TRIUMPH TR7 & TR8

DESCRIPTION

Rear axle is hypoid design with centerline of pinion set below centerline of ring gear. Drive pinion bearing preload is maintained by a collapsible spacer. All other differential adjustments are made using selected shims. Adjustment of axle shaft end play is not required.

AXLE RATIO & IDENTIFICATION

Only one basic axle design is used. To determine axle ratio, divide number of ring gear teeth by number of pinion gear teeth.

REMOVAL & INSTALLATION

DRIVE AXLE ASSEMBLY

Removal – 1) Place jack under rear axle, raise vehicle, and support body securely on stands.

2) Remove rear wheels. Disconnect propeller shaft at rear axle and disconnect forward end of flexible rear brake hose. Disconnect handbrake cable at backplate, then remove bolt and nut securing handbrake adjusting cable compensator to rear axle housing.

3) Disconnect rear shock absorbers at axle housing bracket. Lower jack and remove rear springs. Remove bolts and nuts securing radius rods to axle and detach handbrake cable bracket from left side.

4) Release radius rods from axle brackets, then lift axle clear of suspension arms and anti-roll bar and remove from vehicle.

Installation – To install, reverse removal procedure and bleed brakes.

AXLE SHAFTS & BEARINGS

Removal – Raise and support rear of vehicle. Remove wheels. Release emergency brake and remove brake drum. Remove retaining plate-to-differential housing bolts. Using a puller, remove axle shaft with seal, bearing and retaining collar.

Installation – To install, reverse removal procedure and note the following: Grease bearing, seal and differential housing bearing area with lithium base grease.

PINION FLANGE & SEAL

Removal – Raise and support rear of vehicle. Remove propeller shaft-to-pinion flange bolts. Remove pinion flange nut and pinion flange. Remove pinion seal cover bolts and pinion seal cover. Remove seal.

Installation – To avoid damaging seal lip, wrap a piece of tape around machined step of pinion. Grease seal lip and tape. Install seal with lip facing away from differential housing. Tap seal into place and install pinion seal cover. Install pinion flange and nut, then attach propeller shaft.

OVERHAUL

DISASSEMBLY

1) With rear axle assembly removed from vehicle, remove axle shafts. Place container under differential housing assembly to catch lubricant. Remove differential cover, pinion flange and pinion flange seal cover. Mark differential case bearing caps so they can be installed in original positions. Remove bearing cap bolts and bearing caps. Remove differential case from axle housing assembly. If differential case is difficult to remove, use spreader tool (S101 and S101-1) to ease removal.

NOTE – *Bearing caps MUST be installed in original positions.*

2) Using a press and adapters, remove differential bearings. Remove ring gear bolts and ring gear. Remove pinion shaft locating ball, then remove pinion shaft.

3) Rotate side gears until pinion gears, with thrust washers, are clear of differential case. Remove pinion gears with their thrust washers, then remove side gears and their thrust washers.

4) Remove pinion nut, then tap pinion out of differential housing assembly with a wooden block. Pinion is removed with selective spacer, pinion inner bearing and collapsible spacer.

5) Using a drift, drive pinion bearing outer races from differential housing, being careful not to damage differential housing. Remove collapsible spacer from pinion, then use a press and adaptors to remove pinion bearings from pinion.

INSPECTION

Clean and inspect all components for wear or damage. Ring and pinion gears, differential bearings and pinion bearings must be replaced as matched sets.

REASSEMBLY & ADJUSTMENT

Drive Pinion Depth — 1) Install inner and outer pinion bearing cups to axle housing. Install pinion inner bearing to dummy pinion (18G-191-1). Oil bearing and install dummy pinion, outer bearing, tool spacer, washer and nut. Tighten nut gradually until bearing preload of 15-18 INCH lbs. (1.6-2.1 N.m) is obtained. Clean dummy pinion head and position dial indicator gauge foot on dummy head and zero indicator.

