SECTION 6-C
POSITIVE TRACTION DIFFERENTIAL

6-8 DESCRIPTION OF POSITIVE TRACTION DIFFERENTIAL

a. General Description

Buick Positive Traction Differential is optional equipment on all Buicks. It is designed to perform all the desirable functions of a conventional differential and at the same time overcome its limitations. With a conventional differential, when one wheel is on a slippery surface, its pulling power is limited by the wheel with the lowest traction. Unlike the conventional differential, with the Positive Traction device, the anti-spinning action is limited by the wheel having the best traction, thus limiting the possibility of becoming stuck.

Buick Positive Traction Differential is not a fully locking type and will release before excessive driving force can be directed to one rear wheel. The safety value of this feature eliminates the possibility of dangerous steering reaction. When the rear wheels are under extremely unbalanced tractive conditions, such as having one wheel on ice and the other on dry pavement, wheel spin can occur, if over-acceleration is attempted. However, even when wheel spin does occur, the major driving force is directed to the non-spinning wheel.

Another advantage of the Positive Traction Differential is that on uneven surfaces such as railroad tracks, chuck holes, etc., wheel action is not adversely affected. During power application on a conventional differential, when one wheel hits a bump and bounces clear of the road, it spins momentarily. When this rapidly spinning wheel again contacts the road, the sudden shock may cause the car to swerve. This action is also hard on tires and the entire drive train. With a Positive Traction Differential the free wheel rotates at the same speed as the wheel on the road, thereby minimizing adverse effects.

b. Operation

The design of the Positive Traction Differential is basic and simple. The unit is completely interchangeable with a conventional differential. However, this unit has in addition coarse, spiral-threaded cone brakes installed behind the side gears. These brakes are statically spring pre-loaded to provide an internal resistance to the differential action within the case itself. This preload assures an adequate amount of pull when extremely low tractive conditions such as wet ice, mud, or snow are encountered at one rear wheel. It also provides smooth transfer of torque when traveling over alternating to tractive conditions at both rear wheels.

During application of torque to the axle, the initial spring loading of the cone brakes is supplemented by the inherent gear separating forces between the side and spider gears which progressively increases the resistance in the differential. This unit is therefore an automatic throttle-sensitive device that provides greater resistance under greater torque loads. It should be remembered however, that this is not a positive lock differential, and it will release before excessive driving force can be applied to one wheel.

CAUTION: When working on a car with Positive Traction Differential, never raise one rear wheel and run the engine with the transmission in gear. The driving force to the wheel on the floor could cause the car to move.

6-9 LUBRICATION OF POSITIVE TRACTION DIFFERENTIAL

The lubricant level should be checked every 6000 miles. Maintain level between the bottom of the filler plug opening and 1/4 inch below the opening by adding Special Positive Traction Lubricant or equivalent available through the Buick Parts Department under part No. 531536. Never use any lubricant other than this special lubricant, even for adding.

Positive Traction Differentials can be easily identified either by a stainless steel plate attached by a rear cover bolt or by an X in a circle stamped on the bottom edge of the carrier housing flange. See Figure 6-37. However, if the

