

## TESTING

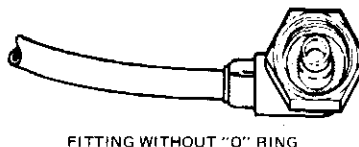
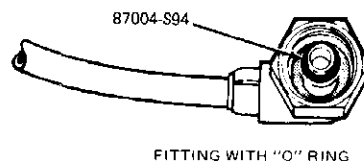
### SYSTEM FUNCTIONAL CHECK

1. Place the unloaded vehicle on a level surface. Make sure that all tires are at the recommended pressure.
2. Measure and record the distance from the rear fender opening to the ground with 18-20 psi pressure in the system.
3. Load the vehicle.
4. Pressurize the system through the fill valve until the vehicle looks level, then check the rear fender opening to ground distance. Add or bleed air from the system until the fender opening to ground distance is the same as recorded in Step 2, above. Do not pressurize over 90 psi.
5. The system should maintain the vehicle at this level without sagging due to loss of pressure. If this occurs, perform the leak test described in the next part.

### LEAK TEST

1. Pressurize the system to 90 psi and apply soap solution to the fittings and shock sleeves and inspect for leaks. Decrease the pressure to 20 psi and again apply the soap solution to the fittings and the shock sleeves and inspect for leaks.
2. If leakage is detected at the air fill valve, check the valve stem for damage. Replace if required.

(Conventional tire valve.) If leakage is detected at the elbow fittings, at the shock absorbers, check the fittings for the presence of, or damaged rubber "O" rings (Fig. 3). Replace the "O" rings (87004-S94) if required. Leaks anywhere else in the air line assembly require replacement of the entire air line assembly.



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**FIG. 3 Installing O-Ring 87004-S94**

## REMOVAL AND INSTALLATION

### AIR LINE ASSEMBLY

#### Removal

1. Discharge the system completely by bleeding air through the air fill valve.
2. Remove the two 379930-S2 nuts that secure the air line assembly bracket to the left fender apron.
3. Remove the clips securing the line to the vehicle frame and the 382929-S clips holding the lines to the spring towers.
4. Remove the elbow fittings from the rear shock absorbers.

#### Installation

1. Apply ESB-M4G-113A sealer or equivalent around the two holes in the left fender apron and install the air line assembly bracket, securing it with the two 379930-S2 nuts. Torque the nuts to 10-12 lb-ft.
2. Secure the air line to the frame with the clips removed in Steps 3 and 4 in Removal above. Tape the line to the #4 crossmember to prevent sagging. The air line must be routed over all fuel and brake lines to prevent pinching.

3. Install the elbow fittings on the rear shock absorbers. Torque the fittings to 7-13 lb-ft. Be extremely careful to avoid breaking the elbows when tightening the fittings to the shocks.

### AIR SLEEVE SHOCK ABSORBER

#### Removal

1. Discharge the system completely by bleeding air through the fill valve.
2. Disconnect the flexible plastic lines from the air sleeve rear shock absorbers.
3. Refer to Part 14-32 for shock absorber Removal Procedure.

#### Installation

1. Install the air sleeve rear shock absorbers in the vehicle following the procedure given in Part 14-32.
2. Connect the flexible plastic lines to the rear shock absorbers. Torque the fitting nuts to 7-13 lb-ft.
3. Pressurize the system to 90 psi, using an external air source applied to the bleed valve. Apply leak detection fluid to the fittings and check for leaks.

# Driving Axles and Drive Shafts

**GROUP  
15**

| PART TITLE                                           | PART NO. |
|------------------------------------------------------|----------|
| Drive Shaft – Double Cardan Type U-Joint . . . . .   | 15-66    |
| Drive Shaft – Single Cardan Type U-Joint . . . . .   | 15-60    |
| General Driving Axle and Drive Shaft Service . . . . | 15-01    |
| Integral Carrier Axle – Conventional . . . . .       | 15-02    |
| Integral Carrier Axle – Ford (WER) . . . . .         | 15-03    |

| PART TITLE                                                 | PART NO. |
|------------------------------------------------------------|----------|
| Integral Carrier Axle – Ford (WGX) . . . . .               | 15-06    |
| Removable Carrier Axle – Ford . . . . .                    | 15-10    |
| Traction-Lok Limited Slip Differential<br>– Ford . . . . . | 15-40    |

