

## SECTION 7-C

### SERVICE, ADJUSTMENT, INSTALLATION PROCEDURES— CHASSIS SUSPENSION

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### 7-9 TIRE SERVICE AND INSPECTION

#### a. Tire Inflation and Inspection

Maintenance of correct inflation pressure in all tires is one of the most important elements of tire care. Correct tire pressure is also of great importance to ease of handling and riding comfort. Overinflation is detrimental to tire life but not so much as underinflation. Inflate all tires as specified in paragraph 1-2.

All tires should be inspected regularly to avoid abnormal deterioration from preventable causes. If tires show abnormal or uneven wear the cause should be determined and correction should be made.

#### b. Tubeless Tire Repairs

After removal of puncturing object a small puncture may be

sealed without removal of tire from wheel by injecting sealing dough with a gun. Larger punctures may be sealed by installation of a rubber plug with cement, after tire has been removed from wheel. Sealing dough with gun, and rubber plugs with cement are contained in tire repair kits available through tire dealers. These materials should be used as directed in the instructions supplied with the kits. If a puncture is unrepairable or there is other damage to the tire carcass, repairs should be made by authorized tire dealers in accordance with instructions of the tire manufacturer.

#### c. Wheel Leaks

Examine rim flanges for sharp dents and straighten, if necessary. The rim flanges should be thoroughly cleaned with No. 3 coarse steel wool, thereby removing all oxidized rubber, soap solution, etc.

In isolated cases loss of air may result from loose rivets or porous welds. If the leak is minute and the rivet is not perceptibly loose, the leak can be sealed with a cement available from tire manufacturers for this purpose. If the rivet is noticeably loose or the air leak is large, replace the wheel.

**CAUTION:** Under no condition should loose rivets or porous welds be brazed, welded or peened.

#### d. Demounting and Mounting of Tubeless Tire

When demounting a tubeless tire use care to avoid damaging the rim-seal ridges on tire beads. **DO NOT USE TIRE IRONS TO FORCE BEADS AWAY FROM WHEEL RIM FLANGES.**

When tire is removed, inspect it carefully to determine whether loss of air was caused by puncture or by improper fit of beads

against rim flanges. If improper fit is indicated, check wheel as follows:

1. Straighten wheel rim flanges if bent or dented.
2. Clean rims thoroughly, using No. 3 course steel wool, to remove all oxidized rubber, soap solution, etc. Remove rust with wire brush.
3. Inspect butt weld and other areas of rim contacted by tire beads, to make certain there is no groove or high spot. Remove any groove or high spot by filing smooth.
4. Inspect valve stem and replace it if damaged. Make certain that valve stem is properly installed to provide an air tight joint.

Before mounting a tubeless tire on a wheel, moisten a cloth with mounting compound or soap solution and wipe rim-seal ridges of both beads to remove all foreign substances.

Moisten base of both beads with mounting compound or soap solution to help beads snap into place when tire is inflated. Start tire over rim flange at point opposite valve stem. Align balance mark on tire with valve stem.

Inflate tire until both beads are firmly seated against rim flanges and temporarily inflate to 50 pounds pressure. Leak test wheel and tire assembly and if satisfactory, reduce to recommended pressure.

#### e. Interchanging Tires

Tires tend to wear unevenly and become unbalanced as mileage accumulates. Uneven tire wear is frequently the cause of tire noises which are attributed to rear axle gears, bearing, etc., and work is sometimes needlessly done on rear axles in an endeavor to correct the noise.

Tire life will be increased and uneven wear and noise will be less likely to occur if the tires, including the spare are balanced and interchanged at regular intervals of approximately 6000 miles. The recommended method of interchanging tires is shown in Figure 7-7.

#### f. Use of Tire Chains

Do not use tire chains on the front wheels under any circumstances because they will interfere with the steering mechanism. Any of the conventional full-type non-skid tire chains can be used on the rear wheels if the car is equipped with 6.50 x 13 tires. However, on Specials equipped with 6.00 x 15 tires, due to the closeness of the rear of the right rear fender to the tire, the use of full tire chains or unit chains should be for emergency use only. The car should not be driven over 25 MPH and chain tighteners should be used. When driving over 25 MPH, the chains will strike the fender and will eventually cause damage.

Tire chains should be loose enough to "creep" but tight enough to avoid striking fenders

or other parts. If chains remain in one position, the tire side wall will be damaged. Tension springs (either metal coil springs or the rubber band type) must also be used in order to prevent chains contacting frame, etc. The use of tension springs will also reduce ordinary chain noise caused by loose cross links contacting pavement.

#### g. Wheel and Tire Balance

Wheel and tire balance is the equal distribution of the weight of the wheel and tire assembly around the axis of rotation. Wheel unbalance is the principal cause of tramp and general car shake and roughness, and contributes somewhat to steering troubles.

The original balance of the tire and wheel assembly may change as the tire wears. Severe acceleration, severe brake applications, fast cornering and side slip wear the tires out in spots and often upset the original balance condition and make it desirable to rebalance the tire and wheel as an assembly. Tire and wheel assemblies should be rebalanced after punctures are required.

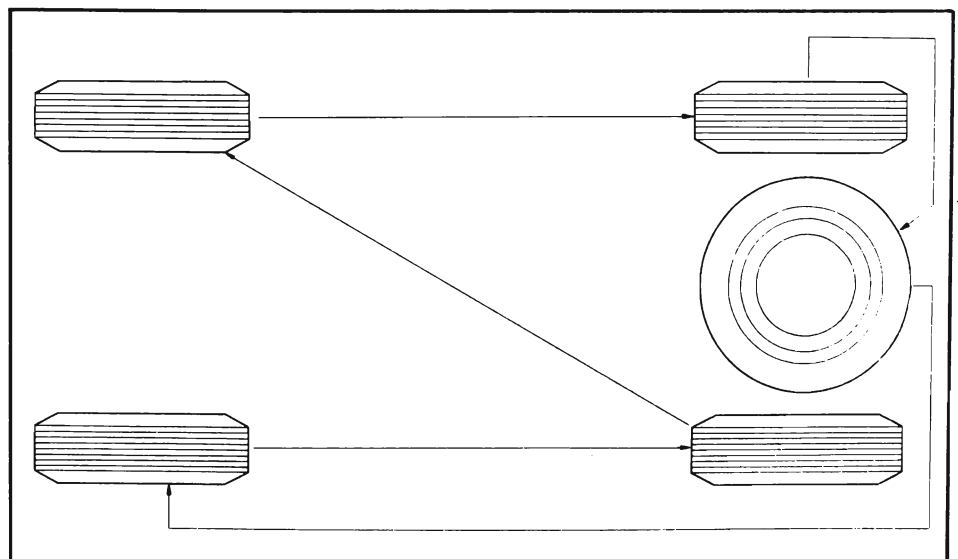


Figure 7-7—Method of Interchanging Tires

Because of the speed at which cars are driven, it is important to test the wheel and tire assembly for dynamic balance. Dynamic balancing of a wheel and tire assembly must be done on a machine designed to indicate out of balance conditions while the wheel is rotating. Since procedures differ with different machines, the instructions of the equipment manufacturer must be carefully followed.

In some cases wheel and tire balance does not always overcome wheel balance complaints because the brake drums themselves are out of balance. Balancing drums with wheels and tires as an assembly is not always satisfactory because the balance is destroyed when wheels and tires are removed or interchanged. On cars where trouble is experienced in maintaining proper wheel balance, it is suggested that all drums be individually checked for static balance and corrected.

## 7-10 STABILIZER SHAFT, LINK AND GROMMETS

### a. Stabilizer Shaft, Removal and Replacement

Disconnect stabilizer links (subpar. c) and disconnect the two underbody to shaft insulator mounts and brackets.

To install, position insulator mounts and brackets over shaft and connect bracket to underbody. Torque bracket bolts to 35 ft. lbs. Connect stabilizer links, subparagraph c below. Do not lubricate insulator mounts.

