1968-74 OPEL

Opel (1968-74)

DESCRIPTION

Rear axle is a semi-floating integral carrier type. Axles are carried by ball bearings located on outer ends of each axle shaft. Removable housing cover permits inspection and service of differential. A breather fitting is located on top of the right axle tube.

AXLE RATIO & IDENTIFICATION

Opel uses only one basic type of axle assembly. Any differences in Removal & Installation or Overhaul procedures will be noted where they occur. To determine axle ratio, divide number of ring gear teeth by number of pinion gear teeth.

REMOVAL & INSTALLATION

AXLE SHAFTS & BEARINGS

Removal 1968-70 – 1) Raise and support rear of vehicle. Remove wheel and brake drum. Remove differential cover and allow lubricant to drain. Working through access holes in axle shaft flange, remove four nuts and washers that retain axle shaft retainer and backing plate to axle housing.

2) Remove axle shaft retaining ring from inner end of axle shaft using suitable pliers (J-8872). Position suitable tool between inner end of axle shaft and pinion shaft and lever out axle shaft. If axle shaft hesitates to move, install suitable axle shaft puller (J8805) and slide hammer (J-2619) on axle shaft flange and remove shaft, using care not to damage oil seal.

3) To remove oil seal and axle bearing, install suitable bearing and seal remover (J-22935) with slide hammer (J-2619) and adapter (J-2619-4) and remove oil seal and bearing.

Installation 1968-70 – 1) If axle bearing and seal were removed, make certain axle housing bore is clean and with suitable bearing and seal driver (J-22936), install bearing until it bottoms in housing bore. Apply sealer to O.D. of new seal and install using bearing and seal driver. Drive seal into housing until it bottoms against axle bearing bore.

2) Check axle shaft radial runout at bearing race and check lateral runout on face of axle shaft flange near outer edge. Replace axle shaft if runout is not to specifications. Position new paper gasket on retaining bolts at backing plate and install axle shaft taking care not to damage oil seal.

3) Install new retaining ring on inner end of axle shaft using suitable pliers (J-8872). Install new differential cover gasket and cover and fill with recommended rear axle lubricant. Install axle shaft retainer nuts and washers. Install brake drum and wheel and lower vehicle.

Removal 1971-74 – Raise and support rear of vehicle and remove wheel and brake drum. Unscrew rear axle shaft retaining plate. Using suitable axle shaft puller (J-8805) and slide hammer (J-2619) on axle shaft flange, remove axle shaft. To remove bearing, cut off retaining ring using a chisel. Press off bearing using a suitable bearing remover (J-22912).

Installation 1971-74 – 1) Check radial runout of axle shaft at ball bearing seat and lateral runout of axle shaft flange near largest diameter. If axle shaft exceeds specifications for runout or is otherwise damaged, it must be replaced. Using suitable installer ring (J-21721-2), press on bearing so that oil seal groove on bearing faces shaft splines. Using an installer ring, press on retainer ring so that shoulder faces bearing.

AXLE ASSEMBLY

Removal & Installation – Raise rear of vehicle and remove rear wheels and one brake drum. Disconnect parking brake components, lower shock absorber mounts, left end of track rod and stabilizer bar shackles (if equipped). Disconnect universal joint from pinion flange and support or tie propeller shaft out of way after marking for reassembly. Disconnect brake lines. Lower axle assembly far enough to remove coil springs. Remove central support bracket and disconnect lower control arms. Remove axle assembly. To install, reverse removal procedure.

OVERHAUL

NOTE – Overhaul may be accomplished with axle assembly installed in vehicle.

Case Assembly – 1) Remove differential cover bolts and allow lubricant to drain. Disconnect left end of track rod and tie out of way. Remove rear wheels and brake drums. Remove axle shafts as previously described. Check and record ring gear backlash.

2) Mark differential side bearing caps and carrier so that caps can be reinstalled in original positions. Remove bearing caps. Using two wooden hammer handles, pry differential case assembly from carrier. Do not drop or interchange side bearing outer races. Insert suitable adapter (J-2241-11) in bearing hub and remove side bearings using suitable puller (J-22588) with adapter leg (J-22929).

