

SECTION 3

SUSPENSION

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SUSPENSION

CORVAIR—500, 700 AND 900 SERIES

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GENERAL DESCRIPTION

All models utilize the S.L.A. (Short-Long arm) type front suspension with spherical joints connecting the control arms and steering knuckles (fig. 3-1). "Brake dive" and acceleration torque is controlled by strut rods running from the outer ends of the lower control arms to brackets that trail back from the front

cross member. "Cornering-sway" is controlled by rubber bushed control arms.

The rear suspension is independently sprung with individual control arms. The rear axles operate through universal joints mounted on each side of the axle case.

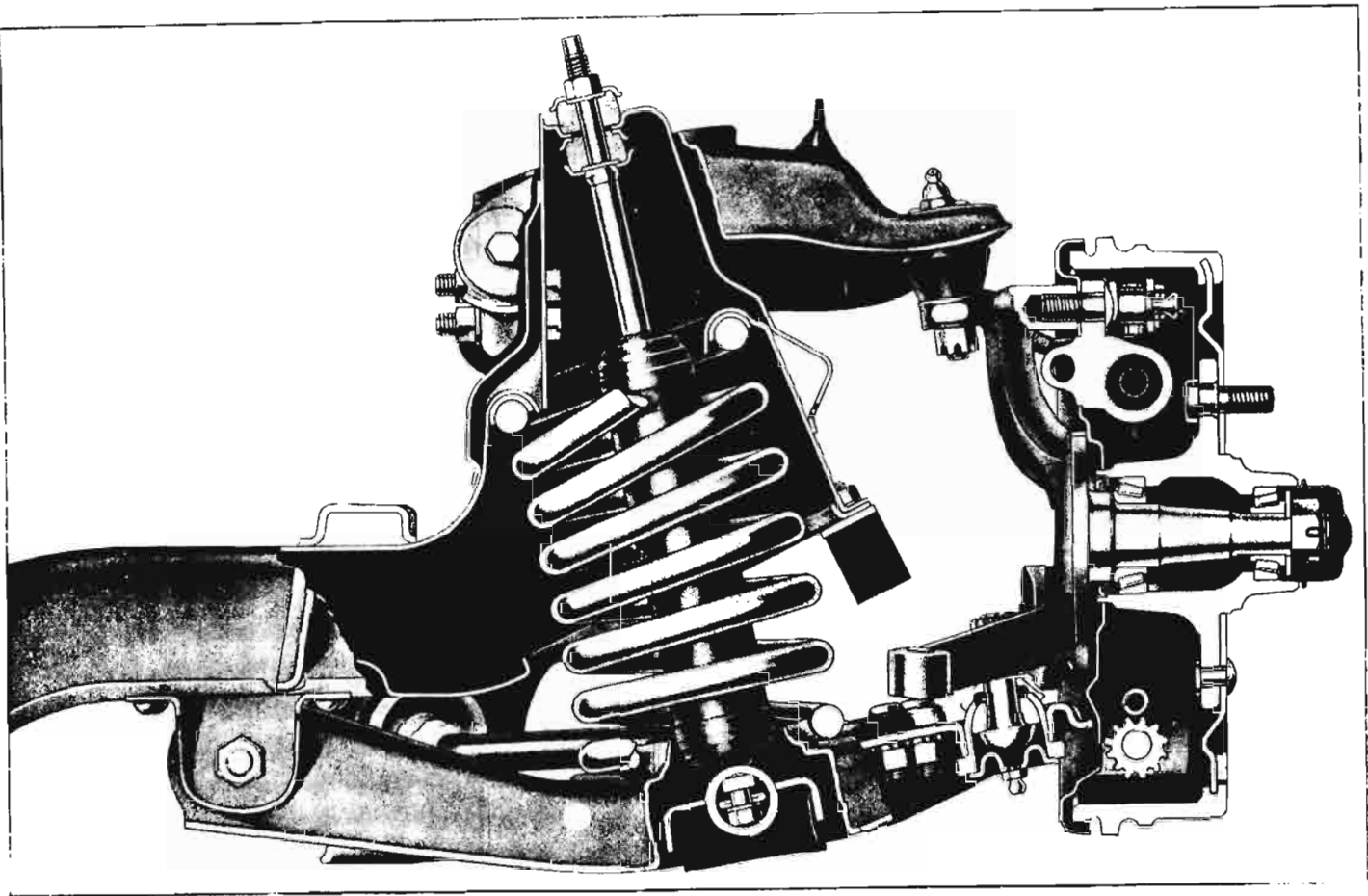


Fig. 3-1—Front Suspension Cross Section

MAINTENANCE AND ADJUSTMENTS

LUBRICATION

Periodic maintenance of the front suspension includes lubrication of the four spherical joints every 1000 miles and lubrication and adjustment of the front wheel bearings every 10,000 miles. See Section 2—"Lubrication and General Maintenance."

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. Remove cotter pin from end of spindle.
 2. Tighten adjusting nut to 80 in. lbs. while rotating wheel.
 3. Back off adjusting nut 1 flat (1/6 turn of nut).
 4. Insert cotter pin 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 .000" to .004" end play when properly adjusted.**
6. Install dust and hub caps.
 7. Repeat operation (if necessary) on opposite side.
 8. Lower vehicle to floor.

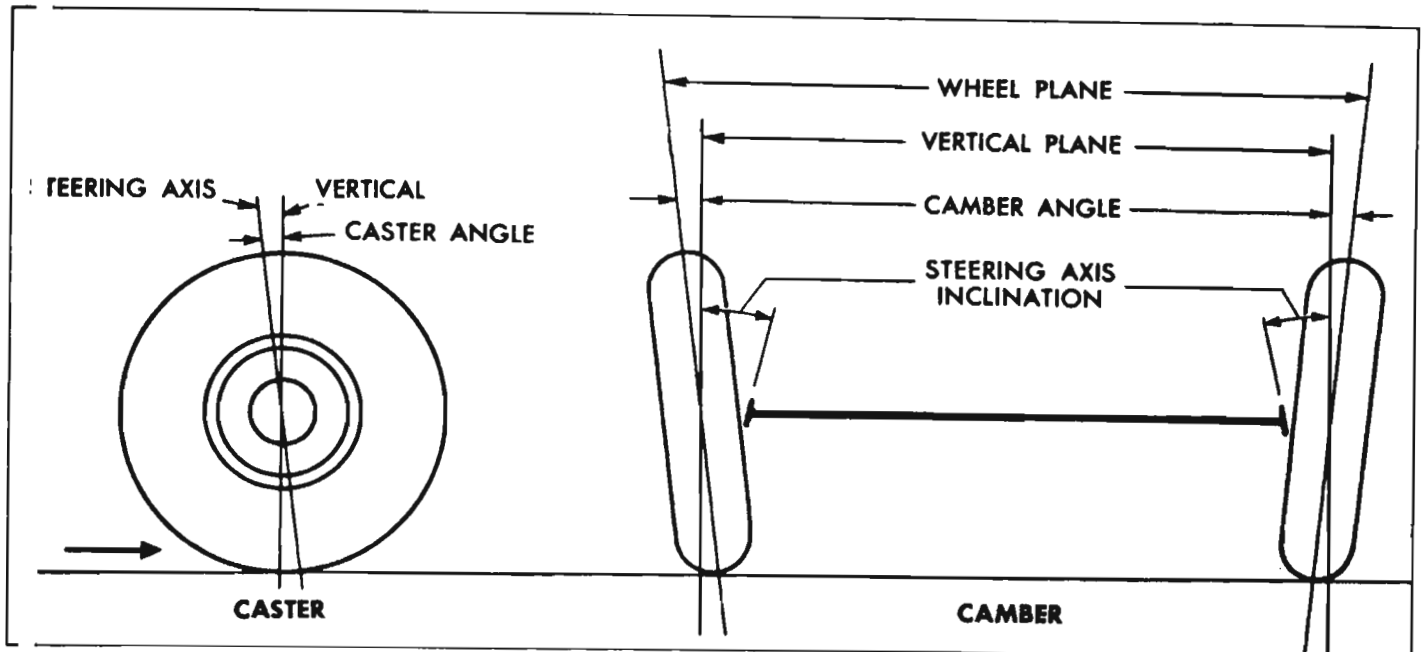


Fig. 3-2—Caster and Camber

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 in 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.

Front Wheel Alignment (Fig. 3-2)

All front wheel alignment adjustments should be made with car at curb height, which is the position of the car when it has the fuel tank filled to capacity; nothing in trunk but standard equipment (spare tire, tools, etc.); the tires filled to correct pressures and no passengers.

Exact curb height may be measured as the distance

from the center of the lower control arm bushing to the ground (fig. 3-3). This distance should be $9\frac{5}{8}'' \pm \frac{1}{32}''$.

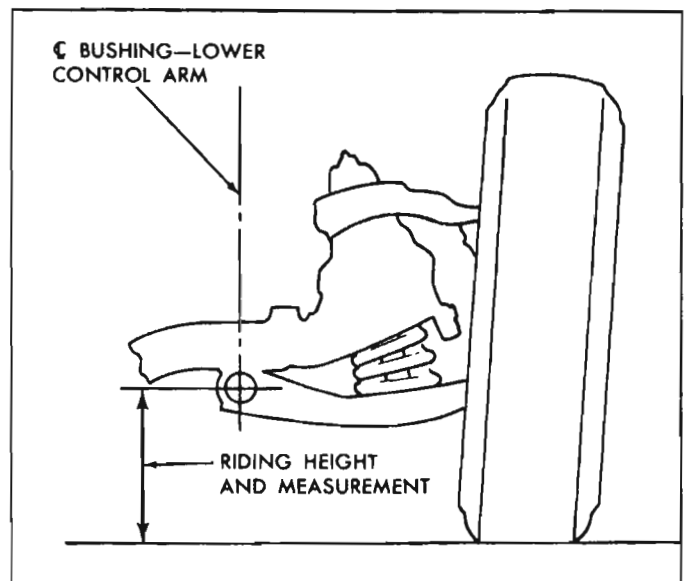


Fig. 3-3—Front Pivot Height

Camber Adjustment

This is the first adjustment to be performed on the front suspension. The camber adjustment is made by means of shims between the upper control arm inner shaft and the front cross member (fig. 3-4). Although shims can be changed at either the front or rear attachment it is important that the shimming be done equally so as to have no effect on caster. Adding shims at both front and rear of support shaft will decrease positive camber. The procedure for adjustment is to

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loosen the upper support shaft to cross member bolts, add or remove shims (equally) as required and retighten the bolts. (It may be necessary to remove the wheel to secure these bolts.) Camber should be positive $\frac{1}{2}^\circ$ $\pm \frac{1}{2}^\circ$ and should be within $\frac{1}{4}^\circ$ of opposite 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

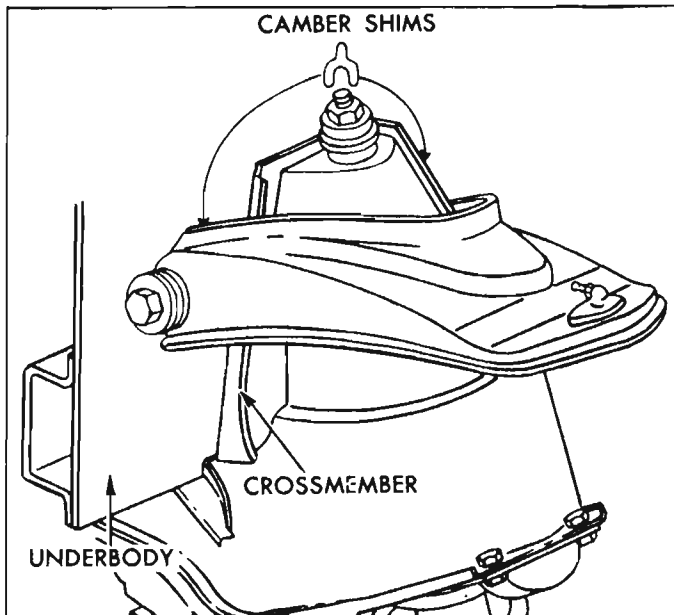


Fig. 3-4—Camber Shims

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.

Caster Adjustment

Caster 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. Caster should be positive $2^\circ + 0^\circ - \frac{1}{2}^\circ$ and be with $\frac{1}{4}^\circ$ of opposite 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 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

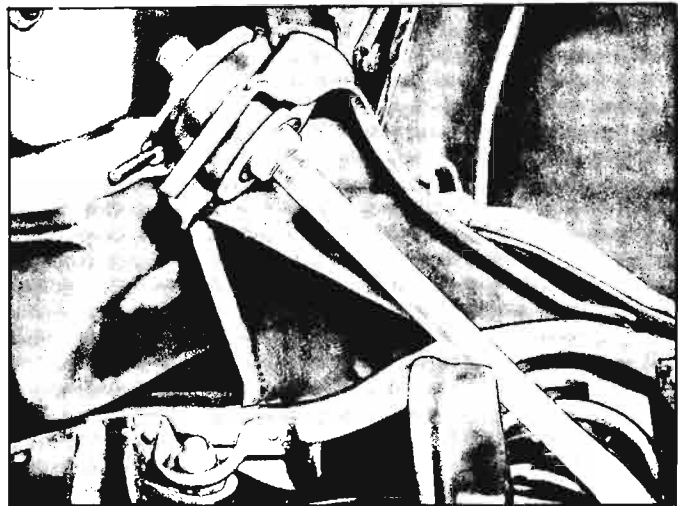


Fig. 3-5—Caster Adjustment

wheels, (fig. 3-2), it is evident that one cannot be corrected without changing the other. The correct steering axis inclination should be 7° plus or minus $\frac{1}{2}^\circ$.

The addition of camber and steering axis inclination should be $7\frac{1}{2}^\circ \pm \frac{1}{2}^\circ$. If not within these 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, which should be $\frac{3}{16}'' + 0''$, $-\frac{1}{16}''$ per wheel 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. Set steering gear on high point, "saw cut" in steering shaft coupling at 6 o'clock position and steering wheel positioned for straight ahead driving.
3. Loosen the clamp bolt at each end of each tie rod individually and adjust to $\frac{1}{8}'' - \frac{3}{16}''$ 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 for $\frac{1}{4}'' - \frac{3}{8}''$ 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. When the inside wheel turns $33\frac{1}{2}^\circ$ the outer wheel should turn $30\frac{1}{2}^\circ$.

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

Rear Wheel Alignment

Toe-In Adjustment

Due to the design of this independently sprung rear axle and suspension it will be necessary to check and adjust rear wheel toe-in. Be sure tires are inflated to correct pressures.

When drive on type equipment is used, reverse the vehicle and back it into position. See "Lifting Corvair With Hoist" in Section One. Toe-in (overall) will be read as toe-out when vehicle is backwards, because readings will be taken from the rear of the tires rather than the front. A tram may also be used in a similar

procedure as that used on the front wheels except both sides will be adjusted at the same time. It must be pointed out however, that since the wheels are adjusted by adding or removing shims at the front edge of the transmission (with rear engine support loose), both wheels are adjusted at the same time. With the design of this suspension, it will be impossible to adjust one wheel at a time as shims must be added or taken away equally from each side. See Figure 3-35.

A shim added to each side will increase toe-in. Removal of a shim from each side will decrease toe-in. Shims must be added or removed in pairs. Toe-in should be 0" to $\frac{1}{4}$ " total toe-in.

NOTE: Due to manufacturing tolerances and parts "stack-up" it is possible to have toe-out on one wheel and toe-in on opposite wheel. In this instance, adjust the suspension to bring the wheel with the toe-out as close to specifications as possible but not letting opposite wheel go out of specifications. If, for example, one wheel toes-out by $\frac{1}{4}$ " then opposite wheel must toe in enough to give 0" to $\frac{1}{4}$ " overall toe-in.

Camber

The camber on rear wheels should be $1\frac{1}{2}^\circ \pm \frac{1}{2}^\circ$. There is no provision for adjustment of this item and it is provided as a checking specification only.

If camber is not within limits, either the cross-member is out of alignment with the body or has become distorted due to collision, etc. (see "Body Dimensions and Checking Procedures" Section 10), or else the control arm has become distorted, bent, etc.

SERVICE OPERATIONS

FRONT SUSPENSION

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 One.

FRONT HUB AND DRUM ASSEMBLY

Removal

1. Remove hub caps, break loose (less than one full turn) the four wheel to hub bolt nuts, raise vehicle from floor place on jack stands and remove wheels.
2. Remove hub grease cap, cotter pin, spindle nut, spindle washer and remove hub and drum as-

sembly. 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 race for looseness in hub.

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Repairs

Replacement of Bearing Races

1. Using steel bar stock $\frac{3}{8}$ " x $\frac{3}{8}$ " up to $\frac{3}{8}$ " x 1" in cross section, make press-out tools shown in Figure 3-6.
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-8351 on the outer race and Tool J-8349 on the inner

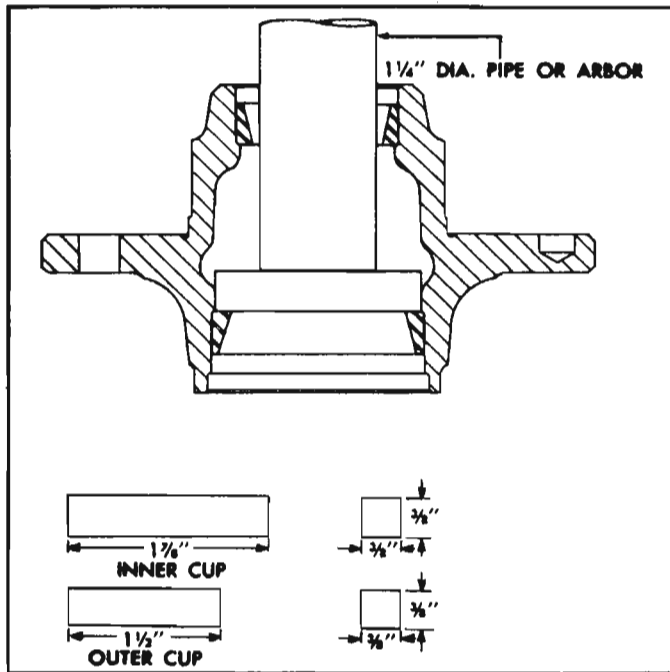


Fig. 3-6—Bearing Cup Removing Tools

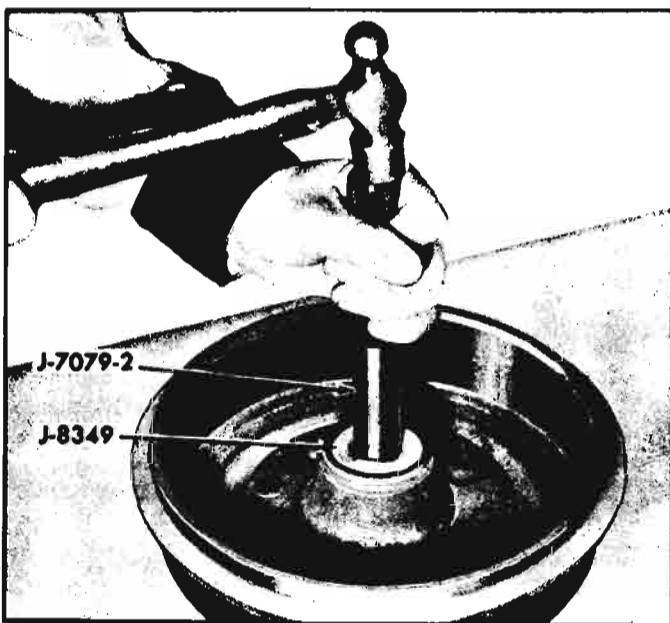


Fig. 3-7—Installing Front Hub Inner Bearing

race. Tool J-7079-2 (Driver Handle) must be used with the above installers (fig. 3-7).

