GROUP 7

CHASSIS SUSPENSION

SECTIONS IN GROUP 7

SECTION 7-A

SPECIFICATIONS AND DESCRIPTION OF CHASSIS SUSPENSION

CONTENTS OF SECTION 7-A

7-1 CHASSIS SUSPENSION SPECIFICATIONS

a. Tightening Specifications

Use a reliable torque wrench to tighten the parts listed, to insure proper tightness without straining or distorting parts. These specifications are for *clean and lightly lubricated* threads only; dry or dirty threads produce increased friction which prevents accurate measurement of tightness.

Part	Location	Thread Size	Torque Ft.Lbs.
Nut	Lower Control Arm Shaft Bolt (280-M—First Jobs)	7/16-20	55-65
Nut	Lower Control Arm Shaft Bolt (300-M—After Jobs)	7/16-20	70-80
Nut	Lower Ball Joint to Knuckle	9/16-18	40-50
Nut	Upper Ball Joint to Knuckle	1/2-20	30-40
Bushing	Control Arm Shaft Lower	1 1/4-11	150 min.
Bushing	Control Arm Shaft Upper	1.1-11	100 min.
Nut	Upper Control Arm Shaft to Frame	9/16-18	90-100
Bolt	Wheel to Front Hub and Rear Axle Shaft	9/16-18	65-75
Nut	Rear Brake Assembly to Axle Housing	7/16-20	65-75
Nut	Brake Assembly and Steering Arm to Steering Knuckle Bolt	7/16-20	65-75
Nut	Upper and Lower Ball Joint to Control Arm Bolt	7/16-20	70-80
Bolt	Front Shock Absorber Lower Bracket	3/8-16	25-35
Nut	Rear Shock Absorber Pivot Bolt Upper and Lower	7/16-20	60-80
Nut	Front Shock Absorber to Upper Bracket	7/16-20	25-35
Nut	Radius Rod Pivot Frame End and Axle End	1/2-20	30-40
Nut	Radius Rod Bracket to Frame Bolt	7/16-20	50-60

b. Wheels and Tires

Item	Series 40	Series 60-50	Series 70
Wheel Type	←Demountable Steel Disk→		
Rim Type	←Drop Center→		
Rim Size	15" x 5.50 K	15" x 6.00 L	15" x 6.00 L
Tire Type	←Tubeless→		
Tire Size	7.10"—15" 7.60"—15" Optional	7.60"—15"	8.00"—15"
Tire Inflation Pressures	←See paragraph 1-1→		

c. Springs and Shock Absorbers

Item	Series 40, 60 (Except 49, 69)	Series 50, 70 (And 49, 69)
Spring Type—Front and Rear	Coil	
Spring Trim Dimensions	See Paragraph 7-13	
Shock Absorber		
Make and Type—Front	Delco, Double Direct-Acting	
Make and Type—Rear	Delco, Double Direct-Acting	

d. Dimensional Specifications

NOTE: *Dimensions and limits given in these specifications apply to new parts only. Where limits are given, "T" means tight and "L" means loose.*

Item	All Series
Caster, Camber, Toe-in, Effective K.P.I., and Steering Geometry	See figure 7-16
Steering Knuckle Spindle	
Large End, Diameter	1.3735"—1.3740"
Small End, Diameter	.8426"—.8431"
Wheel Bearing Cone on Spindle	
Outer	.0004" L—.0014" L
Inner	.0005" L—.0015" L
Wheel Bearing Cup in Hub	
Outer	.0005" T—.0025" T
Inner	.0005" T—.0025" T
Wheel Bearing Adjustment	See paragraph 7-10

7-2 DESCRIPTION OF WHEEL SUSPENSION

a. Front Wheel Suspension

The front wheel suspension allows each front wheel to rise and fall, due to change in road surface level, without appreciably affecting the opposite wheel.

Each wheel is independently connected to the frame front cross member by a steering knuckle, ball and socket assemblies, and upper and lower control arm assemblies. See figure 7-1. The upper and lower arms are so placed and proportioned in length that they allow each knuckle, and wheel to move through a vertical arc only. The front wheels are held in proper relation to each other for steering by means of two tie rods which connect to steering arms on the steering knuckles and to the intermediate rod.