3) Remove differential case-to-ring gear bolts and tap ring gear off case using a soft faced hammer. Remove differential pinion shaft retaining pin using a suitable pin punch. Remove pinion shaft, gears, side gears and thrust washers.

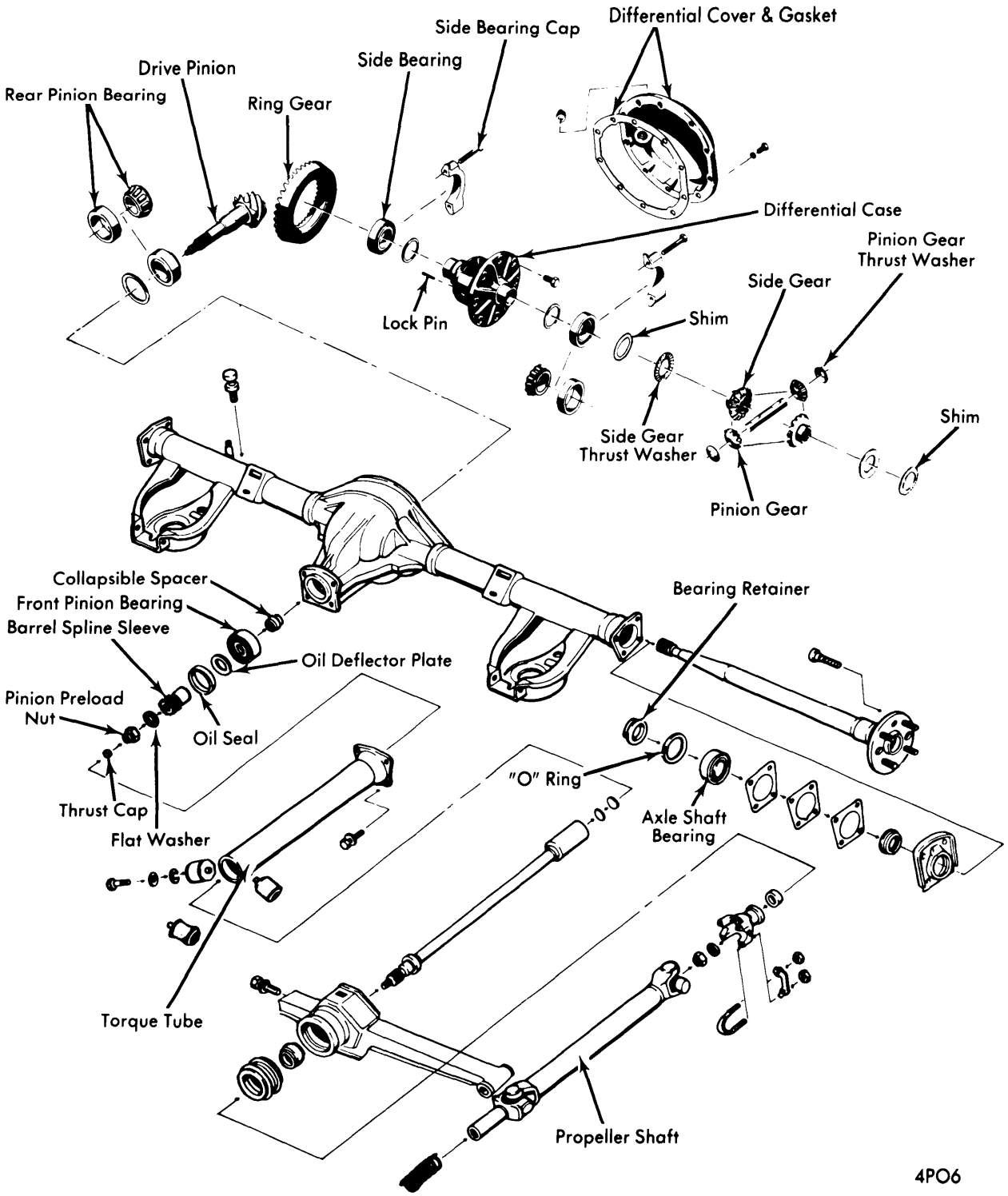
Drive Pinion – Remove torque tube assembly. Using suitable tool (J-229-32), hold barrel spline and remove pinion preload nut. With the aid of above tool, remove barrel spline from drive pinion and remove pinion by tapping rearward with a soft faced hammer. Remove rear pinion bearing using suitable tool (J-22912) and remove pinion bearing outer races using a brass drift.

