

SECTION XVI

SUSPENSION AND STEERING

FRONT SUSPENSION

Description

The Packard front suspension system, figure 1, is of the independent parallelogram type with each front wheel being carried independently of the other. Each front wheel rotates on two tapered roller bearings on the wheel spindle which is an integral part of the steering knuckle. The steering knuckle is carried by a forged steel vertical knuckle support which is attached at its upper end to an upper support arm, the inner end

of which pivots on a bracket attached to the top of the frame. The lower end of the knuckle support is attached to the outer end of the lower support arm, the inner end of which pivots on a bracket attached to the bottom of the frame. The steering knuckle pivots on a steel pin which rotates in a needle bearing at the upper end and a bushing at the lower end. Vertical thrust is absorbed by a ball thrust bearing located between the knuckle support and the knuckle.

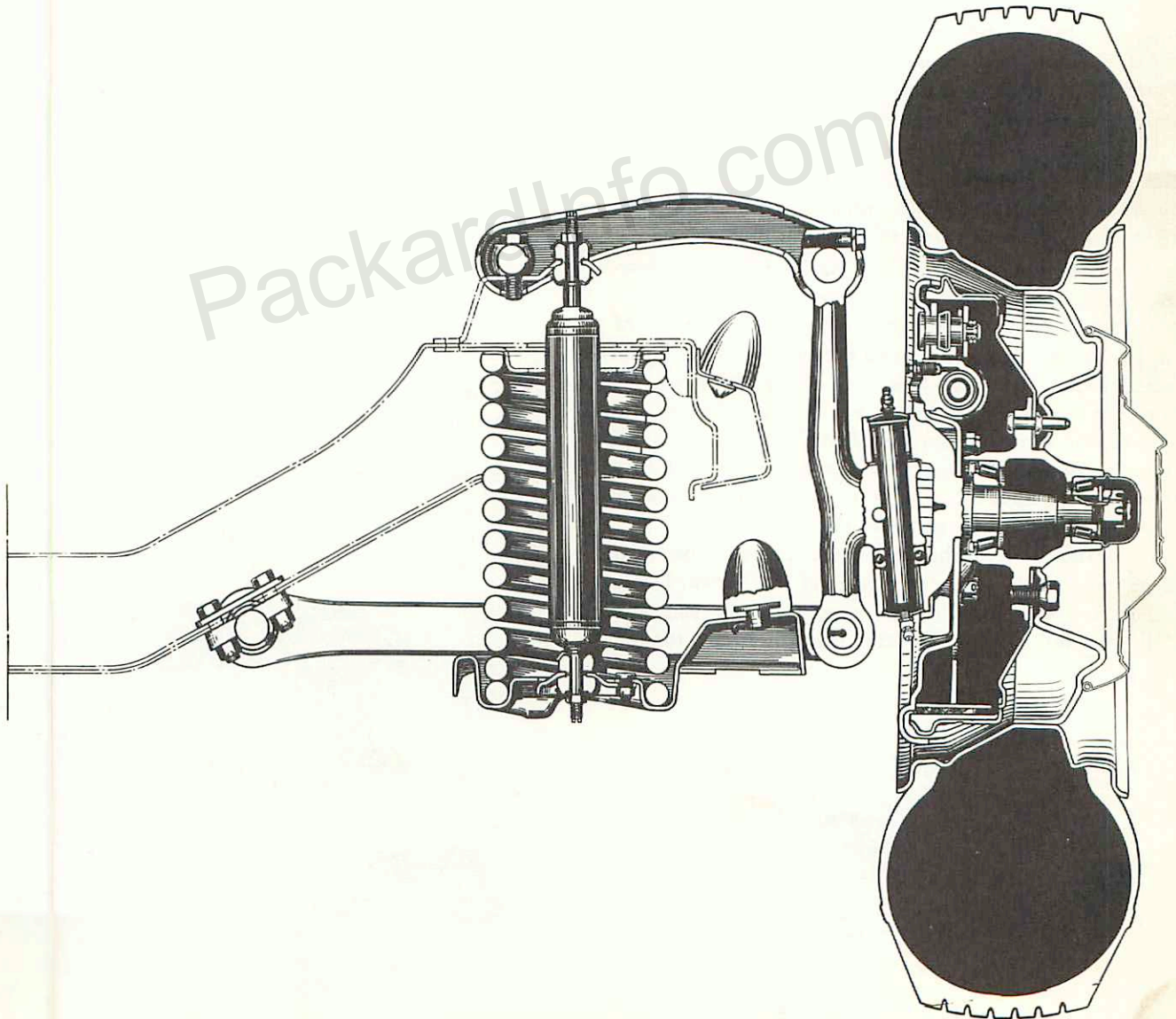


Figure 1—Cross Section of Conventional Front Suspension

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On cars equipped with the conventional front suspension, a low frequency coil spring provides a means of support at each front wheel. The upper end of each spring seats against the bottom of the frame front channel, while the lower end rests in a spring seat attached to the lower support arm.

On Torsion-Level suspension, a link which seats in the lower support at the bottom and which contacts the front load arm at the top provides the means of support at each front wheel.

With both types of suspension systems, rubber com-

pression and rebound bumpers limit the vertical wheel travel in both directions.

Front end stability on curves and on highly crowned roads is provided by a torsional stabilizer bar. The bar is carried in rubber bearings in brackets attached to the frame ahead of the front cross member. The outer ends of the bar are attached to the lower support arms. As one side of the car starts to roll or raise higher than the other side, the spring steel stabilizer bar resists with a twisting action. This twisting action of the bar reacts to keep the car on a level plane.

SERVICING THE FRONT SUSPENSION

General

The following procedures describe the servicing of front suspension details with the front of the car raised and supported by stand jacks under the frame.

On conventional suspension equipped cars, place a hydraulic jack under the outer end of the lower support.

On Torsion-Level suspension equipped cars, the Front Load Arm Holding Tool, J-6065, must be installed for servicing details of the front suspension.

CAUTION: Under no circumstances should the upper or lower support arms or the knuckle supports be disconnected from each other or from the frame at any time without using the holding tool, J-6065.

The Holding Tool, J-6065, is installed in the following manner with the car resting on its wheels.

Place the heavy or shoe section of the tool on top of the load arm with the long end extended into the frame side channel. Insert the U section of the tool from the bottom under the load arm with the handle below and toward the center of the car. Install the pin through the U section and through the heavy or shoe section of the tool. See figure 2. It may be necessary to raise or lower the car slightly to insert the pin.

Raise the car with the jack in the center of the front cross member or under the frame at the forward end.

Figure 3 shows the frame raised with the jack and with the tool in place. At this time the main torsion

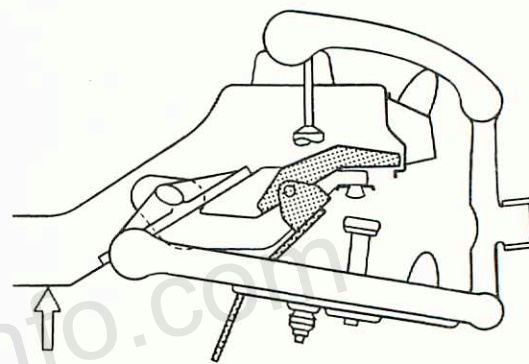


Figure 3—Car Frame Raised

bar is held in its "wound-up" position and the front end details now can be disconnected.

Steering Knuckle Removal

Remove the tire and wheel assembly and the front brake hub and drum. Remove the front brake support plate as shown in figure 4. It is not necessary to dis-

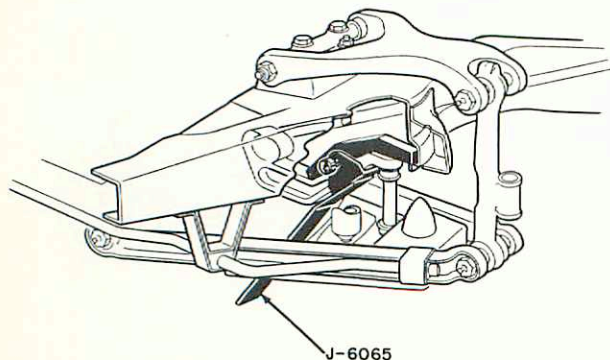


Figure 2—Special Tool Installed

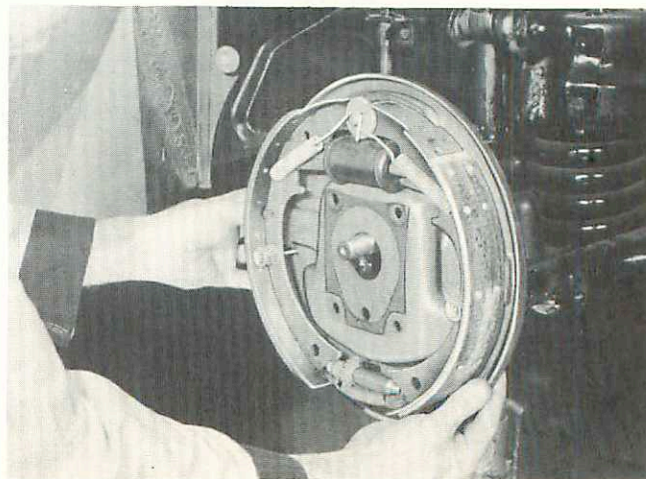


Figure 4—Removing the Front Wheel Brake Support

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connect the brake hose at the support plate as the plate can be moved out of the way and wired or tied to the frame.

Drive out the steering knuckle pivot pin locking pin as shown in figure 5. Remove the lubrication fittings at the top and bottom of the knuckle.

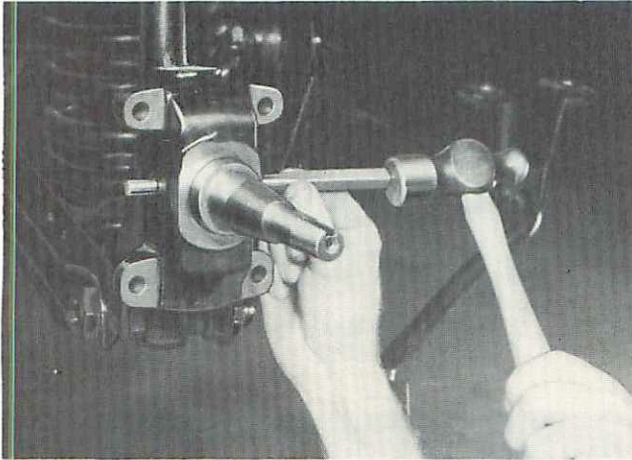


Figure 5—Drive Out the Knuckle Pin Locking Pin

Using a punch, remove the upper grease retaining plug from the knuckle. Using a drift, drive the knuckle pin downward and out through the bottom of the knuckle. The plug in the bottom will come out with the pin. See figure 6.

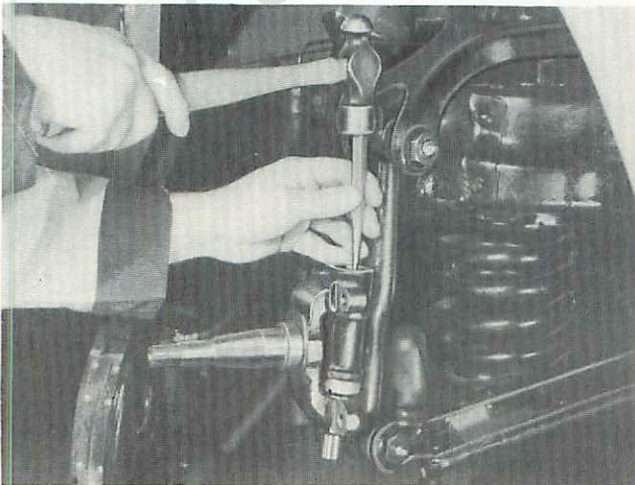


Figure 6—Driving Out the Knuckle Pin

Steering Knuckle Bearing Replacement

Both the knuckle upper bearing and the knuckle lower bushing can be pressed out of the knuckle using a piece of round stock $1\frac{1}{8}$ " in diameter.

When installing new bearings, they should be pressed in to the position shown in figure 7.

Refer to figure 8, and note the locations of the ends of the oil grooves indicated by the arrow. The bushings

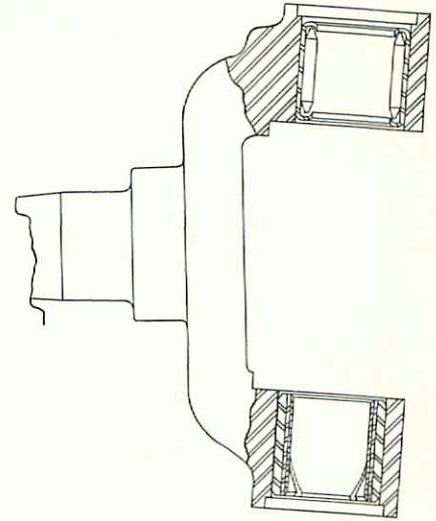


Figure 7—Bearings in Proper Position

should be pressed into the knuckle so that the oil grooves are located as shown in the illustration.

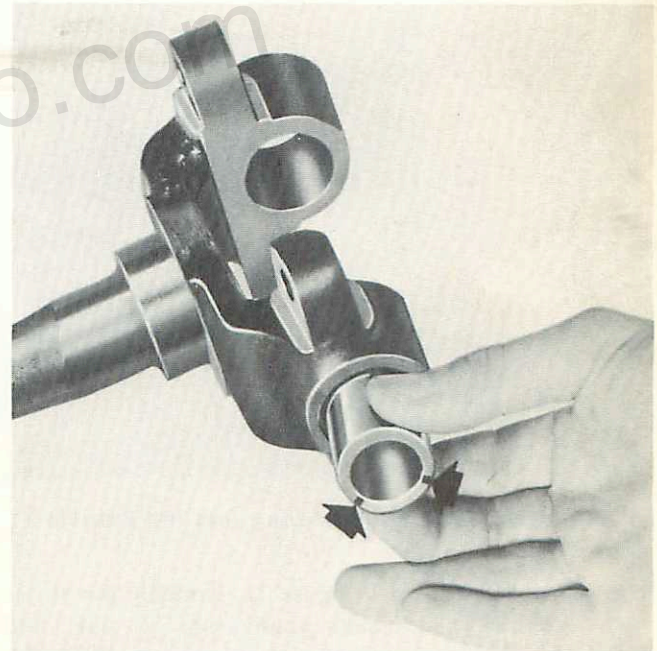


Figure 8—Note Ends of Oil Grooves

Refer to figure 9. The arrow indicates the "Trademark" end of the bearing. The bearing should be pressed into the knuckle so that the "Trademark" end is nearest the spindle. The bearings and bushings should be pressed into the knuckle using an arbor press as shown in figure 10.

Steering Knuckle Installation

When assembling the steering knuckle to the knuckle support, check the clearance between the knuckle and

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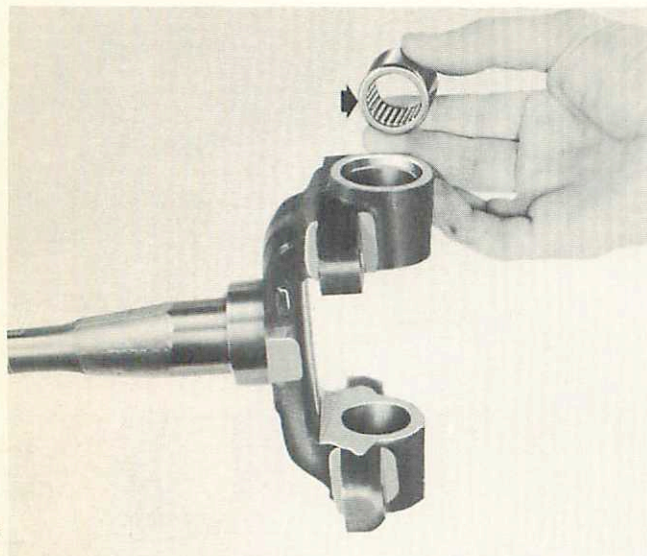


Figure 9—Trademark End Towards Spindle

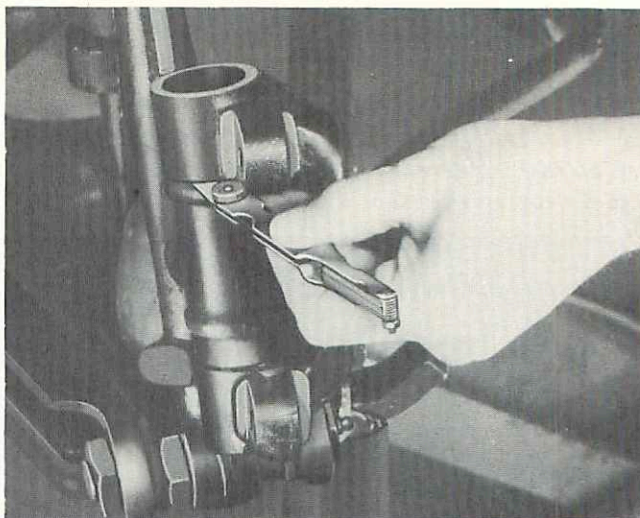


Figure 11—Check the Knuckle and Support Clearance

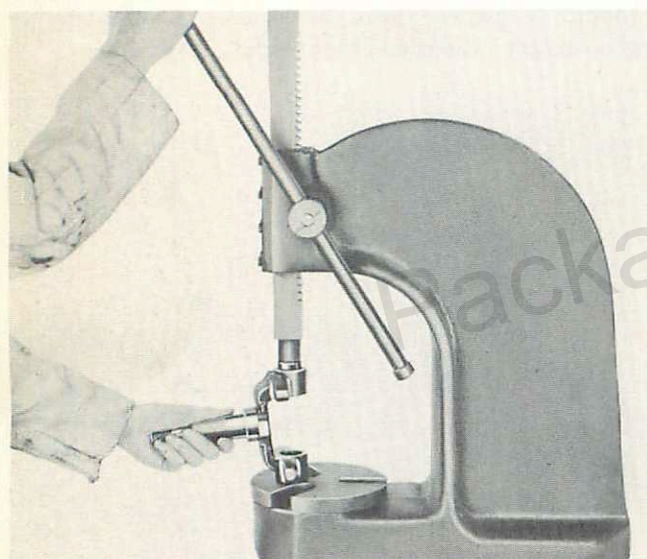


Figure 10—Press the Bearing Into the Knuckle

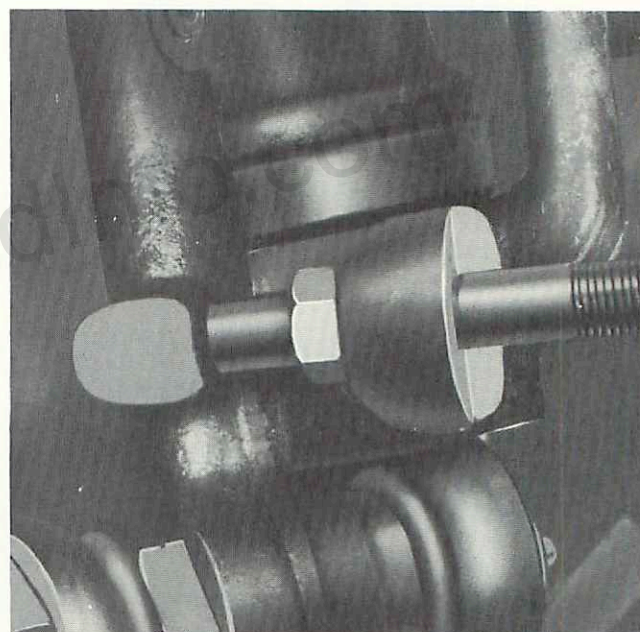


Figure 12—Raised Head Must Contact Flat

the support as shown in figure 11. Knuckle pin shims are available in thickness graduations of .001" and range from .054" to .072". Select and install a shim that will give a pull of 1 to 3 pounds with a scale attached to the end of the wheel spindle.

When a shim of the proper thickness has been selected, install the knuckle pin, bearing, and shim and the knuckle pin lock pin.

Install new lubrication retainer plugs and stake them into place. Reinstall the lubrication fittings.

NOTE: When assembling the brake support plate the retaining screw having the raised head should be installed in the lower rear hole of the plate. Refer to figure 12. You will note that the head of this screw acts as a stop when it contacts

the flat on the knuckle support and interchanging it with another will adversely affect the turning radius of the car.

Torque tighten the support plate cap screw nuts to 45 to 50 ft. lbs.

The front wheel bearings adjusting nut should be torque tightened to 20 ft. lbs. and then the nut backed off one hex and the cotter pin installed.

Knuckle Support Removal

Remove the wheel and tire, hub and drum, and the brake support plate.

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Place a stand jack or a hydraulic jack under the lower support arm.

Remove the lower pivot pin retaining nut "A", shown in figure 13, and then back out the lower pivot pin "B".

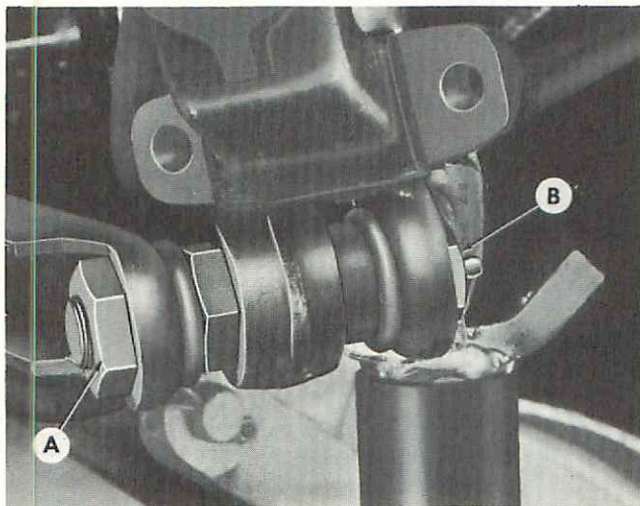


Figure 13—Remove Nut "A" and Pin "B"

Remove the upper pivot pin retaining nut "A", as shown in figure 14, and then back out the upper pivot pin "B".

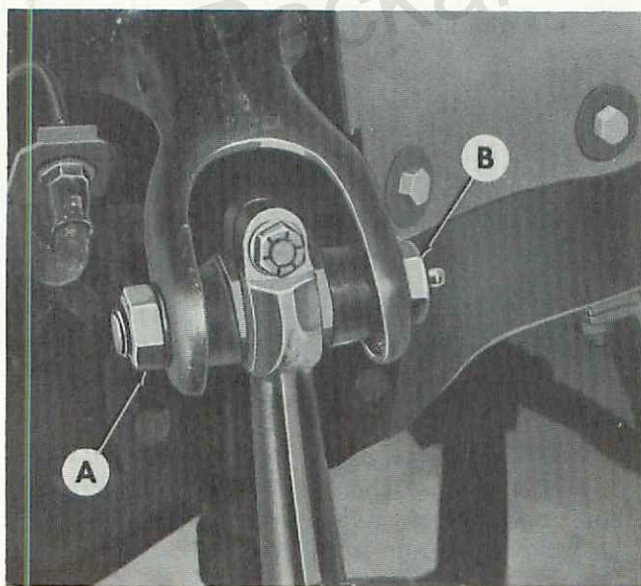


Figure 14—Remove Retaining Nut and Pin

Knuckle Support Bushing Replacement

If the lower pivot pin bushing in the knuckle support is to be replaced or if a new support is to be installed, disassemble the steering knuckle from the knuckle support.

The lower pivot pin bushing is coarsely threaded

and may be installed in the knuckle support using a socket and handle.

Knuckle Support Installation

Place the rubber "O" ring grease seals on the lower pivot pin bushing. Hold the lower end of the knuckle support in position at the lower support arm and install the lower pivot pin "B", figure 13.