4. Make certain that the cup is not cocked and that it is fully seated against shoulder in hub.

Replacement of Brake Drum

The brake drum is held to the hub by rivets which must be removed to replace the brake drum.

1. Cut heads from rivets which retain the drum to the hub. Drilling through upset end of rivet will permit cutting them without distorting holes. A sharp cold chisel should be used in this operation and care exercised to avoid distorting rivet holes. Drive rivets from drum and hub using punch and remove drum from hub bolts.
2. Clean surface on hub thoroughly.
3. Install brake drum over hub bolts and insert new rivets through rivet holes in hub and drum.
4. Support heads of rivets and peen ends securely.

Replacement of Wheel Hub

1. Remove inner and outer bearing cups as outlined previously.
2. Remove the rivets retaining brake drum to wheel hub as outlined in step one under "Replacement of Brake Drum."
3. When installing a new hub, it is necessary to install new bolts and rivets.
4. Install new hub bolts by pressing serrations into hub with arbor press until undersurface of head fully contacts hub flange (fig. 3-8). The end of the shoulder on the hub bolts should be peened into

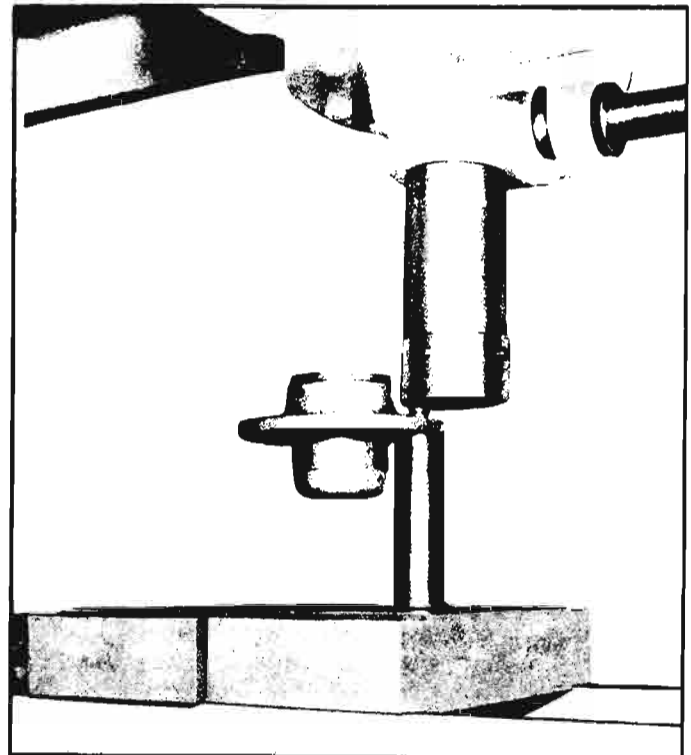


Fig. 3-8—Peening Front Hub Bolts

the countersink around the bolt holes in the hub flange, using Tool J-0544 (fig. 3-8).

5. Install brake drum over hub bolts.
6. Install new rivets through rivet holes in hub flange and drum, and supporting rivet heads, peen ends securely.
7. Install bearing cup into hub using Tool J-8351 for the outer race and Tool J-8349 for the inner race (fig. 3-7).

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. 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 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.
4. Carefully position hub on spindle.
5. Install outer bearing, pressing it firmly into the hub by hand.
6. Install spindle washer and spindle nut. Draw spindle nut up snug and adjust bearings as outlined under "Adjustment of Front Wheel Bearings."

FRONT SHOCK ABSORBERS

Removal

1. 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.
2. Hold shock absorber upper stem on flat section and remove upper attaching nut, cup washer and grommet (fig. 3-9).
3. Remove the two shock absorber lower attaching bolts and lockwashers.
4. Withdraw shock absorber and remove cup washer and grommet from upper end of shock absorber shaft.

Installation

1. Install cup washer and new grommet on shaft. Pull out shock absorber 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 both lower attaching lockwashers and bolts (fig. 3-9).
4. Holding upper flat, install upper retaining nut.
5. Lower vehicle to floor, or remove jackstands.

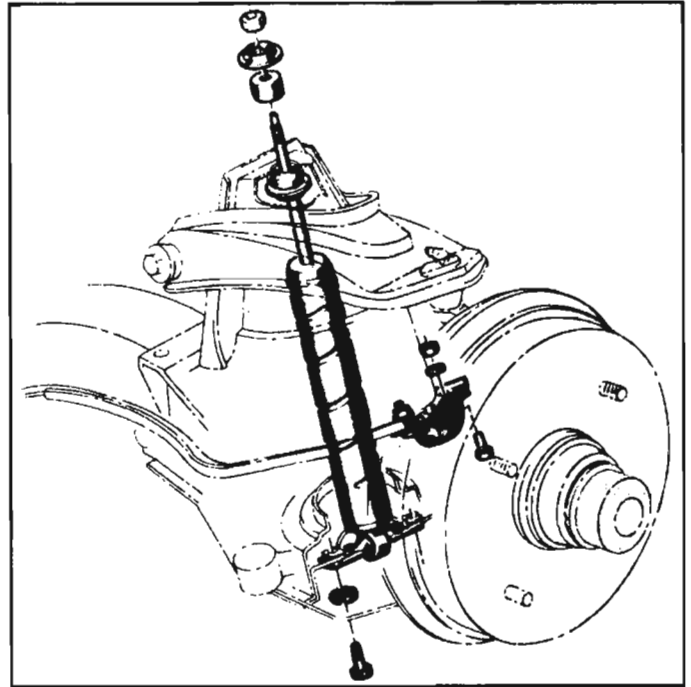


Fig. 3-9—Front Shock Absorber Installation

INSPECTION OF SPHERICAL JOINTS

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. Remove the stud from the steering knuckle with Tool J-6627.
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 ft. lbs. If excessive wear is indicated in upper joint, both upper and lower joints should be replaced. If a tight joint is suspected, 5 ft. lbs. 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 connected to the steering knuckle.

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 top of lubrication fitting to bottom of ball stud, and record the dimensions for each side.
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 $\frac{3}{32}$ " (.09375"), 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 lower spherical joints should be recommended. See "Removal" and "Installation" of Spherical Joint.

RIDING HEIGHT AND FRONT 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).
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 bottom of the rocker panel 27 inches back from the centerline of the front wheel (fig. 3-10).

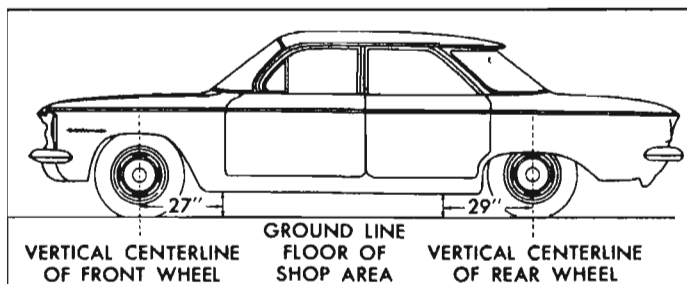


Fig. 3-10—Checking Riding Height

4. This measurement should be $9\frac{3}{8}$ " \pm $\frac{1}{2}$ ".
5. Measure the opposite side of the vehicle in a similar manner. It is essential that the two differences be within $\frac{1}{2}$ ".
6. To correct the height, springs must be replaced. These springs do not have flat ends and shims must not be used.

NOTE: This check should be used in conjunction with the rear spring check to be certain that overall "sag" (trim) is within $\frac{1}{2}$ ".

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 jackstands.
2. Remove shock absorber as outlined previously.
3. Remove the two strut rod to control arm, nuts and lockwashers (fig. 3-11). The studs are pressed into the end of the strut rod.
4. Loosen but do not remove lower control arm inner pivot nut.

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

CAUTION: Do not remove pivot bolt and nut at this time.

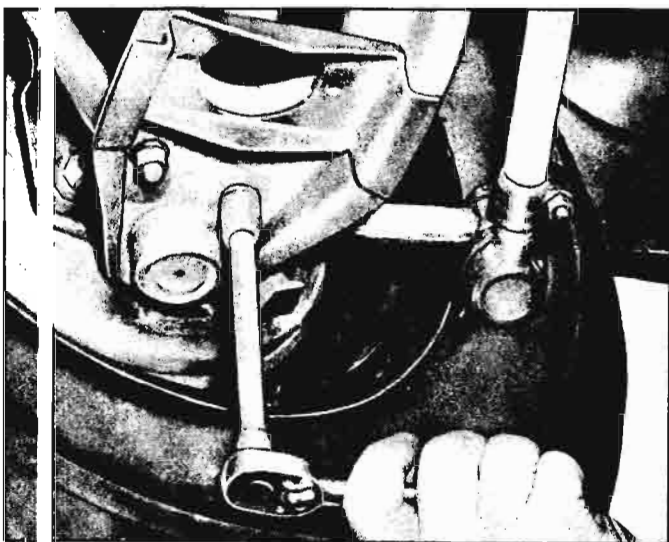


Fig. 3-11—Removing Strut Rod Nuts

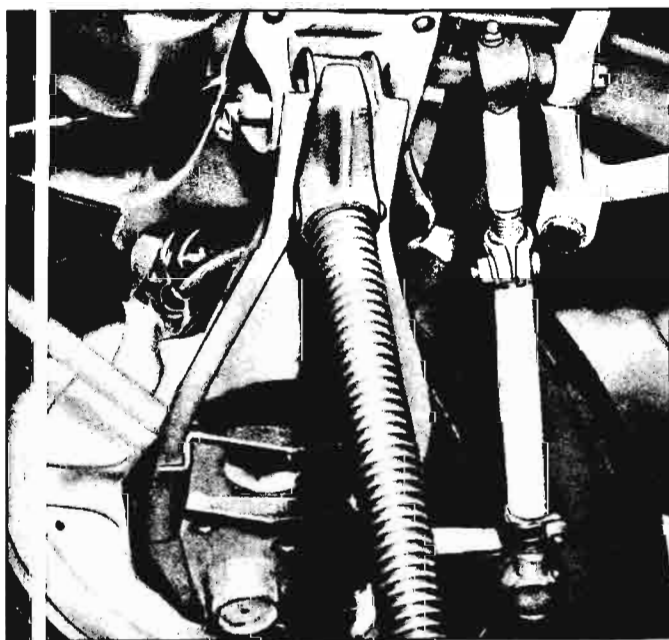


Fig. 3-12—Position of Jackstand for Spring Removal

- 5 Place jackstand or front post of hoist under control arm. Take up slightly on spring compression. If jackstand is used, place it under inner end of control arm, on bushing (fig. 3-12).
- 6 Remove control arm pivot nut and lockwasher. Tap out pivot pin.
- 7 Carefully lower hoist or jackstand until spring is free. Withdraw spring.

NOTE: A bar placed through control arm and into spring tower will retain spring and keep it from slipping until free. Otherwise, keep clear of suspension until all compression is removed from spring.

Removal of Control Arm and Spherical Joint

To remove the control arm, spherical joint and/or bushing, perform steps 1-7 as shown above. Then proceed with the following:

9. Remove cotter pin from the lower spherical joint. Remove nut (fig. 3-13). Tap on control arm to remove it and the joint from the steering knuckle.

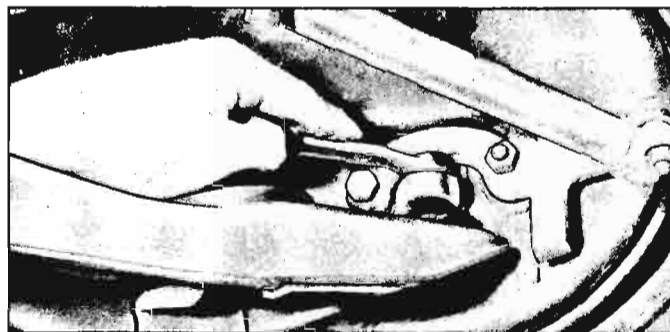


Fig. 3-13—Removing Lower Control Arm

10. If spherical joints are to be replaced, use following procedure.
 - a. Place arm on press bed with Tool J-7081 positioned under spherical joint area as shown in Figure 3-14.
 - b. Place Tool J-6356-6 over spherical joint assembly and press assembly out of arm.

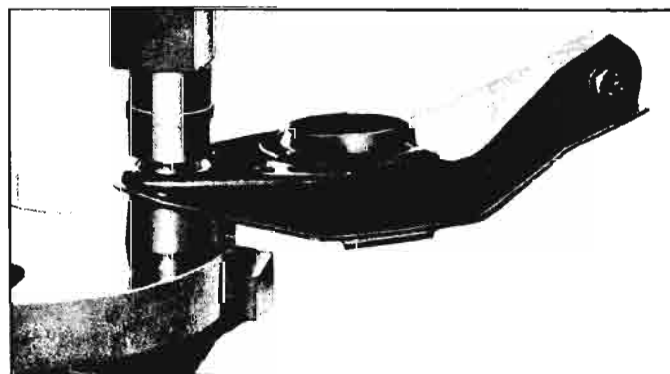


Fig. 3-14—Removing Spherical Joint

Installation of Spherical Joint

1. Place arm on press bed with Tool J-7081 positioned as shown in Figure 3-15.
2. Position spherical joint in hole in arm. If end of press ram is large enough to cover outside diameter of spherical joint assembly, press joint into place with ram in direct contact with bottom of joint. If ram is smaller than outside diameter of joint, place a steel block over bottom of joint which is of large enough size to cover joint outside diameter and withstand pressing force.

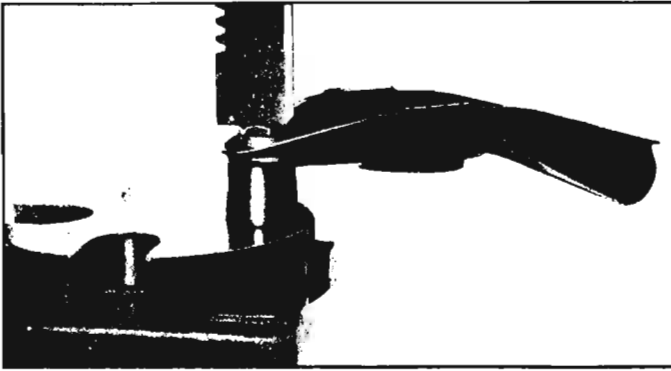


Fig. 3-15—Installing Spherical Joint

3. Press joint assembly into arm until shoulder contacts arm flange.
4. Set control arm in place with the stud of the joint up through steering knuckle. Install and tighten nut. Install cotter key.

Removal of Control Arm Bushings

11. To remove the bushing set up the tools as shown in Figure 3-16. The bushing may be pressed or hammered out of position. In any case, be certain to press on the end of the bushing that does not have the large collar on outer shell.

Installation of Control Arm Bushings

1. If lower control arm bushing was removed, replace as shown in Figure 3-16. The bushing must enter the control arm on the front side of arms.

Installation of Control Arm and Spherical Joint

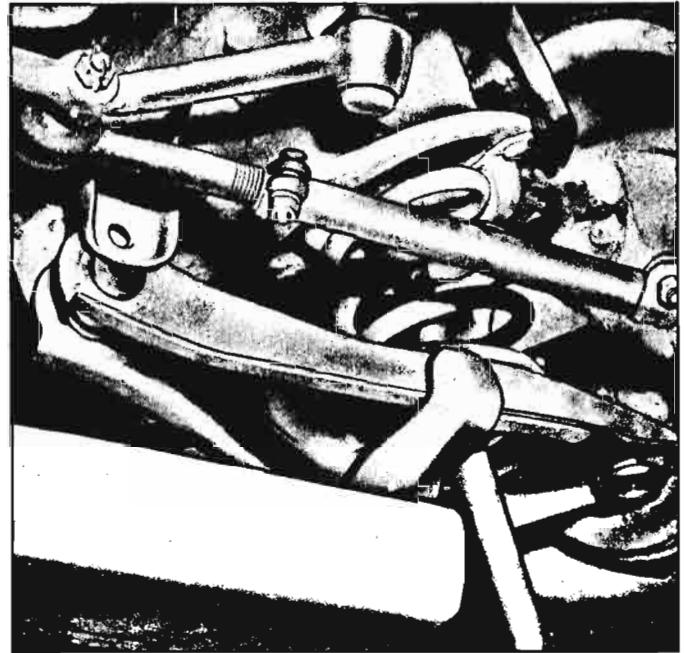


Fig. 3-17—Front Coil Spring Installation (Hoist)

Installation of Front Coil Spring

2. Place spring on control arm.
3. Rotate spring until upper end of coil makes contact with its seat.
4. Using either the front post (fig. 3-17) or a jack stand (fig. 3-18), raise control arm, line up arm and bracket and install bolt (from the front), nut and lockwasher. Do not tighten at this time.

NOTE: A bar placed up through control arms and into spring tower will retain spring and keep it secure until pivot bolt is installed.

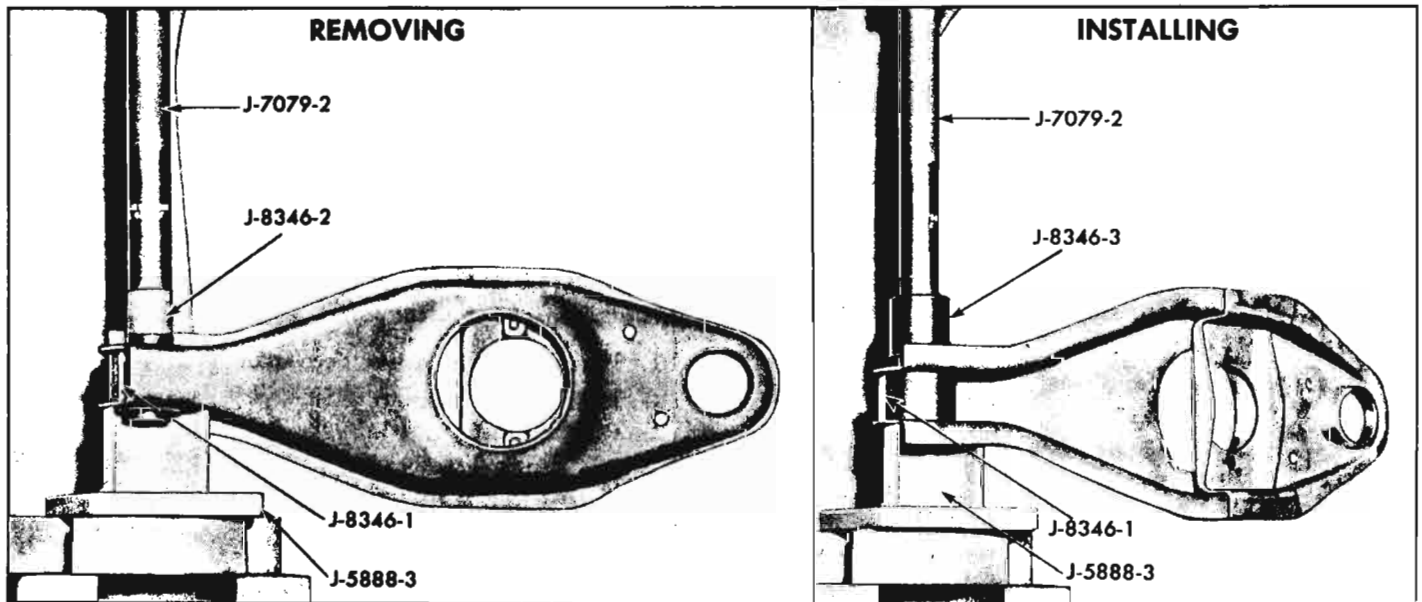


Fig. 3-16—Removing and Installing Lower Control Arm Bushings

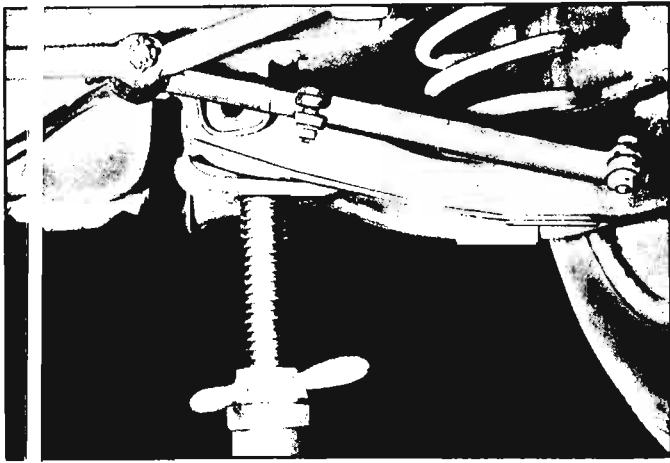


Fig. 3-18—Front Coil Spring Installation (Jack Stand)

Attach strut rod to control arm with two attaching nuts and lockwashers (fig. 3-11). The studs are pressed into end of strut rod.

