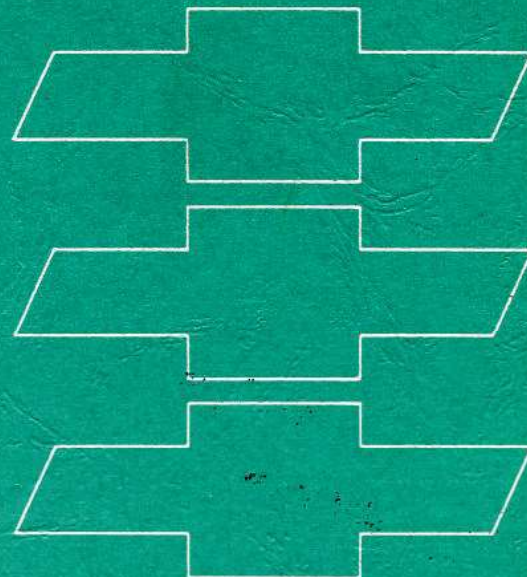
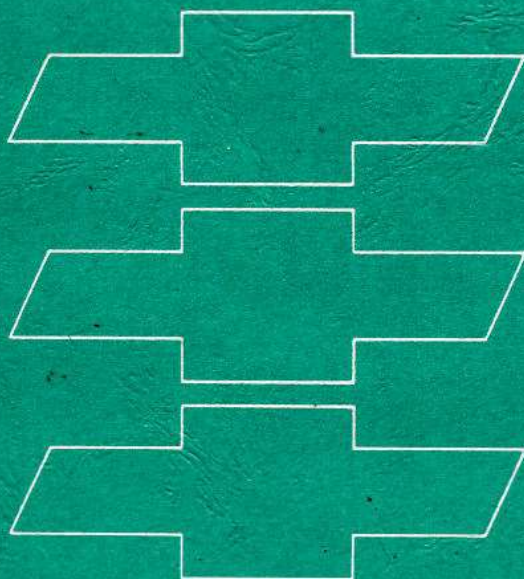


**1965**



**CORVAIR**



**CHASSIS  
SHOP  
MANUAL**



# 1965 CHEVROLET CORVAIR CHASSIS SHOP MANUAL

## FOREWORD

This manual is designed to provide complete information on the maintenance and repair of various units, except the Body, of the 1965 Chevrolet Corvair Passenger Vehicles. Service information for 1965 body items for these vehicles is contained in the 1965 Body Service Manual. For service information on the 1965 Corvair Greenbrier refer to the 1961 Corvair Shop Manual and the 1964 Corvair Shop Manual Supplement.

An effort has been made to produce a manual that will serve as a ready reference book for the experienced service man and also cover step by step procedure for the guidance of the less experienced man.

The Section Index on this page enables the user to quickly locate any desired section. At the beginning of each section, a Table of Contents gives the page number on which major subjects begin. An Index is placed at the beginning of each major subject within the section.

Summaries of Special Tools, when required, are found at the end of major sections, while Specifications covering vehicle components are presented at the rear of the manual.

This manual should be kept in a handy place for ready reference. If properly used, it will enable the technician to better serve the owners of Chevrolet Corvair vehicles.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. The right is reserved to make changes at any time without notice.

## CHEVROLET MOTOR DIVISION

General Motors Corporation  
DETROIT, MICHIGAN

## SECTION INDEX

SECTION	NAME
0	GENERAL INFORMATION AND LUBRICATION
3	FRONT SUSPENSION
4	REAR AXLE AND REAR SUSPENSION
5	BRAKES
6	ENGINE
6M	ENGINE FUEL
6Y	ENGINE ELECTRICAL
7	TRANSMISSION, CLUTCH AND CONTROLS
8	FUEL TANK AND EXHAUST SYSTEM
9	STEERING
10	WHEELS AND TIRES
11	SHEET METAL
12	CHASSIS ELECTRICAL
14	BUMPERS
15	HEATER AND ACCESSORIES
	SPECIFICATIONS



## SECTION 3

# SUSPENSION

### INDEX

	Page		Page
General Description . . . . .	3-1	Inspection . . . . .	3-7
Maintenance and Adjustments . . . . .	3-2	Upper Joint . . . . .	3-7
Adjustment of Front Wheel Bearings . . . . .	3-2	Lower Joint . . . . .	3-8
Wheel Alignment . . . . .	3-2	Stabilizer Bar . . . . .	3-8
Preliminary Steps . . . . .	3-2	Strut Rod . . . . .	3-8
Camber Adjustment . . . . .	3-3	Removal . . . . .	3-8
Caster Adjustment . . . . .	3-3	Installation . . . . .	3-9
Cornering Wheel Relationship . . . . .	3-4	Riding Height and Coil Spring Sag . . . . .	3-9
Toe-in Adjustment . . . . .	3-4	Coil Springs, Lower Control Arms, Spherical	
Steering Axis Inclination . . . . .	3-4	Joints and/or Bushing . . . . .	3-9
Service Operations . . . . .	3-4	Removal of Coil Spring . . . . .	3-9
Speedometer Cable . . . . .	3-4	Removal of Control Arm . . . . .	3-10
Removal . . . . .	3-5	Removal of Spherical Joint . . . . .	3-10
Installation . . . . .	3-5	Installation of Spherical Joint . . . . .	3-10
Front Hub and Brake Drum . . . . .	3-5	Removal of Control Arm Bushings . . . . .	3-10
Removal . . . . .	3-5	Installation of Control Arm Bushings . . . . .	3-11
Inspection . . . . .	3-5	Installation of Control Arm . . . . .	3-11
Repairs . . . . .	3-5	Installation of Coil Spring . . . . .	3-11
Replacement of Bearing Races . . . . .	3-5	Upper Control Arm, Spherical Joint, Cross	
Replacement of Wheel Hub . . . . .	3-6	Shaft and/or Bushings . . . . .	3-12
Installation . . . . .	3-6	Removal of Control Arm Assembly . . . . .	3-12
Shock Absorbers . . . . .	3-6	Removal of Spherical Joint . . . . .	3-12
Removal . . . . .	3-6	Removal of Cross Shaft and/or Bushings . . . . .	3-12
Installation . . . . .	3-7	Installation of Cross Shaft and/or Bushings . . . . .	3-12
Steering Knuckle . . . . .	3-7	Installation of Spherical Joint . . . . .	3-12
Removal . . . . .	3-7	Installation of Control Arm Assembly . . . . .	3-13
Installation . . . . .	3-7	Front Suspension Crossmember . . . . .	3-14
Spherical Joints . . . . .	3-7	Special Tools . . . . .	3-15
Lube Fittings . . . . .	3-7		

## GENERAL DESCRIPTION

The Corvair independent front suspension is of the S.L.A. (Short-Long Arm) type with spherical joints connecting the control arms and steering knuckles. The

narrow lower control arm is designed so that camber adjustment may be made at the inner pivot by means of an eccentric cam bolt. "Brake dive" and acceleration

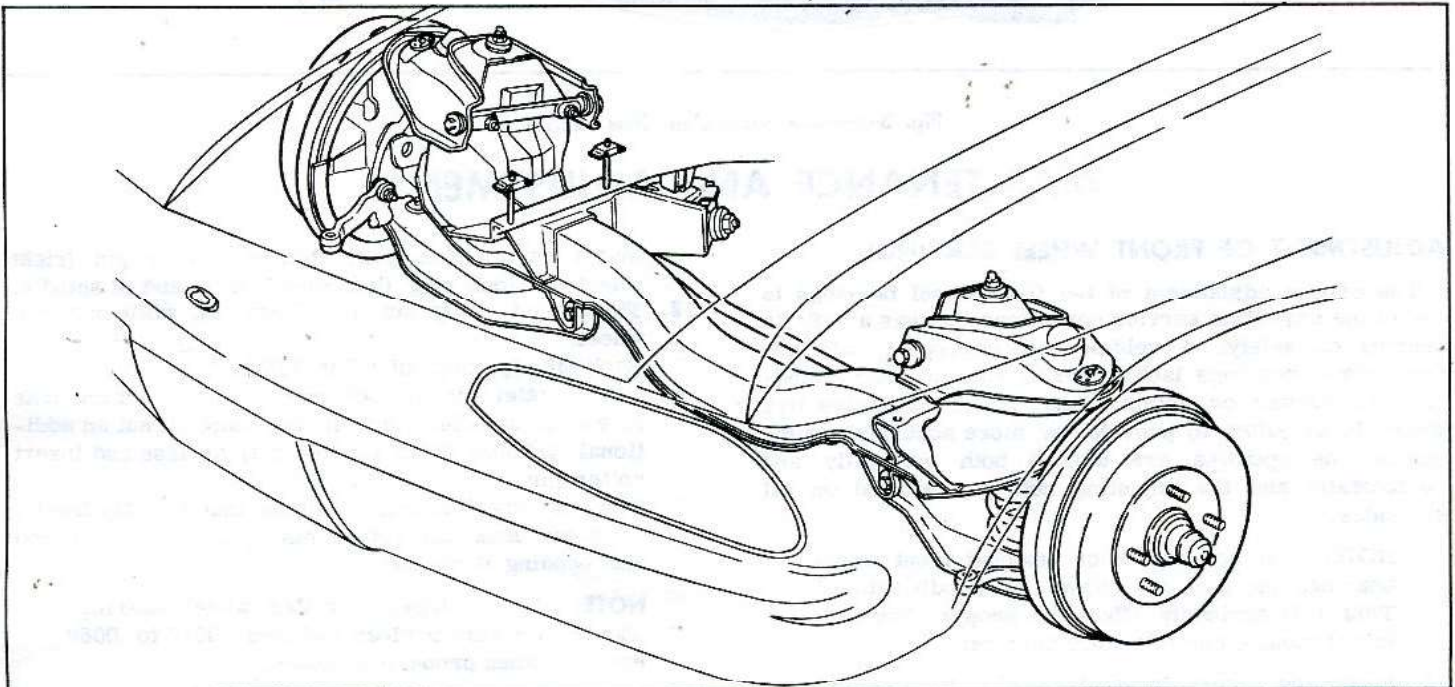


Fig. 3-1—Front Suspension



torque are controlled by strut rods running from the outer ends of the lower control arms to brackets which extend rearward from the front crossmember. These strut rods are adjustable to allow for caster setting. All vehicles are equipped with a stabilizer bar. The rubber jounce bumper encircles the shock absorber shaft and is

located between the shock absorber body and the spring tower.

Speedometer drive is from the left front wheel hub grease cap with the cable running through the hole bored through the center of the wheel spindle.

Figures 3-1 and 3-2 illustrate the entire front suspension assembly and a sectioned view of the left side.