Add the pivot pin retaining nut "A" and lock washer and tighten the nut to 85 to 95 ft. lbs. torque. Refer to figure 15, and note that a clearance of $\frac{1}{8}$ inch exists

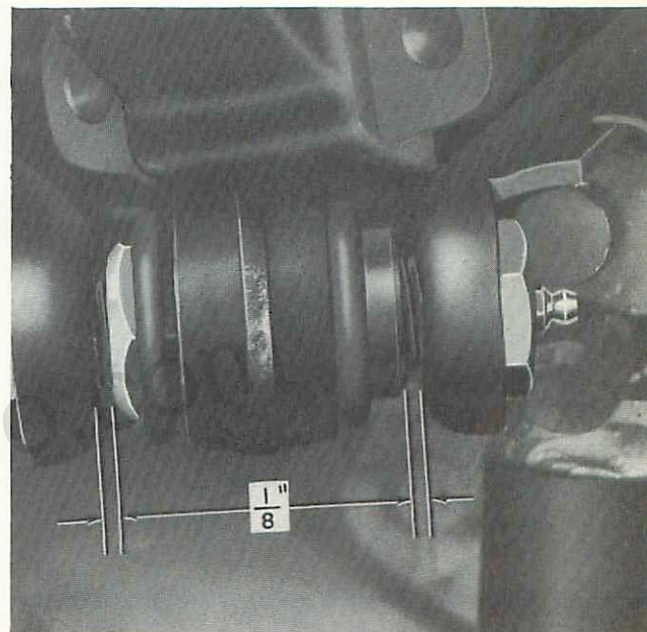


Figure 15—Maintain Clearance Shown

between the ends of the pivot pin bushing and the inner faces of the lower support arm. These clearances can be obtained by moving the pivot pin forward or rearward and then retightening the retaining nut. After these clearances have been obtained, slide the "O" ring grease seals off the bushing and into position.

Hold the upper end of the knuckle support into position in the upper support arm, add the rubber grease seals, and install the upper pivot pin "B", figure 14, and then add the retaining nut "A" and lock washer and tighten the retaining nut to 85 to 95 ft. lbs. torque. Adjust the pivot pin eccentric so that the upper end of the knuckle support is centralized in the support arm.

Reinstall the parts that were previously removed and then adjust the caster and camber.

Upper Support Arm Removal

Two types of upper support arms are used in the Packard suspension systems. The one type incorporates rubber bushings at the inner end of the arm and these

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are not replaceable. On cars equipped with this type of upper arm, the arm and pivot bracket is replaced as an assembly. The other type arms incorporate threaded bushings at their inner ends and these bushings are serviceable. To remove the upper support arm, remove the wheel and tire. Place a stand jack under the hub of the brake drum to prevent the support from falling and possibly damaging the brake hose when the upper pivot pin is removed.

Place a jack under the lower support arm and then remove the upper pivot pin.

Remove the pivot bracket retaining screws shown in figure 16, and remove the arm assembly.

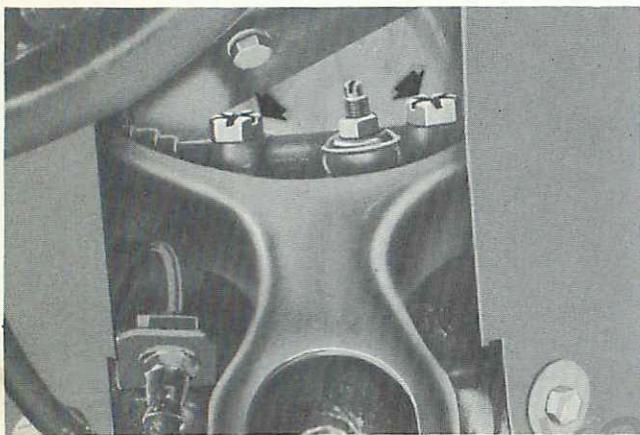


Figure 16—Remove Pivot Bracket Screws

Upper Support Arm Bushing Replacement

Remove the bracket bushings from the support arm using a socket and handle. When installing the bracket bushings, use Support Arm Spreader J-3957, to maintain the distance shown in figure 17. Slide the bushings seals over the ends of the bushing bracket and then locate the bracket centrally in the upper arm. Lubricate the bushings and insert them at each end of the bracket

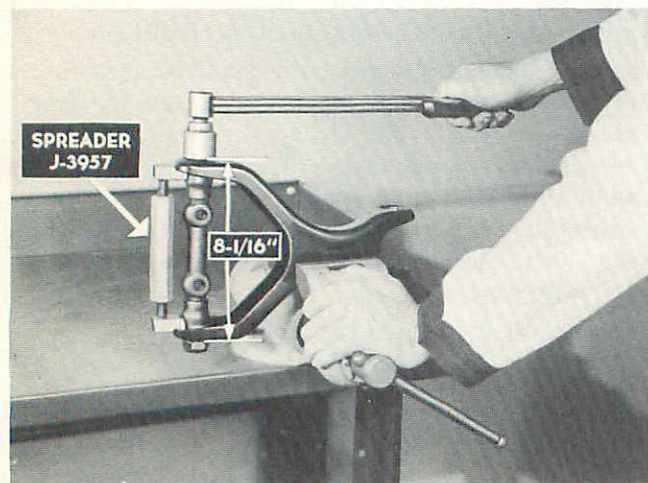


Figure 17—Torque Tighten Support Arm Bushings

and torque tighten the bushings to 110 to 115 ft. lbs. The inner bracket should be positioned so that the spherical segment (or pimple) on the bracket is toward the wheel end of the support arm.

Upper Support Arm Installation

Attach the inner end of the upper support arm assembly to the frame front cross member. Install the attaching cap screws and torque tighten to 110 to 125 ft. lbs.

Reconnect the upper end of the knuckle support to the outer end of the upper support arm as described under "Knuckle Support Installation". Adjust the caster and camber.

Lower Support Arm Removal

Remove the wheel and tire, hub and drum, and the brake support plate. Disconnect the lower end of the shock absorber. Place a hydraulic jack under the lower support arm near the outer end of the arm.

Remove the stabilizer bar bushing clip as shown in figure 18.

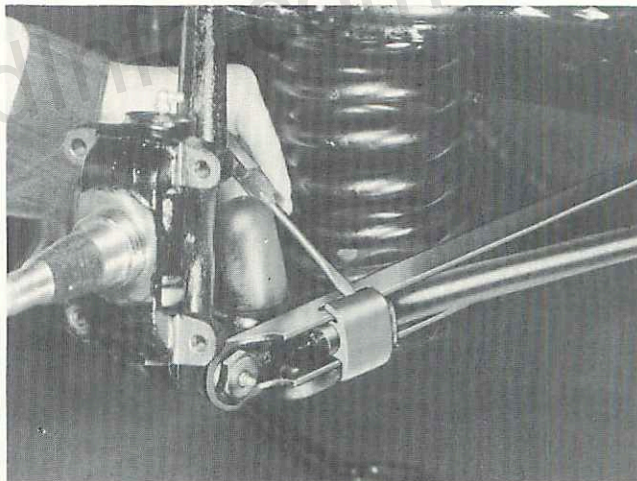


Figure 18—Remove the Stabilizer Bushing Clip

NOTE: If the car is equipped with conventional coil springs, the front end of the car should be high enough to permit the lower support arm to be lowered far enough to remove the coil spring.

Remove the knuckle support lower pivot pin and then lower the jack and remove the coil spring if the car is so equipped.

Detach the lower support arm inner bracket from the bottom of the frame.

Lower Support Arm Bushing Replacement

Two types of lower support arms are used in the Packard suspension systems. The one type incorporates

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rubber bushings which are not replaceable. On cars equipped with these type arms, the lower support arm and the pivot bracket is replaced as an assembly. The other type of lower support arm incorporates threaded bushings which are replaceable. The bushings may be removed from the inner end of the support arm using a socket and handle.

When installing the bushings, insert the Support Arm Spreader, J-1052, between the inner faces of the support arm to maintain the distance shown in figure 19.

Slide the bushing seals over the ends of the bracket and center the bracket between the inner faces of the support arm.

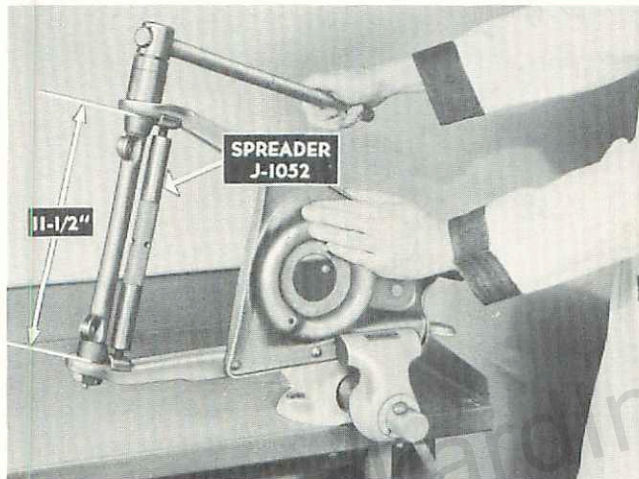


Figure 19—Maintain the Distance Shown

Lubricate the bushings and start the bushings onto both ends of the bracket. Thread the bushings into the lower support arm until the bushing shoulder contacts the arms.

Lower Support Arm Installation

Attach the lower support arm bracket to the bottom of the frame front channel and torque tighten the retaining nuts to 55 to 60 ft. lbs.

If the car is equipped with a coil spring, position the spring in the lower support arm with the flattened end of the spring upward and the lower end of the spring coil in the spring seat index. Place the spring insulator on the top of the spring. Place a jack under the lower support arm near the outer end. Raise the jack until the holes in the outer end of the support arm are in line with the hole in the knuckle support bushing.

Install the lower pivot pin as described under "Knuckle Support Installation". Position the end of the stabilizer bar in the channel of the lower support arm and place the ears of attaching clip into the slots of the arm. Spring this clip over the bottom edge of the arm using Stabilizer Bushing Retainer Clip Installer, J-4654, to lock the stabilizer bar end and bushing into position. Connect the shock absorber at the lower end.

Reinstall the brake support plate, hub and drum and wheel and tire.

FRONT WHEEL ADJUSTMENTS

Caster Adjustment

To adjust the caster, loosen the clamp bolt in the upper end of the steering knuckle support. Turn the

eccentric bushing using Caster and Camber Adjusting Tool, J-4691, see figure 20. Turn the bushing in multiples of full turns so as not to disturb the camber setting. The caster always should be adjusted so that the caster angle is equal on both sides.

NOTE: The caster always should be adjusted before adjusting the camber.

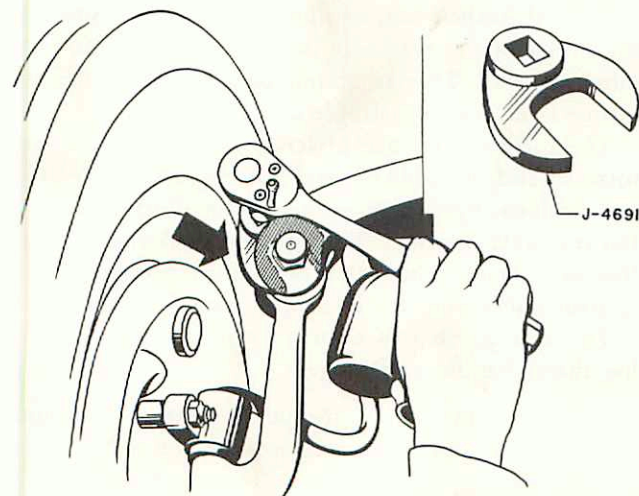


Figure 20—Use the Special Adjusting Tool

Camber Adjustment

Maximum camber adjustment is limited to one-half turn of the eccentric bushing and for this reason caster always should be adjusted first to hold the caster change to a minimum.

Adjust the camber using Caster and Camber Adjusting Tool, J-4691. If additional camber is desired, the upper support arm bracket may be rotated 180° so that the spherical segment or "pimple" is toward the center of the car. This will provide one-half degree more camber because the holes in the bracket are drilled 1/8" off center for this purpose.

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Toe-In Adjustment

The toe-in may be adjusted by using Toe-In Gauge, J-710-0, or other suitable toe-in checking equipment manufactured for that purpose.

Both adjusting sleeves should be turned in equal amounts to obtain proper setting. Before tightening the adjusting sleeve clamps, check each cross tube outer ball socket for being properly centralized.

Wheel Bearing Adjustment

Front wheel bearings should be adjusted so that the bearings do not permit the wheels to shake; however, there should be perceptible side to side wheel movement when grasping the tire at the top of the wheel and pushing inward and pulling outward.

To adjust the wheel bearings, tighten the adjusting nut to 20 ft. lbs. torque, back off one hex on the nut, and install the cotter pin.

TORSION-LEVEL SUSPENSION

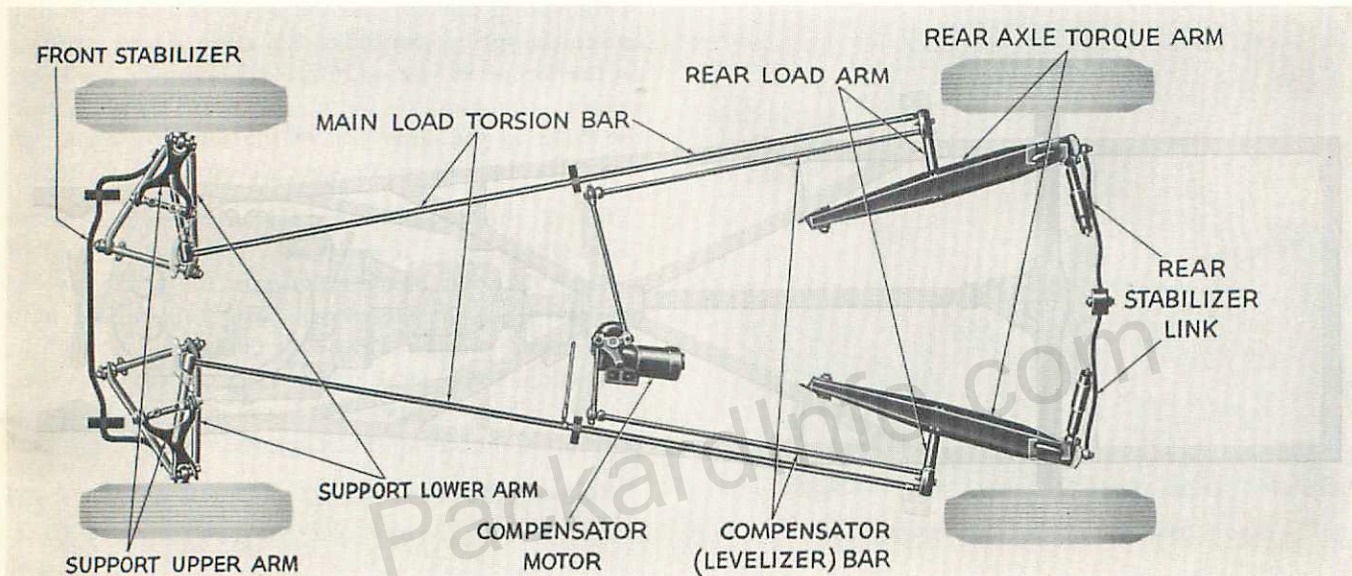


Figure 21—Torsion-Level Suspension

Description

The Packard Torsion-Level Suspension, figure 21, is an entirely new suspension which provides the ultimate in riding comfort.

In this new Packard suspension, the front coil springs and the rear leaf type springs have been eliminated entirely. The springs are replaced by two long, torsionally flexible bars, four pivoting arms termed "load arms" and four links. These are the basic details which support the frame and body and provide a car "ride" heretofore unknown with conventional suspension.

Another new Packard feature, which operates in conjunction with the Torsion-Level Suspension, is a levelizing or compensating mechanism which automatically keeps the car level and approximately at its designed height at all times regardless of load.

Front Suspension

The fundamental construction of the Packard Independent Parallelogram front suspension remains unchanged. Minor design changes have been made in

various details. The major change is the elimination of the coil springs.

Rear Suspension

Because the rear springs are eliminated in the Torsion-Level Suspension, another means of transmitting the thrust of the rear axle to the frame is required to move the car. This is accomplished by two driving torque arms, one at each side of the frame.

The torque arms are attached to the frame at the forward end by rubber cored bushings. The arms also are insulated by rubber at the points of attachment to the rear axle housing. This rubber insulation permits free movement of the rear axle transmitting a minimum of road noises and shocks to the frame.

The arrangement of attachment of the torque arms has three definite advantages:

- (1) Due to the reverse torque on the rear axle housing during rapid acceleration, the torque arms tend to raise the rear end of the car thereby preventing rear end "Squat" which is common with conventional suspension systems.

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- (2) The resistance at the forward end of the arms tends to move the axle housing downward to provide better rear wheel traction during acceleration.
- (3) The torque arms pull downward on the frame during brake application and prevent the rear end from pitching upward which is common with conventional springs.

Transverse or side to side, movement of the rear axle is controlled by two waved stabilizer bars which permit true vertical movement of the rear axle. Rubber grommets at the ends of bars insulate wheel shocks from the frame.

Torsion-Level Suspension

The essential details of the Torsion-Level Suspension are the two, full length main torsion bars, the torsion load arms and brackets and the load arm links.

The main torsion bars, in general, run fore and aft along the frame side rails. Both ends of the bars are hexagon in shape and these fit into the load arms which are hexagon broached at one end.

The front load arms pivot on anti-friction needle type bearings on brackets mounted on the frame front cross member.

The rear load arms also pivot on needle-type bearings in brackets attached to the frame side rails.

The front arms are loaded against anti-friction links which seat in the front suspension lower support arms commonly called "A" frames. The rear arms are loaded against stirrup type links suspended from the driving torque arms. The arms on each side are installed in such a manner that the loaded ends are pointing in opposite directions. In other words, the loaded end of the front arm is pointing away from the center of the car whereas the loaded end of the rear arm is pointing toward the center of the car. With this arrangement, the torsion bar absorbs the torsional loads of both arms and at the same time transmits the load front to rear, and vice versa. This is an important feature, contributing to the flat ride and cornering control. The initial loading of the arms is accomplished by "winding up" or twisting the torsion bar during its assembly in the chassis.

With conventional type suspensions, torsional stresses resulting from vertical wheel movement and spring action are transmitted directly to the car frame. With the Packard Torsion-Level Suspension, vertical wheel movement causes the link end of the load arms to move vertically. The vertical movement of either arm increases or decreases the amount of twist in the torsion bar which in turn transmits this twisting force to the arm on the opposite end of the bar and the load on the link end of this arm then is increased or decreased. For example: When a front wheel rolls over a hump in the road, the

wheel moves upward and the link end of the front load arm, which is pointing away from the center of the car, also moves upward. This upward movement increases the amount of twist in the torsion bar which then transmits a greater twisting force to the rear load arm. The arm, in turn, increases the downward force being applied at the link end which is pointing toward the center of the car. The foregoing may be summarized briefly as follows: The force being applied to move the front load arm is in an upward direction. The force opposing the movement of the rear load arm also may be thought of as being in an upward direction. Therefore, the arms are being loaded against each other with the bar absorbing the torsional load. It is this principle which prevents the torsional stresses from being transmitted to the car frame and which provides a flat and level car ride.

In addition to absorbing the torsional stresses created by road irregularities, the load arms and torsion bars also function in a manner which raises or lowers the car, front and rear, on the side where the road irregularity is encountered. For example: When a front wheel rolls over a hump in the road, the entire side of the car raises instantaneously. The upward movement of the front wheel and end of the front load arm increases the loading of the torsion bar. This increased load is transmitted to the inner end of the rear load arm tending to move it downward; however, the rear wheel on the ground prevents its downward movement and the arm pivots causing the outer end to push upward at the same instant the front wheel raises. These instantaneous actions impart a level raising and lowering of the body and, in effect, produce the same result that would be experienced if both the front and the rear wheel simultaneously rolled over humps one-half the size of the hump which originally moved the front wheel upward. It is this principle which greatly minimizes jars and jolts to provide a smooth, level and comfortable car ride.

Compensator

The components described so far would provide a soft, level ride and excellent stability; however, the car would be level for only one load unless some other means of control was provided. Therefore, the car levelizer or compensator is incorporated to keep the car level and approximately at the design height at all times regardless of load.

Basically, the compensator consists of torsion bars approximately four feet long, connected by means of levers and links to a two-way motor with reduction gearing.

The forward ends of the compensator bars rotate in bearings attached to the frame. The hexagon rear ends of the bars fit into the rear load arms in milled hexagon openings adjacent to the main torsion bar openings. Bar type links are connected to the compensator gear

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box at their inner ends and, at their outer ends, to levers attached to the front end of the compensator bars.

Six switches are used in the compensator electrical system to control its operation:

1. An "On-Off" switch located below the instrument panel to the left of the steering column. This switch normally is in the "on" position and is moved to the "off" position to prevent the compensator from operating when the car is raised such as for changing a wheel and tire or to perform service operations.
2. A three terminal two-way stop light switch is used to prevent compensator operation during brake application.
3. A control switch is used to energize the compensator motor when the car load is increased or decreased.
4. A limit switch is employed which permits the compensator motor to operate only within a predetermined range in accordance with load changes in the car.
5. Two solenoid switches are used to complete the electric circuit to the compensator motor, one for each direction of rotation of the motor.

The control switch assembly is attached to the frame and a lever in the switch is linked to a lever clamped to the left main torsion bar near the center of the bar. Rotation of the center of the main torsion bar in either direction causes the switch to "make" and "break" the circuit to the compensator motor. The switch has approximately a seven-second delayed action to prevent the motor from operating each time the wheels pass over an irregularity in the road.

In operation, with the front and rear of the car equally loaded, the center section of the main torsion bar has no rotation due to the equal twisting forces being applied from each end of the bar. When the loading at either end of the car is increased or decreased, the center section of the main torsion bar will rotate causing the control switch to make contact and operate the motor. This causes the connecting links to move inward or outward to rotate the compensator bars. The bars, in turn, cause the rear load arms to pivot and either raise or lower the rear end of the car to make it level with the front end. Thus, regardless of weight distribution, the car will always be level to the road, front and rear, with very little change in car height.

It should be remembered that the compensator functions only when the loading of the car is changed and does not function to compensate for road irregularities.

SERVICING THE TORSION-LEVEL SUSPENSION

Torsion Bar Removal

Under normal car operation, the torsion bars should never require replacement; however, this may be necessary if the car is involved in a collision which damages the frame. Certain service operations on the suspension system require the unloading of the bars. The following procedure describes the removal and installation of the main torsion bar on the right side of the car.

Position the car over a hoist and then move the "On-Off" switch, located under the instrument panel to the left of the steering column, to the "Off" position which is toward the left door. Raise the car and remove the rear wheel.

NOTE: When raising the car, stop the rear lift of the hoist about three inches below its fully extended position so that it can be raised or lowered slightly in later operation.

Figure 22 shows the compensator bar lever in the

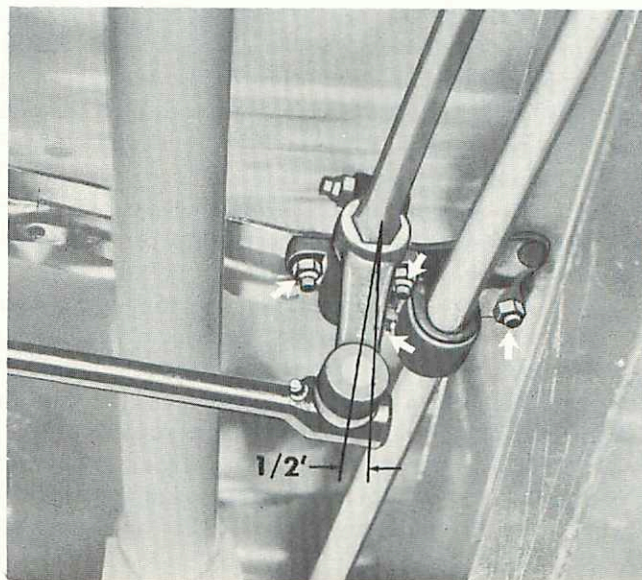


Figure 22—Bar Lever Towards Center of Car

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position at which no load is being transmitted through the bar. Note that the lever is just off vertical toward the center of the car. The levers can be moved by grounding a terminal at the limit switch. See Figure 23. Ground the rear terminal to move the lever outward or the front terminal to move the lever inward.