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 the grommet end as these control caster adjustment. Install shock absorber as outlined previously.

Lower vehicle to floor, bounce front end several times and tighten lower control arm pivot bolt and nut.

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

Removal of Control Arm Assembly

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. Remove the stud from the knuckle with Tool J-6627.
5. Remove two nuts retaining upper control arm cross shaft to front cross member. Note number of shims at each bolt.

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 to replace cross shaft and/or bushings.

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, lockwashers, and collars from both ends of cross shaft. Remove the rubber spacer from the rear end of cross shaft.
11. Install a same size, but longer bolt in end of cross shaft; i. e., opposite side from the bushing that is installed from the outside of arm. This bolt is furnished with Tool J-8345.
12. Set arm in place on Tool J-5888-3 and press out bushing as shown in Figure 3-19.

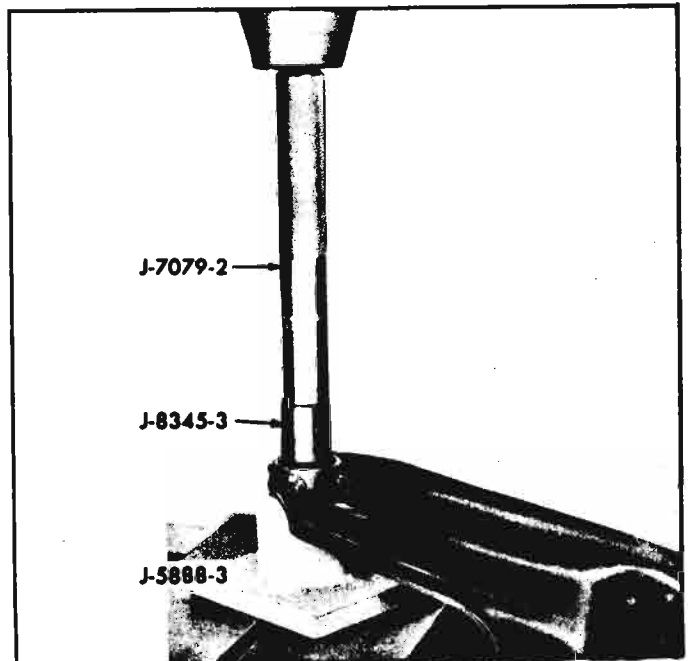
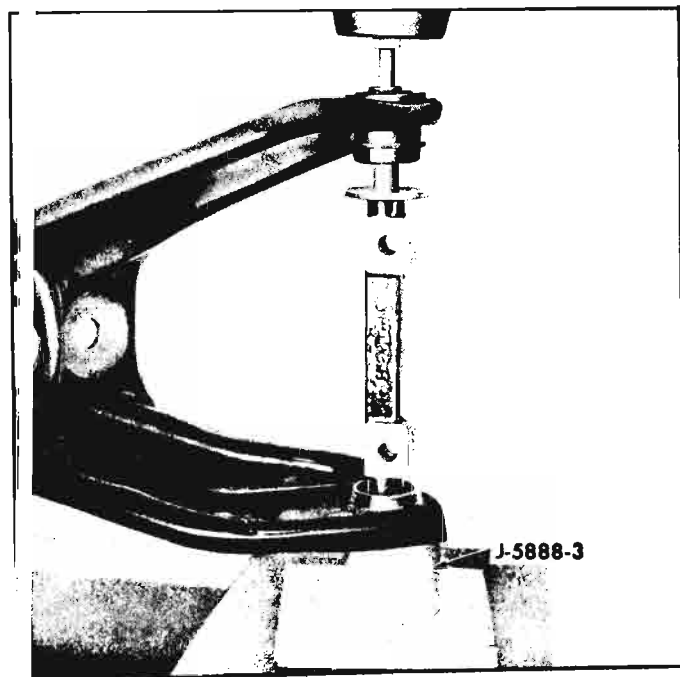


Fig. 3-19—Removing Upper Control Arm Bushings

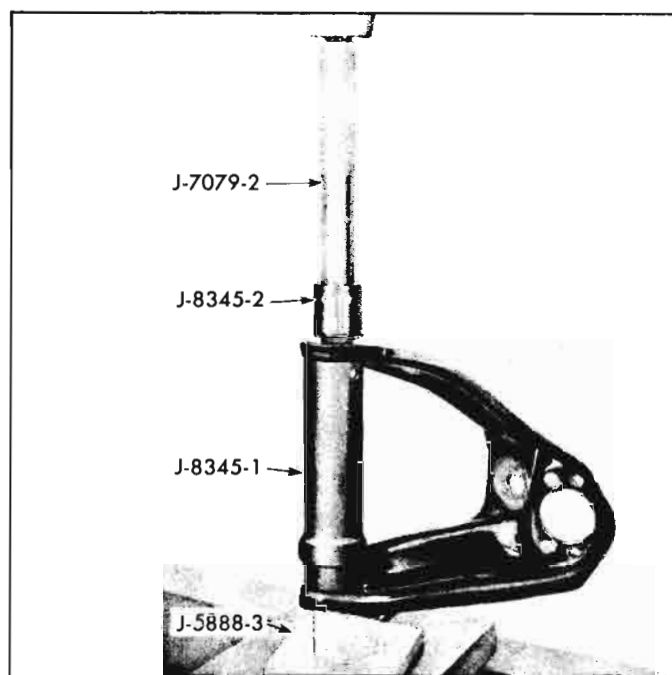
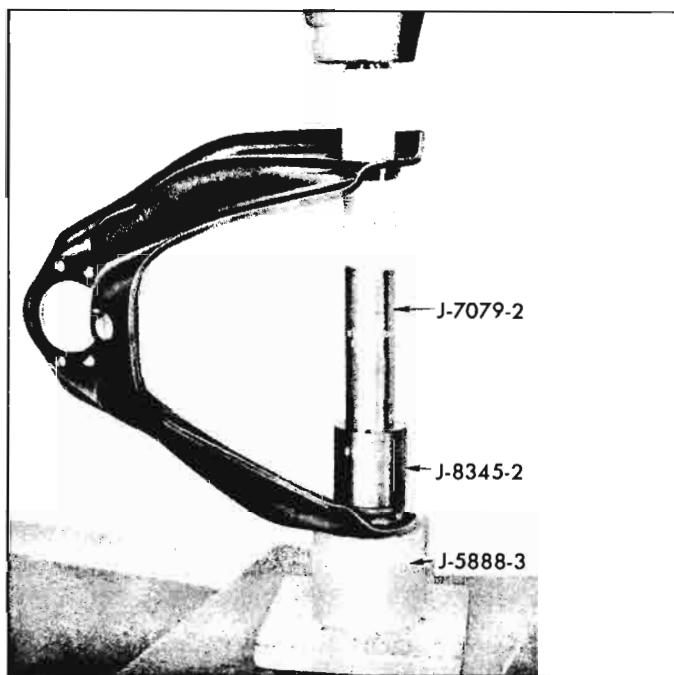


Fig. 3-20—Installing Upper Control Arm Bushings

- Turn control arm over (as shown in right hand section of Figure 3-19) 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.

- 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. Start with the bushing that has to be installed from the inside of the arm (fig. 3-20).
- Install cross shaft in arm, invert in press and press in second bushing as shown in right hand section of Figure 3-19. Tool J-8345-1 must be in place to keep arm from flexing. This second bushing must be installed from the outside of arm.
- Cross shaft should be able to be turned by hand.
- Install rubber spacer on rear end of cross shaft. Install collar, lockwasher and bolt in ends of cross shaft. Do not tighten at this time.

Installation of Spherical Joint

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

- 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.

- Tighten these nuts to 20-25 ft. lbs. 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

- Install upper control arm to vehicle. Make certain new attaching studs are in position.
- Install two nuts and lockwashers to the studs retaining upper control arm shaft to front cross member. Install same number of shims as removed at each bolt.
- Install new rubber seal on joint stud.
- Install ball stud through knuckle, install nut, tighten securely and install cotter pin.
- Install wheel and tire assembly.
- Lower vehicle to floor.
- Bounce front end of vehicle to centralize bushings and tighten cross shaft bolts to 35-40 ft. lbs.
- If spherical joint was replaced or if proper number of shims were not reinstalled, recheck caster and camber.

STRUT ROD

Removal

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

- Remove the two nuts and lockwashers that secure the front end of strut rod to lower control arm (fig. 3-11).

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

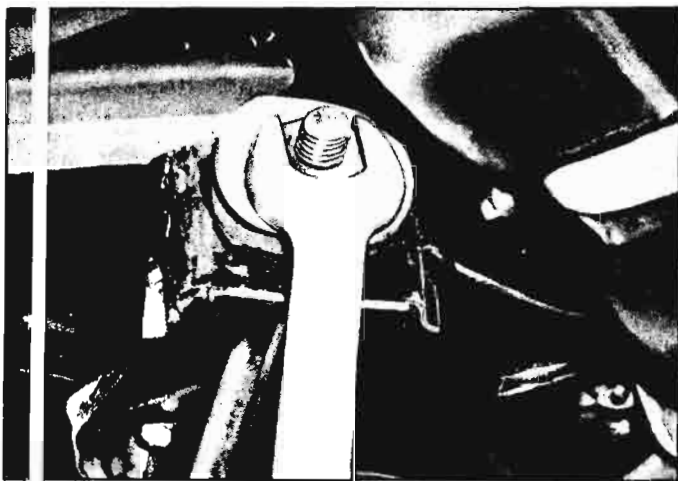


Fig. 3-21—Removing Strut Rod Nut

2. Remove the nut, washer, spacer and grommet from rear end of strut rod (fig. 3-21).
3. Withdraw strut rod from crossmember bracket. Remove rubber grommet, spacer, washer and nut from rod. The studs in the rod are replaceable by driving them in or out.

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 cross member bracket. Install the remaining grommet, spacer, washer and nut. Snug up the rear nut.
3. Install the rod to the lower control arm with the two attaching lockwashers and nuts.

4. Lower vehicle to floor (if raised) and reset caster as outlined earlier in this section. Bend over locking washer on two sides of nut.

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 (fig. 3-22).
3. Remove the two cotter keys and nuts that secure the inner ends of the tie rods to the relay rod (fig. 3-22).
4. 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. 3-22). One of the three bolts (per each side) is actually up through the strut rod bracket.

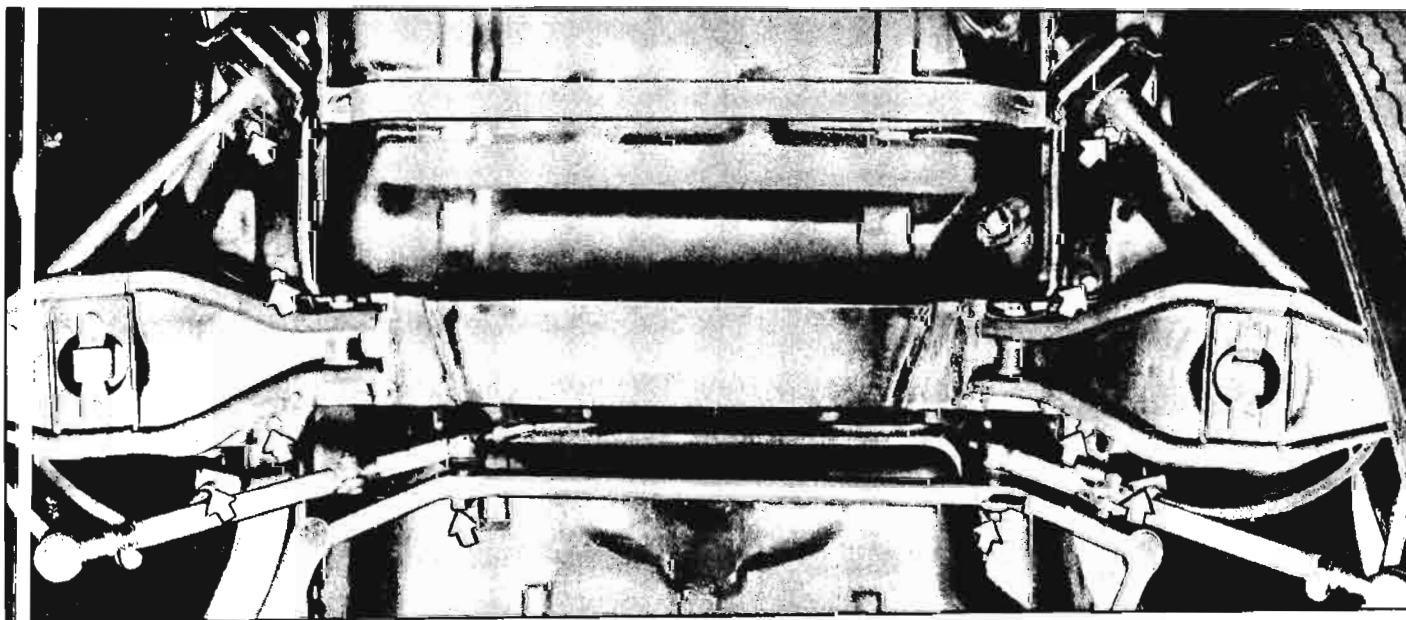


Fig. 3-22—Front Cross Member Attaching Points

SUSPENSION 3-14

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

5. Lower crossmember to floor.

NOTE: If crossmember "caged" nuts become damaged, see Section 10—Body for repairs or replacement.

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 relay rod 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. Lower vehicle to floor.

REAR SUSPENSION

REAR SHOCK ABSORBERS

Removal

The attachment of the rear shock absorber to the rear lower control arm and to the coil spring tower is identical to the mounting on the front suspension. However, the rear shock absorber holds all of the rear spring compression. For this reason, the weight of the vehicle must be resting on the tires. If an attempt is made to support the vehicle on the rear suspension lower control arms, and unless caution is used and proper support is given to control arm, it is possible that when the shock absorbers are removed, the vehicle may tend to raise up at the rear (the body will not actually raise up, but the control arms will be preloaded) or the control arms may be forced downward and inward, causing vehicle to slip from its support. If the vehicle is supported at the body side rails and no support is given to the wheels and control arm, and the shock absorber is removed, the spring pressure would force the control arms downward and inward with extreme force.

1. Place car on a "drive-on" (ramp) type hoist, frame contact hoist or place jack stands under the body at each side rail, just forward of the rear wheel openings. The body should be raised high enough so that the wheels "hang-free" and a floor jack can be placed under tire. With second jack, raise tire so that it is in its normal position. This will allow shock absorber to be removed without interfering with the floor.

2. Proceed as outlined in steps 2-4 under "Front-Removal."

Installation

1. Follow all steps under "Front-Installation."

RIDING HEIGHT AND REAR COIL SPRING SAG

In cases of vehicle riding height complaints, a rear coil spring height check will show if the rear 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).
2. Bounce rear end several times and allow it to settle to its normal height.
3. Measure the distance from the floor to the bottom of the rocker panel 29" ahead of center line of rear wheel (fig. 3-23).
4. This measurement should be $9" \pm \frac{1}{2}"$.
5. Measure the opposite side of the vehicle in a similar manner. It is essential that the two be within $\frac{1}{2}"$.
6. To correct these heights, springs must be replaced. These springs do not have flat ends and shims should not be used.

NOTE: This check should be used in conjunction with the front coil spring check to be certain that overall "sag" (trim) is within $\frac{1}{2}"$.

COIL SPRING

Removal

1. Raise vehicle by body side rails so that the control arms may swing free. The vehicle must be raised far enough so that a rolling floor jack may be placed under the drum.
2. Loosen the control arm cross shaft bolts (in ends of shaft). Remove the bolt that holds brake hose bracket to the underbody. It may also be necessary to disconnect and plug the fuel line and heater fuel supply line (on left side only). Re-

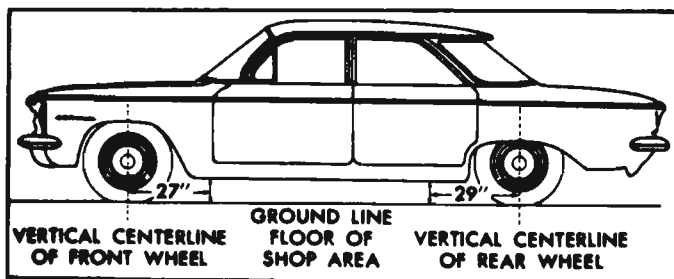


Fig. 3-23—Checking Riding Heights

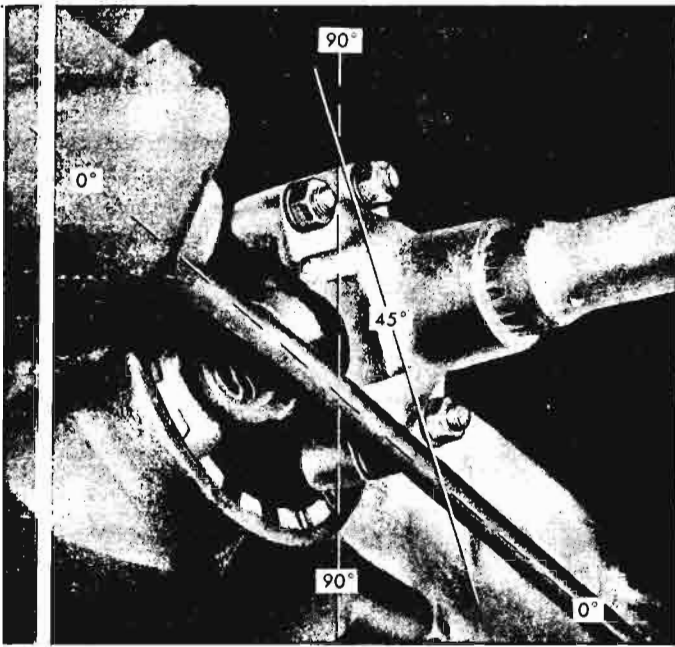


Fig. 3-24—Rear Axle Positioning for Spring Removal

- move the wheel and tire assembly. Replace the nut onto the studs to hold the drum in place.
- Position the axle shaft as shown in Figure 3-24. The side surface of the yoke must be at 45° to the centerline of the axle case. This must be done to allow the axle shaft and control arm to swing down far enough to remove spring. This will keep the yoke on universal joint from hitting the axle case or the side bearing adjusting nut.
 - Place a rolling floor jack under the drum and brake flange.