REASSEMBLY & ADJUSTMENT

NOTE – Prior to reassembly, all parts should be cleaned and inspected for imperfections.

Drive Pinion – 1) Install front pinion bearing outer race using suitable installer (J-8611-01) and driver handle (J-8092). Install rear pinion bearing outer race (without shims) using suitable installer (J-7818) and driver handle (J-8092).

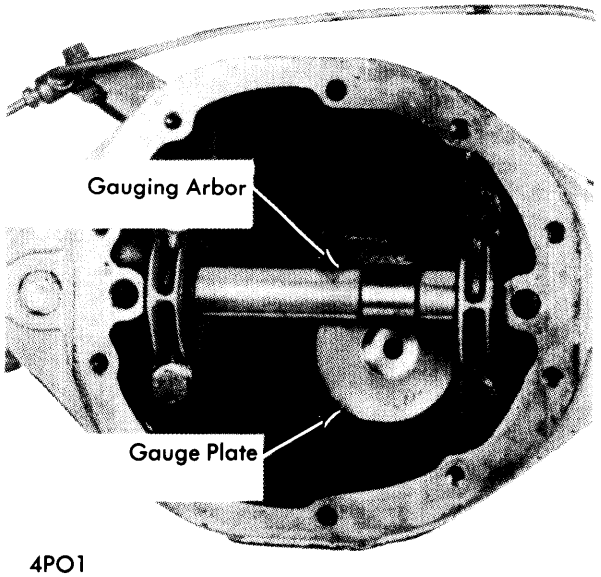
1968-74 OPEL (Cont.)



REAR AXLE ASSEMBLY

1968-74 OPEL (Cont.)

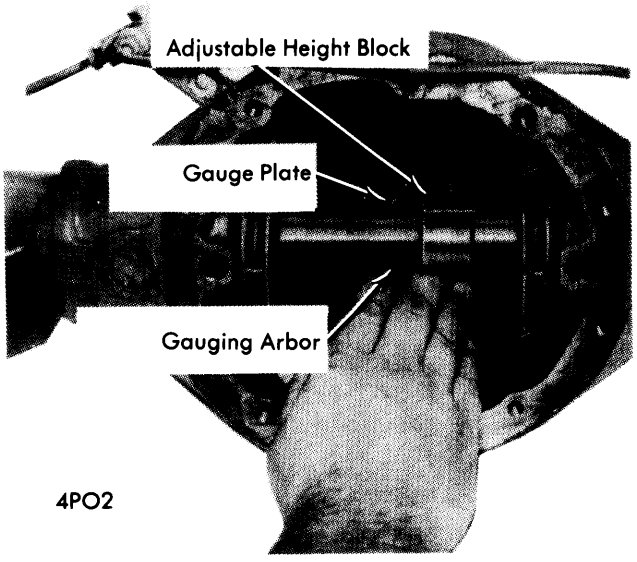
2) To determine correct pinion depth setting, proceed as follows: Assemble suitable gauge plate (J-21691-4), rear pinion bearing (lubricated), stud (J-21691-7), front pinion bearing (lubricated), pilot washer (J-21691-5) and nut into differential carrier (see illustration). Alternately tighten and rotate until specified torque is required to rotate gauge plate assembly.



4PO1

PINION DEPTH GAUGING TOOLS

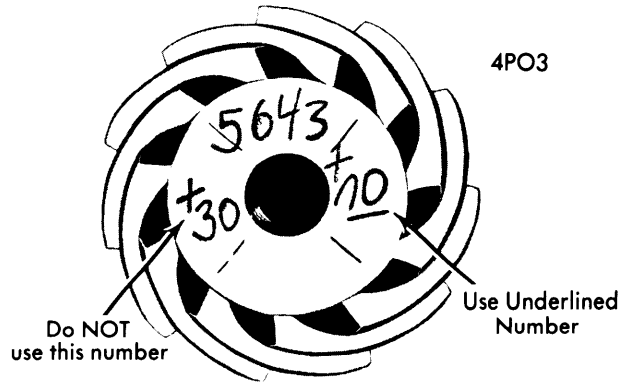
3) Position suitable gauging arbor (J-21691-6) in side bearing bores of carrier, install side bearing caps in their respective positions and torque bearing cap bolts to 33 ft. lbs. (4.5 mkg). Position adjustable height block (J-21691-3) firmly against face of gauge plate and allow moveable plunger to bear against machine surface of gauging arbor. Tighten plunger set screw. (See illustration).



