POSITRACTION REAR AXLE

Chevrolet's Positraction Rear Axle available optionally on Corvettes provides built-in safety through controlled driving power. It keeps delivering safe, managed torque where it will do the most good, always adjusting automatically to conditions of the road.

The conventional rear axle divides the torque equally between both driving wheels and will always drive the wheel which is easiest to turn. This is a definite disadvantage under conditions of driving where the traction of one wheel is limited.

The main purpose of the Positraction rear axle is to overcome this limitation and provide many times the torque of the slipping wheel to the driving wheel resulting in improved operation under all driving conditions.

In the Positraction rear axle Fig. 80, engine power is transmitted from the ring gear to the differential case. The driving force causes cross pins to move up the ramps of cam surfaces applying a load to the clutches. This, in effect, locks the axle shafts in normal, straight ahead driving, thus preventing momentary spinning of the wheels when leaving the road or when encountering poor traction. The division of torque between axle shafts varies in accordance with the traction of each rear wheel. When cornering, however, the faster turning outer wheel relieves the load from the clutch surfaces so that wear is reduced to a minimum and the action is effectively that of a conventional rear axle. The unit is available in three ratios; 3.70:1, 4.11:1 and 4.56:1.

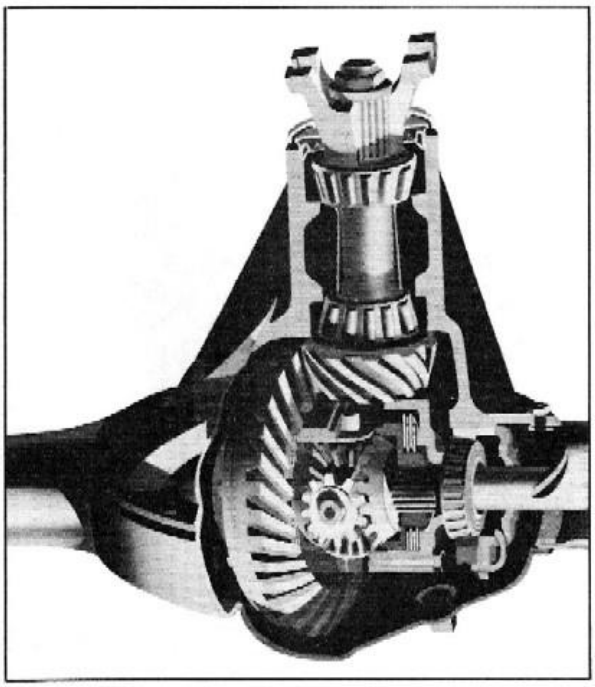

Fig. 80 Positraction Rear Axle, Cross-Section

The Positraction rear axle is available as a factory option and the differential assembly is also available as a parts package for field installations. Adjustments are the same as for the conventional unit.

REMOVAL

1. Remove axle shafts from car as outlined in Section 4 of the 1957 Chevrolet Passenger Car Shop Manual.

NOTE: Corvettes equipped with Positraction have a 1957 Passenger Car type rear axle shaft bearing. All other Corvettes have a construction similar to the 1954 Chevrolet Passenger Car Rear Axle Shaft Bearing.

2. Remove the carrier from under the car.

3. Remove the differential bearing caps. Mark each cap for reassembly. Mark the bearing adjustment nut for reassembly. Keep bearing cups with the bearings if they are reusable: replace if worn or damaged.

DISASSEMBLY

1. Check that the differential case halves are marked with a number or letter to aid aligning the case when assembling. If not, scribe an alignment mark as shown in Fig. 81.