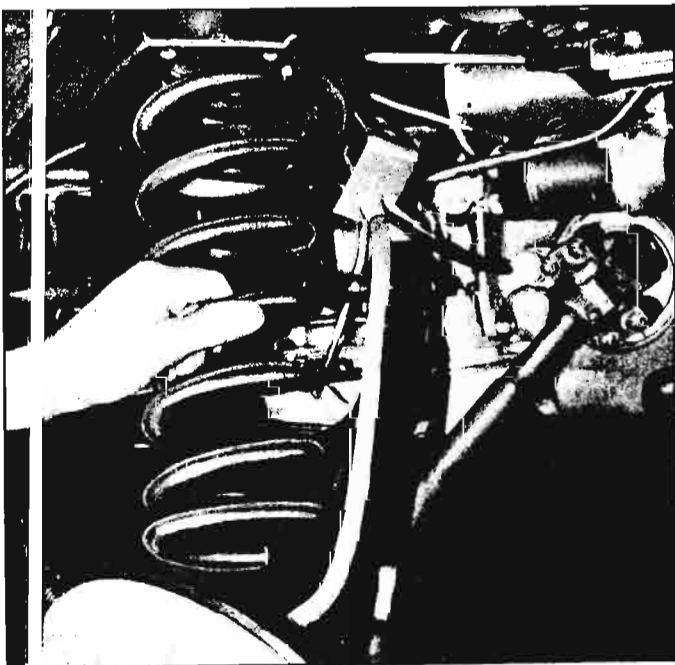


Fig. 3-25—Coil Spring Removal

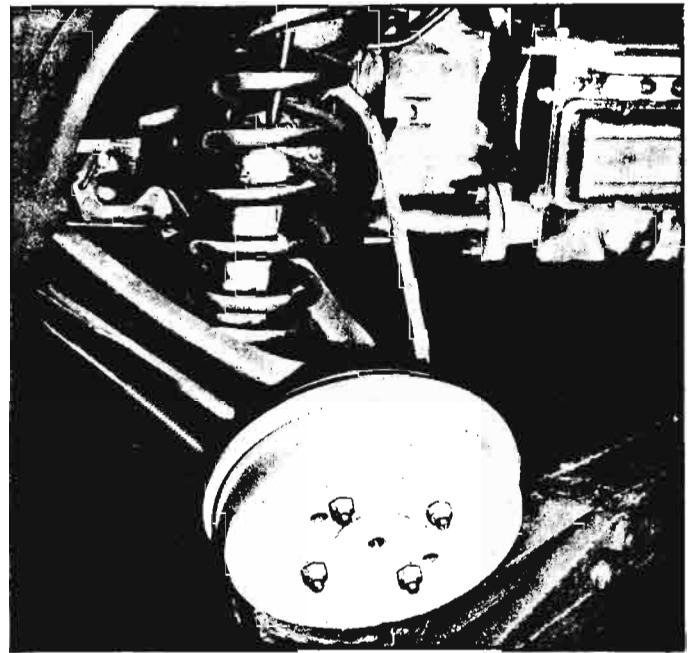


Fig. 3-26—Installing Shock Absorber and Coil Spring

- Raise the jack slightly to place a slight load on the coil spring. Remove the two bolts and lockwashers that secure the bottom of the shock absorber to the control arm. Remove the upper attaching nut, washer and grommet. See "Rear Shock Absorber, Removal." Withdraw shock absorber.
- Carefully lower floor jack until spring is free (fig. 3-25). Do not remove or lower the jack too far as this places too much strain on axle shaft and/or brake hose.

Installation

- Set spring in place on lower control arm. Rotate spring until it seats against step in crossmember.
- Extend shock absorber shaft. Place up through control arm and spring and attach bottom of shock absorber to control arm with two lockwashers and bolts (fig. 3-26). Installing the shock absorber at this time will give safer working conditions in case jack was not securely placed.
- Raise control arm until shock absorber top attaching nut, washer and grommet may be installed.
- Connect the fuel line and heater supply line (if removed) and attach the brake pipe bracket to the underbody. Remove the floor jack and install the wheel and tire assembly.
- Lower vehicle to floor. Bounce rear end several times and with full weight on suspension control arms, tighten the cross shaft bolts to 45-55 ft. lbs.

REAR SUSPENSION LOWER CONTROL ARM

Removal of Control Arm

- Remove the coil spring as outlined above.

2. Before removing floor jack from under drum, support control arm with a suitable jack stand. Do not place a strain on brake hose or damage will result.
3. Remove the wheel nuts from the axle shaft and remove the drum.
4. Place upper end of brake shoe (still assembled and attached onto backing plate) onto brake anchor (fig. 3-27). This will allow the axle flange plate and axle shaft to be pulled out past the parking brake strut.

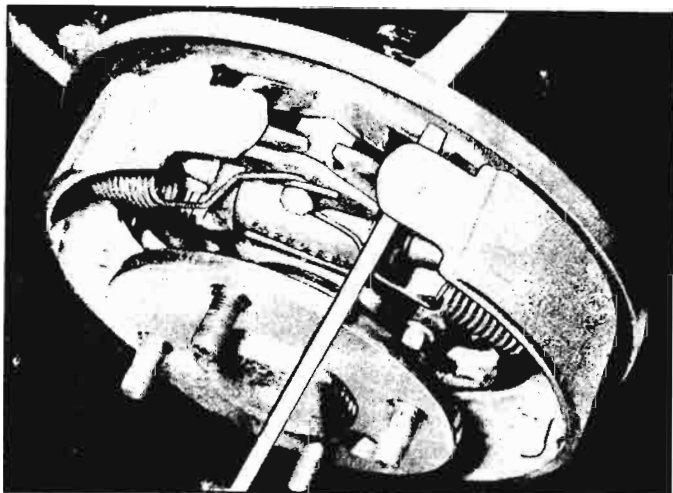


Fig. 3-27—Dislodging Brake Shoe

5. Line up the hole in axle shaft flange with the nuts retaining backing plate to the lower control arm. Remove these four nuts and lockwashers (fig. 3-28).
6. Pry between the axle flange plate and backing plate until axle shaft and universal joint assembly can be pulled out of axle case.
7. Remove the four nuts and lockwashers that secure the universal joint "U" bolts. Remove the "U" bolts.

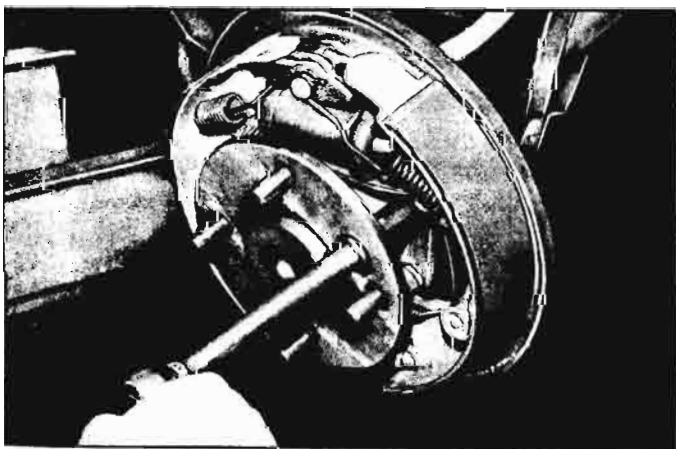


Fig. 3-28—Removing Backing Plate Attaching Nuts

8. Remove the bolt, lockwasher and flat spacer from end of axle shaft.
9. Remove the universal joint yoke by using Tool J-5504. Withdraw axle shaft.
10. Remove backing plate from lower control arm studs. Using "mechanics wire" tie backing plate up to the crossmember.
11. Remove the four bolts, nuts and lockwashers that attach the control arm to the crossmember. A parking brake cable bracket is also retained by two of these four attaching bolts (fig. 3-29). Withdraw control arm from under vehicle.

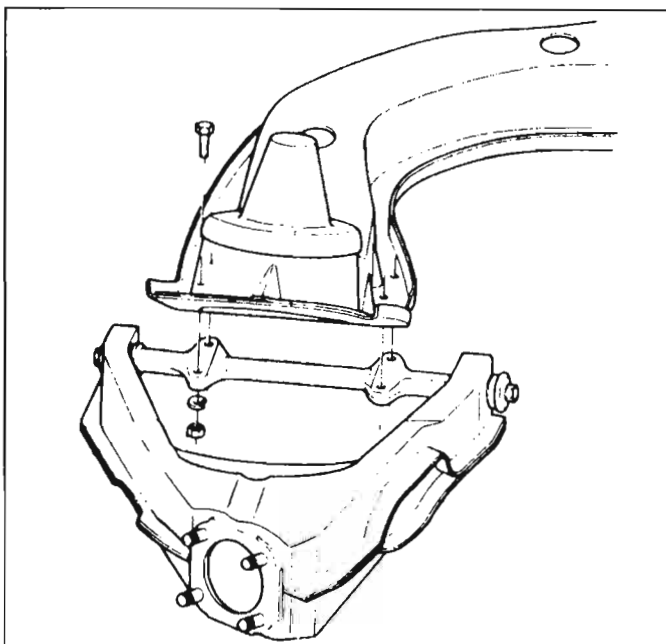


Fig. 3-29—Removing Control Arm

Removal of Bushings and/or Cross Shaft

12. Remove splash shields from each side of arm. Remove bolt, lockwasher and collar from each end of cross shaft.
 13. Thread the large bolt (furnished with Tool J-8347) to the bottom of the threads in one end of the cross shaft.
 14. Support control arm in a press on Tool J-5888-3 as shown in Figure 3-30.
- NOTE: Be certain bushing flange does not contact support.**
15. Press on bolt until bushing is free of control arm. Discard bushing.
 16. Remove bolt from end of cross shaft. Insert it in opposite end. Invert control arm on support (J-5888-3). Again, be certain bushing does not contact support.
 17. Press on bolt until bushing is free of control arm. Discard bushing. Remove cross shaft from control arm.

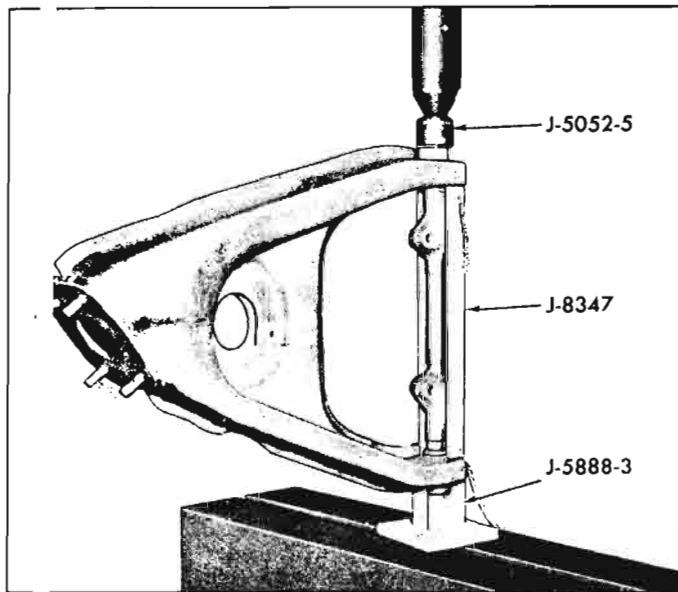


Fig. 3-30—Removing Control Arm Bushings

Installation of Cross Shaft and/or Bushings

- 1 With cross shaft in control arm and Tool J-8347 in position, place control arm on Tool J-5888-3. Hand start bushing into control arm and over end of cross shaft.
- 2 Install Tool J-7052-5 over bushing. Be certain three-piece spacer is not over-lapping bushing holes in control arm.
- 3 Press bushing into control arm until flange contacts control arm (fig. 31).

NOTE: In extreme cases, due to manufacturing tolerances, it may be necessary to shim under Tool J-8347 to assure proper contact with both flanges of control arm.

- 4 Invert arm in press and repeat the process on the opposite bushing. After installation, cross shaft should be free enough to be rotated by hand.

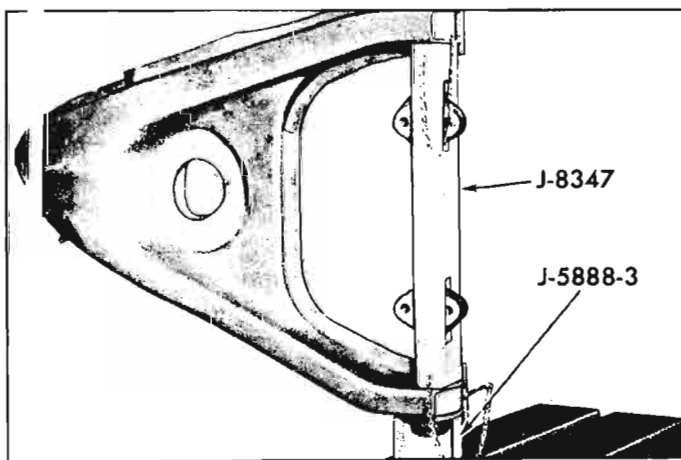


Fig. 3-31—Installing Control Arm Bushings

5. Install collar, lockwasher and bolt in each end of cross shaft. **DO NOT TIGHTEN.**

Installation of Control Arm

6. With splash shields in place (fig. 3-32), set control arm assembly in place (up to cross member). Install the four attaching bolts (from the top), lockwashers and nuts. Be certain to attach the parking brake bracket to the front two attaching bolts before installing nuts and lockwashers (fig. 3-29). Replace jack stand under control arm.

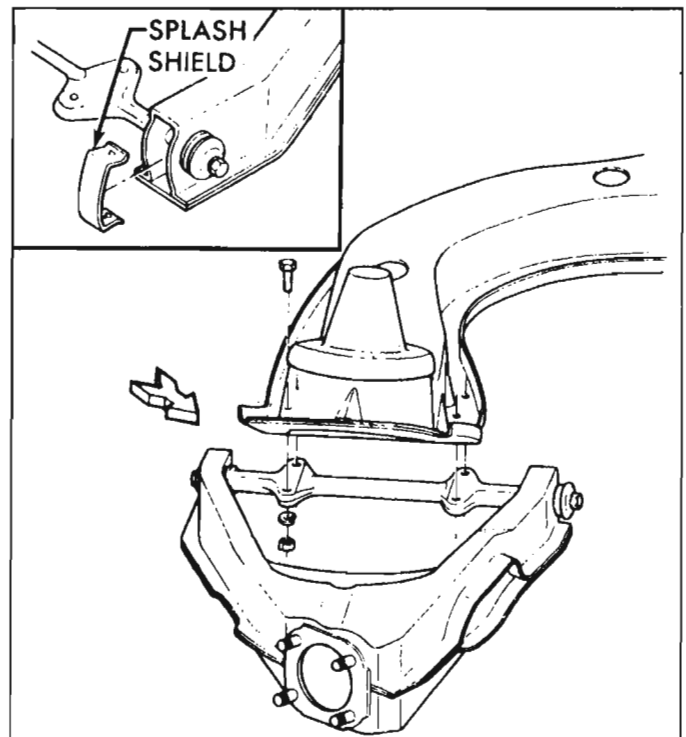


Fig. 3-32—Rear Control Arm and Splash Shield

7. Remove wire retaining backing plate to cross-member. Be certain axle shaft oil slinger is in place (small drain hole should be at bottom) and install backing plate onto studs in end of control arm. Temporarily install two nuts onto studs.
8. Install axle shaft through backing plate and lower control arm. Install yoke on end of axle shaft. Install flat spacer, lockwasher and bolt that retains yoke to shaft (see Section 6C).
9. Assemble universal joint assembly by installing the "U" bolts, nuts and lockwashers.
10. Remove the two nuts installed in step 7. Being careful of seal, install universal joint spline into axle housing (brake shoe should be out of position—see Figure 3-27). Line up holes in axle bearing flange plate with studs on end of control arm. Install the lockwashers and nuts through hole in axle shaft flange (fig. 3-28).
11. Install drum onto axle flange being certain that holes (not stud holes, but machine holes) in drum

SUSPENSION 3-18

DO NOT line up with hole in axle flange or dirt and other foreign matter may get into brake assembly.

12. Temporarily install wheel nuts to hold drum in place.
13. Install shock absorber and coil spring as outlined under "Rear Coil Spring—Installation."

REAR SUSPENSION CROSS MEMBER

Removal

1. Remove both shock absorbers and coil springs as outlined previously. Support control arms with jack stands.
2. Disconnect parking brake cable at rear equalizer. Disconnect transmission linkage or remove clutch cross shaft (see Sections 6B, 6D or 6E). Remove brake pipe from brake hose (both sides). Remove speedometer cable bracket on under body.
3. Remove the four bolts that attach control arm to the crossmember (fig. 3-29). Let parking brake cable bracket hang free. Remove jackstands from under control arms. Hand support arm assembly after removing jackstand. Pull control arm (with drum and axle shaft still assembled) outward to remove axle assembly from axle case (fig. 3-33). Repeat for opposite side.

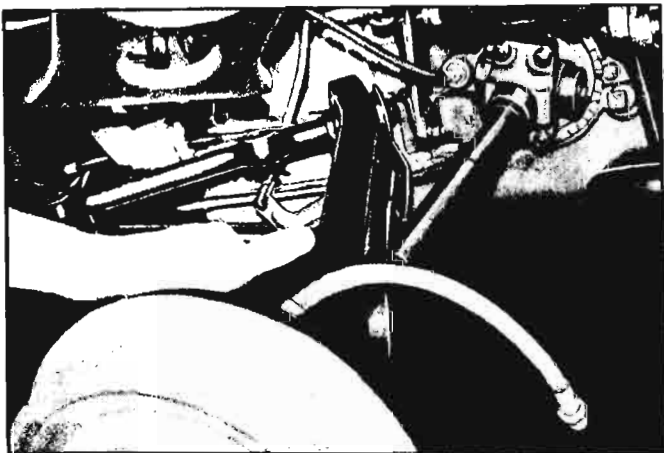


Fig. 3-33—Removing Control Arm with Brake and Axle Assemblies Attached

4. Place a hydraulic floor jack under the axle housing to support power plant when front (towards front of vehicle) mounting is removed.
5. Remove the two forward crossmember to body attaching bolts, thick metal washers and lower cushions. Loosen the two nuts that attach the power plant mounting bracket to the crossmember (fig. 3-35).
6. Remove the four bolts that retain the mounting bracket to the transmission. Note the number of shims removed at each point. Remove the two nuts and lockwashers that attach bracket to crossmember. Remove bracket from under vehicle.

7. Remove the bolt, lockwasher, large "dished" washer and rubber spacer from one side of crossmember. Remove the bolt, lockwasher, large "dished" washer and rubber spacer from opposite

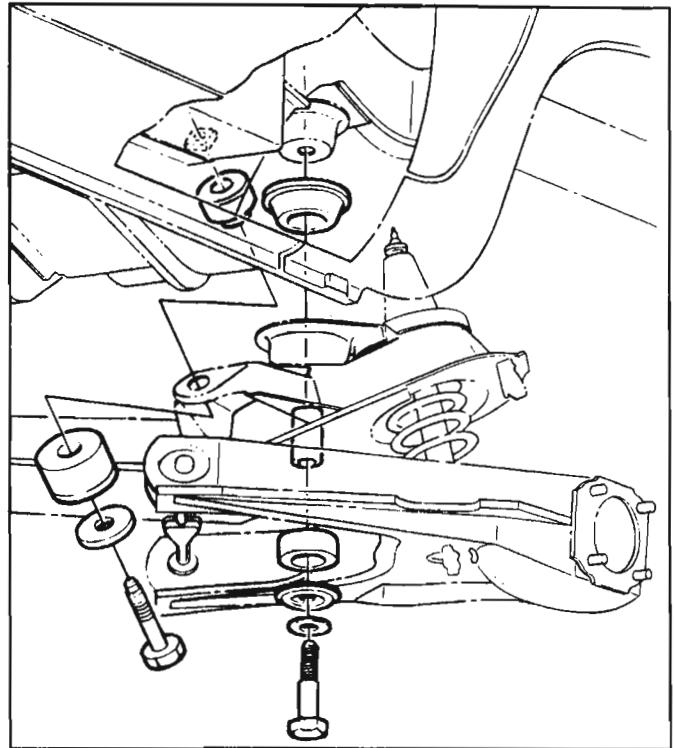


Fig. 3-34—Rear Crossmember Mounting

side (fig. 3-34). Carefully lower crossmember to floor by "rolling" it slightly forward and pulling (not bending) transmission accelerator control rod to one side (if so equipped).