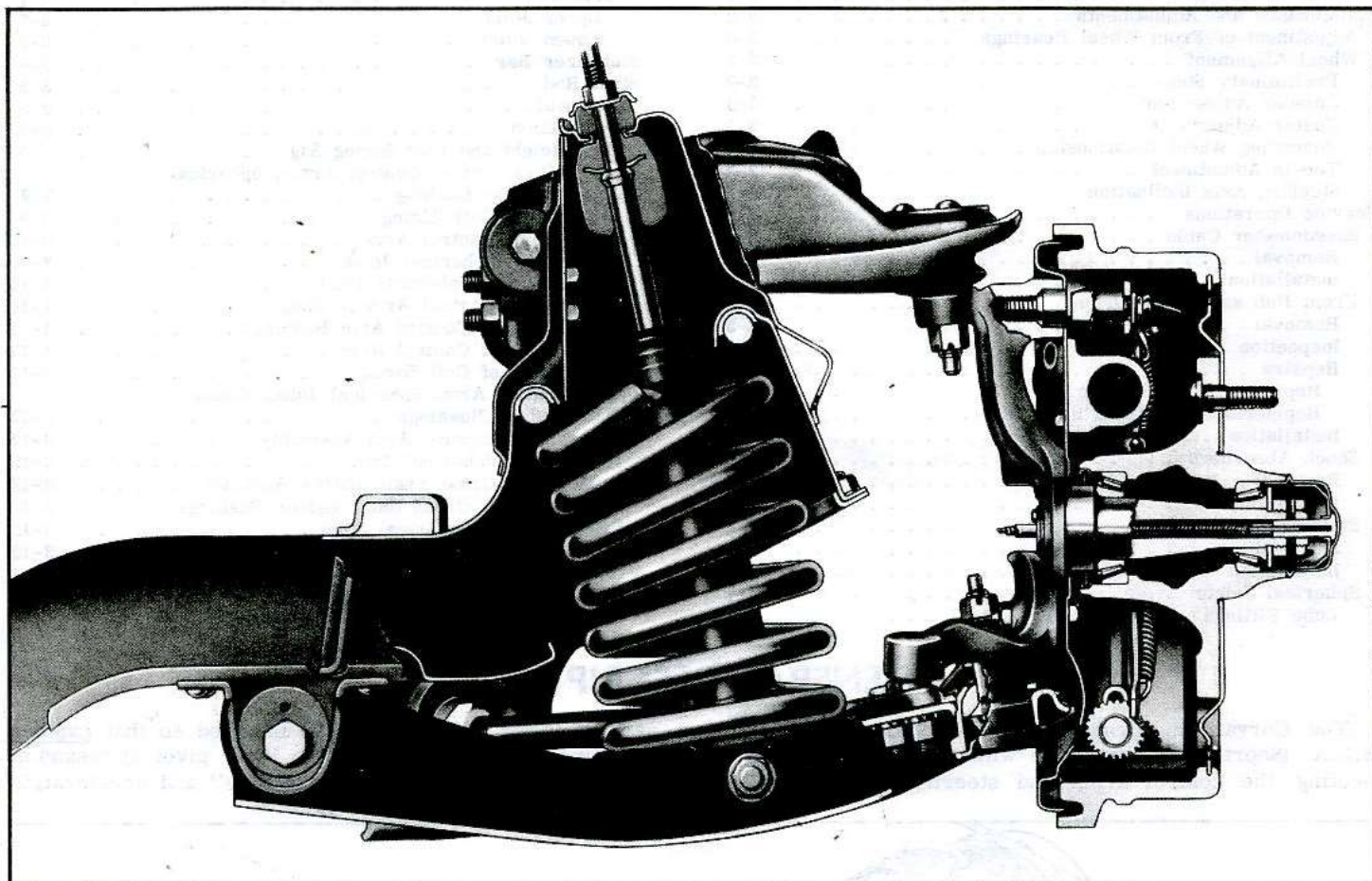


Fig. 3-2—Front Suspension Cross Section

## MAINTENANCE AND ADJUSTMENTS

### ADJUSTMENT OF FRONT WHEEL BEARINGS

The proper adjustment of the front wheel bearings is one of the important service operations that has a definite bearing on safety. A vehicle with improperly adjusted front wheel bearings lacks steering stability, has a tendency to wander or shimmy and causes excessive tire wear. In an effort to provide for more accurate adjustments, the spindles are drilled both vertically and horizontally and the adjusting nuts are slotted on all six sides.

**NOTE:** Do not repack or readjust front wheel bearings as part of "New Car Conditioning." This will seriously affect the proper "mating-in" of these close tolerance bearings.

1. Raise and secure front of vehicle. Remove hub cap and dust cap. Use care, when removing the dust cap from the left side, that the plastic speedometer drive

insert is not damaged. Remove cotter pin (right wheel) or lock ring (left wheel) from end of spindle.

2. Tighten adjusting nut to 100 lbs. in. while rotating wheel.
3. Back off adjusting nut 1 flat (1/6 turn of nut).
4. Insert cotter pin or lock ring if slot in nut and hole in end of spindle align. If not, back off nut an additional 1/2 flat (1/12 turn of nut) or less and insert cotter pin.
5. Spin the wheel to make certain that it rolls freely. Properly lock the cotter pin by spreading the end and bending it around.

**NOTE:** These tapered roller wheel bearings should have zero preload and from .001" to .008" end play when properly adjusted.

6. Install dust and hub caps.
7. Repeat operation (if necessary) on opposite side.



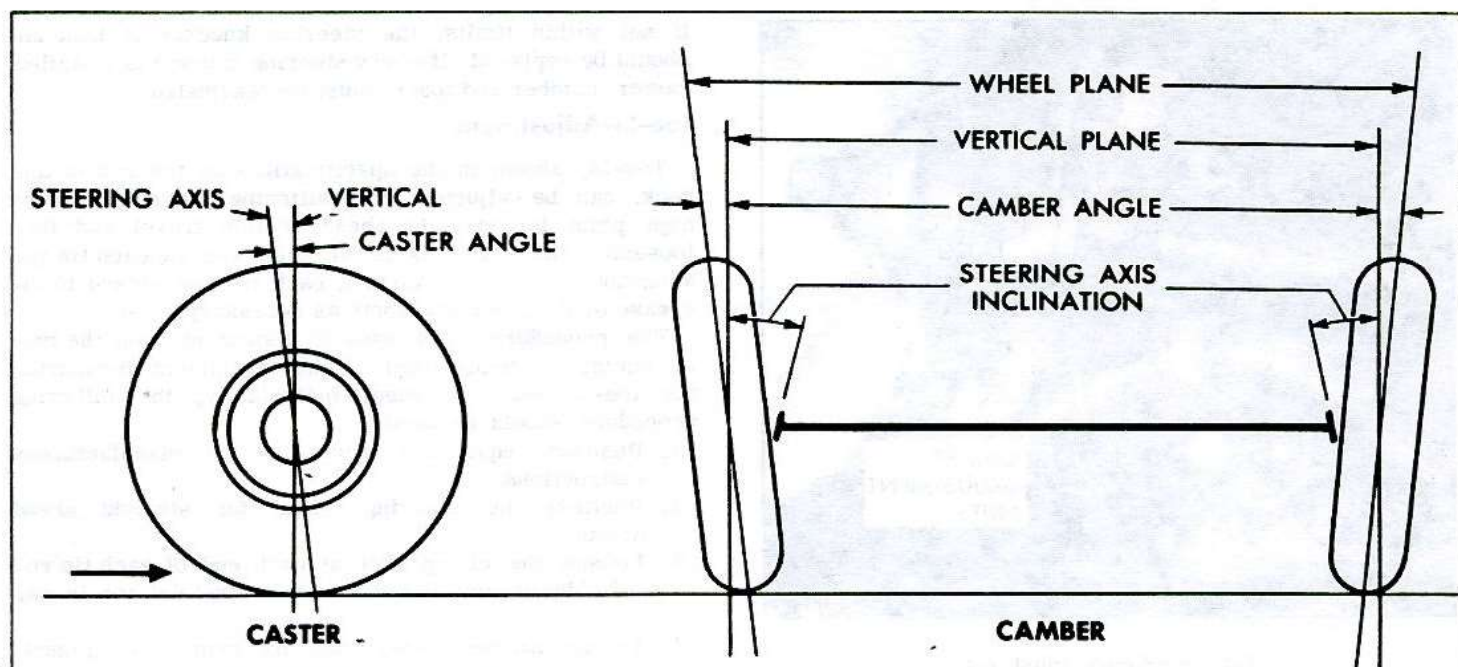


Fig. 3-3—Caster and Camber

8. Lower vehicle to floor.

## WHEEL ALIGNMENT

### Preliminary Steps

There are several different types of front end alignment machines, all of which outline proper procedure for checking the factors of wheel alignment. The instructions furnished by each manufacturer for the operation of his particular equipment should be followed. Regardless of type of equipment used, all checks must be made with the vehicle level, all tires inflated to their proper pressures and the curb weight of the vehicle on its wheels.

Steering complaints and tire wear are not always the result of improper wheel alignment. Therefore, it is recommended that the following factors be checked and corrected if necessary prior to placing the vehicle on the front end machine.

1. Loose or improperly adjusted steering gear.
2. Steering gear housing loose at frame.
3. Play or excessive wear in spherical joints.
4. Loose tie rod or steering connections.
5. Improper coil spring heights (front or rear).
6. Underinflated tires.
7. Unbalanced tires.
8. Wheel bearings improperly adjusted.
9. Shock absorbers not operating properly.
10. Overinflated front tires.

### Camber Adjustment

The camber angle (fig. 3-3) is the angle measured between a true vertical line and a centerline drawn through the vertical plane of the wheel and tire. Camber angle is adjusted by loosening the lower control arm pivot bolt and rotating the cams located on this pivot (fig. 3-4). This eccentric cam action will move the lower control arm in or out, thereby varying camber. The correct camber angle is shown in the Specifications at the

end of this book. Camber angles should be within  $1/2^\circ$  from side to side.

**NOTE:** The steering knuckles in this suspension should never be heated and/or bent in an effort to change front wheel camber. By bending the knuckle, the steering geometry is changed in such a way that the vehicle becomes susceptible to impact shimmy and continual lead. In addition, on vehicles with the front brakes mounted at more than one point on the steering knuckle, bending causes misalignment of brake components and may cause early failure or erratic response.