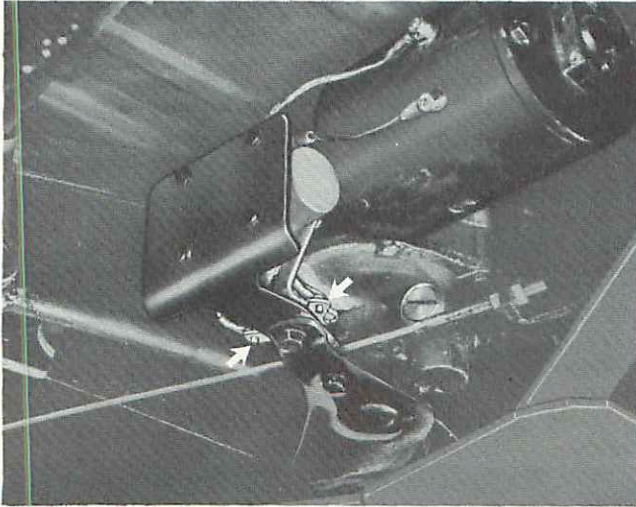


Figure 23—Limit Switch Terminals

Place high-jacks under the frame at all four corners, front and rear, and then extend the jacks so that the pads contact the frame. See figure 24.

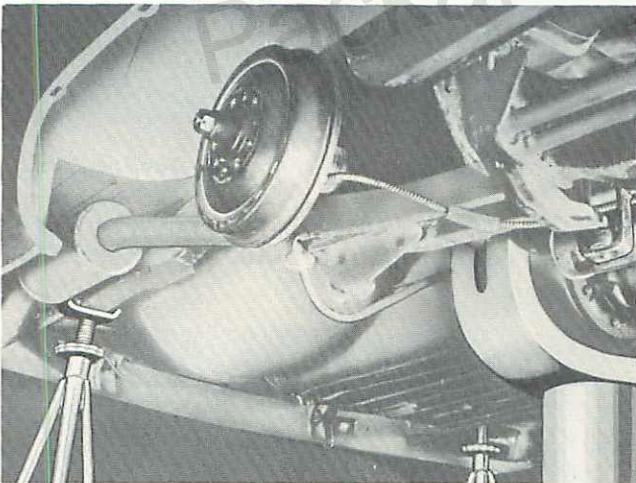


Figure 24—High-Jacks Under Car Frame

NOTE: If a frame-contact type hoist is used, place the high-jacks under the rear axle housing and under the outer ends of the front wheel lower supports.

Remove the four nuts indicated in figure 22 and remove the rubber guide bearing and retainer. If the left torsion bar is being removed, detach the lever shown in figure 25 from the bar.

Loosen the rear load arm clamping nut using a $1\frac{1}{16}$ " socket and offset handle. See figure 26.

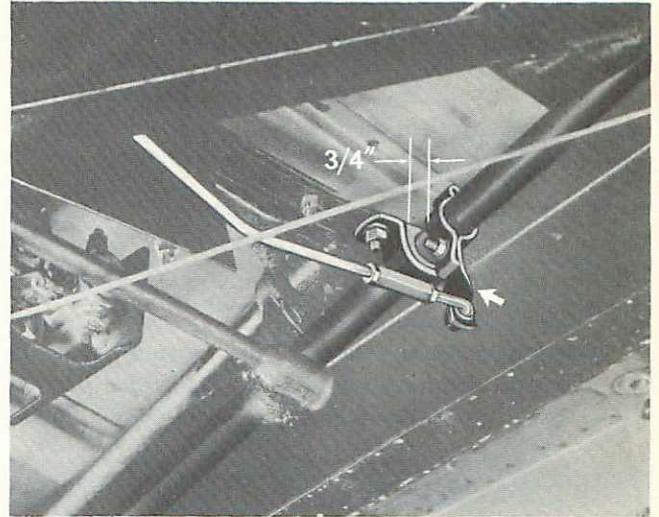


Figure 25—Control Switch Link



Figure 26—Loosen the Clamping Bolt Nut

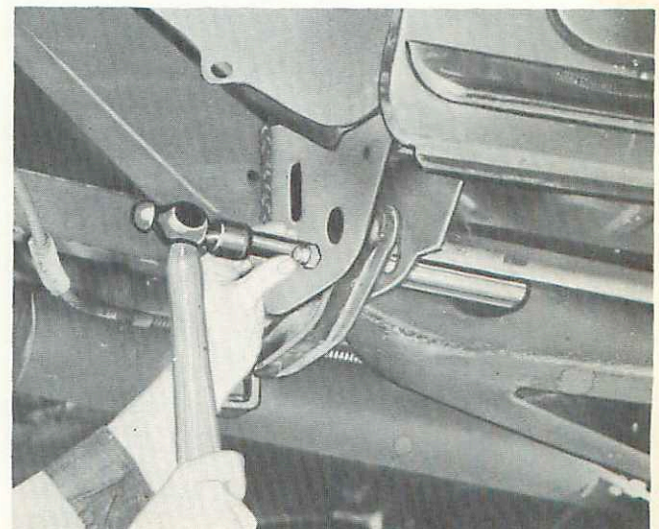


Figure 27—Tap the Bar Forward

SUSPENSION AND STEERING

Tap the compensator bar forward with a brass drift and out of the load arm as shown in figure 27.

Slightly raise or lower the hoist rear lift, if required, in order to centralize the hex in the arm with the hole in the bracket. See figure 28.

Attach the Load Arm Centering Tool J-6045 as shown in figure 29. Make certain that the piloting shoulder at the lower end of the tool is in the hole in the bracket, then tighten the locknut.

Attach the clamping detail of the Torsion Bar Loading and Unloading Tool J-5954 to the load arm as shown in figure 30. Complete the special tool hook-up as

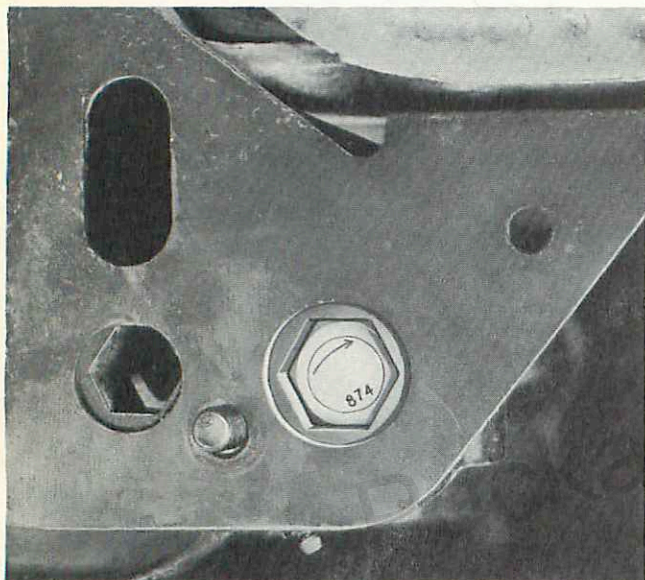


Figure 28—Centralize Hex in Bracket

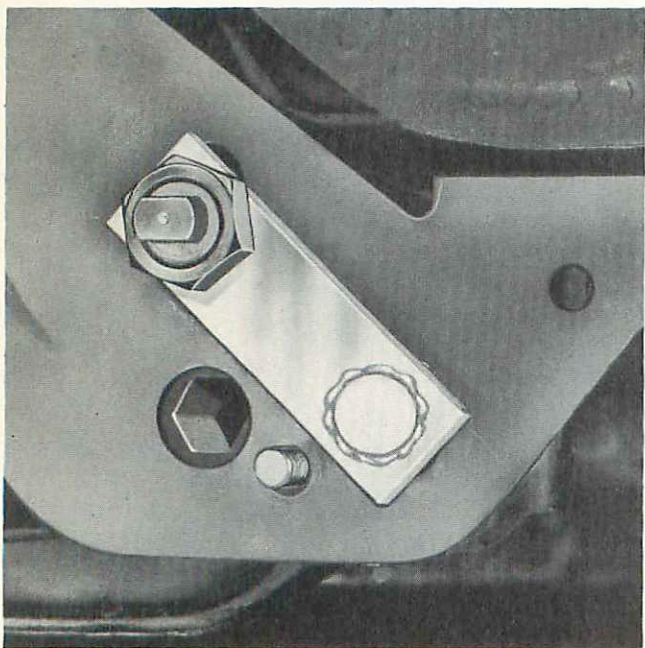


Figure 29—Centering Tool Installed

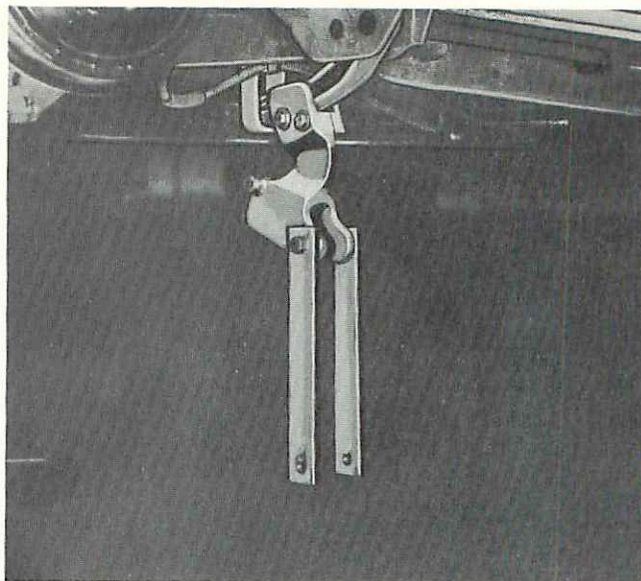


Figure 30—Attach the Clamping Detail

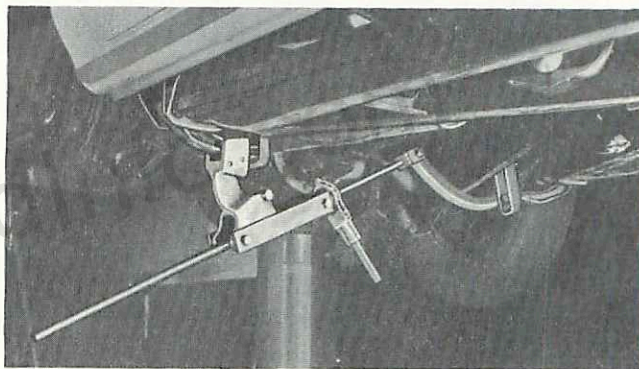


Figure 31—Loading and Unloading Tool Installed

shown in figure 31. The hole in the frame for attaching the "U" detail is in line with the front of the brake drum.

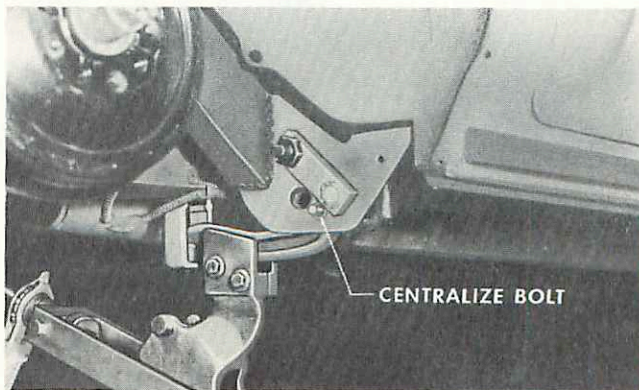


Figure 32—Centralize the Pivot Bolt

Operate the jack handle to move the inner end of the load arm upward far enough to centralize the pivot bolt in the bracket hole as shown in figure 32.

SUSPENSION AND STEERING

Use a brass drift and tap the pivot bolt out as shown in figure 33.

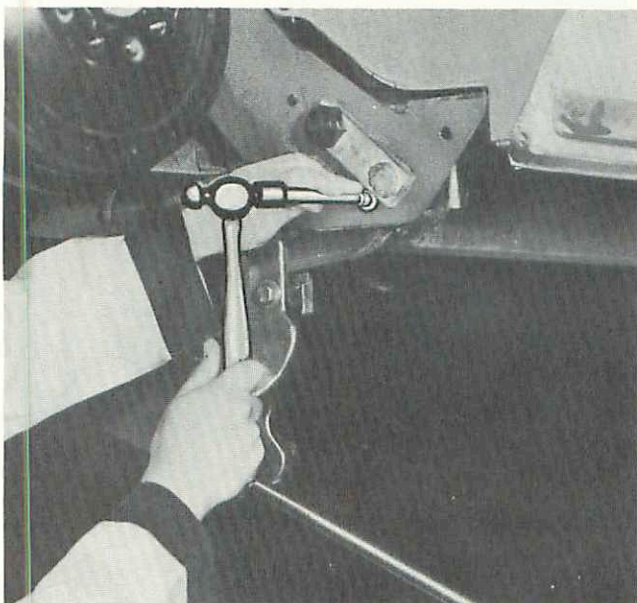


Figure 33—Tap the Pivot Bolt Forward



Figure 34—Raise the Rear Load Arm

Tighten the tool jack to move the inner end of the load arm upward and move the load arm link inward as shown in figure 34. Place a four-inch block between the rear axle case and the bottom of the frame "kick-up."

While holding the link inward, reverse the tool ratchet and lower the inner end of the load arm as shown in figure 35.

After the arm is lowered, remove the tool clamp, attach the Removing Tool J-6046 and knock the bar rearward as shown in figure 36. Remove the tool and push the bar out toward the rear as shown in figure 37.

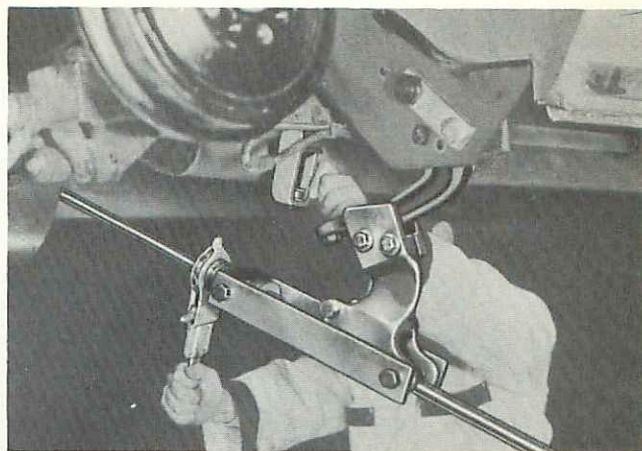


Figure 35—Hold the Link Inward

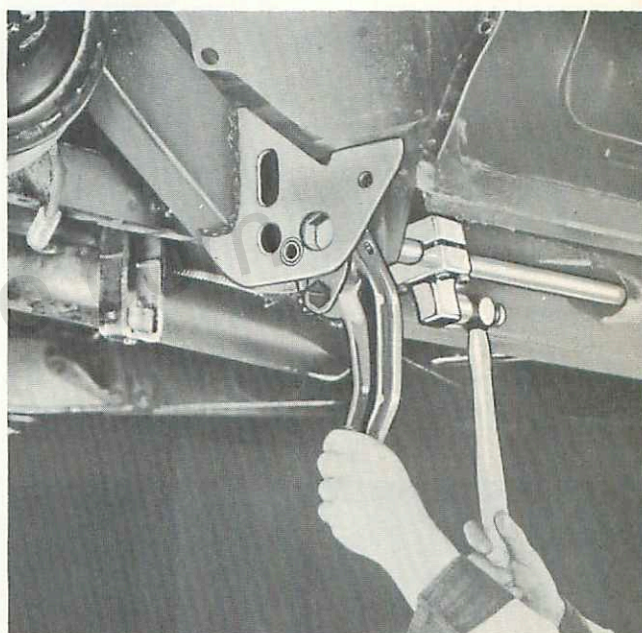


Figure 36—Knock the Bar Rearward

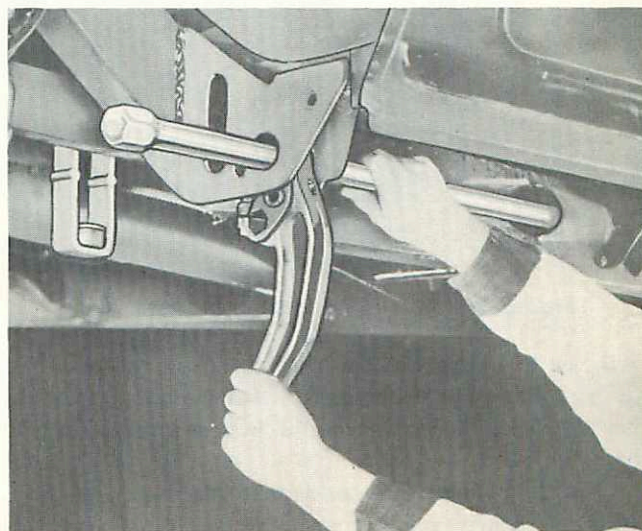


Figure 37—Removing the Main Torsion Bar

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Torsion Bar Installation

Feed the bar in from the rear and through the rear load arm. Refer to figure 38 and note the arrow and number in the end of the bar. The arrow denotes the direction in which the bar should be "wound up." The number represents the last three digits of the part number of the bar.

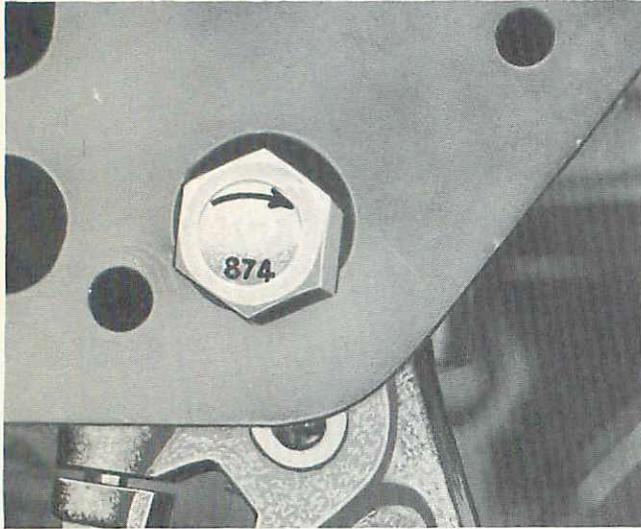


Figure 38—Arrow Denotes Wind-Up Direction

Feed the front end of the bar into the front load arm as shown in figure 39. Make certain that the load arm link is in the position shown in figure 40.

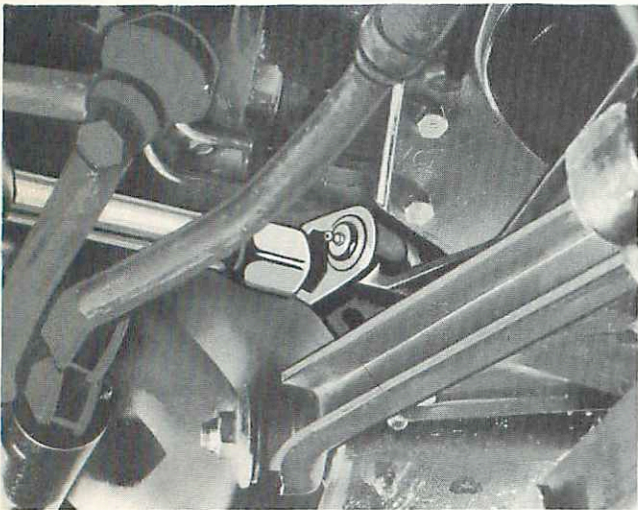


Figure 39—Push Bar Into Front Load Arm

Refer to figure 41. The distance from the rear end of the torsion bar to the rear face of the bracket should be $\frac{3}{4}$ ". The arm also should be centralized in the bracket.

Figure 42 shows the rear arm in its proper position, which is nearly vertical with the clamping detail attached and the centering tool J-6045 in place.

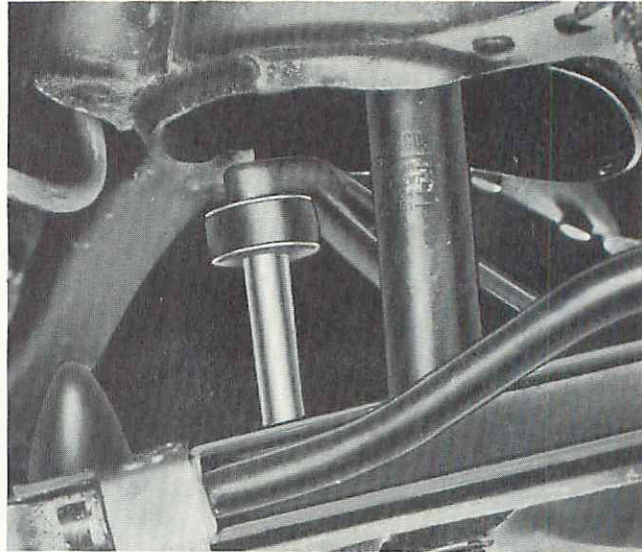


Figure 40—Load Arm Link Properly Positioned

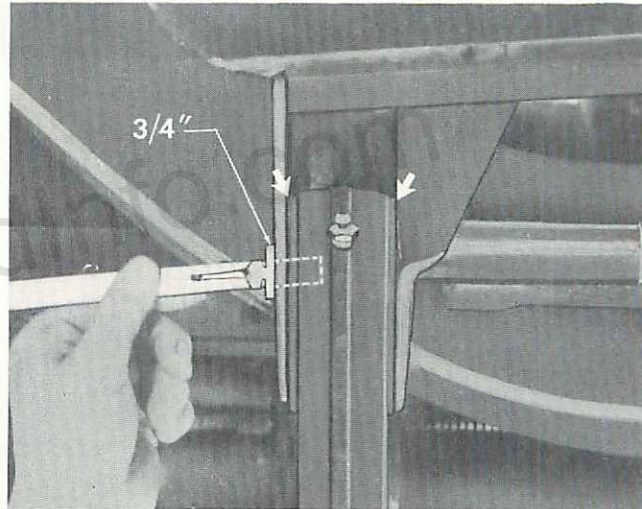


Figure 41—Maintain Distance Shown

Place special lubricant (available through Central Parts Warehouse) in the seat in the load arm link.

Connect the tool jack to the clamp on the load arm. Operate the jack to draw the load arm up into position. Draw the arm upward until the pivot hole in the arm lines up with the pivot holes in the bracket and then insert the pivot bolt. Continue to draw the arm upward while holding the link inward until the link can be swung outward under the arm and then back off on the jack to seat the arm.

Position the compensator bar in the rear load arm and attach the bearing at the front of the arm to the frame. The seal between the bearing and lever should not be squeezed together, but should contact both the bearing and the lever. Tighten the clamping nut in the rear load arm.

If the left torsion bar was replaced, attach the compensator motor linkage so that the rear edge of the

SUSPENSION AND STEERING

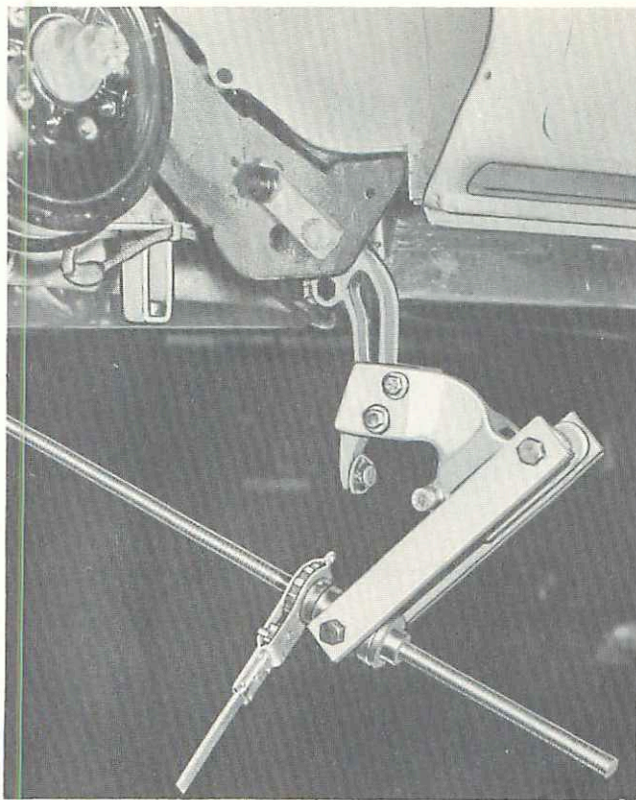


Figure 42—Clamping Detail and Centering Tool in Place

clamping lever is $\frac{3}{4}$ " from the front edge of the rubber guide bearing retainer. See figure 43.