A coil type chassis spring is mounted between the frame front cross member and a spring seat in each lower control arm assembly. A large rubber bumper is mounted on the outer end of each lower control arm to limit travel of the arm during compression of chassis spring. A similar rubber bumper is mounted on the frame under each upper control arm to limit

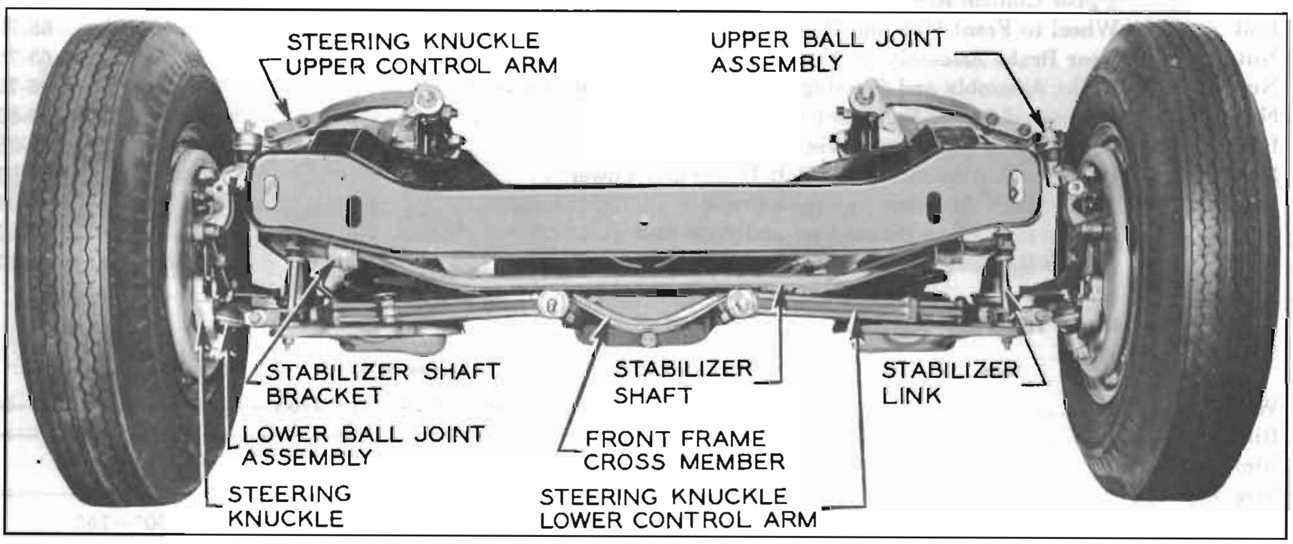

Figure 7-1—Front Wheel Suspension

travel of arm during rebound of chassis spring.

Side roll of the front end of chassis is controlled by a spring steel stabilizer shaft. The shaft is mounted in rubber bushings supported in brackets attached to lower flange of each frame side rail. The ends of stabilizer shaft are connected to the front sides of lower spring seats by links which have rubber grommets at both ends to provide flexibility at the connections and prevent rattle. See figures 7-1 and 7-8.

The lower control arm assembly consists of two drop forged steel arms solidly riveted to a stamped steel spring seat to form a rigid unit. A small plate above the spring seat serves as a mounting for a rubber bumper. Hardened steel threaded bushings are screwed solidly into the inner ends of the forged arms to provide thread-type bearings on the ends of the control arm shaft which is attached to the frame front cross member. The outer end of each arm is bolted to the socket portion of the ball and socket assembly which connects the steering knuckle to the lower control arm. The tapered shanks of the ball studs fit into matching tapered holes in the steering knuckles and are held in place by castellated nuts safetied with cotter pins. See Figure 7-2.

Rubber seals are installed on upper and lower arm shafts to exclude dirt and water from the bearing surfaces. Lubrication fittings are provided at all bearing locations.

