CHASSIS SUSPENSION

TABLE OF CONTENTS

GENERAL DESCRIPTION

All 1954 series Cadillac cars utilize the independently sprung front wheel suspension system. This design permits either front wheel to follow the irregularties of the road without appreciably affecting the other front wheel or transferring road shocks to the steering system.

The front wheels are controlled in their up and down movement by coil springs and direct acting, permanently sealed shock absorbers. The springs are insulated at the upper and lower ends by rubber insulators, which prevent metal to metal contact of the spring with the frame and the resultant transfer of noise, due to spring movement, to the frame. The shock absorbers are located in the center of the coil springs and are attached, at the upper end, to the spring seat tower and, at the lower end to the spring seat in the lower control arm.

The upper and lower control arms are pivoted at their inner ends on parallel solid shafts bolted to the upper and lower sides of the front frame cross member. Each end of both the upper and lower inner shafts has a threaded steel bushing, permitting motion of the suspension arms, Fig. 6-1.

The steering knuckle supports are pivoted at the outer ends of the upper and lower control arms. The pivot at the lower arm is on a plain threaded bushing; while at the upper arm, the pivot is on an eccentric threaded bushing which provides adjustment for caster and camber.

CHASSIS SUSPENSION

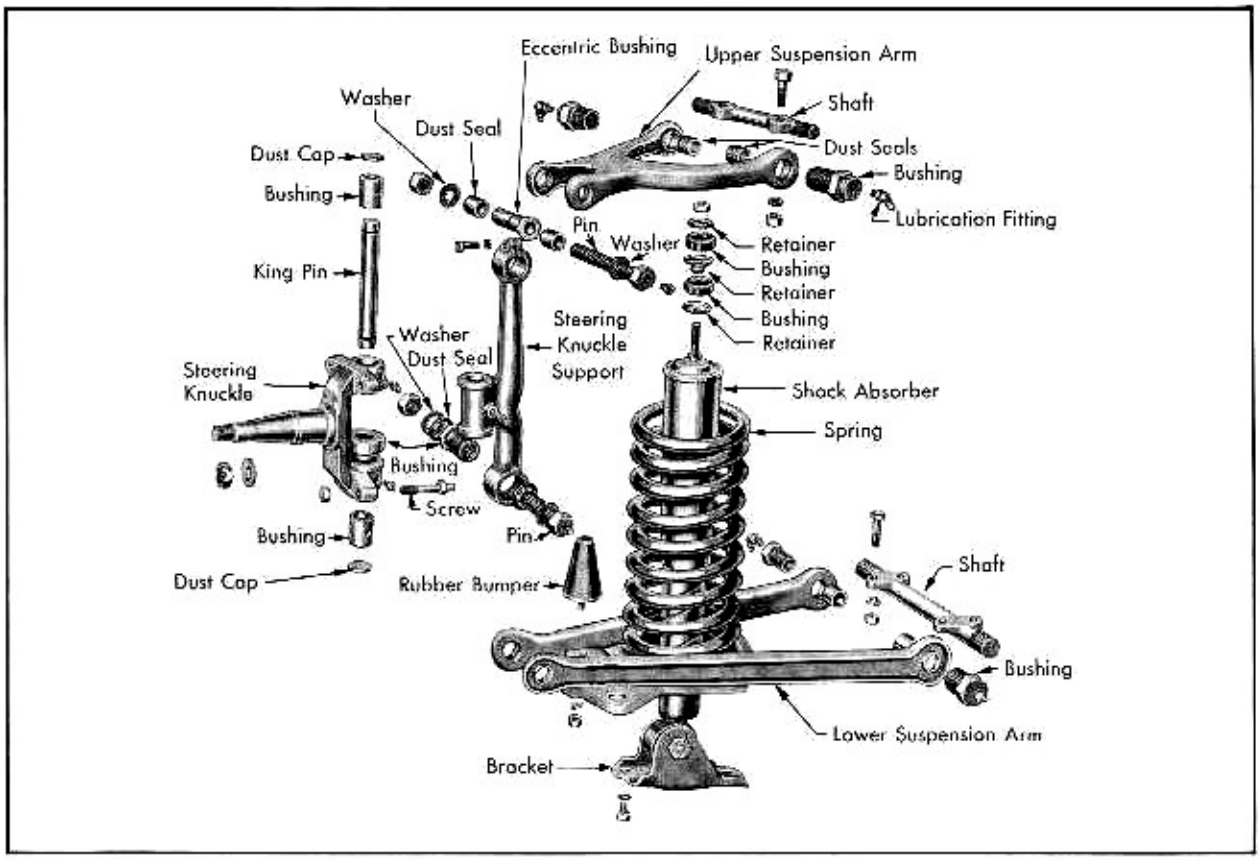


Fig. 6-1 Front Suspension - Disassembled

Synthetic rubber seals are used to protect all bushings against road dirt and other foreign material. A rubber bumper on the lower suspension arm is used to cushion the extreme travel of the upper and lower suspension arms.

The steering knuckle is mounted on the steering knuckle support on a harnened steel knuckle pin (king pin) which rotates in bronze bushings in the upper and lower part of the steering knuckle. The vertical thrust is taken by a bearing located between the lower face of the knuckle support and the steering knuckle.

A front end stabilizer bar is used in connection with the independent suspension system to provide steering stability and to control body roll. The stabilizer bar is mounted ahead of the suspension arms, on the frame side bars and is connected to the coil spring seats on the lower control arms by steel links which are completely cushioned at each end by rubber bushings.