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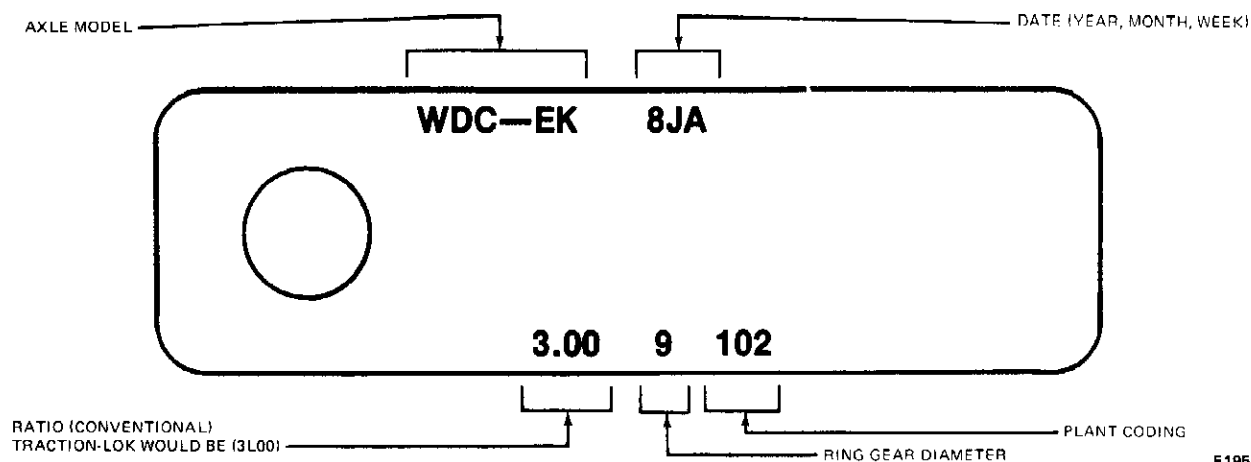
**MFD. BY FORD MOTOR CO. IN U.S.A.**

DATE: 08/77 GVWR 6508  
 GAWR: FRONT 3222 REAR 3375  
 THIS VEHICLE CONFORMS TO ALL  
 APPLICABLE FEDERAL MOTOR  
 VEHICLE SAFETY STANDARDS IN  
 EFFECT ON THE DATE OF  
 MANUFACTURE SHOWN ABOVE  
 F0012/R0165  
 8S63H100001 PASSENGER

| VEH. IDENT. NO. |       | TYPE |        |      |     |
|-----------------|-------|------|--------|------|-----|
| BODY            | COLOR | TRIM | TRANS. | AXLE | DSO |
| 53H             | 1C-YA | DD   | X      | 6    | 48  |

| CONVENTIONAL | TRACTION-LOK | RATIO  |
|--------------|--------------|--------|
| 1            | J            | 2.50:1 |
| 2            | K            | 2.75:1 |
| 3            | L            | 2.79:1 |
| 4            |              | 3.18:1 |
| 5            | E            | 3.07:1 |
| 6            | Ø            | 3.00:1 |
| 7            |              | 3.40:1 |
| 8            |              | 2.73:1 |
| 9            | R            | 3.25:1 |
| A            | S            | 3.50:1 |
| B            |              | 2.47:1 |
| G            | X            | 3.55:1 |

E1917-2H

**FIG. 1 Vehicle Certification Label—Rear Axle Identification**


E1952-2H

**FIG. 2 Rear Driving Axle Model Identification Tag—Typical**

# General Driving Axle and Drive Shaft Service

**PART  
15-01**

Applies To All Cars

| SUBJECT                           | PAGE  | SUBJECT                                 | PAGE  |
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| Preload Adjustments .....         | 01-9  | TESTING                                 |       |
| Pinion and Ring Gear Tooth        |       | Acceptable Tooth Contact Patterns       |       |
| Contact Adjustment .....          | 01-8  | (All Axles) .....                       | 01-4  |
| CLEANING AND INSPECTION           |       | Gear Tooth Contact Pattern Check .....  | 01-3  |
| Inspection After Disassembly      |       | Rear Axle Companion Flange Runout ..... | 01-4  |
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## DIAGNOSIS

Follow the Diagnosis Charts to isolate rear axle noise.

