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 basic type of rear 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 teeth.

REMOVAL & INSTALLATION

AXLE SHAFTS

Removal — 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. Install axle shaft puller (J-8805-01) coupled with slide hammer (J-2619-01) 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, using rear pinion bearing remover (J-22912-01).

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

Installation — Using installer (J-22912-01), press on bearing so that seal groove on bearing faces shaft splines. Using installer ring (J-22912-01), press on retainer ring so that shoulder faces bearing. 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. Place a floor stand under front of rear axle housing. Support extension housing and disconnect center support braket from underbody.

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

Installation — Using installer (J-22931), 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. 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. Position a jack under rear axle and raise axle only enough to support. Remove wheel assemblies. Disconnect parking brake cable equalizer and return spring from brake rod. 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 the 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 axle shafts. Check ring and pinion gear backlash and pinion bearing preload. This will indicate gear or bearing wear or an error in backlash or preload setting. 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.

2) 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.

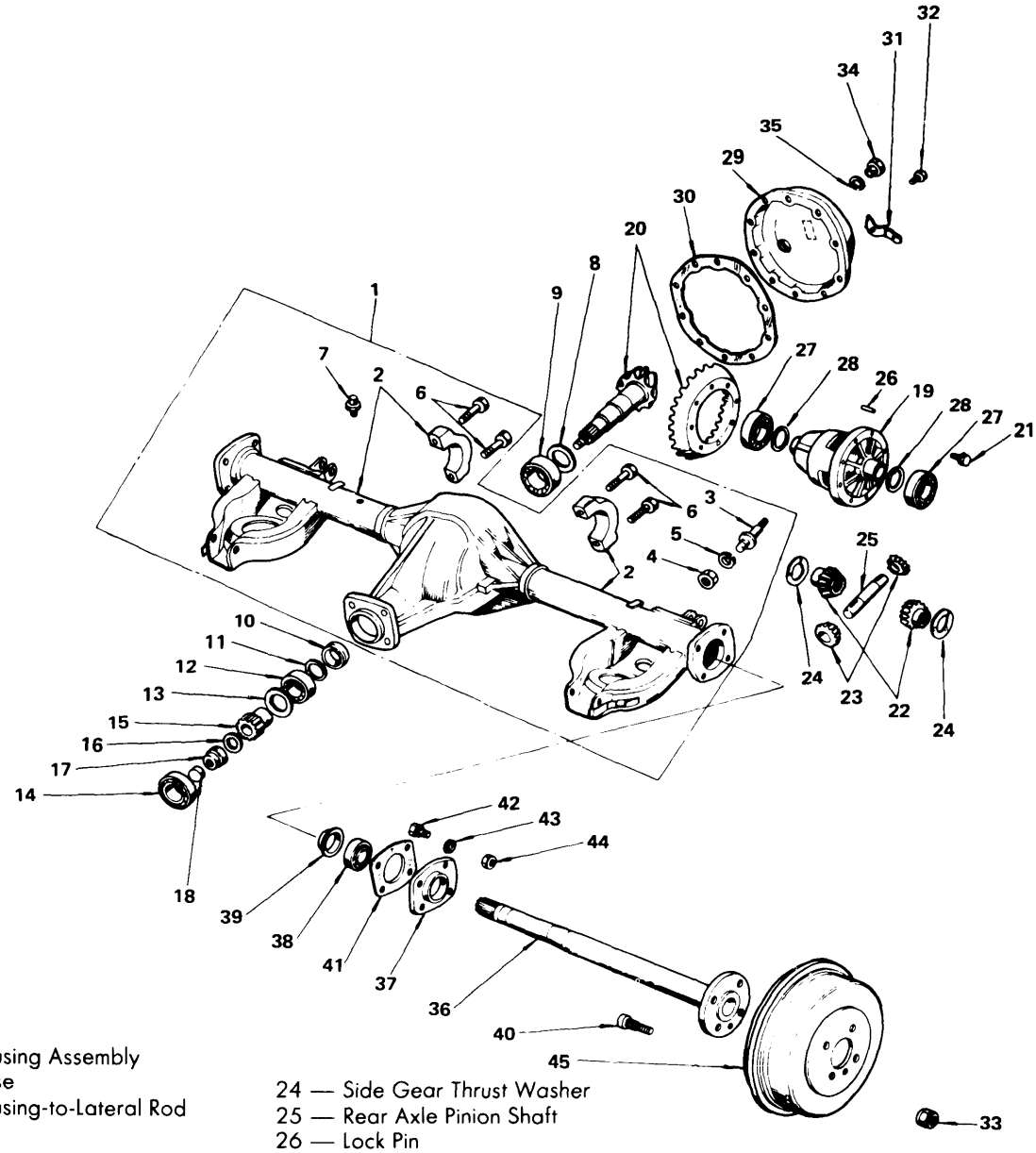
3) Remove pinion nut and drive coupling. Remove pinion shaft and front bearing. If necessary, remove pinion bearing cups from housing using a brass drift. Press pinion shaft out of rear bearing and note thickness of pinion depth shim pack.