The direct acting type rear shock absorbers are secured at the bottom by anchor bolts in the rear spring "U" bolt plates and at the top through brackets welded to the rear intermediate frame cross member. This "sea-leg" type of mounting of the rear shock absorbers gives them the double function of minimizing transverse roll and absorbing road shocks.

The rear springs are of the semi-elliptical leaf type with waxed full length liners between the leaves to provide the correct interleaf friction and prevent squeaking throughout the life of the springs. The springs are cushioned at each end by rubber bushings and at the spring seat on the axle housing by a rubber insulating pad.

The wheels on 1954-62 and 60S are 15 inches in diameter, with 6-inch rims, and use 8.00 x 15-4 ply black tires, optional with 8.20 x 15 white wall tires. The 1954-75 wheels are 15 inches in diameter and use 8.20 x 15 6 ply tires. All rims are of the drop center type. Wheels on the 1954-75 and 86 cars are the same as on 60 and 62 Series except for heavier stock thickness and may be identified by a 3/16" hole in the spider of the wheel. Also, a letter "H" is stamped on the outside of the rim adjacent to the valve stem hole. Wire wheels are standard equipment on Eldorado Style convertible coupes and are available as an accessory for all 62 and 60S series cars. Wire wheels are not recommended for installation on 75 and 86 series.

CHASSIS SUSPENSION

SERVICE INFORMATION

(1) Front Wheel Alignment Procedure

Correct wheel alignment is necessary to keep the front wheels in the true running position and is essential for easy steering. Tire wear is affected, as far as front end alignment is concerned, only by incorrect toe-in. Caster or camber does not affect tire wear.

The following operations should be performed in the order listed whenever the front wheel alignment is checked and adjusted:

Check tire pressure (Note 2).

Check adjustment of front wheel bearings (Note 3).

Check trueness and tracking of front and rear wheels (Notes 4 and 5).

Check spring heights (Note 6, a and b).

Check condition of all bushings and bearings.

Check for looseness in steering gear and connections.

Check caster and camber angle.

Check toe-in and straight ahead position of steering wheel.