REAR AXLE DIAGNOSIS CHART

| CONDITION                                                                                                                                               | POSSIBLE CAUSE                                                                                     | RESOLUTION                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Excessive Rear Axle noise</li> </ul>                                                                             | <ul style="list-style-type: none"> <li>Differential carrier</li> </ul>                             | <ul style="list-style-type: none"> <li>Road test vehicle to assure problem is rear axle noise rather than other system noise. Refer to General Diagnostic Procedure. Repair and replace parts as required.</li> </ul>                              |
| <ul style="list-style-type: none"> <li>Loud "Clunk" in the drive shaft when shifting from reverse to forward</li> </ul>                                 | <ul style="list-style-type: none"> <li>Drive shaft</li> <li>Rear axle shafts or carrier</li> </ul> | <ul style="list-style-type: none"> <li>Raise vehicle, rotate driveshaft by hand to isolate problem as driveshaft or rear axle problem. Repair or replace as required.</li> <li>Remove and inspect. Repair as necessary.</li> </ul>                 |
| <ul style="list-style-type: none"> <li>Limited-slip or Traction-Lok axle does not work in snow, mud or on ice</li> </ul>                                | <ul style="list-style-type: none"> <li>Differential</li> </ul>                                     | <ul style="list-style-type: none"> <li>Perform Traction-Lok Differential Operation Check in this Part. Repair as required.</li> </ul>                                                                                                              |
| <ul style="list-style-type: none"> <li>On turns, the rear axle has a high pitched chattering noise (Limited-slip or Traction-Lok axles only)</li> </ul> | <ul style="list-style-type: none"> <li>Lubricant</li> <li>Differential</li> </ul>                  | <ul style="list-style-type: none"> <li>Roadtest vehicle — Drive car in tight circles — 5 clockwise and 5 counter-clockwise. If chatter is still evident, flush and replace lubricant.</li> <li>Remove differential, repair as required.</li> </ul> |

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## GENERAL DIAGNOSTIC PROCEDURE

| CONDITION                                                                                                 | POSSIBLE CAUSE                                                                                                        |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Noise is the same on drive or coast</li> </ul>                     | <ul style="list-style-type: none"> <li>Road noise.</li> <li>Tire noise.</li> <li>Front wheel bearing noise</li> </ul> |
| <ul style="list-style-type: none"> <li>Noise changes with type of road</li> </ul>                         | <ul style="list-style-type: none"> <li>Road noise.</li> <li>Tire noise.</li> </ul>                                    |
| <ul style="list-style-type: none"> <li>Noise tone lowers as car speed is lowered</li> </ul>               | <ul style="list-style-type: none"> <li>Tire noise.</li> </ul>                                                         |
| <ul style="list-style-type: none"> <li>Similar noise is produced with car standing and driving</li> </ul> | <ul style="list-style-type: none"> <li>Engine noise.</li> <li>Transmission noise.</li> </ul>                          |
| <ul style="list-style-type: none"> <li>Vibration</li> </ul>                                               | <ul style="list-style-type: none"> <li>Refer to N.V.H., Part 18-01.</li> </ul>                                        |
| <ul style="list-style-type: none"> <li>Noise most pronounced on turns</li> </ul>                          | <ul style="list-style-type: none"> <li>Differential side gears and pinion</li> </ul>                                  |
| <ul style="list-style-type: none"> <li>Drive noise, coast noise, or float noise</li> </ul>                | <ul style="list-style-type: none"> <li>Wheel Bearings.</li> <li>Ring and pinion gear.</li> </ul>                      |
| <ul style="list-style-type: none"> <li>Clunk on acceleration or deceleration</li> </ul>                   | <ul style="list-style-type: none"> <li>Worn differential cross shaft in case</li> </ul>                               |

CE2613-2A

## TESTING

## TRACTION-LOK DIFFERENTIAL OPERATION CHECK

A Traction-Lok differential can be checked for proper operation without removing the carrier from the axle housing.

