FRONT SUSPENSION

CONTENTS

DESCRIPTION AND OPERATION

SUSPENSION DESCRIPTION

The front suspension is designed to allow each wheel to compensate for changes in the road surface level without appreciably affecting the opposite wheel. Each wheel is independently connected to the frame by a steering knuckle, ball joint assemblies, and upper and lower control arms. The control arms are specifically designed and positioned to allow the steering knuckles to move in a prescribed three dimensional arc. The front wheels are held in proper relationship to each other by two tie rods which are connected to steering arms on the knuckles and to an intermediate rod.

Coil chassis springs are mounted between the spring housings on the frame and the lower control arms. Ride control is provided by double, direct acting shock absorbers mounted inside the coil springs and attached to the lower control arm by bolts. The upper portion of each shock absorber extends through the frame bracket and is secured with two grommets, two grommet retainers, and a nut.

Side roll of the front suspension is controlled by a spring steel stabilizer shaft. It is mounted in rubber bushings which are held to the frame side rails by brackets. The ends of the stabilizer are connected to the lower control arms by means of links which are isolated by rubber grommets which provide flexibility and ride features.

A ball joint is rivited to the outer end of the upper arm. The upper control arm is attached to a cross shaft through rubber bushings. The cross shaft, in turn, is bolted to frame brackets. It is pre-loaded by a rubber spring to insure proper seating of the ball in the socket.

The inner ends of the lower control arms are bolted to the frame through rubber bushings. The outer end of each arm is connected to the steering knuckle with a ball joint assembly pressed in the lower control arm and bolted to the steering knuckle. Fore-aft alignment is maintained by the wide span lower control arm.

Rubber seals are part of the ball joint assemblies to keep dirt and moisture from entering the joint and damaging bearing surfaces.

Shock absorbers are Delco direct double-acting type.

DIAGNOSIS

FAULTY SPRINGS, SHOCK ABSORBERS, AND BALL JOINTS

Trim Height Checking Considerations

Optional equipment, undercoating, accumulated dirt, etc., change the car weight and must be considered when checking spring trim dimensions. Because of the many possible variations in loading due to optional equipment, it is not possible to give dimensions for all conditions; therefore, the spring trim dimensions following are for the standard car only, without optional equipment or undercoating and with car at curb weight. Curb weight includes a full tank of gas, oil, water, and spare tire but no passengers.

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

Measuring Trim Height

1. On a new car, the *front* spring trim dimension "K" should be as shown in Figures 3D-4 and 3D-5 of the Front Wheel Alignment Section. As mileage accumulates the trim height may be less due to normal settling of bushings, dirt accumulation, etc.

2. On a new car, the *rear* spring trim dimension "L" should be as shown in Figures 3D-4 and 3D-5 of the Front Wheel Alignment Section. As mileage accumulates the trim height may be less due to normal settling of bushings, dirt accumulation, etc.

3. When checking *side to side* differences in trim height at the *front* take measurements at the front rocker panel as shown in Figures 3H-2, 3H-3 and 3H-4 of the Rear Suspension Section.

A maximum of two (2) front shims may be installed on top of the front spring with a change in trim height double the thickness of the shims. This will provide for a maximum correction at the fender of .50 inch. A maximum of two (2) rear shims may be installed between the rear spring and the spring seat on the axle with a change in trim height the same as the thickness of the shims. This will provide for a maximum correction at the fender of .24 inch. Cars with 1 inch tilt right to left cannot be corrected by shims. If side to side variation is in excess of one inch, check suspension components for damage, excessive wear, or incorrect spring installation.

4. When checking side to side differences in trim height at the *rear* take measurements at the rear rocker panel as shown in Figures 3H-2, 3H-3 and 3H-4 of the Rear Suspension Section.

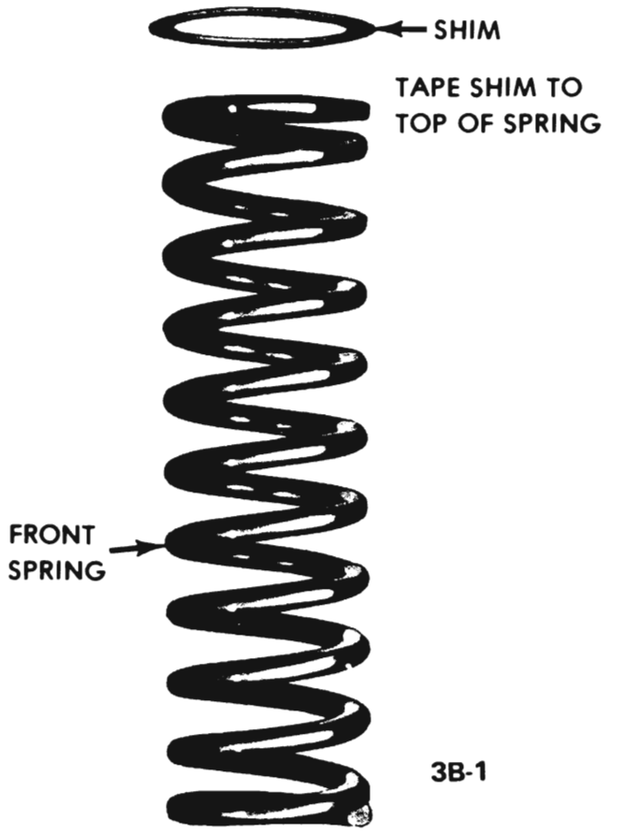


Figure 3B-1 - Installing Shim on Spring

Shimming of only one rear spring is not effective in correcting tilt. Side to side variation should be corrected by changing or shimming front springs.

Installation of Front Spring Shim

To correct variations in trim height, front spring shims may be ordered from the Parts Department under Group 7.425.

1. Remove front spring from car as described in this section.

2. Place shim at top of spring as shown in Figure 3B-1. Taping shim to spring will aid installation.

3. Install shimmed spring in car as described in this section.

Weak and Non-Operative Shock Absorbers

Many shock absorbers have been replaced and returned to the factory with the report that they were weak or leaking oil. When tested with special factory equipment very few of these replaced units have been found weak, leaking oil, or otherwise below standard in operation. This indicates that these shock absorbers were needlessly replaced in an attempt to improve riding conditions which were actually standard, or that erroneous methods were used in judging the operating condition of the units.

Leaking shocks should not be diagnosed by observing a light oil film on or around the shock.

The shock absorber seal is designed to allow for lubrication of the piston rod, which under normal conditions, causes a light oil film to accumulate on the shock. This does not affect shock operation nor is replacement necessary as *all Delco shocks contain an added fluid reserve for this purpose.*

A leaking shock absorber is easily spotted as there will be evidence of fluid droplets on or around the shock. Before replacing any shock absorber, verify that the oil present on the shocks is not from some other chassis component.

Before attempting to test shock absorbers make sure that all attaching bolts and nuts are tight. Tires should be uniformly inflated to specified pressure. 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 closest to the unit being checked. Use the same amount of force 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 front shock absorbers should provide the same feeling of resistance as should both rear shock absorbers. Any noticeable variation between right and left shock absorbers indicates that one unit is not operating normally. Little or no resistance on compression or rebound indicates air in the shock absorbers, internal leakage due to wear, or that the valve is held open by dirt. Excessive resistance indicates that the bleeder holes in the valve are plugged with dirt.

If there is any doubt about the action of a shock absorber after testing as described above, remove the unit from car. Mount it vertically in a vise with the jaws gripping the lower mounting firmly, then move the piston rod up and down by hand. There should be no free movement in this test. Lack of resistance or jerky resistance to movement indicates air in the shock absorber, internal leakage due to wear, or that the valve is held open by dirt. A faulty shock absorber must be replaced as it cannot be disassembled for repairs. 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 as well as any leakage 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.

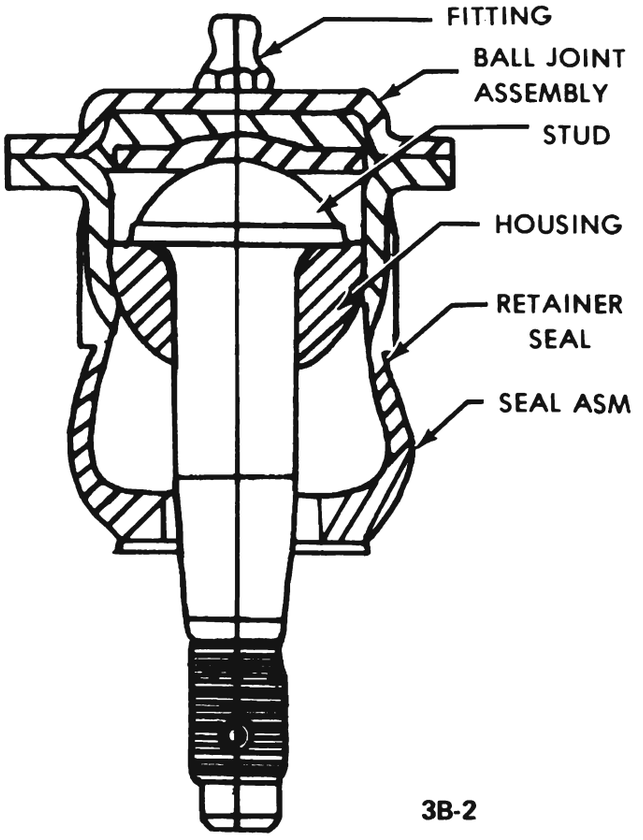


Figure 3B-2 Upper Ball Joint All Seris

Loose Ball Joints

The upper ball joint stud on all series Buicks is rubber spring equipped and thus preloaded in its socket at all times. See Figure 3B-2. This minimizes looseness at the socket and compensates for normal wear. If the upper stud has any noticeable lateral shake, or if it can be twisted in its socket with the fingers, the upper ball joint should be replaced. This check is done with the ball joint disconnected from the steering knuckle.

A torque check can also be run on the upper ball joint (all series) and the lower series lower ball joint. The torque check is as follows:

1. Remove the ball joint stud from the steering knuckle and replace the stud nut.

2. Check to see if any torque is required to rotate the ball stud in the socket.

3. If no torque is required, and the joint is properly lubricated, replace the ball joint.

Sometimes a defective ball joint can be detected by simply applying horizontal pressure on the tire and wheel assembly and watching the suspected ball joint. If the ball joint shows any motion other than the normal rotational and rocking motion, its possible that the ball joint is defective and further diagnosis should be pursued as described.

The lower ball joint on "A" Series cars is also rubber spring loaded and is held seated by the weight of the

car. See Figure 3B-3. With the chassis spring load removed from the ball joint, the ball joint should not show any looseness. The checks mentioned above on the upper ball joint are also applicable on the A body lower ball joint. If the ball joint appears defective, it should be replaced.

On all B-C-E Series Buicks, the lower ball joint is inspected for wear by visual observation. See Figure 3B-4. Wear indicated by the protrusion of the 1/2 inch diameter nipple into which the grease fitting is threaded. This round nipple projects 1/16 inch beyond the surface of the ball joint cover on a new, unworn joint. Normal wear will result in the surface of the nipple retreating very slowly inward.

To inspect for wear, wipe grease fitting and nipple clean and observe the nipple's position relative to the surface of the ball joint. If the round nipple is flush or inside the cover surface, replace the ball joint.