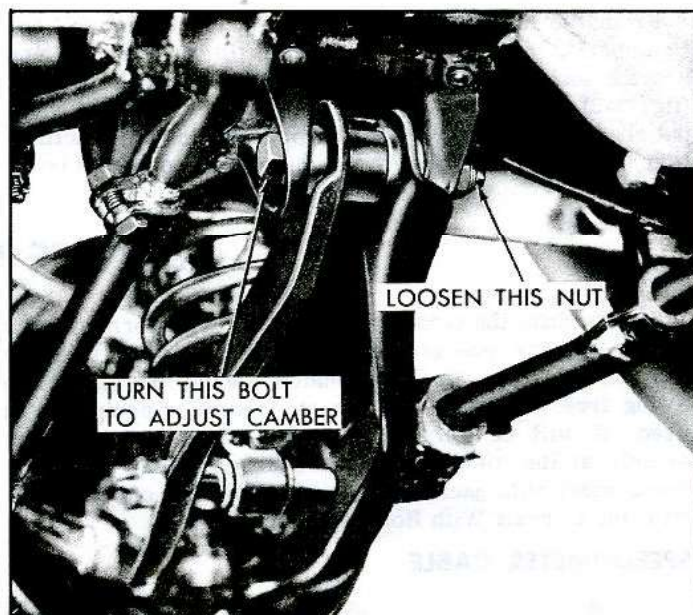


Fig. 3-4—Camber Adjustment



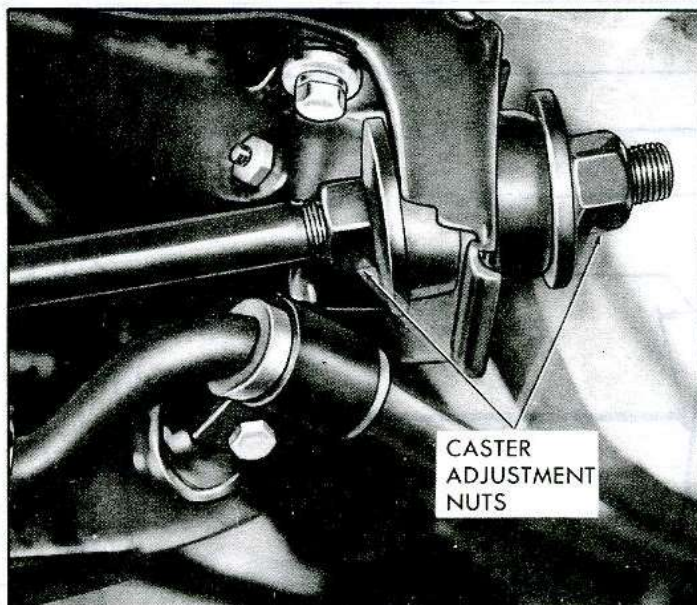


Fig. 3-5—Caster Adjustment

### Caster Adjustment

Caster (fig. 3-3) is adjusted by turning the two nuts at the rear of the strut rod (fig. 3-5). Lengthening this rod by turning the nuts increases caster, shortening this rod by turning the nuts decreases caster. Correct caster specifications will be found at the end of this book. Caster angles should be within  $1\frac{1}{2}^\circ$  from side to side.

**NOTE:** Due to manufacturing tolerances, it is possible to "run out of" threads on the strut rod or cause the front coil spring to be cocked in its seat and rub the spring tower. Only when this happens is it permissible to shim unevenly at upper control arm. However, if this is the case, camber must be rechecked.

### Steering Axis Inclination

From the definitions of "Steering axis inclination" and "camber", one being the inward tilt of the steering knuckle and the other being the outward tilt of the wheels, (fig. 3-3), it is evident that one cannot be corrected without changing the other. The correct steering axis inclination is shown in the Specifications at the end of this book.

## SERVICE OPERATIONS

To overhaul the front suspension or to perform various major service operations, it will be desirable to raise car on a hoist. The suspension should be allowed to swing free. If a twin post hoist or similar equipment is used, it will be necessary to support the front of the vehicle at the forward end of the body side rail extension (each side) with jackstands and lower front of hoist. See "Lifting Corvair With Hoist" in Section O.

### SPEEDOMETER CABLE

The speedometer drive is from the left front wheel in the 1965 Corvair rather than from the transmission output shaft as in past models. See Figure 3-6. The speedo-

If not within limits, the steering knuckle is bent and should be replaced. If a new steering knuckle is installed, caster, camber and toe-in must be readjusted.

### Toe-In-Adjustment

Toe-in, shown in the Specifications at the end of this book, can be adjusted by positioning steering gear on high point for straight ahead vehicle travel and then loosening the clamp bolts at each end of each tie rod adjusting sleeve and turning each tie rod sleeve to increase or decrease its length as necessary.

The procedure to be used is dependent upon the type of equipment being used. Using equipment measuring the toe-in of each wheel individually, the following procedure should be used:

1. Position equipment according to manufacturers instructions.
2. Position the steering wheel for straight ahead driving.
3. Loosen the clamp bolt at each end of each tie rod individually and adjust one-half the total toe-in per wheel.
4. Tighten tie rod clamp bolts and remove equipment.

If a tram gauge is utilized, the following procedure should be used:

1. Set wheels in a straight ahead position.
2. Set tram gauge in position according to equipment manufacturers specifications.
3. Loosen the clamp bolts on one tie rod and adjust total toe-in.
4. Loosen opposite tie rod clamp bolts. Turn both tie rods the same amount and in the same direction to place the steering gear on its high point and position the steering wheel for straight ahead driving.
5. Tighten tie rod clamp bolts and remove tram gauge.

### Cornering Wheel Relationship

"Cornering Wheel Relationship," or "toe-out on turns," is determined by the angle of the steering arms. If, when checking, "toe-out on turns" does not fall within specifications, it will be necessary to replace the steering arm on the wheel side that does not come within limits.

**NOTE:** To accurately adjust the front suspension, all extra weight should be removed from the front compartment. The gasoline tank should be full.

meter cable runs to the inside of the wheel where it is bracket mounted to the steering knuckle. The cable then runs through a hole drilled in the spindle. The square end of the cable pilots into the square center hole of a plastic insert which is part of the hub grease cap. The usual cotter pin cannot be used to lock the spindle nut in place because of the cable through the spindle. In its place a special lock ring is used on the left spindle nut only. When performing the following service operations keep in mind these differences, especially the plastic insert in the hub grease cap. Removal and installation of the cap should be performed with care so as not to damage the insert.



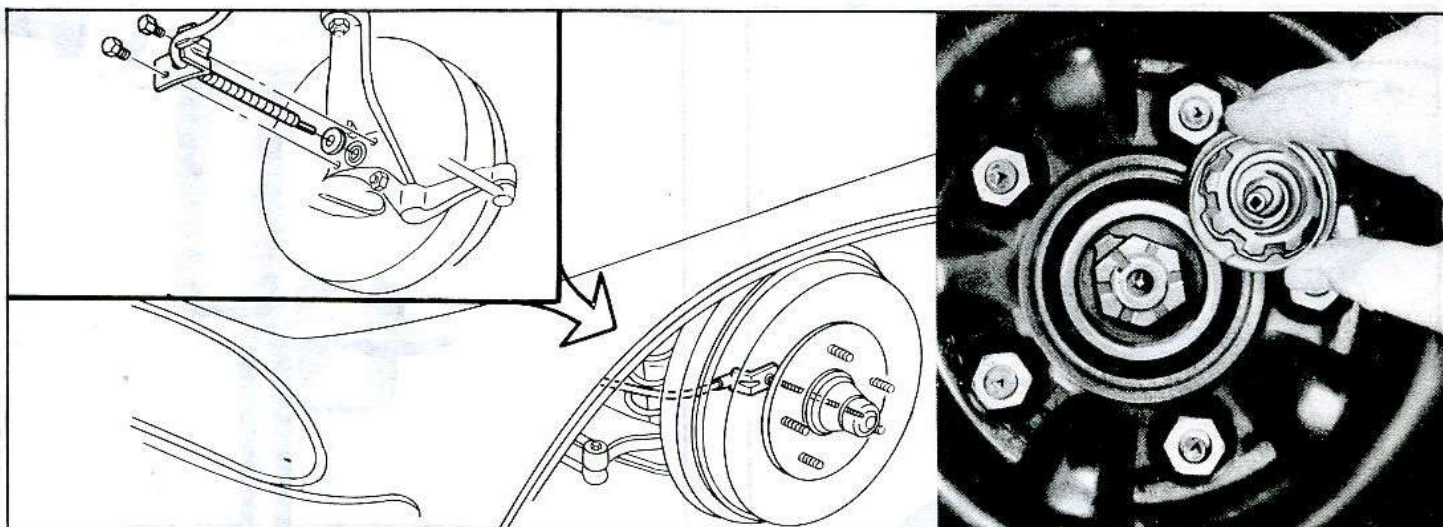


Fig. 3-6—Speedometer Cable

**Removal**

1. Remove the two speedometer cable bracket to steering knuckle attaching screws and carefully pull the cable and seal from the spindle.

**Installation**

1. Remove the hub cap or wheel cover from the left front wheel and then carefully pry the grease cap from the wheel hub.
2. With the seal in place over the speedometer cable, carefully slide the cable into the hole in the spindle and attach the bracket to the steering knuckle with its two attaching screws (30-50 lbs. in. torque).
3. Reinstall the grease cap as follows: set the cap in place over the hub and rotate it with your fingers until you feel the speedometer cable enter the plastic grease cap insert. Then, using a screwdriver, carefully tap around the bead of the cap until it is seated. (If available, Tool J-6417 may be used to install the grease cap.)

**CAUTION:** Do not pound on the end of the cap.

**FRONT HUB AND BRAKE DRUM**

The front hub and brake drum are separate components and may be easily separated after removing the wheel nuts and wheel.

**Removal**

1. Remove hub caps, break loose (less than one full turn) the wheel to hub bolt nuts, raise vehicle from floor, place on jack stands and remove wheels.
2. Remove brake drum, hub grease cap, (use care when removing the left front grease cap) cotter pin or lock ring, spindle nut, spindle washer and remove hub assembly. Do not allow roller bearing to fall out onto floor and become damaged.

**NOTE:** In some cases it may be necessary to back off brake adjustment because of scored drums or badly worn linings.

3. Remove outer bearing from hub. The inner bearing will remain in the hub and may be removed by

prying out the inner bearing seal assembly. Discard old seal.

4. Wash all parts thoroughly in cleaning solvent.

**Inspection**

1. Check all bearings for cracked bearing separators or worn or pitted rollers.
2. Check bearing outer races for cracks or pitting.
3. Check brake drum for out of round or scored condition.
4. Check bearing outer face for looseness in hub.