(2) Checking Tire Pressure

Checking and inflating tires to the proper pressure is the first step when performing any wheel alignment job. Correct tire pressures are essential for securing correct measurements of other alignment factors. Following are the recommended tire pressures for 1954 series cars:

62, 60S - 24 lbs. front and rear.
75 - 28 lbs. front and rear.
86 - 24 lbs. front.
- 30 lbs. rear.

It is recommended that tires be checked and inflated at least once a month including the spare tire.

Tire pressure should always be checked when the tires are cold, preferabley in the morning or after standing in a cool place, and never after a high speed trip. Heat developed on fast runs or from hot pavements increases the pressures and they decrease again when the tires cool.

Tires should not be inflated to lower pressures in summer or bled to compensate for the increase in pressure due to heat. The recommended pressures are minimum pressures when the tires are cold for normal driving.

For sustained speeds above 75 miles per hour, tire pressure should be increased four pounds over specifications when checked cold.

When checking tires, the valve stem caps should be reinstalled. These caps provide an essential function in keeping dirt out of the valves, and in reducing the possibility of slow leaks.

(3) Wheel Bearing Adjustment

In adjusting the front wheel bearings, first make sure that the wheel is all the way on the spindle. Tighten the adjusting nut to 16 to 17 ft. lbs. torque to be sure all parts are properly seated and the threads are free, then back off nut and retighten to approximately 4 ft. lbs. torque. If the cotter key cannot be installed in this position, loosen the adjusting nut until it can be installed.

CAUTION: When adjusting the front wheel bearings, care should be taken not to mistake play in the knuckle pin bushings for play in the wheel bearings.

The rear wheel bearings on all series cars are of the sealed type and require no adjustment or lubrication.

(4) Wheel Runout and Eccentricity

Lateral runout of a wheel and tire together should not exceed 1/16". The lateral runout of the disc wheel, as measured on the side of the rim at the base of the tire, should not exceed 3/64".

Radial runout, or eccentricity, of the disc wheel and tire together or disc wheel alone should not exceed 3/64". Eccentricity of the wheel should be measured on the tire bead seat of the rim with the tire removed. Both lateral and radial runout of the wheel and tire may be minimized by changing the tire location on the wheel until the least amount of runout is obtained.

Runout specifications for both wire and disc wheels are the same. However, wire wheels may become distorted if subjected to abuse by sharply hitting curbs when parking or by hitting chuck holes in the road at higher rates of speed. This can distort wire wheels to such an extent that serious vibration would result.

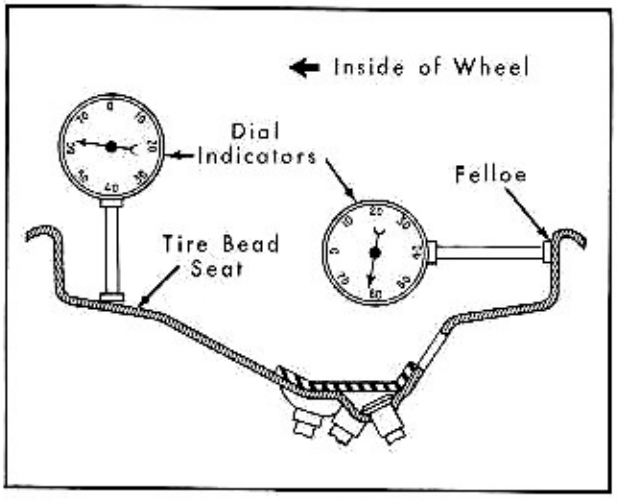


Fig. 6-2 Arrangement of Dial Indicators

Wire wheels may be checked on a fixture similar to a hub and drum mounted on a spindle. The wheel mounting face of the fixture should be exactly at right angles to the axis of rotation and the mounting studs should be equidistant from that axis.

Check runout with dial indicators placed on both bead seats and against the inside face of the outer fellow band, Fig. 6-3. Mark the outside of the rim at the point of greatest radial runout. Install tire on wheel so that point of greatest runout of the tire and wheel assembly is opposite the point of maximum runout of the wheel.

