

GROUP 40

REAR SUSPENSION, PROPELLER SHAFT AND DIFFERENTIAL

Section	Title
A	Rear Suspension
B	Automatic Level Control
C	Propeller Shaft, All Series.
D	Differential, All Series

SECTION A

REAR SUSPENSION ALL SERIES

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DIVISION I

TROUBLE DIAGNOSIS

40-1 CHECKING REAR SHOCK ABSORBERS

Many shock absorbers have been replaced and returned to the factory with the report that they were weak. When tested with special factory equipment, very few of these replaced units have been found weak or otherwise below standard in operation. This indicates that these shock absorbers were needlessly replaced in an attempt to improve

riding conditions that were actually standard or that erroneous methods were used in judging the operating condition of the shock absorbers.

NOTE: *Slight dampness around piston rod seal is normal and represents fluid used to lubricate the piston rod and seal.*

Before attempting to test shock absorbers, make sure that all attaching bolts and nuts are tight. Tires should be uniformly inflated to specified pressure (Group 100). The chassis should be well lubricated to make sure that suspension parts are free moving.

Test each front and rear shock absorber in turn by quickly pushing down and then lifting up on the end of the car bumper adjacent to the unit being checked. Use the same force as near as possible on each test and note the amount of resistance provided by the shock absorber on compression and rebound. A little practice on another car of the same model which has satisfactory ride control will aid in judging the amount of resistance that should exist.

Both rear shock absorbers should provide the same feeling of resistance. Any noticeable variation between right and left shock absorbers indicates that one unit is not operating normally.

If there is any doubt about the action of a shock absorber after testing as described above, remove the unit from car. See paragraph 40-5. Mount it vertically in a vise with jaws gripping the lower mounting eye firmly, then move the piston rod up and down by hand several times. There should be no free movement in this test after cycling several times. Lack of resistance to movement indicates air in the shock absorber, or that the valve is held open by dirt. A faulty shock absorber must be replaced as it cannot be disassembled for repairs. However, shocks should not be replaced in pairs (or car sets) to correct one faulty shock.

NOTE: Do not operate shock absorber in a horizontal position or upside down. This will cause air to be trapped and shock will "lag" (appear defective).

In the test given above, the amount of force that can be applied is not sufficient to open a valve against its spring pressure; therefore, this test only checks the flow of fluid through the valve bleeder hole or due to a valve being held open or due to internal wear of piston and cylinder.

Since it is unlikely that the valve springs will weaken in service, it may be assumed that the shock absorber action is normal if it operates satisfactorily in the test given above.

40-2 CHECKING REAR CHASSIS TRIM

Optional equipment, undercoating, accumulated dirt, etc., change the car weight and must be considered when checking trim height. When checking trim height, be sure that car is at curb weight. Curb weight includes gas, oil, water and spare tire but no passengers or luggage. See Figure 40-4.

Before measuring spring dimensions, bounce both ends of car up and down several times to make sure there is no bind in suspension members and to let springs take a natural position.

DIVISION II

DESCRIPTION AND OPERATION

40-3 DESCRIPTION OF REAR SUSPENSION

a. Rear Suspension All Series Except Estate Wagon

The rear wheels are not independently sprung, being in-

corporated in the rear axle assembly. Alignment is maintained by the rigid rear axle housing. See Figures 40-5 and 7.

The rear axle assembly is attached to the frame through a link type suspension system. Two rubber bushed lower control arms mounted between the axle assembly and the frame maintain fore and aft relationship of the axle assembly to the chassis. Two rubber bushed upper control arms, angularly mounted with respect to the centerline of the car, control driving and braking torque and sideways movement of the axle assembly.

The upper control arms are shorter than the lower arms, causing the differential housing to "rock" or tilt forward on compression. This rocking or tilting lowers the rear propeller shaft to make possible the use of a lower tunnel in the rear floor pan area than would be possible with a conventional rear suspension. See Figure 40-1.

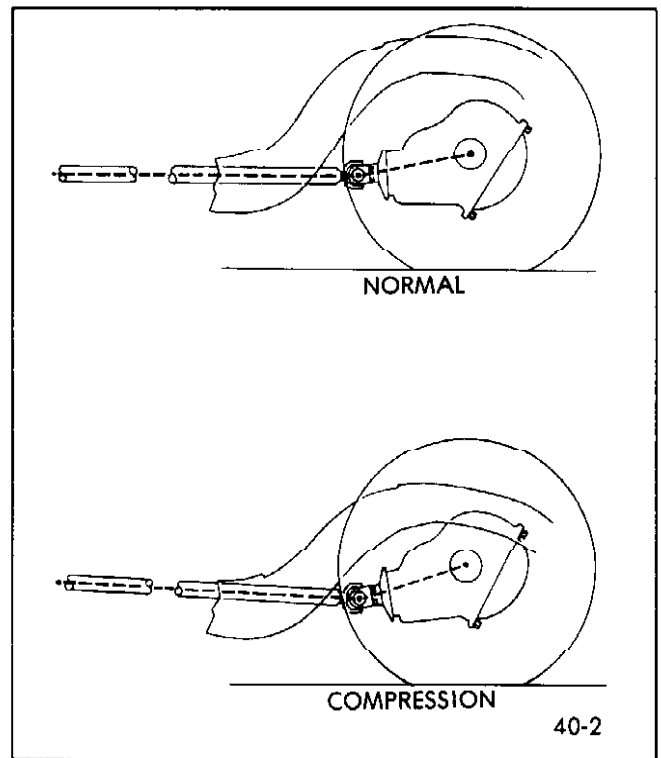


Figure 40-1 - Differential Tilting Action

The rear upper control arms control drive forces, side sway and pinion nose angle. Pinion angle adjustment can greatly affect car smoothness and must be maintained as specified.