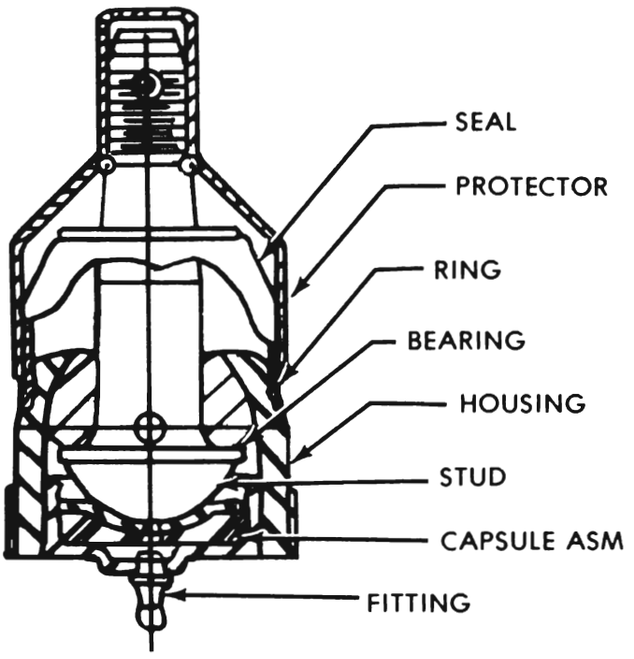


Figure 3B-3 "A" Series Lower Ball Joint

Loose Upper Control Arm Bushing Retaining Bolts

If loose upper control arm bushing retaining nuts are encountered, it is necessary to torque nuts to 55 lb.ft. On some cars equipped with air conditioning, power brakes, etc. it might be necessary to remove the upper control arm to torque the bolts. Bolts should be tightened with the car at curb height.

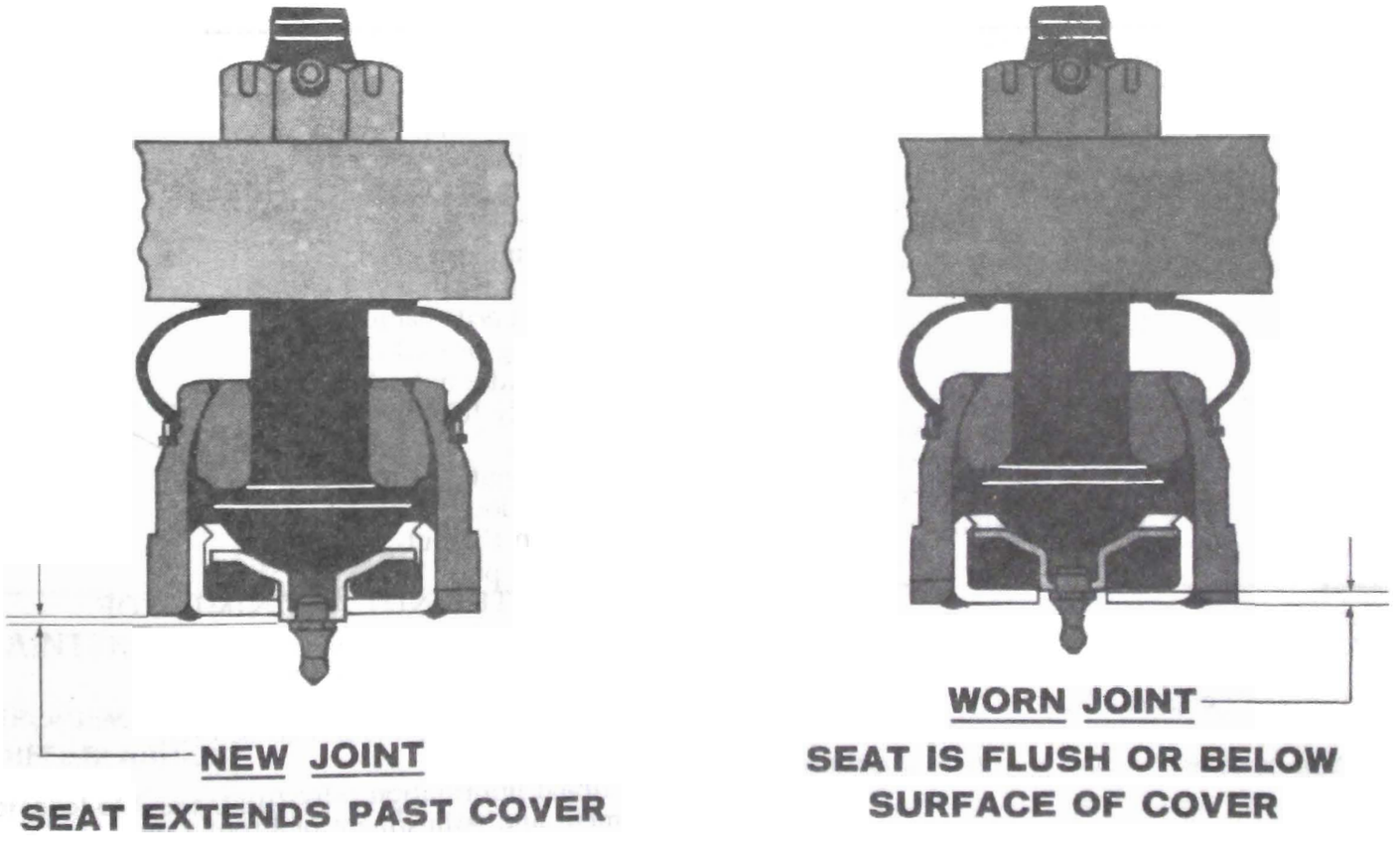


Figure 3B-4 B-C-E Series Lower Ball Joint

Condition	Test Inspection Procedure
Incorrect, weak or inoperative shock absorber	Visual inspection for oil - slight seepage is normal - could be oil spray from another source - replace if the shock is leaking excessively. Test each front shock absorber in turn by quickly pushing down and then lifting up on the end of the bumper closest to the unit being checked. Use the same amount of force on each test and note the amount of resistance provided by the shock absorber on compression and rebound. For additional information, refer to Testing and Inspection of Shock Absorbers - this section.
Incorrect, weak or unmatched springs	Check trim height measurements with specifications. Either replace the spring with the correct unit or shim to desired height. For additional information, refer to Measuring Trim Height and Installing Front Spring Shims - this section.
Stabilizer bar loose	Visually inspect assembly and correct as necessary - torque to specifications.
Incorrect Front Wheel Bearing Adjustment	Feel for bearing looseness while supporting car on the frame to allow the suspension to hang freely in an extension condition. Shake the wheel and tire assembly with a vertical grasp to isolate bearing feel from ball joint and linkage feel (.002 - .006 inch end play) If the bearings need readjusting, use the following procedure. 1. Snug the spindle nut while turning the disc assembly forward to fully seat the bearing. 2. Back off the nut 1/4 to 1/2 of a turn to the just loose position. 3. Hand tighten the nut, but do not insert the cotter pin. 4. BACK OFF THE NUT A MINIMUM OF 1/12 of a turn and a maximum of 1/6 of a turn to a cotter pin hole and insert the cotter pin. UNDER NO CIRCUMSTANCES is the nut to be even finger tight. For additional information refer to Replacement and Adjustment of Front Wheel Bearings in this section.

Condition	Test Inspection Procedure
Worn Front Wheel Bearings	LISTEN FOR A GRINDING OR A ROUGH noise from the bearing area - feel for a roughness while rotating the wheel and tire assembly. A more accurate check can be made with the bearing and hub assembly disassembled. Bearing appearance usually does not dictate the operating condition. Bearings should be replaced only if they operate roughly or produce abnormal noises. For additional information, refer to Wheel Bearing Service - this section.
Worn or Insufficiently Lubricated Ball Joints or Control Arm Bushings	Check for proper ball joint operation by the appropriate means as outlines in this section under Checking for Defective Ball Joints. Lower Series - Lower ball joint - visual inspection of the joint or torque check Upper ball joint - Visual inspection of the joint or torque check. Upper Series - Lower ball joint - Visual inspection of the wear indicator Upper ball joint - Visual inspection of the joint or torque check. If the ball joint is to be replaced, reference should be made to the ball joint service portion of the Major Repairs Section. Visual observation of the bushings while shaking the control arm can isolate a worn bushing. If play exists, the bushing should be replaced as outlined in the bushing service portion of the Major Repairs Section.
Loose Shock Absorber Mounting	Visual observation of the shock mounts will indicate whether the shock is properly mounted or not. If the shock is reinstalled, torque to specifications.

MAINTENANCE AND ADJUSTMENTS

REPLACEMENT AND ADJUSTMENT OF FRONT WHEEL BEARINGS

Removal of Front Wheel Bearings

Common causes for bearing failure include the following:

1. Mounting or tear down abuse.
2. Improper mounting methods.
3. Inadequate or wrong lubricants.
4. Entrance of dirt or water (corrosion and abrasive).
5. Seizing or smearing from overload.
6. Overheating causing tempering.
7. Fatigue pitting.

Of these, the most common cause is that of maladjustment of the bearing. Usually too tight an adjustment resulting in overheating and eventual failure.

1. Raise front of car and support with a safety stand. Remove the hub cap and the tire and wheel assembly to expose the disc brake caliper.

2. Using a hex drive, unscrew the two large retaining bolts and remove the caliper assembly. Support the caliper assembly so as not to put any strain on the brake hose.

3. Remove the bearing dust cap. Straighten the cotter pin and remove. Unscrew the adjusting nut and remove the washer.

4. Shake the disc and hub assembly from side to side, pull the disc outward a short distance and then push back quickly. This motion will remove the outer bearing assembly and race from the hub and leave it on the spindle. Remove the pieces from the spindle and place on a clean surface.

5. Leave the disc assembly on the spindle and replace the spindle nut. Pull the disc assembly from the spindle until the spindle nut retains the disc by contacting the inner bearing assembly and seal. Pull or jerk the disc assembly against the spindle nut until the seal and bearing are removed from the hub portion and are retained on the spindle. The disc and hub will be free of the spindle. Remove the bearing assembly and place it on a clean surface. Discard the grease seal.

Hub Bearing Race Inspection and Removal

1. Thoroughly flush and clean the inside of the hub. Do not allow grease or solvent to contact the disc surface.

2. Inspect the races visibly and feel for roughness while engaging matched bearings and races. If anything but a normal wear pattern appears, or if ant roughness is felt, replace the distressed race and bearing assembly. In all cases, when a race is replaced, the tapered roller bearing assembly should also be replaced.

3. Using a soft steel drift, engage the exposed edge of the race at one of the slots. Tap the cup from the hub by moving from one slot to the other and avoiding excessive tipping.

Installation of Hub Bearing Race

1. Wipe the hub recess clean. Lubricate the new bearing race and place it in position over the recess. Make certain that the race faces in the correct position.

2. Tap the race in place slowly with a soft steel drift. Move the drift around the parimeter of the race to prevent cocking or tipping. Bottom the race out on the lip of the hub recess.

Packing the Wheel Bearing

1. Clean all the old grease from the bearing. The bearing must be clean and dry before the new grease is packed. NEVER MIX WHEEL BEARING GREASES - ALWAYS REPLACE WITH NEW GREASE.

2. Using a bearing packer or packing by hand, pack the bearing full of wheel bearing grease.

Installation of the Inner Wheel Bearing and Grease Seal

1. To prevent rust and grease run off from the bearings, both the hub and dust cap interior should be given a light coating of grease. NEVER PACK THE HUB FULL OF GREASE AS IT WILL ACT AS AN INSULATOR AND CAUSE HEAT TO BUILD UP RESULTING IN AN EVENTUAL BEARING FAILURE.

2. Insert the packed inner bearing and race assembly into the hub. Lubricate the inner seal lip with a light coating of grease and tap the seal into the hub until it is flush with the top surface of the hub. Strike the outer edge of the seal only.

Installing the Disc Assembly

1. Clean the disc surface of all grease and solvents to insure proper braking action.

2. Support the disc assembly and slide it straight onto the spindle. Be careful not to drag the grease seal or bearing over the spindle threads.

3. When the disc assembly is in position, insert the outer bearing and race in place. Also insert the washer and screw on the spindle nut. Hand tighten the nut. Do not replace the cotter pin.