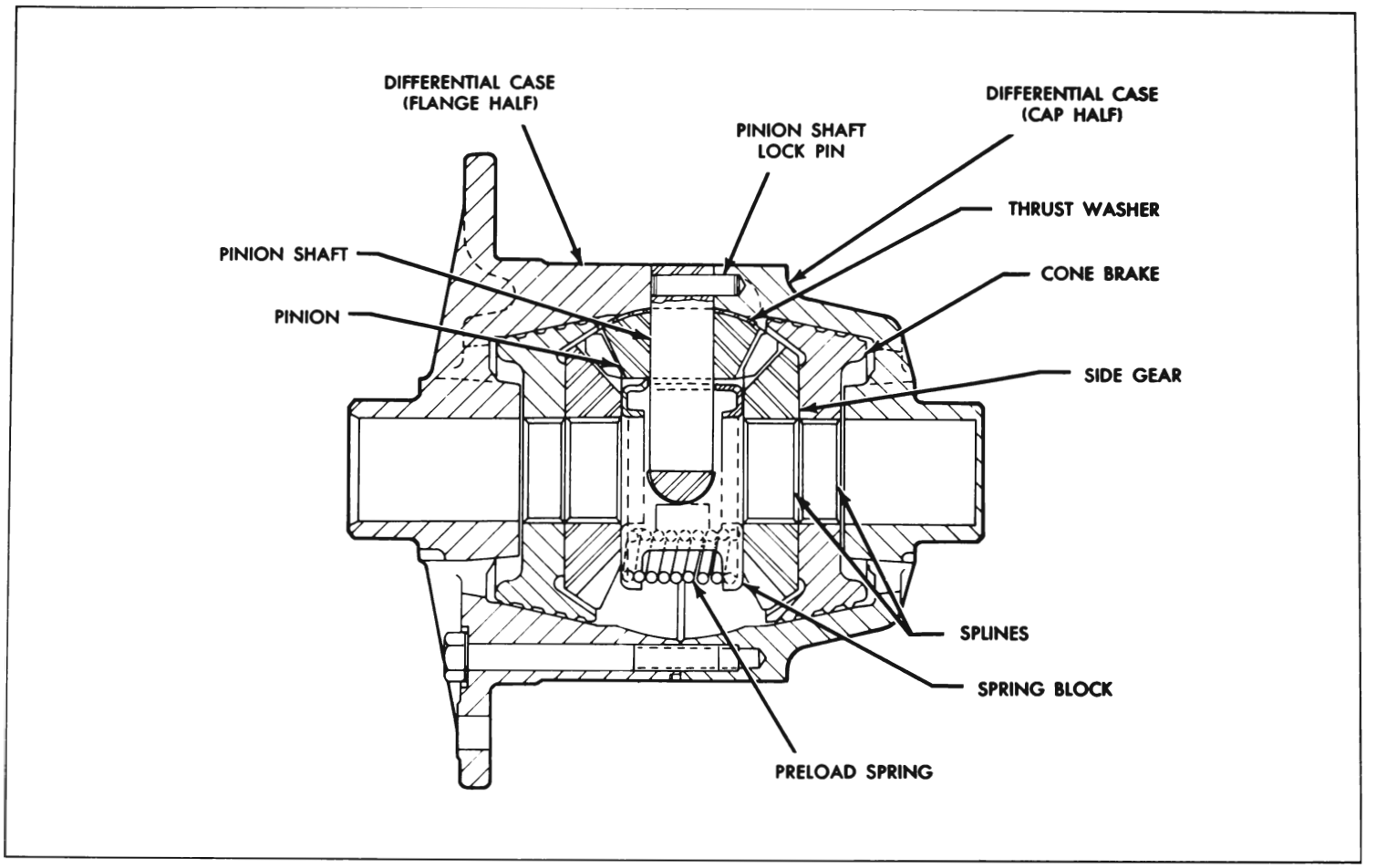

Figure 6-35—Positive Traction Differential

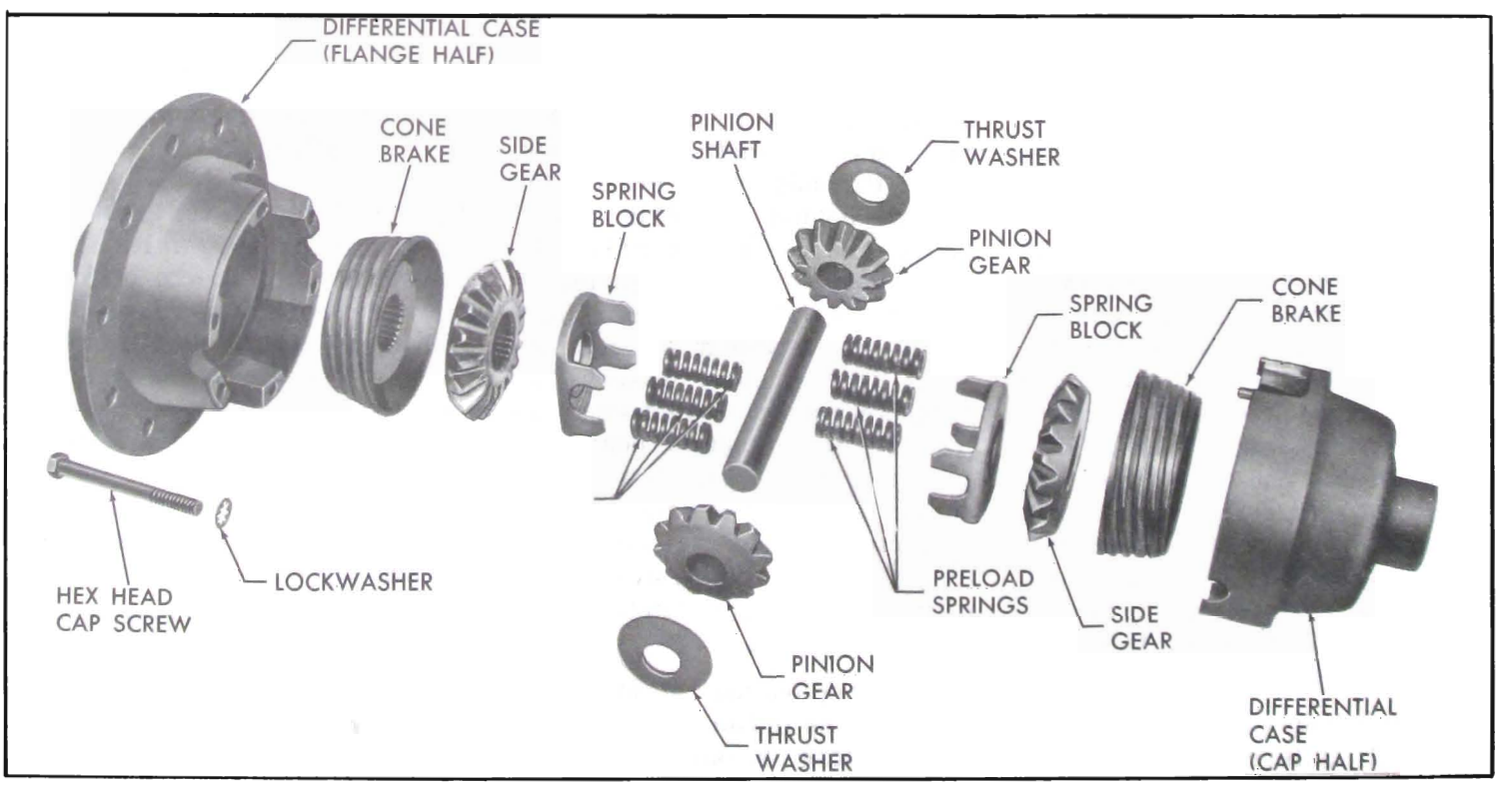

Figure 6-36—Positive Traction Differential - Exploded View

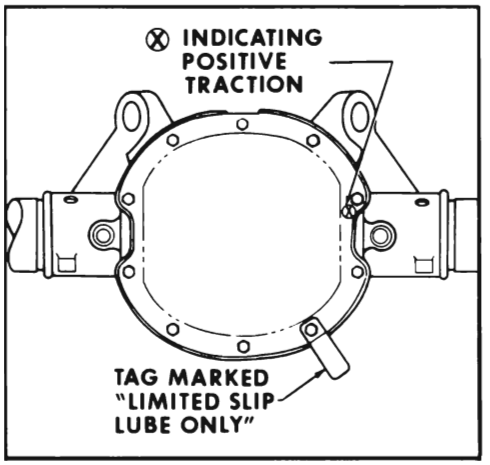

Figure 6-37—Identification of Positive Traction Differential

wrong lubricant is accidentally added, it will be necessary to completely remove all lubricant, flush with light engine oil, and then fill with the special lubricant. Capacity of the rear axle housing is 2 pints.

6-10 POSITIVE TRACTION DIFFERENTIAL SERVICE PROCEDURES

All rear axle service procedures are the same in the Positive Traction rear axle as in a conventional rear axle, except for servicing the internal parts of the differential assembly. All rear axle parts outside of the differential, such as the ring gear, differential side bearings, and axle shafts, are the same in either rear axle assembly.

a. Disassembly of Differential

1. If ring gear or differential case is to be replaced, remove ring gear from case. Otherwise ring gear need not be removed.

2. If a differential bearing is to be replaced, pull bearing outer race from case, using Remover J-2241-A as described in paragraph 6-5 (f).