The rear chassis springs are located between brackets on the axle tube and spring seats in the frame. The springs are held in the seat pilots by the weight of the car and by the shock absorbers which limit axle movement during rebound.

Ride control is provided by two identical direct double

40-4 REAR SUSPENSION—ALL SERIES

acting shock absorbers angle-mounted between brackets attached to the axle housing and the rear spring seats.

b. Rear Suspension Estate Wagon

The rear wheels are not independently sprung, being incorporated into the rear axle assembly. The rear wheels are held in proper alignment with each other by the rigid construction of the axle housing. With the use of an open type drive line, driving and braking forces are taken by multi leaf springs. See Figure 40-8.

Ride control is provided by two identical direct double acting shock absorbers angle-mounted between spring attaching plates at the axle housing and to the frame.

40-4 DESCRIPTION OF REAR SHOCK ABSORBERS

a. Shock Absorber Type and Location

Rear shock absorbers are Delco direct double action, (telescoping) hydraulic type. All shocks are filled with a calibrated amount of fluid and sealed during production; therefore, no refilling or other service is necessary or possible.

Each rear shock absorber is mounted at 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 tube.

The rear shock absorbers except for Superlifts are interchangeable with respect to left and right.

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. See Figure 40-2.

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

This piston, piston rod and stone shield 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 is compressed or elongated and the shock absorber is compressed 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 control of axle and body movements.

1. Compression Stroke Operation

When the chassis spring is being compressed, the shock absorber is compressed causing the piston to move down in the pressure tube, forcing fluid through holes in the

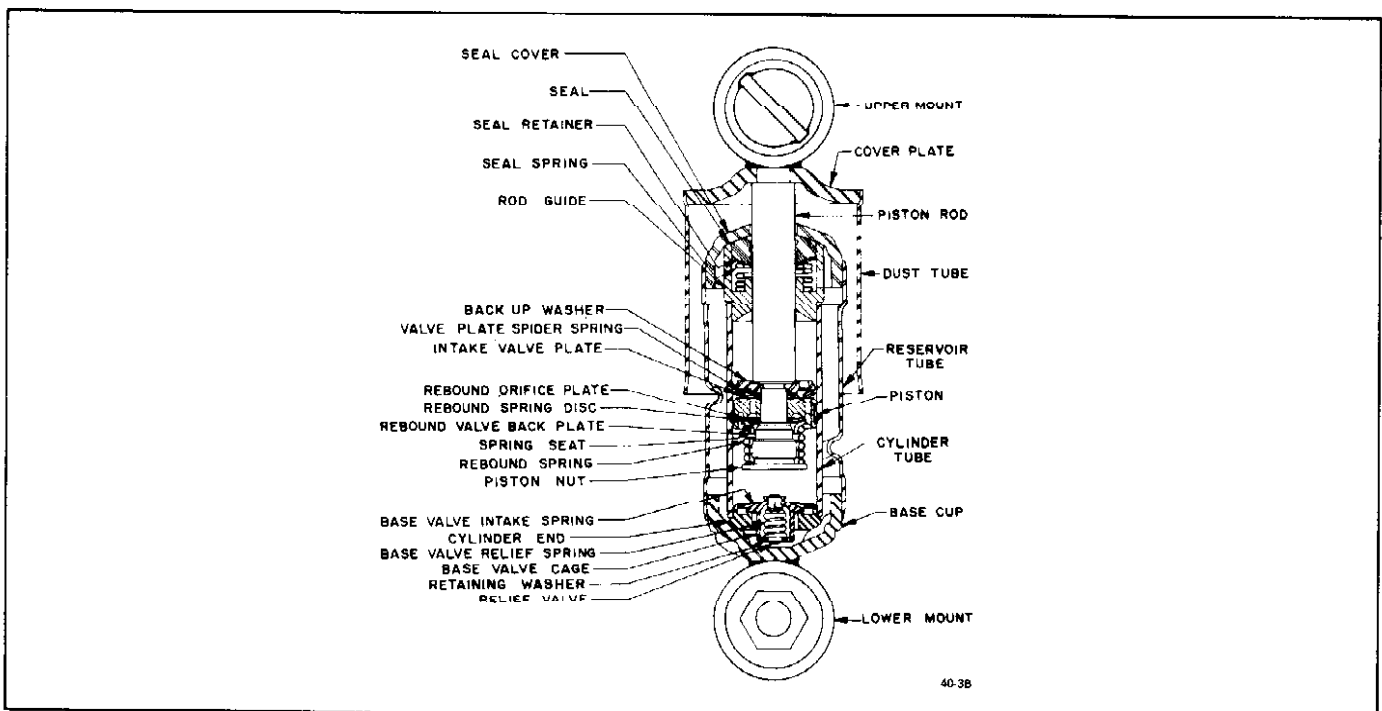


Figure 40-2 - Typical Shock Absorber

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 by the area of the orifice, the area of the piston holes, and the force 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.

