Install parking brake shoes

I9

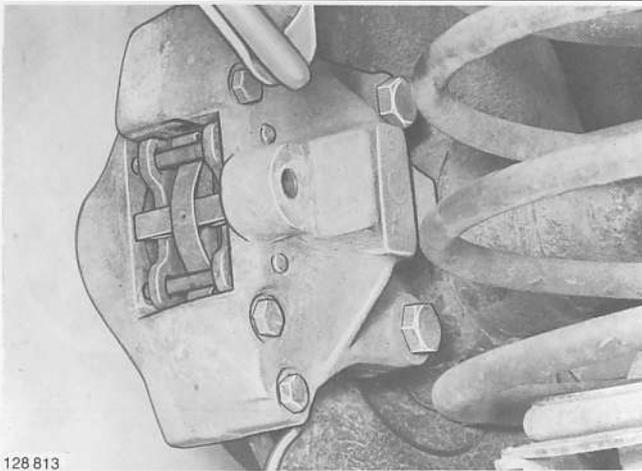


128 814

Install brake discs

Install screws retaining brake discs.

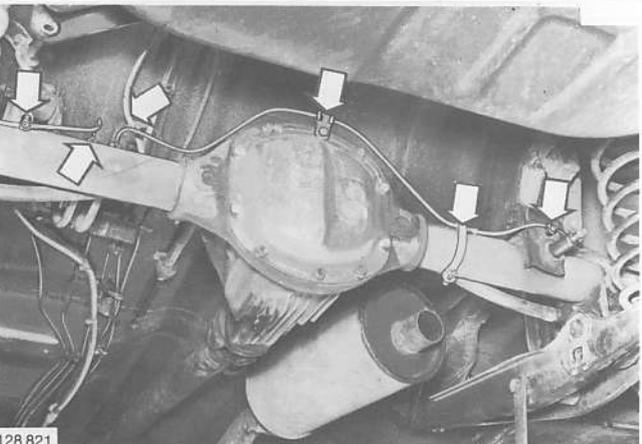
I10



128 813

Install brake calipers

I11



128 821

Connect brake lines

Attach brackets and clamps securing the brake lines.

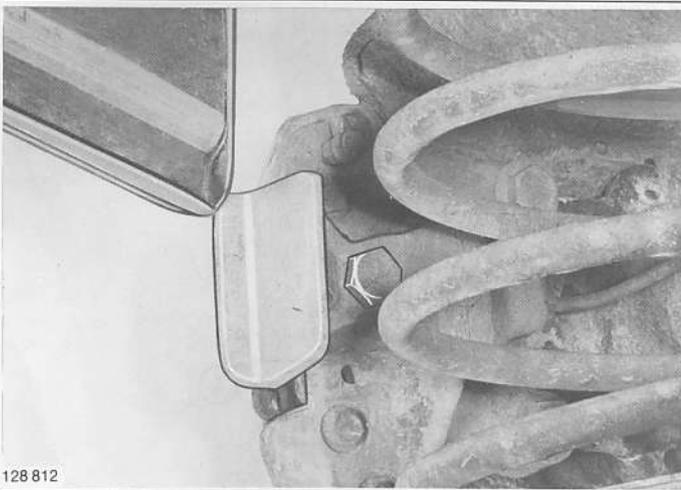
Hook on retaining springs of parking brake cables to the upper clamps.