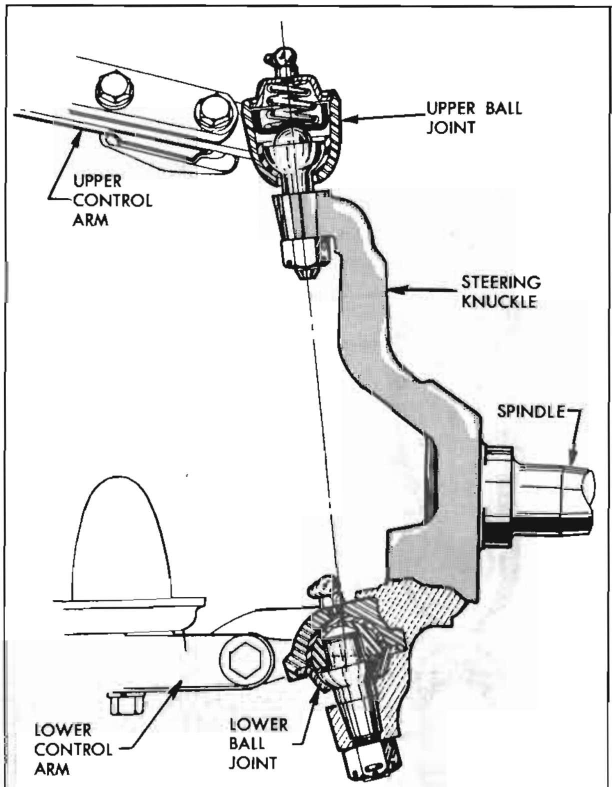

Figure 7-2—Steering Knuckle and Ball Joints

The ball joints which attach the steering knuckle to the upper and lower control arms also provide the bearing surfaces to withstand the thrust and turning loads. The steering knuckle spindle supports the wheel hub with two New Departure adjustable cup and cone ball bearings. The outer end of hub is closed by a cap and inner end is sealed with a lip seal to exclude dirt and water from bearings. See figure 7-9.

During brake application two forces act on the front suspension. When the brakes are applied, the torque is transmitted to the backing plate and knuckle assembly through the brake shoes, which tends to rotate the backing plate and knuckle assembly forward. The weight of the car is thrown forward tending to move the front of the car downward. This downward motion is called "front-end dive". In order to minimize "front-end dive", the upper control arm shaft is mounted to the frame so that the front end of the shaft is higher than the rear end at an angle of approximately 14° relative to that of the lower control arm shaft. Thus, when the braking force is applied, the tendency of the car's front end to dive rotates the backing plate and spindle assembly in a rearward direction, while the braking torque tends to rotate the backing plate and spindle assembly in a forward direction. Therefore, the braking torque creates an upward force nearly equal to the downward (diving) force. In this manner, "front-end dive" is held to a predetermined minimum. See Figure 7-1.

b. Rear Wheel Suspension

Rear wheels are not independently sprung since they are mounted on axle shafts incorporated in the rear axle assembly. The rear wheels are held in proper alignment with each other by the rigid construction of the rear axle housing. They are held in alignment with the rest of the chassis by the torque tube and radius rod between car frame and the rear axle assembly.

Two coil type chassis springs are mounted between the frame cross member at top of kick-up, and spring seats welded to the axle housing near each end. Ride control is provided by two identical double direct-acting shock absorbers angle mounted between brackets welded to the front of the rear axle housing and brackets bolted to the front of the rear spring cross member. Side sway of the chassis springs and rear end of frame is prevented by the transverse radius rod. Large rubber bumper and rubber rear axle stops are bolted to lower flange of frame side rails over axle housing to limit travel of axle housing during compression of the chassis springs. See figure 7-3.

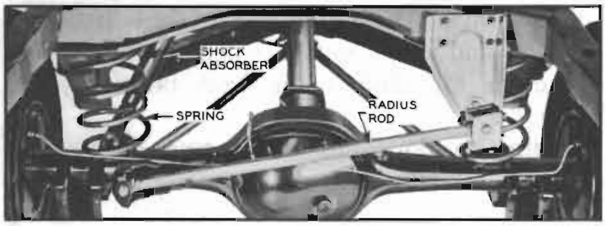

Figure 7-3—Rear Wheel Suspension

c. Wheels and Tires

Wheels are demountable steel disk type. The wheels have wide drop center type rims designed to give ample support for the tire sizes used as standard equipment. The rims have a tapered tire bead seat on the inboard side and a hump-type bead seat on the outboard side which cause tire beads to wedge tightly in place when tires are inflated.