Adjusting Compensator Linkage

Set the car on its wheels. If the rear end of the car is

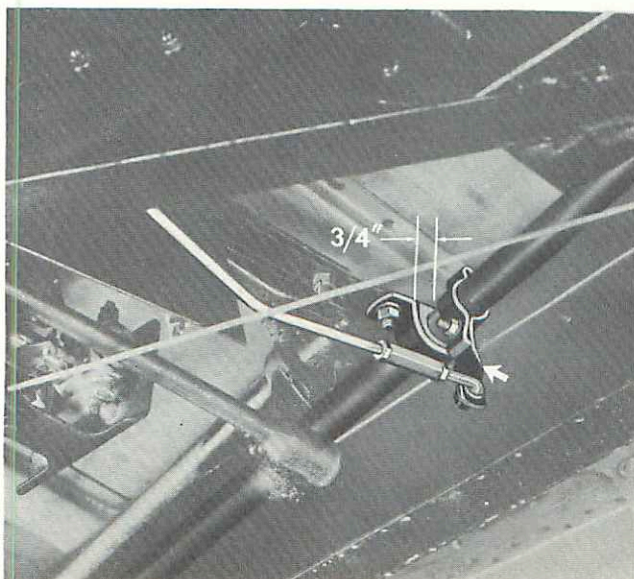


Figure 43—Maintain Distance Shown

too high, shorten the compensator switch turnbuckle link. If the rear end is too low, lengthen the link.

Lubrication

The Torsion-Level Suspension incorporates ten lubrication points which should be lubricated with pressure gun grease at 1,000-mile intervals.

Whenever torsion bars are replaced or unloaded for other service operations, the link seats should be lubricated with a special grease available through the Central Parts Warehouse.

Service Precautions

Care must be exercised when raising a car with Torsion-Level Suspension, either on a hoist or with floor jacks. The lower ends of the front shock absorbers extend below the lower wheel support arms and these ends can be damaged if the arms do not seat properly on the hoist or jack.

A Torsion-Level Suspension car should never be jacked up in the rear with the jack or hoist under the rear load arms as the rear load arm link may become disconnected.

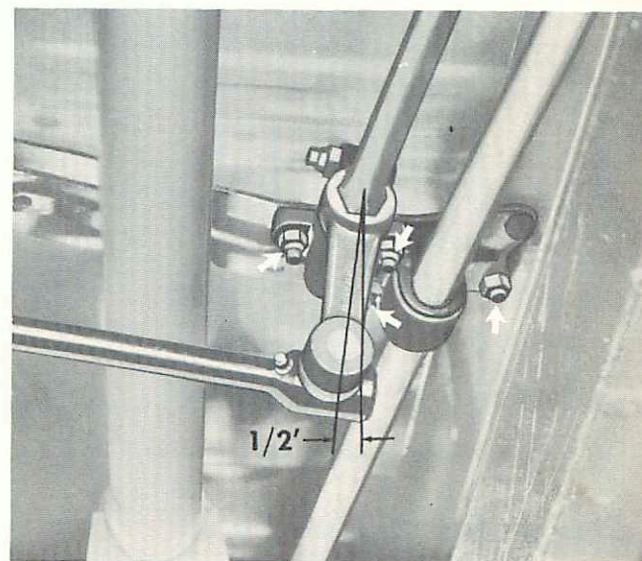


Figure 44—Lever Toward Center of Car

Compensator Removal

Before removing the compensator assembly, it will be necessary to take the load of the body and frame off the compensator bars and links.

Move the "On-Off" switch, located under the instrument panel to the left of the steering column, to the "Off" position which is toward the left door.

SUSPENSION AND STEERING

With the car on a hoist, ground the terminal "A" or "B" on the compensator control switch to position the compensator links and levers so that no load exists on the links. Refer to figure 44, and note that the lever is $\frac{1}{2}$ " off vertical and toward the center of the car.

Disconnect the two wires from the limit switch. Disconnect the wire from one of the compensator solenoids that leads from the engine starting motor. Remove the two screws that attach the limit switch and solenoid bracket to the compensator mounting bracket and remove this assembly. Unscrew the ball joint plugs at the outer ends of the two compensator links and disconnect the links from the levers at the forward ends of the compensator bars. Remove the two compensator mounting bracket screws that are attached to the frame X-member and rotate the mounting bracket toward the front of the car. Remove the two long bolts that attach the compensator upper cover to the cross member and then remove the assembly. Disconnect the compensator links from the compensator.

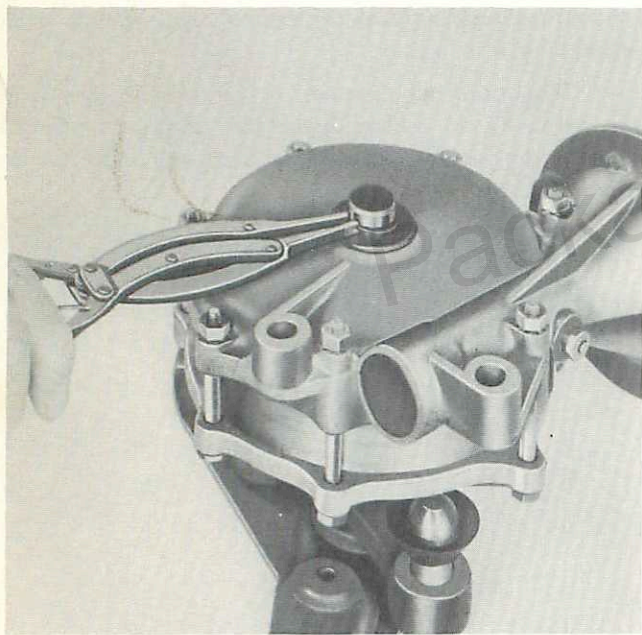


Figure 45—Remove the Retaining Ring

Compensator Disassembly

Remove the compensator shaft retaining ring using expanding type retaining ring pliers. See figure 45. Lift off the shaft thrust washer.

Lift off the upper housing assembly, thrust washer and the large compensator worm gear. See figure 46.

Remove the compensator sun gear, first stage planetary pinions and pinion spacers and then lift out the pinion carrier. See figure 47.

Remove the second stage compensator sun gear, second stage pinions and pinion carrier. See figure 48.

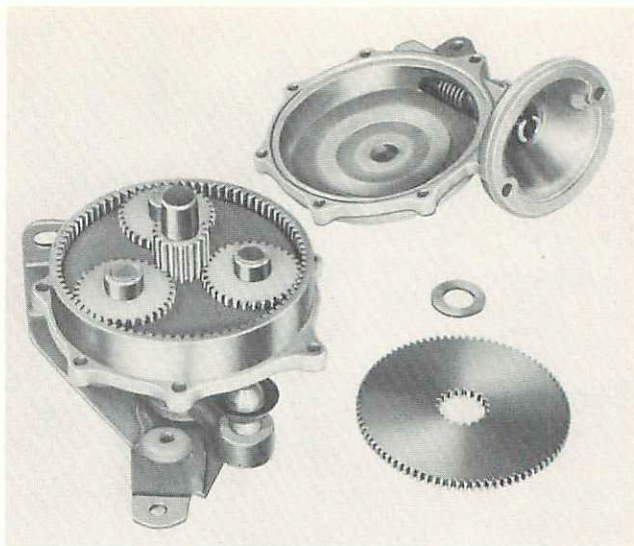


Figure 46—Upper Housing Removed

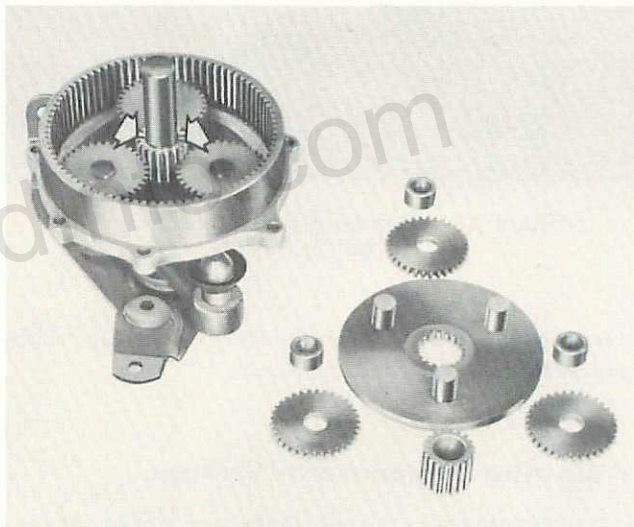


Figure 47—First Stage Planetary Details Removed

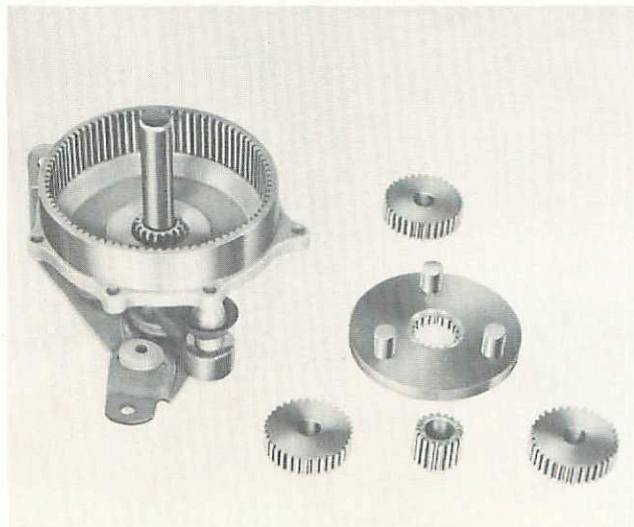


Figure 48—Second Stage Planetary Details Removed

SUSPENSION AND STEERING

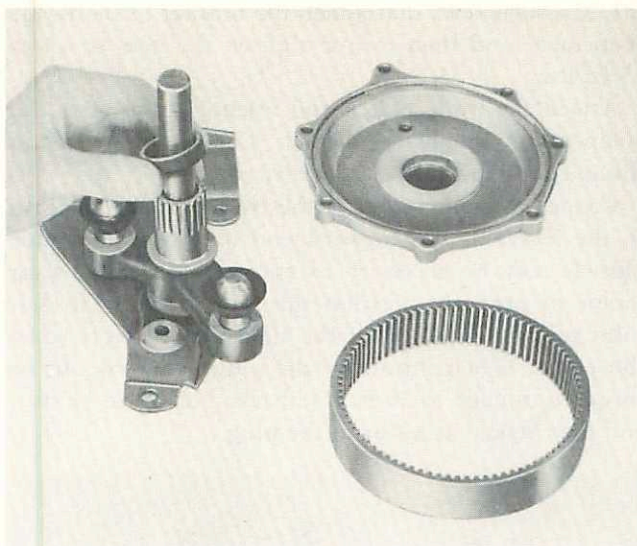


Figure 49—Remove the Rubber Seal

Remove the ring gear and the lower housing. Remove the compensator lever seal as shown in figure 49.

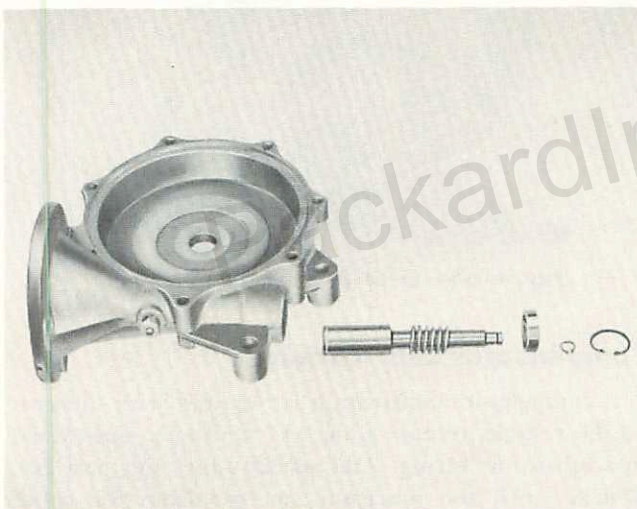


Figure 50—Worm Shaft Details Removed

Remove the compensator lever and the lever seal.

To remove the details from the upper housing, first pierce the expansion plug and pry the plug out with a drift.

Remove the Tru-Arc ring from the housing. Push the worm shaft and bearing out through this end of the housing. The bearing can be removed from the worm shaft after first removing the small retaining ring. Figure 50, shows the worm shaft and details removed from the housing.

The worm shaft oil seal can be replaced by driving out the old seal and tapping a new seal into the seal bore.

Compensator Assembly

Refer to figure 50, and assemble the worm shaft and details in the housing. Make certain that both retaining

rings are properly in their grooves after they have been installed. Install a new expansion plug and stake it in place.

Place a new compensator lever seal in the groove in the bottom of the lever as shown in figure 51.

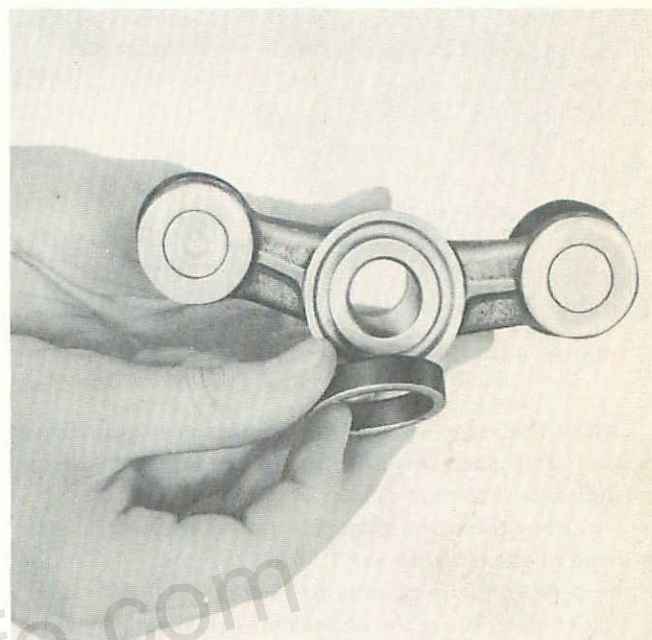


Figure 51—Install a New Rubber Seal

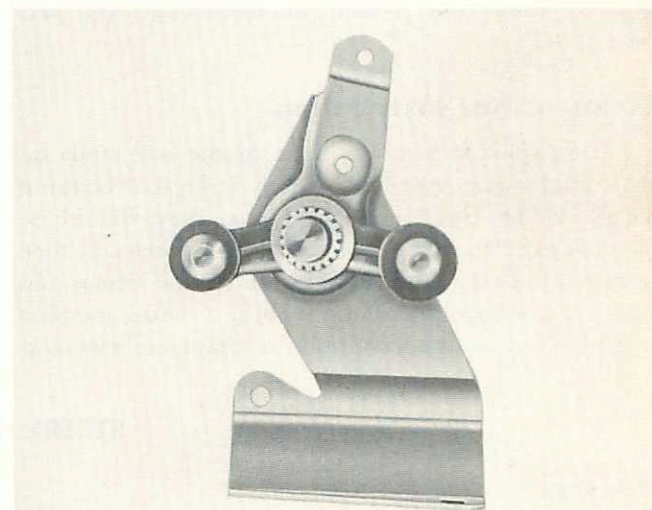


Figure 52—Note the Position of the Lever

Assemble the lever on the shaft in the position shown in figure 52.

Install the lever upper seal as shown in figure 49.

Install the lower housing, ring gear, second stage pinion carrier, second stage pinions and the second stage sun gear. Refer to figure 47, and note that the second stage sun gear has oil grooves at both ends. These are indicated by the arrows.

Install the first stage pinion carrier, first stage pinions, pinion spacers and the first stage sun gear.

SUSPENSION AND STEERING

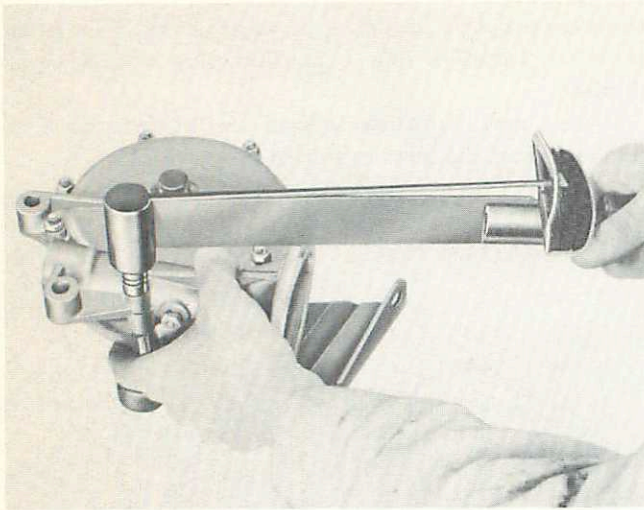


Figure 53—Torque Tighten the Retaining Nuts

Install the large compensator worm gear and thrust washer and then install the upper housing, thrust washer and retaining ring.

Torque tighten the retaining nut at the worm shaft portion of the housing to 6 ft. lbs. See figure 53. Torque tighten the remaining nuts to 12 to 14 ft. lbs.

Before assembling the compensator, thoroughly clean all parts in a suitable cleaning solvent. During the course of assembly, thoroughly pack the unit with approximately one pound of special grease, part No. 474028.

Compensator Installation

Attach the compensator links to the ball studs on the compensator lever and securely stake the retaining plugs. When tightening the plugs, they should be torqued to 20 ft. lbs., backed off $\frac{1}{8}$ to $\frac{1}{4}$ turn and then staked. Hold the unit in position at the frame and install the compensator upper cover to cross member retaining bolts and nuts. Install the compensator mount-

ing bracket screws that attach the bracket to the frame X-member and then torque tighten the nuts to 40 to 45 ft. lbs.

Attach the limit switch and solenoid bracket to the compensator mounting bracket. Connect the wires to the solenoid and to the limit switch.

Connect the outer ends of the two compensator links to the levers at the forward end of the compensator bars. It may be necessary to operate the compensator motor to properly position the links. Install the ball joint plugs at the end of the links and securely stake the plugs. When installing the plugs, they should be torque tightened to 20 ft. lbs., backed off $\frac{1}{8}$ to $\frac{1}{4}$ turn and then staked at a slot in the plug.

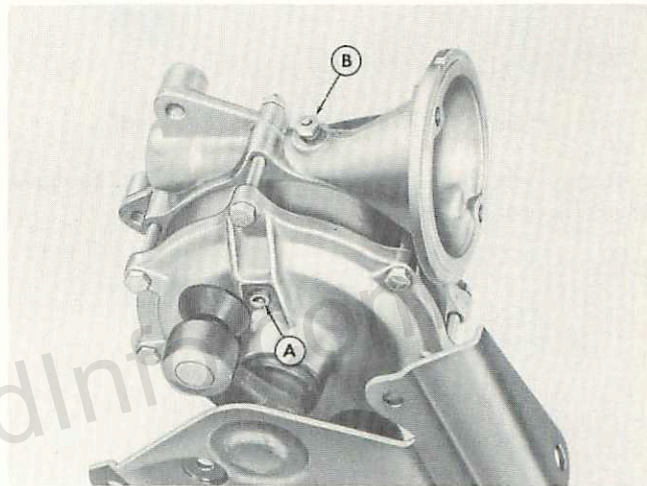


Figure 54—Gear Box Lubricating Point

Compensator Lubrication

If compensator lubrication is required with the unit on the vehicle, remove plug "A" figure 54, and thread in a lubricator fitting. Add special lubricant, part No. 474028, until the lubricant emerges from the relief valve "B" in the upper housing.

STEERING SYSTEM

General

Before performing any steering gear adjustments, it is recommended that the front end of the car be raised and an inspection be made for stiffness or lost motion in the steering gear, steering linkage, and front suspension. Badly worn or damaged parts should be replaced with new parts, since a satisfactory adjustment of the steering gear and linkage cannot be obtained if the parts are bent or badly worn.

Steering Gear Alignment

It is very important that the steering gear be properly aligned to the frame before proceeding with any

further adjustments. Misalignment places a stress on the steering worm shaft so that the shaft must alternately bend during each revolution.

To align the steering gear, loosen the steering gear to frame bolts to permit the gear to align itself to the height determined by the column to instrument panel bracket. Check the seat of the steering gear mounting pad to the frame, and if there is a gap at either of the attaching bolts, proper alignment may be obtained by placing shims where excessive gap appears. This will bring the mounting pad in proper alignment with the frame. Torque tighten the steering gear case to frame bolts to 55 to 60 foot pounds.

Loosen the column to instrument panel bracket, and

SUSPENSION AND STEERING

if necessary shift the bracket on the instrument panel to align the steering column laterally. In some cases, it may be necessary to elongate the holes in the instrument panel to obtain proper alignment.

Worm Bearing Inspection and Adjustment (Conventional Steering)

Remove the Pitman arm nut, and using Pitman arm puller J-2572, remove the Pitman arm from the cross shaft. Turn the steering wheel to the extreme right or left stop and back up approximately $\frac{1}{8}$ turn. This is necessary so that the worm and roller are not on the high spot when the worm bearing inspection is made.

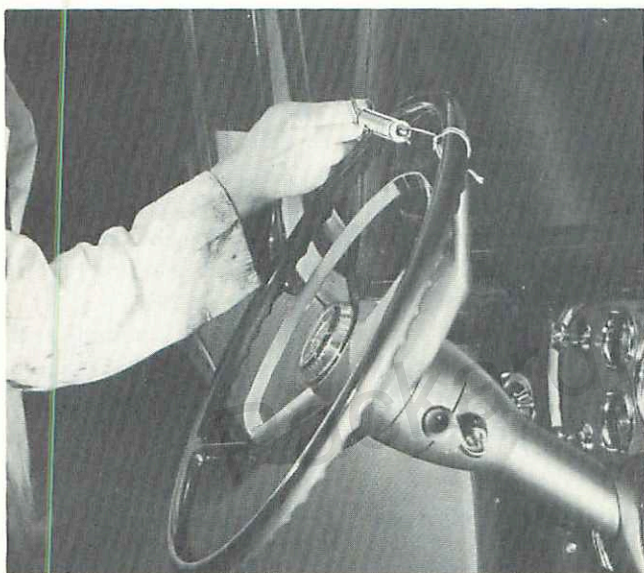


Figure 55—Check the Steering Wheel Pull

With a spring scale attached to a spoke at the steering wheel rim as shown in figure 55, the pull required to turn the steering wheel should not be less than $\frac{1}{2}$ pound nor more than 1 pound, as indicated on the spring scale.

If the pull required to turn the steering wheel is less than $\frac{1}{2}$ pound, loosen the four lower worm cover attaching screws and back them out approximately $\frac{1}{8}$ inch. Move the cover away from the steering gear, separate the shims, and remove the thinnest shim, being careful not to damage the remaining shims. Tighten the worm cover attaching screws to a torque tightness of 15 to 18 foot pounds, and recheck the effort required to turn the steering wheel. If the reading on the scale still indicates less than $\frac{1}{2}$ pound pull, remove another shim. However, if the pull exceeds 1 pound, the worm cover should be removed and a .003 inch shim should be added and the pull rechecked after the worm cover is installed and tightened.

NOTE: These shims are available in three thicknesses: .003 inch, .005 inch, and .010 inch. Do not remove more than 1 thin shim without rechecking the steering wheel effort or pull. Be sure the worm cover plate is not distorted. If it is damaged or distorted, it should be replaced with a new cover. After the worm bearing adjustment is properly performed, proceed with the cross shaft inspection and adjustment.

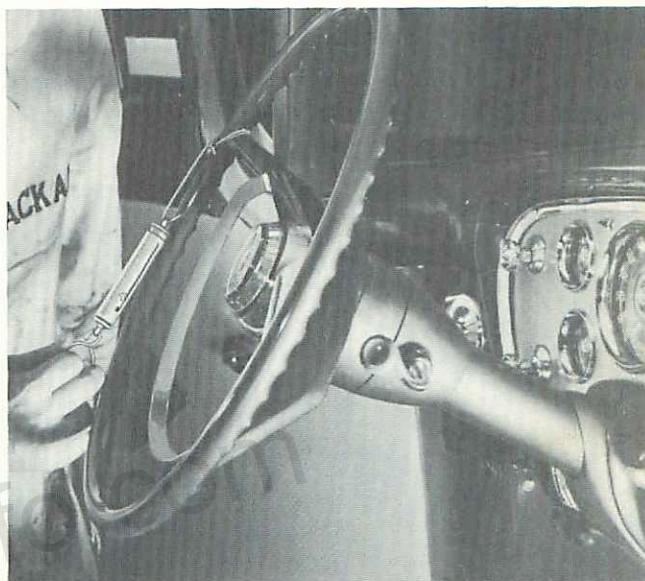


Figure 56—Pull the Wheel Through the High Spot

Cross Shaft Inspection and Adjustment

Locate the straight-ahead or high spot position of the steering gear by turning it to the stop at the extreme left or right and then turning back $\frac{1}{2}$ of the number of revolutions required to turn the steering gear from the extreme left to right. Turn the steering wheel $\frac{1}{4}$ turn to either side of the straight-ahead or high spot position. Pull the steering wheel through the high spot with a spring scale attached to a spoke at the steering wheel rim. See figure 56. The pull should increase at least $\frac{3}{4}$ pound when passing through the high spot. The total effort or pull should not exceed 2 pounds. If the pull or effort is outside these limits, the cross shaft should be adjusted.