8. Remove, if necessary, any parts of the crossmember mounts by prying out old pieces.

Installation

1. Replace any mount part which appears defective. Refer to Figures 3-34 and 3-35. It may be desirable to tape the mounts to hold them in place when installing the crossmember.
2. Set the crossmember in place and install the two outer mounts to the body (fig. 3-34). Do not tighten.
3. Loosely install the power plant brace to the crossmember.
4. Install the four bolts and all washers (after coating threads with an "anti-seize" compound) and shims (same number as removed) that attach the brace to the transmission (fig. 3-35). Be careful not to damage threads in aluminum casting. Secure these four bolts to 20-30 ft. lbs. torque.
5. Tighten the two bolts on the crossmember outer mounting. Install and tighten the two inner attaching mounts (fig. 34). Tighten the two bolts

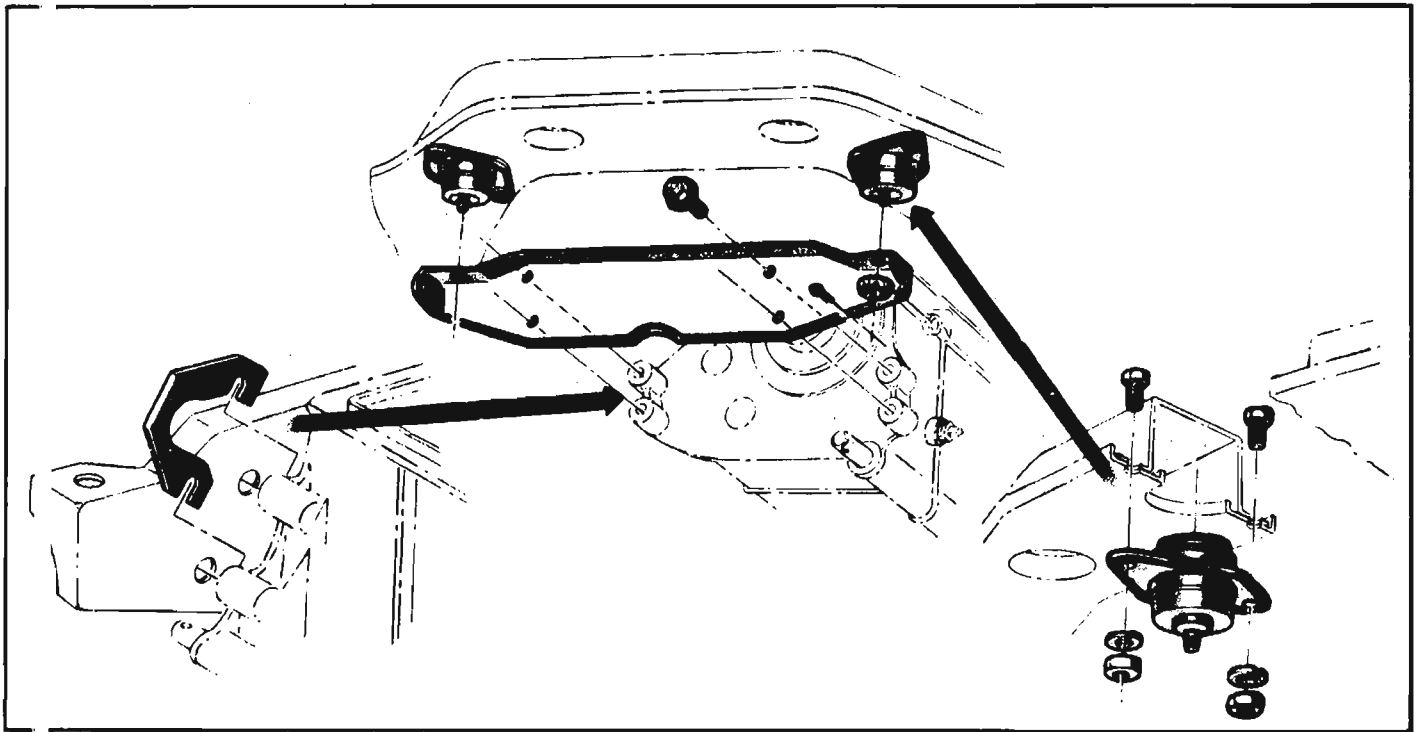


Fig. 3-35—Power Plant Brace Mounting

- that attach the brace and mounts to the cross-member.
6. Remove the hydraulic floor jack from under axle housing.
 7. Install all linkage except the accelerator control rod (if used on this vehicle). See Sections 6B, 6D or 6E for proper assembly procedure.
 8. Install the speedometer cable bracket to underbody.
 9. Place the two rear control arm assemblies under vehicle (these are still attached together by the parking brake cable).
 10. Pick up one control arm assembly (axle shaft assembly and brake assembly are still attached) and place universal joint into axle case being careful of seal. Place jackstand under control arm to help support. Install the four control arm attaching bolts, lockwashers and nuts. Be certain to get parking brake bracket in place. Torque to 40-50 ft. lbs. torque.
 11. Pull the parking brake cable (the one to each brake assembly) up over automatic transmission accelerator control and hook up control. See Section 6E.
 12. Install opposite control arm assembly as outlined in Step 10.
 13. Install any transmission or clutch linkage removed. See Sections 6B, 6D or 6E.
 14. Hook up the brake pipe and position brake hose as outlined in Section 5.
 15. Install rear coil springs and shock absorbers as outlined earlier in this section.
 16. Bleed the brakes as outlined in Section 5.
 17. Check rear wheel toe-in as described earlier in this section.

FRONT AND REAR SUSPENSION TO BODY ALIGNMENT

See Section 10 for alignment procedures of the

body affecting front and rear suspension chassis alignment.

CAGE NUT REPAIR

In many cases, bolts that retain suspension components to the body are secured by "cage" or "weld"

nuts. Full coverage is given for repair or replacement of these nuts in Section 10 of this manual.

WHEELS AND TIRES

CORVAIR—500, 700 AND 900 SERIES

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GENERAL DESCRIPTION

All models carry disc type wheels with tubeless type tires. The wheels are connected to the front wheel hubs and rear axle shaft flanges by four studs and nuts each.

The tires used on all models are 6.50 x 13-4 ply. The spare tire is mounted in the front compartment. A scissors type jack stowed under the tire, and a combination ratchet type jack wrench, wheel nut wrench and hub cap remover are supplied with all models.

MAINTENANCE

TESTING TIRE PRESSURES

The correct tire pressure is:

- Front—15 pounds cold
- Rear —26 pounds cold

Frequent checking is essential with low pressure tires as variations of only a few pounds make an appreciable difference in riding qualities, handling ease and tire wear. It should also be general practice to check tire pressures each time a car is brought in for service, not only as a convenience to the owner, but also to reduce the possibility of owner complaint of riding, steering or tire wear due solely to improper tire inflation. Checking inflation pressures should be a part of every lubrication job. **If too high a pressure is used in the front, a complaint of oversteer may develop.**

The following recommended pressures must be maintained to obtain maximum tire performance:

- Starting Pressure—Front—15 pounds
- Rear —26 pounds
- Hot Pressure—Front—18 pounds
- Rear —30 pounds

The pressures do not increase more than 4-5 pounds when heated under hard driving. Do not “bleed” tires to reduce this higher pressure.

When checking tires, servicemen should be careful to reinstall valve stem caps. These caps provide an essential function in keeping dirt out of the valve thus reducing the possibility of slow leaks through the valve.

PUNCTURE INSPECTION

Every 1000 miles or at each lubrication, the tires should be inspected for puncturing objects. If such are found, they should be removed and the tire repaired as explained in this section.

CHANGING ROAD WHEELS

To change the road wheels using the jack that comes with the car, observe the following procedure:

1. Set hand brake and block front wheels if rear wheel is being changed.
2. Remove hub cap or wheel disc and break wheel mounting nuts loose.

NOTE: If large size balance weights have been used to balance the wheel and tire assembly, their removal is necessary to be able to remove the accessory trim ring. Reinstall weights in same locations.

Place the jack directly under the side edge of body, approximately 10" toward center of vehicle from forward edge of rear fender opening or 4" back of front seam of sill (fig. 3-36) and raise car until wheel clears ground.

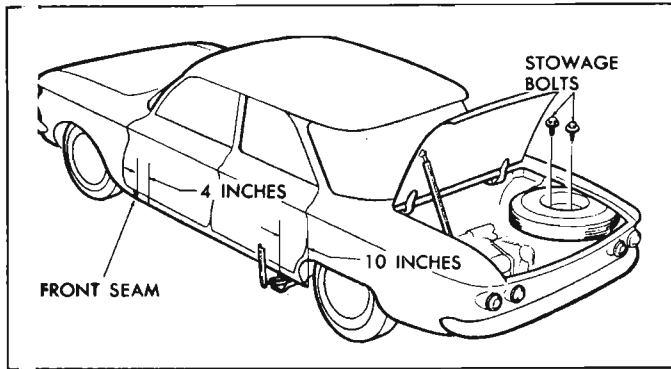


Fig. 3-36—Jacking Vehicle

Remove wheel mounting nuts and remove wheel from hub or drum.

To replace road wheel, reverse the above instructions. Proper torque on nuts is 45-65 ft. lbs.

INTERCHANGING TIRES

Normal tire wear is uneven between the front and rear wheels because of the difference in the functions of the front and rear tires. To minimize tire wear and the noise, it is recommended that tires be interchanged both as to front or rear use and as to change direction at intervals of from 4,000 to 5,000 miles.

In addition, utilizing the spare tire in rotation with the other four tires gives 20% more total car mileage before replacement tires must be purchased.

SERVICE OPERATIONS

CORRECTION OF IRREGULAR TIRE WEAR

Heel and Toe Wear

This is a saw-toothed effect where one end of each tread block is worn more than the other.

The end that wears is the one that first grips the road when the brakes are applied.

Heel and toe wear is less noticeable on rear tires than on front tires, because the propelling action of

The recommended plan for interchanging tires is based on the following steps.

Move the left front wheel to right rear, right rear to right front, right front to left rear, left rear to spare and spare to left front.

In detail, the plan provides the changes as shown in Figure 3-37 each time the tires are interchanged.

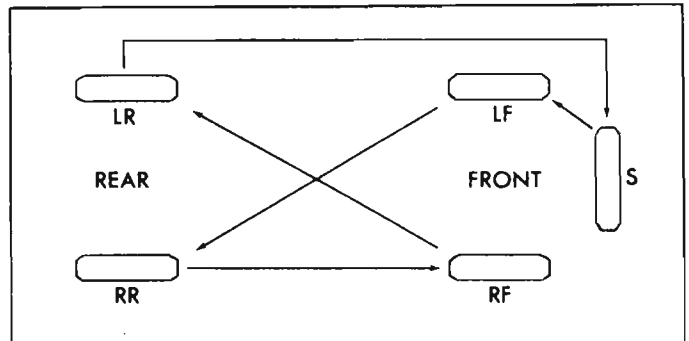


Fig. 3-37—Tire Rotation Plan

If the spare tire is not used, criss-cross the tires to obtain balanced tire wear (left front to right rear, etc.).

NOTE: Be certain to readjust tire pressures after rotating or criss-crossing.

CLEANING WHITEWALL TIRES

A great deal of ordinary road dirt which collects on white sidewall tires may be sponged off with clear water or a mild soap solution.

Chevrolet Whitewall Tire Cleaner, however, is a quicker and more effective cleaner for removing dirt and stains from whitewall tires and in many cases it will remove stains and discoloration that the simpler method of soap and water will not remove.

Under no circumstances should gasoline, kerosene or any cleaning fluid containing a solvent derived from oil be used to clean whitewall tires. Oil in any form is detrimental to rubber and a cleaner with an oil base will discolor or injure whitewall tires.

the rear wheels creates a force which tends to wear the opposite end of the tread blocks. The two forces, propelling and braking, make for more even wear of the rear tires, whereas only the braking forces act on the front wheels, and the saw-tooth effect is more noticeable.

A certain amount of heel and toe wear is normal. Excessive wear is usually due to high speed driving and excessive use of brakes. The best remedy, in

addition to cautioning the owner on his driving habits, is to interchange tires regularly.

Side Wear

This may be caused by incorrect wheel camber, under-inflation, high cambered roads or by taking corners at too high a rate of speed.

The first two causes are the most common. Camber wear can be readily identified because it occurs only on one side of the treads, whereas underinflation causes wear on both sides. Camber wear requires correction of the camber first and then interchanging tires.

There is, of course, no correction for high cambered roads. Cornering wear is discussed further on.

Misalignment Wear

This is wear due to excessive toe-in or toe-out, front or rear. In either case, tires will revolve with a side motion and scrape the tread rubber off. If misalignment is severe, the rubber will be scraped off of both tires (or all four tires if front and rear toe is not correct); if slight, only one will be affected.

The scraping action against the face of the tire causes a small feather edge of rubber to appear on one side of the tread and this feather edge is certain indication of misalignment. The remedy is readjusting toe-in within specifications, or rechecking the entire front end alignment or rear toe setting if necessary.

Uneven Wear

Uneven or spotty wear is due to such irregularities as unequal caster or camber, bent front or rear suspension parts, out-of-balance wheels, brake drums out-of-round, brakes out-of-adjustment or other mechanical conditions. The remedy in each case consists of locating the mechanical defect and correcting it.

Cornering Wear

Since the introduction of independently sprung front and rear wheels, improvements in spring suspension have enabled drivers to negotiate curves at higher rates of speed with the same feeling of security that they had with the older cars at lower speeds. Consequently, curves are being taken at higher speeds with the result that a type of tire wear called "Cornering Wear," frequently appears.

When a car makes an extremely fast turn, the weight is shifted from an even loading on all four wheels to an abnormal load on the tires on the outside of the curve and a very light load on the inside tires, due to centrifugal force. This unequal loading may have two unfavorable results.

First, the rear tire on the inside of the curve may be relieved of so much load that it is no longer geared to the road and it slips, grinding off the tread on the inside half of the tire at an excessive rate. This type of tire shows much the same appearance of tread wear as tire wear caused by negative camber.

Second, the transfer of weight may also over-load the outside tires so much that they are laterally distorted resulting in excessive wear on the outside half of the tire, producing a type of wear like that caused by excessive positive camber.

Cornering wear can be most easily distinguished from abnormal camber wear by the rounding of the outside shoulder or edge of the tire and by the roughening of the tread surface which denotes abrasion.

Cornering wear often produces a fin or raised portion along the inside edge of each row in the tread pattern. In some cases this fin is almost as pronounced as a toe-in fin, and in others, it tapers into a row of tread blocks to such an extent that the tire has a definite step wear appearance.

The only remedy for cornering wear is proper instruction of owners. They should be shown that rubber is being ground off of their tires and they should be instructed to drive a little more slowly on curves and turns. Also, the tires should be interchanged at regular intervals.

DISMOUNTING AND MOUNTING TIRES

Dismounting Tubeless Tires

Dismounting the tubeless tires presents no problems if the correct procedures are used and the following precautions observed.

1. Remove the valve cap and valve core. Let out all air.
2. Press the inner side of the tire into the rim well. Apply vegetable oil soap to each bead and rim before attempting to pull over rim. Use bead loosening tool or if regular tire irons are used, take particular care not to injure or tear the sealing ribs on the bead when pulling tire over rim.
3. Using tire irons on the opposite side (outer), remove bead, taking small "bites" around the rim.

CAUTION: Never use tire irons with sharp edges or corners.

NOTE: It is imperative that the rim and both tire beads be lubricated for removal and installation. The 13" tire bead does not stretch as much as larger sizes and the wire bead bundle can be severely damaged to the point where the tire seal to the bead seat is broken.

4. Turn the tire over, and use two tire irons, one between the rim flange and the inner bead to pry the rim upward, the other iron to pry outward between the bead seat and bead.

Mounting Tubeless Tires

The general procedure is the same as for tube and tire installation except that extreme care must be exercised to prevent injury to the sealing bead and circumferential bead when forcing tire over rim.

fewly designed tire mounting machines or tire irons should be used.

- 1 Apply a light film of vegetable oil soap to sealing beads of tire and rim of wheel.

NOTE: The use of excessive lubrication may lead to rim slippage and subsequent breaking of air seal.

- 2 Carefully mount the inner bead in usual manner by using tire irons, taking small "bites" around rim, being careful not to injure the tire bead.

NOTE: It is imperative that the rim and both tire beads be lubricated for removal and installation. The 13" tire bead does not stretch as much as larger sizes and the wire bead bundle can be severely damaged to the point where the tire seal to the bead seat is broken.

CAUTION: Do not use a hammer, as damage to the bead will result.

- 3 Install the outer bead in the same manner.

NOTE: If a seal cannot be effected in the foregoing manner with the rush of air it can be accomplished by applying to the circumference of the tire a tire mounting band or heavy sash cord and tightening with the use of a tire iron. On tire mounting machines, bouncing the tire assembly is not required. The tire should be lifted on the rim to force the top tire bead against the top rim flange. The weight of the tire will seat the bottom bead. This style rim has an extra bead around the rim to insure tire seats properly. Care must be used to see that tire is mounted over extra bead to insure proper installation.

TIRE AND RIM REPAIR

Different types of tubeless tire repair equipment and various methods of repair are recommended by the tire manufacturers. The two methods recommended by Chevrolet are as follows:

The Hot Patch Method

With this method the patch uses its own fuel to be ignited when vulcanization takes place. This method is recommended for repairing punctures not exceeding $\frac{3}{16}$ " in diameter. Size of puncture can be determined by size of puncturing object.

- Clean out the injury with an awl or hand rasp furnished with the tire repair kit.
- Using sealing gun, fill puncture from outside of tire, see Figure 3-38.
- Thoroughly clean inside of tire around injury with a good grade of non inflammable clear dry cleaner. Allow the cleaned area to dry.
- Roughen area around injury with hand buffer or wire brush, see Figure 3-39.

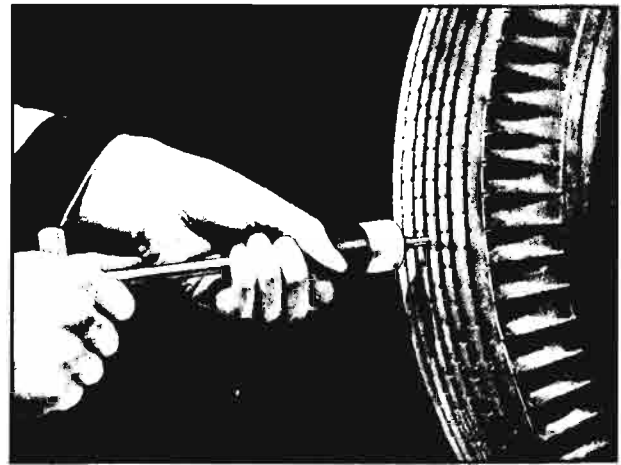


Fig. 3-38—Filling Hole with Sealing Gun

5. Spread an even coating of a good grade of rubber cement over the puncture, slightly larger than the patch area, and allow to dry for 5 minutes.
6. Prepare patch material for igniting by loosening material slightly with point of a knife blade in the center of each side.
7. Carefully center hot patch over injury and hold in place using special hot patch clamp. Tighten clamp, maximum finger tight. (See Figure 3-40.)