**Repairs****Replacement of Bearing Races**

1. Using steel bar stock, make press-out tools shown in Figure 3-7.

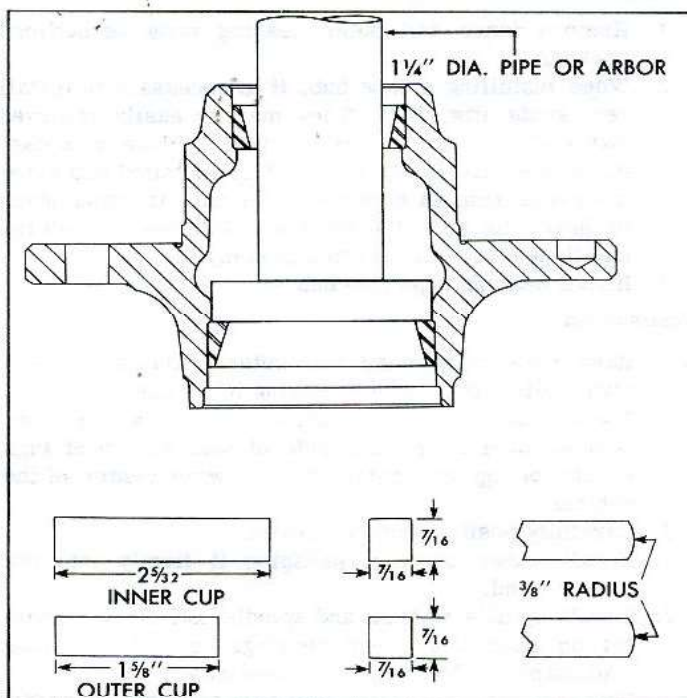


Fig. 3-7—Bearing Cup Removing Tools



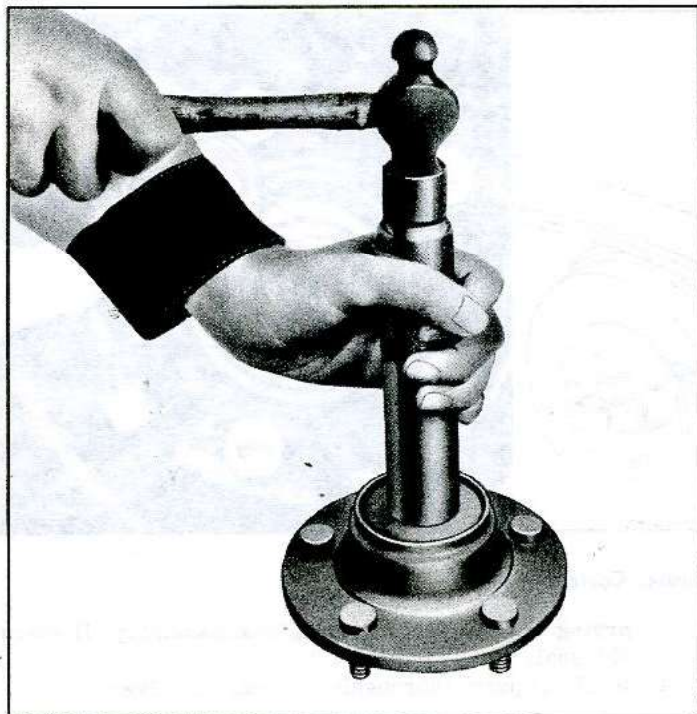


Fig. 3-8—Installing Bearing Cups

2. Place appropriate tool behind bearing cup, indexing tool in provided notches, and press out cup with arbor press.
3. Install new bearing cup in hub using Tool J-8849 on the outer race and Tool J-8850 on the inner race. Tool J-8092 (Driver Handle) must be used with the above installers (fig. 3-8).
4. Make certain that the cup is not cocked and that it is fully seated against shoulder in hub.

#### Replacement of Wheel Hub

1. Remove inner and outer bearing cups as outlined previously.
2. When installing a new hub, it is necessary to install new studs (fig. 3-9). They may be easily removed and installed on an arbor press. Place a socket under the stud being removed or installed and bring the press ram in direct contact with the stud shank or head. Be sure the head is in full contact with the hub flange when installation is complete.
3. Install bearing cups into hub.

#### Installation

1. Hand pack both inner and outer bearings, using a high melting point wheel bearing lubricant.
2. Place inner bearing in hub, and install a new inner bearing seal assembly. Side of seal with bent lugs should be up as installed, or toward center of the vehicle.
3. Carefully position hub on spindle.
4. Install outer bearing, pressing it firmly into the hub by hand.
5. Install spindle washer and spindle nut. Draw spindle nut up snug and adjust bearings as outlined under "Adjustment of Front Wheel Bearings."
6. Using a piece of fine sand paper, lightly sand the inside braking surface of brake drum to insure a clean surface and proper brake operation. Using

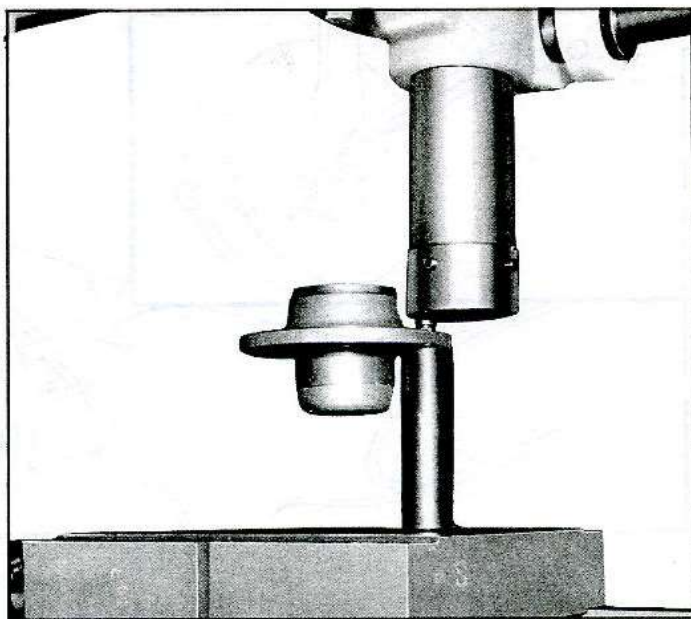


Fig. 3-9—Installing Hub Bolts

compressed air, blow all loose foreign material from drum. Do not use a cloth and attempt to wipe out drum as the braking surface may become contaminated with grease, oil, etc., from the cloth.

#### FRONT SHOCK ABSORBERS

##### Removal

1. Hold shock absorber upper stem on flat section and remove upper attaching nut, cup washer and grommet (fig. 3-10).

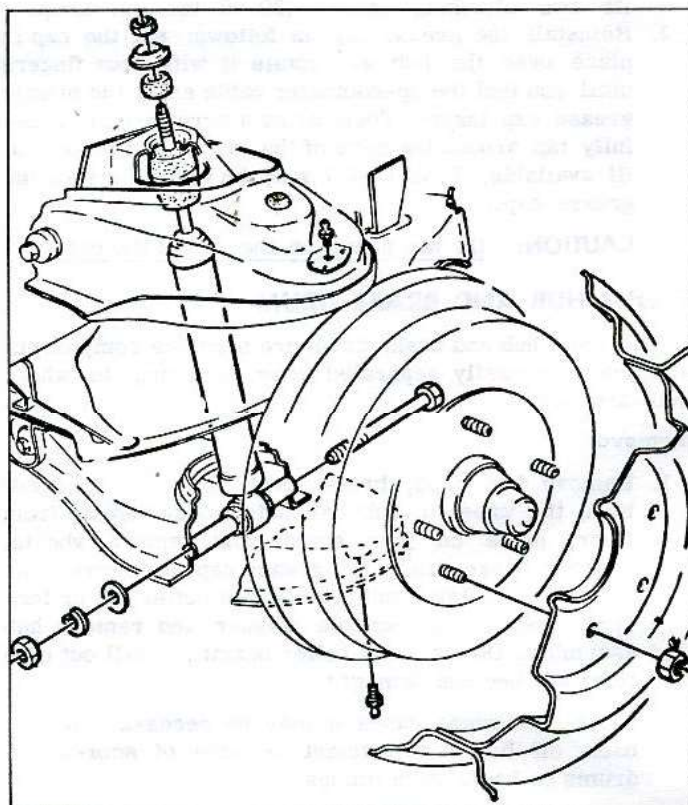


Fig. 3-10—Shock Absorber Installation



2. Properly support vehicle with hoist and/or jack stands so that front suspension "hangs free" and so that clearance is sufficient on front lower control arms to allow removal of shock absorber.
3. Remove the shock absorber lower attaching bolt, nut and lock washer and flat washer.
4. Withdraw shock absorber and bumper.

#### Installation

1. Install bumper on shock absorber shaft. Pull out shaft to extend it to its full length.
2. Install shock absorber up through lower control arm and through coil spring. Be certain shaft protrudes out of small hole in top of spring tower.
3. Install lower attaching bolt, flat washer, lock washer and nut.
4. Lower vehicle to floor.
5. Holding upper flat, install upper retaining nut.

### 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 lower control arm with an adjustable jackstand to safely retain spring and lower control arm in their curb height position.

#### Removal

1. Raise vehicle and support lower control arm as noted above.
2. Remove hub cap, wheel hub dust cap, cotter pin (right side) or lock ring (left side), wheel bearing adjusting nut and washer, and remove wheel, tire, brake drum and wheel hub from the spindle.

**CAUTION:** Use care when removing the left dust cap that no damage is done to the plastic speedometer cable drive insert in the cap.

3. Remove brake shoes.

**CAUTION:** Keep brake shoes clean and dry.

4. Remove brake anchor pin and two bolts securing brake backing plate and steering arm to steering knuckle.
5. Withdraw steering arm and brake backing plate from steering knuckle. Wire backing plate to sheet metal. Do not disconnect brake line.

**NOTE:** Refer to Section 4--Steering, Service Operations entitled Steering Linkage--Tie Rod, for further steering arm service operations.

6. If working on the left steering knuckle, remove the two bolts attaching the speedometer cable bracket to the knuckle and carefully remove the cable.
7. Remove upper ball stud cotter pin and nut. Strike steering knuckle upper boss, backing up with another hammer, to loosen ball stud.
8. Remove lower ball stud cotter pin and nut. Strike steering knuckle lower boss as in Step 7 above. Raise up and withdraw steering knuckle.

#### Installation

1. Place steering knuckle over lower ball stud, install nut and tighten 30-40 lbs. ft. Insert new cotter pin.

2. Drop upper control arm ball stud into steering knuckle upper boss, install nut and tighten 30-40 lbs. ft. Insert new cotter pin.
3. On left knuckle, carefully insert the speedometer cable into the hole through the center of the spindle and attach the bracket with two bolts. Torque to 30-50 lbs. in.
4. Assemble backing plate to steering knuckle with brake anchor bolt.
5. Assemble steering arm to steering knuckle and insert steering arm bolts and lock nuts through backing plate, steering knuckle and steering arm. Tighten nuts 40-50 lbs. ft.
6. Tighten brake anchor bolt to 70-90 lbs. ft.
7. Install brake shoes.
8. Install wheel hub assembly over steering arm spindle. Then install washer and wheel bearing adjusting nut, brake drum, wheel and tire.
9. Adjust bearings. Insert new cotter pin, dust cover and hub cap. On the left side of vehicle, be sure that the speedometer cable end is correctly positioned in the plastic insert in the left side dust cover.
10. Remove adjustable jackstand and lower vehicle.
11. Recheck and readjust front wheel alignment where necessary.

### SPHERICAL JOINTS

#### Lube Fittings

Special self threading type lube fittings are used in the spherical joint assemblies. If it is necessary to replace a fitting a standard threaded type may be used. However, replacement spherical joint assemblies are supplied less the lube fitting. Therefore it will be necessary to install a self threading type fitting into the untapped hole provided when replacing the entire assembly.

#### Inspection

##### Upper

The upper spherical joint is checked for wear by checking the torque required to rotate the ball stud in the assembly. Use the following procedure:

1. Support vehicle weight at outer end of front suspension lower control arm.
2. Remove wheel and tire assembly.
3. Remove cotter pin and nut from upper control arm ball stud.
4. Back up the knuckle with a hammer and tap with another hammer to break the stud loose, then remove the stud from the steering knuckle.

**CAUTION:** Use care when striking the knuckle that the seal is not damaged.

5. Raise control arm to clear knuckle. Install a stud nut on the stud and measure the torque required to turn the stud in the assembly with a torque wrench. This should be a minimum of 2 lbs. ft. If excessive wear is indicated in upper joint, both upper and lower joints should be replaced. If a tight joint is suspected, 4 lbs. ft. is the maximum allowable torque with the joint well lubricated.
6. Lower control arm and install joint into knuckle. Install nut and cotter key. (If joint is to be replaced, cotter key need not be installed at this time. For replacement see "Upper Control Arms, Spherical Joints, Cross Shaft and/or Bushings").



7. Install the wheel and tire assembly.
8. Lower vehicle to floor.

### Lower

The lower control arm spherical joint should be replaced whenever wear is indicated in the upper joint inspection.