Turn the steering wheel to the straight-ahead or high spot position. Remove the cross shaft adjusting screw lock nut, and raise the lock plate enough to clear the jaws on the cross shaft cover. Turn the adjusting screw until the effort required to pull the steering wheel through the high spot position is from $1\frac{1}{2}$ to 2 pounds. Turning the screw clockwise brings the cross shaft roller in closer mesh with the worm and increases the effort, while turning the screw counter-clockwise moves the roller away from the worm and decreases the effort.

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NOTE: Do not attempt to adjust the cross shaft until the steering gear alignment and worm bearing adjustments are known to be correct. Recheck the operation of the steering gear off the spot. There should be no binding or drag in excess of 1 foot pound when the gear is off the high spot. If the operation of the steering gear is unsatisfactory, the steering gear should be removed and reconditioned.

Steering Gear Disassembly

Drain the lubricant from the steering gear. Support the steering gear in a vise by clamping the jaws of the vise over the mounting pad.

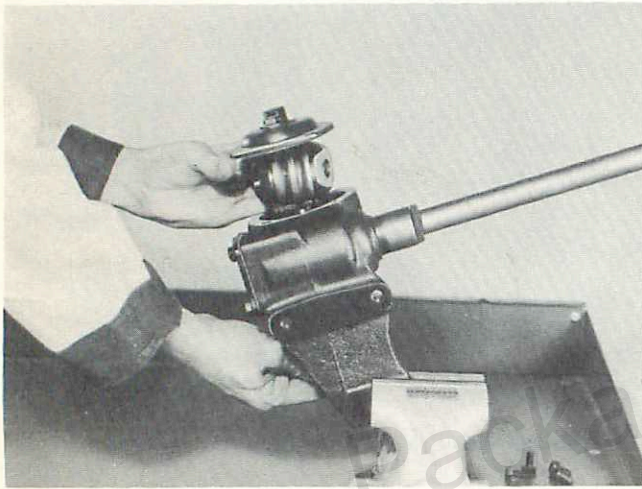


Figure 57—Lift Out the Cross Shaft

Remove the cross shaft cover and lift out the cross shaft. See figure 57. Remove the worm cover and shims. Remove the worm and shaft and the worm bearings out of the lower end of the steering gear case.

Cleaning and Inspection

Clean all the steering gear parts with clean, unleaded gasoline, naphtha or kerosene. Blow the parts dry with clean, compressed air. Inspect the worm and cross shaft roller for wear, roughness, or flat spots. Inspect the bearings and cups for wear, scores, chips, or pits. Inspect the cross shaft and bushings for excessive wear or damage. Inspect the cross shaft oil seal. Replace any parts that do not meet inspection standards with new parts. The oil seal may be driven out from the case and a new seal may be pressed or tapped into place by using a hardwood block.

Steering Gear Assembly

Install a new cross shaft oil seal in the case. If the worm bearing cups are damaged, drive them out and

install new bearing cups. The short bearing cup is used at the upper end. Lubricate the worm bearing and cups with a heavy lubricating oil. Place the worm bearings over the inner race on the worm, and install the worm and shaft into the steering gear case. Install the lower worm bearing cup, the adjusting shims, and the worm cover. Install the worm cover attaching screws and tighten finger tight until the worm bearing adjustment is performed as described under "Worm Bearing Adjustment." Temporarily install the steering wheel to check the worm bearing adjustment.

After the proper worm bearing adjustment is performed, remove the two cover attaching screws nearest to the cross shaft, and coat the threads of these screws with a suitable sealing compound; reinstall and torque tighten these screws to 15 to 18 foot pounds. This is necessary since these holes are tapped directly into the steering gear case, and unless the threads were sealed would result in steering gear lubricant leakage.

After the worm bearings are properly adjusted, install the cross shaft and cross shaft cover, making sure that the cross shaft adjusting screw head and plate fit into the slotted, claw-like recess of the cross shaft. Be sure to use a new gasket when installing the cross shaft cover. Back off the cross shaft adjusting screw before tightening the cover plate attaching screws.

Adjust the cross shaft to obtain $1\frac{1}{2}$ to 2 pounds pull at the steering wheel through the high spot. After the steering gear cross shaft is properly adjusted, install the lock plate and lock nut.

Servicing the Steering Linkage

The steering linkage will seldom require any attention other than the proper lubrication at the specified 1,000 mile intervals. However, it may become necessary to disassemble the linkage to replace a bent steering cross tube or connecting rod or a part which is excessively worn due to lack of lubrication. To remove the outer ball socket stud from the steering knuckle lever, remove the attaching nut and install the steering cross tube ball and socket remover J-3295 on the threaded end of the ball socket stud. Hit the remover a sharp blow with a hammer to loosen the tapered stud. The ball socket assembly may be removed from the adjusting sleeve by loosening the clamp bolt and screwing the ball socket from the sleeve. The inner end of the cross tube may be removed from the connecting rod by removing the adjusting plug at the end of the steering connecting rod. The steering connecting rod may be disconnected from the Pitman arm or idler lever bolt after removing the adjusting plug.

After assembling the steering linkage, the adjusting plug at each end of the connecting rod should be drawn up tight and backed off $\frac{1}{4}$ to $\frac{1}{2}$ turn to align the slot with the cotter pin hole.

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Steering Linkage Centering and Adjustment

Set the steering wheel in the straight-ahead position and the steering gear in the center of the high spot. Adjust the cross tube adjusting sleeves until the front

wheels are in the straight-ahead position and there is 0 inch to $\frac{1}{16}$ inch toe-in. Check each cross tube outer ball socket for being properly centralized around the ball. Torque tighten the adjusting sleeve clamp screws to 15 to 18 foot pounds.

POWER STEERING SYSTEM

Pump Removal

Disconnect either hose at the pump and permit the fluid to drain from the reservoir at the pump into a receptacle.

Disconnect the remaining hose at the pump connection and secure both hoses in an upright position to prevent fluid from dripping.

Loosen the cap screw which attaches the pump pulley to the pump hub.

Remove the cap screws which hold the pump to the pump mounting bracket and remove the pump.

Pump Disassembly

Remove the reservoir cover and the filter and then remove the filter mounting stud. See figure 58.

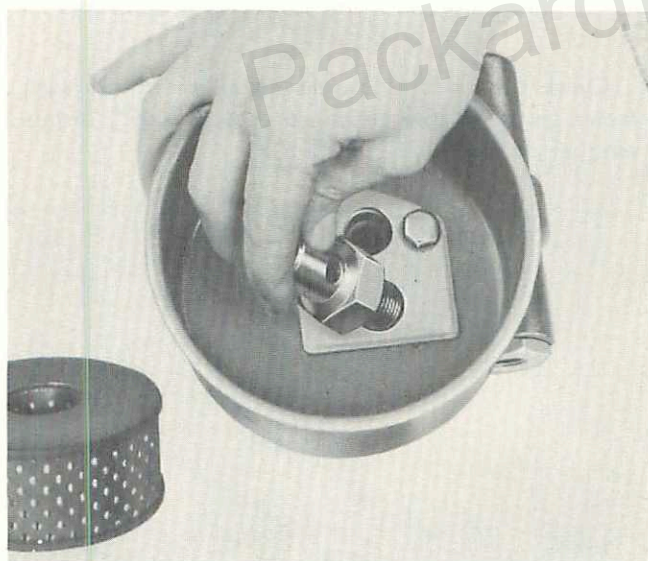


Figure 58—Remove the Filter Mounting Stud

Remove the two cap screws which attach the reservoir to the top of the pump and remove the reservoir.

Remove the four "O" ring gaskets from the opening at the top of the pump.

Clamp the pump in a vise at the two lower bolt holes. Loosen the hose adaptor valve cap.

Remove the bolts which attach the pump cover to the pump body. Separate the body from the cover and remove the large and small "O" ring gaskets.

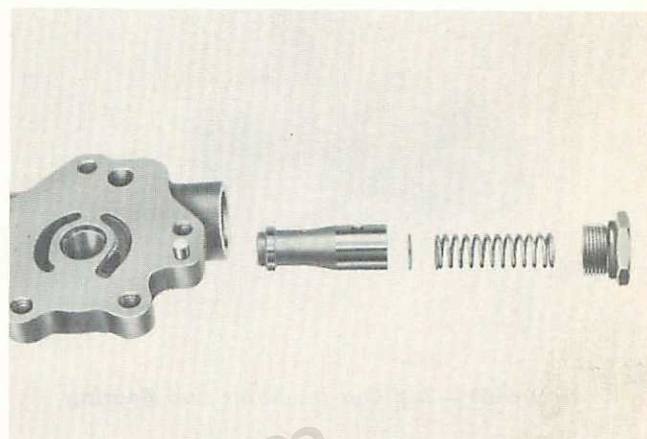


Figure 59—Flow Control Valve Removed

Remove the adaptor valve cap and "O" ring gasket and then remove the flow control valve spring, orifice plate, and the valve sub-assembly from the pump body cover. See figure 59.



Figure 60—Use the Special Valve Spring Compressor

Disassemble the valve sub-assembly, compress the relief valve spring in the valve body using Pump Relief Valve Spring Compressor, PK-15, and remove the retaining ring using a pointed instrument. See figure 60. After the retaining ring is removed, lift out the relief valve and relief valve spring from the flow control body.

SUSPENSION AND STEERING

Remove the rotors as an assembly from the pump body keeping them nested in the position from which they were removed. Remove the drive pin. From the opposite end of the pump body, remove the retaining ring holding the bearing assembly in the pump bore.

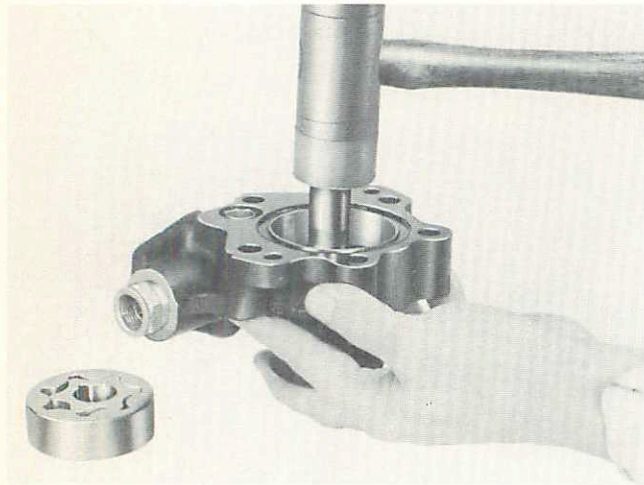


Figure 61—Tap Out the Shaft and Bearing

Remove the assembly of shaft and ball bearing retainer from the pump body as a unit by tapping the pump shaft on the end with a plastic tipped hammer. See figure 61.

The ball bearing assembly may be removed from the pump shaft, if necessary, with an arbor press.

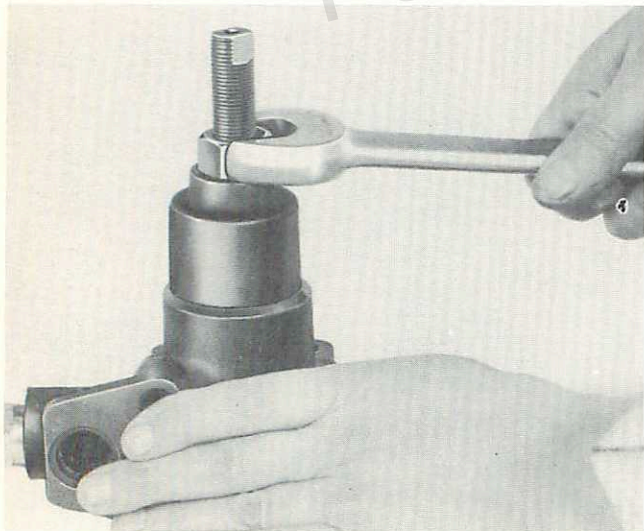


Figure 62—Removing the Oil Seal

The pump shaft oil seal may be removed, if necessary, using Pump Drive Shaft Seal Remover Details, PK-2, as shown in figure 62.

Inspection

Wash all parts in a suitable cleaner and blow the

parts dry using compressed air. If a cloth is used, it should be clean and lintless.

Inspect the pump body face for nicks or burrs. Inspect the pump body bores for burrs and nicks and clean up with crocus cloth if found in this condition.

Inspect the pump body rotor pocket bushing. If badly scored or damaged, replace the pump body.

Inspect the pump body cover face for nicks and burrs, and the pump cover bushing for excessive wear and clean up or replace as necessary.

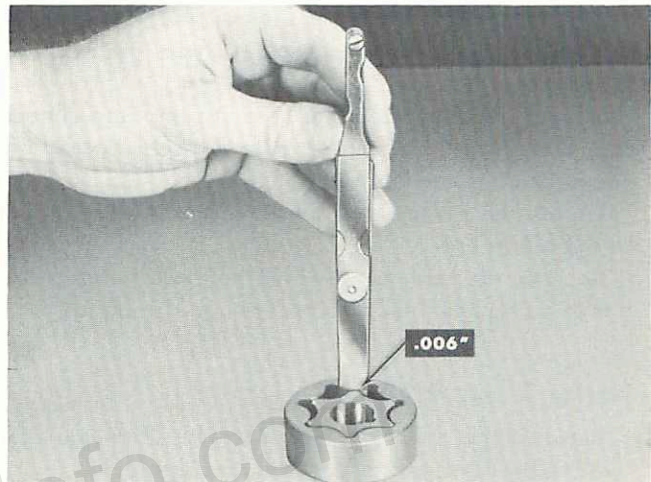


Figure 63—Check the Tooth Nose Clearance

Check the tooth nose clearance of the rotors with a feeler gauge. If the clearance exceeds .006", install a new set of rotors. See figure 63.

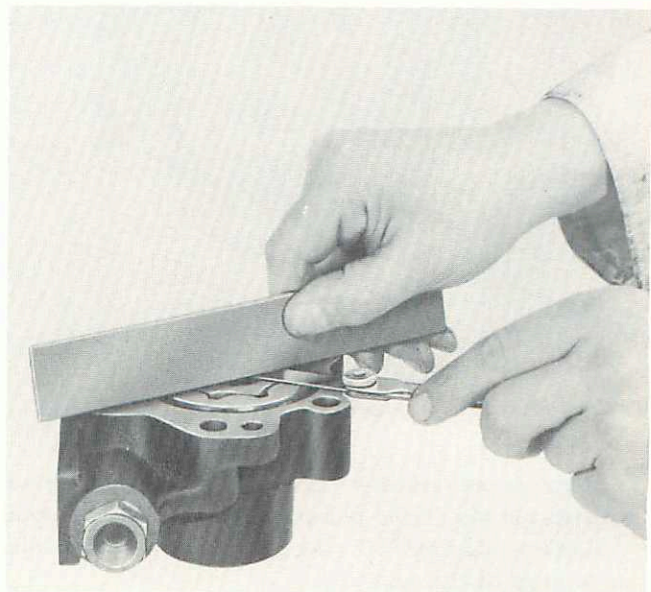


Figure 64—Checking Rotor End Clearance

Check the rotor end clearance as shown in figure 64. If the clearance exceeds .003", replace the rotors.

SUSPENSION AND STEERING

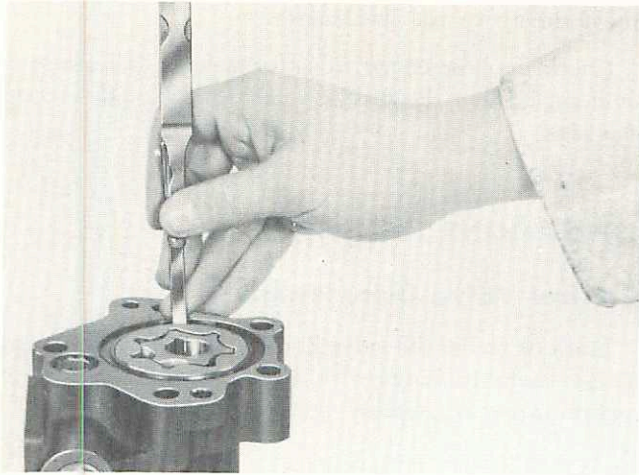


Figure 65—Checking Rotor to Body Clearance

Check the rotor to body clearance as shown in figure 65. If the clearance exceeds .008", replace the pump body.

Always install new gaskets ("O" rings) after dismantling the pump to prevent possible leakage. All parts should be lubricated with Ultramatic oil when reassembling the unit.

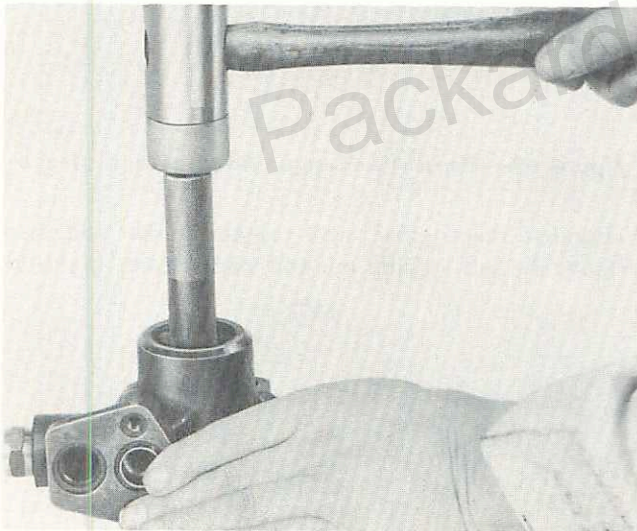


Figure 66—Installing the Oil Seal

Pump Assembly

If the oil seal was removed from the pump body bore, install a new seal with the "lip" side down using Pump Drive Shaft Seal Replacer, PK-5. See figure 66.

If the ball bearing has been removed from the pump shaft, the new bearing should be pressed on until it butts against the shoulder on the pump shaft.

Install the pump shaft and bearing in the pump body bore and then install the bearing retaining ring.

Position the pump shaft drive pin in the slot in the shaft and install the rotors.

If the flow control valve was disassembled, install the relief valve spring, relief valve and retaining ring using Compressor PK-15. Compress the spring and make certain that the retaining ring is in its groove.

Refer to figure 59, and install the valve, orifice plate, spring and end cap using a new "O" ring on the cap.

Install a new gasket on the hose adaptor valve cap and install and tighten the cap.

Attach the pump cover to the pump body and torque tighten the cap screws to 25 to 30 ft. lbs.

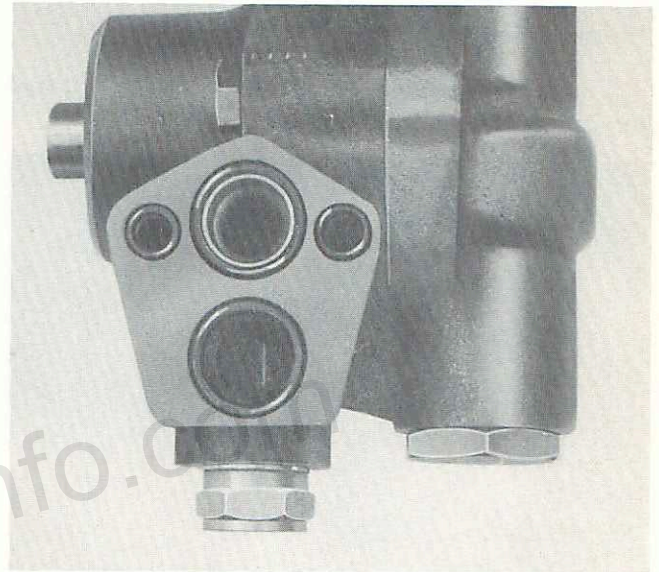


Figure 67—Install New "O" Rings

Install new "O" ring gaskets at the openings on the pump body as shown in figure 67.

Attach the reservoir to the pump body and then install the filter mounting stud.

Install the filter element on the mounting stud and install the cover.

Install the pump driving pulley and the key on the pump shaft and tighten the pulley retaining cap screw to 15 to 18 ft. lbs. torque.

Pump Installation

Attach the pump and bracket assembly to the cylinder head. Position the belt over the pump driving pulley and adjust the belt tension at the pump mounting bracket. The bracket should be adjusted so that $\frac{1}{2}$ " to $\frac{3}{4}$ " deflection of the belt can be obtained using finger pressure on the belt midway between the pump driving pulley and the idler pulley.

Connect the pressure hose and the return hose to the pump.

With the reservoir cover removed, fill the reservoir with Ultramatic fluid. Start the engine and turn the wheels from right to left several times to bleed the

SUSPENSION AND STEERING

hydraulic system of any air that may have entered. When the system is free of air no air bubbles will be noticed coming up through the fluid in the reservoir.

Install the reservoir cover and gasket and then bring

the fluid up to the level mark.

Check the hose connections for leakage. If leakage is evident, tighten the fittings only tight enough to stop the leak.

CONTROL VALVE SERVICE OPERATIONS (BENDIX)

Removal from Vehicle

Remove the cotter pin and the retaining nut at the Pitman arm stud.

Using Ball Stud Remover, PK-11, press the ball stud out of the Pitman arm. See figure 68.

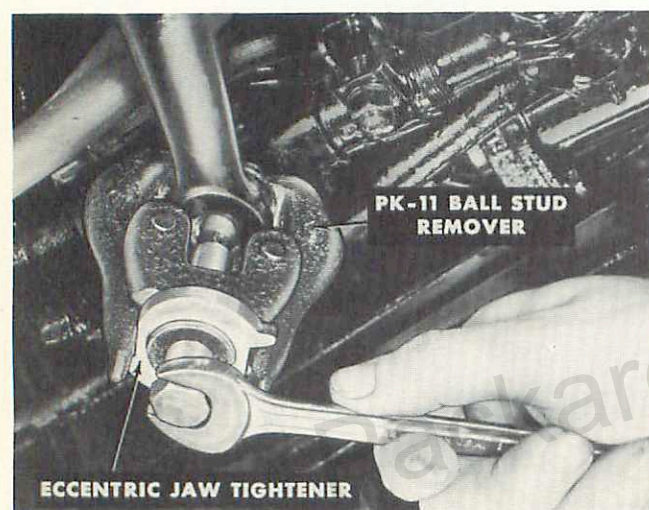


Figure 68—Press Out the Ball Stud

Disconnect the pressure hose and return hose at the valve and allow the fluid to drain into a clean pan or receptacle. Cap or plug the hose fittings to prevent fluid from dripping and dirt from getting into the hose lines.

Using calipers or a scale, measure the distance between the end of the control valve and the center of the connecting rod ball. This measurement is taken so that on re-installation of the valve it will be threaded onto the end of the steering rod to the exact position from which it was removed. An alternate method for performing this alteration is to count the number of turns required to thread the valve assembly off the end of the connecting rod.

Remove the grease fitting from the control valve and disconnect the remaining hoses or tubes.

Loosen the bolt in the clamp on the end of the control valve and unscrew the valve assembly from the end of the connecting rod.

Control Valve Disassembly

Mark or scribe the valve housing flange, adaptor and sleeve assembly flange with a punch or scratch awl to assure proper reassembly. See figure 69.

