

**MC-9 MAINTENANCE MANUAL**

# SECTION 2

## REAR AXLES

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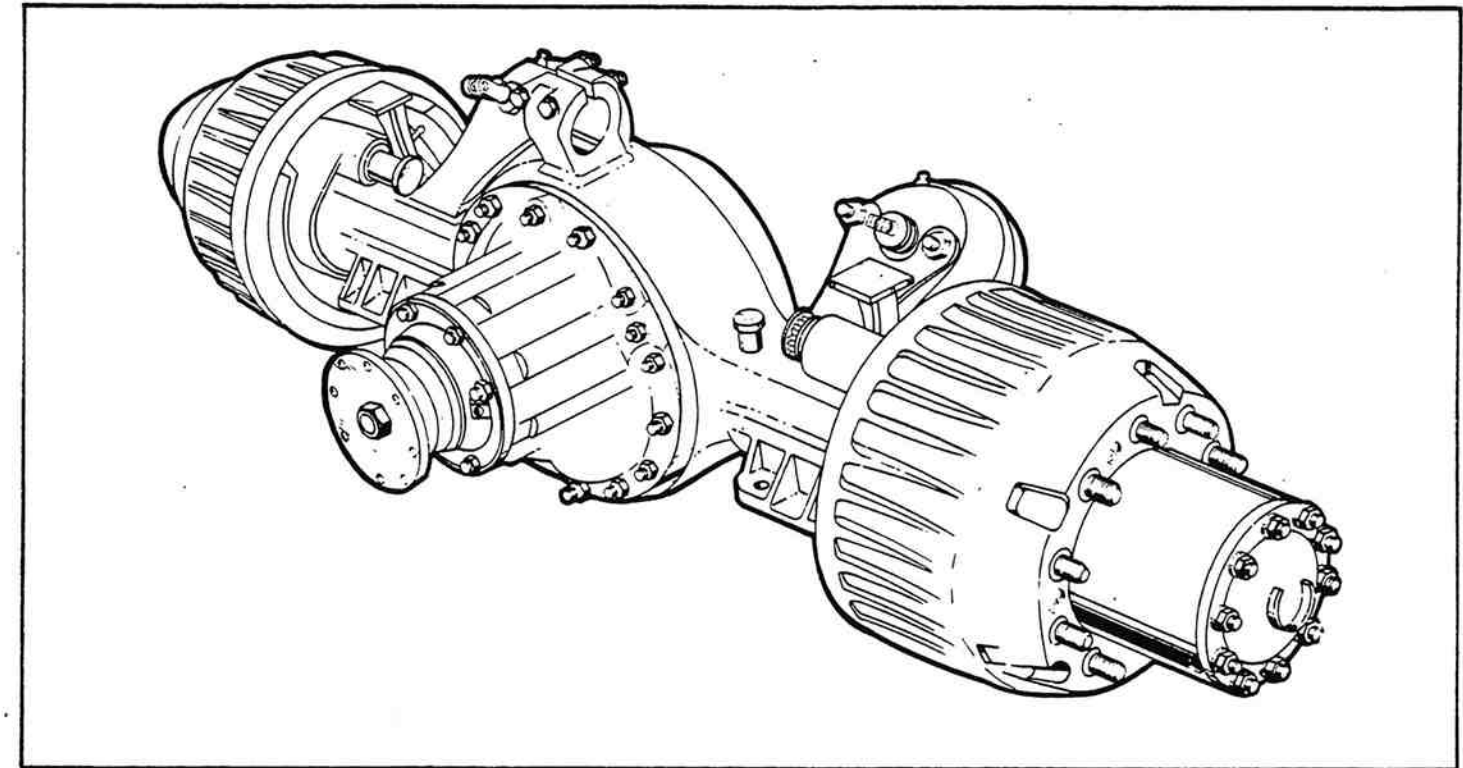


Figure 2-1. Drive Axle

## REAR AXLES

### DRIVE AXLE

The drive axle (figure 2-1) is a Rockwell Standard full floating type with pressed steel housing, fitted with replaceable pressed in steel sleeves. A magnetic drain plug is installed in the bottom of the housing.

The single reduction final drive employs a heavy duty hypoid drive pinion and ring gear. The differential and gear assembly is mounted on tapered roller bearings and lubricated by the differential oil.

The straddle-mounted pinion has two tapered roller bearings in front of the pinion teeth which take the forward and reverse thrust, and a third bearing behind the pinion teeth to carry the radial load.

The standard drive axle ratio on all of the coach models is 3.73:1. Optional ratios which may be present are 3.33:1 and 4.10:1.

### LUBRICATION

Lubrication recommendations will be found in Section 10 of

this manual.