### b. Stabilizer Bracket and Insulator, Removal and Replacement

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

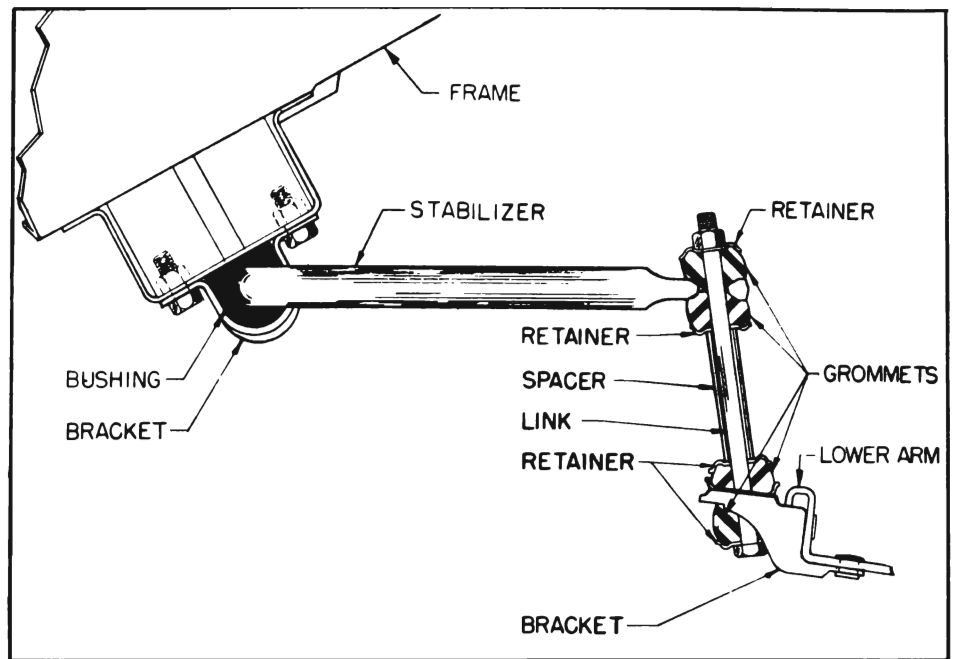


Figure 7-8—Stabilizer and Link

Replace by supporting stabilizer shaft in position and replacing brackets and mounts one at a time. Torque bracket bolts 35 ft. lbs.

### c. 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 bracket on lower control arm. Also, center the retainers on grommets before tightening rod nut.
4. Tighten rod nut to 7 ft. lbs.

**NOTE:** The measured distance from stabilizer shaft to bracket on lower control arm should be equal at both links. If dimensions are not equal, adjust nut, or replace grommets.

## 7-11 REPLACEMENT AND ADJUSTMENT OF FRONT WHEEL BEARINGS

### a. Replacement of Bearings

1. Raise front of car and remove wheel with hub and drum assembly.
2. Remove oil seal from hub and remove cone (inner race), and roller bearing assemblies from cups (outer races) in hub. Wipe old lubricant out of hub and from steering knuckle spindle.
3. Clean and inspect all bearing parts. When inspecting or replacing cone and bearing assemblies, make certain the assemblies are free to creep on spindle of steering knuckle. Wiping the spindle clean and applying bearing lubricant will permit creeping and prevent rust forming between cones and spindle.
4. If bearings require replacement, drive the old cups from the

hub. Install new cups with a soft (brass) drift being certain to start each squarely into hub to avoid distortion and possible cracking.

5. Thoroughly pack both roller bearing assemblies with new wheel bearing lubricant. Remove surplus lubricant. Apply light coating of lubricant to spindle and inside surface of wheel hub.

6. Place inner cone and bearing assembly in cup and install new oil seal.

7. Install wheel on spindle, then install outer cone and bearing assembly, washer and spindle nut.

8. Adjust bearings as follows (subpar. b).

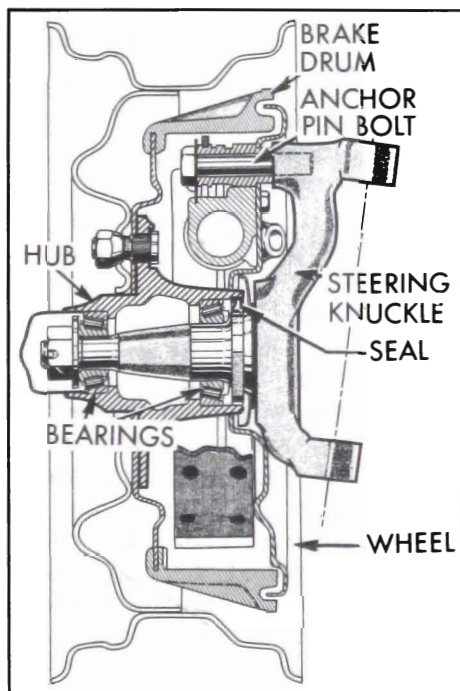


Figure 7-9—Front Wheel Hub and Bearings

#### b. Adjustment of Front Wheel Roller Bearings

1. Torque spindle nut to 19 ft. lbs. while rotating wheel.

2. Back off nut and re-torque to 11 ft. lbs.

3. If a spindle hole lines up with one of the six nut slots, back off nut 1/6 turn and insert cotter key.

4. If neither spindle hole lines up with nut slot, back off nut a maximum of 3/12 turn and install cotter key.

5. Before installation of grease cap in hub, make sure that end of spindle and inside of cap are free of grease so the radio static collector makes good contact. Make sure that static collector is properly shaped to provide good contact between end of spindle and the grease cap.

### 7-12 BALL JOINTS AND/OR STEERING KNUCKLE

#### a. Upper Control Arm—Ball Joint Assembly—Removal and Installation

The upper ball joint assembly is pressed into the upper control arm and is serviced only as a part of this upper control arm-ball joint assembly. The upper ball joint stud is spring loaded in its socket. If the upper stud has any perceptible shake, or if it can be twisted in its socket with the fingers, the upper control arm-ball joint assembly should be replaced. See Figure 7-10.

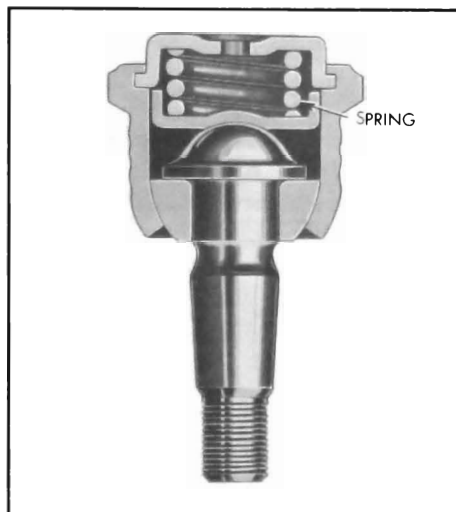


Figure 7-10—Upper Ball Joint

#### Removal

1. Support car on car stand at body rail so front suspension is in full rebound position.

2. Remove front wheel.

3. Remove upper ball stud cotter key.

4. Loosen, but do not remove ball stud nut.

5. Rap steering knuckle sharply in area of ball stud to allow force of chassis spring to disengage tapered stud from knuckle. See Figure 7-11.

6. Now place jack under lower control arm at spring seat. Raise jack till compression is relieved on upper control arm rubber rebound bumper.

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

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

9. Clamp the control arm assembly in a vise and remove the bushings, seals, and shaft. After cleaning away the old grease, examine the shaft and bushings for excessive wear or damage. Replace any excessively worn parts.

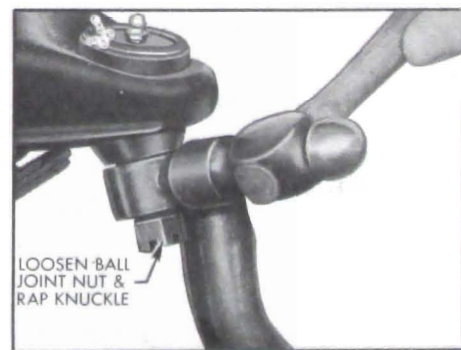


Figure 7-11—Separating Ball Joint from Knuckle



### Installation

1. Assemble new grease seals on the shaft. Apply a coating of good quality chassis lubricant to the shaft threads and position the shaft in the new control arm-ball joint assembly.
2. Start second bushing into the upper control arm with shaft threaded into the opposite bushing. See Figure 7-12.
3. After bushing has been threaded part way into arm, rotate shaft to engage threads of second bushing as an aid in piloting the bushing squarely into position.
4. Tighten bushing into arm until hex section of bushing seats firmly into arm. Shaft should be free enough to turn by hand. Install grease fittings and lubricate bushings.
5. Rotate shaft to make distance between shaft bolt holes and arm equal both sides as nearly as possible. See Figure 7-13.

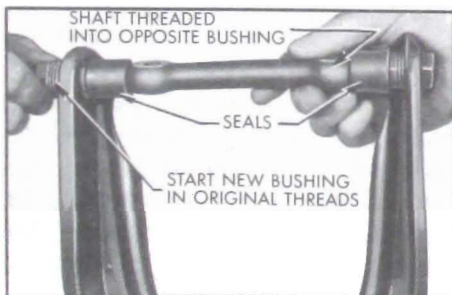


Figure 7-12—Upper Control Arm Bushing Replacement

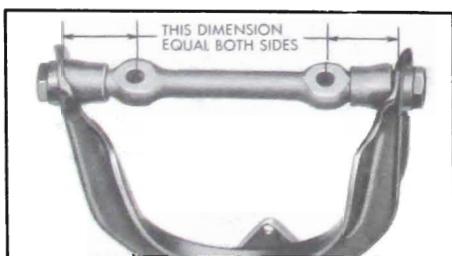


Figure 7-13—Upper Control Arm Shaft Position

6. 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. Torque shaft to bracket nuts to 75 ft. lbs. The nuts 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. On the right side it will be necessary to loosen the generator and rotate it toward the engine to provide accessibility to the front control arm shaft to cross member nut.