4. Replace the disc brake caliper and torque the two bolts to specifications.

Adjusting Front Wheel Bearings

Proper front wheel bearing adjustment is very important. Improper adjustment can result in abnormal car driving characteristics and unusually quick bearing failure.

1. Snug the spindle nut while turning the disc assembly forward to fully seat the bearing. This will remove any grease or burrs which could cause excessive wheel bearing play later.

2. Back off the nut 1/4 to 1/2 of a turn to the just loose position.

3. Hand tighten the spindle nut, but do not insert the cotter pin.

4. BACK OFF THE NUT A MINIMUM OF 1/12 OF A TURN AND A maximum of 1/6 of a turn to the appropriate cotter pin hole and insert the cotter pin. UNDER NO CIRCUMSTANCES IS THE SPINDLE NUT TO BE EVEN FINGER TIGHT.

5. Feel the looseness in the hub assembly. There will be from .002 to .006 inches end play.

6. Replace the wheel and tire assembly and torque the wheel nuts to specs.

Most front wheel bearing complaints are results of noise or of a slight vibration of rumble from the front end. Many bearings and races are replaced unnecessarily because of misinterpretation of normal wear indications. Therefore, unless a bearing is noisy or causing a rough feeling during operation, replacement of the front wheel bearing assemblies is unnecessary.

MAJOR REPAIR

REMOVAL AND INSTALLATION OF BALL JOINTS AND STEERING KNUCKLE

Removal of Upper Control Arm Ball Joint Assembly

1. Support car on car stand at the frame so front suspension is in full rebound position.

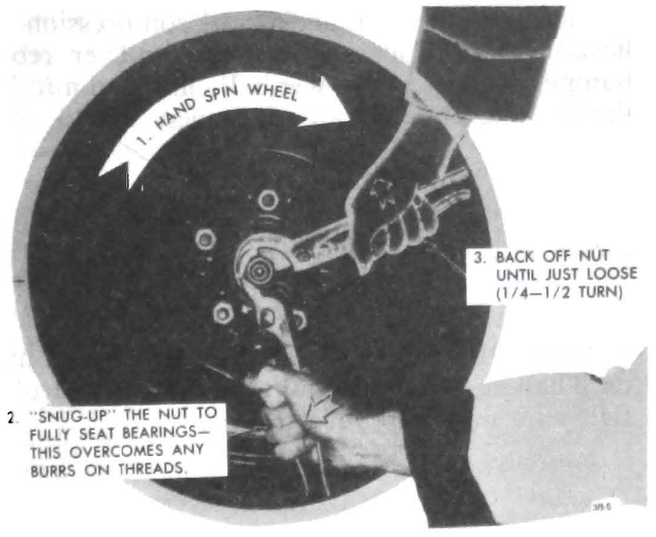


Figure 3B-5 Wheel Bearing Adjustment

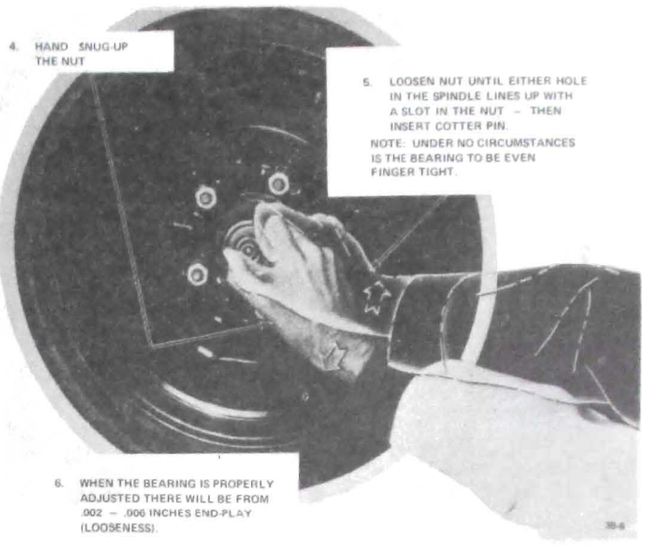


Figure 3B-6 Wheel Bearing Adjustment

2. Remove front wheel.

3. Remove upper ball stud cotter key.

4. Loosen but do not remove ball stud nut. Nut should be loosened not more than 1/8". If ball stud nut is removed, injury could result, since heavily compressed chassis spring will be completely released.

5. Install Tool J-23742-1 between ball stud and turn threaded end of tool until the ball stud is free of steering knuckle. See Figure 3B-7. Remove tool.

6. Place jack under lower control arm at spring seat. Raise jack until compression is relieved on upper control arm rubber rebound bumper.

7. Remove the stud nut and lift upper control arm from knuckle.

8. Place a wood block between the upper control arm and the frame to act as a support during the following operations.

9. Center punch the four rivets, as close to the center as possible.

10. Drill a 1/8" hole through the center of the rivets about 1/2 to 3/4 the length of the rivet.

11. Using a 7/32" drill, enlarge the hole, drilling again about 1/2 the length of the rivet.

12. With a chisel, remove the rivet heads.

13. Using a 3/4" punch and hammer, remove the rivets. Remove ball joint. Care must be used not to hit and damage the ball joint seat and rivet holes in the control arm.

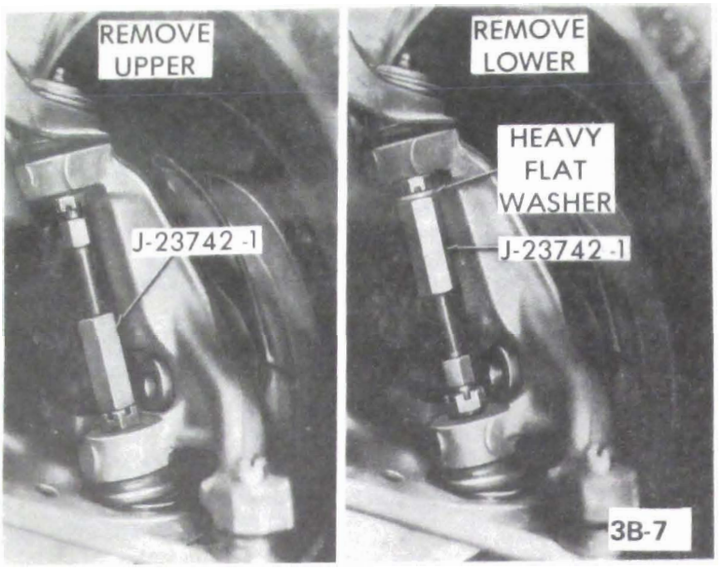


Figure 3B-7 Separating Steering Knuckle from Ball Joints

Installation of Upper Control Arm Ball Joint

An inspection of the tapered holes in the knuckle should be made. If any out-of-roundness, deformation, or damage is noted, the knuckle should be replaced.

1. Install the new ball joint in the upper control arm and attach with the bolt and nut assemblies provided. Insert the bolts from the bottom with the nut on top. Torque to 8 lb ft.

2. Turn tapered stud so cotter pin hole is fore and aft. Remove the wood block from between the arm and the frame, move the knuckle up by jacking under outer edge of spring seat. Knuckle and brake drum assembly should be in a straight-ahead position.

3. Wipe tapered hole in knuckle and tapered stud free of dirt and grease. Check the tapered hole for crakcs or deformation. assemble stud to knuckle with castellated nut. Torque to 50 lb.ft.

4. Never back off nut to align cotter pin holes. *Always tighten nut to next slot that lines up with hole in ball joint stud.*

5. Install new cotter pin.

CAUTION: *This front upper control arm ball joint to steering knuckle 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.*

6. Install wheel and tire and adjust wheel bearing.

Lower Ball Joint Removal

1. Raise front of car and place jack stands under frame side rails. Remove tire and wheel assembly.

2. For safety, place a floor jack under the lower control arm as far outboard on the arm as possible to gain maximum leverage advantage. Do not place the jack against the arm but about 1/2" below. Now remove cotter pin and loosen (do not remove) nut on lower ball joint tapered stud. Nut should be loosened not more than 1/8". If jack is not used and nut is removed, injury could result since heavily compressed chassis spring will be completely released.

3. Install Tool J-23742-1 between ball studs. See Figure 3B-7.

4. Turn the threaded end of J-23742-1 until the ball stud is free of steering knuckle. Remove tool.

5. Place the jack under the lower control arm at the spring seat. Raise the jack until compression is relieved on the upper control arm rubber rebound bumper. Remove the lower ball joint stud nut. Move the steering knuckle out of the way.

6. Install lower ball joint remover and installer as shown in Figure 3B-8.

7. Tighten Detail J-9519-8 with a socket and handle until ball joint is forced out of the lower control arm. Ball joint may pop out suddenly.

Lower Ball Joint Installation

An inspection of the tapered holes in the knuckle should be made every time a ball joint is replaced. If

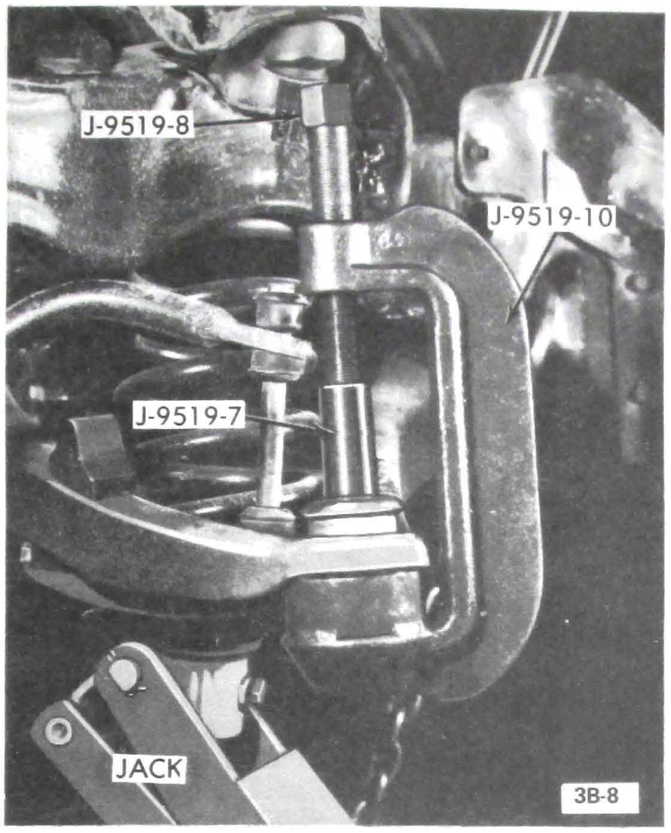


Figure 3B-8 - Lower Ball Joint Remover in Place

any out-of-roundness, deformation or damage is noted, the knuckle should be replaced.

1. Position ball joint in lower control arm and install Tool J-9519 as shown in Figure 3B-9. Position bleed vent in rubber boot of the new ball joint facing inward.

2. With a suitable socket and handle force the ball joint into the lower control arm until it is fully seated.

3. Turn the stud so the cotter pin hole is fore and aft. Knuckle should be in a straight-ahead wheel position. Stud and knuckle hole must be free of dirt and grease before assembly. Inspect tapered hole for cracks or deformaties.

4. Position the tapered stud in the knuckle and install castellated nut. Tighten the nut to 85 lb.ft. Never loosen nut to align cotter pin holes. Always tighten nut to next slot that lines up with hole. Install new cotter pin.