During initial stages of normal operation, tiny metal particles are freed from mating surfaces of moving parts. These metal particles are carried by the lubricant through the assembly and act as lapping compound which accelerates wear of all parts.

To ensure maximum life of the differential and prevent premature failure, the original "factory fill" lubricant should be drained. This also prevents lubricant contamination caused by differences in the "factory fill" and lubricant used by the operator when topping up.

**CAUTION: Change break-in oil after 1,000 miles (1,600 km) but no later than 3,000 miles (4,800 km). Drain the unit while still warm from operation.**

See figure 2-2 for fill and drain plugs. Magnetic drain plugs perform the vital function of trapping small metallic particles that circulate in the lubricant, through the gears and bearings. They prevent rapid wear and premature failure. The magnet must be strong enough to firmly hold the particles under service conditions. We recommend plugs with elements having a minimum pick-up capacity of 2 pounds of low carbon steel in plate or flat bar form.

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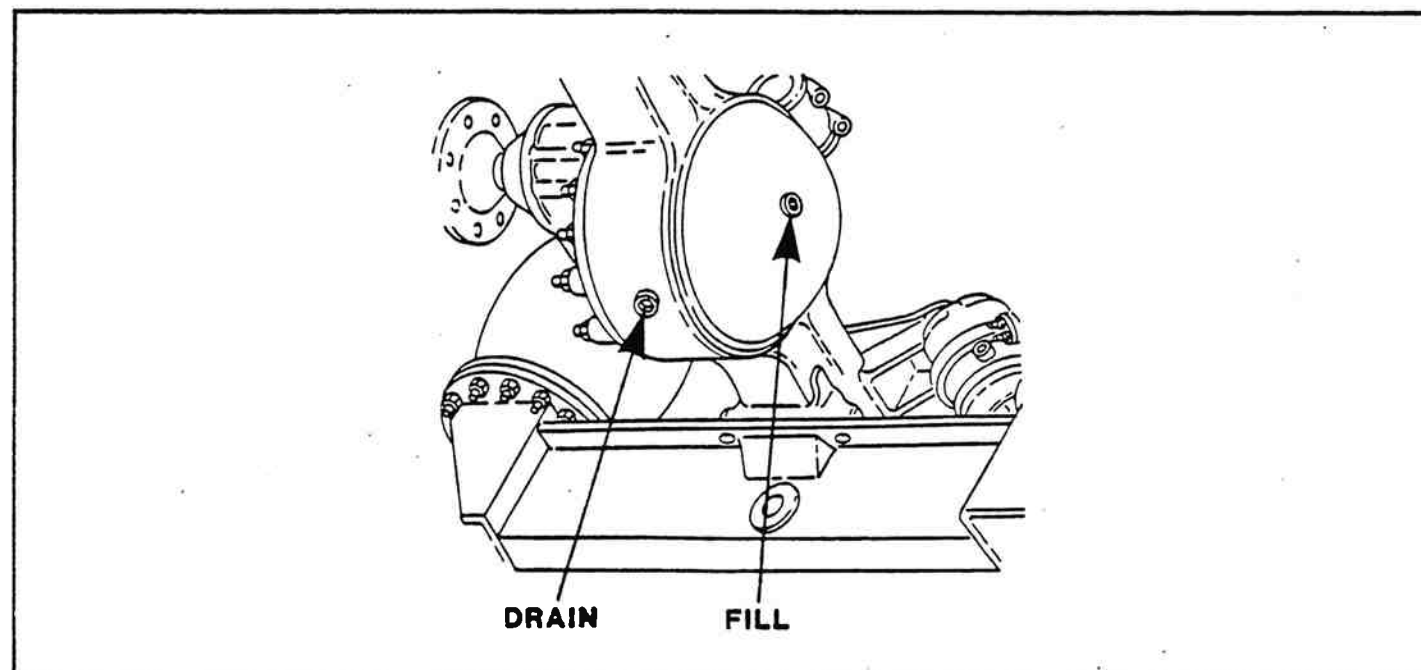


Figure 2-2. Drive Axle Housing.

Clean all magnetic drain plugs prior to reinstallation.

1. Fill axle housing to the correct level with specified lubricant with the vehicles on level ground. Use general purpose gear lubricant SAE 90 above 0°F. (-18°C.) or SAE 140 below 0°F. (-18°C.).

2. Lubricate universal joint.

3. Drive the vehicle, unloaded, for one to two miles at speeds not to exceed 25 miles per hour to thoroughly circulate the lubricant throughout the assembly.

For reconditioned axles, follow the same procedures as above, after overhaul.