**NOTE:** The lower control arm spherical joint is a loose fit in the assembly when not under load.

Only if inspection of each upper joint indicates them both to be within limits, inspect each lower joint for excessive wear as follows:

1. Support vehicle weight on wheels or wheel hubs.
2. With outside micrometer or caliper, measure distance from tip of lubrication fitting to upper surface of ball stud (fig. 3-11) and record the dimensions for each side.

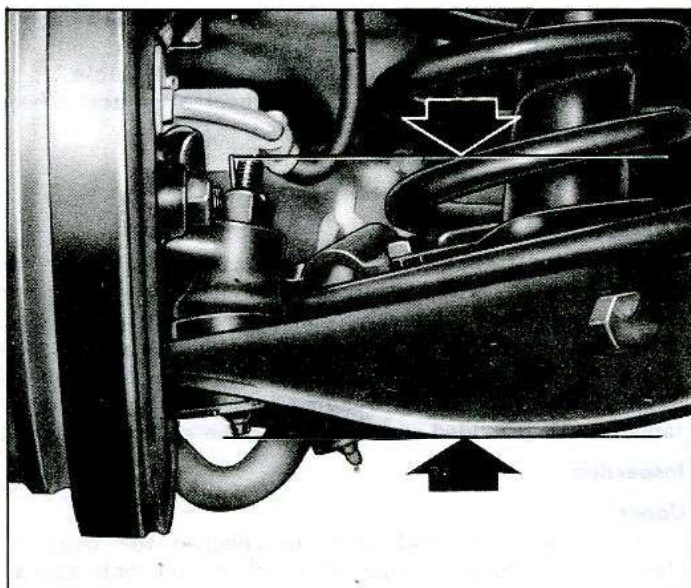


Fig. 3-11—Checking Lower Spherical Joint

3. Then support vehicle weight at outer end of each lower control arm, so that wheels or wheel hubs are free, then repeat Step 2.
4. If the difference in dimensions on either side is greater than  $1/16$ " (.060"), the joint is excessively worn and both lower joints should be replaced.

If inspection of lower spherical joints does not indicate excessive wear, inspect further as follows:

5. Examine lubrication hole in each joint assembly after cleaning out hole. Look for evidence of the liner partially or fully blocking lubrication opening. Such evidence indicates that liner is disintegrating and that both lower spherical joints should be replaced.

Another indication of lower spherical joint excessive wear is indicated when difficulty is experienced when lubricating the joint. If the metal liner has worn to the point where the lubrication grooves in the liner have worn away, then abnormal pressure is required to force lubricant through the joint. This is another reason to recommend replacement of both lower joints.

If the above inspections do not indicate any reason for spherical joint replacements, test the torque tightness of the lower ball stud on each side as follows:

1. Wire-brush off nut and cotter pin attaching spherical joint ball stud to steering knuckle and examine for evidence of looseness of stud in knuckle.
2. If no evidence of looseness, remove cotter pin and with prick punch or equivalent, mark nut and stud to identify relative location later.
3. Tighten attaching nut to original position and observe torque reading. If less than 45 lbs. ft., stud may have been loose in steering knuckle and replacement of both spherical joints should be recommended. See "Removal" and "Installation" of Spherical Joint.

### STABILIZER BAR

Located to the rear of the front wheels, the front stabilizer is a steel bar interconnecting each lower control arm. It is attached directly to the arms through rubber bushings held in place by stamped brackets. Rubber bush links bolted to the front cross-member support the center portion of the bar. Figure 3-12, illustrating the points of attachment of the bar, may be used for reference during removal and installation procedures.

The stabilizer bar support with its upper bushing is serviced as an assembly. The support to stabilizer bar bushing as well as the stabilizer bar to lower control arm bracket bushing may be replaced.

### STRUT ROD

#### Removal

**NOTE:** The vehicle need not be raised, but for working clearance it may be desirable.

1. Remove the two nuts, bolts and lock washers that secure the front end of strut rod to lower control arm, and remove the arm stop bracket.

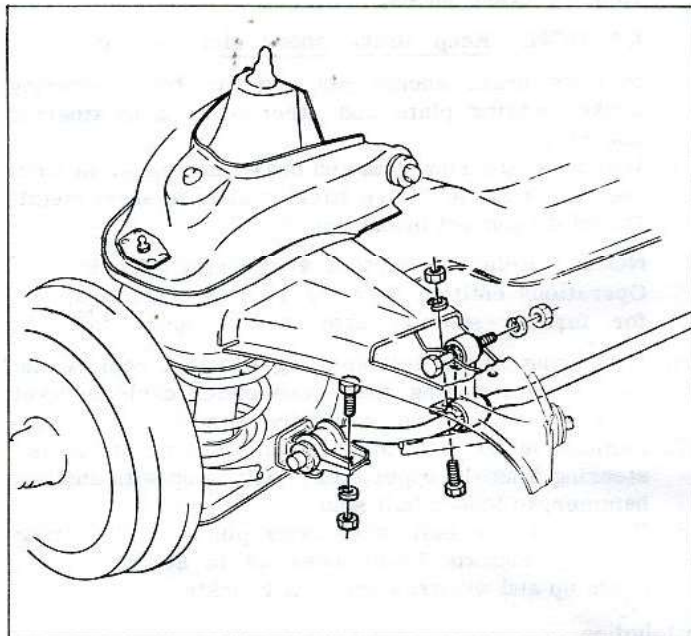


Fig. 3-12—Stabilizer Bar Attachment



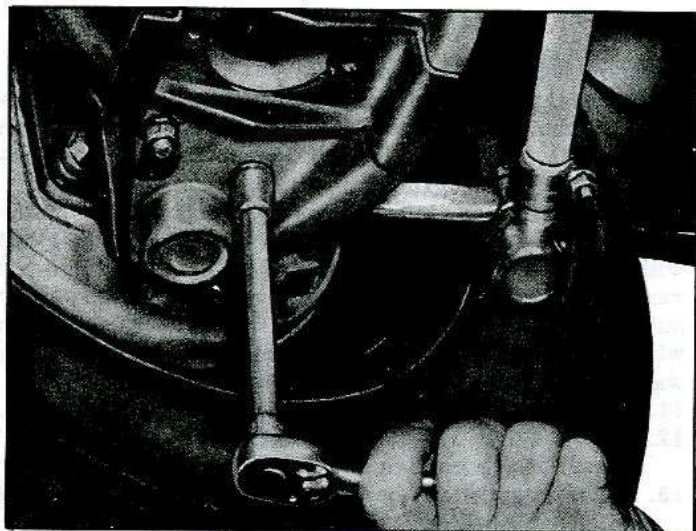


Fig. 3-13—Removing Strut Rod Nut

**NOTE:** There is slight tension on the rod caused by the rubber grommets at rear of strut rod.

2. Remove the nut, washer and grommet from rear end of strut rod (fig. 3-13).
3. Withdraw strut rod from crossmember bracket. Remove rubber grommet, spacer, washer and nut from rod.

#### Installation

1. Install the forward nut onto the rod. Position it about 1" from front end of threads. Install the nut, washer, spacer and grommet.
2. Set strut rod in place in crossmember bracket. Install the remaining grommet, washer and nut. Snug up the rear nut.
3. Install the rod and arm stop bracket to the lower control arm with the attaching bolts, lock washers and nuts.
4. Lower vehicle to floor (if raised) and reset caster as outlined earlier in this section.

#### RIDING HEIGHT AND COIL SPRING SAG

In cases of vehicle riding height complaints, a coil spring height check will show if the front suspension is at the proper height.

1. Position car on smooth, level floor. The vehicle should be at curb weight (a full tank of gasoline but an empty front compartment, except for spare tire when installed in the trunk).
2. Bounce and rock the car several times and allow it to settle to a normal height.
3. Measure the distance from the floor of shop area to the top of the wheel well opening at the centerline of the front wheel (fig. 3-14).
4. Correct measurement will be found in the Specifications at the rear of this book.
5. Measure the opposite side of the vehicle in a similar manner. It is essential that the two differences be within 1/2".
6. To correct the height, springs must be replaced. These springs do not have flat ends and shims must not be used.

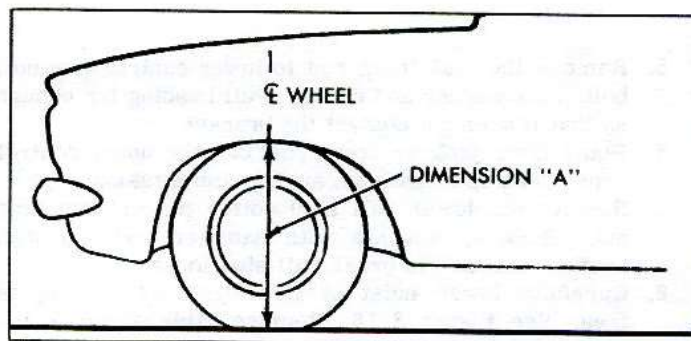


Fig. 3-14—Checking Riding Height

**NOTE:** This check should be used in conjunction with the rear spring check to be certain that overall "sag" (trim) is within 1/2".

#### FRONT COIL SPRINGS, LOWER CONTROL ARMS, SPHERICAL JOINTS AND/OR BUSHINGS

See preceding "Riding Height and Front Coil Spring Sag" checking procedure. If in doubt as to condition of spherical joints, proceed as outlined under "Inspection of Spherical Joints".

#### Removal of Coil Spring

1. Place vehicle on suitable hoist or jackstands. The front control arms must be allowed to swing free and positioned so that they (the control arms) may be raised or lowered with the hoist (front post on a twin post, etc.) or floor jack.
2. Remove shock absorber as outlined previously.
3. Loop Cable J-4988, or suitable chain, up around the third spring coil and, using a 1/2" nut and bolt, attach the cable through one of the shock absorber lower bolt holes (fig. 3-15).
4. Remove the two strut rod to control arm, nuts, bolts and lock washers and the arm stop bracket.

**NOTE:** The strut rod is under slight tension from the rubber grommet on opposite end.

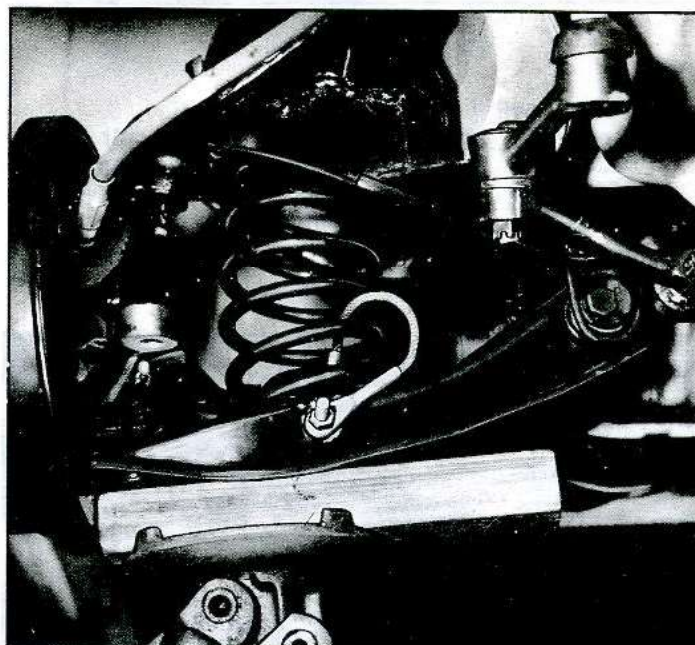


Fig. 3-15—Tool J-4988 Installed



5. Remove the stabilizer rod to lower control arm nut, bolt, lock washer and clamp. Pull bushing far enough so that it does not contact the bracket.
6. Place floor jack or front post of hoist under control arm. Take up slightly on spring compression.
7. Remove the lower ball stud cotter pin and attaching nut. Back up knuckle with hammer and tap with another hammer to break ball stud loose.
8. Carefully lower hoist or floor jack until spring is free. See Figure 3-16. Remove cable or chain installed in Step 3 and withdraw spring.