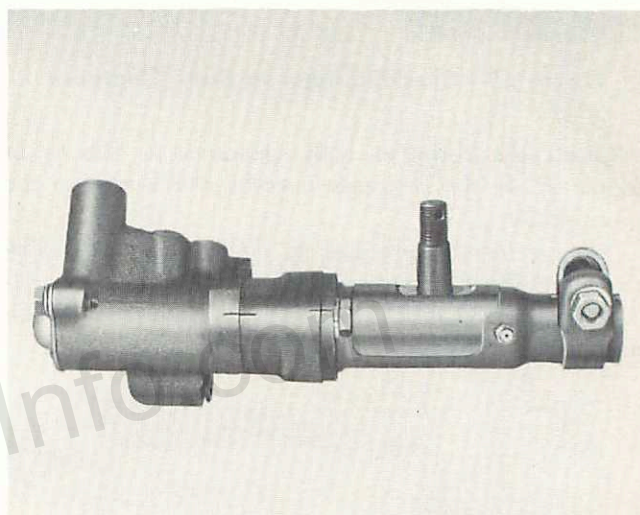


Figure 69—Mark the Flange, Adaptor and Sleeve

Remove the control valve cap and gasket and then remove the self-locking nut and washer from the valve

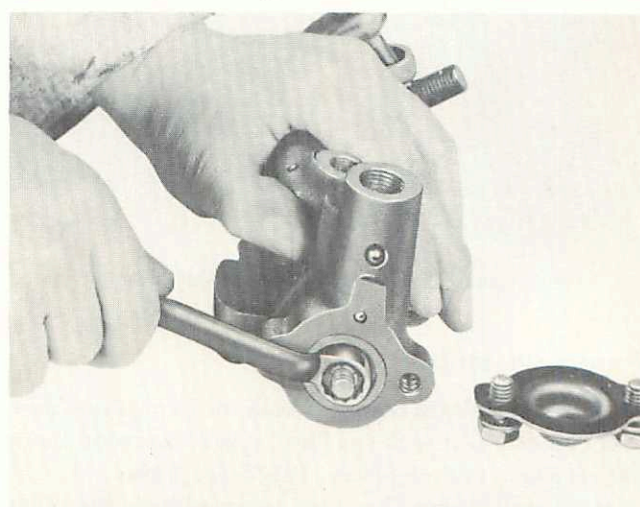


Figure 70—Removing the Valve Spool Bolt Nut

spool bolt. See figure 70. Remove the cap screws which hold the sleeve assembly, adaptor and valve housing together and separate these details.

SUSPENSION AND STEERING

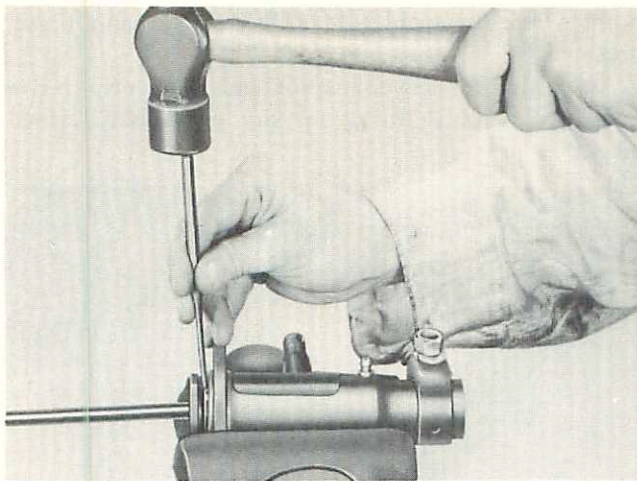


Figure 71—Tap Out the Lock Pin

Using a small punch, tap out the pin that locks the socket tube, stop screw and valve spool bolt together as shown in figure 71. Unscrew the stop screw from the socket tube.

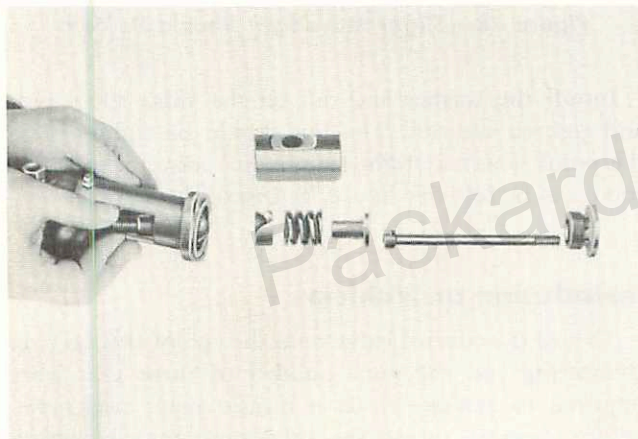


Figure 72—Removing the Ball Stud

Using a small screwdriver, snap the dust shield off the sleeve and ball stud.

Remove the ball stud and details from the sleeve as shown in figure 72.

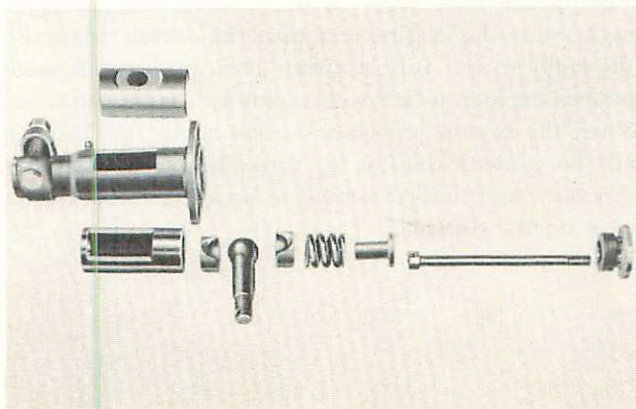


Figure 73—Socket Tube and Sleeve Details Removed

Remove the socket tube from the bore of the sleeve. Figure 73 shows the sleeve and details.

Remove the end caps, rubber seals and spool valve from the valve housing. Figure 74 shows the position of the valve, seals and caps as they function in the housing.

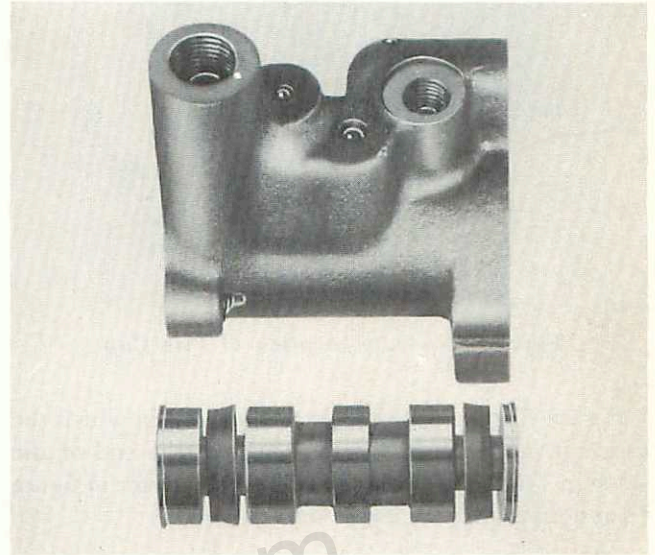


Figure 74—Valve Spool Details Removed

Control Valve Assembly

Refer to figure 74, and install the spool valve and details in the housing in the relation in which they are shown in the illustration.

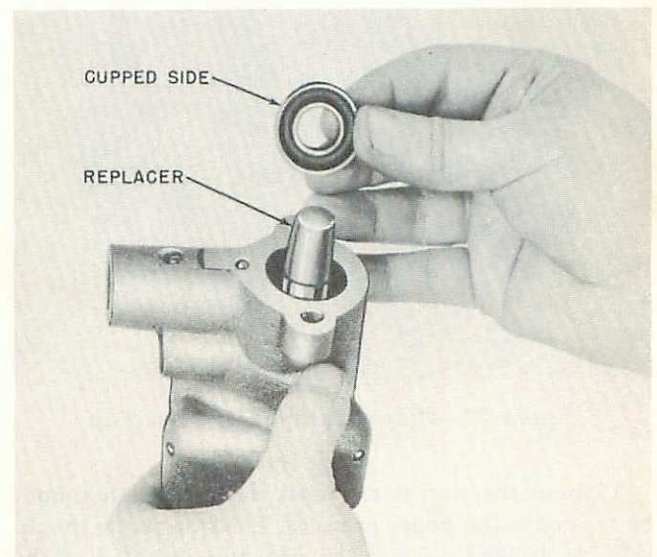


Figure 75—Install New Rubber Seals

Using Spool Seal Replacers, PK-7 and PK-8, will facilitate the installation of the rubber seals. The seals should be installed so that the cupped side is against the valve. See figure 75.

SUSPENSION AND STEERING

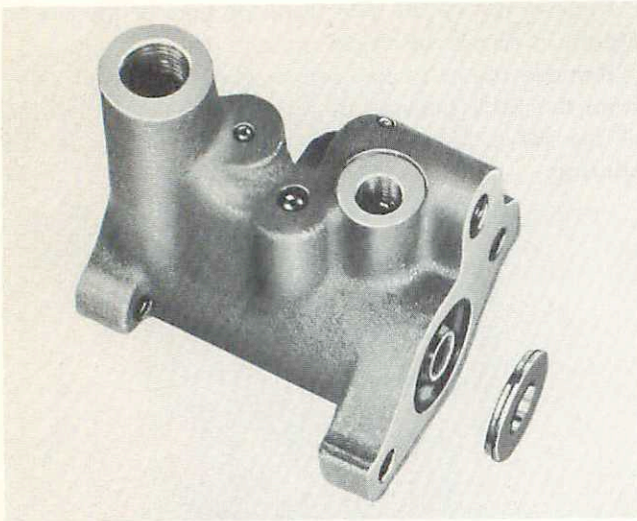


Figure 76—Note Location of Thin Cup

Figure 76 shows the end of the housing in which the thin cup is installed. Figure 77 shows the end of the valve in which the thick cup is installed. Refer to figure 73 and assemble the details into the sleeve.

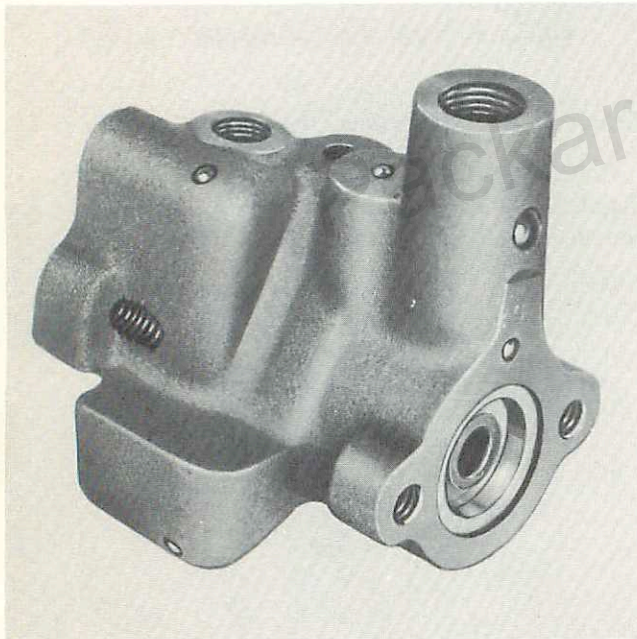


Figure 77—Proper Location of Thick Cup

Tighten the stop screw until the spool bolt cannot be rotated using finger pressure. The stop screw should then be backed off and the stop pin installed at the

point where the spool bolt can be rotated using finger pressure.

Assemble the sleeve, adaptor and the control valve housing assembly lining up the previously scribed marks.

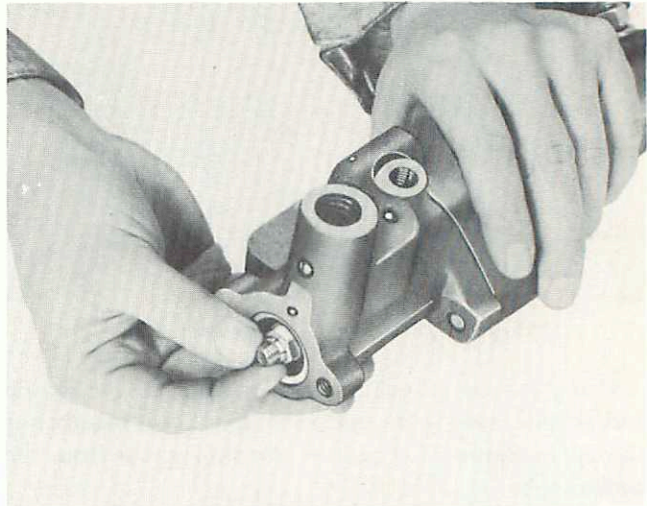


Figure 78—Slight Movement Should Be Felt

Install the washer and nut on the valve spool bolt and tighten the nut. The nut should be tightened to the point where a slight side to side movement of the spool can be felt. See figure 78. Install the end cap.

Installation on Vehicle

Thread the control valve onto the end of the steering connecting rod the same number of turns that were required to remove it. If a measurement was taken before removal, thread the valve onto the connecting rod enough to obtain the same dimension.

Position the control valve ball stud in the Pitman arm, install the retaining nut and tighten the nut to 50 to 55 ft. lbs.

Install the hoses at their proper connectors on the control valve and tighten.

Bring the fluid level in the reservoir to the level mark. Start the engine and turn the wheels from the full right to the full left turn position several times to bleed the hydraulic system of any air that has entered. When the system has been purged of air, no bubbles will be evident coming up through the fluid in the reservoir. Add fluid if needed to bring the level to the mark on the dipstick.

SUSPENSION AND STEERING

POWER STEERING SERVICE OPERATIONS (MONROE)

General

Extreme care should be exercised in the disassembly of the valve to prevent dirt and foreign matter from getting into the system. Before disassembling, wash the exterior of the unit with a suitable solvent and blow dry with compressed air.

As the parts are removed, wash them in a suitable solvent and blow dry. If a cloth is used, it must be clean and lintless. Careful handling of parts must be exercised to avoid the occurrence of nicks and burrs.

Valve and Cylinder Disassembly

Clamp the cylinder in a vise between the ball stud adaptors. Remove the cotter pin from the outer adjusting plug.

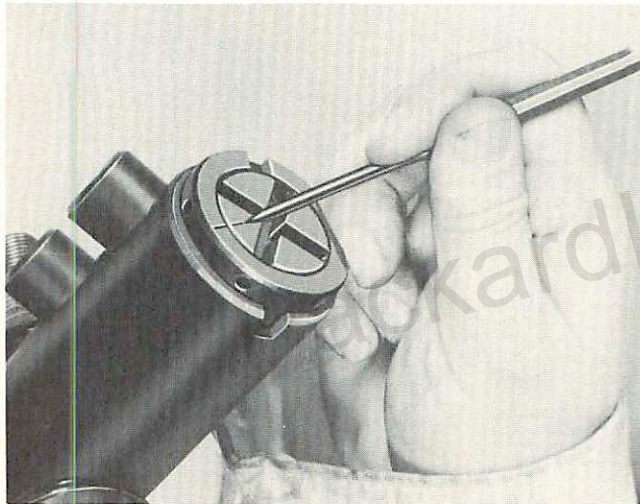


Figure 79—Mark the Plug and Cylinder

Using a scribe, mark the location of the adjusting plug in relation to the end of the cylinder as shown in figure 79. These scribe marks will be of assistance when making final adjustment.

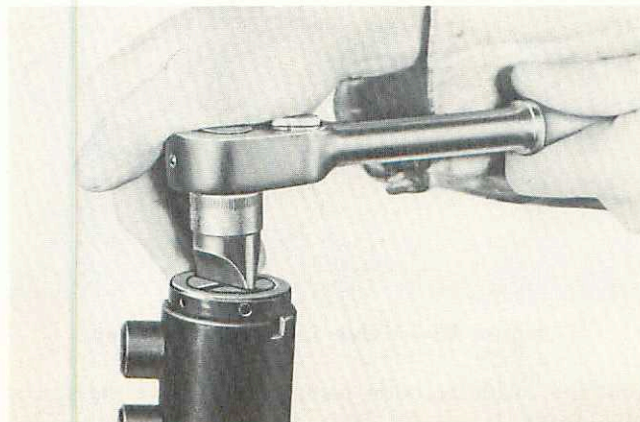


Figure 80—Bottom the Adjusting Plug

Tighten the adjusting plug until it bottoms and record the number of turns required. See figure 80. (This should be approximately $1\frac{3}{4}$ to $2\frac{1}{4}$ turns.) Remove the plug. See figure 81.

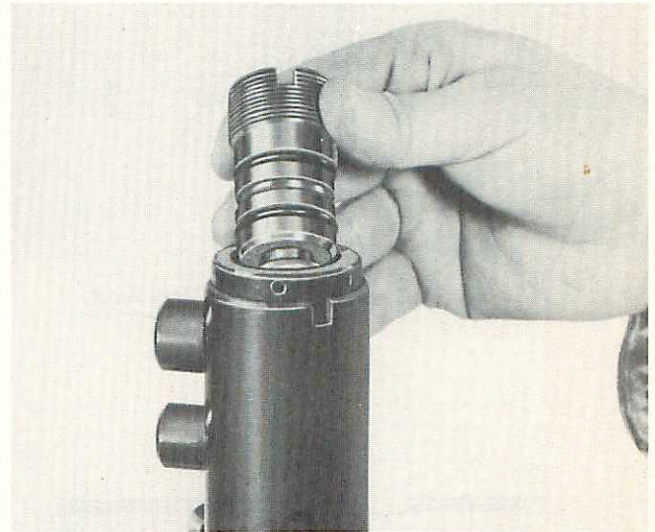


Figure 81—Remove the Adjusting Plug



Figure 82—Tap Out the Rollpin

Using a small drift, tap the rollpin out of the end of stud. See figure 82. Remove the nut and then remove the washer, rubber cushion, bushing, the egg-shaped washer and the retainer. From the opposite side, extract the stud, washers, etc. See figure 83.

NOTE: Care must be exercised in the next operation to avoid nicking or burring the valve spool.

Using a $\frac{5}{8}$ " diameter rod through the ball in the valve, start the valve out of the cylinder as shown in figure 84. Sharply rap the end of the cylinder on a block of wood to bring the valve to the end of the cylinder.

SUSPENSION AND STEERING

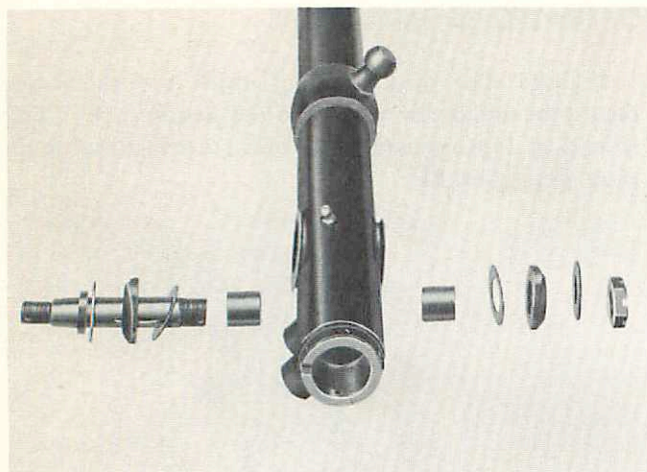


Figure 83—Stud and Details Removed

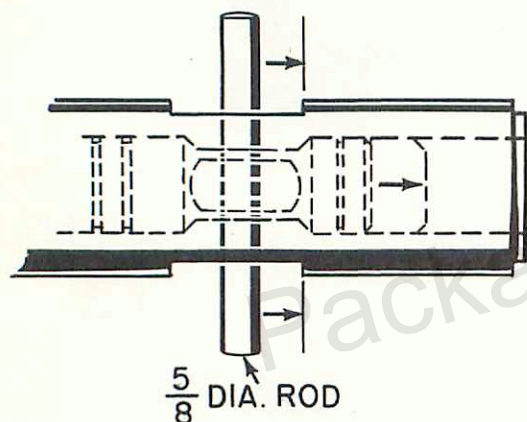


Figure 84—Start Valve Out of Cylinder

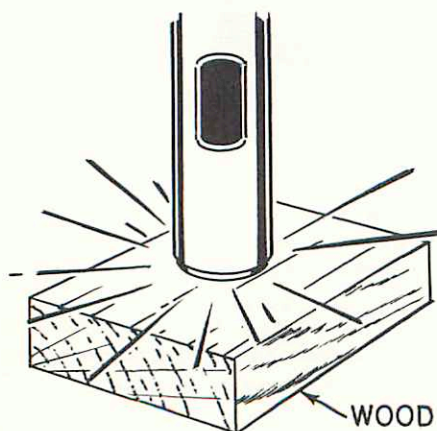


Figure 85—Use Block of Wood

See figure 85. While pushing on the valve, rotate the opposite end and work the valve out of the cylinder. See figure 86.

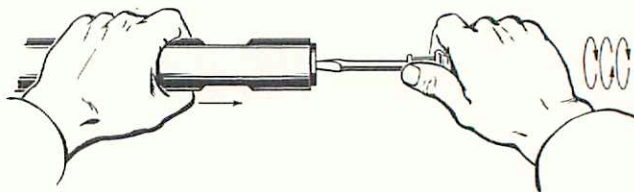


Figure 86—Push and Rotate Valve

The valve spool assembly can be further disassembled with the rod clamped in the vise and supporting the valve as shown in figure 87. Remove the adjusting plug and then remove the outer ball seat, ball, inner ball seat and spring. From the opposite end of the valve, pull

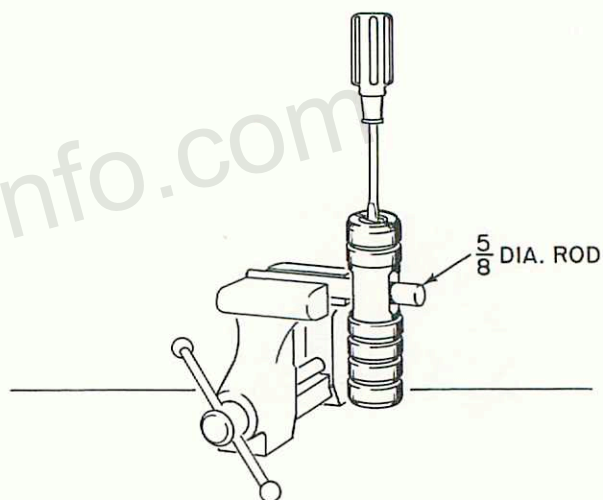


Figure 87—Support Valve on Rod

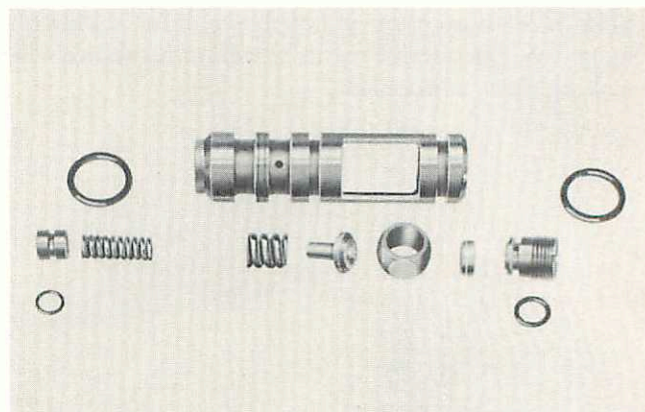


Figure 88—Valve Spool Disassembled

out the inside reaction piston and remove the spring. Figure 88 shows the valve spool assembly completely disassembled.

SUSPENSION AND STEERING

The outer adjusting plug can be disassembled by pulling out the outside reaction piston and removing the spring. See figure 89.

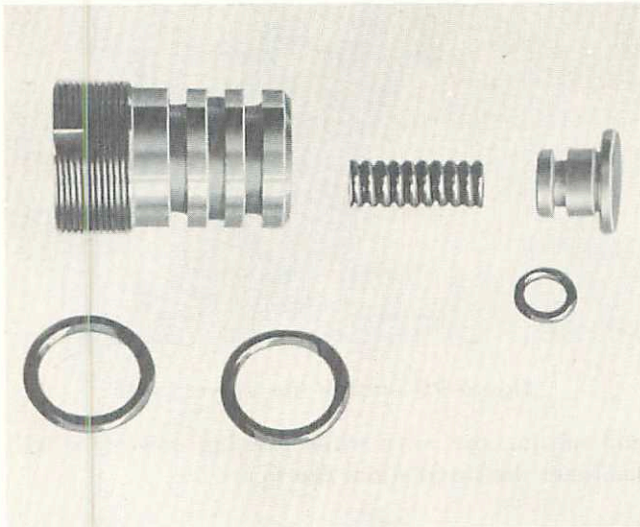


Figure 89—Outer Adjusting Plug Disassembled

Turn the cylinder end for end and clamp it in the vise between the ball stud adaptors and remove the large plug. Pull the piston rod upward to its limit of travel. Push the rod downward about an inch or two and then pull upward to obtain a bumping action. Repeat this operation two or three times to work the tube out of the cylinder. Lift out the tube and the rod as an assembly.

