GROUP 7

CHASSIS SUSPENSION

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SECTION 7-A

SPECIFICATIONS AND DESCRIPTION OF CHASSIS SUSPENSION

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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	Brake Reaction Rod to Lower Control Arm	1/2-13	80-100
Nut	Brake Reaction Rod to Frame	9/16-18	60-80
Nut	Track Bar	5/8-18	110-140
Nut	Rear Shock to Upper Bracket	1/2-13	35-45
Nut	Rear Shock to Lower Bracket	7/16-14	35 min.
Bolt	Front Shock to Lower Control Arm	3/8-16	15-25
Nut	Front Shock to Frame	3/8-24	5-10
Nut	Stabilizer Bushing to Frame	3/8-16	25-35
Bolt	Idler Arm Support to Frame	3/8-16	25-35
Nut	Upper Control Arm Shaft to Frame	9/16-18	90-110
Bushing	Upper Control Arm	1 3/32-11	70 min.
Nut	Upper Ball Joint to Knuckle	7/16-20	30-40
Nut	Lower Control Arm Bumper to Lower Control Arm	7/16-14	60-65
Nut	Front Lower Control Arm to Frame	3/4-16	80-120
Nut	Lower Ball Joint to Knuckle	9/16-18	60-70
Nut	Spindle - Bearing Adjustment (See Par. 7-10)	13/16-16	--
Bolt & Nut	Brake Assembly and Steering Arm to Knuckle, Front	7/16-20	40-50
Bolt & Nut	Brake Assembly and Steering Arm to Knuckle, Rear	1/2-20	65-75
Bolt	Brake Assembly through Anchor Pin to Knuckle	9/16-18	130-150
Nut	Wheel to Front Hub or Rear Axle Shaft	1/2-20	65-85
Nut	Rear Lower Control Arm to Frame	5/8-18	90-110
Nut	Stabilizer Link to Lower Control Arm	5/16-24	5-10
Nut	Rear Spring Clamp to Frame	1/2-13	15-20
Nut	Rear Spring Clamp to Rear Lower Control Arm	1/2-13	20-30
Bolt	Rear Axle Bumper to Frame	5/16-18	10-15

b. Wheels and Tires

Item	Series 4400	Series 4600	Series 4800
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	7.60"-15"	7.60"-15"	8.00"-15"
Optional Tire Size	None	8.00"-15"	None
Tire Inflation Pressures		See paragraph 1-3	
Wheel Attaching Studs and Nuts			
Rear Drums		1/2-20	
Front Finned Aluminum Drums		1/2-20	

c. Shock Absorbers

Item	All Series
Shock Absorber	
Make and Type—Front	Delco, Double Direct-Acting
Make and Type—Rear	Delco, Double Direct-Acting

d. Springs

Spring Trim Dimensions	See Paragraph 7-13
Spring Type	Coil Front and Rear

e. 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 7-28
Steering Knuckle Spindle	
Large End, Diameter	1.3743—1.7348
Small End, Diameter	.8430—.8435
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
Stabilizer Shaft	All Models except Estate Wagons—27/32" Bar 4600 Estate Wagons—29/32" Bar

7-2 DESCRIPTION OF WHEEL SUSPENSION

a. Front Wheel Suspension

The front wheel suspension is designed to allow 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 an intermediate rod.

A coil type chassis spring is mounted between the frame front cross member and lower control arm assembly.

A 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 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