NOTE – *Dummy pinion incorporates the maximum allowance for pinion head bearing spacer available, .0492" (1.25 mm) thickness.*

2) Move dial indicator over center of one differential bearing bore and note reading. Repeat for opposite bearing bore. Average these 2 measurements and perform the following calculation:

EXAMPLE:

Average of bore measurements	.002" (.051 mm)
Plus dummy pinion spacer allowance	.0492" (1.25 mm)
Required size of pinion spacer	.051" (1.301 mm)

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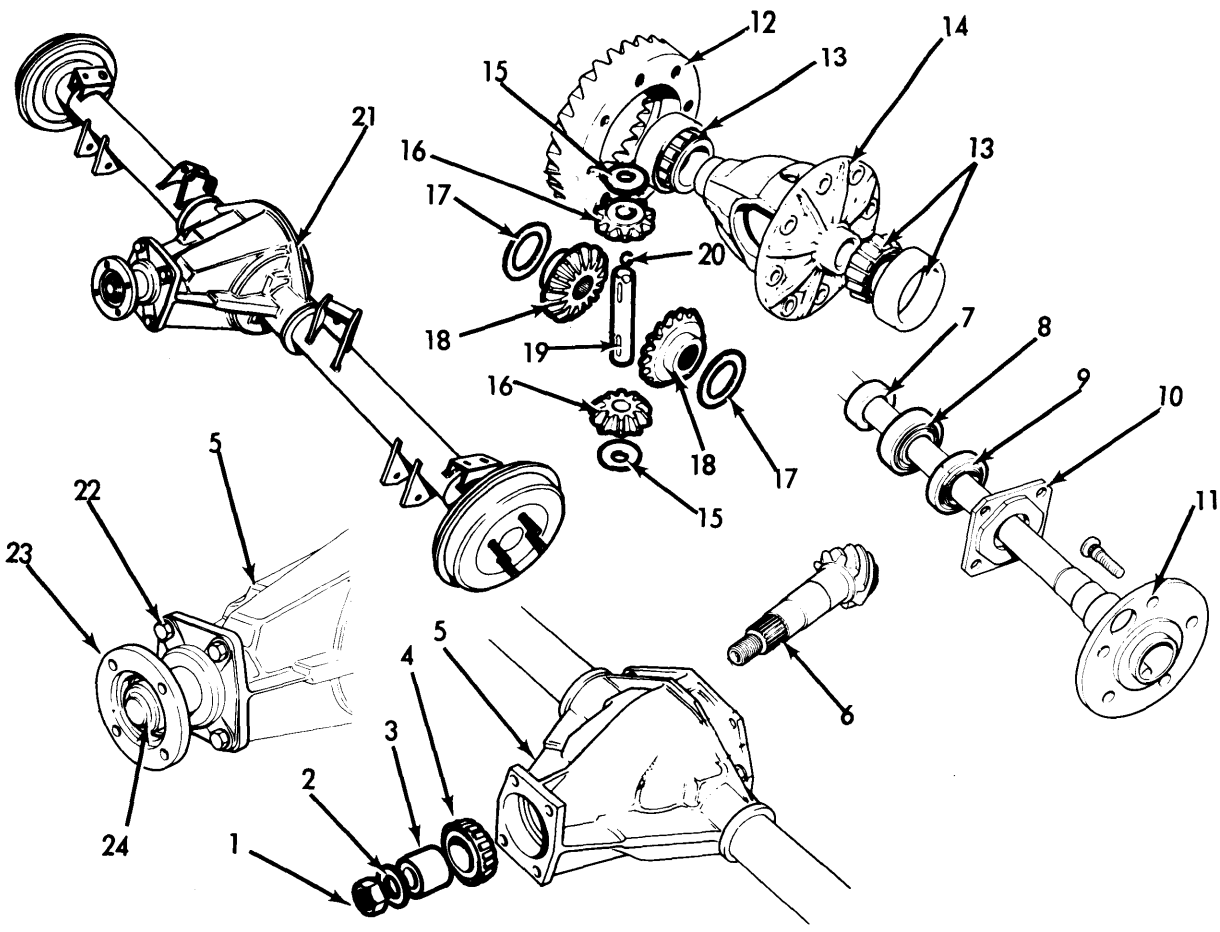
TRIUMPH TR7 & TR8 (Cont.)



