Drive Axles

ISUZU INTEGRAL HOUSING

I-Mark

DESCRIPTION

Semi-floating hypoid gear type axle with integral housing. Centerline of pinion is set below centerline of ring gear. A removable steel cover, bolted to rear of housing, permits servicing the differential case without removing complete axle assembly from vehicle.

AXLE RATIO & IDENTIFICATION

I-Mark uses one type of rear axle assembly. A 3.154:1 gear ratio is used with manual transmission on both gas and diesel models. A 3.308:1 gear ratio is used with manual transmissions on gas and diesel models, and with automatic transmission on gas models. A 3.583 gear ratio is used with automatic transmissions on diesel models only.

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 teeth.

REMOVAL & INSTALLATION

AXLE SHAFTS

Removal

1) Raise and support vehicle. Remove wheel and brake drum. Working through access holes in axle shaft flange, remove 4 nuts and washers that retain axle shaft bearing retainer.

2) Install slide hammer on axle shaft flange and remove axle shaft. To replace bearing parts, first remove retaining ring by cutting off with a chisel. Press off bearing.

NOTE: When removing axle shaft from housing, make sure axle shaft or splines do not rest on or tear axle seal.

Installation

1) Press on bearing so that seal groove on bearing faces shaft splines. Press on retainer ring so that shoulder faces bearing.

2) Check axle shaft end play. Lubricate and insert axle shaft into housing. Install lock washers and nuts. Install brake drum and wheel assembly.

COMPANION FLANGE & OIL SEAL

Removal

1) Raise and support vehicle. Disconnect propeller shaft from companion flange and remove shaft from transmission. Plug transmission extension housing to prevent lubricant loss. Place a floor stand under front of rear axle housing. Support extension housing and disconnect center support bracket from underbody.

2) Remove bolts attaching extension housing to axle housing and separate them, using a screwdriver if necessary. Pry oil seal out of housing.

Installation

1) Drive lubricated oil seal into axle housing. Making sure thrust washer is in place between extension shaft and pinion shaft, slide extension shaft over drive coupling and support front end with a floor stand.

2) Install flange-to-axle housing bolts and connect center support bracket to underbody. Install propeller shaft, being sure thrust spring is in place. Remove floor stands and lower vehicle.

REAR AXLE ASSEMBLY

Removal

1) Raise vehicle and support at frame. Remove wheels and tires. Disconnect parking brake cable equalizer and return spring from brake rod. Position a jack under rear axle and raise axle only enough to support. Remove stabilizer bar and axle bracket (LS coupe only).

2) Disconnect shock absorbers at lower end. Disconnect lateral rod at left end. Unhook exhaust system brackets. Disconnect drive shaft at companion flange and tie out of way after marking for reassembly. Disconnect brake hose and remove retaining clip.

3) Lower rear axle assembly far enough to remove coil springs. Remove central joint support bracket to underbody retaining bolts and nuts. Disconnect lower control arms at rear axle assembly bracket and roll assembly from under vehicle.

Installation

Reverse removal procedure and note the following. Use a new cover gasket when reinstalling cover. Refill axle housing with lubricant. Bleed and adjust brake system.

OVERHAUL

DISASSEMBLY

1) Remove differential cover, drain lubricant. Remove axle shafts. Check and record ring and pinion gear backlash and pinion bearing preload. This will indicate gear or bearing wear or an error in backlash or preload setting.

2) Mark differential bearing caps and housing for reassembly reference. Remove caps and pry differential case from housing. Remove bearing cups and shims and keep each set with proper bearing cap for reassembly reference.

3) Remove pinion shaft lock pin. Remove differential pinion shaft, gears and side gears with thrust washers keeping them in order for reassembly. Remove ring gear bolts (left hand threads) and tap gear from case using soft drift and hammer.

4) Remove pinion nut and drive coupling. Remove pinion shaft and front bearing. If necessary, remove pinion bearing cups from housing using a brass drift. Press pinion shaft out of rear bearing and note thickness of pinion depth shim pack.