Fig. 3-39—Roughening Injury Area

8. Ignite patch material. Allow to cool 15 minutes or until cool enough to touch.
9. Carefully remove metal cup and blow out any ashes remaining in tire.

The Self-Vulcanizing Outside Plug Method (Tire Mounted)

Through the use of self-vulcanizing outside plug repair kits currently on the market, passenger car tubeless tire punctures can now be permanently repaired without dismounting the tire from the rim and in many cases, without removing the wheel from the car.



Fig. 3-40—Using Hot Patch Clamp

Punctures which cannot be repaired, are those which are over $\frac{3}{16}$ -inch diameter, or leaks caused by incisions or ragged lacerations. Outside plug repairs can be made on all passenger car tubeless tires including those containing soft puncture sealing material.

The following procedure should be followed in using these kits.

1. Inflate tire to approximately 10 pounds pressure to support tire. Satisfactory repairs can be made with lower, or no pressure.
2. Locate puncture. Mark, and note direction or angle of puncture channel when removing puncturing object.
3. With cutter shaft or reaming tool in position, make circular cut (approx. $\frac{1}{4}$ -in. deep) around puncture hole, using twisting action (fig. 3-41).

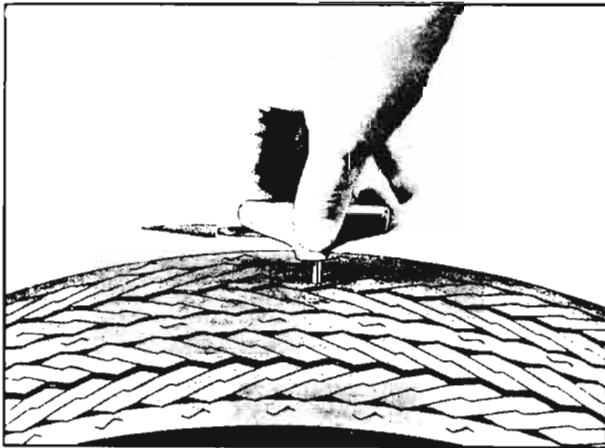


Fig. 3-41—Making Circular Cut with Reaming Tool

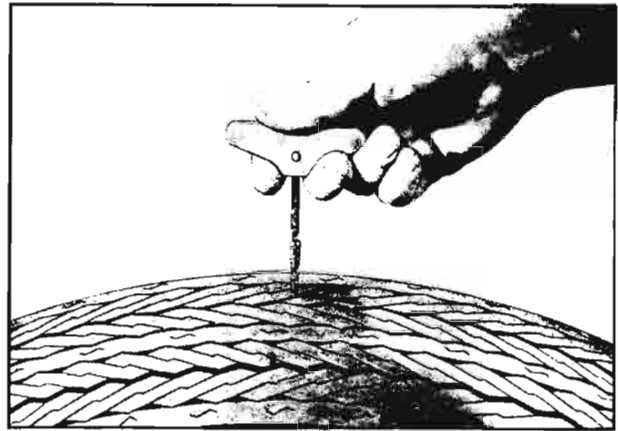


Fig. 3-42—Cleaning Puncture with Cleaning Needle



Fig. 3-43—Preparing Plug for Use

each retraction. Make sure the small circular cutout resulting from operation shown in Figure 3-41 has been removed. Lever the needle in the puncture to prevent escape of air.

5. Prepare the plug for insertion into nozzle of the plug-insertion tool by pulling white stem of plug in metal tube until the head of the plug is seated tightly against the end of the tube (fig. 3-43). Cut off protruding end of plug stem.
6. Prepare the plug-insertion tool for insertion of plug:
 - a. Insert cartridge of self-vulcanizing rubber cement into the open tool.
 - b. Fit plunger into recessed cartridge base.
 - c. Remove cleaning needle from the puncture and pierce cartridge with point of needle inserted through the nozzle of the tool. Enlarge the opening by twisting (fig. 3-44).
7. Press the nozzle of the plug-insertion tool firmly over the puncture hole and squeeze cement from cartridge until red spring on the tool stops the action (fig. 3-45). This deposits part of the cement. For repairs of punctures between narrow tread grooves, attach short extension tube.

4. Flip the screw-type cleaning needle of reaming tool into position and insert into puncture (fig. 3-42). Apply light pressure only and turn clockwise into puncture channel right down to the handle of the tool, carefully following the direction of the puncture. Retract tool by continuing to turn clockwise but with slight pulling action. Repeat this operation twice. Clean rubber particles, if any, from round cutter of needle, after

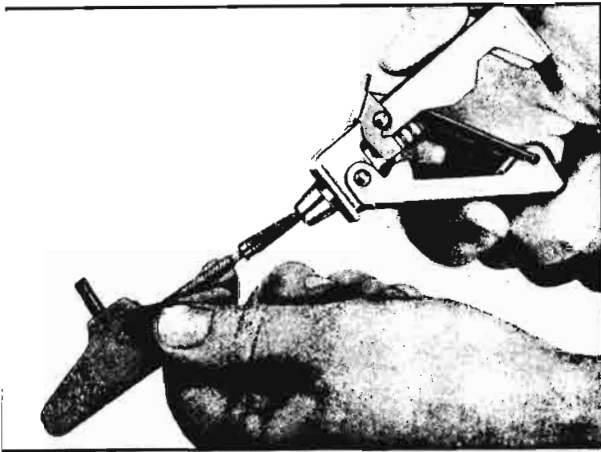


Fig. 3-44—Piercing Cement Cartridge

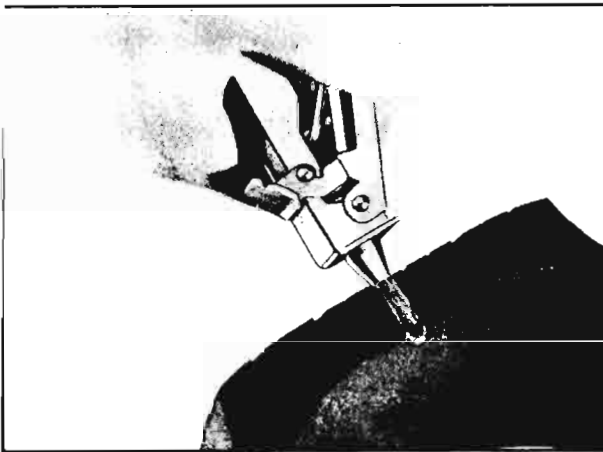


Fig. 3-45—Inserting Cement in Puncture

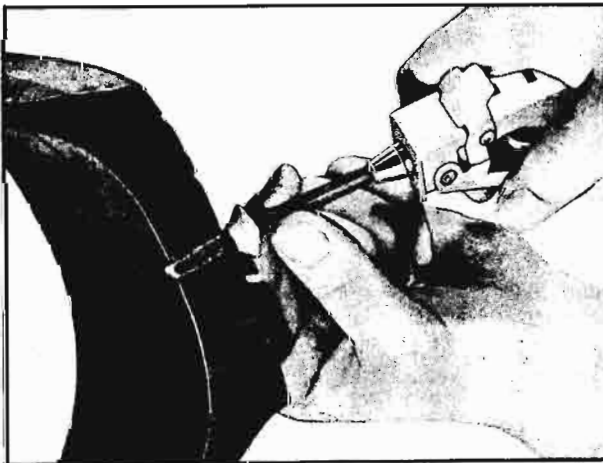


Fig. 3-46—Starting Plug into Puncture

3. Insert the metal tube with plug into nozzle of the plug-insertion tool, turning to the right until it is locked by the pin inside the nozzle. Lubricate head of plug with rubber cement. Place plug

head over puncture hole—holding lower end of metal tube to guide it and prevent bending—and push the entire metal tube into the puncture hole up to the base of the nozzle (fig. 3-46). Now press red spring stopper and squeeze the balance of cement into the tire (fig. 3-47). Retract metal tube with continuous clockwise turning and pulling action (fig. 3-48). Do not pull, but trim off excess of rubber plug protruding from puncture. The repair is now complete and the tire is ready for immediate use.

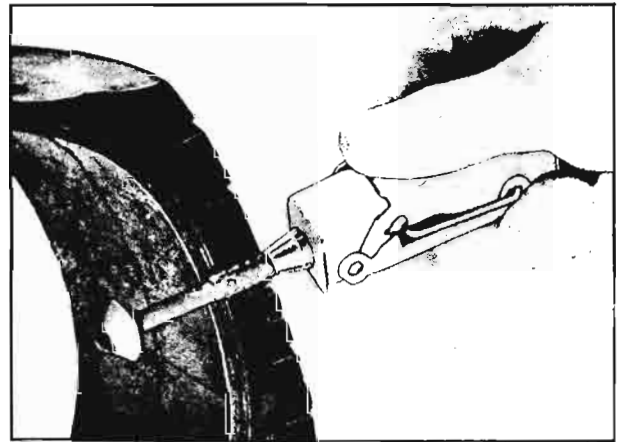


Fig. 3-47—Applying Remainder of Cement with Plug Inserted

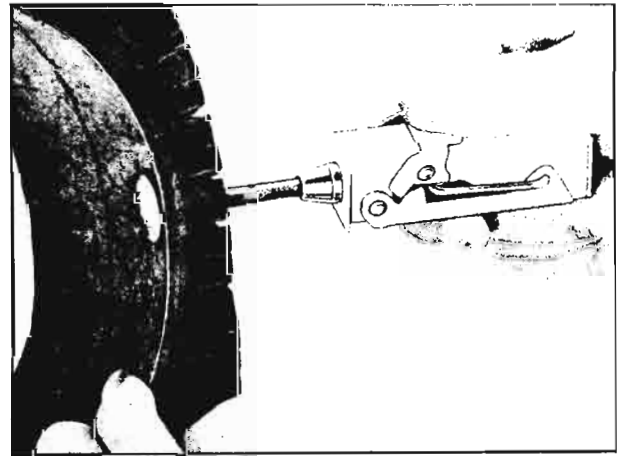


Fig. 3-48—Seating Plug to Complete Repair

9. Clean your tools. Especially remove hardened rubber cement before using the plug insertion tool for the next repair.

NOTE: If the puncture is an irregular cut that will not seal completely by this method, a self-vulcanizing patch or hot patch repair should be made.

The Self-Vulcanizing Method (Tire Dismounted)

In this method, a chemical action vulcanizes the patch. No external source of heat is necessary. Maxi-

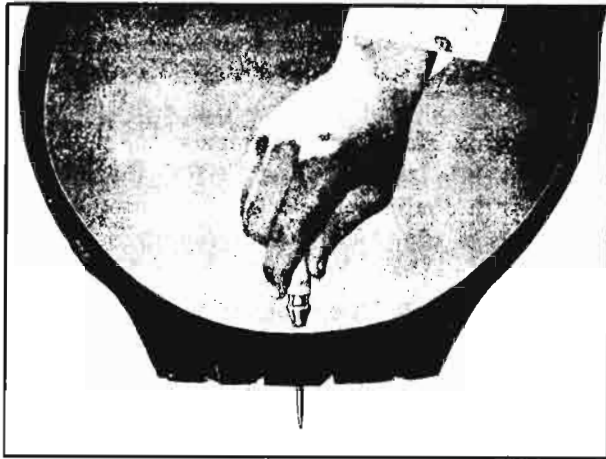


Fig. 3-49—Installing Needle in Tire Hole

imum size of puncture hole must not exceed $\frac{3}{16}$ " for this method of patching. (Larger size injuries must be repaired with press type vulcanizing equipment.) Many kits are manufactured and may be procured locally.

NOTE: This method should be used only for tires without soft puncture sealing material. The following procedure should be followed in using this kit.

1. Clean out the injury with the awl to remove puncturing object and foreign material.
2. Thoroughly clean the inside of the tire around the injury with a good grade commercial cleaner that will have no detrimental effect on rubber. Allow to dry.
3. Fill the injury with Filler Rubber (supplied in the kit) using the awl as follows:
 - a. Clean awl needle and dip in Self-Vulcanizing Fluid. From inside of tire, force needle through tire until point extends beyond tread (fig. 3-49).
 - b. Remove detachable handle from awl needle. Cut $\frac{1}{8}$ " by 1" strip of Filler Rubber, remove protective cover and insert into hole of awl needle with end of rubber strip extending beyond the needle. (See Figure 3-50.)
 - c. Pull needle through tire with pliers. Filler Rubber will remain in the puncture. Cut off excess rubber flush with inside of tire. The injury may also be filled from the outside or inside with a sealant gun. Hold gun tip firmly against puncture and force sealant through until it comes through the other side of the tire.
4. Thoroughly roughen area around puncture, slightly larger than the patch, with wire brush included in kit. Remove all traces of lubricant, foreign matter, etc. Do not use additional solvent after buffing.

5. Apply Self-Vulcanizing fluid over buffed area. Spread evenly with clean finger. Allow to dry for five minutes until no longer tacky. **This is important.**
6. Remove foil backing from patch. Place over injury and stitch down firmly, especially the edges, with roller tool included in kit. To prevent buckling and insure a good seal, roll patch from the center toward the outer edges. Vulcanizing is completed chemically. (See Figure 3-51.) The repaired tire can be placed back in service immediately.

Rim Repair

1. Straighten the rim if it is bent or dented.
2. Clean rim flange thoroughly with small piece of steel wool or sandpaper.
3. Inspect the butt-weld in the rim flange area to make certain there is no groove or high spot. Any grooves or high spots must be filed flat and smooth.
4. If air loss occurs at valve it can be corrected by replacing valve core or valve assembly.

Valve Assembly—Replace

1. Cut or drive old valve assembly out of rim.
2. Clean valve hole and surrounding area on inside of flange with steel wool.
3. Coat O.D. of new valve assembly liberally with the mounting compound.
4. Insert assembly through rim from inside. Snap into place, using a pair of slip-joint pliers with one jaw on rim and one jaw on base of valve assembly.

BALANCING WHEELS AND TIRES

A wheel and tire assembly may lose its original balance due to irregular tire wear, tire repair or some type of misalignment. Consequently, if front end in-



Fig. 3-50—Installing Filler Rubber in Hole

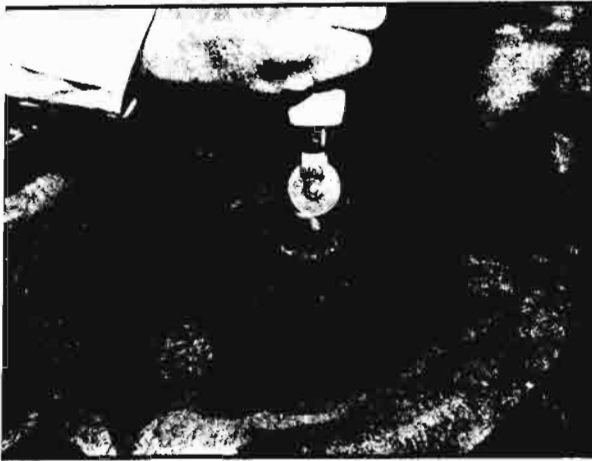


Fig. 3-51—Stitching Patch

stability develops, the tire and wheel assembly should be checked for static and, in severe cases, dynamic balance. The assembly should also be checked for balance whenever any original tire is removed or repaired, and especially in cases where nonstandard tire equipment, such as an extra ply casing, is used. Balancing is important on service replacements of wheels, tires, drums or any combination of the three because all assemblies are balanced at the factory to a total maximum unbalance of 11 inch ounces; 6 inch ounces on the hub and drum assembly and 5 inch ounces on wheel and tire assembly.

NOTE: Before attempting to balance the wheels, check to be certain that no foreign matter has been trapped in the wheel ventilation slots. This is especially critical if the vehicle has been run in soft mud and then parked in freezing weather.

Static Balance (still balance) is the equal distribution of weight of the wheel and tire assembly about the axis of rotation so that the assembly has no tendency to rotate by itself. Static unbalance causes the pounding action of the front wheels that is called "f amp."

To correct static unbalance:

- 1. Remove wheel and hub from spindle as a unit.
- 2. Clean all grease from wheel bearings and races.
- 3. Clamp a clean spindle in a bench vise, or if the spindle on the car must be used, clean it carefully.
- 4. Mount the wheel on the spindle and adjust the bearings loosely so that the wheel is just held in position and is practically frictionless.
- 5. Make sure that the tire is inflated to the correct pressure.
- 6. Start the wheel in motion and allow it to stop by itself. When it stops, the heavy side will be at the bottom.

7. Mark the heaviest point and also the uppermost or lightest point.
8. Install two balancing weights on the rim opposite each other and 180° away from the heavy point.
9. Move these weights equally in opposite direction toward the heavy side until the wheel is in balance.
10. Repack wheel bearings, reinstall and adjust bearings as explained in this section under "Front Wheel Bearings—Adjust."

Dynamic Balance (running balance) requires not only that the wheel be in static balance, but also that it runs smoothly at all speeds on an axis which runs through the center line of the wheel and tire and is perpendicular to the axis of rotation. Dynamic unbalance sets up forces which cause the wheels to wobble or "shimmy."

The quickest and best methods of testing and correcting dynamic unbalance are by the use of dynamic wheel balancers which are available commercially. These commercial balancers include all necessary instructions on where and how the balancing weights should be placed. The following information, however, will help in the correction of dynamic balance.

When a wheel that is statically unbalanced is dynamically in balance, the dynamic balance can be retained while correcting the static balance by installing the corrective weights so that half of the weight required is placed on the inner edge of the rim and the other half on the outer edge of the rim.

Dynamic unbalance can be corrected without destroying static balance by installing weights so half of weight required for dynamic balance is placed on the rim opposite the heavy point, while the other half is placed 180° away and on the opposite side of the rim.

WHEEL RUN-OUT AND ECCENTRICITY

The wheels should not run out (wobble) more than $\frac{1}{16}$ " as measured on the side of the rim at the base of the tire. Excessive run-out is the result of a bent wheel, an improperly mounted wheel, worn ball joints or steering connections. These parts should be checked for correct adjustment, proper alignment and wear whenever excessive run-out is encountered.

The wheels should also run concentric with the steering knuckle spindle within $\frac{1}{16}$ inch as measured on the tire bead seat of the rim with the tire removed.

Wheel run-out, eccentricity and balance are closely associated with steering and wheel alignment. Further information on these subjects will be found earlier in this Suspension Section.

TESTING FOR TIRE NOISE

Noise caused by the normal action of tire treads on various road surfaces is often confused with rear axle gears or other noises in the car.

The determination of whether tires are causing the noise complained of is relatively simple. The car should be driven at various speeds and note taken of part throttle, sudden acceleration and deceleration as axle and exhaust noises show definite variations under these conditions, while tire noise will remain constant. Tire noise is, however, most pronounced at speeds of approximately twenty or thirty miles per hour.

The tires may be further checked by driving the car over smooth pavement with the tires at normal

pressure and again over the same stretch of pavement when the tires have been inflated to fifty pounds pressure. Reduce the tires to normal pressure one at a time to determine the faulty tire or tires. This high inflation pressure should immediately be reduced to normal after test. If the noise for which the test is being made is caused by tires, it will noticeably decrease when the tire pressure is increased, whereas axle noise should show no change in volume.

If, on inspection, the tires on the front wheels are found to be creating most of the noise the alignment of the front wheels should be checked, as excessive tire noise usually results from low tire pressure, incorrect alignment or from uneven tire wear.