DIVISION IV

REMOVAL AND INSTALLATION

40-5 REMOVAL AND INSTALLATION OF REAR SHOCK ABSORBER

NOTE: *This Section covers the standard shock absorber only. See Section B for Automatic Level Control.*

Both rear shock absorbers are filled and sealed in production and cannot be refilled in service.

a. Removal

1. Raise rear of car and support rear axle assembly.
2. Disconnect shock at lower end. Disconnect shock at upper end and remove shock. See Figures 40-4, 6, and 8.

NOTE: *A hex is located on the stud between the axle bracket and shock absorber lower bushing so that a wrench can be used to remove the lower attaching nut without turning the stud. Failure to hold the stud in this manner will result in damage to the mechanical bond between the shock absorber bushing and the lower mounting stud.*

b. Installation

NOTE: *Do not operate shock absorber in a horizontal position. This will cause air to be trapped and shock will "lag" (appear defective).*

1. Make certain that new shock absorber is correct for car model as indicated by part number stamped on the outer tube. See Master Chassis Parts Catalog Group 7.345 for standard and optional parts.

NOTE: *Before installing new shock absorbers, place each one vertically in a vise and stroke through full travel until hydraulic resistance is smooth. This pumps trapped air out of the inner cylinder. Keep the shock in a vertical position until installed in the car.*

2. Loosely attach shock at upper and lower mounting points. While observing the following "NOTE", tighten mounting parts to specified torque.

NOTE: *Car weight must be on rear wheels when tightening shock absorber lower ends in order to clamp rubber bushings in a neutral or unloaded position.*

Shock absorber calibrations as furnished in production have been carefully engineered to provide the best ride control over a wide range of driving conditions. Substitution of other calibrations can alter handling and ride characteristics and are not normally recommended by Buick Motor Division.

40-6 REMOVAL AND INSTALLATION OF REAR CHASSIS SPRINGS - ALL SERIES EXCEPT ESTATE WAGON

a. Removal

1. Raise rear end of car and support frame on jack stands.
2. Mark universal joint and pinion flange for correct reinstallation. This maintains the balance between these two parts as installed during original assembly.
3. Disconnect and slide propeller shaft forward far enough to clear rear companion flange. Wire or otherwise suitably support propeller shaft up out of the way. This will prevent damage to universal joint caused by allowing it to bend to the end of its travel.
4. Position jack under rear axle housing and raise jack slightly to relieve tension on shock absorber.
5. Disconnect shock absorbers at axle bracket by removing nut.
6. Carefully lower jack to fully extend spring after disconnecting shocks and remove spring.

NOTE: *It may be necessary to disconnect rear brake line in order to obtain sufficient axle drop to remove spring.*

NOTE: Do not completely lower jack as this will cause strain on brake hose.

b. Installation

NOTE: Position spring, as shown in Figure 40-7.

1. Install insulator on top of spring. Rotate spring so that top end is located as shown in Figure 40-7.
2. Raise rear axle and connect shock absorber. Tighten mounting stud nut to 45 lb.ft.

NOTE: Car weight must be on rear wheels before tightening shock absorber lower ends.

3. Carefully attach the propeller shaft to the rear companion flange. Tighten U-bolt nuts on 43-44-45- 46-48000 to 12 lb. ft. On 49000, tighten flange bolts to 85 lb.ft.

NOTE: THIS PROPELLER SHAFT TO PINION FLANGE FASTENER IS AN IMPORTANT ATTACHING PART IN THAT IT COULD AFFECT THE PERFORMANCE OF VITAL COMPONENTS AND SYSTEMS, AND/OR COULD RESULT IN MAJOR REPAIR EXPENSE. IT MUST BE REPLACED WITH ONE OF THE SAME PART NUMBER OR WITH AN EQUIVALENT PART IF REPLACEMENT BECOMES NECESSARY. DO NOT USE A REPLACEMENT PART OF LESSER QUALITY OR SUBSTITUTE DESIGN. TORQUE VALUES MUST BE USED AS SPECIFIED DURING REASSEMBLY TO ASSURE PROPER RETENTION OF THIS PART.

NOTE: If rear brake line was disconnected, connect line and bleed rear brake system.

4. Remove jack stands and lower car.

40-7 REMOVAL AND INSTALLATION OF CHASSIS SPRINGS - ESTATE WAGON

a. Removal

1. Raise car on hoist.
2. Disconnect shock at lower attachment by removing nut.
3. Support car by placing jack stands at frame in front of leaf springs and at rear of leaf springs at bumper. It is also necessary to support axle.
4. Disconnect right side of exhaust system by removing exhaust hanger screw to rear frame cross member.
5. Remove lower spring plate attaching nuts.
6. Remove front and rear attaching bolts and remove spring.

b. Installation

NOTE: See Figure 40-8 for leaf spring attachment.

1. Connect leaf spring at front attachment.
2. Lubricate rubber spring cushions and attach lower spring plate. Be sure spring cushions are in plate. Torque nuts to 40 lb.ft.

NOTE: It may be necessary to lower axle to attach spring plate.

3. Attach leaf spring at rear shackle. Torque nut to 115 lb. ft.
4. Torque nut at front attachment to 75 lb. ft.
5. Reconnect shock.
6. Reconnect exhaust system.
7. Remove jack stands and lower hoist.