7. Assemble tapered stud to knuckle with cotter pin holes fore and aft. Install castellated nut. Torque to 50 ft. lbs. and install cotter pin.

8. Install wheel.
9. Check and adjust front end alignment if necessary.

When working in the area of the front upper control arm, make certain that the rubber water deflectors are securely attached in their original positions when the work is completed. If reasonable care is exercised in removing the metal or plastic fasteners for these rubber deflectors, they may be satisfactorily reused.

10. Lubricate with a long effectiveness grease equivalent to Buick Specification #742.

### b. Lower Control Arm—Ball Joint Assembly—Removal and Installation

The lower ball joint assembly is pressed into the lower control arm and is serviced separately. The lower ball joint is not spring equipped and depends upon car weight to load the ball. See Figure 7-14.

The lower ball joint should never be replaced merely because it "feels" loose when in an unloaded

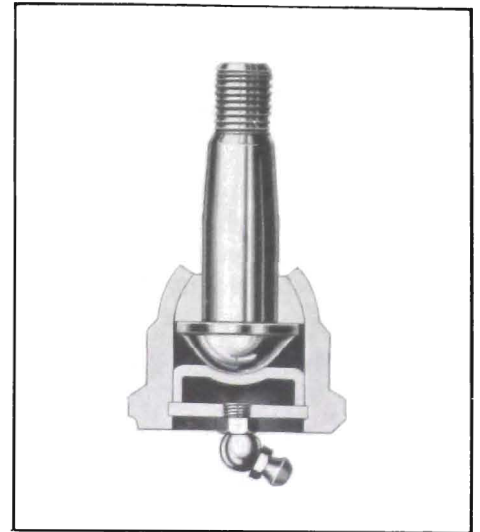


Figure 7-14—Lower Ball Joint

position. Use ONLY the following check to determine if a lower ball joint requires replacement:

Before checking lower ball joints the wheel bearings must be properly adjusted and the suspension must be freely suspended. The car should be supported at the frame rails on each side at the front end. **DO NOT USE A JACK OR STANDS UNDER LOWER CONTROL ARMS.** Place a dial indicator at the lower vertical edge of the wheel. With one hand at the top and the other at the bottom of the tire, moderately rock the wheel at the top and bottom. If more than 1/16" movement appears at the dial indicator, the lower ball joint should be replaced.

### Removal

1. Raise front of car and place jack stands under frame side rails. Remove wheel with hub and drum assembly.
2. Remove the brake backing plate. If the backing plate is wired carefully out of the way as shown in Figure 7-15, there will be no need to disconnect the brake hose.

3. Remove the ball stud cotter key. Loosen, but do not remove, the ball stud nut.

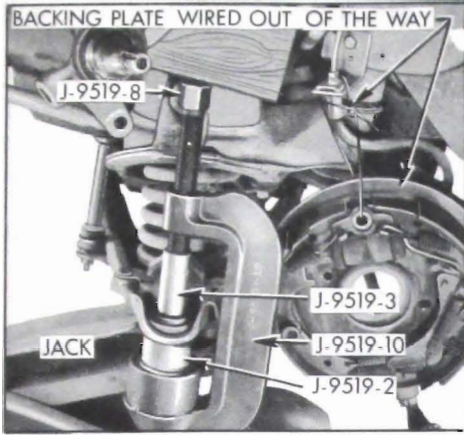


Figure 7-15—Lower Ball Joint Remover Tool in Place

4. Rap steering knuckle sharply in the area of the ball stud to allow the force of the chassis spring to disengage the tapered ball stud from the knuckle. NOTE: It is sometimes helpful to wedge a block of wood under the upper control arm to provide a solid stop so the lower ball stud can be loosened with a more solid hammer rap.

5. Place a 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 stud nut. Move the steering knuckle out of the way.

6. Install Lower Ball Joint Remover and Installer J-9519 as shown in Figure 7-15. Note that the larger O.D. portion of Detail J-9519-2 is positioned in J-9519-10.

7. Tighten Detail J-9519-8 with a socket and handle as shown in Figure 7-16 until ball joint is forced out of the lower control arm. CAUTION: Ball joint may pop out suddenly!

**Installation**

1. Position ball joint minus dust shield in lower control arm and install Tool J-9519 as shown in Figure 7-17. Note that the larger

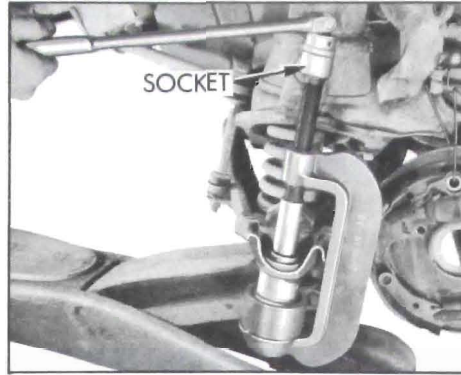


Figure 7-16—Removing Lower Ball Joint

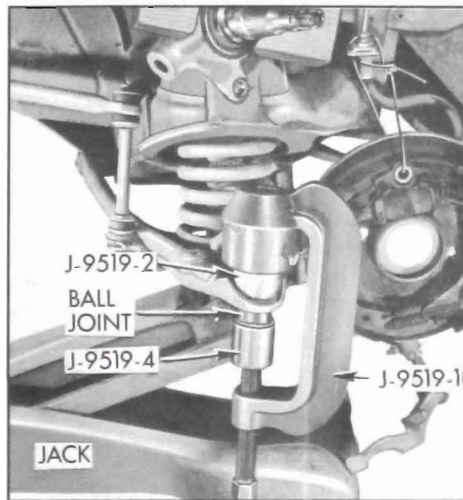


Figure 7-17—Lower Ball Joint Installer Tool in Place

O.D. portion of Tool Detail J-9519-2 is positioned in Detail J-9519-10.

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 key hole is fore and aft, and assemble the rubber dust shield to the stud.

4. Position the tapered stud in the knuckle and install nut. Tighten the nut to 50 ft. lbs. and install cotter key.

5. Install wheel with hub and drum assembly. Adjust wheel bearing (par. 7-11). Remove car stand and lower car.

NOTE: Upper and lower ball

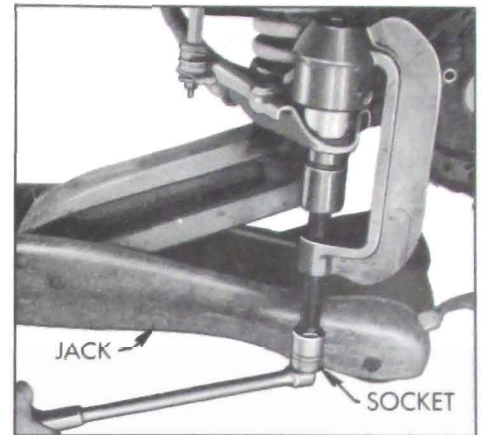


Figure 7-18—Installing Lower Ball Joint

joints are similar in appearance but are not interchangeable.

**c. Removal and Installation of Steering Knuckle**

1. Raise front of car. Remove wheel with hub and drum assembly.

2. Disengage lock plate from brake anchor bolt and remove bolt. Remove two cotter pins and bolts holding brake backing plate and steering arm to steering knuckle. Support brake backing plate out of the way to avoid damage to brake hose and linings.

3. Remove cotter pins from castellated nuts on both ball joint tapered studs. Loosen, but do not remove nuts.

4. Force of chassis spring will be tending to disengage ball joint tapered studs from steering knuckle. Rap knuckle sharply in areas of tapered studs to disengage studs from knuckle.

5. Support lower control arm and remove nuts from ball joint tapered studs. Raise upper control arm and remove tapered studs from knuckle. Remove steering knuckle.

6. To replace knuckle, wipe tapered studs clean and assemble tapered studs to knuckle with

cotter pin holes fore and aft. Install castellated nuts. Torque to 50 ft. lbs. and install cotter pins.

7. Position gasket on steering knuckle. Position steering arm and brake backing plate to steering knuckle being certain brake anchor pin engages properly in steering knuckle. Install two bolts and castellated nuts. Torque to 55-80 ft. lbs. and install cotter pins. Install brake anchor bolt and torque to 95 ft. lbs. Bend lock plate to engage flats on brake anchor bolt head.