CAUTION: *When mounting a tire on this type of wheel, it is imperative to apply mounting soap around the beads for ease of mounting and to prevent damage to the beads.*

Tires are tubeless low pressure balloon type, of 4-ply construction. Tires are used in production without optional selection of any specified make.

All tires used as standard factory equipment have been worked out with the tire manufacturer for stability. *This does not imply that other makes and types of tires are not suitable for Buick cars, but owing to the large number of tire makes and designs it is impossible for ride and handling calibrations to be worked out for each one.*

Standard production tire sizes are given in paragraph 7-1. Tires other than those used as standard equipment may cause a wander. Larger tires will reduce clearance at fenders and be difficult to mount in spare carriers. Tires with more plys may cause hard riding. Some types of tire and tube combinations are difficult to balance and may cause "tramp."

7-3 SHOCK ABSORBERS

a. Shock Absorber Type and Location

Both front and rear shock absorbers are Delco double direct-acting (telescoping) hydraulic type. All shocks are filled with a calibrated amount of fluid and sealed during production; therefore, no refilling or other service is possible other than replacement of deteriorated rubber bushings on the rears only.

Each *front* shock absorber is mounted vertically inside a front chassis spring. The upper end is attached to the upper control arm frame bracket through a rubber insulated bolt and nut. The lower end has a bracket which is a part of the shock absorber assembly. This bracket is attached to the lower spring seat by two bolts. See figure 7-4.

Each *rear* shock absorber is mounted on an angle with the upper end in toward the center of the car. The upper end is attached to a bracket bolted on the frame through rubber bushings. The lower end is attached to a bracket welded on the rear axle housing through rubber bushings. See figure 7-5.

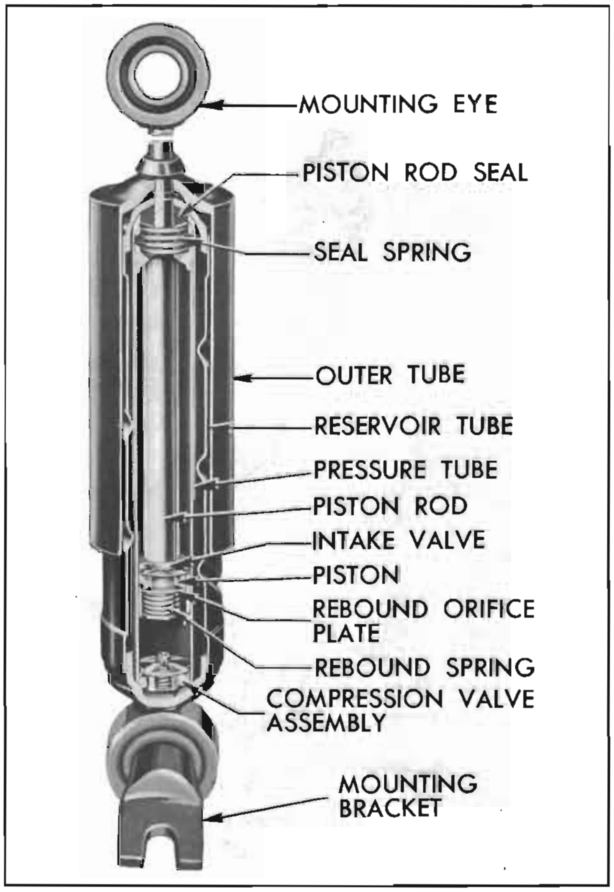

Figure 7-4—Front Shock Absorber—Sectional View

Right and left *front* shock absorbers are identical and interchangeable. Right and left *rear* shock absorbers are also identical and interchangeable. Front and rear shock absorbers are of the same general type, but are *not* interchangeable.

b. Shock Absorber Construction and Operation

The shock absorber consists of three concentric tubes, a piston and rod, and valves for controlling hydraulic resistance. The pressure (inner) tube provides a cylinder in which the piston and rod operate. The upper end is sealed by a piston rod seal, and the lower end is closed by the compression valve assembly. This tube is completely filled with fluid at all times. The reservoir (middle) tube provides space for reserve fluid and for overflow from the pressure tube during operation. The outer tube telescopes over the reservoir tube to provide a dust shield.