REASSEMBLY & ADJUSTMENTS

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 bearings. 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. Rotate bearings to ensure proper seating. Hold preload stud stationary with wrench on

ISUZU INTEGRAL HOUSING (Cont.)



1 — Rear Axle Housing Assembly
2 — Rear Axle Case
3 — Bolt; Axle Housing-to-Lateral Rod
4 — Nut
5 — Washer
6 — Bolt; Bearing Cap-to-Axle Case
7 — Rear Axle Breather Assembly
8 — Pinion Bearing Shim
9 — Pinion Rear Bearing
10 — Collasible 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 — Bolt; Bearing Retainer-to-Axle Case
43 — Spring Washer
44 — Nut
45 — Rear Brake Drum

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

ISUZU INTEGRAL HOUSING (Cont.)

flats. Tighten hex nut until 20 INCH Lbs. (2.3 N.m) are required to rotate bearings.

3) 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. Position dial indicator on mounting post of arbor, with contact button resting on top surface of plunger. Preload dial indicator ½ revolution. Tighten in this position.

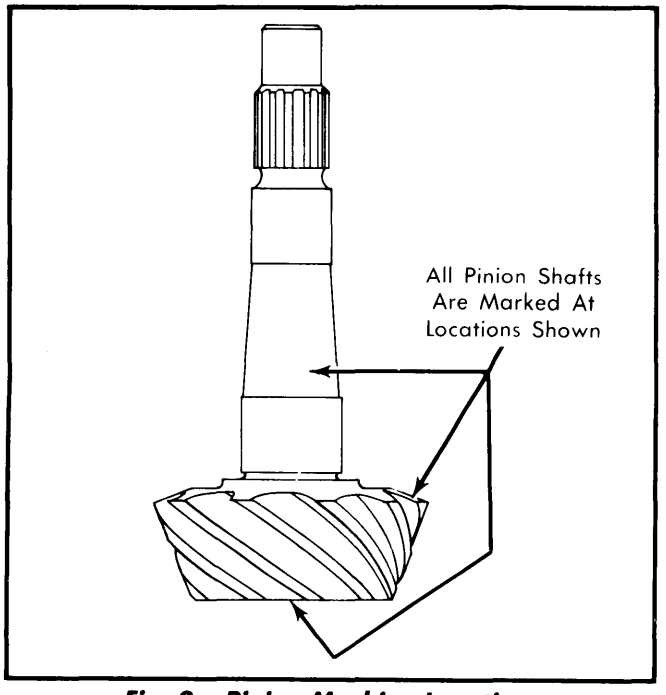


Fig. 2 Pinion Marking Locations

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

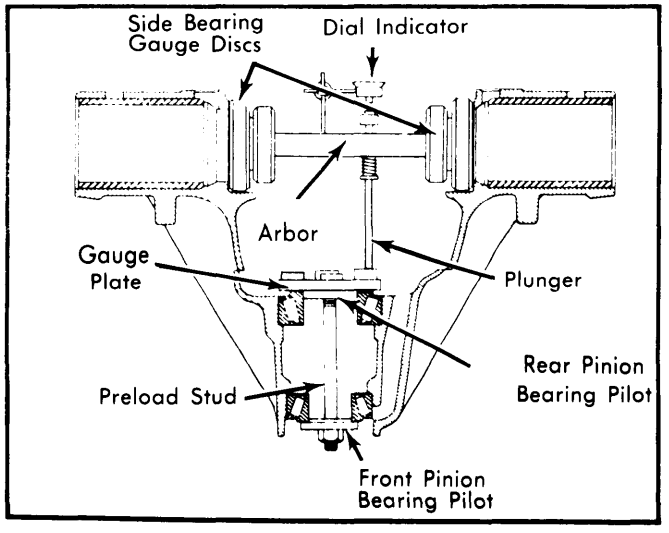


Fig. 3 Pinion Depth Gauge Set

5) 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.