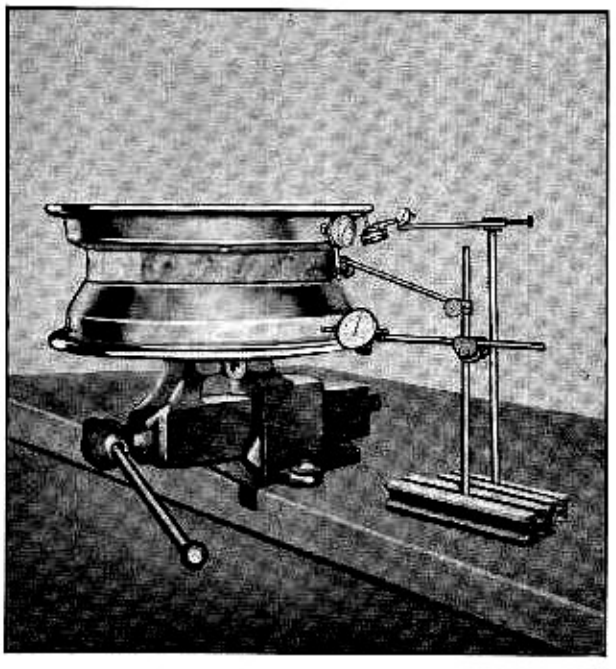


Fig. 6-3 Checking Runout

(5) Balancing Wheels and Tires

A wheel and tire assembly may lose its original balance due to irregular tread wear, tube or tire repair, or toe-in misalignment. Consequently, if front end instability develops, the tire and wheel assembly should be checked for both static and dynamic balance in addition to steering gear adjustment. The assembly should also be checked for balance whenever tires are replaced, and especially in cases where non-standard tire equipment, such as puncture proof tubes or heavier ply casings, are installed.

a. Static Balance (Stationary Balance)

This is the equal distribution of weight of the wheel and tire assembly about the axis of rotation so that the assembly has no tendency to rotate by itself. Static unbalance causes the pounding action on the front wheels that is called "tramp".

b. Correction of Static Unbalance (Special Equipment Not Available)

1. Remove wheel and hub from spindle as a unit.

2. Clean all grease from wheel bearings and races.

3. Clamp a clean spindle in a bench vise, or if spindle on car must be used, clean it carefully.

4. Mount wheel on spindle and adjust bearings loosely so that wheel is just held in position and is practically frictionless.

5. Make sure that tire is inflated to correct pressure.

6. Start wheel in motion and allow it to stop by itself. If it continually stops in the same position, the heavy side will be at the bottom and the assembly is not in static balance.

7. Mark heaviest point and also upper-most, or lightest point.

8. Install a weight at lightest point on the inside fellow band of the wheel, which will compensate for the out of balance condition.

NOTE: If only a very slight unbalance is indicated, it may be necessary to use the following procedure to obtain correct balance, installing the smallest weights available. -- Avoid "hanging-on" more weights than are necessary.

(a) Install two balancing weights on inside of rim opposite each other and 90° away from the light and heavy points.

(b) Move these weights equally toward light side until wheel is in balance.

9. Repack wheel bearing with grease, install wheel, and adjust bearing as explained in Note 3.

c. Dynamic Balance (Running Balance)

Dynamic balance requires not only that the wheel be in static balance, but also that it run smoothly at all speeds on an axis which runs through the center of the wheel spindle. Dynamic unbalance sets up forces which cause the wheel to "wobble" or "shimmy".

The quickest and best methods of testing and correcting dynamic unbalance are by use of the precision balancing equipment. Follow equipment manufacturer's instruction for correct placement of balancing weights. The best balancing is done with the least amount of weight.

(6) Checking Spring Heights

Before checking spring height, be sure that trunk is empty and that there is a full tank of gas, as all alignment specifications are based on curb weight. Normalize position of the springs by working the bumper up and down and release slowly, permitting the car to assume its normal position.