I12

Reconnect the ventilation hose to the rear axle

I13

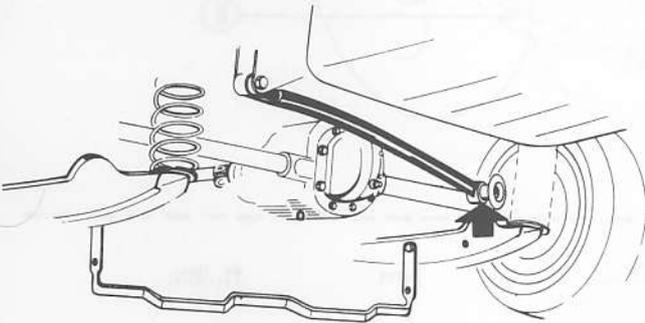
I14



128 812

Install collision guards

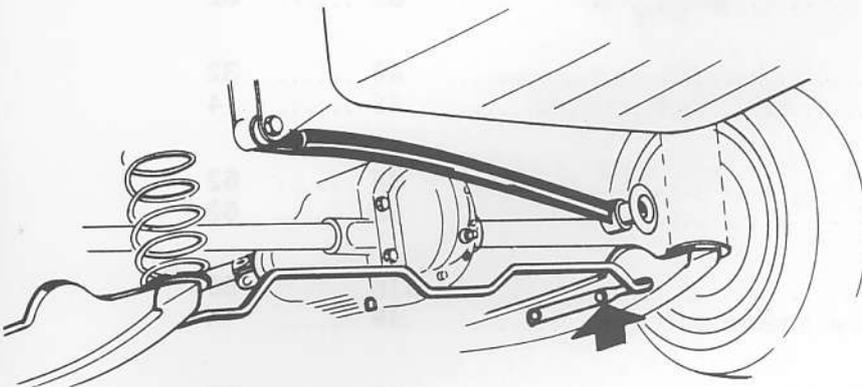
I15



129 329

Install the track rod (Panhard rod)

I16



129 328

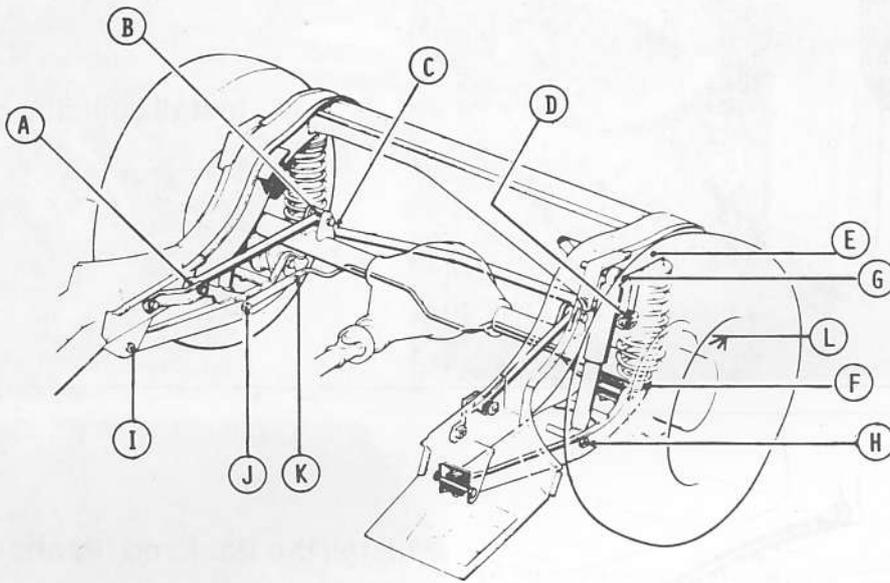
Install the stabilizer bar

I17

Rear End Torque.

Lower and rock the car before tightening. Use Torque Specs Chart.

Rear end torques



130515

	Nm	ft. lbs.
Reaction rod:		
A Body attachment	85	62
B Rear axle attachment	85	62
Track rod (Panhard rod):		
C Rear axle attachment	60	44
D Body attachment	85	62
Rear spring:		
E Upper attachment	45	32
F Lower attachment	19	14
Shock absorber:		
G Upper attachment	85	62
H Lower attachment	85	62
Trailing arm:		
I Body attachment	115	85
F Rear attachment (= spring lower attachment)	19	14
Stabilizer:		
J Front attachment (= shock absorber)	85	62
K Rear attachment	45	32
Wheels:		
L Nuts, tightened criss-cross	115	85



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BY THE N.I.A.S.E.**

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