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

6) 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.

Case Assembly — Place ring gear onto case and install new bolts. Alternately tighten bolts to pull ring gear into position on case. Place side gear thrust washers over side gear hubs. Install assemblies into case in their original position. Install pinions and thrust washer into case. Install pinion shaft and lock bolt. Using installing tools, install side bearings onto differential case.

Differential Shim Selection — 1) Measure thickness of original side bearing preload shims. Select a service spacer and service shims with a total thickness slightly less than original shims. Install differential case in housing. Install spacer between each bearing cup and housing with chamfered edge of spacer against housing. Install left bearing cap loosely so that differential case is free to move.

2) With left bearing race and spacer against housing, install both left and right service shims previously selected between right bearing race and service spacer. Insert progessively larger feeler gauges between right service spacer and shim pack until a noticeable drag is felt. Remove differential case, shims and spacers from axle housing.

Pinion Installation & Preload Adjustment — 1) Install a new collapsible spacer over pinion stem. Position pinion in housing. While holding pinion forward, carefully drive front pinion bearing onto pinion shaft until a few threads are exposed. Install oil seal.

2) Install drive coupling, washer and nut and tighten until end play is removed. Rotate pinion several times to seat bearings. Check preload using an INCH lb. torque wrench. Continue tightening nut and checking preload until proper preload is obtained (see specifications).

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.*

Ring & Pinion Gear Backlash — 1) With pinion depth set and pinion installed, place differential case and ring gear assembly into axle housing. Select 2 shims with a combined thickness equal to that of service shims and feeler gauge used in shim selection procedure. Install shims and spacers between bearing cups and housing. Install differential bearing caps and tighten cap bolts to specification.

2) Rotate differential case several times to seat bearings and then check backlash using a dial indicator. Increase or decrease shim size where necessary to correct backlash reading. *See Fig. 4.* Recheck backlash at 4 points, equally spaced around ring gear, making sure that variation between points does not exceed .002" (.05 mm).

ISUZU INTEGRAL HOUSING (Cont.)

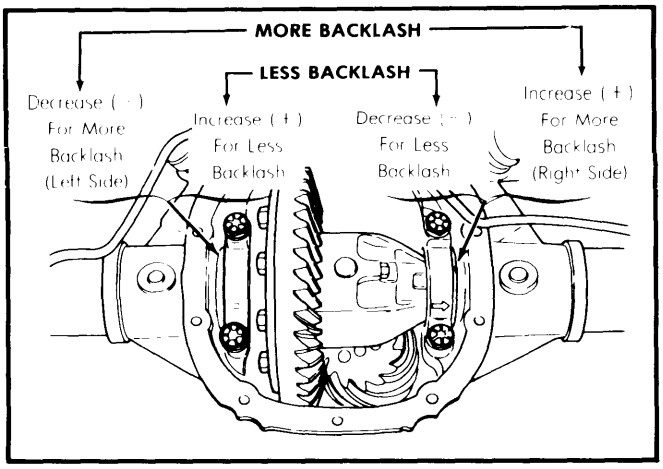


Fig. 4 Backlash Adjustment

Differential Bearing Preload — Remove differential bearing caps and increase both left and right shim sizes .004" (.008" total for both sides). Gentle tapping may be necessary to install second shim. Make sure shims are seated and differential turns freely. Using gear marking compound, check gear tooth contact pattern to verify proper assembly and adjustment.

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.*

AXLE ASSEMBLY SPECIFICATIONS

Application	Specification
Pinion Bearing Preload	
New Bearings①	10-20 INCH Lbs. (1.1-2.3 N.m)
Used Bearings①	5-15 INCH Lbs. (.5-1.9 N.m)
Ring Gear Backlash	.005-.007" (.13-.18 mm)
Side Bearing Preload②	Slip Fit Plus .008" (.20 mm)

①— Measured with new seal without ring gear installed.
②— Add .004" to each side to preload bearings.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Ring Gear-to-Case Bolt	45-50 (61-68)
Bearing Cap Bolt	55-65 (75-88)
Pinion Shaft Lock Bolt	10-15 (14-20)
Housing Cover Bolts	20-30 (27-41)