REASSEMBLY & ADJUSTMENTS

Case Assembly

1) Install side gears and thrust washers in the differential case. Lubricate and install pinion gears 180° apart. Rotate the gears as an assembly until the pinion gear bores are aligned with the pinion shaft bores in case.

2) With one side gear held stationary, measure the backlash between side gears and pinion gears. If backlash is greater than .003" (.08 mm) adjust with thrust washers. Thrust washers are available in thicknesses of .039-.055" (1.0-1.4 mm).

3) Install pinion shaft lock pin and stake to prevent loosening. Install ring gear. Coat ring gear bolts

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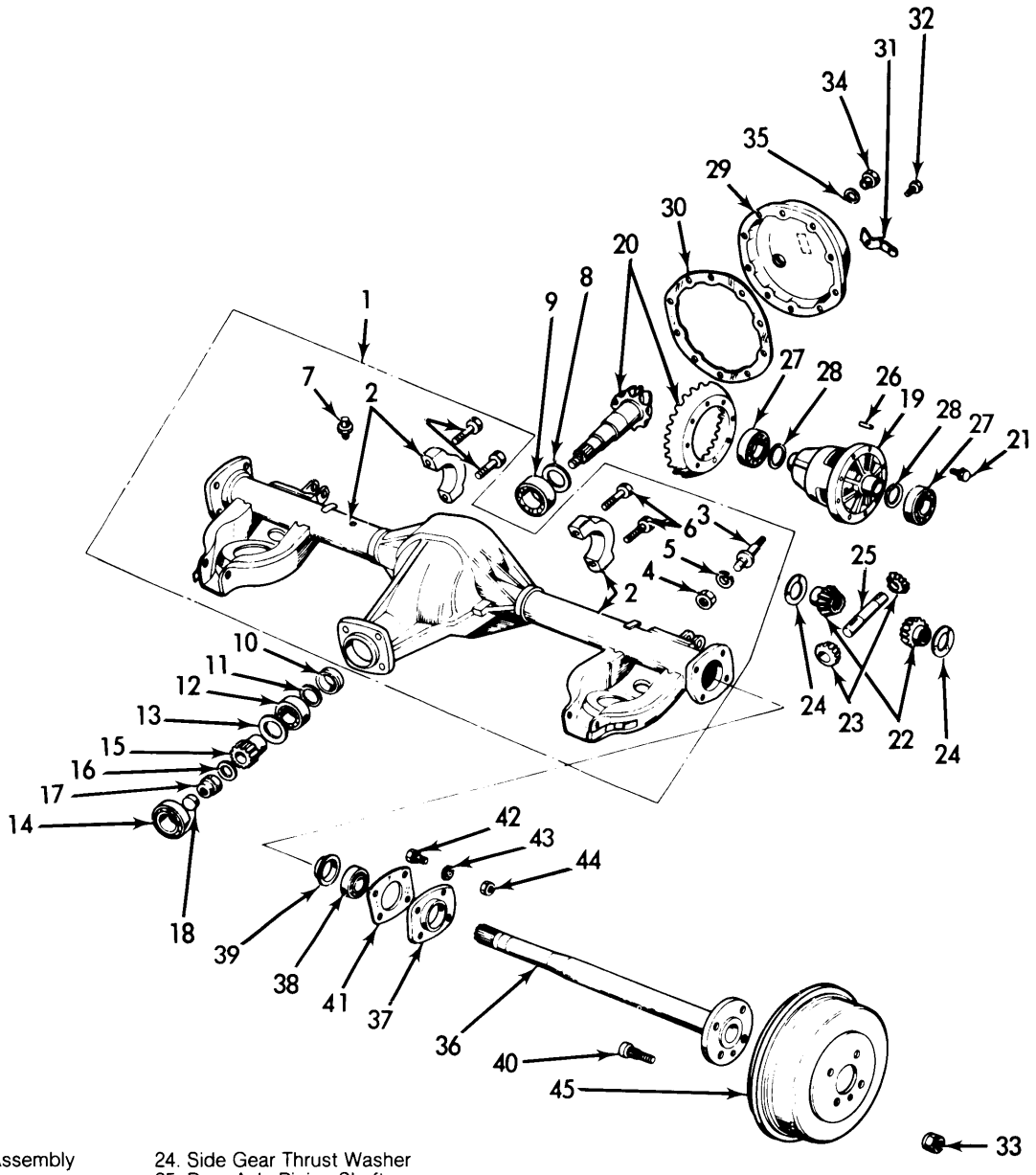
ISUZU INTEGRAL HOUSING (Cont.)