8. Install wheel with hub and drum assembly. Be certain inner and outer bearings have sufficient bearing lubricant. Adjust wheel bearings (par. 7-11).

### **7-13 REMOVAL AND INSTALLATION OF UPPER CONTROL ARM SHAFT OR ARM ASSEMBLY**

The removal and installation of the Upper Control Arm and Shaft is covered in paragraph 7-12 under: a. Upper Control Arm-Ball Joint Assembly Removal and Installation.

### **7-14 REMOVAL AND INSTALLATION OF FRONT SHOCK ABSORBER**

#### **a. Removal**

1. Raise front of car.
2. Remove two lower mounting brackets to spring seat bolts and lock washers. Remove two upper mounting brackets to suspension cross member bolts. Remove shock absorber through spring seat.
3. Check shock absorber for obvious physical damage or oil

leakage. Push and pull shock absorber in an upright position. If smooth hydraulic resistance is not present in both directions, replace shock absorber.

#### **b. Installation**

1. Make certain that new shock absorber is correct for car model as indicated by part number stamped on the outer tube. See Master Parts List Group 7.345. 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 may adversely affect car performance and is not recommended by Buick Motor Division.

2. Install shock absorber mounting bolts. Be certain lock washers are positioned under heads of attaching bolts. Torque bolts to 20 ft. lbs.

### **7-15 CHECKING AND INSTALLATION OF CHASSIS SPRINGS**

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; therefore, the spring trim dimensions given below are for the standard car only, without optional equipment or undercoating and with car at curb weight. Curb weight includes gas, oil, water, and spare tire but no passengers.

Before measuring spring trim 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.

#### **a. Measuring Trim Height**

1. Front Springs. On a car having service miles, the front spring trim dimension "Y" should be as shown in Figure 7-19 chart.

NOTE: When checking NEW springs, add 1/4".

2. Rear Springs. On a car having service miles, the rear spring trim dimensions should be as shown in Figure 7-19 chart.

NOTE: When checking NEW springs, add 3/8".

#### **b. Removal and Installation of Chassis Springs**

##### **Front Springs**

1. Raise front of car. Remove wheel with hub and drum assembly.

2. Disconnect stabilizer link from lower control arm and remove shock absorber according to instructions in paragraph 7-14.

3. Disconnect lower control arm ball joint from steering knuckle according to instructions in paragraph 7-12.

4. Lower floor jack until spring is fully extended and remove coil spring.

5. Position spring with top of spring seated in front suspension cross member. The top of the spring may be identified by a ground (flat) coil. Rotate spring so the end of the bottom coil will index with edge of hole in lower control arm spring seat.

6. Raise lower control arm to compress spring and allow assembly of ball joint to steering



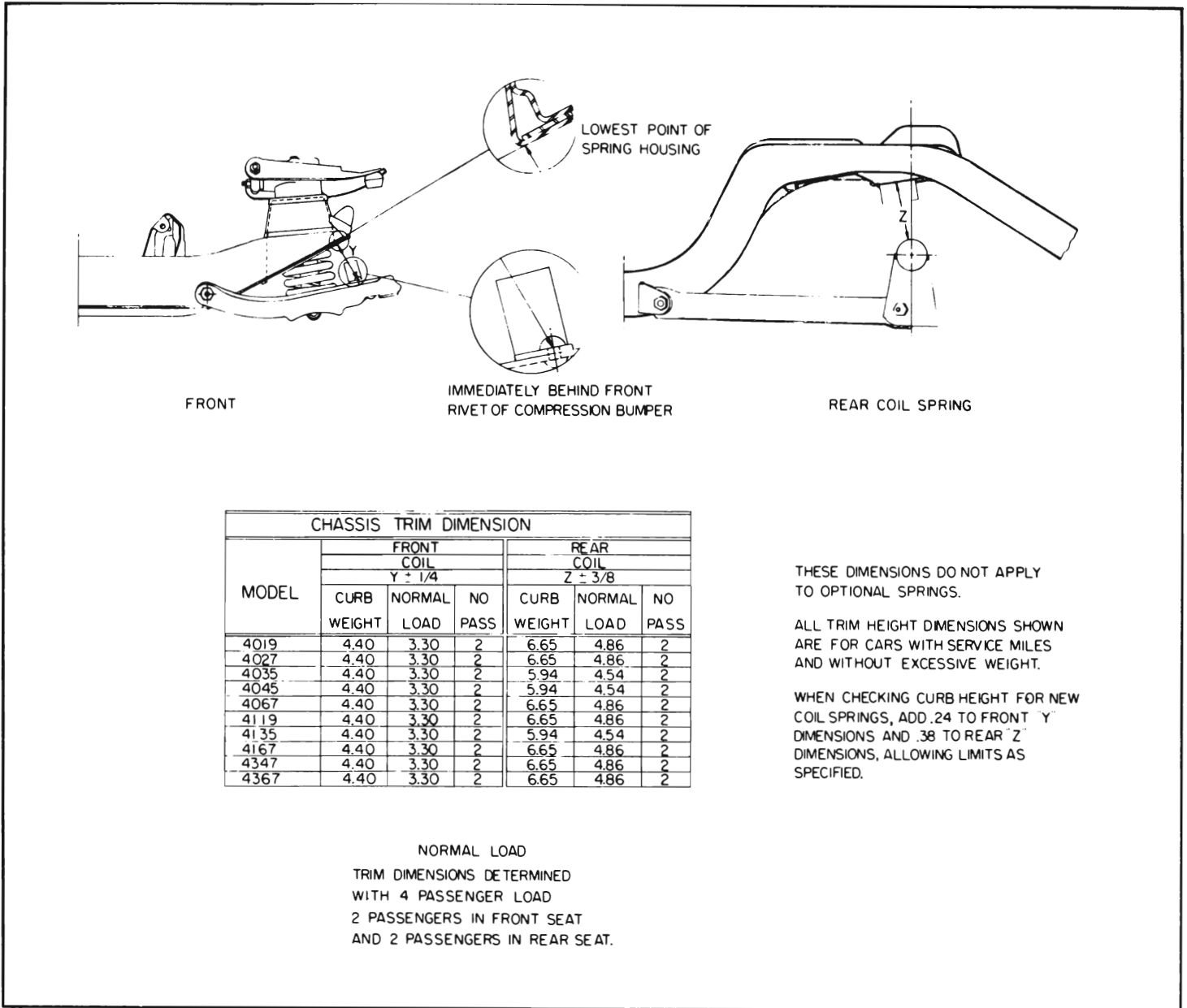


Figure 7-19—Trim Height Chart

knuckle. Connect ball joint to knuckle according to instructions in paragraph 7-12.

7. Install shock absorber according to instructions in paragraph 7-14. Connect stabilizer link to lower control arm according to instructions in paragraph 7-10.

8. Reinstall wheel with hub and drum assembly. Adjust wheel bearings. (par. 7-11).

**Rear Springs**

1. Raise rear of car. Slightly

raise and support rear axle with a floor jack.

2. Provide slack in parking brake cables by disconnecting at cable hanger. Disconnect shock absorber from bracket on axle housing. It is necessary to only disconnect shock absorber on the side in which coil spring is being removed.

3. Lower rear axle assembly fully and remove coil spring and insulator.

4. Inspect insulator and replace if necessary.

5. Position coil spring with ground (flat) end of spring and insulator at top and tang at lower end located in notch of lower control arm.

6. Raise rear axle assembly and connect shock absorber to bracket on axle housing. Torque nut to 40 ft. lbs. Connect parking brake cable at hanger.



## 7-16 REMOVAL AND INSTALLATION OF FRONT LOWER CONTROL ARM SHAFT BUSHING AND/OR LOWER CONTROL ARM

1. Remove coil spring according to instructions in paragraph 7-15.
2. Remove threaded bushings from control arm, permitting removal of control arm from shaft.
3. If lower control arm is to be replaced, remove rubber bumper and install on new arm if bumper is not damaged. Torque nut to 35 ft. lbs.
4. Lightly coat shaft threads with chassis lubricant and install rubber seals on shaft.
5. Position control arm on shaft and start front bushing onto threads of shaft. Place Spacer Tool J-8808 on shaft between control arm and front cross member.
6. With the spacer against the front cross member and the control arm against the spacer, thread front bushing into control arm. Tighten bushing until hex of bushing seats firmly into arm.
7. Remove spacer and install rear bushing as in Steps 5 and 6 above.
8. Install coil springs according to instructions in paragraph 7-15.