3. Clamp case assembly in a brass jawed vise by ring gear or by case flange.

4. Mark flange half of case and cover half with a center punch or paint to provide alignment for reassembly. See Figure 6-38.

5. Loosen six bolts holding cover half of case to cap half. Remove assembly from vise, place on bench with bolt heads up, and remove bolts.

6. Lift cap half of case from flange half. Remove cap half, cone brake, preload springs, spring block, and side gear shims if provided, from assembly so that they can be reinstalled in their original positions.

7. Remove corresponding parts from flange half of case and keep with flange half.

b. Cleaning and Inspection of Parts

1. Make certain all parts are absolutely clean and dry.

2. Inspect pinion shaft, pinion and side gears, brake cone surfaces and corresponding cone seats in the case. The cone seats in the case should be smooth and free of any excessive scoring. Slight grooves or scratches indicating passage of foreign material are permissible and normal. The land surface on the heavy spirals of the male cones will duplicate the case surface condition. Replace any parts which are excessively scored, pitted or worn. Both

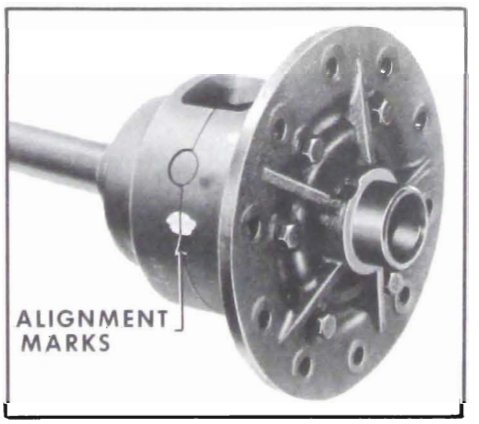

Figure 6-38—Alignment Marks

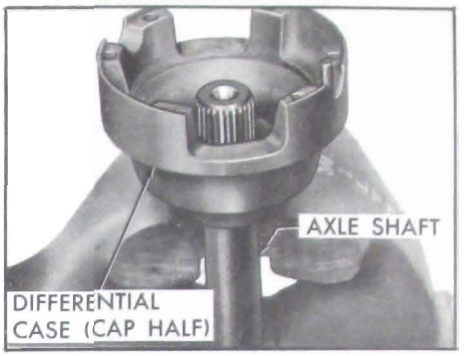

Figure 6-39—Axle Shaft & Cap Half of Differential Positioned in a Vise

halves of case must be replaced if one half is damaged or worn.

c. Assembly of Differential

CAUTION: When assembling the unit, use axle shafts as mounting tools to assure proper gear and cone spline alignment. Do not ignore this procedure as it will be impossible to install shafts at final assembly and attempting to force the shafts into position may result in damage to the spring thrust blocks.

1. Clamp one axle shaft in a vise allowing three inches to extend above vise jaws. Then place the cap side of differential case over extended axle shaft with interior of case facing up. See Figure 6-39.

2. Install proper cone over axle shaft splines, seating it into position in cap half of case. NOTE: Be certain that each cone is installed in proper case half since tapers and surfaces become matched and their positions should not be changed.

3. If unit was orignally assembled with shims located between side gears and cones for backlash adjustment, reinstall side gear with shim so that gear may seat on shim. If unit was originally assembled without shims, reassemble the same way.

4. Place one spring block in position over gear face in alignment with pinion gear shaft

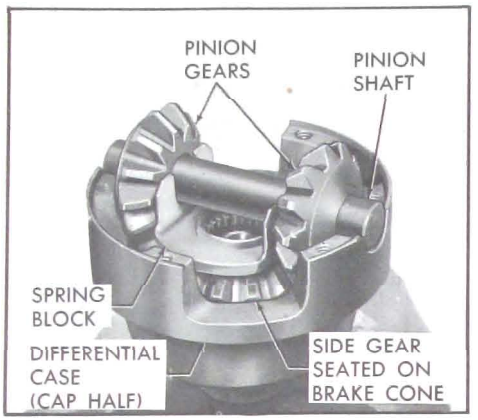

Figure 6-40—Installing Parts Into Cap Half of Differential Case

grooves. Install thrust block, pinion shaft, pinion gears and thrust washers into cap half of differential case in such a manner that pinion shaft retaining dowel can be inserted through pinion gear shaft into differential case. This prevents the pinion shaft from sliding out and causing damage to the carrier assembly. See Figure 6-40.