Fig. 1: Exploded View of I-Mark Rear Axle Assembly



1. Rear Axle Housing Assembly
2. Rear Axle Case
3. Axle Housing-to-Lateral Rod Bolt
4. Nut
5. Washer
6. Bearing Cap-to-Axle Case Bolt
7. Rear Axle Breather Assembly
8. Pinion Bearing Shim
9. Pinion Rear Bearing
10. Collapsible Spacer
11. Shim
12. Pinion Front Bearing
13. Oil Slinger
14. Sliding Sleeve Oil Seal
15. Barrel Spline Sleeve
16. Drive Pinion Washer
17. Pinion Nut
18. Pressure Cap
19. Differential Case
20. Ring Gear & Pinion
21. Ring Gear Setting Bolt
22. Side Gears
23. Pinion Gears
24. Side Gear Thrust Washer
25. Rear Axle Pinion Shaft
26. Lock Pin
27. Side Bearing
28. Side Gear Shim
29. Differential Cover
30. Differential Cover Gasket
31. Brake Pipe Union Bracket
32. Union Bracket Bolt
33. Wheel Nut
34. Oil Filler Plug
35. Oil Filler Gasket
36. Rear Axle Shaft
37. Axle Shaft Bearing Retainer
38. Axle Shaft Bearing
39. Axle Shaft Bearing Retaining Ring
40. Wheel Pin
41. Axle Shaft Shim
42. Bearing Retainer-to-Axle Case Bolt
43. Spring Washer
44. Nut
45. Rear Brake Drum

ISUZU INTEGRAL HOUSING (Cont.)

with thread sealant and install bolts. Install side bearings on differential case.

Pinion Depth Adjustment

1) Drive pinion rear bearing shim thickness, controlling pinion depth of mesh with ring gear, must be determined whenever a new axle housing, ring and pinion set or pinion bearings and races are installed. Depth of mesh is determined using Pinion Setting Gauge tool set.

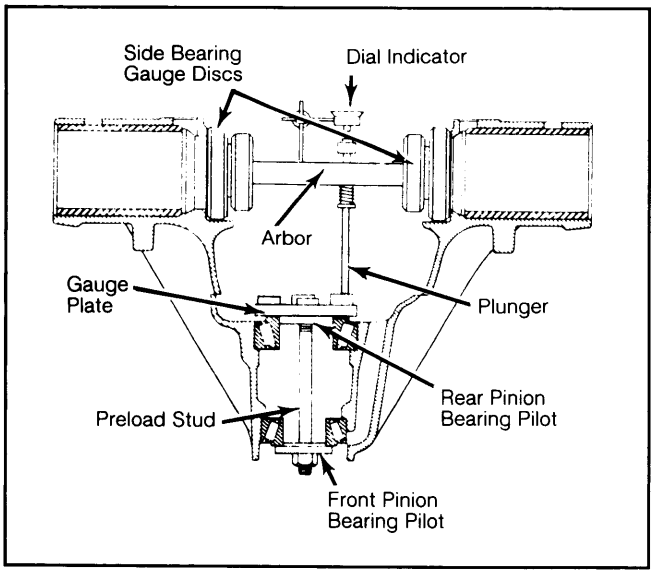
2) If removed, install pinion bearing races. Install lubricated pinion bearing. Position gauge plate and rear pinion bearing pilot (if used) on preload stud. Install through far pinion bearing and through front pinion bearing and front pinion pilot. Install hex nut until snug.

3) Rotate bearings to ensure proper seating. Hold preload stud stationary with wrench on flats. Tighten hex nut until 20 INCH lbs. (2.3 N.m) are required to rotate bearings.