NOTE: In some instances, the tube may remain in the cylinder and only the rod guide will be extracted. If so, lift out the tube.

The "T"-Ring Assembly, which includes the rubber ring and four washers, may be removed by first prying out the retainer and then removing the washers and the rubber ring. See figure 90.

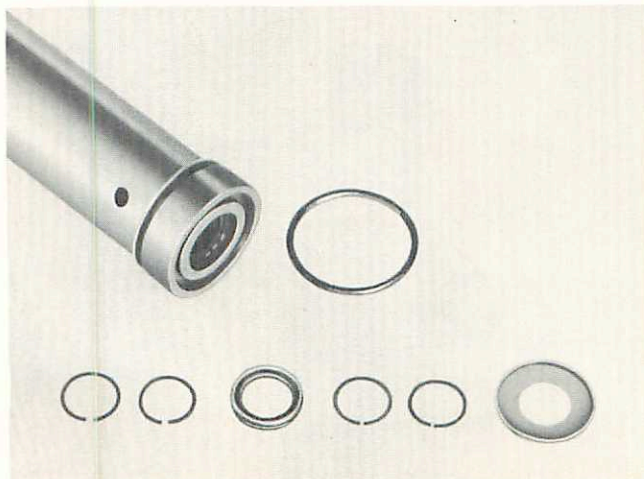


Figure 90—"T"-Ring Details Removed

Inspection

Thoroughly wash all parts in a suitable cleaning solvent and blow dry with compressed air. If a cloth is used, it must be clean and lintless.

Inspect the valve spool for nicks or burrs especially at the edges of the valve lands. The use of crocus cloth is permissible for removing slight nicks or burrs providing it is used carefully. Extreme care should be exercised not to round off the sharp edges at the valve lands.

In the event either valve spring is weak or broken it is recommended that both springs be replaced.

Check the cylinder tube for being dented or distorted.

Check the ball seats for being scored or worn. Also check the condition of the ball.

It is recommended that all the "O" rings and the rubber "T"-Ring be replaced with new rings. When installing the "T"-Ring, be sure the gaps in the composition washers are staggered.

It also is recommended that the wiper ring in the large plug be replaced. This can be accomplished by prying out the wiper retainer and then replacing the wiper and tapping the retainer back into place.

Valve and Cylinder Assembly

If the piston was removed from the piston rod, install the piston on the rod and only snugly tighten the nut. With the piston ring on the piston, insert the rod and piston assembly into the tube and guide assembly. Compress the piston ring and push the piston into the tube. Center the piston relative to the rod, tube and rod guide by working the piston and rod in and out of the tube, as shown in figure 91, (with the nut tight enough

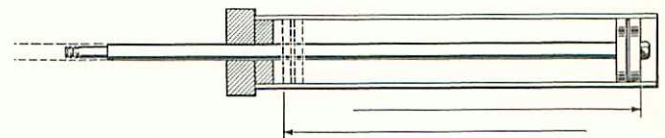


Figure 91—Move Rod in Both Directions

to allow centering) and then tighten the nut as shown in figure 92. Using lead jaws, clamp the piston rod in the vise and securely stake the piston retaining nut.

Lubricate the "O" ring on the rod guide and insert the tube assembly into the cylinder. Install the large plug, securely tighten the plug and then stake it securely.

SUSPENSION AND STEERING

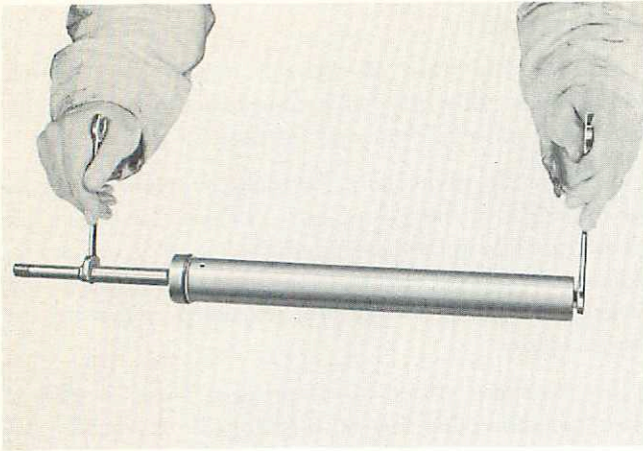


Figure 92—Tighten the Piston Retaining Nut

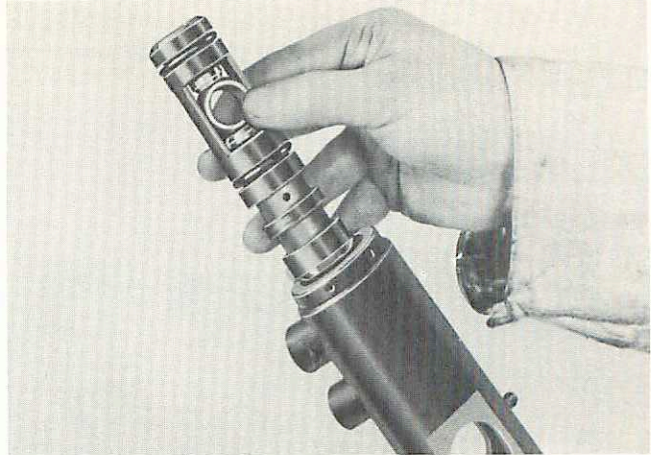


Figure 95—Install the Valve Spool

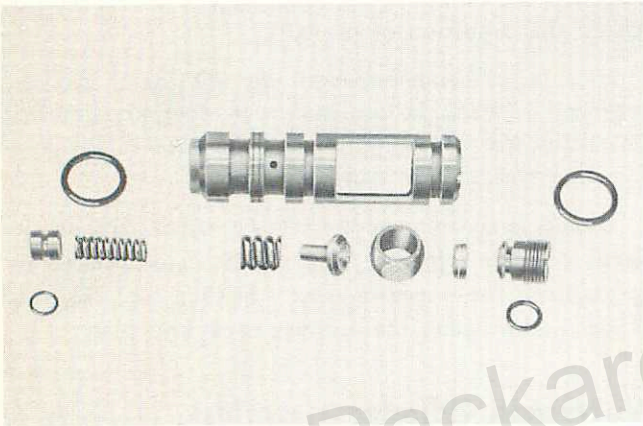


Figure 93—Valve Spool Details

Assemble the valve spool details into the valve using figure 93 as a reference. Support the valve as shown in

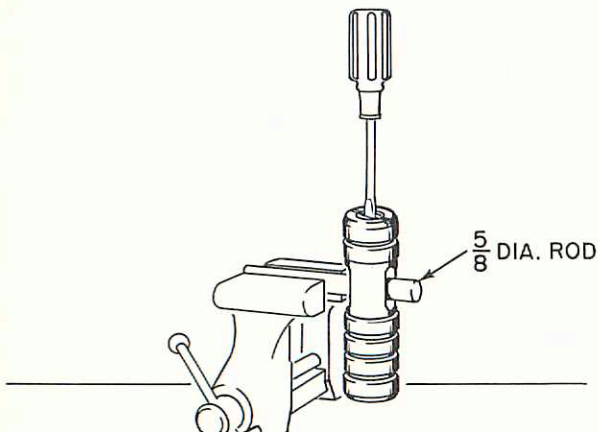


Figure 94—Bottom the Adjusting Plug

figure 94, tighten the adjusting plug until it bottoms and then back off $\frac{1}{4}$ turn and stake securely.

Lubricate the "O" rings and install the valve spool assembly in the cylinder. See figure 95. Slowly and carefully press the valve spool down into its bore. Using a piece of flat stock in the slots in the end of the valve

and turning the valve while pressing downward will facilitate the installation. See figure 96.

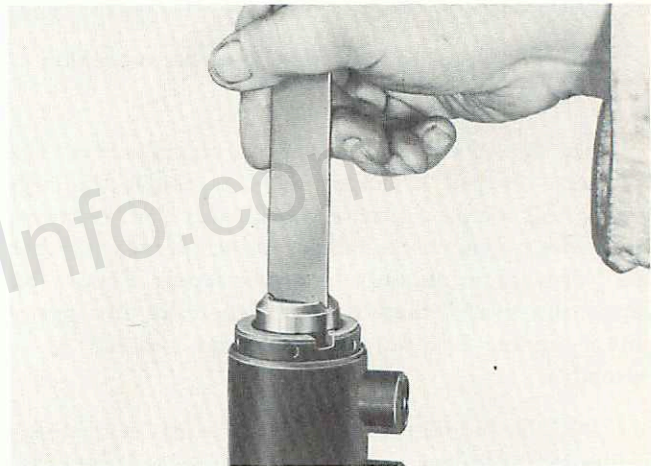


Figure 96—Slowly Turn the Valve

Insert the spring and the outer reaction piston into the outer adjusting plug, lubricate the "O" rings and install the plug. See figure 97.

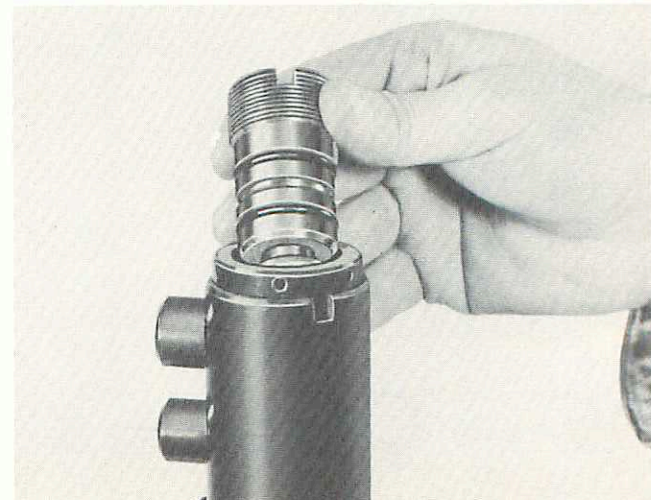


Figure 97—Install the Adjusting Plug

SUSPENSION AND STEERING

Turn the adjusting plug in until it bottoms, and then back off the same number of turns recorded when it was disassembled. Line up the previously scribed marks which were placed on the plug and the end of the cylinder upon disassembly. The plug may be keyed at this time; however, it may be necessary to readjust the plug after the unit is installed on the vehicle.

Refer to figure 98, and assemble the round washer, bushing, cushion, egg-shaped washer and retainer to

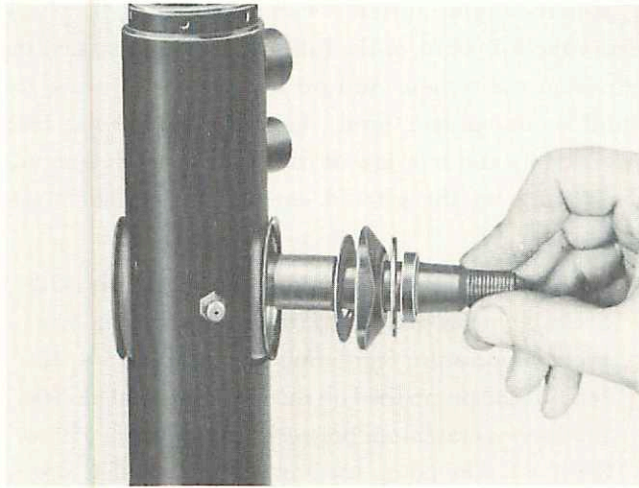


Figure 98—Install the Stud and Washer Details

the stud. Insert the stud through the ball in the valve spool.

NOTE: Tapered end of the stud should be nearest the lubricator fitting.

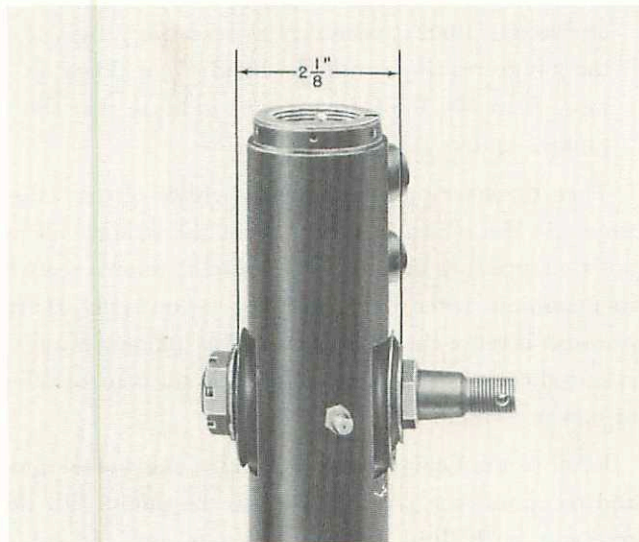


Figure 99—Obtain the Measurement Shown

Add the retainer, washers, bushing and rubber cushion to the opposite end of the stud and install the retaining nut. Make certain that the two retainers are

properly seated on the machined surfaces of the cylinder and that the cushions and washers are properly positioned in the retainers and then tighten the retaining nut to obtain a measurement of $2\frac{1}{8}$ " measured from the inner faces of the round washers (over the rubber cushions). See figure 99. After obtaining this measurement, install the locking rollpin.

When installing the unit on the vehicle, the retaining nut at the threaded end of the piston rod should be tightened to obtain a measurement of $1\frac{3}{16}$ " when measured from the points shown in figure 100.

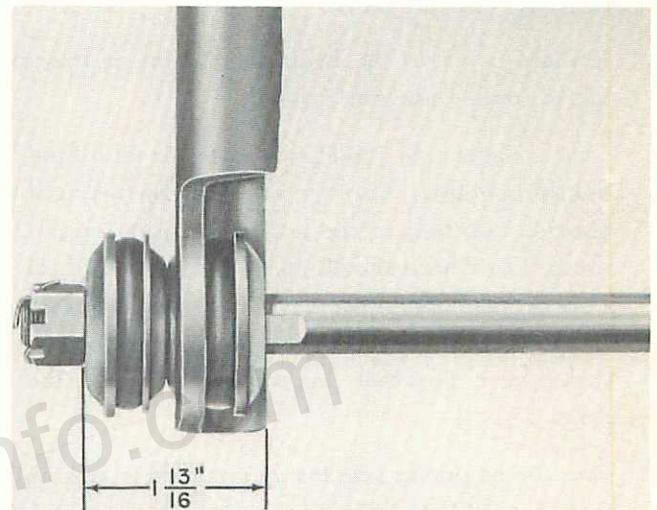


Figure 100—Tighten Nut to Obtain Measurement Shown

Final Adjustment

After the unit is installed on the vehicle, one or more of the following symptoms may be apparent during a road test indicating the direction in which the outer adjusting plug should be turned.

Turn plug "OUT" when:

- (a) Right turn is too hard
- (b) Left turn is too easy
- (c) Poor recovery after left turns; good recovery after right turns
- (d) Vehicle tends to wander to the left

Turn plug "IN" when:

- (a) Left turn is too hard
- (b) Right turn is too easy
- (c) Poor recovery after right turns; good recovery after left turns
- (d) Vehicle tends to wander to the right

SUSPENSION AND STEERING

POWER STEERING MAINTENANCE

Fluid Level

With the engine shut off, remove the pump reservoir filler cap and check the fluid level. The proper level is marked on the dipstick or reservoir.

If it is necessary to add fluid, use Ultramatic Drive fluid or a type "A" automatic transmission fluid which has an "AQ-ATF" number embossed on the can.

Bleeding the System

If there is air in the hydraulic system, it may be removed in the following manner:

Start the engine and fill the reservoir with fluid to its proper level. Turn the wheels to the full right position and then to the full left position several times. The wheels should not be held at the wheel stops or the pump pressure will build and create an excessive strain on the system. When bleeding the system, turn the wheels immediately away from the stops.

Run the engine at idle for approximately two minutes. When all bubbles cease to appear in the reservoir while turning the wheels, the system has been purged of air. Add fluid if necessary to bring it to the proper level. Check all hose connections for leaks.

Pump Belt Adjustment

Loosen the pump pivoting bolts. Loosen the pump belt adjusting bolt in the elongated hole in the pump bracket. Adjust the position of the pump so that $\frac{1}{2}$ " to $\frac{3}{4}$ " deflection can be obtained when using finger-pressure on the belt midway between the pump driving pulley and the idler pulley.

Checking Pump Pressure

Remove the pump reservoir cover and then withdraw the oil from the reservoir using a suction pump. If a suction pump is not available, disconnect a hose at the control valve and drain the oil from the pump. If this last method is used, reconnect and tighten the hose to the control valve.

Disconnect the pressure hose from the pump at the adaptor which is toward the rear of the pump. Using the adaptor PK 13-E attach the Gauge Hose and Valve PK-13 to the pump with the hand valve open. Connect the pressure hose and adaptor PK-13-H to the fitting on the hand valve side of the gauge. Refill the reservoir to the proper level.

Run the engine until it is warmed up. Turn the wheels from the full right to the full left position to bleed the air from the system. Add oil if necessary to bring the fluid to the proper level. After the engine has been warmed up and is at low or curb idle, the wheels should be resting on the ground and in the straight ahead position.

NOTE: Power Steering pumps used on 55th Series vehicles are identical in appearance; however, the pressure regulation specifications are different. The pump used on the 5560 and 5580 models produces a maximum pressure ranging from 550 to 800 P.S.I. The pump used on the 5540 models produces a maximum pressure ranging from 650 to 900 P.S.I. and can be identified with the number "900" stamped on the pressure hose adaptor on the pump. Close the gauge hand valve and observe the gauge reading. The reading should be within the ranges described in the foregoing note.

NOTE: Do not keep the gauge hand valve closed any longer than is necessary to read the gauge. If the gauge reading, with the hand valve closed, is more than 100 P.S.I. low it will indicate that the pump requires repair.

Turn the steering wheel toward either of the wheel stops. As the wheel is turned from the straight-ahead position, pressure should start increasing until it reaches its maximum when the wheel stop is contacted. If the pressure is more than 100 P.S.I. below its maximum, it is an indication that the trouble lies in the control valve or power cylinder.

Remove the Gauge Hose and Valve and the adaptor and reconnect the pressure hose to the pump. Fill the reservoir with fluid, bleed the system and add oil if necessary.

SUSPENSION AND STEERING

POWER STEERING GEAR SERVICE OPERATIONS

Worm Bearing Inspection and Adjustment

Remove the Pitman arm nut at the control valve ball stud. Using Ball Stud Remover No. PK-11, pull the Pitman arm loose from the ball stud and push the linkage up out of the way. See figure 101. Turn the steering

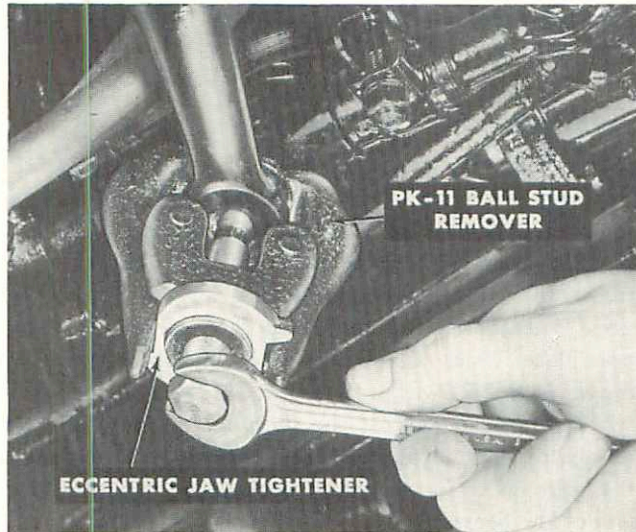


Figure 101—Push Out the Ball Stud

wheel to the extreme right or left stop and back up approximately $\frac{1}{8}$ turn. This is necessary so that the worm and roller are not on the high spot when the worm bearing inspection is made.

With a spring scale attached to the outside edge of the steering wheel rim, the pull required to turn the steering wheel should not be less than 1 oz. nor more than 8 oz. See figure 102.

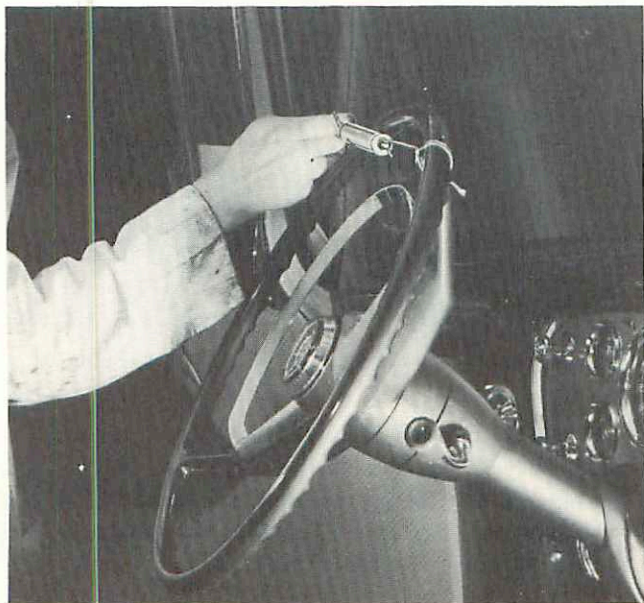


Figure 102—Check the Steering Wheel Pull

If the pull required to turn the steering wheel is less than 1 oz., loosen the four cover attaching screws and back them out approximately $\frac{1}{8}$ inch. Move the cover away from the steering gear, separate the shims, and remove the thinnest shim, being careful not to damage the remaining shims. Tighten the worm cover attaching screws to a torque tightness of 15 to 18 foot pounds, and recheck the effort required to turn the steering wheel. If the reading on the scale still indicates less than 1 oz. pull, remove another shim. However, if the pull exceeds 8 oz., the worm cover should be removed and a .003 inch shim should be added and the pull rechecked after the worm cover is installed and tightened.

NOTE: These shims are available in three thicknesses: .003 inch, .005 inch, and .010 inch. Do not remove more than 1 thin shim without rechecking the steering wheel effort or pull. Be sure the worm cover plate is not distorted. If it is damaged or distorted, it should be replaced with a new cover. After the worm bearing adjustment is properly performed, proceed with the cross shaft inspection and adjustment.

Cross Shaft Inspection and Adjustment

Locate the straight-ahead or high spot position of the steering gear by returning it to the stop at the extreme left or right and then turning back $\frac{1}{2}$ of the number of revolutions required to turn the steering gear from the extreme left to right. Turn the steering wheel $\frac{1}{4}$ turn to either side of the straight-ahead or high spot position. Pull the steering wheel through the high spot with a spring scale attached to the outside edge of the steering wheel rim. The pull should increase approximately to 12 oz. when passing through the high spot. The total effort or pull should not exceed 12 oz. If the pull or effort is outside these limits, the cross shaft should be adjusted.

Turn the steering wheel to the straight-ahead or high spot position. Remove the cross shaft adjusting screw lock nut, and raise the lock plate enough to clear the jaws on the cross shaft cover.

Turn the adjusting screw until the effort required to pull the steering wheel through the high spot position is approximately 12 oz. Turning the screw clockwise brings the cross shaft roller in closer mesh with the worm and increases the effort, while turning the screw counter-clockwise moves the roller away from the worm and decreases the effort.

NOTE: Do not attempt to adjust the cross shaft until the steering gear alignment and worm bearing adjustment are known to be correct. Recheck the operation of the steering gear off the high spot. There should be no binding or drag in excess of 3 oz. when the gear is off the high spot.

SUSPENSION AND STEERING

Steering Gear Disassembly

Drain the lubricant from the steering gear. Support the steering gear in a vise by clamping the jaws of the vise over the mounting pad.