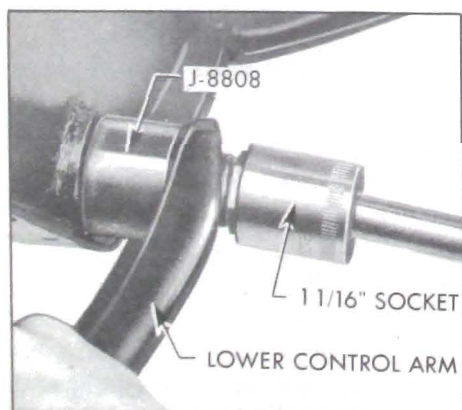


Figure 7-20—Installing Lower Control Arm Shaft Front Bushing

## 7-17 REMOVAL AND INSTALLATION OF LOWER CONTROL ARM SHAFT

1. Remove lower control arm. (par. 7-16.)
2. Thread Installer & Remover J-8907 on rear of lower control arm shaft approximately 7/8". Adjust lock bolt to secure Installer & Remover J-8907 to shaft. Do not thread Installer & Remover J-8907 tightly on shaft.
3. Turn Installer & Remover J-8907 clockwise to remove shaft through front of cross member. When shaft threads are free of threads in front suspension cross member loosen lock bolt and remove Installer & Remover J-8907. Remove lower control arm shaft. See Figure 7-21.

**NOTE:** The shaft to front suspension cross member threads on the rear of the shaft are smaller than the threads on front of the shaft. See Figure 7-22. This permits removal of the shaft after the threads on the shaft are disengaged from their respective threads in the front suspension cross member. The front of the shaft is stamped "F".

4. To install lower control arm shaft, position shaft through front of front suspension cross member with "F" toward front.

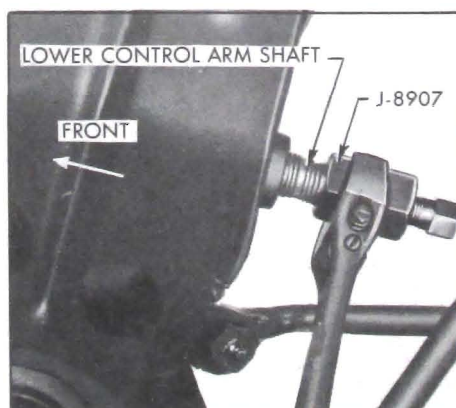


Figure 7-21—Removing Lower Control Arm Shaft

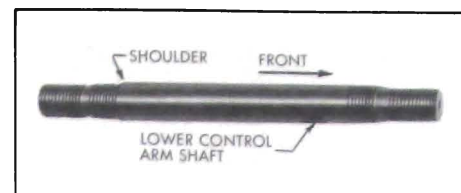


Figure 7-22—Lower Control Arm Shaft

5. Install Installer & Remover J-8907 on front of shaft as in Step 2. Lightly coat shaft to front suspension cross member threads with lubriplate. See Figure 7-23.
6. Thread shaft into front suspension cross member until the shaft extends an equal distance from front and rear of front suspension cross member. This distance is approximately 1-11/16"; however, it is necessary to measure and exactly position shaft. See Figure 7-24.
7. Install lower control arm (par. 7-12).

## 7-18 FRONT WHEEL ALIGNMENT

Wheel alignment is the mechanics of properly adjusting all the factors affecting the position of front wheels so as to cause the car to steer with the least effort and to reduce tire wear to a minimum.

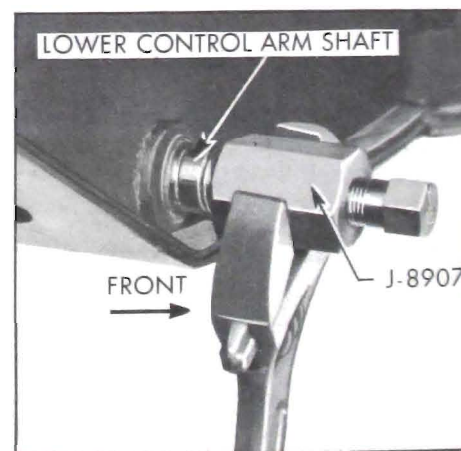


Figure 7-23—Installing Front Lower Control Arm Shaft

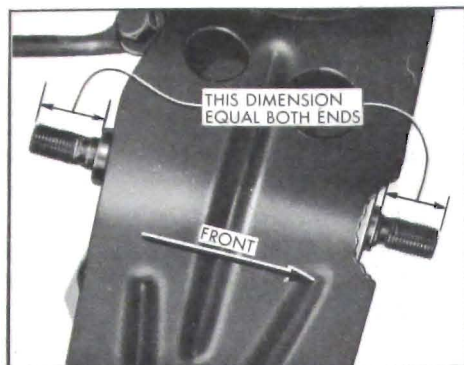


Figure 7-24—Lower Control Arm Shaft Installation

Correct alignment of the underbody is essential to proper alignment of front and rear wheels. Briefly, the essentials are that the underbody must be square in plan view within specified limits, that the top and bottom surfaces of front cross member must be parallel fore and aft, and the upper control arms and lower control arms must be at correct location in respect to shafts and front cross member. All bushings, ball joints and bolts must be of proper torque and in usable condition.

Wheel and tire balance has an important effect on steering and tire wear. If wheels and tires are out of balance, "shimmy" or "tramp" may develop or tires may wear unevenly and give the erroneous impression that the wheels are not in proper alignment. For this reason, the wheel and tire assemblies should be known to be in proper balance before assuming that wheels are out of alignment.

Close limits on caster, front wheel camber, and theoretical king pin inclination are beneficial to car handling, but require only reasonable accuracy to provide normal tire life. With the type of front suspension used, the toe-in adjustment is much more important than caster and camber is so far as tire wear is concerned. Caster and camber adjustments need not be considered unless

visual inspection shows these settings to be out, or unless the car gives poor handling on the road.

In the majority of cases, services consisting of inflating tires of specified pressure and interchanging tires at recommended intervals (par. 7-9), balancing all wheels and tires (par. 7-9), adjusting steering gear (par. 8-4), and setting toe-in correctly (sub-par. e, below) will provide more improvement in car handling and tire wear than will front end alignment adjustments as usually made on front end alignment equipment.

The use of accurate front end alignment is essential to determine whether front suspension parts have been damaged by shock or accident, and to obtain correct alignment settings after new parts have been installed.

#### a. Inspection Before Checking Front Wheel Alignment

Before any attempt is made to check or make any adjustment affecting caster, camber, toe-in, theoretical king pin inclination, or steering geometry, the following checks and inspections must be made to insure correctness of alignment equipment readings and alignment adjustments.

1. The front tires should have approximately the same wear and all tires must be inflated to specified pressures (par. 1-2).
2. Check front wheel bearings for looseness and adjust, if necessary (par. 7-11).
3. Check for run-out of wheels and tires and correct to within limit of .107" run-out at sides of tires, if necessary.
4. Check wheels and tires for balance and correct if out of balance (par. 7-9).
5. Check for looseness at ball joints and tie rod ends; if found excessive it must be corrected

before alignment readings will have any value (par. 8-4).

6. Check shock absorber action and correct, if necessary (par. 7-14, 7-21).

7. Check trim height; if out of limits, correct with shims or replace spring.

**CAUTION:** Consideration must be given the optional equipment on the car, undercoating, dirt, etc.

Good judgment should be exercised before replacing a spring when car trim height is only slightly out of limits. Spring replacement under conditions of excessive weight as mentioned above will accomplish little and must be accompanied by shimming to obtain satisfactory results. 1/8" shims are available through Buick Parts Warehouses under Group 7.425. Refer to paragraph 7-15.

8. Car must be on level surface. Raise front of car slightly and place Front End Alignment Height Tool J-8973-22 between front cross member and lower control arm at each front wheel as shown in Figure 7-25. Lower front of car to hold Alignment Height Tool J-8973-22 securely in position.

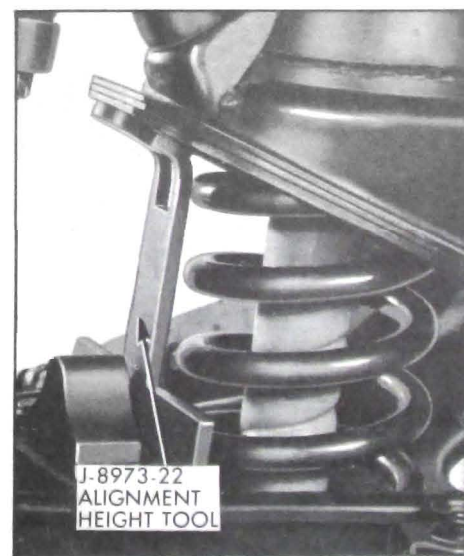


Figure 7-25—Front Alignment Height Tool in Position (Right Shown)



9. Raise rear of car slightly and place Spacer Block J-8973-20 (station wagon) or J-8973-21 (all other) at each rear wheel. Position the cut-out in the block over the rubber bumper, and position the bottom of the block to rest on axle housing. Lower rear of car to hold blocks securely in position.