CORVAIR 95 AND GREENBRIER—1200 SERIES

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GENERAL DESCRIPTION

All of the Corvaire 1200 Series vehicles use the same suspension system, incorporating short and long arm front suspension, and swing type independent rear suspension. The front and rear wheel tread is 58 inches.

The front suspension is basically the same as the 1100 series passenger car, as shown in Figure 3-52. All components are assembled as a unit with a removable front suspension crossmember. Control arms, stamped of heavy gauge metal, are used with rubber bushed shafts. Forged steel steering knuckles are supported by spherical joint assemblies riveted to the control arms. All spherical joints are seated in concave bearing surfaces of durable, molded phenolic-impregnated fabric laminations.

The unitized, swing-type independent rear suspension system is of the same design as the 500, 700 and 900 vehicles, except for heavier rate springs and shock absorbers.

Service Operations and Maintenance are basically the same as the 500, 700 and 900 Series components, except as outlined in the following pages.

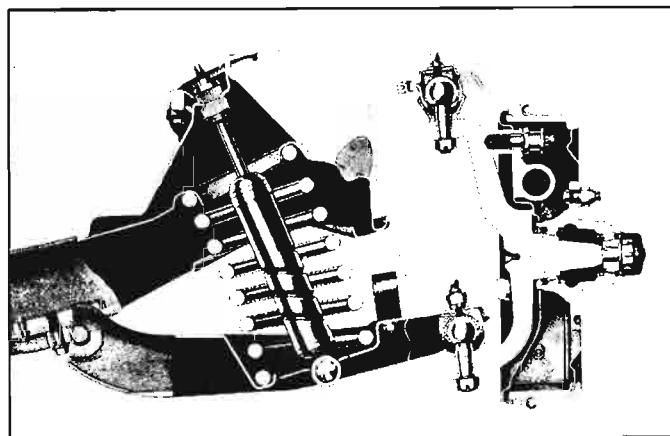


Fig. 3-52—Front Suspension—1200 Series

MAINTENANCE AND ADJUSTMENTS

LUBRICATION

Lubrication requirements are the same as for 500, 700 and 900 series vehicles. Consult Lubrication—Section 2 for detailed information.

ADJUSTMENT OF FRONT WHEEL BEARINGS

Adjust front wheel bearings as outlined in 500, 700 and 900 Maintenance and Adjustments, except that nut should be backed off $\frac{1}{2}$ flat or less as required to insert cotter pin.

WHEEL ALIGNMENT

For wheel alignment preliminary steps, see Corvair 500, 700 and 900 Maintenance and Adjustment. Proceed with actual adjustments as follows:

Front Wheel Alignment

Caster and Camber Adjustment

The caster and camber adjustments are made by means of shims between the upper control arm inner support shaft and the support bracket attached to the frame side rail. Shims may be changed at either the front of the shaft or the rear of the shaft to change caster or at both points equally to change camber.

The addition of shims at the front bolt or removal of shims at the rear bolt will decrease positive caster. A $\frac{1}{32}$ " shim difference, one shim, will change caster $\frac{1}{4}$ °. Adding shims at both front and rear of support shaft will decrease positive camber. A $\frac{1}{32}$ " shim change will move camber $\frac{1}{6}$ °.

The procedure for adjustment is to loosen the upper support shaft-to-bracket bolts, add or remove shims as required and retighten the bolts (fig. 3-53).



Fig. 3-53—Caster and Camber Shims

NOTE: Both caster and camber can be adjusted in one operation.

Caster should be $2\frac{1}{2}$ ° plus or minus $\frac{1}{4}$ ° and camber should be $\frac{1}{4}$ plus or minus $\frac{1}{4}$ °. Both sides of vehicle must be equal within $\frac{1}{2}$ °.

Note that these adjustments must be made with vehicle standing at curb height; which means height of center of lower control arm pivot from floor ($9\frac{3}{4}$ " \pm $\frac{1}{8}$ "") when vehicle has full capacity of fuel and oil, correct pressure in tires, nothing inside except standard items such as spare tire, jack, etc., and, of course, no passengers.

Steering Axis Inclination

Steering axis inclination may be serviced as outlined for 500, 700 and 900 vehicles, except that desired reading should be $7\frac{1}{4}$ ° \pm $\frac{1}{2}$ ° for 1200 series vehicles.

Toe-in Adjustment

Follow instructions for toe-in adjustment on Corvair 500, 700 and 900 vehicles except that amount of toe-in should be $\frac{1}{8}$ " at curb height (explained under Caster and Camber Adjustment in this section).

Note also that position of relay arm must be as explained on page 4-17 when adjustment is completed.

Rear Wheel Alignment

Follow steps outlined in Corvair 500, 700 and 900 section to adjust alignment of rear wheels, adding following operations.

1. Vehicle must be at curb height (defined under Front Wheel Alignment in this section).
2. Desired amount of toe-in is $\frac{1}{4}$ " to $\frac{1}{2}$ "; of camber $\frac{3}{4}$ ° \pm $\frac{1}{2}$ °. Note that camber is a reference dimension only, as no provision exists to set independently of toe-in.

SERVICE OPERATIONS

FRONT SUSPENSION

To perform many suspension service operations, it will be desirable to raise vehicle on hoist. Consult jacking point diagram in Section One for lifting areas.

FRONT HUB AND BRAKE DRUM

As the front hub is not riveted to the brake drum, these two parts may be easily separated by removing the front wheel. The front wheel hub may be removed from the spindle and service as outlined for 500, 700 and 900 models except for following differences:

1. Wheel studs are not staked on replacement. They may be easily removed and installed on an arbor press. Place a socket under stud being removed or installed and bring press ram in direct contact with stud shank or head (fig. 3-54).

Be sure that head is in full contact with hub flange when installation is completed.

2. Bearing races are removed and replaced in the same manner as 500, 700 and 900 counterparts. However, removal tools (fig. 10-6) should be of $\frac{7}{16}$ " stock. Inner cup tool should be $2\frac{3}{16}$ " long and outer cup tool should be $1\frac{1}{16}$ " long. Replace outer cups with J-8849 and inner cups with J-8850.
3. When installing hub on spindle, follow directions given under *Adjustments—Front Wheel Bearings* in this section (1200 series vehicles).

Inspection of Spherical Joints

Perform inspection of spherical joints as outlined in 500, 700 and 900 series service operations.

RIDING HEIGHT AND COIL SPRING SAG

Check spring height following operations one and two under 500, 700 and 900 Service Operations—*Riding Height and Front Spring Sag*; replace operations 3, 4, 5

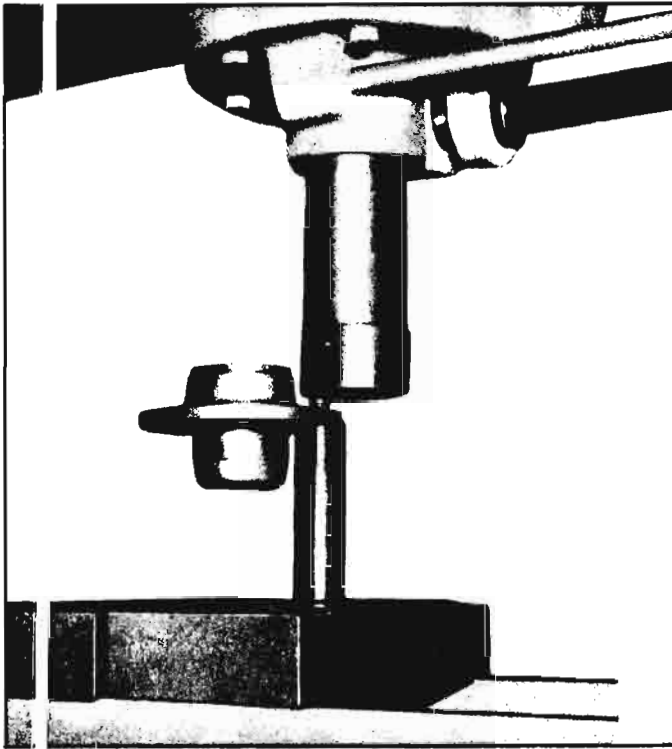


Fig. 3-54—Pressing Stud—Front Hub

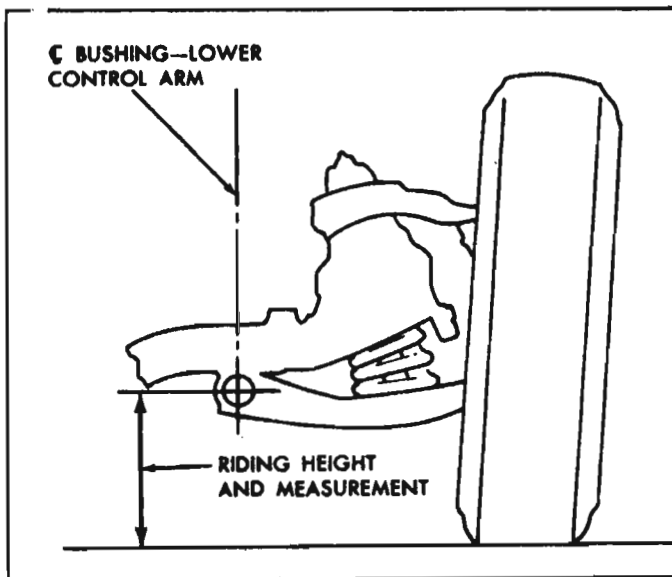


Fig. 3-55—Front Pivot Height

at 16 under this heading with the following operations:

1. Check tires and inflate to correct pressures.
2. Front height may be checked by measuring the distance from the center of lower control arm pivot bolt to floor (fig. 3-55). This distance should be $11\frac{1}{8}'' \pm \frac{1}{8}''$ with vehicle at curb weight. Measure both sides of vehicle in this manner; the resulting measurements should be within $\frac{1}{2}''$ of each other.

3. If measured heights do not fall within tolerances, springs must be replaced. Follow appropriate service outline in this section.

FRONT SPRINGS, LOWER CONTROL ARMS, SPHERICAL JOINTS AND 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. Pry out upper rebound bumper. 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 floor jack or jackstands.
2. Remove shock absorber as outlined previously.
3. Position a $16\frac{1}{4}''$ piece of 2 x 4 as shown in Figure 3-56; be sure upper corner of 2 x 4 is placed behind re-enforcing channel toward inside of vehicle.

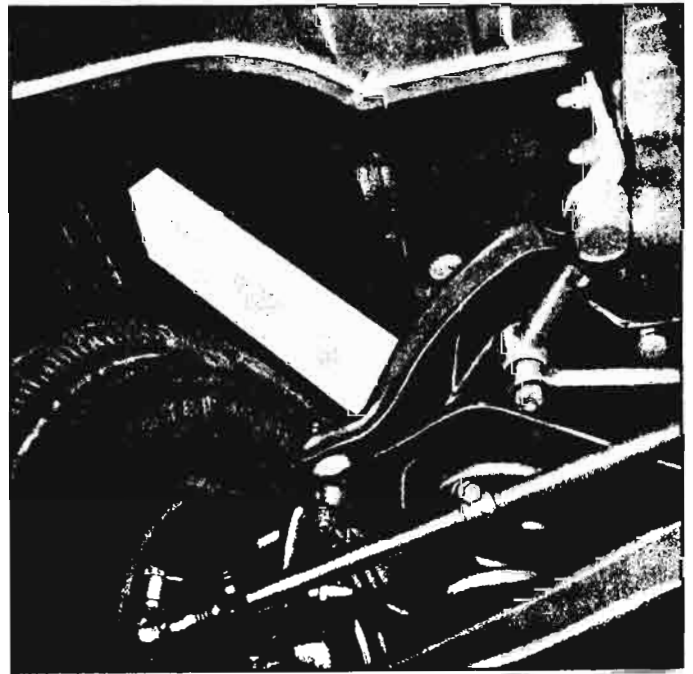


Fig. 3-56—Position of 2x4—Spring Removal

4. Place floor jack or stand under lower control arm and raise until 2 x 4 is forced firmly against channel.
5. Remove nut from lower control arm ball stud and strike knuckle boss with hammer, backing up boss with larger hammer (fig. 3-57).
6. Raise control arm until ball stud is free of knuckle boss. Swing wheel out far enough to clear lower arm; block or wire in this position.
7. Carefully lower jack or stand which is supporting control arm until spring is de-compressed and remove spring.

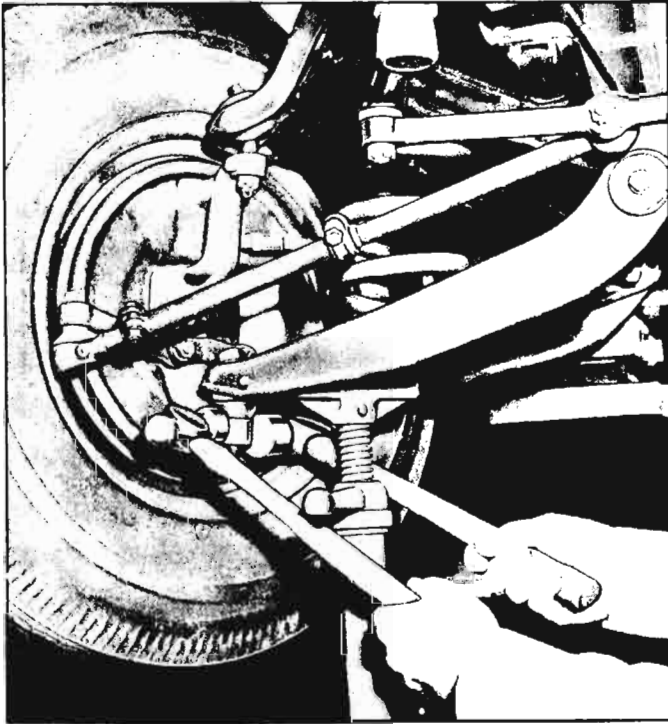


Fig. 3-57—Freeing Ball Stud

Coil Spring Installation

1. Seat spring in tower with end of spring coil in contact with step in spring seat.
2. Swing lower arm up as far as possible and seat spring in control arm as above.
3. Place jack or screwstand under lower control arm and raise until ball stud may be placed into knuckle boss hole (be sure dust cap is in position on ball stud). Check position of spring in both seats from time to time while raising arm.
4. When stud will enter hole, lower jack and install ball stud nut and torque 60-94 ft. lbs.; align castellation in nut with hole in ball stud and install cotter pin.
5. Lower vehicle to floor or raise lower control arm far enough to position upper rebound bumper over its hole. Lubricate point of bumper with Ru-Glide or Door Ease and place point in hole. Slowly raise car from floor or lower the lower control arm until upper arm presses point of bumper through the hole in the spring tower.

SPHERICAL JOINTS

Removal

Remove coil spring as explained in the foregoing outline and continue as follows:

1. With control arm hanging free, but still attached to crossmember, remove grease fitting and nut from upper side of lower control arm.
2. Mark center of rivet heads with center punch and drill through heads with $\frac{1}{4}$ " drill.
3. Cut off rivet heads with cold chisel and remove

balance of rivets with punch. Remove spherical joint assembly.

Installation

1. Position new assembly on control arm and install special bolts through mounting holes. Install nuts on bolts and spherical joint mounting stud.

NOTE: Do not substitute any bolts for those specified for use in the replacement of spherical joints.

2. Place dust cover over ball stud and assemble suspension as outlined under *Front Coil Spring—Installation*.

Cross Shaft and/or Bushings

Removal

1. Remove bolt, lockwasher and collar from each end of cross shaft.
2. Thread a $\frac{7}{16}$ x 20 cap screw (furnished with Tool J-5888) to the bottom of the threads in one end of the cross shaft.
3. Support control arm in an arbor press on Tool J-5888-3, as shown in Figure 3-58.

NOTE: Be certain bushing flange does not contact support.

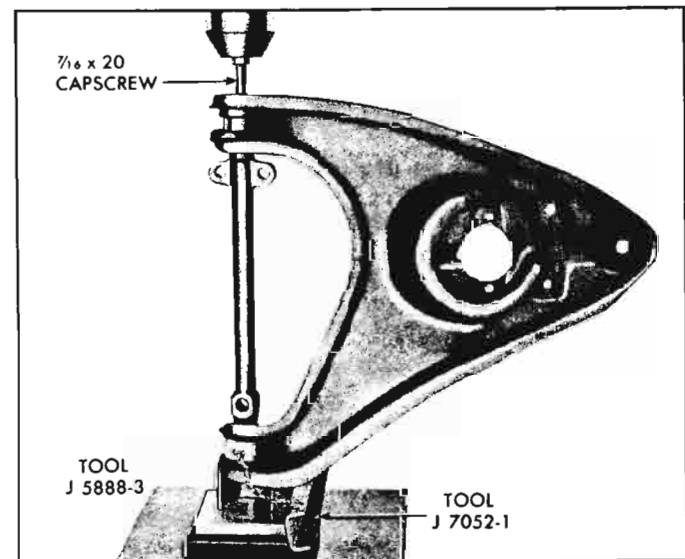


Fig. 3-58—Removing Lower Control Arm Cross Shaft Bushing

4. Press on cap screw until bushing is free of control arm. Discard bushing.
5. Remove cap screw from cross shaft. Insert it in other end of shaft. Invert control arm on support (fig. 3-59). Again be certain bushing flange does not contact support.
6. Press on cap screw until bushing is free of control arm. Discard bushing.

Installation

1. With cross shaft in control arm and Tool J-7052-1

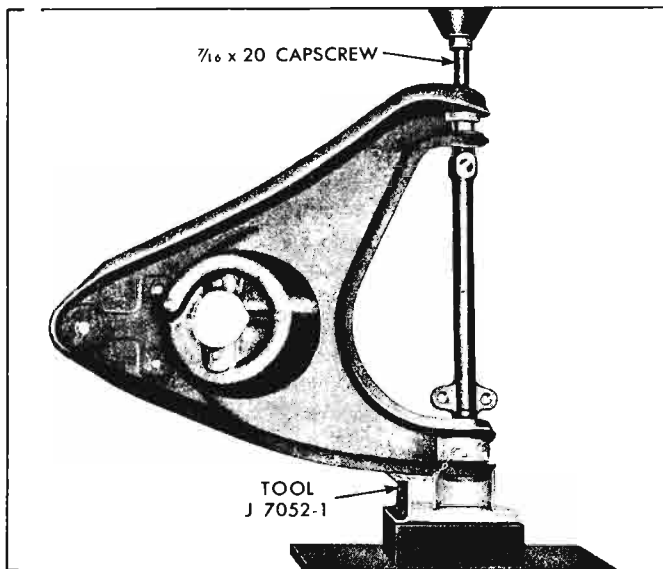


Fig. 3-59—Removing Second Lower Control Arm Cross Shaft Bushing

in position, place control arm on Tool J-5888-3. Hand start bushing into control arm and over end of cross shaft.

NOTE: The end of the shaft with the two bolt holes should be toward front of control arm.

2. Install Tool J-7052-5 over bushing. Be certain three-piece spacer is not over-lapping bushing holes in control arm.
3. Press bushing into control arm until flange contacts control arm (fig. 3-60).

NOTE: In extreme cases, due to manufacturing tolerances, it may be necessary to shim under Tool J-7052-1 to assure proper contact with both flanges of control arm.