4PO2

GAUGING PINION DEPTH

4) Remove adjustable height block and measure distance from bottom of height block to top of extended plunger and record this height. *NOTE — Figures marked on end of pinion gear are in milimeters. The German figure one is similar to a seven. The German figure seven will always have a horizontal line drawn through it.*



PINION GEAR REFERENCE NUMBER

5) If the control figure is plus, SUBTRACT this value from the measured block height. If control figure is minus, ADD this value to measured block height. From this result, SUBTRACT the nominal figure. 1.468" (37.28 mm). The result is the thickness of shims required to set pinion (see example below).

Height Block Dimension = 1.484" (37.69 mm)
Control Figure of +10 (+.10 mm) Converted to inches = .0039"
Height Minus the Plus Control Figure = 1.4801" (37.59 mm)
Result Minus the Nominal Figure 1.468" (37.28 mm) = .0121" (.307 mm).
Shim Thickness Required = .012" (.304 mm)

6) Remove all measuring tools and bearings and remove rear pinion bearing outer race using a brass drift. Install pinion depth shims calculated above in rear pinion bearing outer race bore and install rear pinion bearing outer race using suitable tools. Install rear pinion bearing onto pinion.

7) Lubricate pinion bearings and assemble drive pinion, collapsible spacer, front pinion bearing, oil deflector plate and barrel spline sleeve in differential carrier. Thread barrel spline sleeve installer (J-22938) onto drive pinion and draw spline sleeve onto pinion until there are sufficient threads of pinion protruding to install pinion preload nut. Do not use installer to adjust pinion preload.

8) Remove installer and install washer and pinion preload nut. Using suitable tool (J-22932) to hold barrel spline, tighten preload nut until specified preload torque is obtained. If preload specification is exceeded, replace collapsible spacer and adjust again. Use suitable tool (J-22931) to install a new pinion seal that has been soaked in rear axle lubricant.

Differential Case — **1)** Install side gears without thrust washers or shims. Lubricate and install pinion gears and thrust washers between side gears, 180° apart, and rotate gears as an assembly until pinion gear bores are aligned with pinion shaft bores in case. Install pinion shaft.

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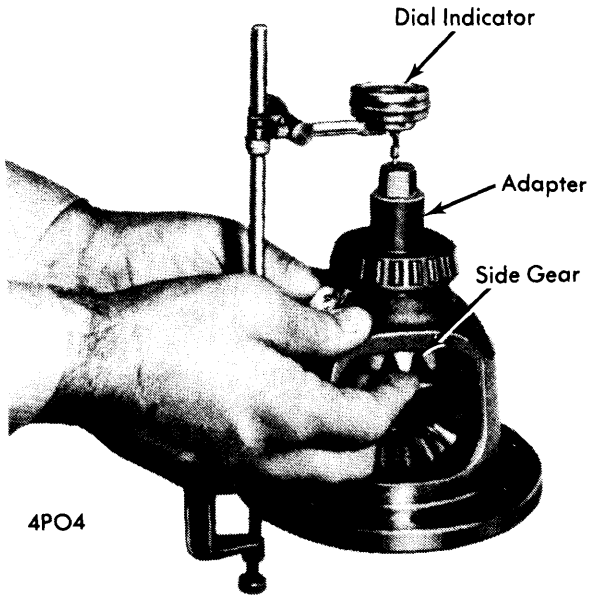
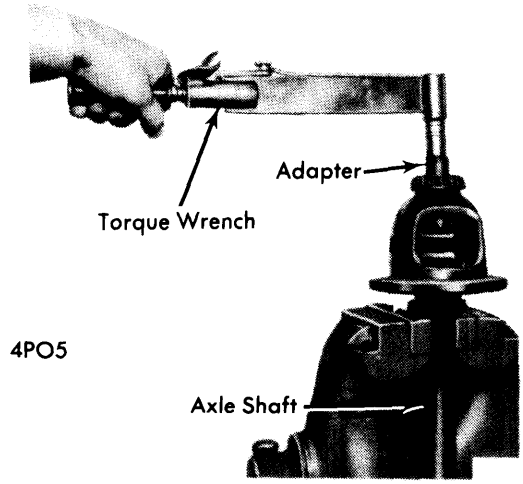
2) Using a dial indicator and suitable tool (J-24093), check end play clearance between side gear and case. Measure thickness of concave thrust washer and subtract this dimension from end play reading. Subtract an additional .002" (.05 mm) from this value to obtain correct shim thickness required. Turn case over and repeat this procedure for other side gear. Measure shim thickness to ensure that correct thickness is being used and install shims and reassemble pinion shaft assembly. Install pinion shaft lock pin and install thrust washers with concave side towards differential case.