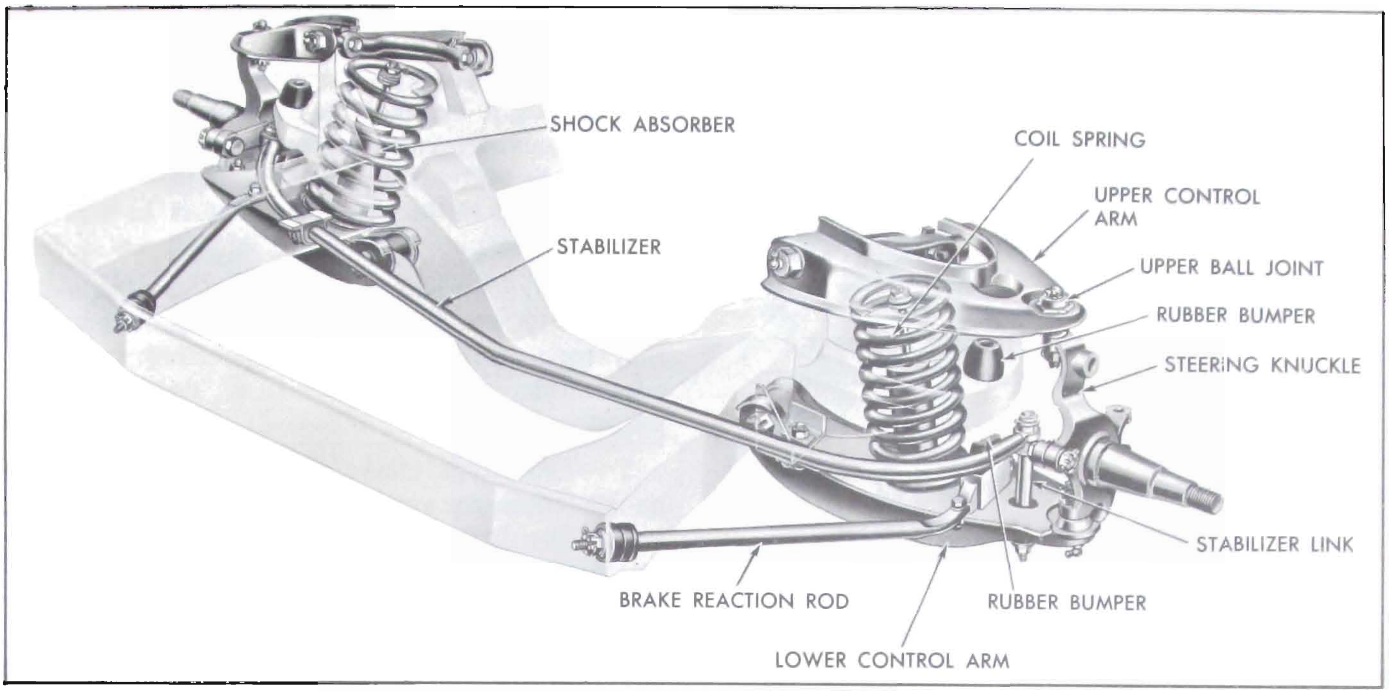

Figure 7-1—Front Suspension

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 control arm by links which have rubber grommets at both ends to provide flexibility at the connections and prevent rattle. See Figure 7-7.

The lower control arm assembly consists of two stamped steel plates welded together. The inner ends of the lower control arms are bolted to the frame front cross member through rubber bushings. The outer end of each arm is connected to the steering knuckle with a tapered ball socket assembly self-threaded, in production, through the lower control arm and bolted to the steering knuckle. The ball socket can be removed in service with a suitable socket. Position of the lower control arms is maintained by a brake reaction rod mounted between the lower control arm and frame. See Figure 7-1.

To resist fore and aft movement of the lower control arm in relationship to the frame, two solid steel brake reaction rods are positioned between the lower control arms and front of the frame side rails. The forward ends of the rods are rubber mounted to hold securely to the frame bracket with castellated nuts and cotter pins. The rearward end of the brake reaction rod attaches to the lower control arm with two 1/2"-13 bolts.

Special hardened flat washers are used under the bolts and nuts to aid in maintaining required torque. Brake reaction rod must be properly installed and secured prior to checking and adjusting caster and camber.

The upper control arms consists of a single stamped steel plate formed to provide maximum strength. Two replaceable hardened steel bushings are threaded into the inner end of each assembly. Rubber seals are installed on shafts to exclude dirt and water from the bearing surfaces. Lubrication fittings are provided at both bearing locations on upper arm inner shafts. As in the lower control arms, a replaceable ball joint is positioned through the outer end of each arm.