The piston, piston rod and outer tube are attached to the car frame, while the pressure and reservoir tubes are attached as a unit to the chassis suspension through the mounting eye. As the wheel moves up and down with respect to the frame the chassis spring compresses or expands, and the shock absorber is telescoped or extended. This action forces the fluid to move between the pressure and reservoir tubes through small restricting orifices in the valves. The relative slowness of fluid movement imposes restraint on the telescoping or extension of the shock absorber, thus providing the required dampening effect on spring action.

(1) *Compression Stroke Operation.* When the chassis spring is being compressed the shock absorber is telescoped, causing the piston to move down in the pressure tube, forcing fluid through holes in the piston. The pressure lifts the intake valve plate, allowing fluid in lower chamber to pass into the upper chamber. As the piston rod moves downward into the pressure tube it occupies space previously filled with fluid and this displaced fluid is forced out of the lower chamber into the reservoir through the restricting orifice in the compression valve. On fast or extreme movements when the fluid flow exceeds the capacity of the orifice, the spring loaded relief valve in the compression valve assembly is forced open to permit more rapid escape of fluid. The amount of compression control is governed entirely by the volume of fluid displaced by the piston rod, and the resistance to chassis spring travel is governed by the area of the orifice and the strength of the compression relief valve spring.

(2) *Rebound Stroke Operation.* When the chassis spring expands, or rebounds, the shock absorber is extended and its resistance is instantly effective. As the piston is pulled upward the intake valve plate seats and fluid in the upper chamber is forced through slots in the plate and holes in the piston to build up pressure against the rebound orifice plate. As the pressure increases, the rebound spring is compressed and the orifice plate leaves its seat to permit fluid to pass into the lower chamber. As the piston rod moves upward out of the pressure tube the space previously occupied by the rod is filled with fluid drawn into the lower chamber from the reservoir. A separate intake valve in the compression valve assembly opens to permit return of this fluid.

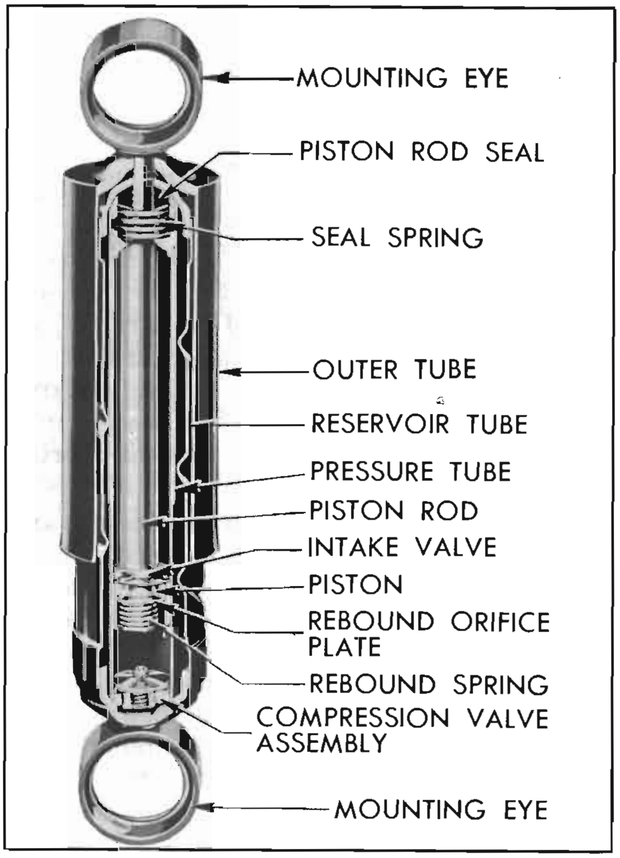

Figure 7-5—Rear Shock Absorber—Sectional View