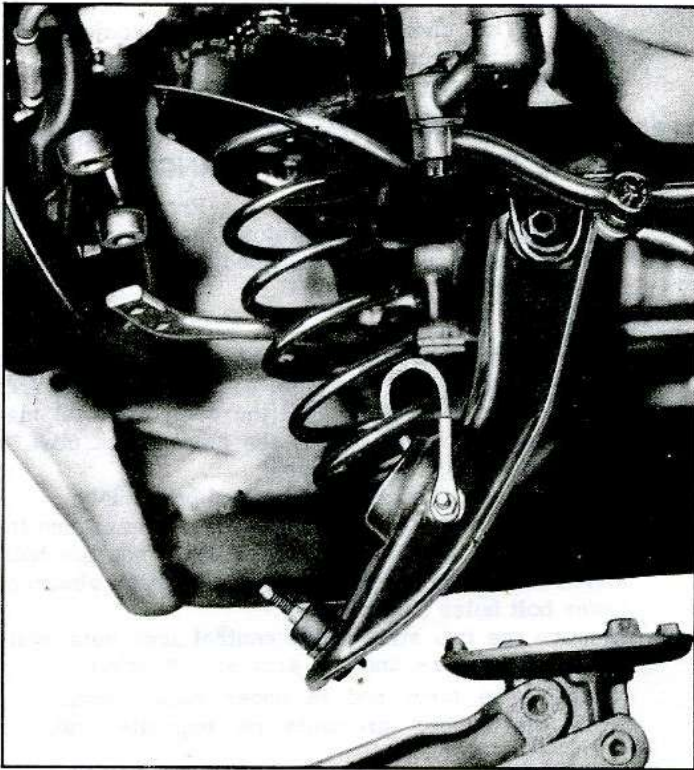


Fig. 3-16—Spring Relaxed

#### Removal of Control Arm

9. Scribe the location of the inner pivot bolt cam so that it may be reinstalled in exactly the same position. Then remove the inner pivot nut, lock washer, outer cam and the adjusting cam bolt assembly. See Figure 3-17.
10. Remove the control arm.

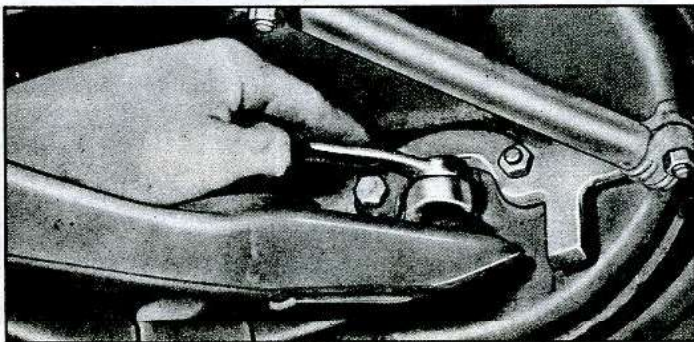


Fig. 3-17—Removing Lower Control Arm

#### Removal of Spherical Joint

Spherical joint removal is performed in the same manner whether the control arm has been removed from the vehicle or not. If the arm has previously been removed it may be supported in a vise.

To remove the joint with the arm installed in the vehicle, support the lower control arm at its outer end with a hoist or floor jack located clear of the joint and remove the wheel and tire. Remove the upper and lower ball stud nuts and free the studs from the knuckle, then wire the knuckle and brake drum assembly out of the way.

11. With a screw driver, pry off the seal and retainer.
12. Install Tools J-9519-10, J-21058-6 and a 7/8" (1/2" drive) deep socket as shown in Figure 3-18.
13. Turn down on the hex head screw until the spherical joint is pushed out.

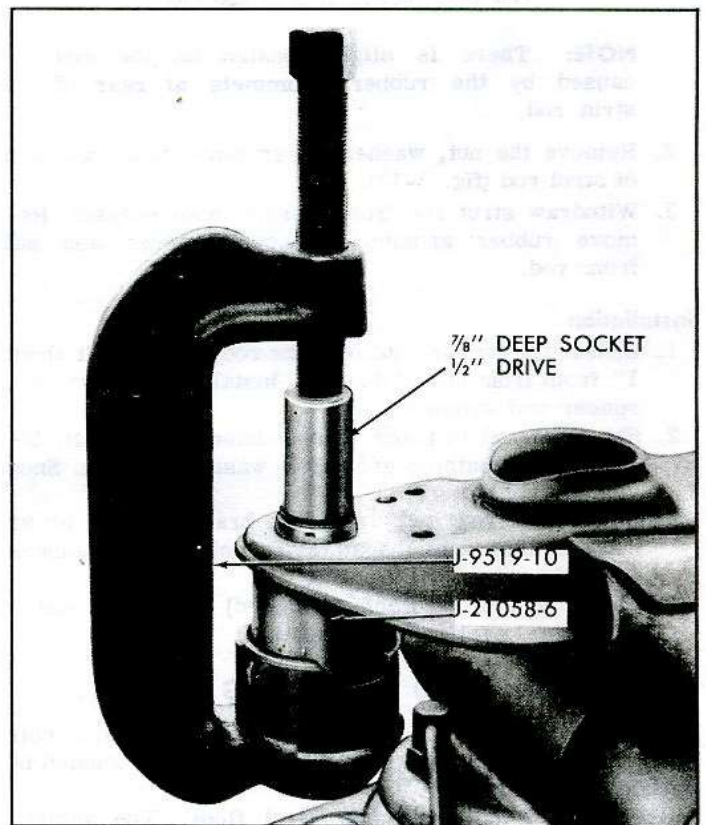


Fig. 3-18—Removing Spherical Joint

#### Installation of Spherical Joint

14. Start the replacement ball stud into the control arm and install Tools J-9519-10, J-9519-16 and J-21058-6 as shown in Figure 3-19.
15. Turn down the hex screw until the ball stud is seated properly in the control arm.
16. Install the studs in the steering knuckle, secure in place with the attaching nut, tighten nut and install the cotter pin.
17. Replace the wheel and tire.
18. Lower the vehicle to the floor.

#### Removal of the Control Arm Bushing

19. With the control arm removed from the vehicle, set up the removal tools as shown in Figure 3-20.



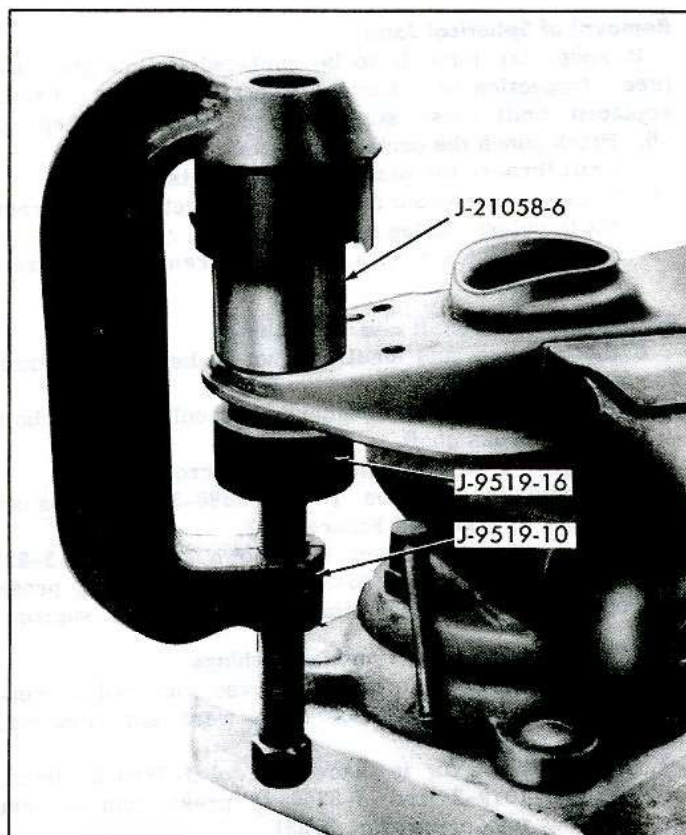


Fig. 3-19—Installing Spherical Joint

Notice that the bushing must be pressed from the front of the control arm (the side opposite the stabilizer bar bracket) on the end of the bushing

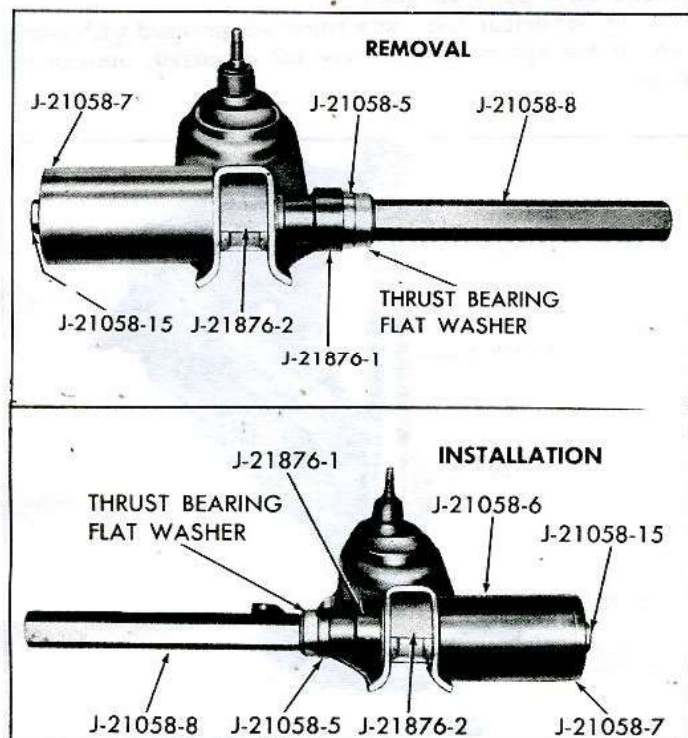


Fig. 3-20—Removing and Installing Lower Control Arm Bushings

that does not have the large collar on the outer shell.  
20. Turn down the hex head screw until the bushing is pressed free.

#### Installation of Control Arm Bushing

21. With the bushing hand-started into the control arm, set up the installation tools as shown in Figure 3-20. Notice that the bushing must be pressed into the arm from the rear (the side on which the stabilizer bar bracket is mounted) and that the bushing must be pressed from its flanged end.
22. Turn down on the hex head screw until the bushing flange is seated flush on the control arm.