The steel forged steering knuckle accommodates tapered roller bearings in the front wheel hubs. The brake shoe anchor pin is rigidly bolted to the steering knuckle. It is not adjustable.

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 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 and by a pair of lower control arms. With the use of an open-type drive line, driving and braking forces are taken by these control arms. The control arms are connected to the frame at their front ends, and to a bracket welded to the axle housing at the opposite ends. Both mounting joints are pivoted through rubber bushings.

To prevent the axle housing from rotating about the two lower control arms during braking and acceleration and to adjust rear universal joint angle, an adjustable, third control arm is mounted between the frame side rails and axle housing to a bracket on the upper right side of the housing. Adjustment is obtained through a series of vernier-spaced holes and two slotted holes in the two piece arm.

The angles at which the universal joints operate are extremely critical. Car roughness is greatly affected by universal joint angles, therefore, joint angles as specified must be adhered to and maintained as described in paragraph 6-17.

Two coil type chassis springs are mounted at an angle forward and to center of car between the lower control arm and the frame cross member at top of kickup. Ride control is provided by two identical double direct-acting shock absorbers angle-mounted between brackets attached to the axle housing and to frame cross member.

Brackets for attaching the track bar are located with the frame bracket on the left and the axle housing bracket on the right. The track bar is rubber mounted at each end.

To maintain relative position of the frame side rails and further prevent rear axle sway, a tie bar is mounted between the track bar frame bracket on the left and frame side rail on the right. See Figure 7-2.