**NOTE:** It is not necessary to use additional weight to hold car on Spacer Blocks J-8973-20 or J-8973-21 and Alignment Height Tool as they are designed to slightly raise car.

10. It is advisable to check the condition and accuracy of any equipment being used to check front end alignment, and to make certain that instructions of the manufacturer are thoroughly understood.

### b. Checking Caster and Camber Settings

Since caster and camber are both adjusted by shimming in the same locations, both of these settings must be checked before changing either setting.

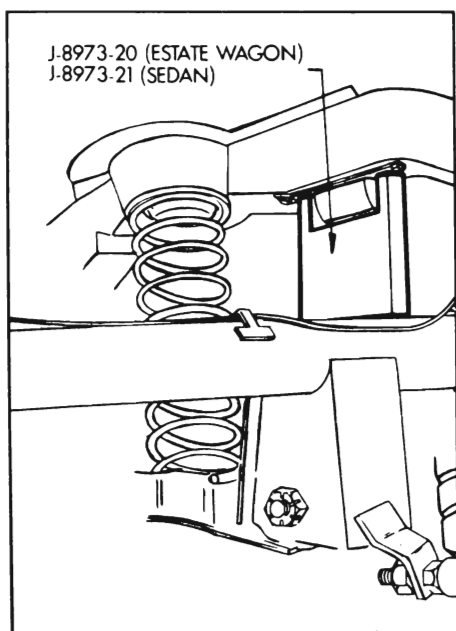


Figure 7-26—Rear Alignment Height Tool

**CAUTION:** Regardless of equipment used to check caster and camber, car must be on level surface both transversely and fore and aft. Since camber and caster vary in proportion to the height of the front springs, it is very important that the correct alignment height is maintained while checking (subpar. a, above).

Alignment height is used only when checking and adjusting caster and camber and should not be confused with trim height which is used to establish proper spring dimensions.

When equipment is used which bears against the tire or wheel rim to obtain readings, it is very essential that the tires or wheels be checked for run-out.

Readings must be taken at points which have no run-out or which lie in the same plane. Caster and camber should be within limits shown in Figure 7-28. Note that the caster angles at both front wheels need not be exactly the same but must be within  $3/4$  degrees of each other. Likewise, the camber angles on both sides must be within  $3/4$  degrees of each other. If caster and camber are not within the specified limits, adjust as described below.

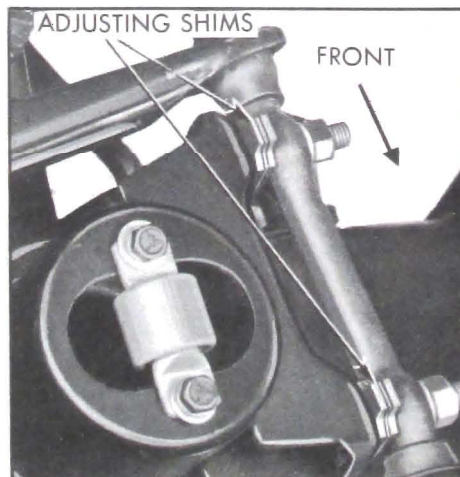


Figure 7-27—Caster and Camber Adjusting Shims

### c. Adjustment of Caster and Camber

Caster and camber are adjusted by shimming at the upper control arm shaft attaching points. These shims are available in thicknesses of .030", .060" and .120", and are listed under Group 6.178 of the Master Parts list.

Adding shims at the front locations will change caster and camber toward negative. Adding shims at the rear locations will change caster toward positive and camber toward negative. Adding equal shims at both front and rear locations will not change caster but will change camber toward negative.

To adjust, loosen both front and rear bolts to free the shims for removal or addition. After installing or removing shims (limit to .380" in any one stack), tighten and torque shaft nuts to 75 ft. lbs. Recheck alignment and correct toe-in, if necessary. It is imperative to adhere strictly to the torque specifications given in paragraph 7-1.

### d. Checking Theoretical King Pin Inclination

**CAUTION:** When checking theoretical king pin inclination, car must be on a level surface, both transversely and fore and aft. It must be maintained at specified alignment height while checking (subpar. a above).

With camber known to be within specified limits, theoretical king pin inclination should check within specified limits given in Figure 7-28.

If camber is incorrect beyond limits of adjustment and theoretical king pin inclination is correct, or nearly so, a bent steering knuckle is indicated.

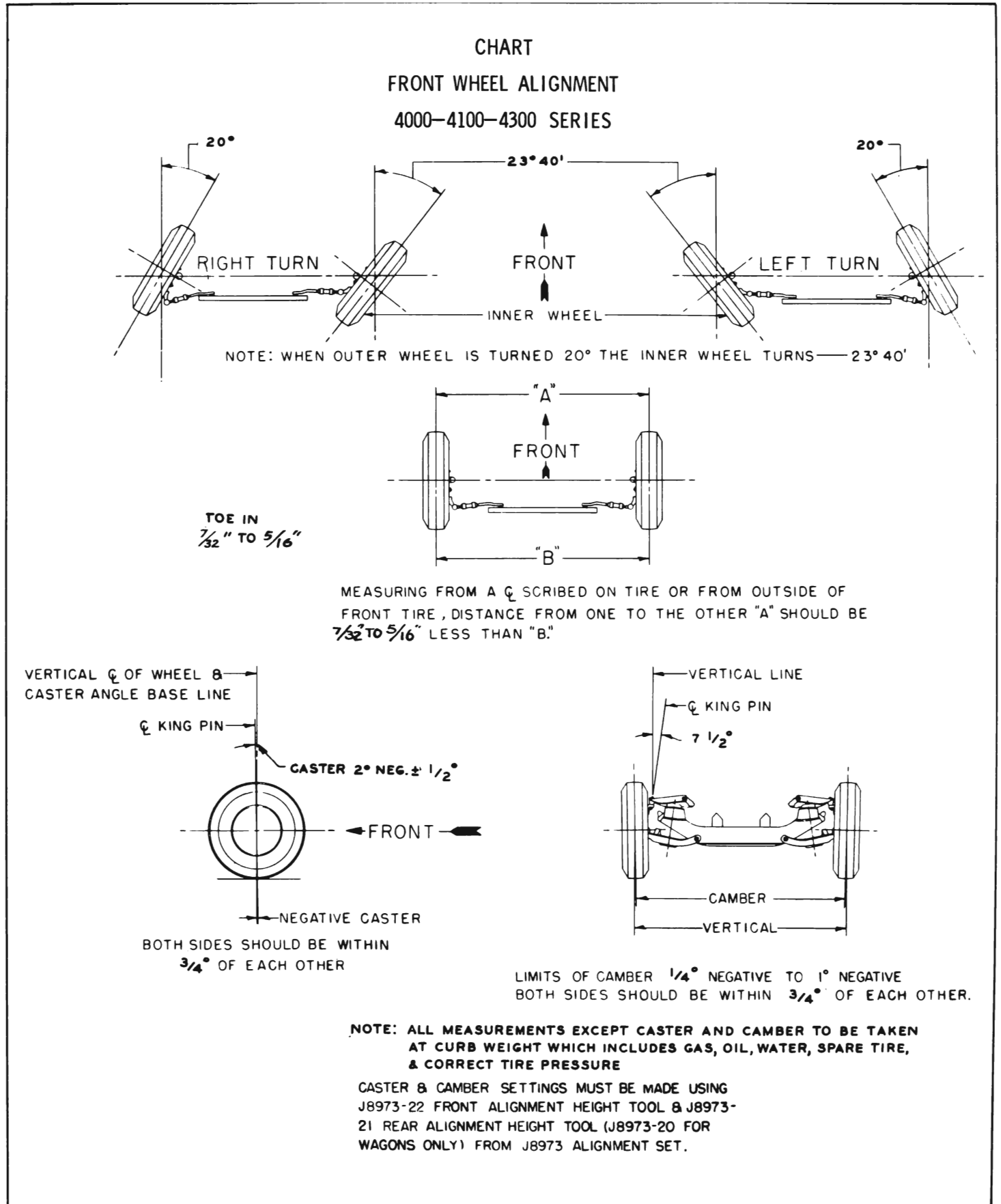


Figure 7-28—Front End Alignment Chart



There is no adjustment for theoretical king pin inclination as this factor depends on the accuracy of the front suspension parts. Distorted parts should be replaced with new parts. The practice of heating and bending front suspension parts to correct errors is not recommended as this may produce soft spots in the metal in which fatigue and breakage may develop in service.

### e. Checking and Adjusting Toe-In

CAUTION: Car must be at curb weight and running height (DO NOT USE ALIGNMENT SET J-8973 - bounce front end and allow it to settle to running height). Steering gear and front wheel bearings must be properly adjusted with no looseness at tie rod ends. The car should be moved forward one complete revolution of the wheels before the toe-in check and adjustment are started and the car should never be moved backward while making the check and adjustment.