Jack up one rear wheel and remove the wheel cover. Install the tool on the axle shaft flange studs as shown in Fig. 1.

Using a torque wrench of at least 200 ft-lb. capacity, rotate the axle shaft. **Be sure that the transmission is in neutral, one rear wheel is on the floor, and the other rear wheel is raised off the floor.** The breakaway torque required to start rotation should be at least 40 ft-lb. The initial breakaway torque may be higher than the continuous turning torque, but this is normal. The axle shaft should turn with even pressure throughout the check without slipping or binding. If the torque reading is less than specified, check the differential for improper assembly. **A vehicle equipped with a Traction-Lok differential will always have both wheels driving. If, while the vehicle is being serviced, only one wheel is raised off the floor and the rear axle is driven by the engine, the wheel on the floor could drive the vehicle off the stand or jack.**

## GEAR TOOTH CONTACT PATTERN CHECK

Note: It is not necessary to roll a tooth pattern if special Tool T76P-4020-A is used to set pinion depth. See appropriate Part for use in specific axle.

When rolling a tooth pattern, use the special compound (tube) packed with each service ring

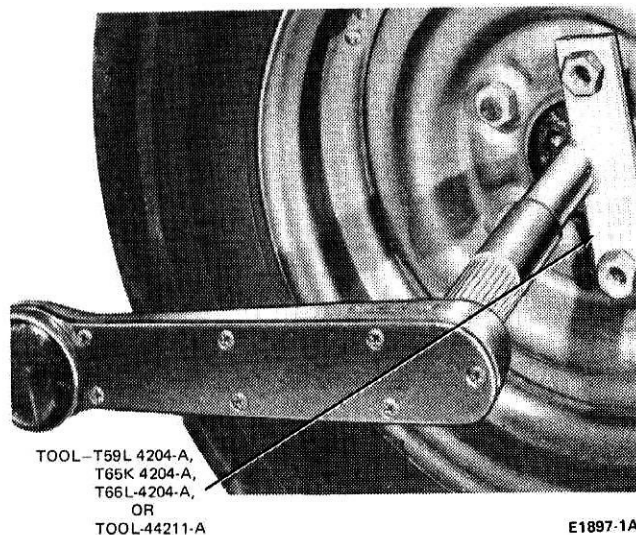
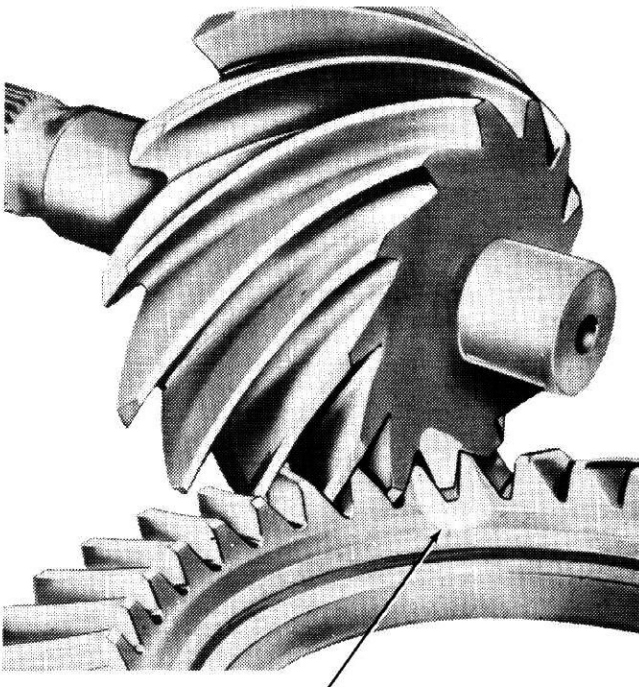


FIG. 1 Traction-Lok Differential Check

gear and pinion set. Paint all gear teeth and roll a pattern as described in Cleaning and Inspection. After diagnosing the tooth pattern as explained here, make the appropriate adjustments as outlined in Adjustments. In making a final gear tooth contact pattern check, it is necessary to recognize the fact that there are three different types of gear sets: hunting, nonhunting and partial nonhunting. Each type is determined by the number of teeth in the gears. The nonhunting and partial nonhunting types can be identified by the paint timing marks on the pinion and ring gear teeth (Fig. 2).