40-8 REMOVAL AND INSTALLATION OF REAR LOWER CONTROL ARM

NOTE: If both right and left lower control arms are to be replaced, one side should be completed before opposite side is started in order to keep axle from rotating out of position.

a. Removal

1. With axle housing and frame supported, remove lower control arm rear bracket bolt. If some difficulty is encountered in removing bolt, reposition jack farther forward under nose of carrier and slowly raise to relieve pressure and bind at control arm bushing. It may be necessary to use suitable brass drift to tap out bolt.
2. Remove lower control arm front bracket nut and bolt. After nut is removed, it may be necessary to tap out bolt with brass drift. Remove lower control arm.

b. Installation

NOTE: Fasteners in steps 1 and 2 are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part or lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

1. Position control arm in front bracket and install bolt and nut. Do not tighten.
2. Raise or lower nose of axle slowly with jack until bush-

ing in arm and holes in axle bracket align. Install nut and bolt.

3. Torque attaching nuts and bolts to specification.

NOTE: Attaching parts should be tightened with suspension in curb load position.

40-9 REMOVAL AND INSTALLATION OF REAR UPPER CONTROL ARM

NOTE: If both right and left upper control arms are to be replaced, one side should be completed before opposite side is started in order to keep axle from rotating out of position.

a. Removal

1. Raise rear of car and support frame and rear axle assembly.
2. Disconnect control arm at axle housing by removing attaching nut and bolt.
3. Disconnect arm at frame by removing nut and bolt.
4. Remove upper arm assembly.

b. Installation

NOTE: Fasteners in steps 1 and 2 are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part or lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

1. Position new arm in the frame bracket with nut and bolt. Do not tighten.
2. Align holes in bushing and holes in axle housing. Install nut and bolt. Torque attaching nuts and bolts to specification.

NOTE: Attaching parts should be tightened with suspension in curb load position.

NOTE: It may be necessary to jack the carrier nose up or down slightly to align the mounting holes for bolt removal or installation.

40-10 REAR SUSPENSION SPECIFICATIONS

a. Tightening Specifications

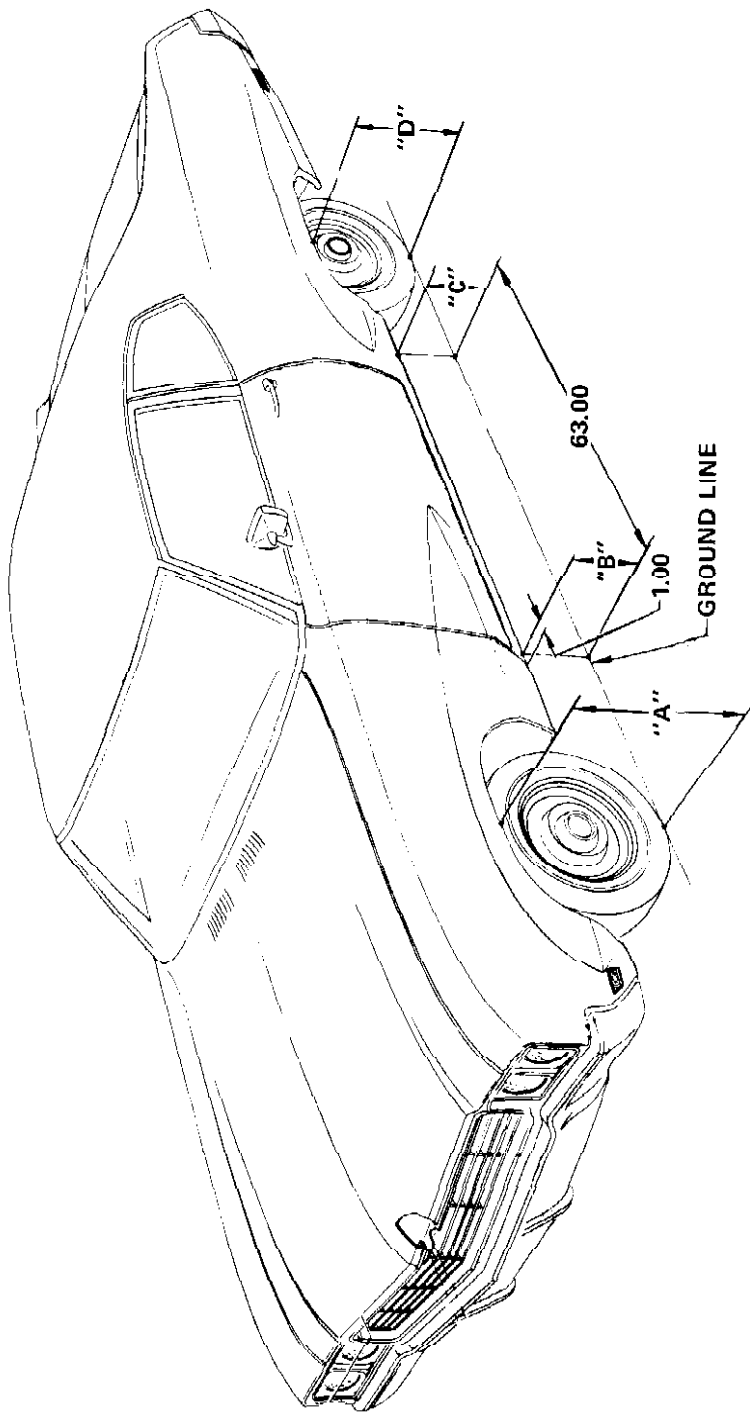
Use a reliable torque wrench to tighten the parts listed to insure proper tightness without straining or distorting parts. These specifications are for clean and lightly lubricated threads only; dry or dirty threads produce increased friction which prevents accurate measurement of tightness.