5. Insert springs into spring thrust block that is already installed into case, and then place second thrust block over springs. See Figure 6-41.

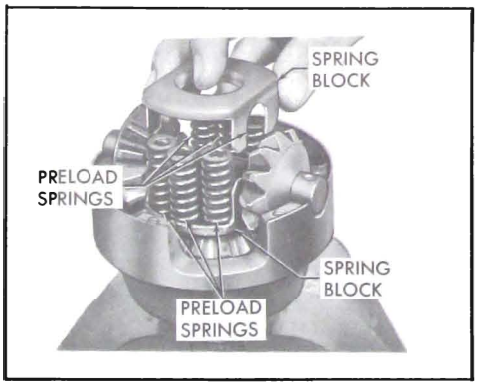

Figure 6-41—Installing Preload Springs & Second Thrust Block Into Differential Case

6. Install second side gear face down on spring thrust block so that side gear will mesh with pinion gears.

7. Place shim, if provided, and remaining cone over side gear.

8. Install flange side of differential assembly over cone in proper position to match alignment marks; insert two bolts finger tight 180° apart. See Figure 6-42.

9. Install other axle shaft through flange half of differential case rotating axle to enter cone splines and then side gear splines. Leaving the axle shaft in this position, insert remaining bolts and tighten to 15-18 ft. lb. See Figure 6-43.

10. Remove axle shafts. A slight tapping on the shafts with a soft hammer may be necessary to align the splines during assembly. The shafts can then be readily reinstalled without spline interference during final assembly.

11. Install unit into axle carrier following instructions given in paragraph 6-6 (f). CAUTION: After unit is installed in carrier, do not attempt to rotate one axle shaft until both are in position. Rotation of one shaft without the other installed will result in misalignment of cone and side gear splines and may prevent entry of second shaft.

d. Simple Procedure for Testing a Positive Traction Differential

If there is a doubt that a Buick is equipped with a Positive Traction Differential, or to determine if

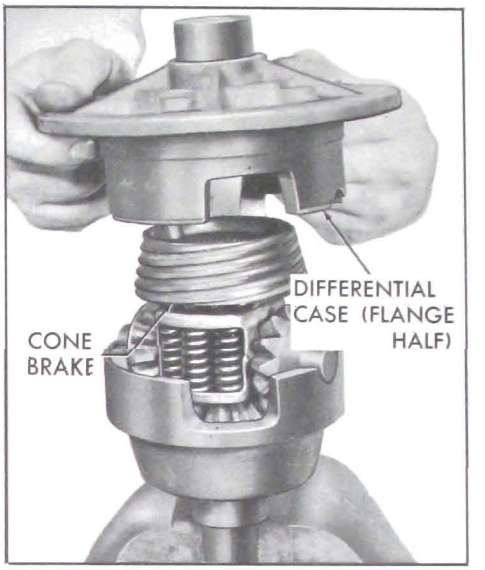

Figure 6-42—Installing Flange Half of Differential Case

this option is performing satisfactorily, a simple test can be performed. Place a roller-mounted floor jack far outboard under the rear axle housing and slightly raise one wheel off floor. With one person guiding the jack, another can attempt to slowly drive the car forward. If the car is equipped with a properly-functioning Positive Traction Differential, the car will move forward since the spring-loaded brake cones partially lock the rear axle to point that the car will move.

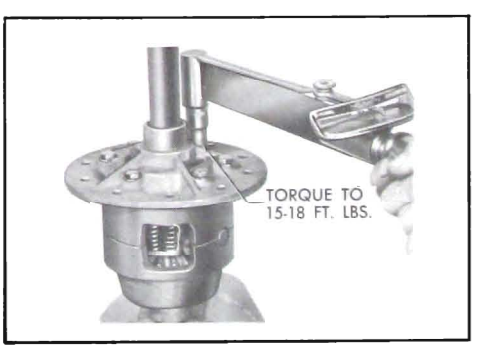

Figure 6-43—Torquing Differential Bolts