> **CAUTION:** *This front lower control arm ball joint to steering knuckle 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.*

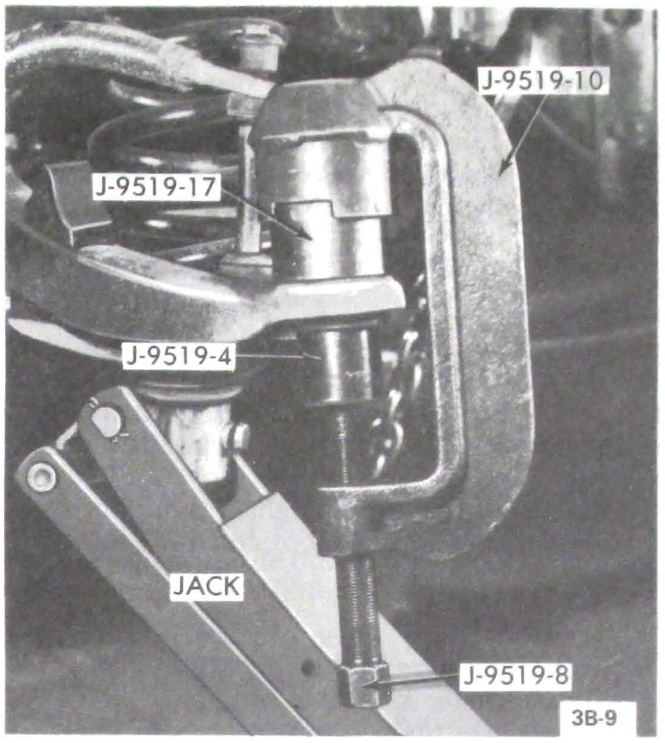


Figure 3B-9 - Lower Ball Joint Installer in Place

5. Install tire and wheel assembly. Adjust wheel bearing. Remove car stand and lower car.

Removal and Installation of Steering Knuckle

It is recommended that the vehicle be raised and supported on a twin-post hoist so that the front coil spring remains compressed, yet the wheel and steering knuckle assembly remain accessible. If a frame hoist is used, support the lower control arm with an adjustable jack stand to retain spring in the curb height position.

1. Raise vehicle on a hoist and support the lower control arm.

2. Remove the wheel and tire assembly.

3. Remove the brake caliper and brake disc. Hang the brake caliper assembly from some part of the suspension assembly. Do not allow the unit to hang by the hydraulic line.

4. Remove the splash shield.

5. Remove upper and lower ball stud cotter pins and partially unscrew the ball stud nut so that it protects the end of the ball stud.

6. Place Tool J-23742 in position and force ball studs

from steering knuckle tapered hole. Loosen the upper and lower ball stud from the knuckle separately. See Figure 3B-7.

7. The upper control arm will swing up, allowing the upper ball joint stud to come free. The steering knuckle can then be lifted from the lower ball stud.

Installation of Knuckle

1. Place steering knuckle into place on lower ball stud. Swing the upper control arm down and position the upper ball stud in the tapered knuckle hole.

2. Install ball stud nuts and tighten to specifications. If necessary, tighten one more notch to aligh cotter pin.

> **CAUTION:** *The upper and lower control arm ball joint to steering knuckle fasteners 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 of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.*

3. Install the splash shield and hub and rotor assembly.

4. Install outer bearing and spindle washer and nut. Adjust the bearing.

5. Install the brake caliper and tire wheel assembly.

6. Lower the vehicle to the floor.

REMOVAL AND INSTALLATION OF UPPER CONTROL ARM ASSEMBLY

Removal

1. Raise car with jack under frame. Remove wheel and tire.

2. Remove cotter pin from castellated nut on upper ball joint tapered stud.

3. Loosen, but do not remove nut. Force of chassis spring will be tending to disengage ball joint tapered stud from steering knuckle using Tool J-23742-1. See Figure 3B-7. If ball stud nut is removed, injury could result since heavily compressed chassis spring will be completely released.

4. With another jack, support car weight under outer edge of lower control arm. Raise jack until compression is relieved on upper control arm bumper and remove castellated nut from ball joint tapered stud.

5. Wire brake and knuckle assembly in place to prevent damage to the brake hose, and rotate upper control arm upward and away from knuckle.

6. Remove the upper control arm shaft to frame bracket nuts, carefully noting the number, location, and thickness of adjusting shims between the shaft and frame bracket. Remove the control arm assembly. Remove rebound rubber bumper from arm.

7. Inspect stud hole in knuckle. If elongated or damaged, replace knuckle.

Installation

> **CAUTION:** *Fasteners in steps 1, 2, and 3 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. Assemble upper control arm and shaft assembly to bracket, making certain the number, thickness and location of adjusting shims between shaft and bracket are correct. Assemble rubber rebound bumper to arm. Torque shaft to bracket nuts to 75 lb.ft. Those bolts may be torqued from within the engine compartment through the use of a standard 11/16"-1/2" drive socket and J-1313 Torque Wrench or its equivalent.

2. Make sure stud and tapered hole in knuckle are free of dirt and grease. Inspect tapered hole for cracks or deformations. Spindle should be in a straight-ahead wheel position when the stud is inserted. Assemble tapered stud to knuckle with cotter pin holes fore and aft. Install castellated nut. Torque to 35 lb.ft. *Never loosen nut to align cotter pin holes. Always tighten nut to next slot that lines up with hole.* Install new cotter pin.

3. With car at curb load, loosen upper control arm bushing to shaft bolts and bounce front end of car. Retorque bolts to 35 ft.lbs.

4. Install wheel. Check and adjust front end alignment. Adjust wheel bearings. When working in the area of the front upper control arm, make certain that the rubber water deflectors on fender skirt are

securely attached in their original positions when the work is completed. If reasonable care is exercised in removing the fasteners for these rubber deflectors, they may be satisfactorily reused.

REMOVAL AND INSTALLATION OF LOWER CONTROL ARM ASSEMBLY

Removal

1. Remove coil spring and stabilizer link.

2. Remove ball stud from steering knuckle.

3. Remove two nuts and bolts securing control to frame.

4. Remove the control arm from vehicle.

5. If lower control arm is to be replaced, remove the rubber bumper and attaching nut.

Installation

1. Install new arm assembly with the arm to frame bolt head to the front of car. Install rubber side bumper to arm. Torque to 17 lb.ft. Make sure bolts point to rear of car.

2. Reinstall coil spring and stabilizer link.

3. With the car at curb load, tighten the control arm to frame attaching bolt nuts to 100 lb.ft. This operation must be done with the car off the hoist and at curb weight. If the nuts are torque while the car is still on the hoist and the suspension is in an unloaded position, the bushings will be stressed when the car is finally lowered and suspension takes a loaded position.

> **CAUTION:** *This front lower control arm to frame 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.*

4. Check and adjust front end alignment.

REMOVAL AND INSTALLATION OF UPPER CONTROL ARM BUSHINGS

Removal

1. Raise car with jack under frame. Remove wheel and tire.

2. Remove cotter pin from castellated nut on upper ball joint tapered stud.

3. Loosen, but do not remove nut. If ball stud is removed, injury could result since heavily compressed chassis spring will be completely released.

4. Install Tool J-23742-1 between ball stud and turn threaded end until the ball stud is free of steering knuckle. See Figure 3B-7.

5. With another jack, support car weight under outer edge of lower control arm. Raise jack until compression is relieved on upper control arm bumper and remove castellated nut from ball joint tapered stud.

6. Wire brake and knuckle assembly in place to prevent damage to the brake hose, and rotate upper control arm upward and away from knuckle.

7. Remove the upper control arm shaft to frame bracket nuts, carefully noting the number, location, and thickness of adjusting shims between the shaft and frame bracket. Remove the control arm assembly.

8. Using Special Tools J-22269-5 and J-5888-3 and one of the support shaft bolts as shown in Figure 3B-10, tighten Tool J-22269-5 sufficiently to insert Special Tool J-23514-1 onto shaft.

9. Turn control arm around and install Tool J-22269-5 over J-23514 as shown in Figure 3B-11 and tighten screw against J-5888-3 to remove bushing.

10. To remove bushing from other side, install Special Tools J-5888-3 and J-22269-5 as shown in Figure 3B-12 and turn forcing screw until bushing is pushed out.

Installation

1. Install first bushing with Special Tools J-22269-5, J-5888-3 and J-23514-2 as shown in Figure 3B- 13.

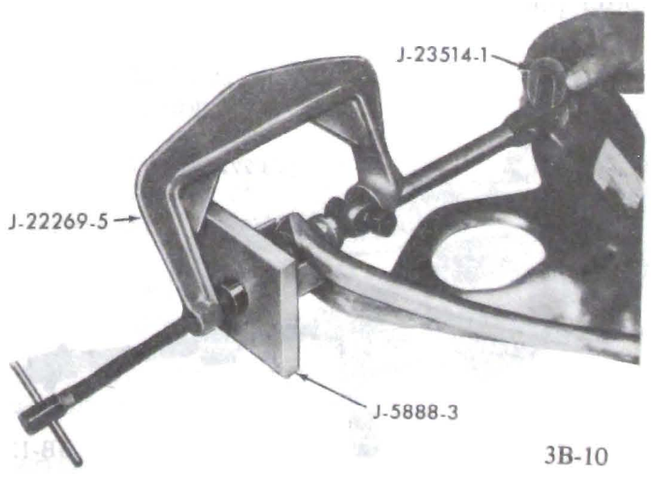


Figure 3B-10

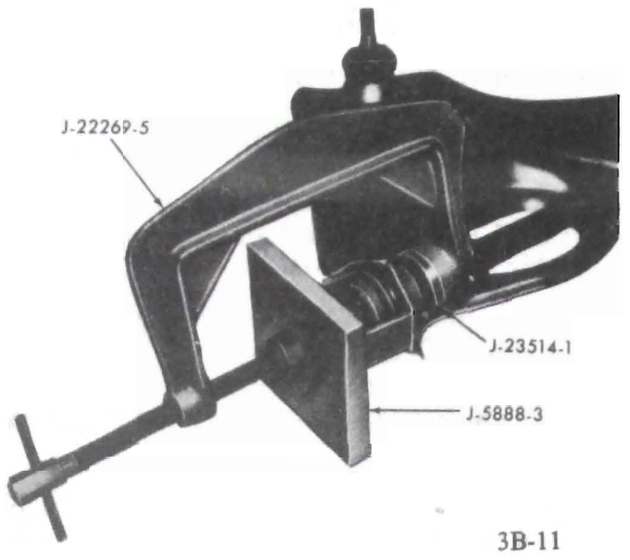


Figure 3B-11

2. Install the support shaft and bushing on the other side of the control arm with Special Tools J-22269-5 and Adapter J-23514-2 as shown in Figure 3B-14. Mounting surface of shaft shouls be in same realtive position to arm as when removed.

3. Assemble upper control arm and shaft assembly to bracket, making certain the number, thickness and location of adjusting shims between shaft and bracket are correct. Assemble rubber rebound bumper to arm. Torque shaft to bracket nuts to 75 lb.ft. Those bolts may be torqued from within the engine compartment through the use of a standard 11/16"-1/2" drive socket and J-1313 Torque Wrench or its equivalent.

4. Make sure stud and tapered hole in knuckle are free of dirt and grease. Inspect tapered hole for defects. Spindle should be in a straight-ahead wheel position when the stud is inserted. Assemble tapered stud to knuckle with cotter pin holes for and aft. Install castellated nut. Torque to 35 lb.ft. Never loosen nut to align cotter pin holes. Always tighten nut to next slot that lines up with hole. Install new cotter pin.