Part	Location	Thread Size	Torque
Nut and Bolt	Rear Shock Upper Mounting	5/16-18	18 lb. ft.
Nut	Rear Shock Lower Mounting	1/2-20	65 lb. ft.
*Nut	Upper and Lower Control Arm	1/2-13	80 lb. ft.
*Bolt	Upper and Lower Control Arm	1/2-13	110 lb. ft.
Nut	Rear Propeller Shaft "U" Joint to Pinion Flange (43-44000 & Estate Wagon)	5/16-18	15 lb. ft.
Bolt	Rear Propeller Shaft Flanged Yoke to Pinion Flange (45-46-48-49000)	7/16-14	70 lb. ft.

*Torquing of Nut or Bolt to be optional

b. General Specifications

Shock Absorbers Delco Direct Double Acting
 Springs (All Except Estate Wagon) Coil
 Springs Estate Wagon - Multi-Leaf



Dim	Skyllark	-G.S.	Sportwagon	Estata Wagon	LeSabre	Centurion	Electra	Riviera
CURB HEIGHT AT CURB WEIGHT								
A	26 15/16	26 1/2	28 1/8	29 11/16	28 1/2	28 1/2	28 5/8	29
B	10 1/4	9 3/4	11 1/2	10 1/2	9 1/4	9 1/4	9 3/8	9
C	10 1/8	9 7/16	11 1/2	10 1/2	9 3/16	9 3/16	9 5/16	8 5/8
D	25 1/8	24 15/16	26 11/16	25 11/16	25 5/16	25 5/16	24 7/16	28 13/16

Dimensions given do not include moldings except for "B" and "C" dimensions on Riviera.