#### Installation of Control Arm

23. With the bushing installed and both bushing caps in place, insert the arm into the crossmember bracket.
24. Install the cam adjusting bolt, outer cam, lock washer and loosely install the nut.
25. Line up the camber adjusting cams with the scribe marks made during the removal procedure.
26. Install the spherical joint stud into the steering arm and tighten the nut to 30 to 40 ft. lbs. torque.
27. While holding the cam adjusting bolt with a wrench to keep it from turning tighten the nut to 90-120 ft. lbs. torque.

#### Installation of Front Coil Spring

28. Place spring up into spring tower, determine its proper positioning, and then rest its lower end on the lower control arm spring seat. Then install Cable J-4988 or a suitable length chain around the third coil of the spring and secure to one of the shock absorber bolt holes by means of a 1/2" nut and bolt. See Figure 3-21.

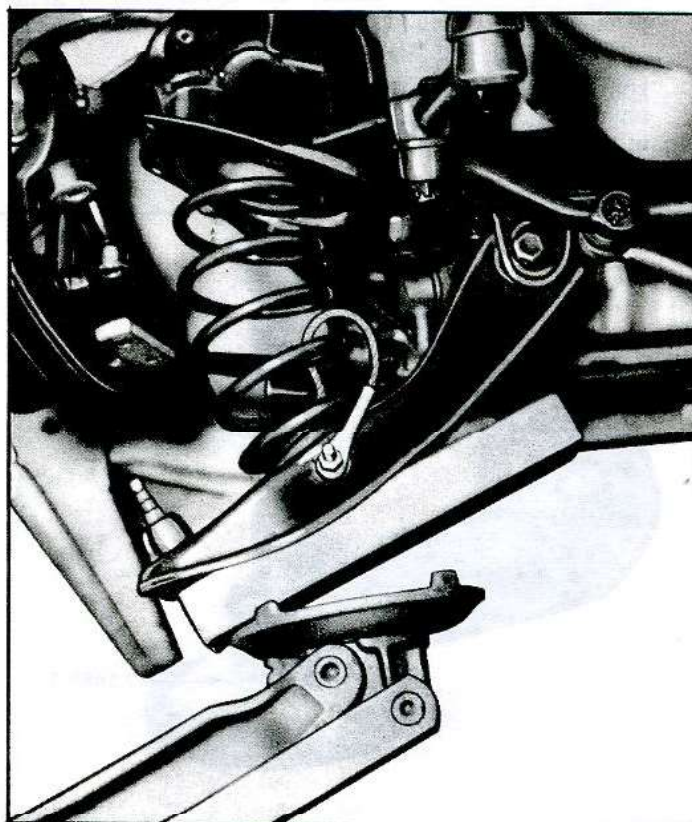


Fig. 3-21—Installing Coil Spring



29. Install the stabilizer bar to lower control arm bracket bushing.
30. Raise control arm, line up the ball stud and steering arm and install the nut. Tighten the nut to 30-40 ft. lbs. torque and install the cotter pin.

**NOTE:** A wooden block between the lift and the control arm will make this lifting operation easier.

31. Attach strut rod and arm stop bracket to control arm with two attaching bolts, nuts and lock washers.

**NOTE:** The tension in this rod is due to the rubber grommet at the opposite end of rod. Do not touch the large nuts at grommet end as these control caster adjustment.

32. Install stabilizer bar clamp, nut, bolt and lock washer over the stabilizer bar bushing. Torque to 100-140 in. lbs.
33. Install the shock absorber as outlined previously.
34. Lower vehicle to floor.

### UPPER CONTROL ARM, SPHERICAL JOINT, CROSS SHAFT AND/OR BUSHINGS

#### Removal of Control Arm Assembly

1. Support vehicle weight at outer end of lower control arm.
2. Remove wheel and tire assembly.
3. Remove cotter pin and nut from upper control arm ball stud.
4. Break the stud loose from the knuckle by backing up the knuckle with a hammer and tapping with a second hammer.
5. Remove two nuts retaining the upper control arm cross shaft to front crossmember. Note number of shims at each bolt if any are present.

**NOTE:** It is unlikely that any shims will be found at this location. See "Caster Adjustment" in this Section.

#### Removal of Spherical Joint

If spherical joint is to be replaced, follow Steps 6-9 (see "Inspection of Spherical Joints"). If it is not to be replaced omit these steps and proceed with Step 10.

6. Prick punch the center of the four rivets.
7. Drill through the heads of these rivets.
8. Using a sharp cold chisel cut off rivets being careful not to enlarge holes in control arm.
9. Tap out rivets with a punch and remove joint from control arm.

#### Removal of Cross Shaft and/or Bushings

If the bushings and shaft are not to be removed, omit the following steps.

10. Remove bolts, lock washers, and collars from both ends of cross shaft.
11. Install a 5/16"-24 bolt in end of cross shaft.
12. Set arm in place on Tool J-5888-3 and press out bushing as shown in Figure 3-22.
13. Turn control arm over (as shown in Figure 3-22) and using Tool J-8345-3 and Tool J-7079-2, press out second bushing using J-5888-3 as a support.

#### Installation of Cross Shaft and/or Bushings

If bushings or shaft were removed, proceed as outlined below. If bushings or shaft were not removed, omit Steps 1-4.

1. Set control arm in place on Tool J-5888-3. Using Tool J-7079-2 and J-8345-2, press control arm bushing into place (fig. 3-23).
2. Install cross shaft in arm, invert in press and, with Tool J-8345-1 in place to keep arm from flexing, press in second bushing.
3. Cross shaft should be able to be turned by hand.
4. Install collar, lock washer and bolt in ends of cross shaft. Do not tighten at this time.

#### Installation of Spherical Joint

If the spherical joint was removed, proceed with Steps 5-6. If the spherical joint was not removed, omit these steps.

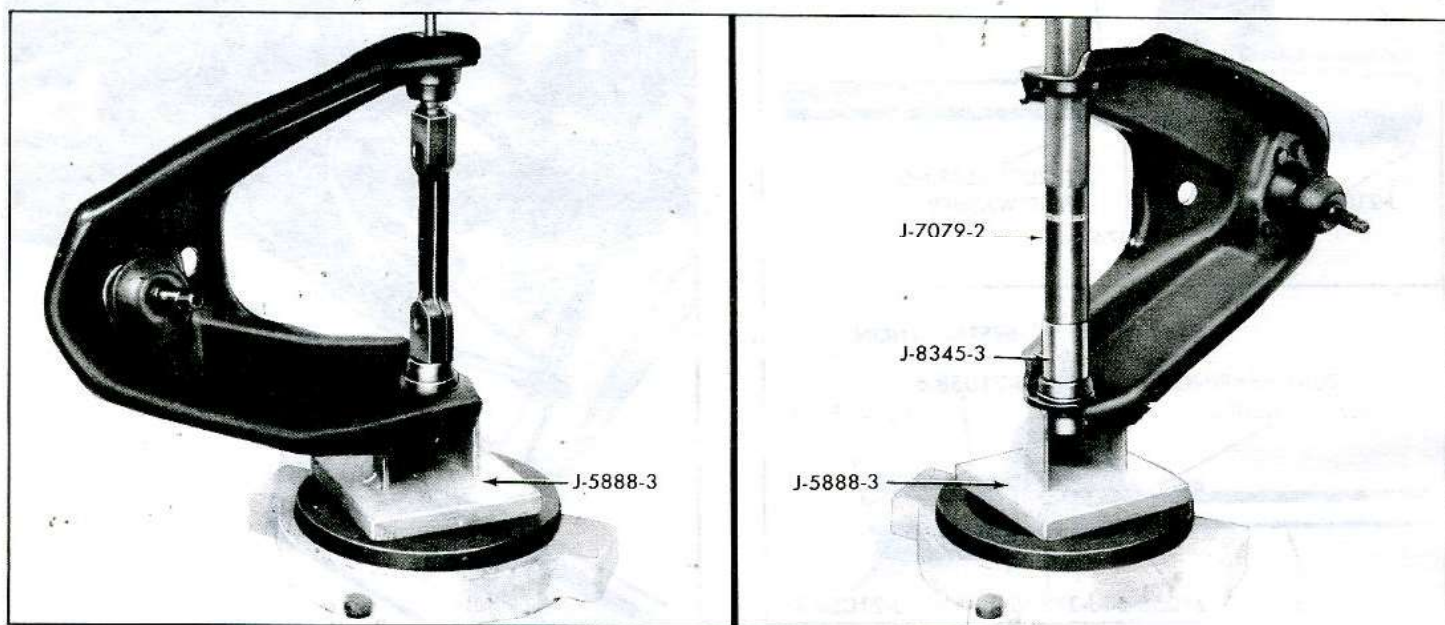


Fig. 3-22—Removing Upper Control Arm Bushings



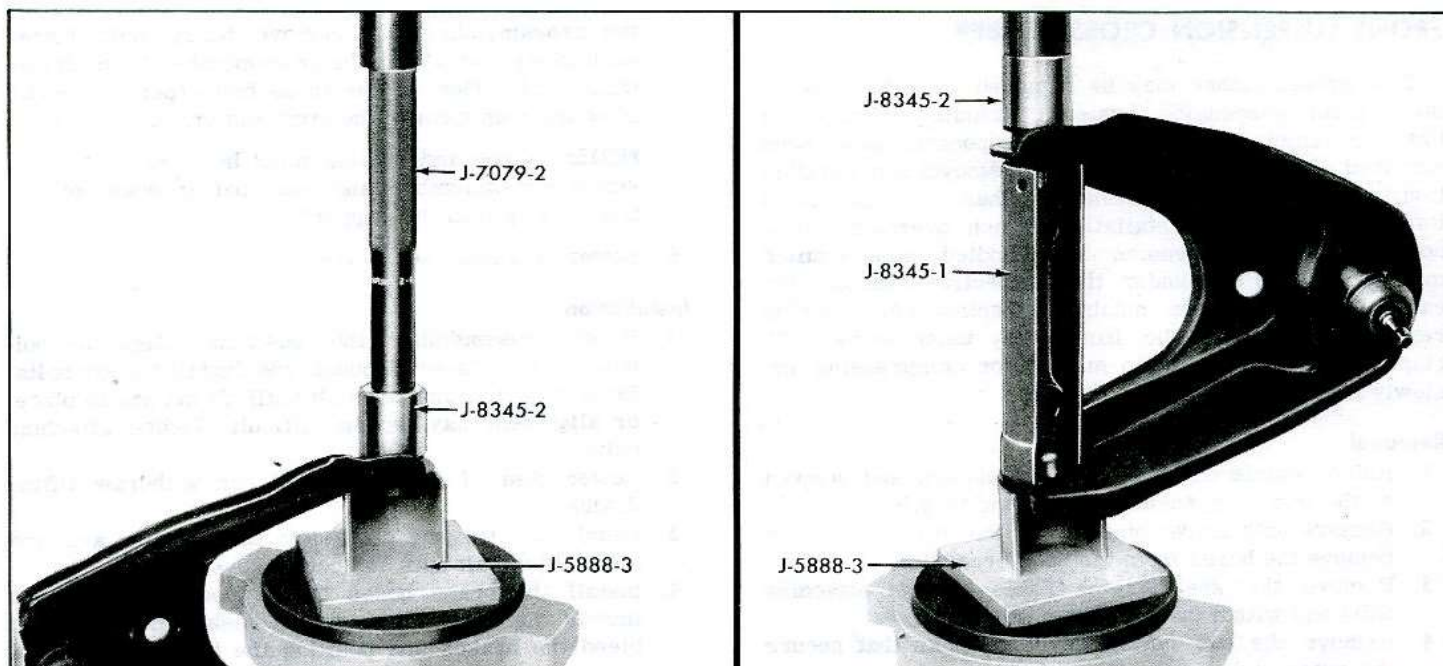


Fig. 3-23—Installing Upper Control Arm Bushings

5. Install new joint against top side of upper control arm. Secure joint to control arm with the four special alloy nuts and bolts furnished with replacement part.