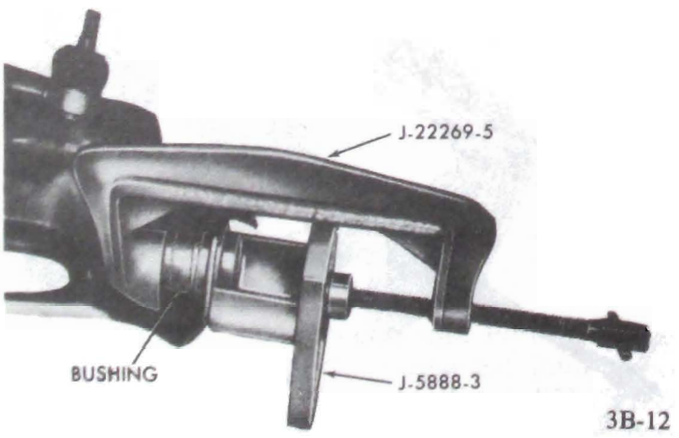


Figure 3B-12

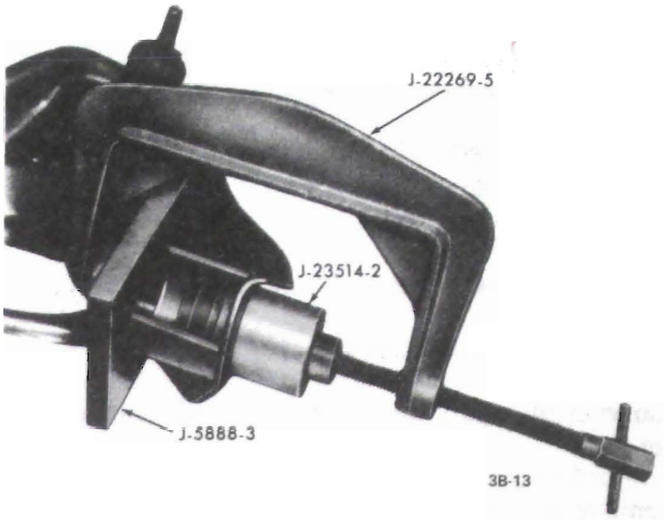


Figure 3B-13

5. With car at curb load, loosen upper control arm bushing to shaft bolts and bounce front end of car. Retorque bolts to 35 ft.lbs.

6. Install wheel.

7. Check and adjust front end alignment.

REMOVAL AND INSTALLATION OF LOWER CONTROL ARM BUSHINGS

Removal

1. Raise car with jack under frame.

2. With the vehicle supported by the frame so that the control arms hang free, remove the lower shock absorber bolts and push the shock absorber up through the coil spring.

3. Remove the front stabilizer rod link from the lower control arm.

4. Position Tool J-23028 to a suitable jack and place under lower control arm bushing so that bushings seat in the grooves of the tool. See Figure 3B-15.

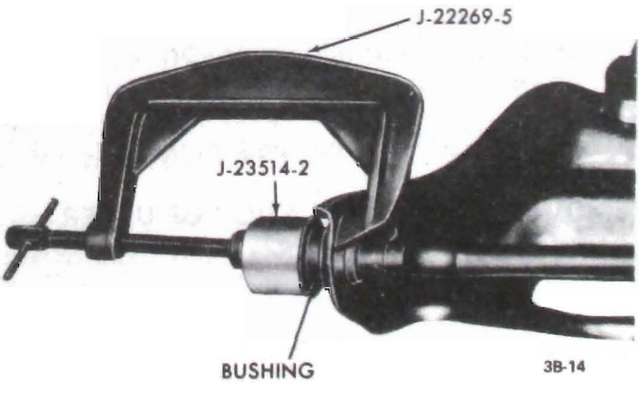


Figure 3B-14

Figure 3B-15

5. Install a chain around the control arm and through a coil of the spring as a safety measure.

6. Remove the control arm pivot bolts and nuts. (Remove rear bolt first).

NOTE: *If bolts "hang-up" between control arm, and frame, use a pry bar to move the control arm so that bolts can be removed. Do not "hammer" bolts out.*

7. Lower control arm by slowly releasing jack.

8. Install J-21474-12 spacer.

NOTE: *Do not attempt to remove bushing without having the spacer in position. Distortion to the arm will result.*

See Figure 3B-16.

9. Install remaining tools as shown in Figure 3B-16 and turn hex bolt and nut until the old bushing is removed.

10. Remove tools and discard bushing.

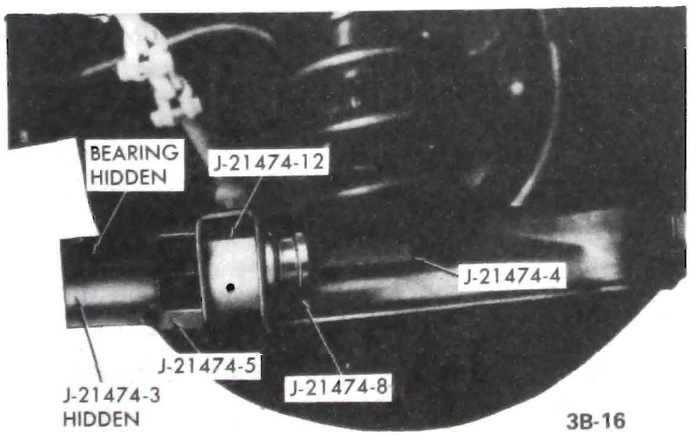


Figure 3B-16

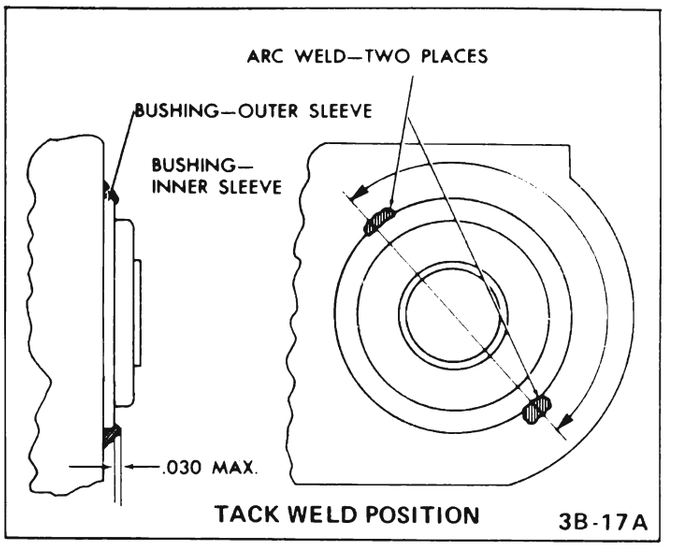


Figure 3B-17A

Installation

1. Start a new bushing in place and position tools as shown in Figure 3B-17.

NOTE: *Spacer J-21472-12 should still be in position.*

2. Turn hex bolt and nut until new bushing is properly seated.

3. Remove tools.

4. After installing a new bushing it will be necessary to tack weld the front bushing to the control arm. See Figure 3B-17A.

NOTE: *: ARC WELD ONLY. Heat transmitted by acetylene welding could result in damage to the bushing. Weld build-up must not exceed .030 inch above the face of the bushing outer sleeve.*

Excessive weld bead should be ground off to the required dimension.

CAUTION: *: Eye protection must be worn when breaking the tack welds and again during the welding operation.*

5. Position Tool J-23028 under bushings and install control arm to vehicle frame.

6. Install pivot bolts (front bolt first) and nuts and torque nuts to 100 ft.lbs. Remove safety chain.

NOTE: *: Mandatory installation of pivot bolts is in direction from front to rear. The bolt heads will be to the front of the vehicle.*

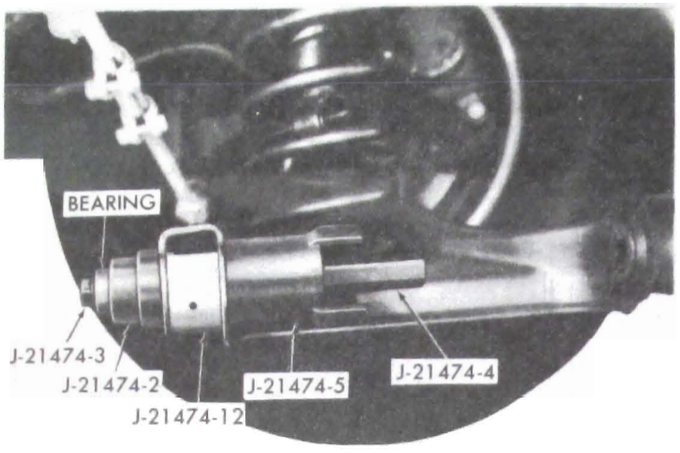


Figure 3B-17

7. Pull shock absorber lower and through the lower control arm and install mounting bolts. Torque bolts to 20 ft.lbs.

8. Install stabilizer rod link and torque nut to 12 lb.ft.

9. Lower jack and remove Tool J-23028.

10. Lower vehicle to floor.

11. Check and adjust front end alignment.

REMOVAL AND INSTALLATION OF FRONT SPRING

Removal

1. Raise front of car and support solidly with a car stand under the frame side rail on the side where the spring removal is to be performed.

2. Remove wheel and hub assembly.

3. Remove upper shock absorber attaching nut, grommet retainer and grommet. Remove the shock absorber lower retaining screws and lower shock trhough the hole in the lower control arm.

4. Remove the front stabilizer rod link from the lower control arm.

5. Remove tie rod.

6. Remove control arm bumper.

7. As a safety precaution place a floor jack under the lower control arm as far outboard as possible to gain maximum leverage advantage.

Do not place the jack against the arm, but about 1/2 inch below. Now remove the cotter pin and *LOOSEN, DO NOT REMOVE* the nut on the lower ball joint tapered stud. The nut should be loosened not more than 1/8".

8. Install Tool J-23742-1 between ball studs and turn threaded end of Tool J-23742-1 until ball stud is free of steering knuckle. See Figure 3B-7.

9. Raise the jack against the control arm to relieve pressure on the nut, remove the nut and separate the steering knuckle from the tapered stud.

10. Carefully lower the jack supporting the lower control arm to release the spring. With the jack all the way down to the floor it still may be necessary to pry the spring off its seat on the lower control arm with long pry bar. Caution should be exercised in handling this preloaded spring while it is still installed in the car. Care should be taken so the spring, when removed, does not damage the ball joint stud or seal.

11. Inspect stud and hole in knuckle. If stud is damaged or hole in knuckle is elongated, replace the necessary parts.

Installation

1. Position spring in upper seat with lower spring resting on lower control arm.

2. Raise lower control arm with jack and connect lower ball joint to steering knuckle. Do not tighten.

3. Lower jack so that control arm hangs free and install shock (lower mountings). Tighten screws to 20 lb.ft.

> **CAUTION:** *Fasteners in Steps 4, 5, 6, 7, 8, and 9 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 of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.*