ALLOWABLE VARIATIONS

Locations "B" and "C" $\pm 3/4$

Side to Side $\pm 3/8$

40-42C

Figure 40-3 - Trim Dimensions

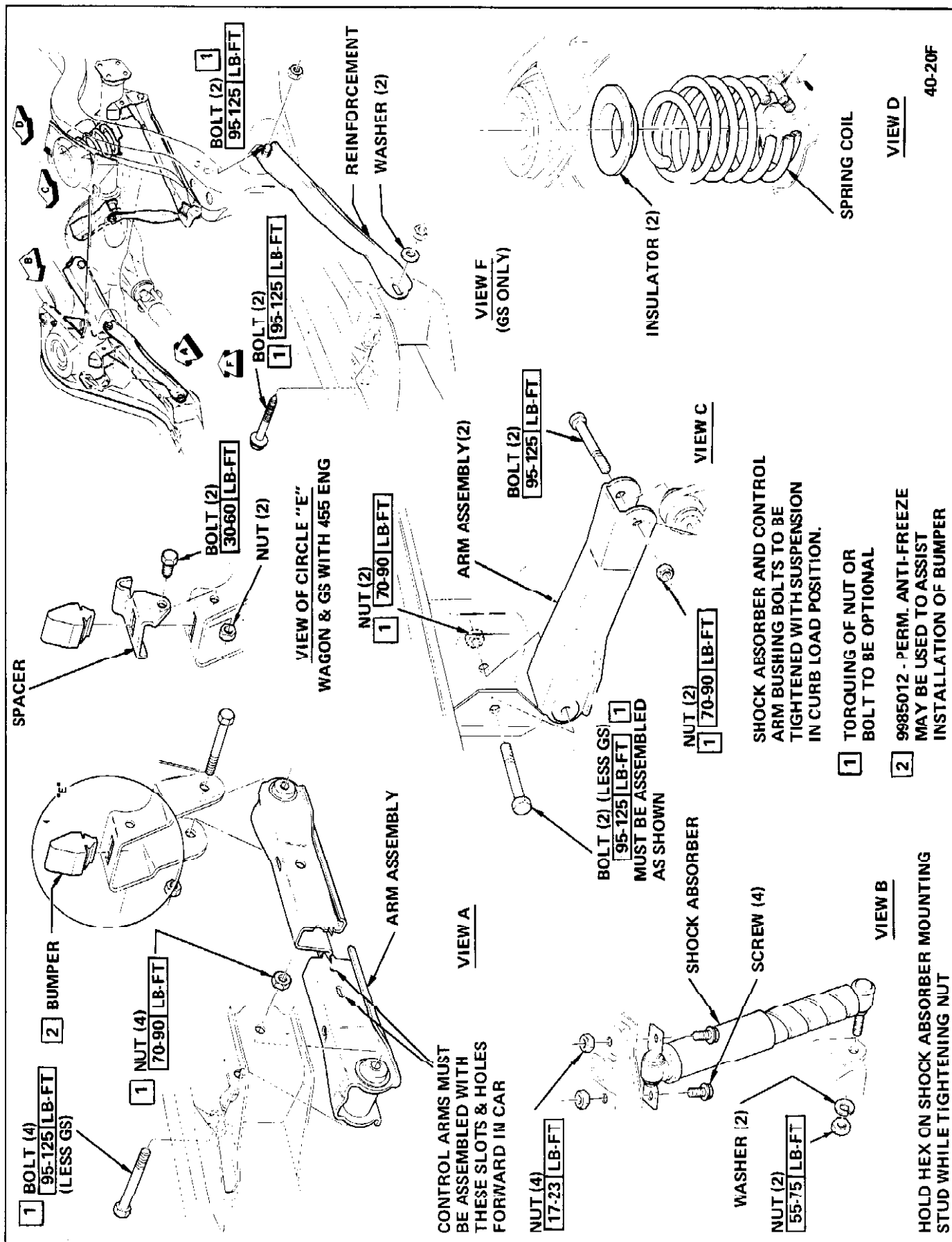
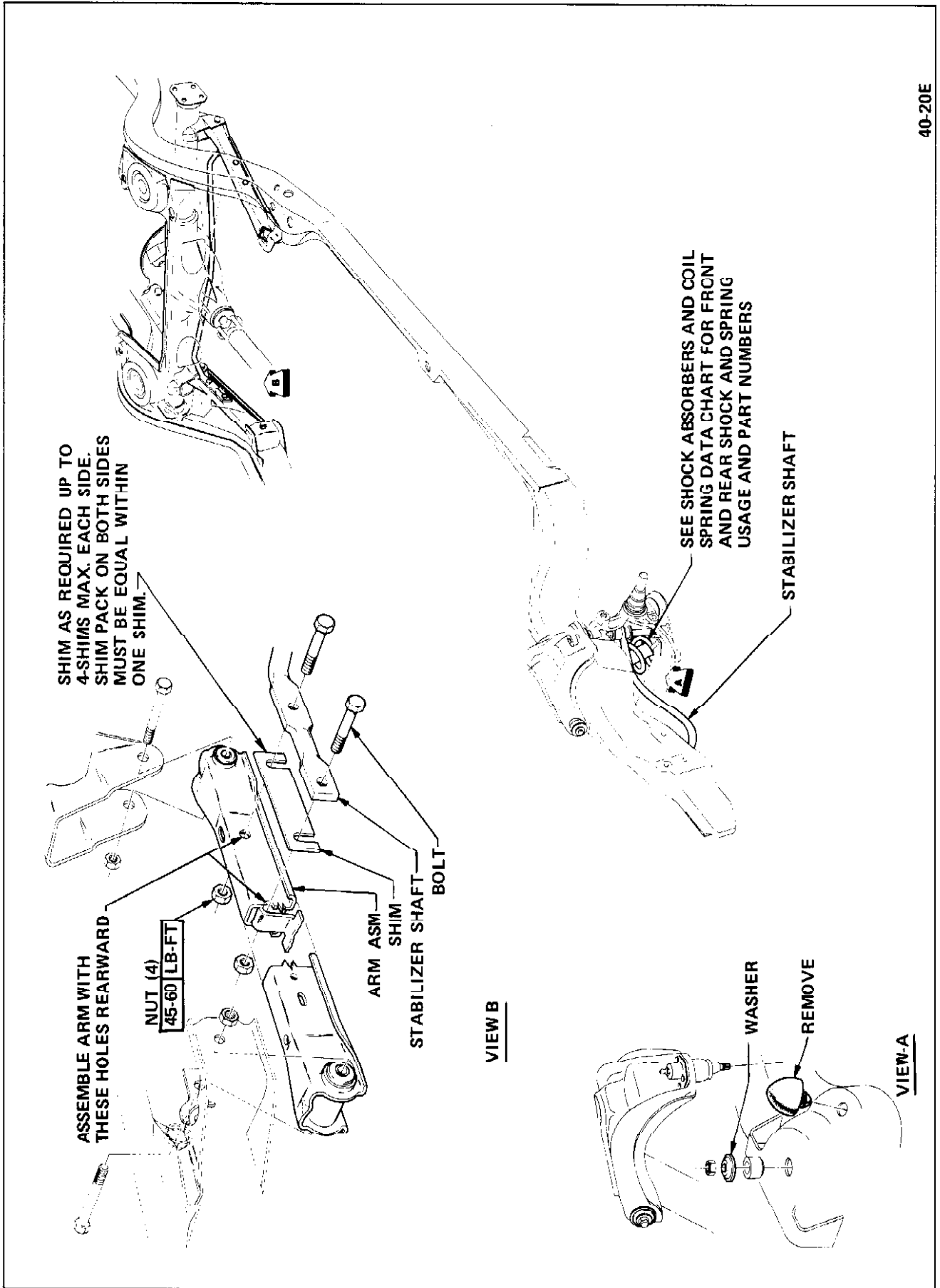