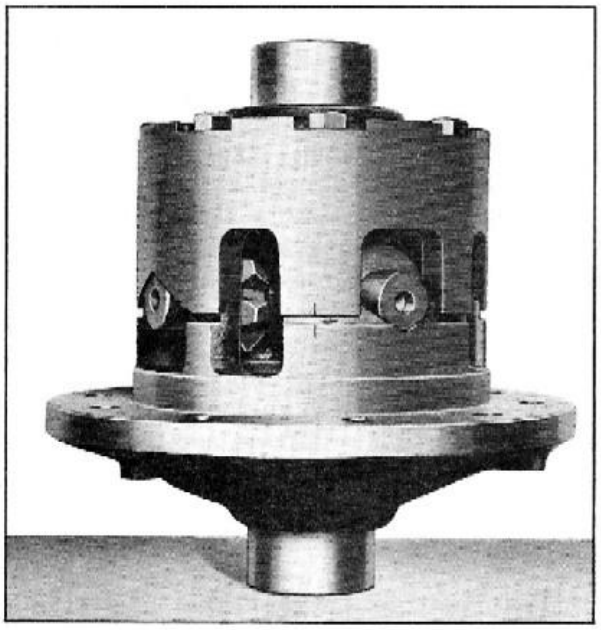

Fig. 81 Differential Case Alignment Marks

2. With unit on bench, remove eight bolts securing the end case to the ring gear case.

3. Remove end case.

4. Remove clutch plates from side gear retainer and note the relation of these clutch plates.

5. Remove side gear retainer and side gear.

6. Remove pinion mate shafts and gears.

7. Remove remaining side gear, side gear retainer and clutch plates.

CLEANING AND INSPECTION

All parts, before reassembly, must be clean and free from all foreign substance. All parts must be inspected. See that there are no worn, cracked or distorted clutch plates. All parts must be free of nicks, burrs, or any imperfections that will reduce the efficiency of operation of this unit. Lubricate all parts before assembly.

ASSEMBLY

1. Hold ring gear case half on its side,

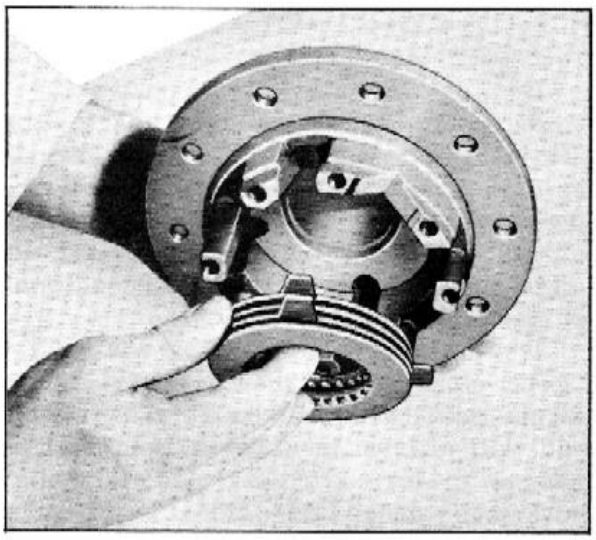

Fig. 82 Installing Clutch Plates

Fig. 82. Install side gear retainer and clutch plates so that an external tanged plate is installed first and last as shown in Fig. 87.

NOTE: Clutch stack may be varied for certain driving conditions. See "Clutch Stack Arrangement" below.

Make sure the side gear retainer will rotate with a slight drag when in the case. Repeat for opposite side.