1. Turn steering wheel to straight ahead position, with front wheels in straight ahead position.

2. Measure the horizontal distance from the near edge of front boss of lower control arm shaft to the front edge of brake backing plate, on each side. Adjust tie rods, if necessary, to make measurements equal on both sides.

3. Using a suitable toe-in gauge, measure the distance between outside walls of tires at the front at a height approximately horizontal to floor and through the centerline of the wheel assembly. See Figure 7-28.

NOTE: An accurate check also can be made by raising and rotating front wheels to scribe a fine line near the center of each tire, then, with tires on the floor

and front end at running height, measure between scribed lines with a suitable trammel.

4. Roll the car forward until measuring points on tires are approximately  $180^\circ$  from point used in Step 3 above.

The measurement at the front (dimension "A") should be  $7/32''$  to  $5/16''$  less than the measurement at the rear (dimension "B"). See Figure 7-28.

5. If toe-in is not within specified limits, loosen clamp bolts and turn adjusting sleeves at tie rod ends as required. Decrease toe-in by turning left sleeve in same direction as wheel rotates moving forward and turn right sleeve in opposite direction. Increase toe-in by turning both sleeves in opposite direction.

CAUTION: Left and right adjusting sleeves must be turned exactly the same amount but in opposite directions when changing toe-in, in order to maintain front wheels in straight ahead position when steering wheel is in straight ahead position.

6. After correct toe-in is secured, tighten clamp bolts securely.

CAUTION: The steering knuckle and steering arm "rock" or tilt as front wheel rises and falls. Therefore, it is of vital importance to position the bottom face of tie rod and parallel with machined surface at outer end of steering arm when tie rod length is adjusted. Severe damage and possible failure can result unless this precaution is observed. Tie rod sleeve clamps must be positioned straight down to  $45^\circ$  forward to provide clearance.

### f. Checking Steering Geometry (Turning Angles)

CAUTION: Be sure that caster, camber, and toe-in have all been

properly corrected before checking steering geometry. Steering geometry must be checked with the weight of the car on the wheels.

1. With the front wheels resting on full floating turntables, turn wheels to the right until the outside (left) wheel is set at 20 degrees. The inside (right) wheel should then set at 23 degrees 40 minutes. See Figure 7-28.

2. Repeat this test by turning front wheels to the left until the outside (right) wheel sets at 20 degrees; the inside (left) wheel should then set at 23 degrees 40 minutes.

3. Errors in steering geometry generally indicate bent steering arms, but may also be caused by other incorrect front end factors. If the error is caused by a bent steering arm, it must be replaced. Replacement of such parts must be followed by a complete front end check as described above.

## 7-19 REMOVAL AND INSTALLATION OF REAR LOWER CONTROL ARM

1. Remove rear coil spring (par. 7-15).

2. Disconnect lower control arm at bracket on axle housing. See Figure 7-28. Disconnect front bracket from underbody and remove lower control arm and bracket. Be certain to note number of shims between underbody and bracket.

3. Disconnect front bracket from control arm. Inspect rubber bushings and replace as necessary. Bushings are replaceable through one side of arm only. If control arm is bent or damaged, it must be replaced.

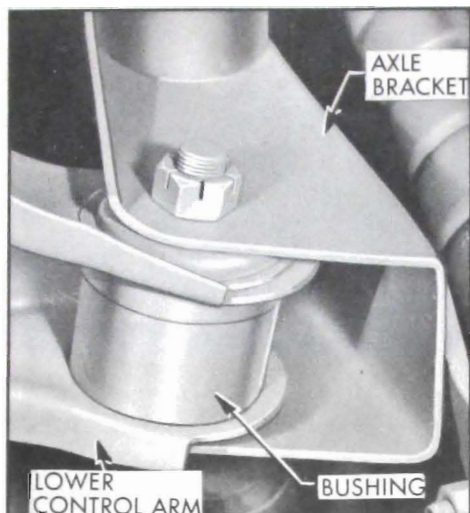


Figure 7-29—Rear Lower Control Arm Rear Attachment

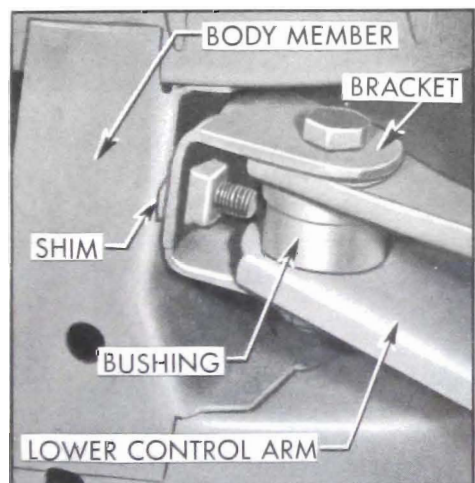


Figure 7-30—Rear Lower Control Arm Front Attachment

4. Assemble front bracket on control arm and torque nut to 100 ft. lbs. (When the bracket is in its normal position, the arms of the bracket will be angled downward.)

5. Bolt front bracket to underbody with original number of shims in place. Torque bolts to 50 ft. lbs. Connect control arm to bracket on axle housing. Torque bolt to 100 ft. lbs.

6. Install rear coil spring (par. 7-15).

7. Check rear universal joint angle and adjust as necessary as described in paragraph 6-17.

## 7-20 REMOVAL AND INSTALLATION OF REAR UPPER CONTROL ARM

1. Raise rear of car and support rear axle assembly.

2. Disconnect control arm at carrier housing by removing arm bolt and lock nut. See Figure 7-31.

3. Disconnect control arm at front bracket by removing arm bolt and lock nut and remove upper control arm. See Figure 7-32.

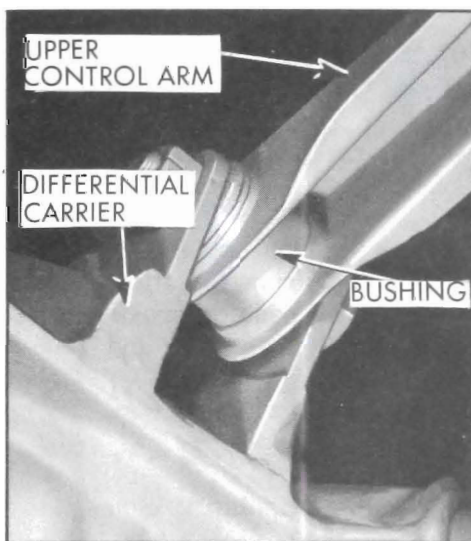


Figure 7-31—Rear Upper Control Arm Rear Attachment

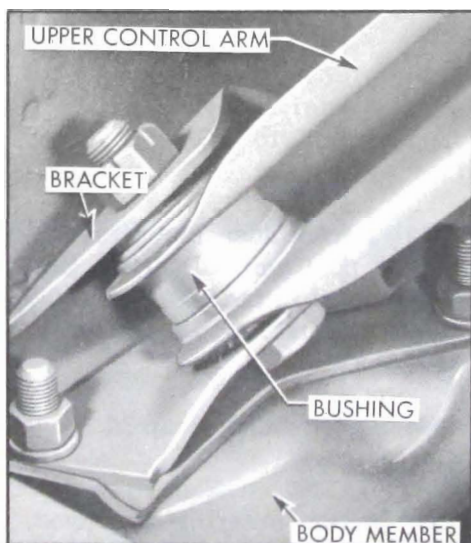


Figure 7-32—Rear Upper Control Arm Front Attachment

4. Inspect rubber bushings and replace as necessary. Bushings are replaceable through one side of arm only. If control arm is bent or damaged it must be replaced.

5. Position control arm with flange on bushings facing forward and open side of arm down. Right and left upper control arms are interchangeable.

6. Install arm bolts and lock nuts at front bracket and at bracket on carrier housing. Torque to 100 ft. lbs. It may be necessary to slightly rotate axle housing to permit bolt holes in bracket to line up with bolt holes in arm.

## 7-21 REMOVAL AND INSTALLATION OF REAR SHOCK ABSORBER

1. Raise rear of car and support rear axle assembly.

2. Disconnect shock at upper bracket. Disconnect shock at lower bracket and remove shock.

**NOTE:** When performing any work requiring rear shock absorber removal or loosening of the shock absorber lower mounting nut, it is most essential that the stud be prevented from turning. A hex is located on the stud between the axle bracket and shock absorber lower bushing in order that a wrench may be used for this purpose. 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. See Figure 7-33.

3. Check shock absorber for obvious physical damage and oil leakage. Push and pull shock absorber in an upright position. If smooth hydraulic resistance is not present in both directions, replace shock.