PAINT MARKING INDICATES POSITION IN WHICH GEARS WERE LAPPED

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**FIG. 2 Gear Set Timing Marks**

### **ACCEPTABLE TOOTH PATTERNS (ALL AXLES)**

Fig. 3 shows acceptable tooth patterns for all axles. In general, desirable tooth patterns should have the following characteristics:

1. The drive pattern should be fairly well centered on the tooth.
2. The coast pattern should be fairly well centered on the tooth.
3. Some clearance between the pattern and the top of the tooth is desirable.
4. There should be no hard lines where the pressure is high.

The individual gear set need not conform exactly to the ideal pattern to be acceptable. **Any combination of drive and coast patterns shown in Fig. 3 is acceptable.**

#### **Hunting Gear Set**

In a hunting-type gear set, any one pinion gear tooth comes into contact with all ring gear teeth. In this type, several revolutions of the ring gear are required to make all possible gear combinations.

Any combination of drive and coast patterns shown in Fig. 3 will be acceptable.

#### **Nonhunting Gear Set**

In a nonhunting-type gear set, any one pinion gear tooth comes into contact with only a few ring gear teeth. In this type, only one revolution of the ring gear is required to make all possible tooth contact combinations. Any combination of drive and coast patterns shown in Fig. 3 will be acceptable.

#### **Partial Nonhunting Gear Set**

In a partial nonhunting-type gear set, any one pinion tooth comes into contact with only part of the ring gear teeth, but more than one revolution of the ring gear is required to make all possible gear tooth combinations. Any combination of drive and coast patterns shown in Fig. 3 will be acceptable.

#### **SHIM AND BACKLASH CHANGES**

Since each gear set rolls a characteristic pattern, the patterns shown in Fig. 3 are considered acceptable and should be used as a guide. The drive pattern is rolled on the convex side of the tooth, and the coast pattern is rolled on the concave side.

The movement of tooth contact patterns with changes in shimming can be summarized as follows:

#### **REMOVABLE CARRIER-TYPE AXLE**

On removable carrier axles, the pinion locating shim is located between the pinion retainer and the carrier housing.

1. Thicker shim, with the back lash set to specification, moves the pinion further from the ring gear:
2. Thinner shim, with the back lash set to specification, moves the pinion closer to the ring gear:

If the patterns are not correct, make the changes as indicated by the pattern. The pinion need not be disassembled to change a shim. Just remove the pinion, bearing, and retainer assembly and install a different shim. When reinstalling the pinion and retainer assembly of a nonhunting or partial nonhunting gear set, be sure that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig. 2).

#### **INTEGRAL CARRIER-TYPE AXLE**

On integral carrier axles, the pinion locating shim is located immediately behind the pinion gear and the ring gear and pinion must be removed in order to change a shim.

1. Thinner shim, with the back lash set to specification, moves the pinion away from the ring gear.
2. Thicker shim, with the back lash set to specification, moves the pinion closer to the ring gear.

If the patterns are not correct, make the changes as indicated by the pattern. The differential case and drive pinion will have to be removed from the carrier casting to change a shim. When reinstalling the pinion and ring gear of a nonhunting or partial nonhunting gear set, be sure that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig. 2).

### **REAR AXLE COMPANION FLANGE RUNOUT CHECK**

The specified total runout for each type of rear axle companion flange is given in the appropriate Part of this Manual covering that axle type.

**All Axles Except Thunderbird, Lincoln Continental, Continental Mark V, Versailles, Fairmont and Zephyr**

1. Raise the vehicle on a hoist that supports the rear axle (twin-post hoist).