2. Install side gear on ring gear case half.

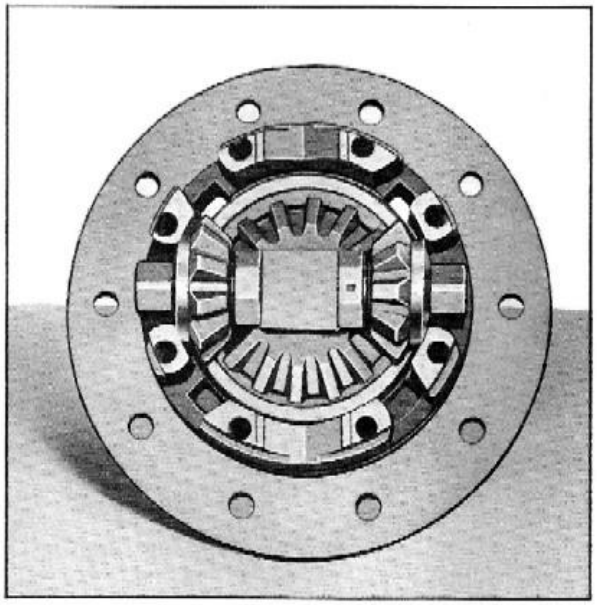

Fig. 83 Installing Mate Shaft

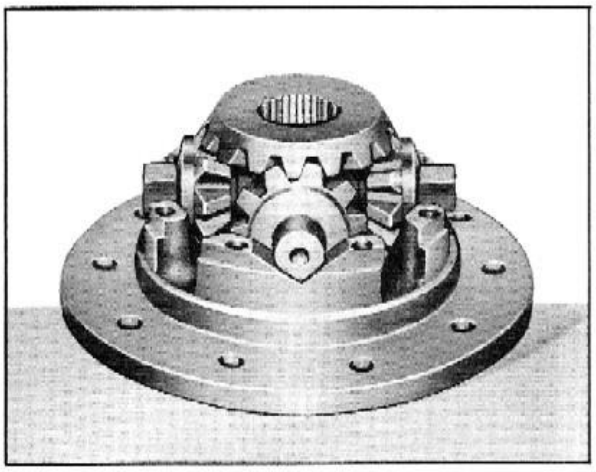

Fig. 84 Pinion and Side Gear Installation

3. With the ring gear case half of the differential case in a vertical position, install one mate shaft and gears as shown in Fig. 83. Make certain that notch in shaft is up, and shaft is 90^{O} from "V" notches in case.

4. Install remaining shaft and gears over the first with the center notch down, as shown in Fig. 84.

5. Install side gear in other half of case.

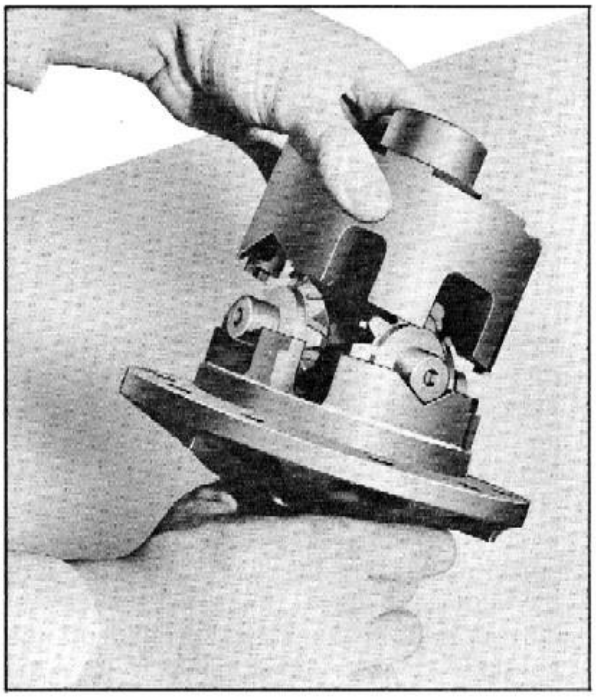

Fig. 85 Installing Differential Case Cover

6. Hold the remaining end case through the bearing trunnion and install it on the ring gear flange half as shown in Fig. 85. Make certain that identification marks are in alignment.

7. Tighten eight attaching bolts evenly to 35-45 foot-pounds torque to avoid distortion to case assembly.

8. Check the clearance between each pinion mate shaft and the "V" of the case, Fig. 86. Do this by placing shim stock or feeler gauges on opposite ends of the same shaft and on opposite sides of the "V" notch. The clearance should be .010" to .035".

If the clearance is less than .010" on one pair of "V" notches, but considerably more on the other pair, disassemble the unit and measure all clutch plates and related parts with a micrometer. Change thicker parts to the side opposite the one with too little clearance. If this does not bring both sides within limits, replace parts as required.