1. Pinion Nut
2. Selective Spacer
3. Collapsible Spacer
4. Pinion Bearing
5. Differential Housing
6. Pinion
7. Retaining Collar
8. Axle Bearing
9. Axle Seal
10. Retaining Plate
11. Axle
12. Ring Gear
13. Differential Case Bearings
14. Differential Case
15. Thrust Washer
16. Pinion Gear
17. Thrust Washers
18. Side Gear
19. Pinion Shaft
20. Locating Ball
21. Rear Axle Assembly
22. Pinion Seal Cover
23. Pinion Flange
24. Pinion Flange Nut

Fig. 1 Exploded View of Triumph TR7 and TR8 Drive Axle Assembly

3) There are 3 sets of numbers stamped on pinion head; the first is a 4 digit number indicating pinion and ring gear matching sets (this same number will be stamped on ring gear). The second number will be preceded by a plus or minus, this indicates variation of pinion head nominal thickness in thousandths of an inch (+2 equals plus .002″). The third number is boxed and indicates the variation from nominal position for best running position. If boxed number is a "+", subtract this value from calculated pinion spacer size (.051″ minus .003 is .048″ spacer). If boxed number is a "−", add this value to calculated pinion spacer size (.051″ plus .003 is .054″).

4) Zero dial indicator with differential case pushed to one side, then push differential case to opposite side and record reading as dimension "A". This will be used later to determine preload shim pack. Remove differential case and bearings. Lubricate side gears, pinion gears and thrust washers. Install side gears, with thrust washers, to differential case. Install pinion gears to side gears (1 each side) and rotate side gears to align pinion gears to pinion shaft holes in differential case. Install pinion shaft.

5) After performing above calculations, remove all measuring devices and dummy pinion. Install spacer of calculated thickness to pinion. Install pinion inner bearing collapsible spacer to pinion. Install pinion to axle housing. Install outer bearing, washer and nut to pinion. Carefully tighten nut.

Side Bearing Preload — 1) Preload should be .002-.004″ (.05-.10 mm). To obtain this, proceed as follows: Install differential case bearings (lubricated) to dofferential case.

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2) Install differential case to axle housing and rotate dofferential case while periodically checking turning torque of pinion, until specified turning torque is obtained. If nut is overtightened, collapsible spacer must be replaced. Never loosen nut to obtain specified turning torque.