## OIL CHANGE INTERVALS

Gear oil should be changed every 25,000-30,000 miles (40,000-48,000 km) on units run over 60,000 miles (96,000 km) annually.

For units run less than 60,000 miles, the oil should be changed twice yearly (spring and fall) regardless of mileage.

The Rockwell axle drive unit employs the gravity feed (splash) system of distributing lubricant throughout the assembly. As the vehicle is initially driven in service, a short period of time is required for the lubricant to reach all areas of the drive units.

## MAINTENANCE

Careful adherence to maintenance and lubrication procedures will go a long way toward successful operation.

The most common causes of drive axle carrier failures are spinout, shock, fatigue and poor lubrication.

Spinout is defined as excessive differential action. On a single rear axle, main differential spinout occurs when one wheel remains stationary while the other wheel is spinning. The

relatively high speed differences between the mating parts generate heat, and the rate of heat generation increases with the speed differences. When the heat becomes excessive it can cause galling of the journals of the cross and the mating differential pinion bores. In extreme cases of spinout, enough heat may be generated to weld the differential pinion to the cross and cause a catastrophic failure.

Shock is another common cause of carrier failure. It results from a rapidly applied load or force that is severe enough to exceed the strength of the carrier component and cause it to crack or fail instantly.

There are a number of operating conditions which can result in a shock failure:

- Hitting dry pavement with a spinning wheel.
- Missing a shift.
- "Popping" the clutch.
- Reverse interlock failure.

If the failed part separates into two or more pieces, the operator will usually realize the fact immediately. But if the part is only cracked, the operator may not be aware of the damage until sometime later. Depending on the severity of the crack in the part, the final failure may not occur until many miles later. The crack will be a point of origin for a fatigue failure, and can progress until the part fails. Thus the failure could happen while the vehicle is being operated under normal conditions.

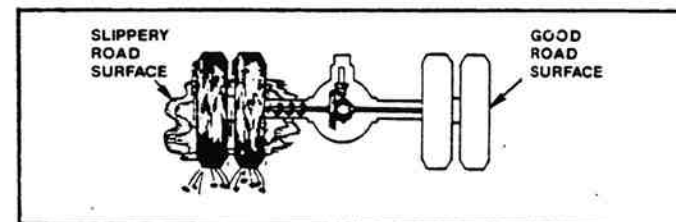


Figure 2-3. Drive Axle Spinout.

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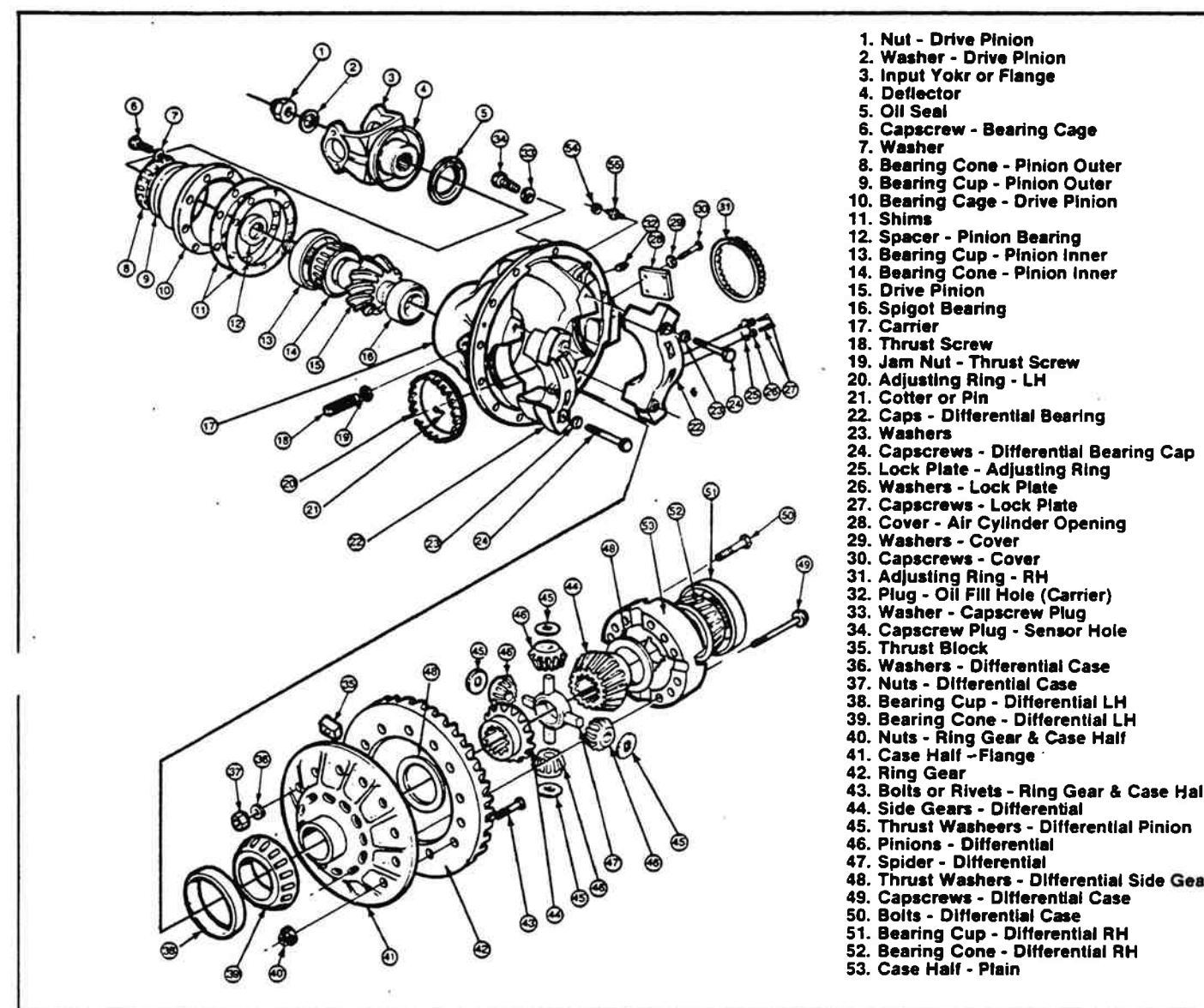