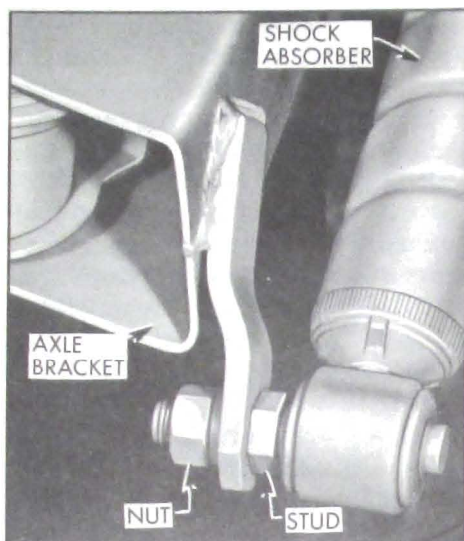


Figure 7-33—Rear Shock Absorber Lower Attachment

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

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 recommended by Buick Motor Division.

5. Loosely attach shock to both brackets. Torque lower stud nut to 40 ft. lbs. and upper bolt nut to 50 ft. lbs.

## 7-22 REMOVAL AND INSTALLATION OF ISOLATION MOUNTS

### a. Removal

1. Hoist front of car and support at body frame rails and front suspension cross member.
2. Support engine with chain fall or other suitable means.
3. Disconnect engine mounts at

front suspension cross member brackets.

4. Disconnect exhaust pipe at crossover.
5. Remove front wheels.
6. Disconnect brake lines at hoses, both sides.
7. Disconnect stabilizer links.
8. Disconnect steering shaft at flexible coupling.
9. If power steering equipped, disconnect power steering hoses at pump.
10. Remove isolation mount to body member bolts.
11. Disconnect ground strap at front mount location.

12. Lower front suspension assembly and drive isolation mount up out of suspension cross member. See Figures 7-34 and 7-35.

### b. Installation

1. Press new isolation mount into place.

There are two size mounts. The front isolation mount is smaller than the other two.

Do not press on inner spacer but bear on outer sleeve flange with suitable tool to press isolation mount into place.

2. Raise front suspension assembly into position and install isolation mount attaching bolts and washer assemblies. Torque to 80 ft. lbs.

3. Connect ground strap at front location.

4. If power steering equipped, connect hoses and fill reservoir.

5. Reconnect steering shaft coupling.

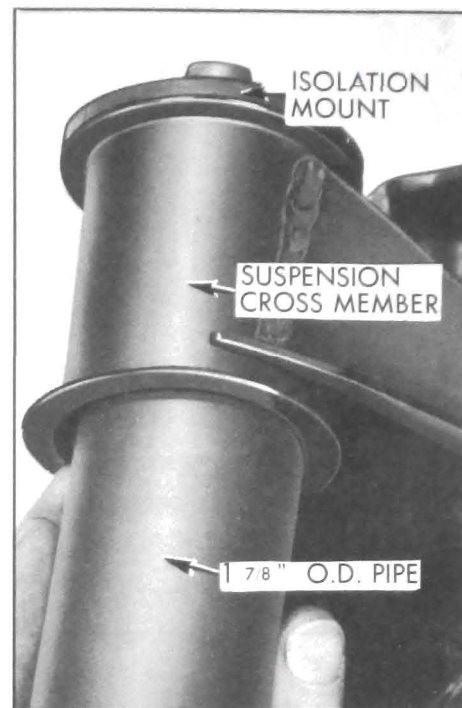


Figure 7-34—Removing Isolation Mount

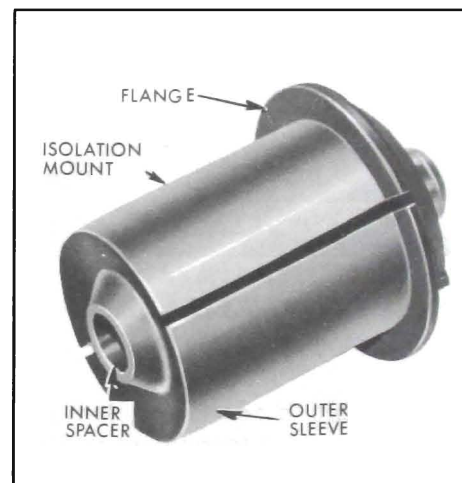


Figure 7-35—Isolation Mount

6. Reconnect stabilizer links as outlined in paragraph 7-10.

7. Reconnect brake hoses. Bleed brake system.

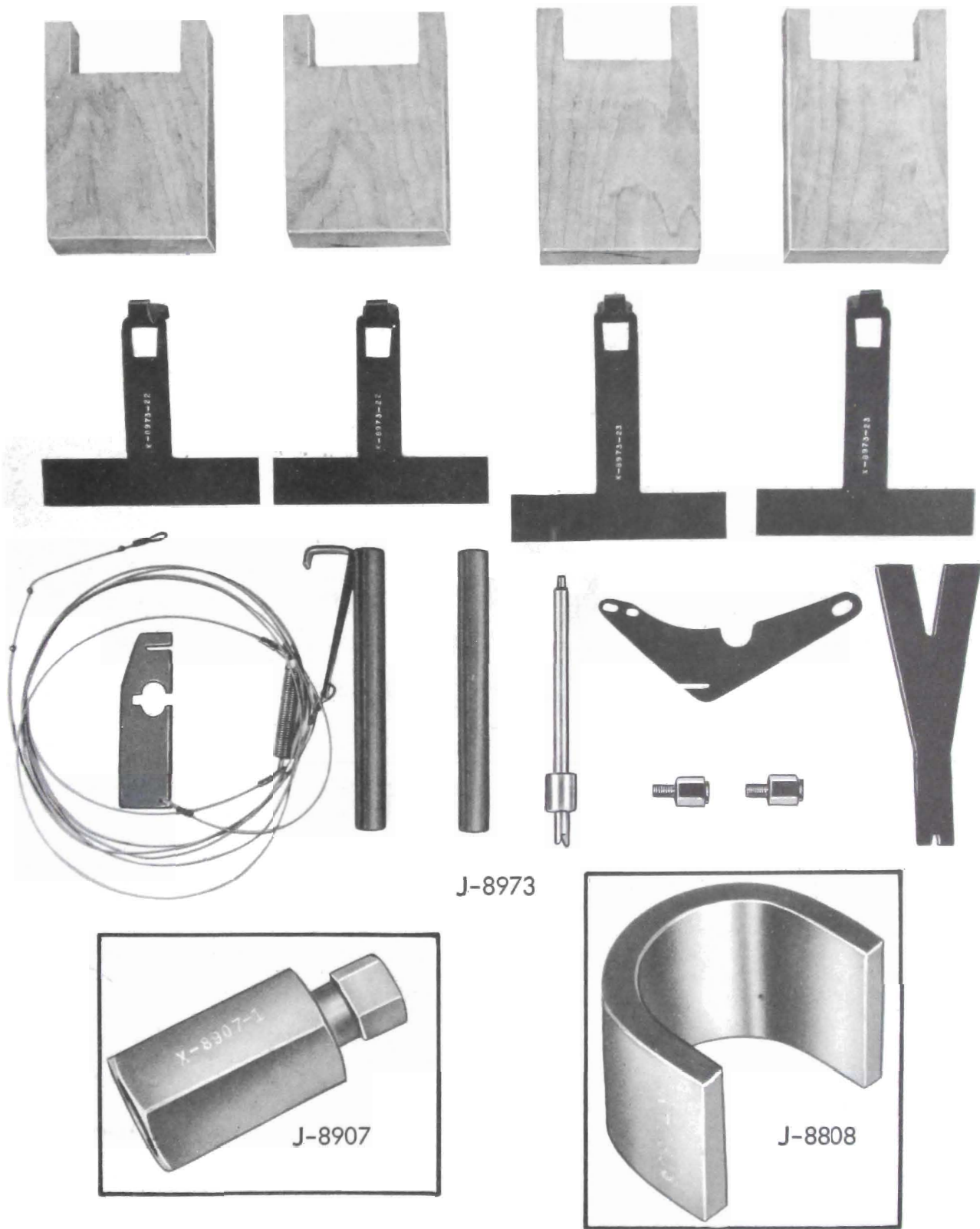
8. Install wheels and tires. Torque nuts to 65 ft. lbs.

9. Reconnect exhaust pipe.

10. Lower engine and attach mounts.

11. Lower car.





CHASSIS SUSPENSION SPECIAL TOOLS

- J-8808 Lower Control Arm Spacer
- J-8907 Lower Control Arm Shaft Remover and Installer
- J-8973 Alignment Set

Figure 7-36—Suspension System Special Tools





Figure 7-37—Lower Ball Joint Tools