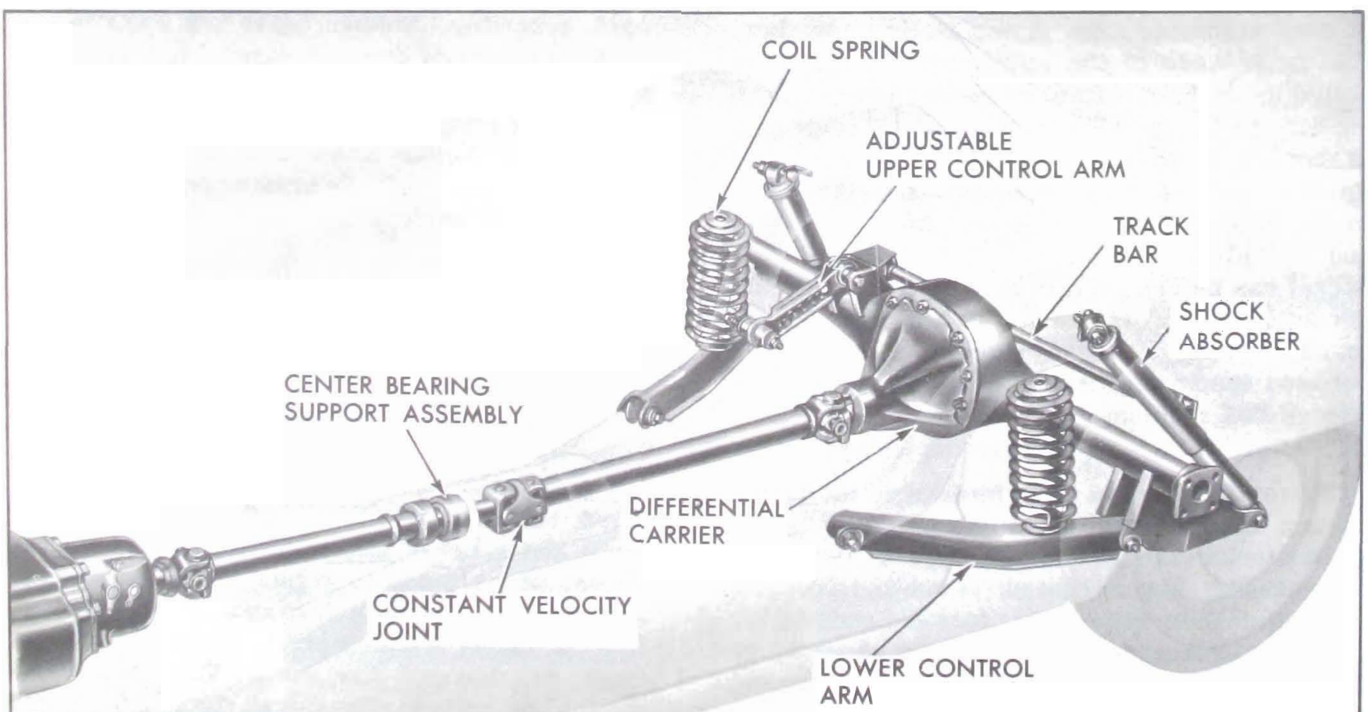

Figure 7-2—Rear Suspension

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. U.S. Royal, Firestone, Goodyear and Goodrich 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 owning 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.

Each front shock absorber is vertically mounted inside the front spring. The upper stem is attached to the frame by means of grommets and grommet retainers held in place by a nut. The lower insulated bracket is bolted to the lower control arm.

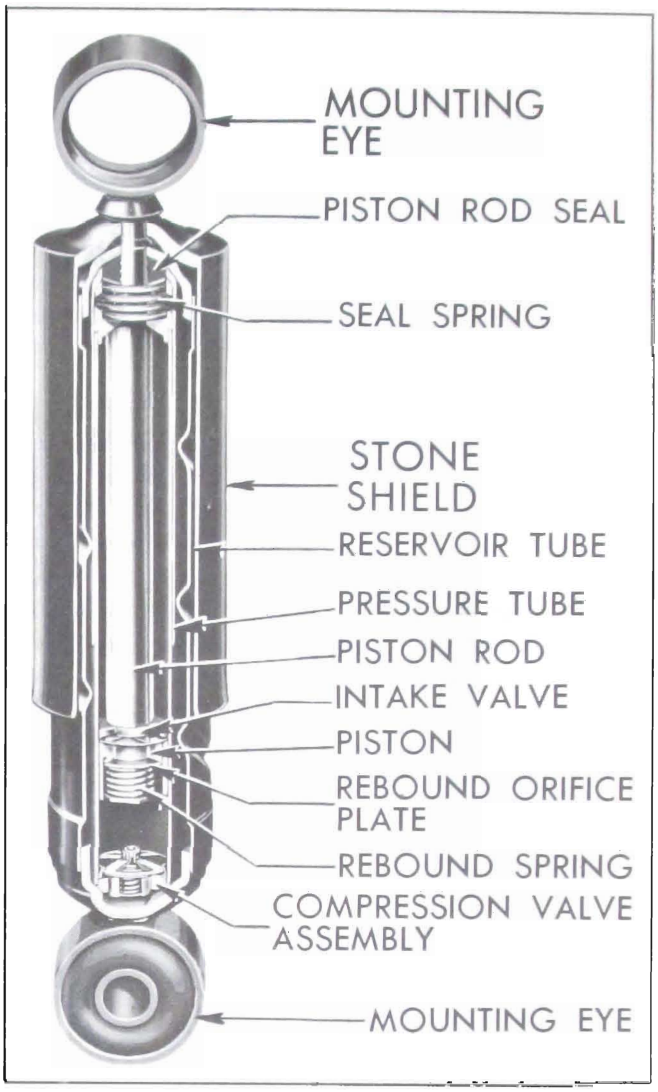

Figure 7-3—Typical Shock Absorber (Rear Shown)

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 frame bracket. The lower end is attached to a bracket welded to the rear axle housing.

The shock absorbers are basically the same for all models but vary as to calibration. Front shock absorbers are interchangeable in respect to right and left, as are the rear. However, front and rear are not interchangeable with each other.

b. Shock Absorber Construction and Operation

The shock absorber consists of two concentric tubes, a piston and rod, and valves for controlling hydraulic resistance. The rear shock absorber has an additional tube which acts as a stone shield.

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 tube provides space for reserve fluid and for overflow from the pressure tube during operation.

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 lower mounting. 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.