Figure 2-4. Single Reduction Differential Carrier.

- Nut - Drive Pinion
- Washer - Drive Pinion
- Input Yokr or Flange
- Deflector
- Oil Seal
- Capscrew - Bearing Cage
- Washer
- Bearing Cone - Pinion Outer
- Bearing Cup - Pinion Outer
- Bearing Cage - Drive Pinion
- Shims
- Spacer - Pinion Bearing
- Bearing Cup - Pinion Inner
- Bearing Cone - Pinion Inner
- Drive Pinion
- Spigot Bearing
- Carrier
- Thrust Screw
- Jam Nut - Thrust Screw
- Adjusting Ring - LH
- Cotter or Pin
- Caps - Differential Bearing
- Washers
- Capscrews - Differential Bearing Cap
- Lock Plate - Adjusting Ring
- Washers - Lock Plate
- Capscrews - Lock Plate
- Cover - Air Cylinder Opening
- Washers - Cover
- Capscrews - Cover
- Adjusting Ring - RH
- Plug - Oil Fill Hole (Carrier)
- Washer - Capscrew Plug
- Capscrew Plug - Sensor Hole
- Thrust Block
- Washers - Differential Case
- Nuts - Differential Case
- Bearing Cup - Differential LH
- Bearing Cone - Differential LH
- Nuts - Ring Gear & Case Half
- Case Half - Flange
- Ring Gear
- Bolts or Rivets - Ring Gear & Case Half
- Side Gears - Differential
- Thrust Washers - Differential Pinion
- Pinions - Differential
- Spider - Differential
- Thrust Washers - Differential Side Gear
- Capscrews - Differential Case
- Bolts - Differential Case
- Bearing Cup - Differential RH
- Bearing Cone - Differential RH
- Case Half - Plain

Fatigue is another type of failure in axle carriers, one that results from repeated loadings of a component. A single application of these loads or forces is not great enough to damage the part but repeated applications gradually weaken it to the point of failure. Fatigue failures that occur in drive axle carriers have two sources:

- Exceeding the GVW/GCW rating of the carrier
- Shock loads

When the vehicle is operated at a weight in excess of what the carrier was designed for, the life of the components is reduced. The rated GVW/GCW of a carrier changes with the road grade and surface. As the grade increases, so does the effort (torque) required to move a vehicle loaded to a given GVW/GCW. Again, as the road surface changes from hard to soft, rolling resistance increases and more torque is needed. Thus, a vehicle loaded to a given GVW/GCW will have a reduced carrier life when operated in hilly or mountainous

terrain as opposed to being operated on the level. The same is true for operation on soft or unimproved surfaces as compared to hard surface roads.

The fourth common cause of axle carrier failures originates with the lubricant, or with lubricant change practices. The lubricant which protects the axle components has three key functions:

- To reduce friction between parts.
- To carry heat away from parts.
- To carry dirt and wear particles away from parts.

When lubricant failure occurs, it is generally the result of improper maintenance and has its roots in one of three basic problem areas:

- Low lubricant level.
- Improper type of lubricant or lubricant with depleted additives.
- Contaminated lubricant.