Figure 40-4 - 43-44000 Rear Suspension



40-20E

Figure 40-5 - Rear Suspension - Rallye Pac

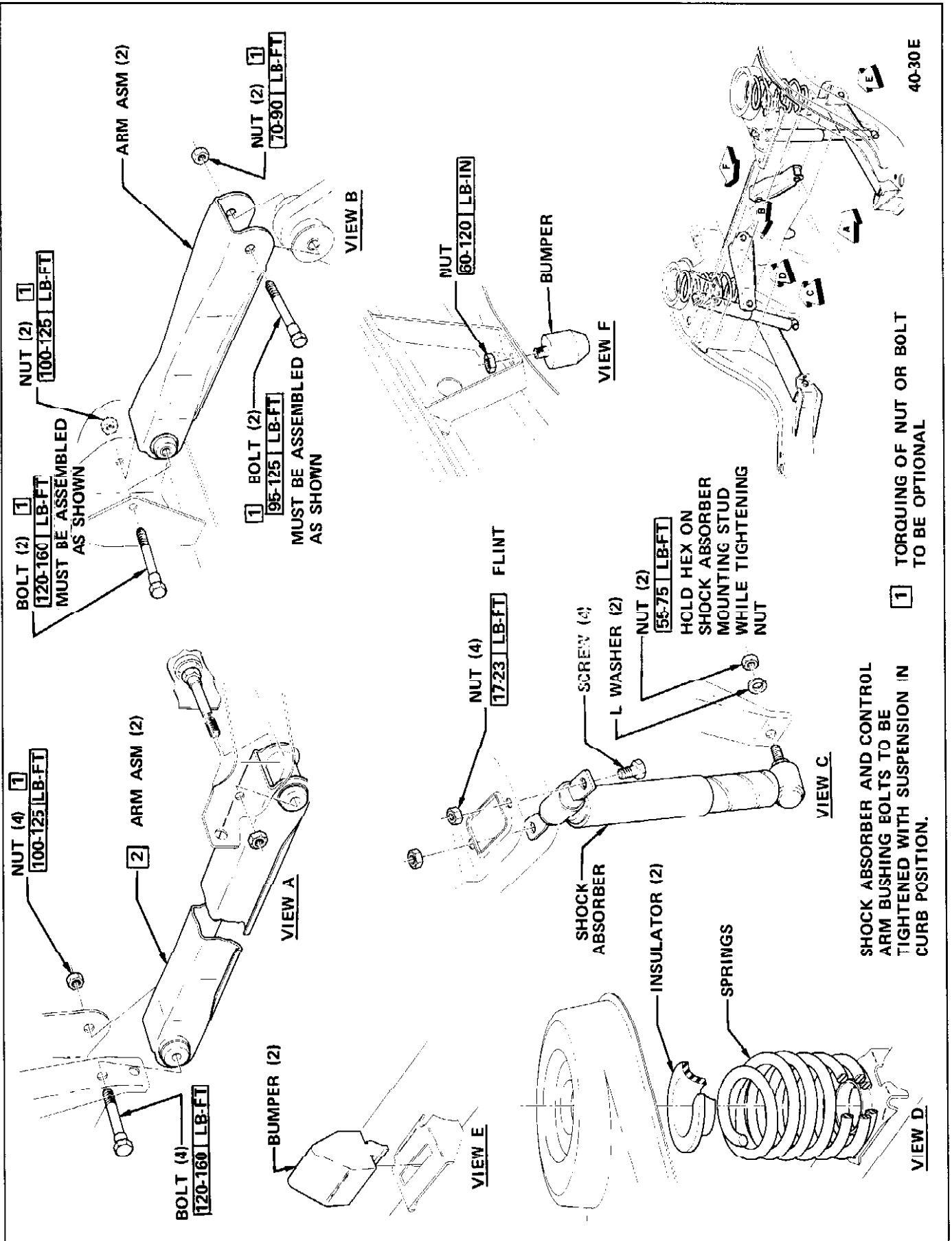
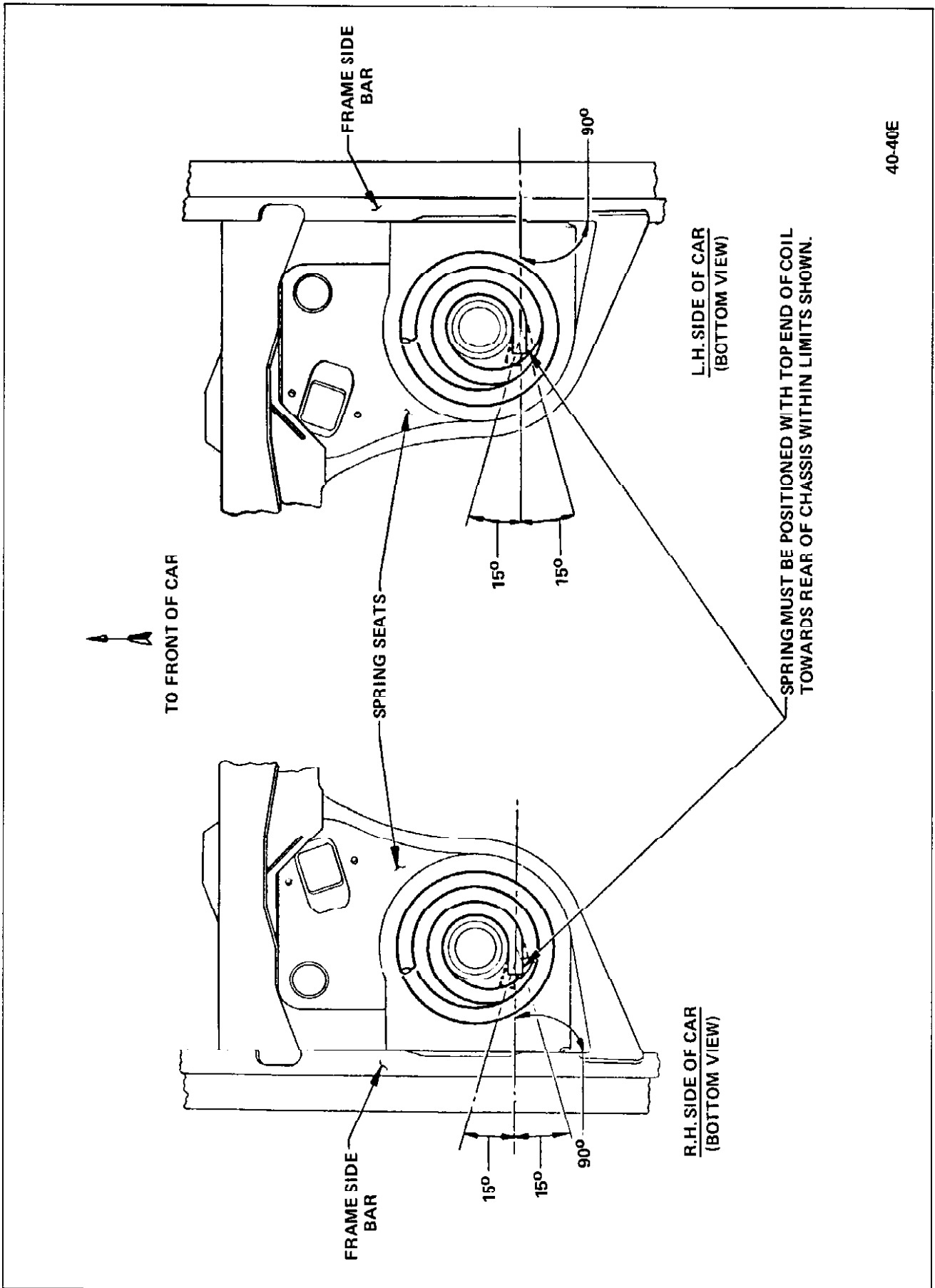