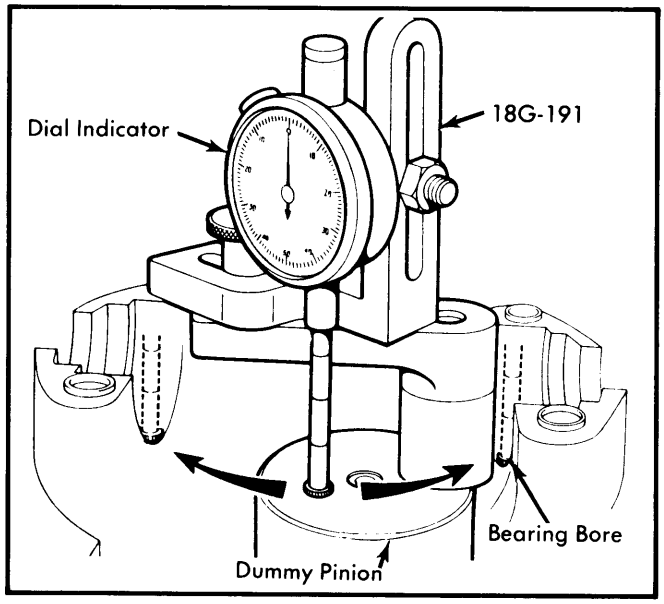

Fig. 2 Checking Drive Pinion Gear Depth

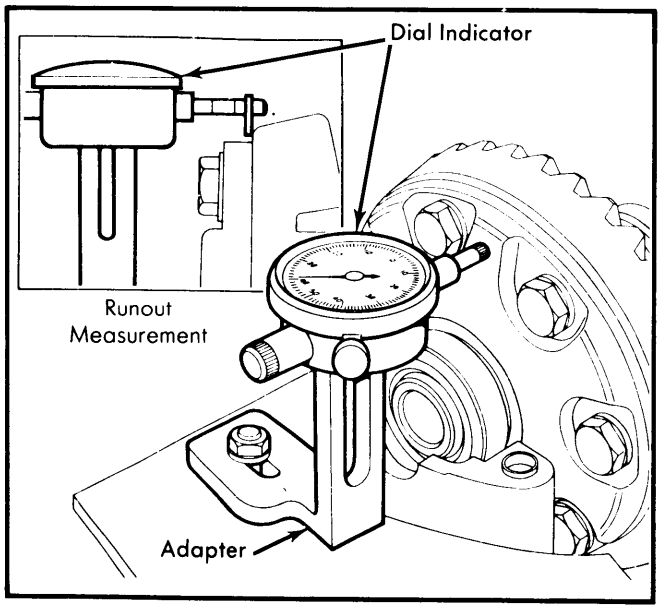

Fig. 3 Checking Ring Gear Flange Runout

3) Press each pinion gear firmly into mesh with side gears and determine pinion gear thrust washer thickness to give a "O" backlash. Remove pinion shaft and pinion gears, then install lubricated pinion gears with selected thrust washers to differential case. Install pinion shaft, with groove aligned with locating hole (for locating ball), in differential case. Recheck for "O" backlash. Install ring gear. Install locating ball to pinion shaft.

4) Install the assembled differential case into axle housing assembly. Lower case until ring gear is fully meshed with pinion. Push differential case to one side. Install and zero a dial indicator. Push differential case to opposite side and record this reading as dimension "B". To calculate shim pack thickness, proceed as follows:

5) For shim pack on ring gear toothed side of differential case; dimension "A" minus dimension "B" plus ½ bearing preload.

EXAMPLE:
Dimension "A" — .240" (6.10 mm)
Dimension "B" — .115" (2.92 mm)
½ bearing preload — .0015" (.04 mm) is ½ of .003" (.08 mm) which is mid point of .002-.004" (.05-.10 mm)
Shim pack thickness for toothed side equals .1265" (3.21 mm)

6) For shim pack on smooth side of differential case; dimension "B" minus ring gear backlash plus ½ bearing preload.

EXAMPLE:
Dimension "B" — .115" (2.92 mm)
Ring gear backlash — .005" (.13 mm) which is mid point of .004-.006" (.10-.15 mm)
½ bearing preload — .0015" (.04 mm) is ½ of .003" (.08 mm) which is mid point of .002-.004" (.05-.10 mm)
Shim pack for smooth side equals .1115" (2.83 mm)

7) Shims are available from .112-.136" (2.85-3.45 mm) in .0016" (.04 mm) increments. With shim packs selected and indicated as to which side (toothed or smooth) they go, carefully spread axle housing using spreader tool (S101 and S101-1). Install shim packs to their respective sides and remove spreader tool.

8) Install differential case bearing caps in their original marked positions. Recheck backlash of ring gear and pinion. See *Axle Assembly specifications for ring gear backlash.* If backlash is not to specifications, recheck Drive Pinion Depth and Side Bearing Preload adjustment procedures. If backlash is correct, install axle shafts and differential cover.

AXLE ASSEMBLY SPECIFICATIONS

Application	Specification
Ring Gear Runout	.003" (.076 mm)
Pinion Bearing Preload	13-20 INCH lbs. (1.5-2.3 N.m)
Ring Gear Backlash	.004-.006" (.10-.15 mm)

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs (N.m)
Rear Cover-to-Axle Case	16-21 (22-29)
Pinion Housing-to-Axle Case	30-37 (41-50)
Differential Bearing Caps	60-75 (82-102)
Ring Gear-to-Differential	80-90 (109-122)
Pinion Flange-to-Pinion	90-120 (122-163)
Axle Shafts-to-Axle Casing	35-40 (48-54)

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