4. Invert arm in press and repeat the process on the other bushing. After installation, cross shaft

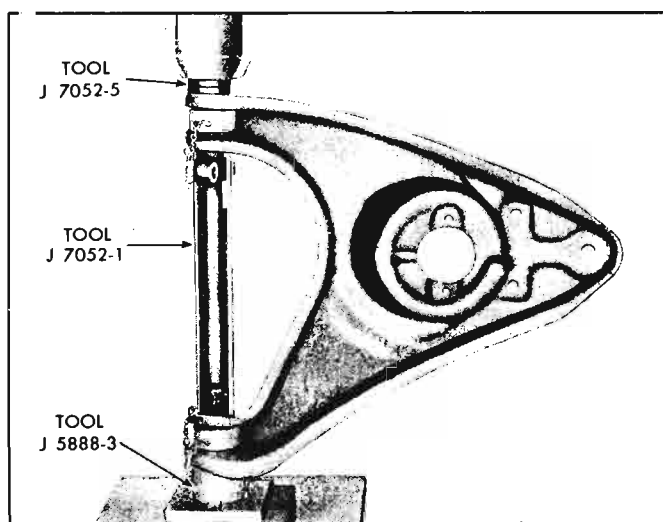


Fig. 3-60—Installing Lower Control Arm Cross Shaft Bushings

- should be free enough to be rotated by hand.
5. Install collar, lock washer and cap screw in each end of cross shaft. **Do not tighten.**

Lower Control Arm Assembly

Installation

1. With the control arm in place, attach in place with the three lock washers, bolts, and anchor nuts.
2. Install coil spring as outlined under *Front Coil Spring Installation*.
3. With unit on floor, tighten cross shaft bushing bolts to 45-55 ft. lbs. torque.

FRONT SUSPENSION UPPER CONTROL ARM SPHERICAL JOINT, CROSS SHAFT OR BUSHINGS

Upper Control Arm Assembly

Removal

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. Remove the stud from knuckle with Tool J-6627. Wire hub-drum assembly in position.
5. Remove two nuts retaining upper control arm shaft to front cross member. Note number of shims at each bolt.
6. Remove upper control arm from vehicle.

Spherical Joint

Inspection

The upper spherical joint is checked for wear by checking the torque required to rotate the ball stud in the assembly. 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 ft. lbs. If excessive wear is indicated in upper joint, both upper and lower joints should be replaced. If a tight joint is suspected, 15 ft. lbs. is the maximum allowable torque with joint well lubricated.

NOTE: This inspection does not necessitate upper control arm removal. Follow the upper arm removal procedure through Step 4 and raise the arm for the check.

Replacement

The upper control arm spherical joint is replaced as outlined for lower control arm, except that flange of joint is installed on top side of upper control arm, and holes in arm are reamed out to $2\frac{1}{64}$ " diameter.

Cross Shaft Bushings

Removal

1. Remove cap screws, lock washers and collars from both ends of cross shaft.

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2. Install a $\frac{3}{8}$ -24 cap screw (furnished with Tool J-5888) in one end of cross shaft.
3. Support control arm in an arbor press on Tool J-5888-3 as shown in Figure 3-61.

NOTE: Be certain flange of bushing does not contact support.

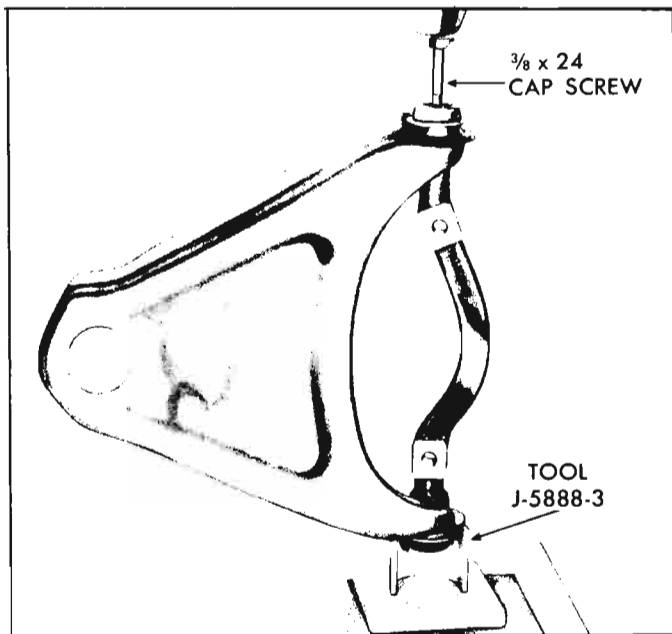


Fig. 3-61—Removing Upper Control Arm Cross Shaft Bushings

4. Press out bushing, invert control arm and repeat process on other bushing. Discard bushings.
5. Remove cap screw from cross shaft.

Installation

1. Install arm in arbor press with Tool J-7052-2 in

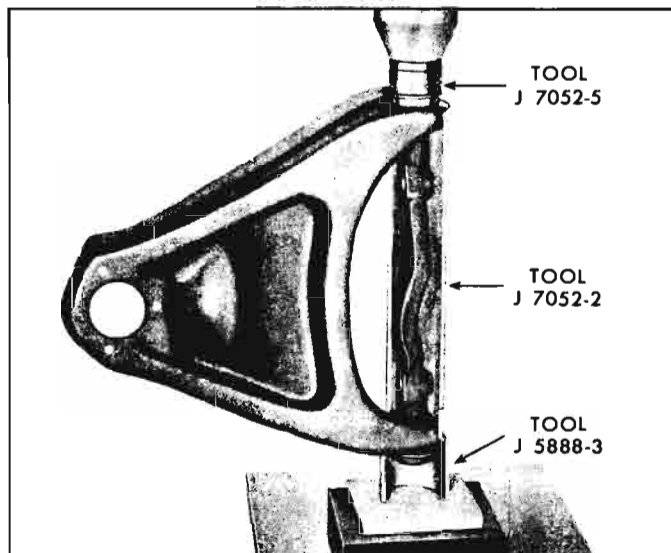


Fig. 3-62—Installing Upper Control Arm Cross Shaft Bushing

place and press in one bushing while supported on Tool J-5888-3 as shown in Figure 3-62.

2. Install cross shaft in arm invert in press, and press in second bushing as above.
3. Cross shaft should be able to be turned by hand.
4. Install collar, lockwasher and cap screw in ends of cross shaft. Do not tighten.

Upper Control Arm Assembly

Installation

1. Install upper control arm to vehicle. Make certain attaching studs are in position.
2. Install two nuts and bolts retaining upper control arm shaft to front cross member. Install same number of shims as removed at each bolt.
3. Install new rubber seal on joint stud.
4. Install ball stud through knuckle, install nut, tighten securely and install cotter pin.
5. Install wheel and tire assembly.
6. Lower vehicle to floor.
7. Bounce front end of vehicle to centralize bushings and tighten bushing collar bolts to 35-40 ft. lbs.

Front Suspension Crossmember

The front suspension crossmember assembly may be removed from the vehicle as a unit with wheels and control arms still attached, as well as with these parts removed. To perform removal of entire assembly, raise vehicle on hoist or jacks and proceed as follows:

1. Remove steering relay rod from pitman arm as outlined in Section Four—*Service Operations*.
2. Remove bolts retaining idler arm to frame.

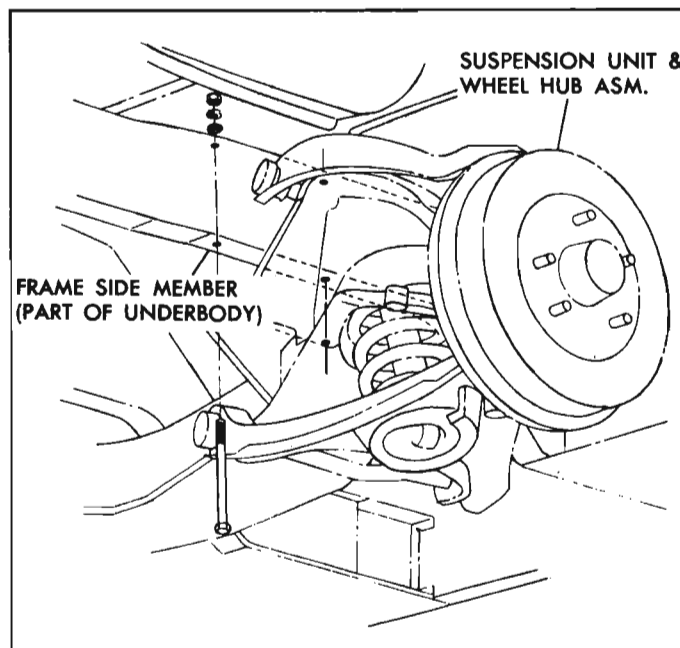


Fig. 3-63—Front Crossmember Mounting

3. Disconnect brake main cylinder line and rear brake feed line from junction block at top center of crossmember.
4. Place a suitable lifting device under crossmember and remove the four bolts (2 per side—fig. 3-63) holding crossmember to frame section of underbody; assembly may now be removed from vehicle.

Installation

1. Raise crossmember into position and align mounting holes with drift.
2. Install mounting bolts; torquing nuts to 100-110 ft. lbs.
3. Install idler arm to frame; torquing nuts to 13-22 ft. lbs. Install pitman arm to relay rod; refer to Section Four—*Service Operations*.
4. Connect brake lines to junction block and bleed brakes as outlined in Section Five.

REAR SUSPENSION

The rear suspension used on 1200 series vehicles is basically of the same design as that used on 500, 700 and 900 series. For this reason, the service operations outlined for the 500, 700 and 900 series may be, in most cases, applied to 1200 series also.

The following information provides service procedures for areas of rear suspension which differ from 500, 700 and 900 series vehicles.

RIDING HEIGHT AND COIL SPRING SAG

Proper riding height should be measured as the distance from the center of control arm pivot bolt to ground, which should be $14\frac{5}{8}'' \pm \frac{1}{2}''$ at curb height of vehicle. (The curb height of any vehicle is the distance of a given point on the chassis to the ground where the vehicle is loaded with nothing but its full capacity of fuel and oil, and standard equipment, such as spare tire, jack, etc.)

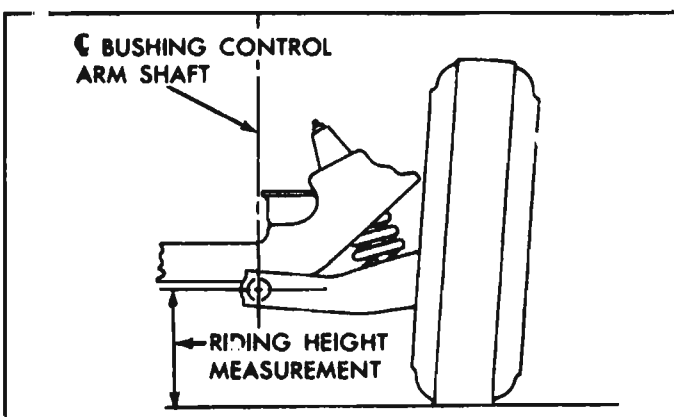


Fig. 3-64—Rear Pivot Height

REAR SUSPENSION CROSSMEMBER

Rear suspension crossmember may be removed from vehicle as a unit with wheels and control arms installed. Proceed as follows:

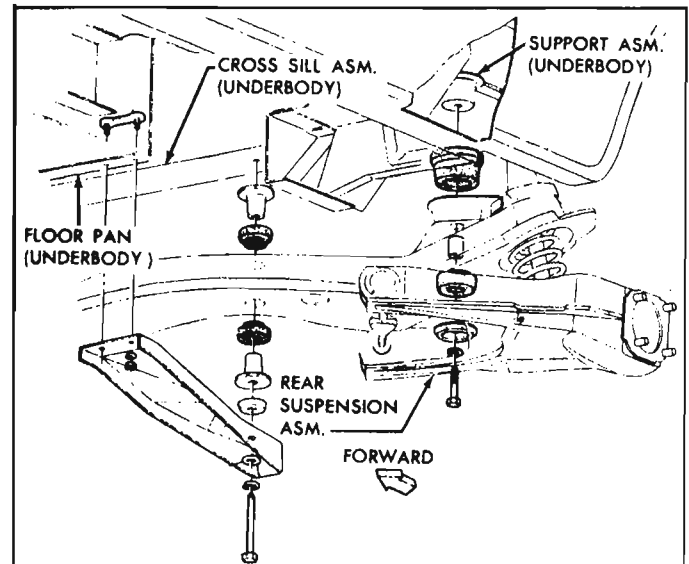


Fig. 3-65—Rear Crossmember

Removal

1. Disconnect parking brake cables at equalizer.
2. Disconnect brake lines at body-mounted supports.
3. Disconnect transmission and/or clutch linkage from transmission mounting plate.
4. Support transmission with jackstand and remove transmission support plate as outlined in Corvaire 500, 700 and 900 series—*Service Operations*.
5. Remove both crossmember-to-body supports.
6. Support crossmember with suitable lifting device. Remove inner and outer crossmember mounting bolts and lower crossmember to floor.
7. For repair of cage nuts, see Section 10.

Installation

1. Position upper mounts and cups (where used) in crossmember and tape into place.
2. Raise crossmember into position and align mounting holes with drift.
3. Install outer bolts, torquing to 55-70 ft. lbs.
4. Install inner bolts with crossmember-to-body supports in position. Torque to 55-70 ft. lbs. Torque support-to-body nut to 70-110 ft. lbs.
5. Connect all linkage removed. Refer to Section 6D and 6E for Transmission Linkage and Section 6B for Clutch.
6. Connect parking brake linkage and hydraulic brake lines. Refer to Section 5 for assembly and brake bleeding procedures.

WHEELS AND TIRES

GENERAL DESCRIPTION

1200 Series vehicles are equipped with five stud disc wheels. The tires used are Tubeless Tyrex type. Size 7.00 x 14 four ply tires are standard equipment,

with six ply tires available as an extra cost option.

A spare tire, a wheel wrench and a jack are provided with each vehicle.

MAINTENANCE

Maintenance procedures are the same as for Corvair 500, 700 and 900 models, except as outlined in the following.

TIRE PRESSURES

The following recommended pressures must be maintained to obtain maximum tire life.

	HOT	COLD
7.00 x 14 4 ply	28 psi	24 psi
7.00 x 14 6 ply	32 psi	28 psi

CHANGING ROAD WHEELS

Follow operations 1 and 2 outlined for Corvair 500, 700 and 900 series under Wheels and Tires—*Changing Road Wheels*. Position furnished jack as shown in Figure 3-66, and raise wheel from ground. Perform operations 4 and 5 under above heading.

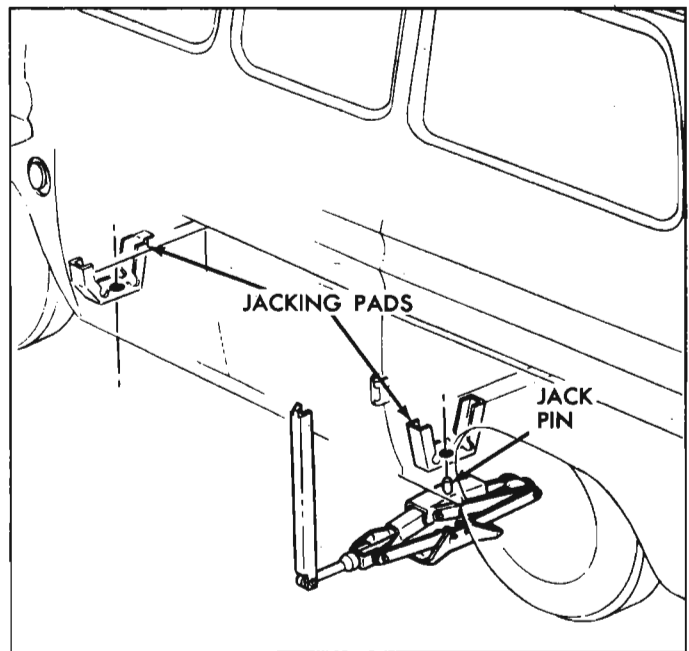


Fig. 3-66—Jacking Instructions

TROUBLES AND REMEDIES

Symptoms and Probable Cause

Hard Steering

- Lack of lubrication.
- Improper wheel alignment.
- Sagging front or rear spring.
- Bent wheel or spindle.
- Broken wheel bearings.
- Tight spherical joints.
- Underinflated tires.
- Improper steering gear adjustment.
- Tie rod ends out of alignment.

Probable Remedy

- Lubricate according to instructions.
- Front end alignment correction.
- Replace springs as required.
- Straighten or replace wheel or replace spindle.
- Replace necessary bearings.
- If not corrected by lubrication, replace joints.
- Inflate tires to recommended pressure.
- Adjust steering gear.
- Align tie rod ends with ball studs.

Front Wheel Shimmy

- a. Underinflated tires.
- b. Broken or loose wheel bearings.
- c. Worn spherical joints.
- d. Improper caster.
- e. Unbalanced wheels.
- f. Steering gear loose.
- g. Tie rod ball loose.
- h. Loose wheel lugs.
- i. Bent wheel.
- j. Improper alignment.
- k. Wheel out-of-balance.

- a. Inflate tires to recommended pressure.
- b. Replace or adjust wheel bearings.
- c. Replace joints.
- d. Adjust caster.
- e. Balance wheel and tire assemblies.
- f. Adjust steering gear.
- g. Replace tie rod end.
- h. Tighten lugs.
- i. Replace or tighten wheel.
- j. Front end alignment as per specifications.
- k. Balance wheel.

Excessive or Uneven Tire Wear

- a. Wheels out of balance.
- b. High speed cornering.
- c. Improper air pressures.
- d. Not rotating tires as recommended.
- e. Improper acting brakes.
- f. Improper alignment.
- g. Rapid stopping.

- a. Balance wheels.
- b. Instruct driver.
- c. Inflate tires to recommended pressure.
- d. Rotate tires according to instructions.
- e. Correct brakes as required.
- f. Align front end as per specifications.
- g. Apply brakes slowly on approaching stop.

Vehicle Too Flexible

- a. Faulty shock absorber.

- a. Disconnect shock absorber and test action (there should be considerable and steady resistance in each direction when held in upright position), replace if necessary.

Harsh Riding

- a. Shock absorber broken or seized.
- b. Excessive tire pressure.

- a. Disconnect shock absorber and test action, replace if necessary.
- b. Check tire pressure.

Road Wander

- a. Underinflated tires.
- b. Lack of lubrication.
- c. Tight steering gear.
- d. Improper toe-in.
- e. Improper caster and camber.
- f. Worn tie rod ends.
- g. Loose relay rod.

- a. Inflate tires to recommended pressure.
- b. Lubricate chassis and steering gear.
- c. Adjust steering gear.
- d. Adjust toe-in.
- e. Adjust caster and camber.
- f. Replace tie rod ends.
- g. Adjust relay rod joint.

Noise in Front or Rear Wheels

- a. Loose wheel lugs.
- b. Broken or loose brake shoe return springs.
- c. Broken or rough wheel bearings.
- d. Scored drums.
- e. Lack of lubrication (wheel bearings).

- a. Tighten wheel lugs.
- b. Replace return springs.
- c. Replace bearings according to instructions.
- d. Replace brake lining and machine drums.
- e. Lubricate as per instructions.

Wheel Tramp

- a. Wheel assembly out of balance.
- b. Blister or bump on tire.
- c. Improper shock absorber action.

- a. Clean wheel and balance assembly.
- b. Replace or repair tire.
- c. Replace shock absorber.

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Shock Absorber Noisy

- a. Faulty shock absorber.
 - b. Improper grommet installation or loose retaining nuts.
- a. Disconnect shock absorber and test action, replace if necessary.
 - b. Inspect and correct as necessary.

Shock Absorber Leaks Fluid

- a. Faulty shock absorber.
- a. Replace shock absorber.

Loss of Air (Tires)*

- a. Puncture in tire.
 - b. Faulty valve or valve core.
 - c. Rim defect.
- a. Repair puncture.
 - b. Replace valve assembly or core.
 - c. Correct rim defect.

*See Wheels and Tires in this section.

SPECIFICATIONS

For Corvaair 500, 700 and 900 Suspension Specifications, See Section 12.