Figure 40-6 - 45-46-48-49000 (Less Estate Wagon) Rear Suspension



40-40E

Figure 40-7 Rear Chassis Spring Orientation

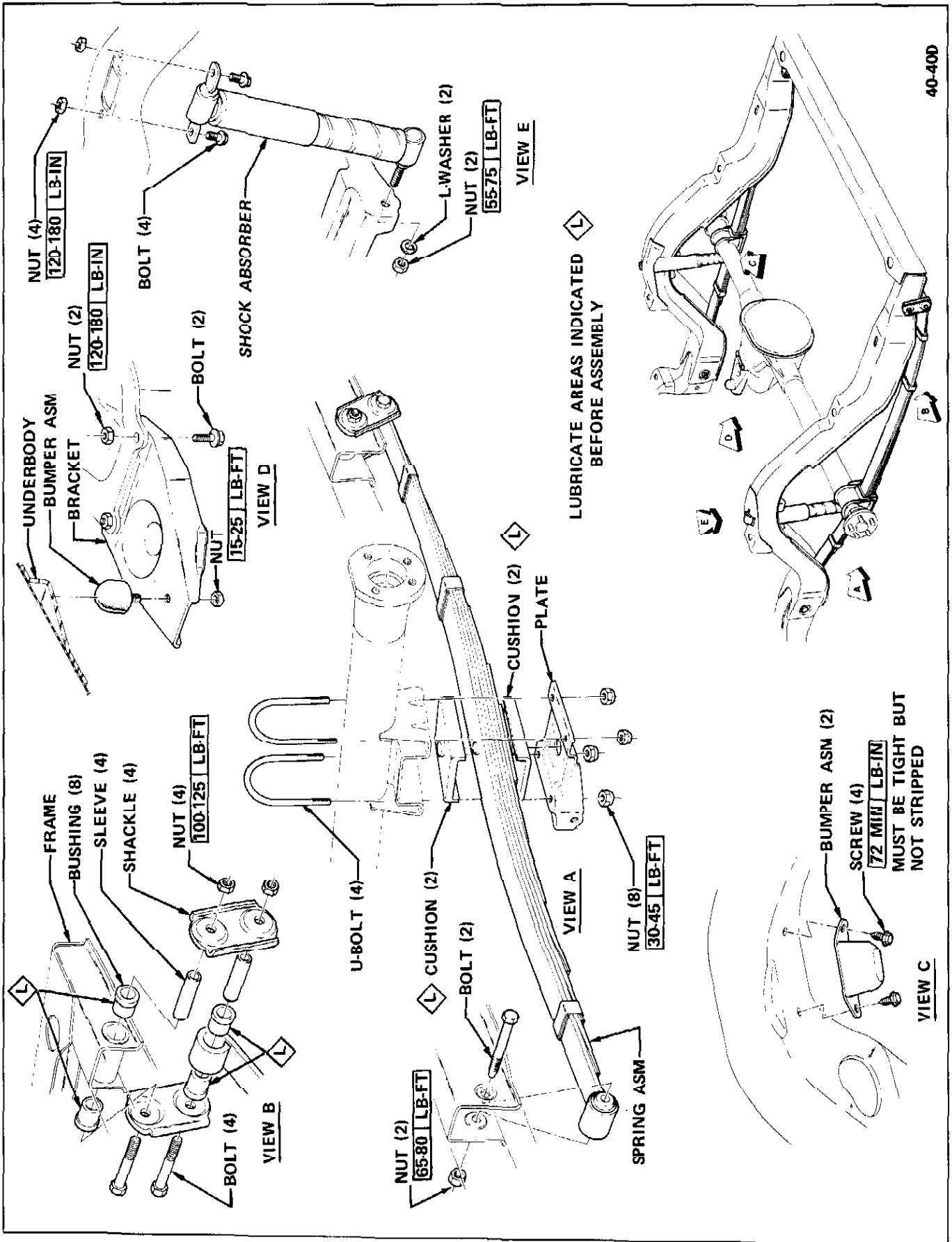


Figure 40-8 - Estate Wagon Rear Suspension