4) Mount side bearing gauging discs on ends of arbor. Place arbor into carrier making sure discs are properly seated. Install side bearing caps and bolts. Tighten bolts to avoid movement.

5) Position dial indicator on mounting post of arbor, with contact button resting on top surface of plunger. Preload dial indicator 1/2 relovution. Tighten in this position.

Fig. 2: Pinion Depth Gauge Set



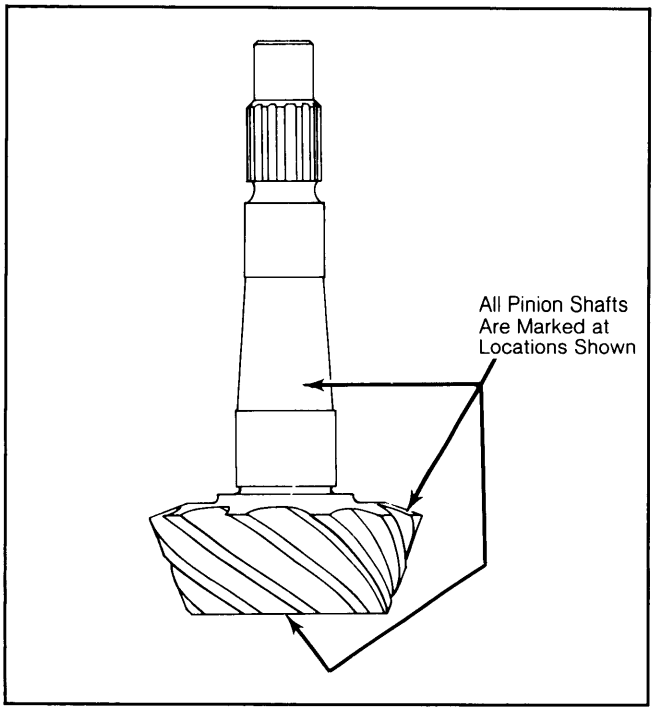
Add dial indicator reading to the number in thousands marked on the pinion gear.

6) Place plunger onto gauging area of gauge plate. Rock plunger rod slowly back and forth across gauging area until dial indicator reads greatest deflection. Set indicator to zero. Repeat rocking action several times to verify setting.

7) Once zero reading is obtained, swing plunger until it is removed from gauging area. Dial indicator will now read required pinion shim thickness for a "normal pinion". Record this reading.

8) Check drive pinion for painted or stamped markings on pinion stem, or a stamped code number on small end of pinion gear. If marking is found to be a plus or minus number (for instance +2 or -5), add or subtract that many thousandths from indicator reading. This will then be the thickness of rear pinion bearing shim pack.

Fig. 3: Pinion Marking Locations



If no markings are found on pinion, use dial indicator reading as shim thickness.

9) Remove bearing caps and gauging tools from housing. Place selected shim pack on drive pinion. Install lubricated pinion bearing onto pinion shaft using a press.

Pinion Installation & Preload Adjustment

1) Install pinion gear with shims and rear bearing installed into carrier housing. Install collapsible spacer, front pinion bearing, oil slinger, and barrel spline sleeve onto the pinion shaft.

2) Draw the barrel spline sleeve onto the pinion until there is enough threads to install the drive pinion washer and preload nut. Torque preload nut to 108 ft. lbs. (146 N.m).

3) Continue to tighten preload nut until a preload of 6-11 INCH lbs. (.7-1.2 mm) 9 INCH lbs. (1.0 mm) preferred new bearings, and 5-8 INCH lbs. (.6-.9 mm) with 6 INCH lbs (.7 mm) preferred old bearings is required to rotate drive pinion. Install new oil seal.

CAUTION: Do not back off nut to loosen preload. If preload is exceeded, a new collapsible spacer must be installed and nut retightened until preload is obtained.

Side Bearing Preload

1) Place differential case assembly without shims into the side bearing bores of the carrier. Using two feeler gauges, insert feeler stock of sufficient thickness between each bearing outer race and carrier to remove all end play. Make sure feeler stock is pushed to the bottom of bearing bores.