4. Raise lower control arm with jack and torque lower ball joint nut to 95 lb.ft.

5. Install stabilizer link to control arm and torque nut to 12 lb.ft. See Figures 3B-18 and 3B-19.

6. Install tie rod end to knuckle and torque to 35 lb.ft.

7. Install lower control arm rubber bumper and torque nut to 17 lb.ft.

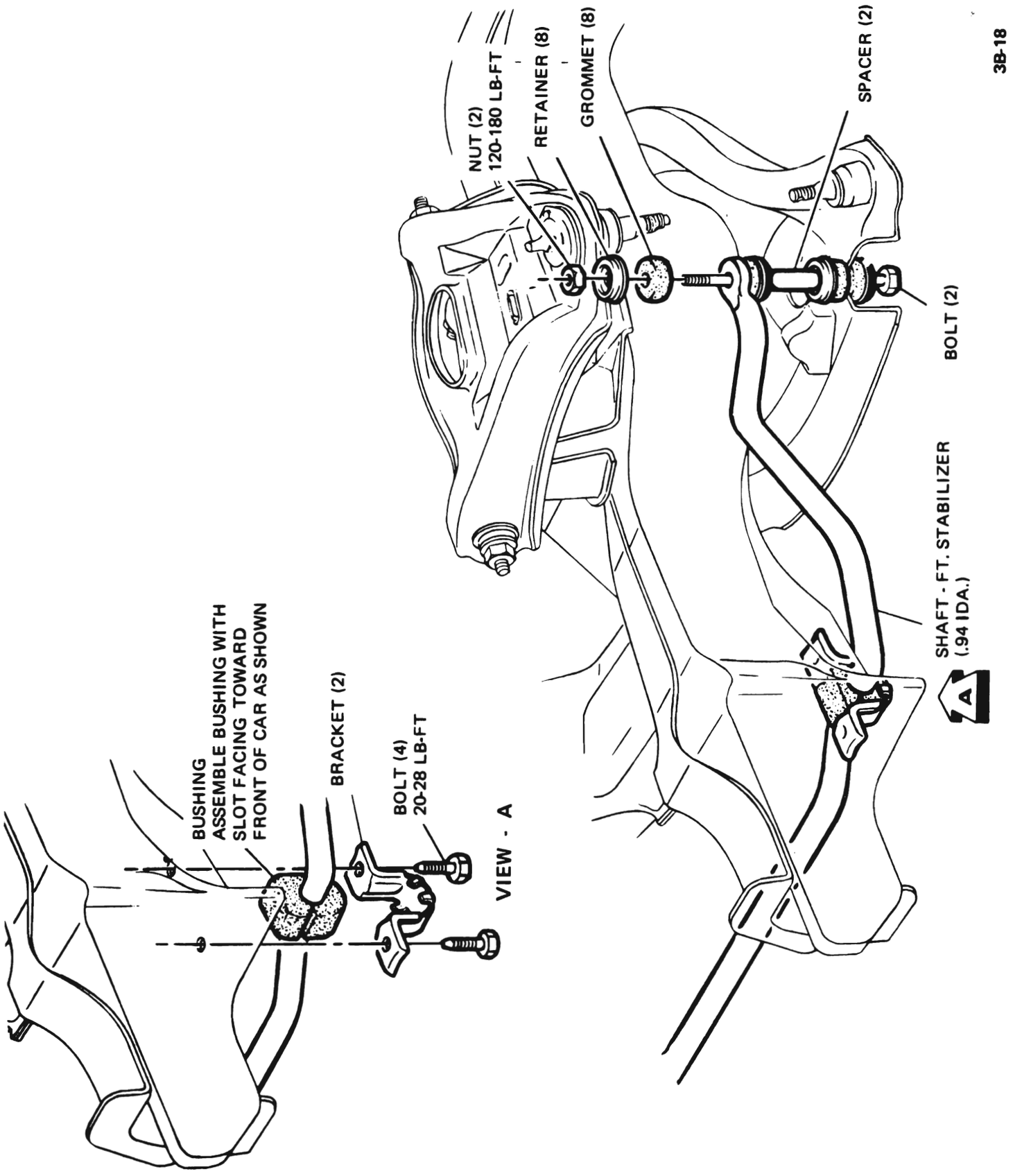
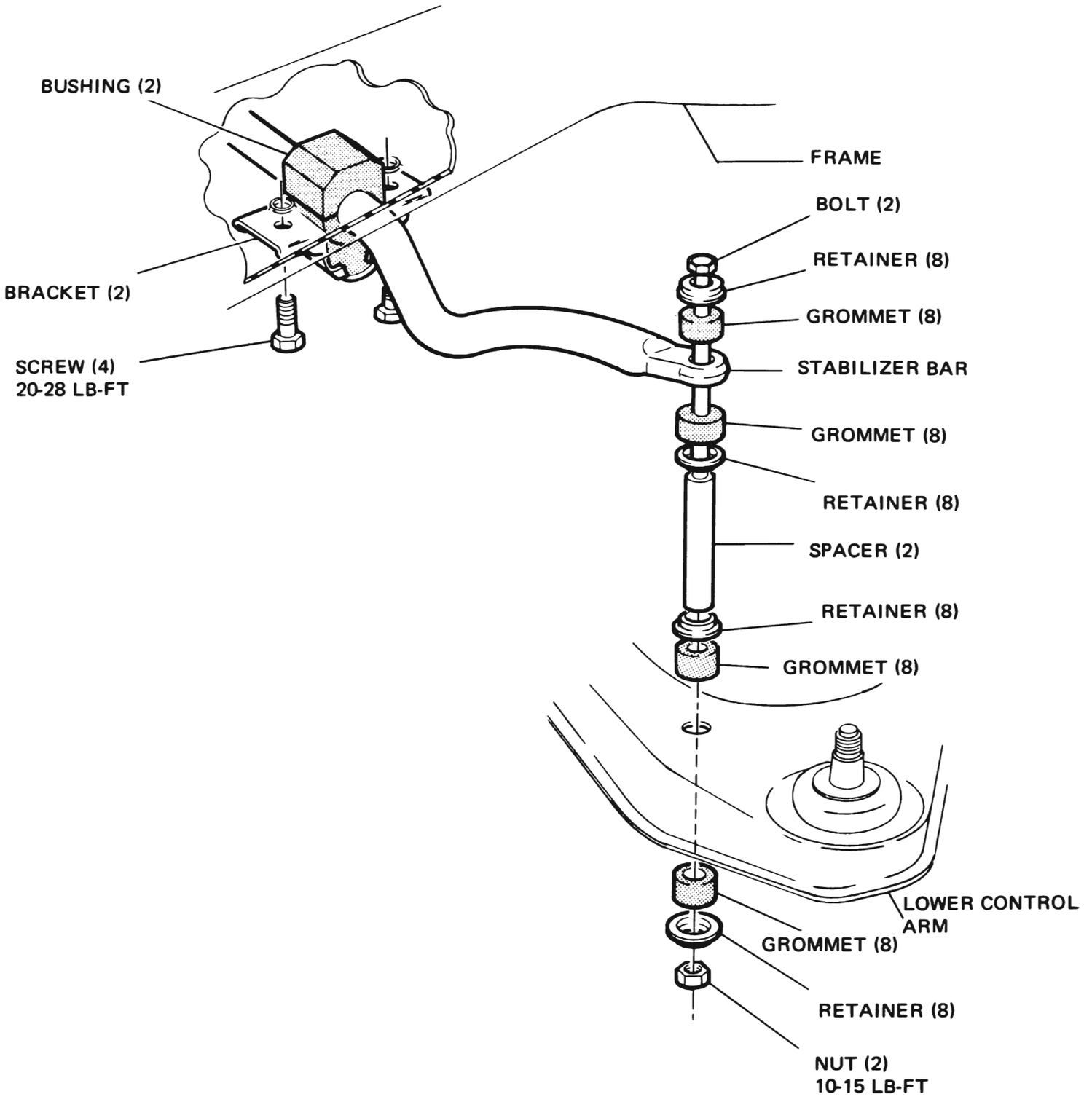


Figure 3B-18 - "A" Series Stabilizer Link Installation



3B-19

Figure 3B-19 B-C-E Stabilizer Link Installation

8. Install shock absorber upper nut and torque to 8 lb.ft.

9. Install wheel. Torque to 75 lb.ft.

10. Lower jack and remove. Recheck and adjust toe-in.

REMOVAL AND INSTALLATION OF SHOCK ABSORBERS

Removal

1. Remove upper shock absorber attaching nut, grommet retainer and grommet.

2. Remove the lower retaining screws. Lower shock through hole in lower control arm.

Installation

1. Select the correct shock absorber for the particular car model. Refer to Master Chassis Parts Catalog for correct absorber. Substitution of an incorrectly calibrated shock absorber will adversely affect car performance.

2. Assemble lower grommet retainer and grommet on shock stem. Extend shock and install through lower control arm. With shock upright in vise, push and pull shock rod thrugh its full travel several times to pump out any air which might be trapped in the inner cylinder. Keep shocks upright until installed. It is a good idea to replace the shock absorber rubber grommets whenever a shock is removed or replaced.

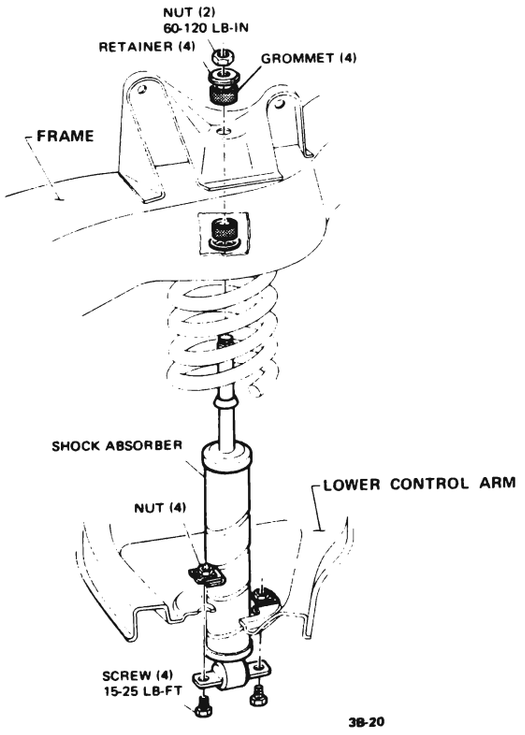


Figure 3B-20 - Typical Shock Absorber Mounting Details

3. Install shock, lower attaching screws. Torque to 20 lb.ft.

4. Assemble top grommet, grommet retainer, and nut on stem. Torque to 8 lb.ft.

REMOVAL AND INSTALLATION OF STABILIZER BAR

CAUTION: *Stabilizer bar fasteners 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.*

Stabilizer Shaft, Removal and Replacement

Disconnect stabilizer links and disconnect the two frame-to-shaft insulator mounts and brackets. See Figures 3B-18 and 3B-19.

To install, position insulator mounts and brackets over shaft and connect bracket to frame.

Torque bracket bolts to 24 lb.ft. Connect stabilizer links subparagraph c below. Do *not* lubricate insulator mounts.

Stabilizer Bracket and Insulator, Removal and Replacement

Stabilizer brackets should be replaced if damaged, and rubber insulator mounts replaced if deteriorated.

Replace by supporting stabilizer shaft in position and replacing brackets and mounts one at a time. Torque bracket bolts to 24 lb.ft.

Stabilizer Link Removal and Replacement

1. Remove nut from lower end of link. Remove link, spacer, retainers and grommets.

2. Inspect link and grommets.

3. Install grommets dry and use care to center the grommets in the seats on stabilizer shaft and hole in control arm. Also, center the retainers on grommets before tightening link nut.

4. Tighten link nut to 12 lb.ft.

SPECIFICATIONS

BOLT TORQUE SPECIFICATIONS

Use a reliable torque wrench to tighten the parts listed to insure 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.