MEASURING SIDE GEAR END PLAY

3) Using suitable tool (J-24093) and a torque wrench, check torque required to turn gears as follows: Hold axle shaft in a vise and position differential case onto shaft. Insert special tool into opposite side gear and attach torque wrench (see illustration). Check torque required to rotate gear. Check torque for both side gears. If torque is not correct add or reduce one side shim pack by one size. If this is not sufficient to attain correct torque, re-shim both sides completely.



MEASURING SIDE GEAR TORQUE

4) Install ring gear on case and tighten bolts. Check lateral runout of ring gear. If runout is not to specifications, ensure that dirt or burrs are not holding ring gear in a cocked position and that bolts are evenly tightened. Install side bearings using suitable installer (J-22919) and drive handle (J-8092) while supporting opposite side of case on pilot (J-2241-11) to prevent bearing damage.

5) Position differential case assembly, less side bearing shims, into side bearing bores of carrier. Insert feeler gauges of sufficient thickness between each bearing outer race and carrier to remove all end play. Ensure feeler stock is pushed to bottom of bearing bores. Mount suitable dial indicator (J-8001) on carrier so indicator stem is at right angles to a tooth on ring gear. Adjust feeler gauge thickness from side to side until ring gear backlash is to specifications.

6) With zero end play and correct backlash established, remove feeler gauges, determine thickness of shims required and add .002" (.05 mm) to each shim pack to provide side bearing preload. Remove case assembly and install shim packs with respective side bearing using suitable installer (J-22919), driver handle (J-8092) and pilot (J-2241-11). Position case assembly and outer races in carrier. Use a soft faced hammer to drive case into carrier until side bearing outer races bottom in their bores.

7) Install side bearing caps in their original locations and tighten bolts. Rotate case assembly several times to seat bearings. Check backlash and preload using a torque wrench on ring gear attaching bolt. If torque is not correct, it will be necessary to re-shim side bearings. Install torque tube assembly and axle shaft.

AXLE ASSEMBLY SPECIFICATIONS

Axle Shaft Radial Runout	
1968-70	.001" (.025 mm) max.
1971-74	.002" (.051 mm) max.
Axle Shaft Flange Lateral Runout	.004" (.102 mm) max.
Axle Shaft End Play	.002" (.051 mm) max.
Pinion Bearing Torque	
New Bearings	9 INCH lbs. (10.35 cmkg)
Used Bearings	6 INCH lbs. (6.9 cmkg)
Side Gear Rotating Torque	14.5-17.5 ft. lbs. (2-2.4 mkg)
Ring Gear Runout	.003" (.08 mm)
Ring Gear Backlash	.004-.006" (.10-.15 mm)
Side Bearing Preload Torque	
New Bearings	20-30 ft. lbs. (2.7-4.1 mkg)
Used Bearings	10-20 ft. lbs. (1.4-2.7 mkg)

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Ring Gear-to-Case Bolt	47 (6.48)
Side Bearing Cap-to-Carrier Bolt	33 (4.55)
Differential Housing Cover Bolt	22 (3.03)
Propeller Shaft-to-Flange Bolt	11 (1.52)
Flange-to-Drive Shaft Extension Nut	87 (12)
Stabilizer Bar-to-Shackle Bolt	25 (3.45)
Stabilizer Bar-to-Body Bolt	15 (2.07)
Track Rod-to-Rear Axle Nut	76 (10.49)
Track Rod-to-Side Member Nut	22 (3.05)