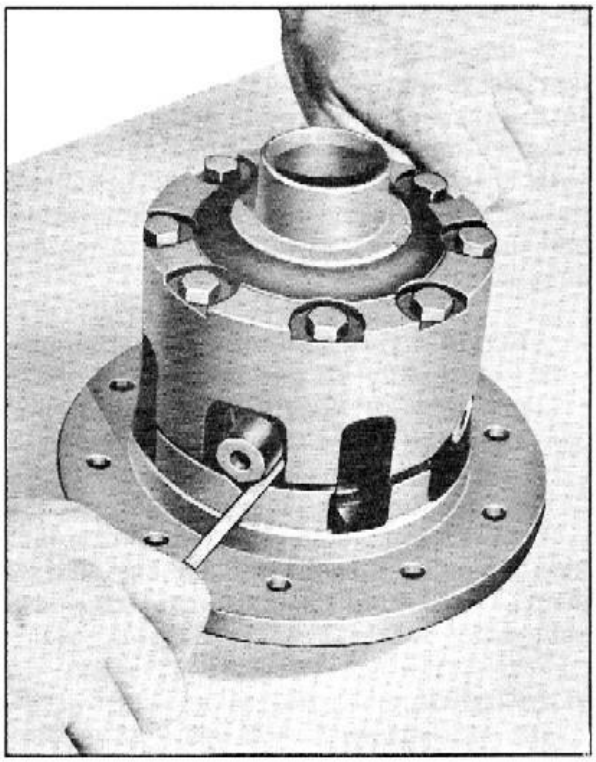

Fig. 86 Checking Mate Shaft - "V" Notch Clearance

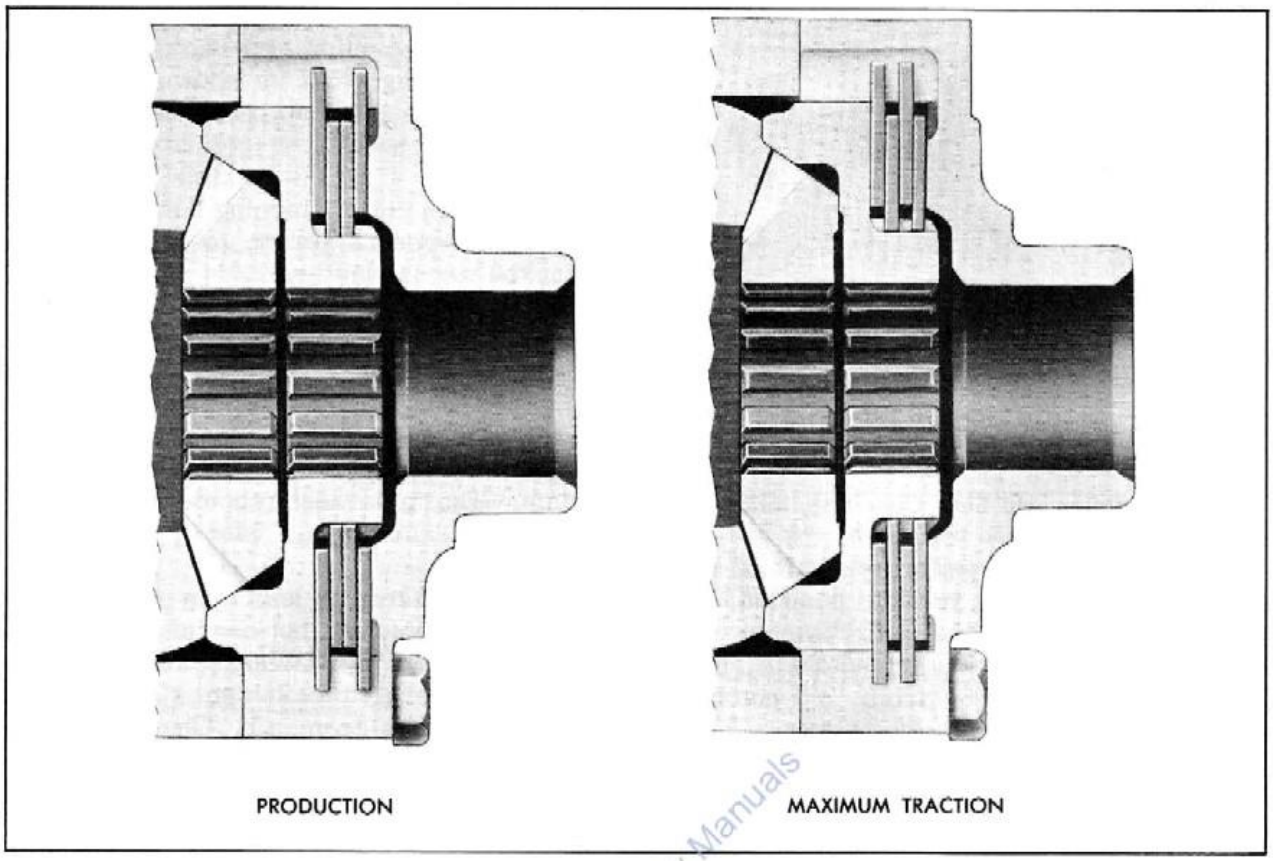

Fig. 87 Clutch Stack Arrangement

If the clearance at either pair of "V" notches is more than .035", cut shim stock in thicknesses required to bring the clearance within limits. The shims must be cut with a 3-1/4" O.D. and a 2-3/8" I.D. Place the shims between the outer clutch plate and the case on the side opposite the excess clearance.

NOTE: This shimming operation may be used only if the production clutch stack is used. No shimming operation is available if the clutch stack is made up as shown on the right-hand side of Fig. 87.

9. Check for clutch plate freedom on each side by using a discarded and cut-off axle shaft. The shaft should turn firmly but should not lock.

Installation

1. Install the Positraction differential with the ring gear and bearings assembled as outlined in Section 4 of the 1957 Chevrolet Passenger Car Shop Manual for standard differential.

2. Use the same instructions and specifications for ring gear bolts, bearing cap bolts, backlash, and bearing preload as used for the standard differential.

3. Install axle shafts.

NOTE: Make sure the spline end of the axle shaft does not interfere with the pinion mate shafts. This is best determined by measurement. Use a steel tape, and with the aid of a flashlight, measure from the bottom of the axle shaft bearing bore to the pinion mate shafts. Then measure the axle shafts from the corresponding point of the bearing to the end of the spline. The minimum clearance required is 1/8 of an inch. Grind off the spline end of the axle shaft if it is too long. Check the other axle shaft in the same manner.

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WARNING: Do not spin wheels with one elevated as it is possible to have sufficient driving load due to friction, etc. to actuate the Positraction unit and cause the car to move.

CAUTION: Use only SAE 90 Multi-Purpose gear lube. The black factory-fill lubricant available through parts stock should not be used for filling Positraction Rear Axles.