**CAUTION:** Use only alloy bolts supplied for this operation.

6. Tighten these nuts to 20-25 lbs. ft. torque.  
If the cross shaft bushings or spherical joint were not removed, omit Steps 1-6 and start procedure with Step 7.

#### Installation of Control Arm Assembly

7. Install upper control arm to vehicle.

8. Install two nuts and lock washers to the studs retaining upper control arm shaft to front cross-member. Replace any shims previously removed.
9. Install ball stud through knuckle, install nut, tighten to 30-40 lbs. ft. and install cotter pin.
10. Install wheel and tire assembly.
11. Lower vehicle to floor.
12. Bounce front end of vehicle to centralize bushings and tighten cross shaft bolts to 35-40 ft. lbs.
13. If spherical joint was replaced recheck caster and camber.

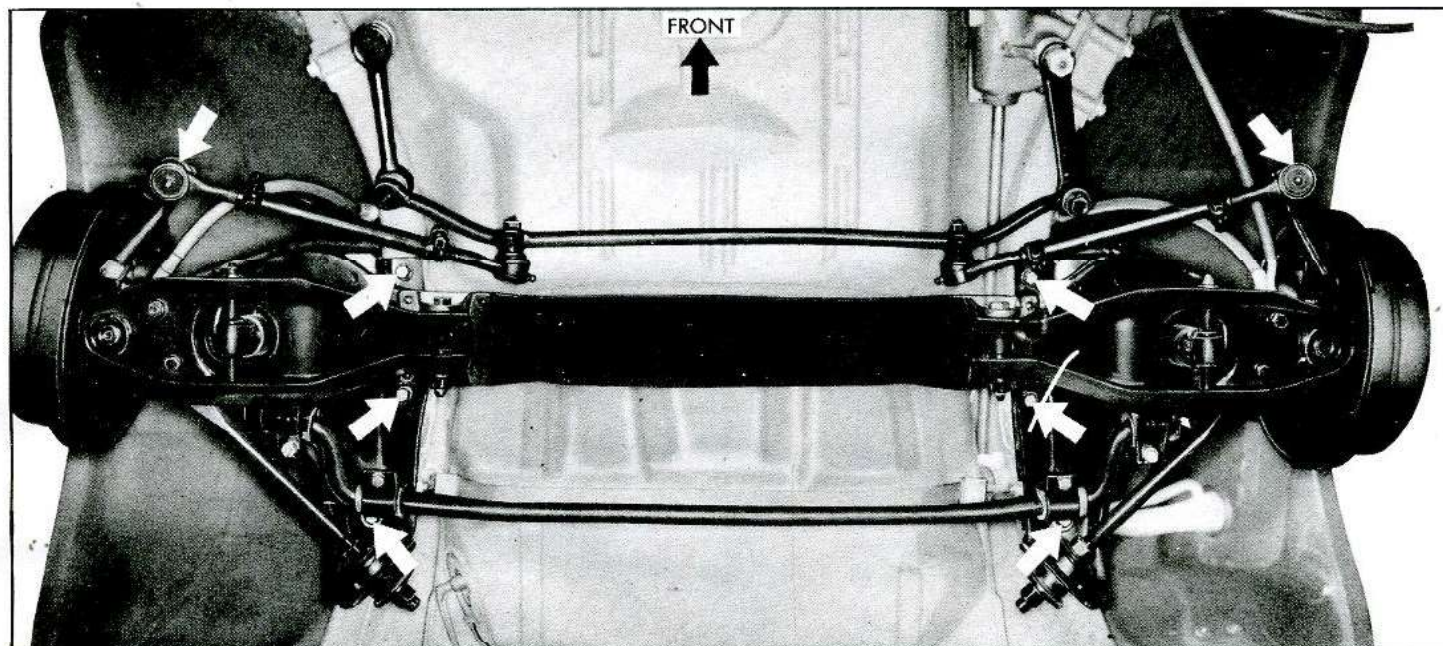


Fig. 3-24—Front Cross Member Attaching Points



## FRONT SUSPENSION CROSSMEMBER

This crossmember may be removed as either a complete front suspension system, including wheels and brake assemblies, or after all components have been removed. The basic crossmember removal and installation procedures are the same in either case. Individual item removal and installation (bench overhaul) on a complete front suspension are handled in a similar manner as outlined under the respective headings for each component. One notable exception being spring removal. This may be handled by using large "C" clamps (or other suitable means) for compressing and slowly lessening coil spring tension.

### Removal

1. Raise vehicle on hoist (or jack stands) and support so the front suspension will "swing free."
2. Remove both brake pipes from the brake hoses and remove the hoses from the body brackets.
3. Remove the speedometer cable bracket attaching bolts and withdraw cable from spindle.
4. Remove the two cotter keys and nuts that secure the outer ends of the tie rods to the steering arms.
5. Place the front post of a hoist (or other means to allow lowering and raising of crossmember) under

the crossmember, and remove the six bolts (three each side) that attach the crossmember to the frame (fig. 3-24). One of the three bolts (per each side) is actually up through the strut rod bracket.

**NOTE:** Care and caution must be used to restrain crossmember and see that it does not fall, or slip from its support.

6. Lower crossmember to floor.

### Installation

1. Raise crossmember into position. Align the bolt holes with a tapered punch and install the six bolts. Do not tighten any one bolt until all six are in place, or alignment may become difficult. Tighten attaching bolts.
2. Lower post of hoist (if used) or withdraw lifting device.
3. Install the tie rod studs into the steering arm and properly install nuts and cotter keys.
4. Install the brake hoses to the body brackets and install the brake pipes to the hoses. Be certain to bleed the brakes and position the hoses as outlined in Section 5—"Brakes."
5. Install the speedometer cable and attaching bracket.
6. Lower vehicle to floor.



## SPECIAL TOOLS

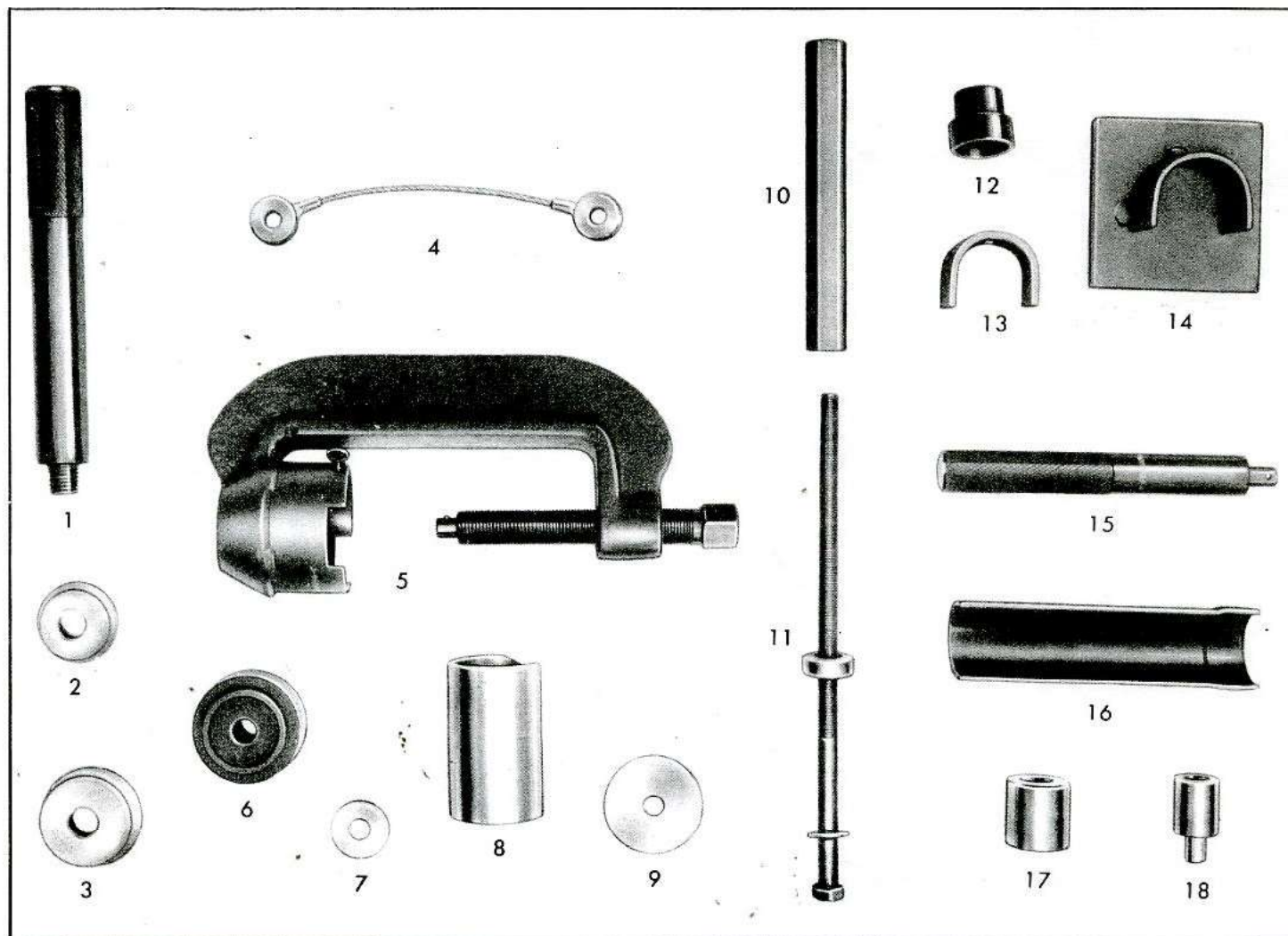


Fig. 3-25—Special Tools

- |               |                      |                |  |
|---------------|----------------------|----------------|--|
| 1. J-8092     | Driver Handle        | 11. J-21058-15 | Puller Screw                                       |
| 2. J-8849     | Outer Race Installer | 12. J-21876-1  | Lower Control Arm Bushing<br>Remover and Installer |
| 3. J-8850     | Inner Race Installer | 13. J-21876-2  | Lower Control Arm Spacer                           |
| 4. J-4988     | Cable                | 14. J-5888-3   | Support  |
| 5. J-9519-10  | Ball Joint Remover   | 15. J-7079-2   | Driver Handle                                      |
| 6. J-9519-16  | Ball Joint Installer | 16. J-8345-1   | Upper Control Arm Spacer                           |
| 7. J-21058-5  | Bridge for J-21876-1 | 17. J-8345-2   | Upper Control Arm Bushing<br>Installer             |
| 8. J-21058-6  | Receiver             | 18. J-8345-3   | Upper Control Arm Bushing Remover                  |
| 9. J-21058-7  | Bridge for J-21058-6 |                |  |
| 10. J-21058-8 | Puller Screw Nut     |                |  |



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