Parts	Location	Torque Lb.Ft.
Screws	Front Shock to Lower Control Arm	20
Nut	Front Shock to Frame	8
Screw	Stabilizer Bushing to Frame	24
Nut and Bolt	Upper Control Arm Shaft to Frame	Nut 75
Nut	Upper Ball Joint to Knuckle	50
Nut and Bolt	Front Lower Control Arm to Frame	Nut 100
Nut	Lower Ball Joint to Knuckle	95
Nut and Bolt	Stabilizer Link to Lower Control Arm	Nut 12
Nut, Bolt and Washer	Idler Arm to Frame	Bolt 65, Nut 35
Nut	Tie Rod End to Steering Knuckle	35
Nut	Lower Rubber Bumper to Lower Control Arm	17

3B-25 DIMENSIONAL SPECIFICATIONS

Stabilizer Bar Lower Series Standard ..... 7/8"
Stabilizer Bar Lower Series Heavy Duty ..... 15/16"
Stabilizer Bar Diameter LeSabre, Electra ..... 13/16"
Stabilizer Bar Diameter Estate Wagon, Centurion, Riviera ..... 27/32"
Steering Knuckle Spindle Bearing Diameter
- Large End 1.3743-1.3748
- Small End ..... .873B-.8435

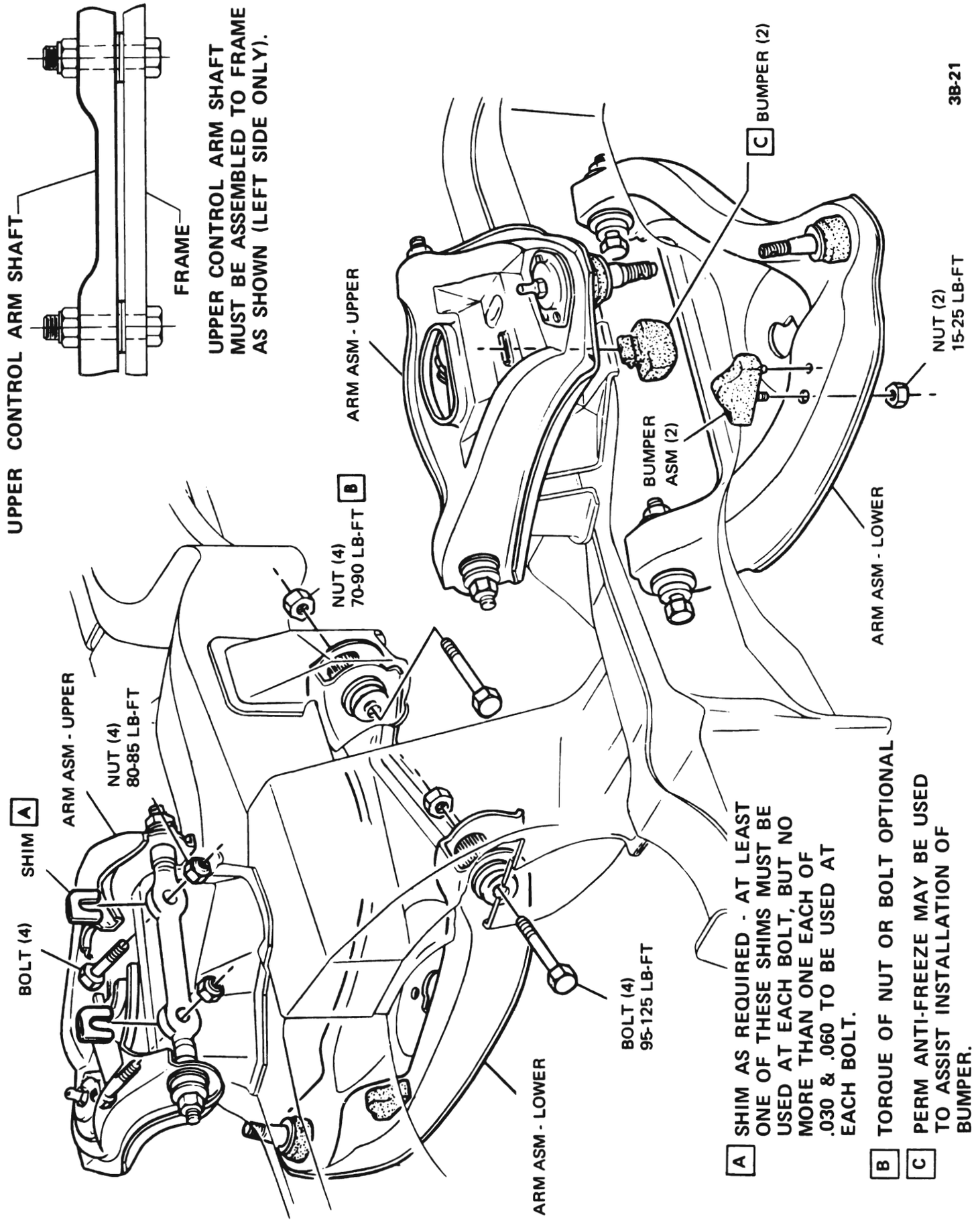


Figure 3B-21 "A" Series Front Suspension Details

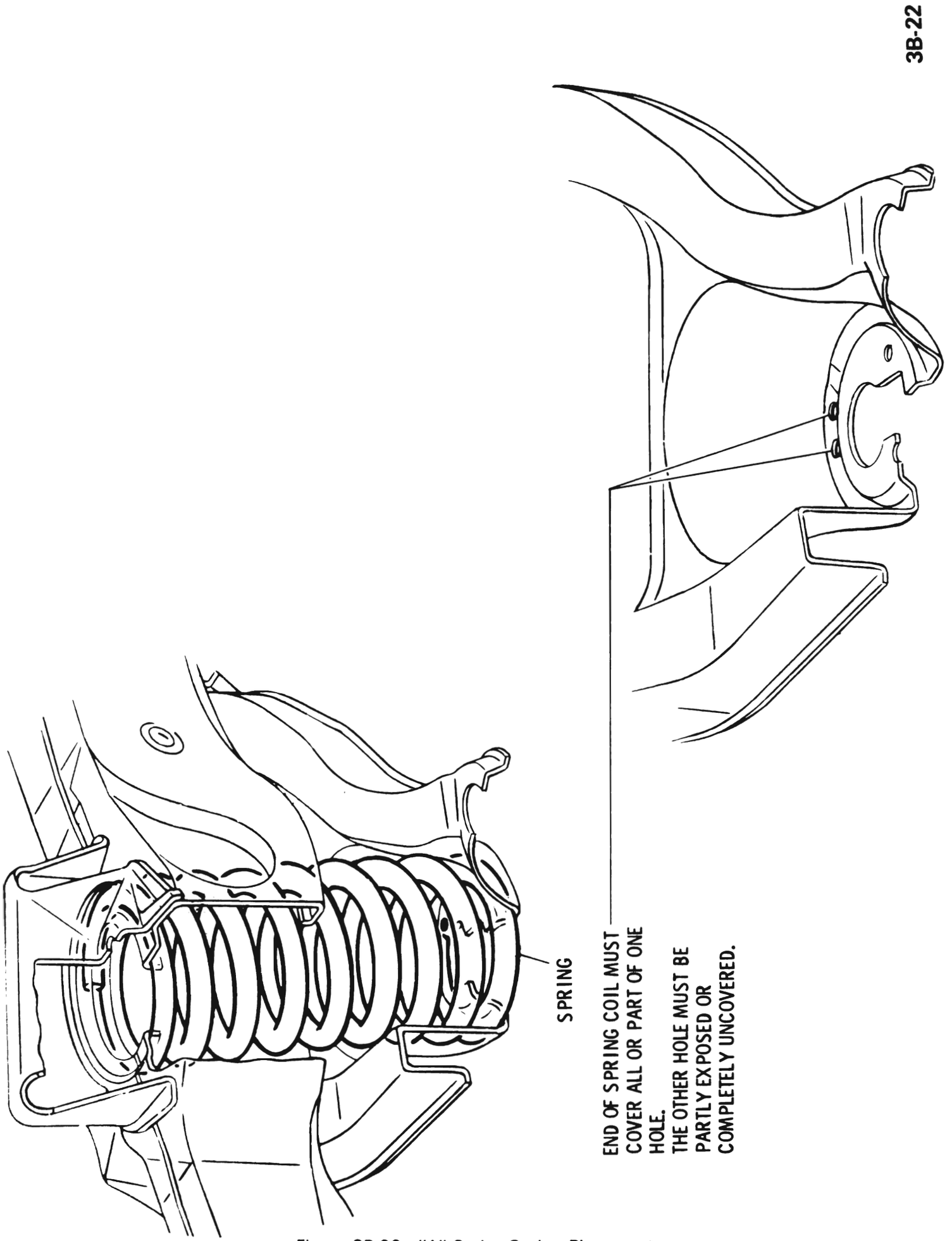


Figure 3B-22 - "A" Series Spring Placement

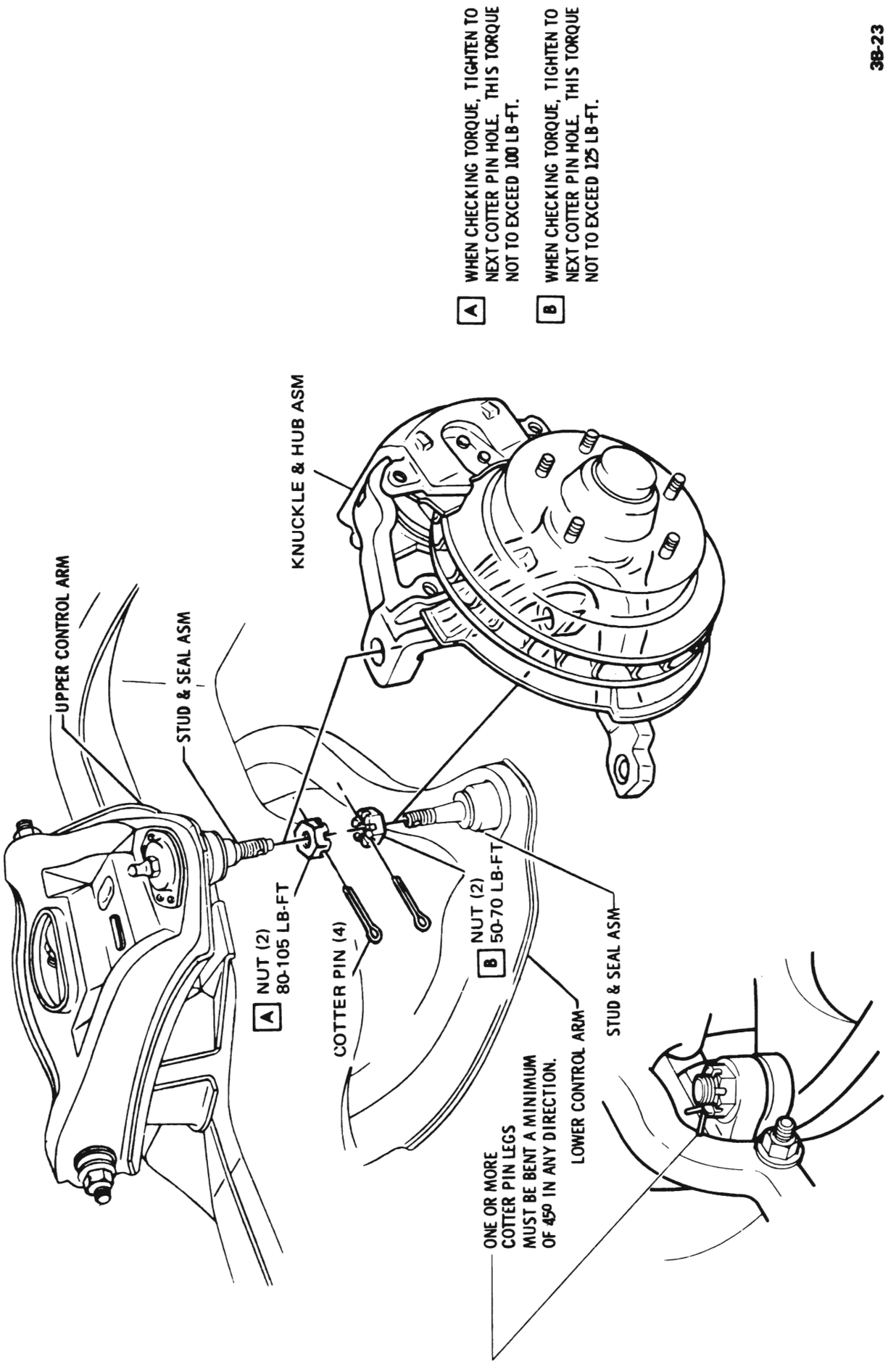


Figure 3B-23 - "A" Series Steering Knuckle

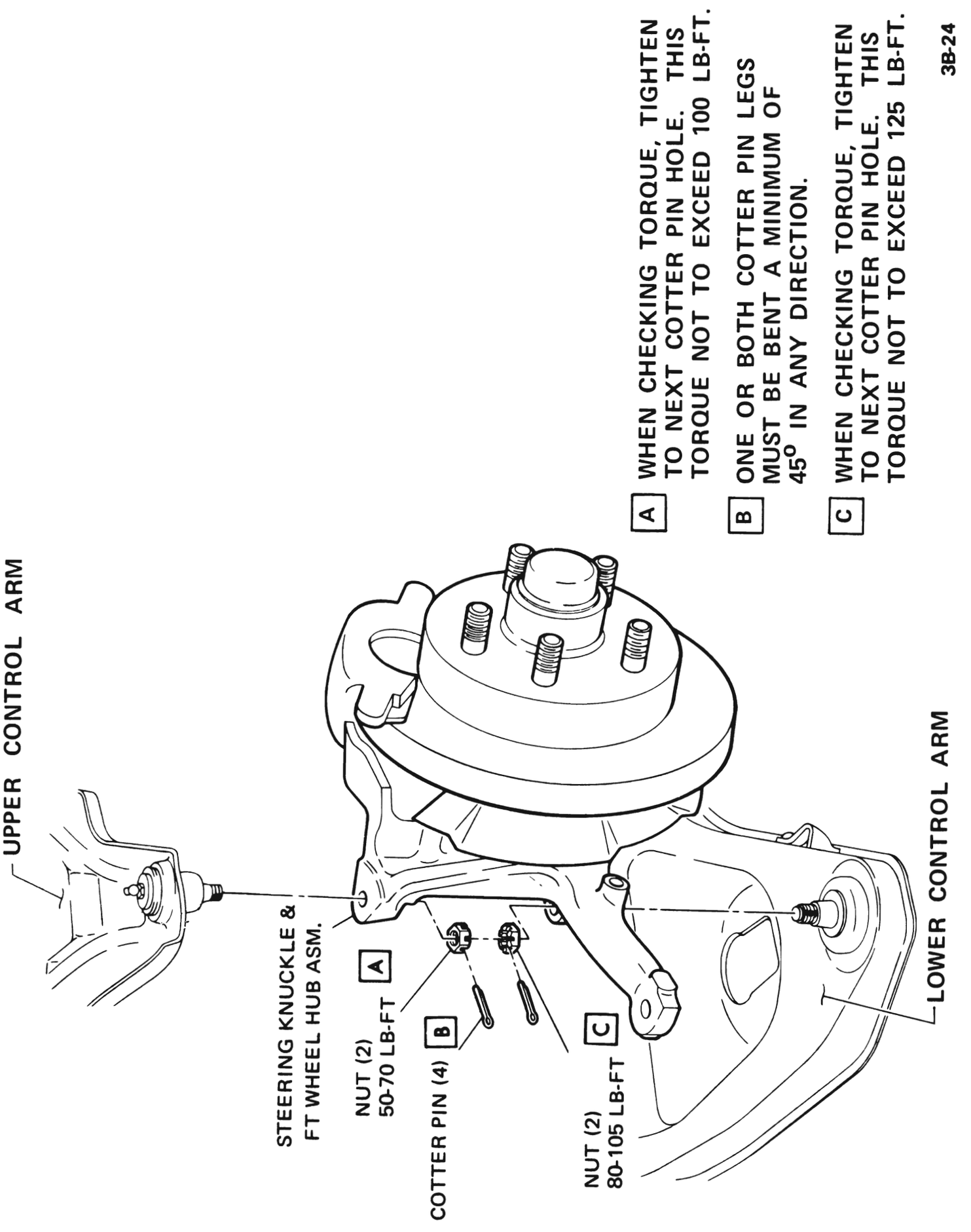


Figure 3B-24 "B-C-E" Series Steering Knuckle

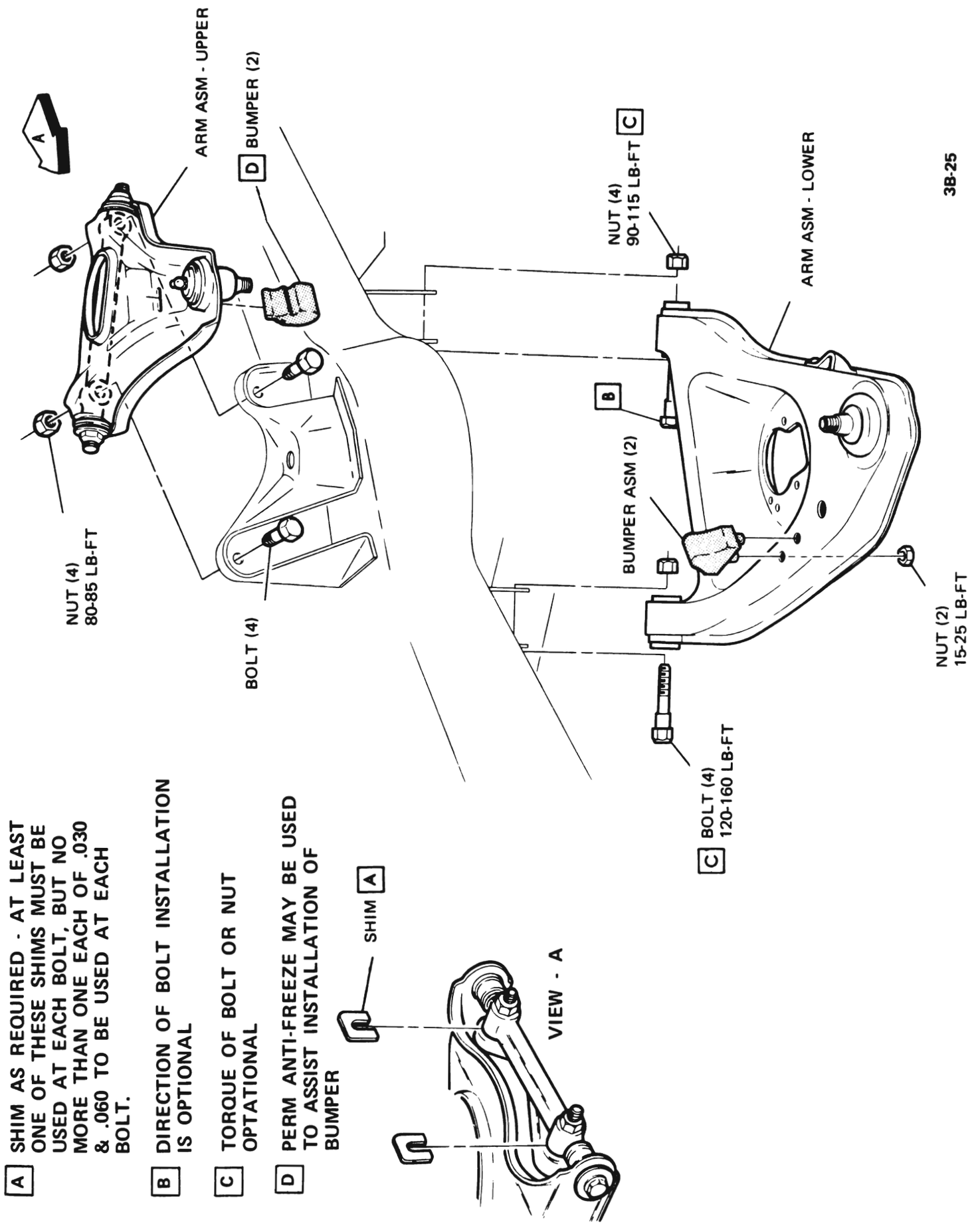
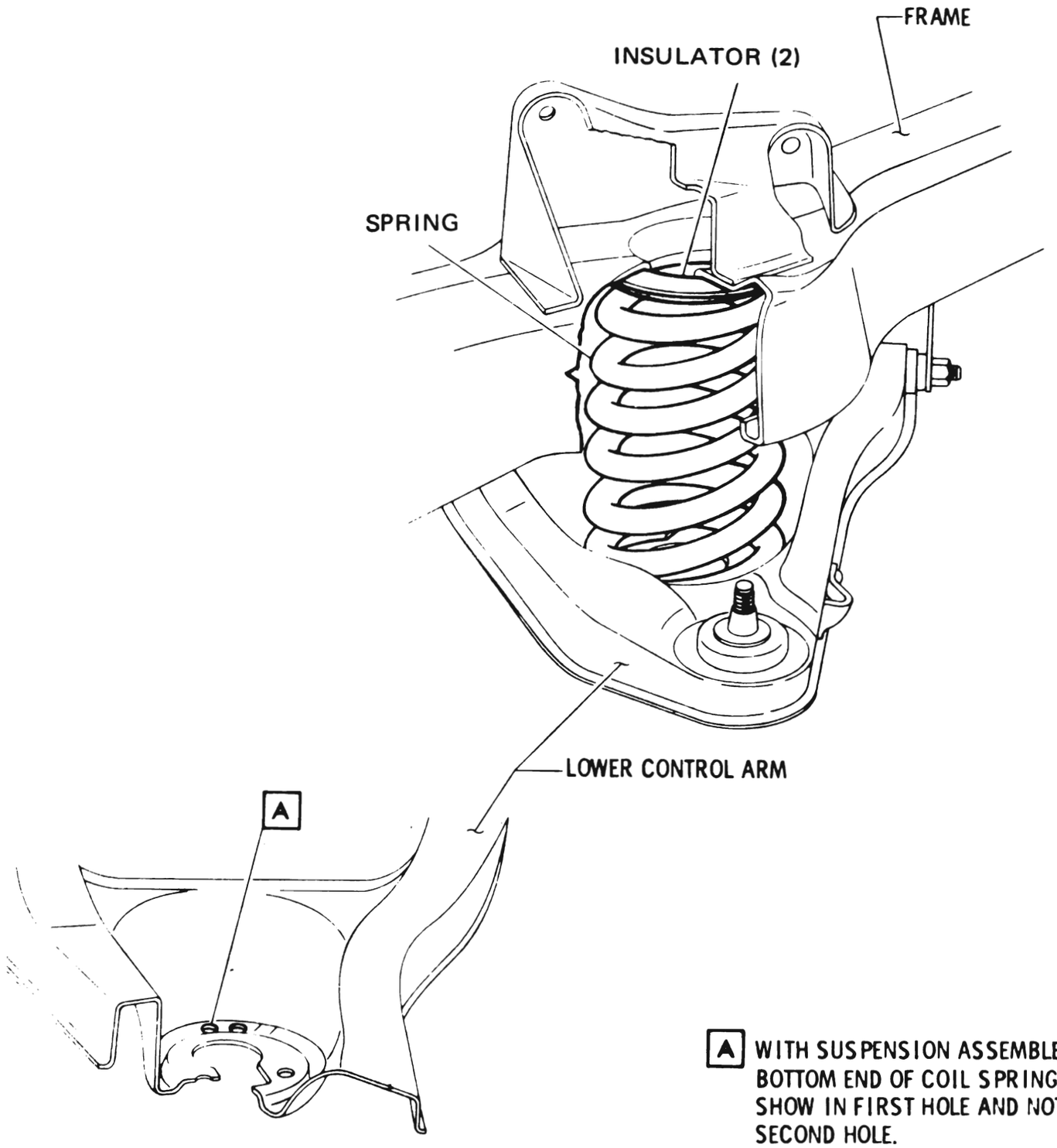


Figure 3B-25 "B-C-E" Series Control Arm Installation



A WITH SUSPENSION ASSEMBLED, THE BOTTOM END OF COIL SPRING MUST SHOW IN FIRST HOLE AND NOT COVER SECOND HOLE.

3B-26

Figure 3B-26 "B-C-E" Spring Placement