Remove the cross shaft cover and lift out the cross shaft. See figure 103. Remove the worm cover and tube

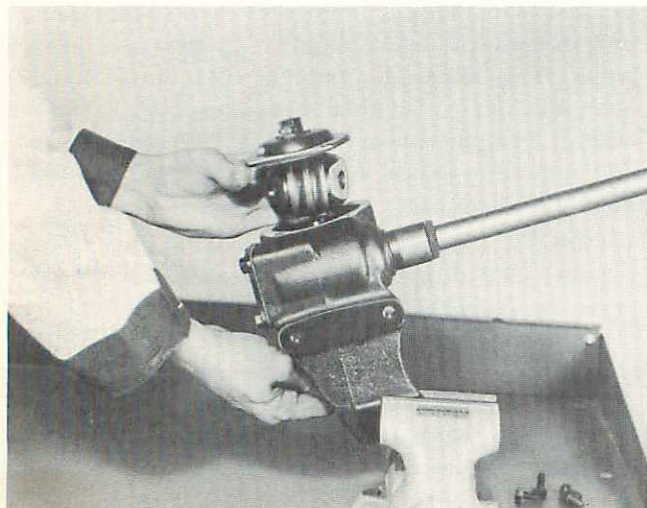


Figure 103—Removing the Cross Shaft

assembly and shims. Remove the worm and shaft and the worm bearings and cups out of the lower end of the steering gear case. If the cross shaft bearings are in need of replacement, they may be pressed out in the following manner. Position the steering gear case in an arbor press with the cross shaft end of the case up and the bottom end supported in PK-9-D Support Base.

Using Cross Shaft Bearing and Sleeve Remover No. PK-9-A, install this tool in the inner bore of the needle bearing and press out the two needle bearings, sleeve and oil seal. See figure 104.

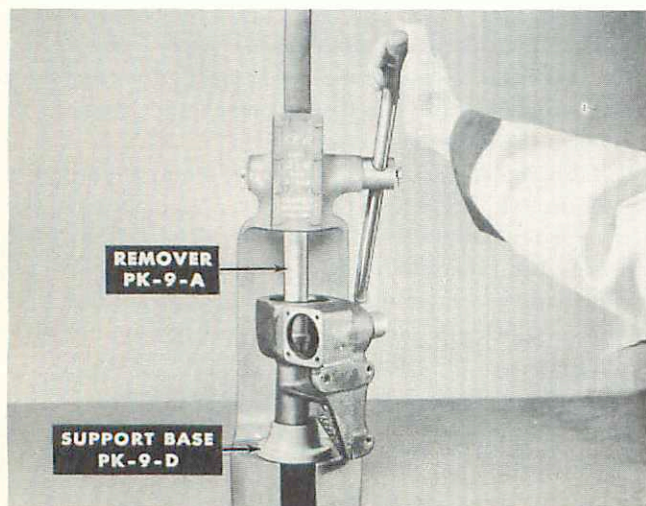


Figure 104—Press Out the Bearings, Sleeve and Seal

Cleaning and Inspection

Clean all the steering gear parts with clean, unleaded gasoline, naphtha or kerosene. Blow the parts dry with compressed air. Inspect the worm and cross roller for wear, roughness, or flat spots. Inspect the bearings and cups for wear, scores, chips, or pits. Inspect the cross shaft and bearings for excessive wear or damage. Inspect the cross shaft oil seal. Replace any parts that do not meet standards.

Steering Gear Assembly

If the needle bearings, sleeve, and oil seal for the steering gear cross shaft have been removed from the steering gear case bore, lubricate the new parts with steering gear oil before reassembling in the case. To reassemble, position the steering gear case in an arbor press with the oil seal end of the case into PK-9-D Support Base. Using Cross Shaft Bearing and Sleeve Remover No. PK-9-A, press the needle bearing with the lettered end up against the shoulder of the tool until it is below flush of the top end of the bore. Then install the split sleeve into the bore until it contacts the lower end of the bearing.

Install Cross Shaft Bearing Replacer Adaptor No. PK-9-B on Cross Shaft Bearing and Sleeve Remover No. PK-9-A and press in the remaining needle bearing assembly until the tool bottoms against the outer end of the gear case. See figure 105.

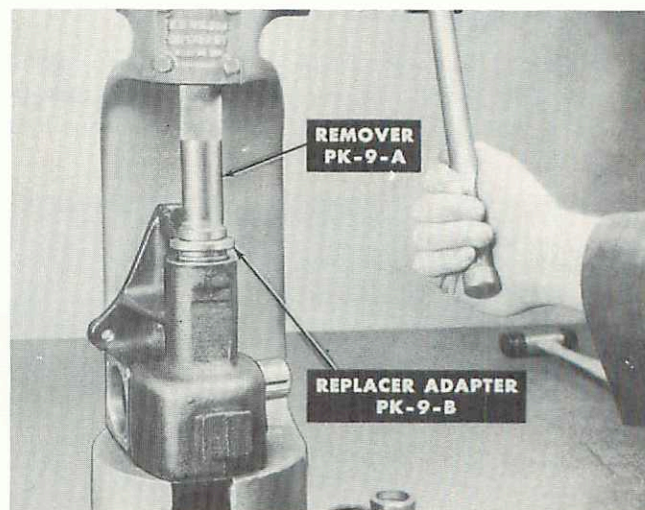


Figure 105—Installing the Lower Bearing

Remove Replacer Adaptor PK-9-B and install Cross Shaft Oil Seal Replacer Adaptor PK-9-C on PK-9-A with the tapered end facing this tool. Lubricate the oil seal with steering gear oil and press it into the case until the seal bottoms. See figure 106.

Lubricate the worm bearing and cups with a heavy lubricating oil. The short bearing cup is used at the

SUSPENSION AND STEERING

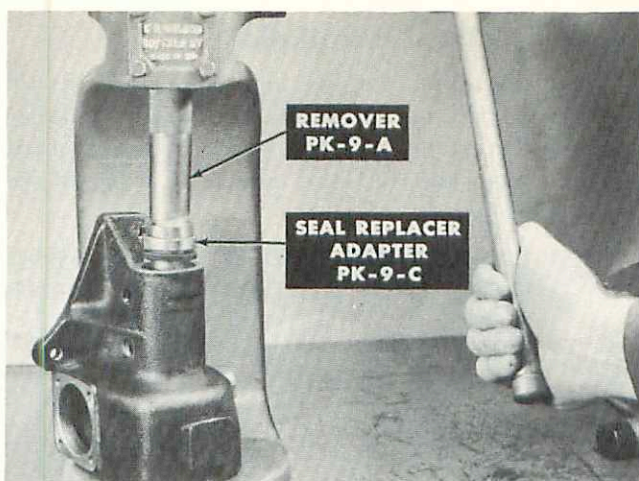


Figure 106—Installing the Oil Seal

upper end. Install the upper bearing cup and felt seal in the housing. Slide the bearing over the end of the worm and shaft assembly and install this assembly in the case. Install lower bearing and cup. Install the adjusting shims, and worm cover. Check the worm bearing adjustment as described under Worm Bearing Inspection and Adjustment. Temporarily install the steering wheel to make this check.

After the worm bearing adjustment is performed, remove the two cover attaching screws nearest to the cross shaft indicated by arrows, and coat the threads of these screws with a suitable sealing compound. See figure 107. Reinstall and torque tighten these screws to

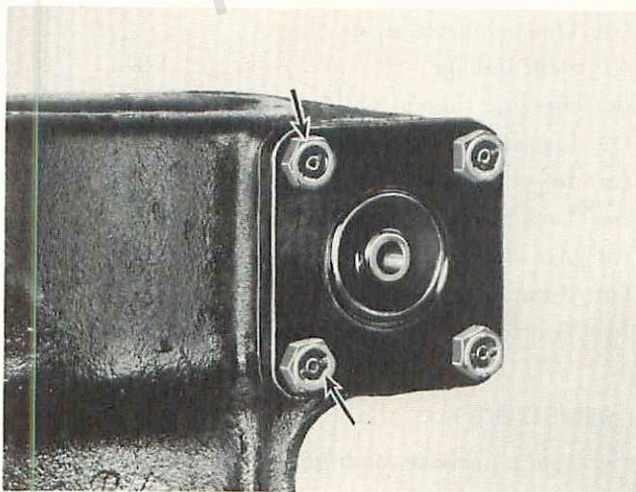


Figure 107—Screws Indicated Should Be Coated

15-18 foot pounds. This is necessary since these holes are tapped directly into the steering gear case, and unless the threads were sealed would result in steering gear lubricant leakage.

After the worm bearings are properly adjusted, install the cross shaft and cross shaft cover, making sure that the cross shaft adjusting screw head and plate fit into the slotted, claw-like recess of the cross shaft. Be

sure to use a new gasket when installing the cross shaft cover. Back off the cross shaft adjusting screw before tightening the cover plate attaching screws.

Adjust the cross shaft to obtain approximately 12 oz. pull at the steering wheel through the high spot. After the steering gear cross shaft is properly adjusted, install the lock plate and lock nut and remove the steering wheel.

Steering Wheel Removal

Remove the horn button emblem using a thin bladed screwdriver as shown in figure 108. Remove the steering wheel retaining nut.

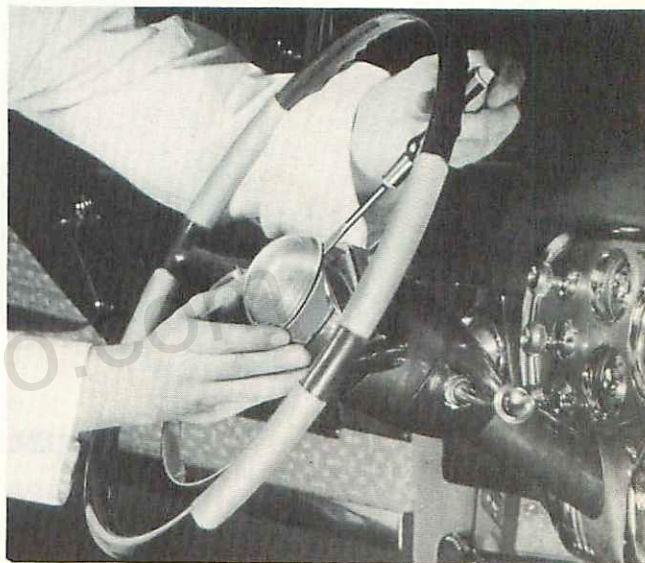


Figure 108—Removing the Bottom Emblem

Using a scribe, mark the steering tube and the hub of the steering wheel to maintain the proper relation of the wheel and tube on reassembly.

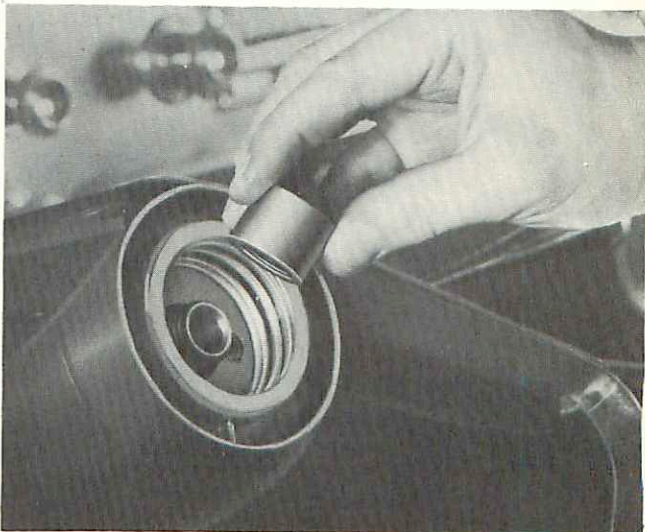


Figure 109—Install the Adaptor

SUSPENSION AND STEERING

Thread the adaptor of Steering Wheel Puller, J-2557-A, on the tube. See figure 109. Install the puller details as shown in figure 110 and remove the steering wheel.

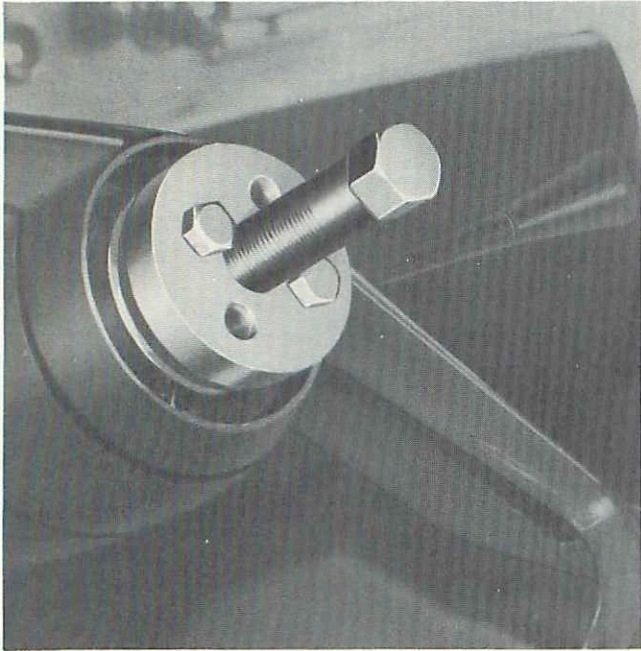


Figure 110—Wheel Puller Installed

Steering Wheel Installation

When installing the steering wheel, line up the previously scribed marks on the tube and on the hub of the wheel to maintain proper wheel spoke alignment. Tighten the wheel retaining nut to 55 to 60 ft. lbs. torque. See figure 111.

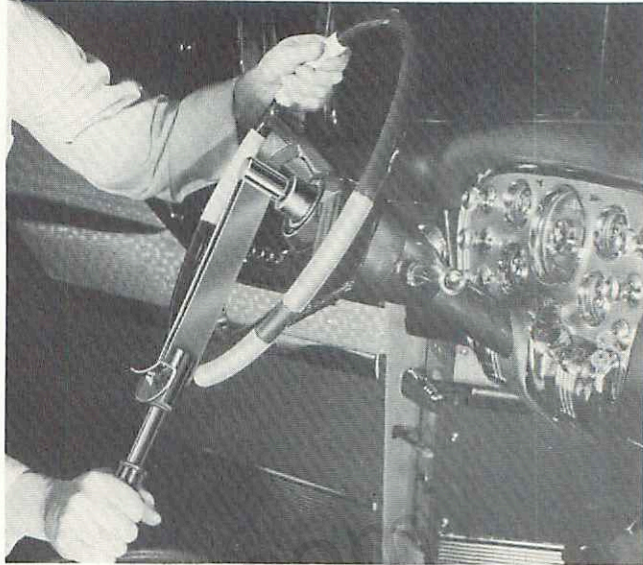


Figure 111—Torque Tighten the Retaining Nut

TRUBLE SHOOTING

HARD STEERING

Causes

- (a) Failure of pump.
- (b) Loose or broken belt.
- (c) Badly worn pump parts.
- (d) Broken or weak relief valve spring.
- (e) Sticking relief valve.
- (f) Low pump pressure.
- (g) Line leakage.
- (h) Fluid in system low.
- (i) Under-inflated tires.
- (j) Bent linkage.
- (k) Steering tube mis-alignment.
- (l) Steering adjustment tight.
- (m) Improper wheel alignment.
- (n) Lack of lubrication.
- (o) Air in system—improperly bled.
- (p) Pump control valve sticking.
- (q) Control valve spool out of round, or damaged.

STEERING TOO SENSITIVE

Causes

- (a) Overinflated tires.
- (b) Pump pressure too high.
- (c) Flow control valve stuck in closed position.

LOOSE STEERING

Causes

- (a) Wheel out of alignment.
- (b) Loose ball joints.
- (c) Loose steering knuckle pins.
- (d) Wheel bearings loose or worn.
- (e) Lash in linkage.
- (f) Air in system—improperly bled.
- (g) Shock absorbers not operating properly.
- (h) Loose steering gear to frame bolts.
- (i) Steering gear needs adjustment.
- (j) Loose Pitman arm.

SUSPENSION AND STEERING

POOR CENTERING

Causes

- (a) One tire underinflated.
- (b) Faulty or binding control valve spool.
- (c) Control valve spool nut too loose or too tight.
- (d) Loose wheel bearings.
- (e) Steering misalignment.
- (f) Binding power cylinder.

POOR RECOVERY

Causes

- (a) Lack of lubrication of linkage.
- (b) Steering gear adjusted too tight.
- (c) Improper caster adjustment.
- (d) Low tire pressure.
- (e) Stop nut pin installed in wrong hole causing spool assembly to bind in bore.

PUMP NOISE

Causes

- (a) Improper fluid level.
- (b) Loose return hose connection.
- (c) Pump belt squeal.
- (d) Hose rubbing against other parts.
- (e) Mechanical trouble in pump, worn parts, etc.
- (f) Clogged intake line or filter.
- (g) Pump pulley loose.
- (h) Relief valve chattering.
- (i) Improper fluid used in power system.
- (j) Wheels held at stops too long. Overheating pump.

LOW OIL PRESSURE WHEN TESTED WITH GAUGE

Causes

- (a) Belt slips.
- (b) Low fluid level.
- (c) Pump mechanical trouble (worn parts, etc.)
- (d) Pump relief valve spring weak.
- (e) Pump relief valve stuck open.
- (f) Flow control valve stuck open.
- (g) External leakage.
- (h) Internal leakage.

NO POWER ACTION ON STEERING GEAR WHEN ENGINE IS RUNNING

Causes

- (a) No pressure at pump.
- (b) Relief valve stuck in open position. All items (a) to (h) above apply.

CHUCKLE OR RATTLE IN STEERING

Causes

- (a) Too much back lash in steering. Worn or loose parts.
- (b) Control valve improperly adjusted.
- (c) Ball socket or ball studs not tight.

SHIMMY

Causes

- (a) Lash in linkage (worn or loose steering parts).
- (b) Wheels out of balance.

OIL LEAKS (PUMP)

Causes

- (a) Loose or defective connections.
- (b) Hose leaks.
- (c) "O" ring seals between reservoir and pump.
- (d) "O" ring seals between connections.
- (e) Seal on pump shaft.
- (f) Seal between pump cover and body.

SUSPENSION AND STEERING

OIL LEAKS (CONTROL VALVE)

Causes

- (a) Worn seals on ends of spool.
- (b) Drippage of fluid from the ball stud section indicates that the seals on the spool are passing fluid.

CONTROL VALVE NOISE

Causes

- (a) Spool bolt nut loose, causing spool flutter.
- (b) Linkage loose.

STEERING WHEEL WILL NOT CONTROL OPERATION OF POWER STEERING (AFTER ASSEMBLING THE UNITS TO THE CAR)

Causes

- (a) Hose connections not connected correctly.
- (b) Power Steering Pump inoperative.

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SUSPENSION AND STEERING

56TH SERIES SUPPLEMENT

ADJUSTING STEERING COLUMN AND SHAFT ASSEMBLY

Procedure for Assembly

1. Loosen all column clamps.
 - (a) At steering column lower end.
 - (b) At instrument board.
2. Assemble the steering wheel and tighten the retaining nut.
3. Hold the steering column adapter "1" figure 112. Screw nut "2" against end of column until all

end play between upper and lower bearings is removed. Then back off nut "2" one-half turn. Bring column down against nut "2" and tighten clamp "3". Nut "2" must then be retightened. Figure 113 shows the details of the flexible coupling.

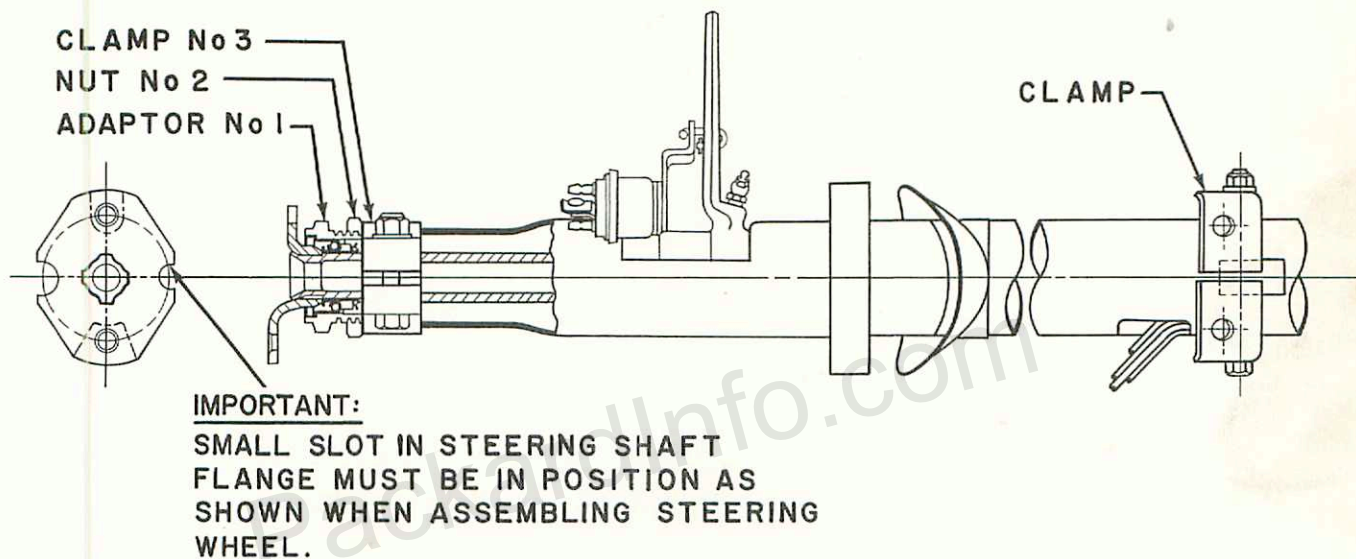


Figure 112—Steering and Shaft Assembly

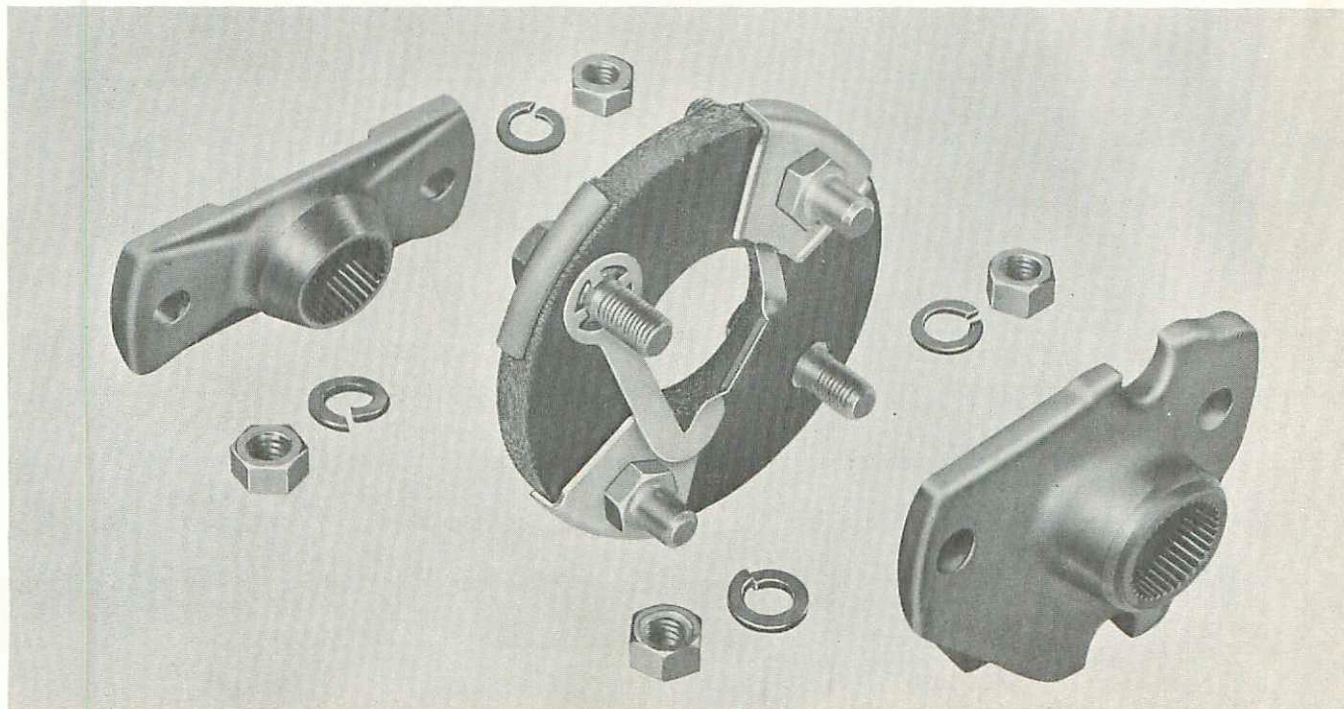


Figure 113—Details of Flexible Steering Coupling

SUSPENSION AND STEERING

NOTES

Traction level sw schematic in Electrical section

Brake SW replacement info in ELECT.

Shocks - front

Upper inner bushings (Ford # D3 A2 3068 A)

MAY 84
NEWS BULLETIN

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