2) Mount dial indicator on carrier so indicator stem is at right angles to a tooth on the ring gear. Adjust feeler gauge thickness on both sides until ring gear backlash is .005-.007 (.13-.18 mm) with .006 (.15 mm) preferred.

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3) With zero end play and correct backlash, remove feeler gauges. Determine thickness of required shims and add .002" (.051 mm) to each shim pack to provide side bearing preload.

4) Remove case assembly and both side bearings. Install shim packs with respective side bearing. Position case assembly and outer races in the carrier. Use a soft faced hammer to drive the case into the carrier until the side bearing outer races bottom in their bores.

5) Install side bearing caps in their original location and tighten bolts to 36 lbs. (49 N.m). Rotate case assembly several times to seat bearings. Check backlash and preload using torque wrench on ring gear attaching bolt. Torque should be 20-30 INCH lbs. (2.2-3.3 N.m) for new bearings or 10-20 INCH lbs. (1.1-2.2 N.m) for used bearings.

6) If torque is incorrect, it will be necessary to reshim the side bearings.

NOTE: Do not attempt to reinstall the original production shims as they will break when tapped into place. Previously installed SERVICE shims may be reused.

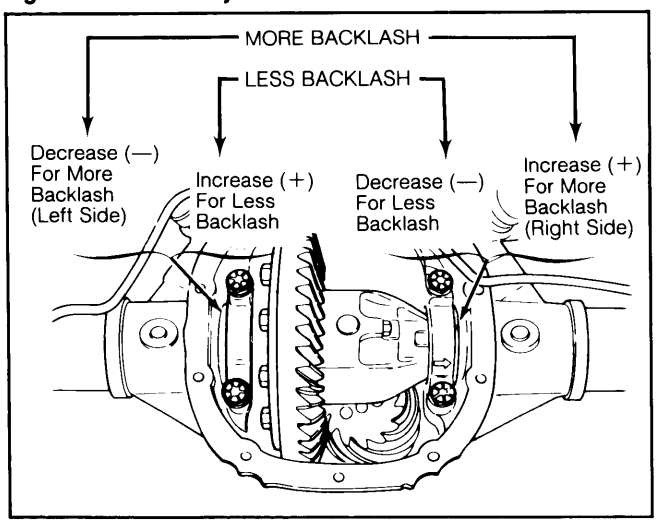
Ring & Pinion Gear Backlash

1) With pinion depth set and pinion installed, place differential case and ring gear assembly into axle housing. Select two shims with a combined thickness equal to that of service shims and feeler gauge used in shim selection procedure.

2) Install shims and spacers between bearing caps and housing. Install differential bearing caps and tighten cap bolts to specifications.Rotate differential case several times to seat bearings and then check backlash using a dial indicator.

3) Increase or decrease shim size where necessary to correct backlash reading. *See Fig. 4.* Recheck backlash at 4 points, equally spaced around ring gear. Make sure variation between points does not exceed .002" (.05 mm).

Fig. 4: Backlash Adjustment



Shim subtracted from one side must be added to the other side to maintain preload.

AXLE ASSEMBLY SPECIFICATIONS

Application	Specification
Pinion Bearing Preload	
New Bearings [1]	6-11 INCH Lbs. (.7-1.2 N.m)
Used Bearing [1]	5-8 INCH Lbs. (.6-.9 N.m)
Ring Gear Backlash	.005-.007" (.13-.18 mm)
Ring Gear Runout	.003" (.08 mm)
Side Bearing Preload [2]	Slip Fit Plus .004" (.10 mm)

[1] — Measured with new seal without ring gear installed.
[2] — Add .002" to each side to preload bearings.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Axle Shaft Flange nuts	28 (38)
Bearing Cap Bolt	36 (48)
Housing Cover Bolts [1]	22 (30)
Pinion Preload Nut	108 (146)
Ring Gear-to-Case Bolt	50 (68)

[1] — Lower center bolt only 16 Ft. Lbs. (21 N.m).