CLUTCH STACK ARRANGEMENT

Two clutch stack arrangements can be made as shown in Fig. 87 to tailor axle operation to owner's preference.

For general service, the arrangement used in production with the two internally splined plates placed between the two externally tanged plates provides ample traction. In cases where the owner desires maximum traction for off-highway operation or heavy duty operation, the clutch plates should be stacked alternately starting with an internally splined plate against the differential case. However, owners should be cautioned that in order to obtain the benefits of the maximum traction arrangement, tire squeal on turns and a tendency toward oversteer is to be expected.

DRIVELINE BACKLASH

Driveline backlash is inherently more noticeable with Positraction axles because of the greater looseness required between the clutch plates and side gears to insure sufficient clearance for full release of the clutches during coast. The backlash results in a slight "clunk" as the driveline goes from drive to coast or from coast to drive.

To determine if Positraction backlash is abnormal, proceed as follows:

1. Remove one rear wheel, then tighten brake adjustment on the opposite rear wheel until it is fully locked.

2. Wedge the propeller shaft to hold it stationary.

3. On the side with the wheel removed, turn the brake drum forward until it stops. Mark both the brake drum and flange plate while holding drum in this position.

4. Turn brwke drum its full limit rearward and place a second mark on the brake drum opposite the mark on the flange plate.

5. Measure distance between marks on the brake drum. Distance between marks should not be more than 1/2-inch; otherwise rear axle backlash is considered excessive.

Backlash found by the preceding check is confined to the rear axle as driveline and transmission backlash was eliminated by blocking the propeller shaft. If backlash is excessive, remove the Positraction differential, check for worn or scored parts, and replace as necessary, paying particular attention to the mate shaft "V" notch clearance.