NOTE: New springs settle considerably during the first 2,000 miles and therefore the springs should not be replaced due to excessive height before this time.

a. Front Springs

Measure the distance from the top of the lower control arm to the center of the rubber bumper bracket front lower rivet on the frame, Fig. 6-4. The spring height should be equal on both sides of the car within 3/8". If heights are unequal, the low side may be adjusted by the addition of shims, available from the Factory Parts Department, between the bottom of the spring and the spring seat on the lower suspension arm.

b. Rear Springs

Measure the distance from the top of the spring "U" bolt to a hole in the frame side bar directly above the "U" bolt, Fig. 6-5. The rear spring height should be equal within 1/2" on both sides of car.

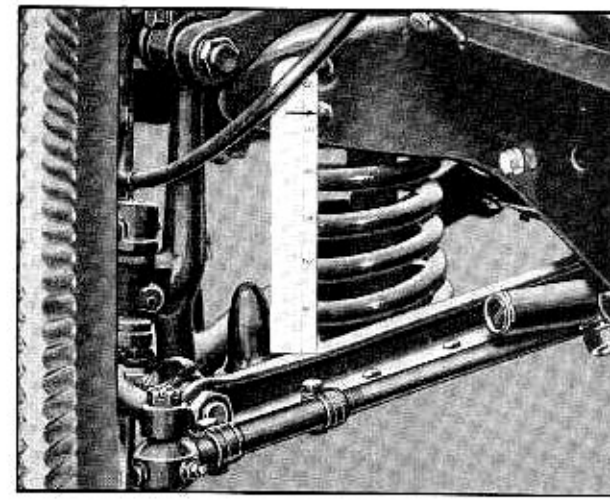


Fig. 6-4 Measuring Front Spring Height

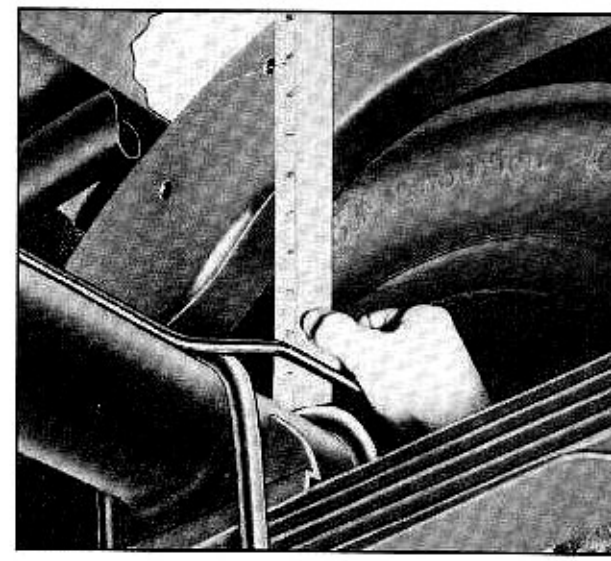


Fig. 6-5 Measuring Rear Spring Height

The spring heights should be:

Model	Weight*		Front Spring	Rear Spring
	Front	Rear	Height in Inches	Height in Inches
6019	2455	2250	4-1/2 to 5-1/4	8-3/4 to 9-1/2
6237	2390	2170	4-1/2 to 5-1/4	8-3/4 to 9-1/2
6237D	2410	2215	4-1/2 to 5-1/4	8-3/4 to 9-1/2
6267	2510	2335	4-1/2 to 5-1/4	8-3/4 to 9-1/2
6219	2390	2180	4-1/2 to 5-1/4	8-3/4 to 9-1/2
7523-33	2700	2500	5-3/8 to 6-1/8	10 to 10-3/4
86 Comm. (approx.)	2550	3040	5-1/2 to 6-1/4	9-5/8 to 10-3/8

*Car weight with full tank of gasoline, heater, radio, and wheel discs.

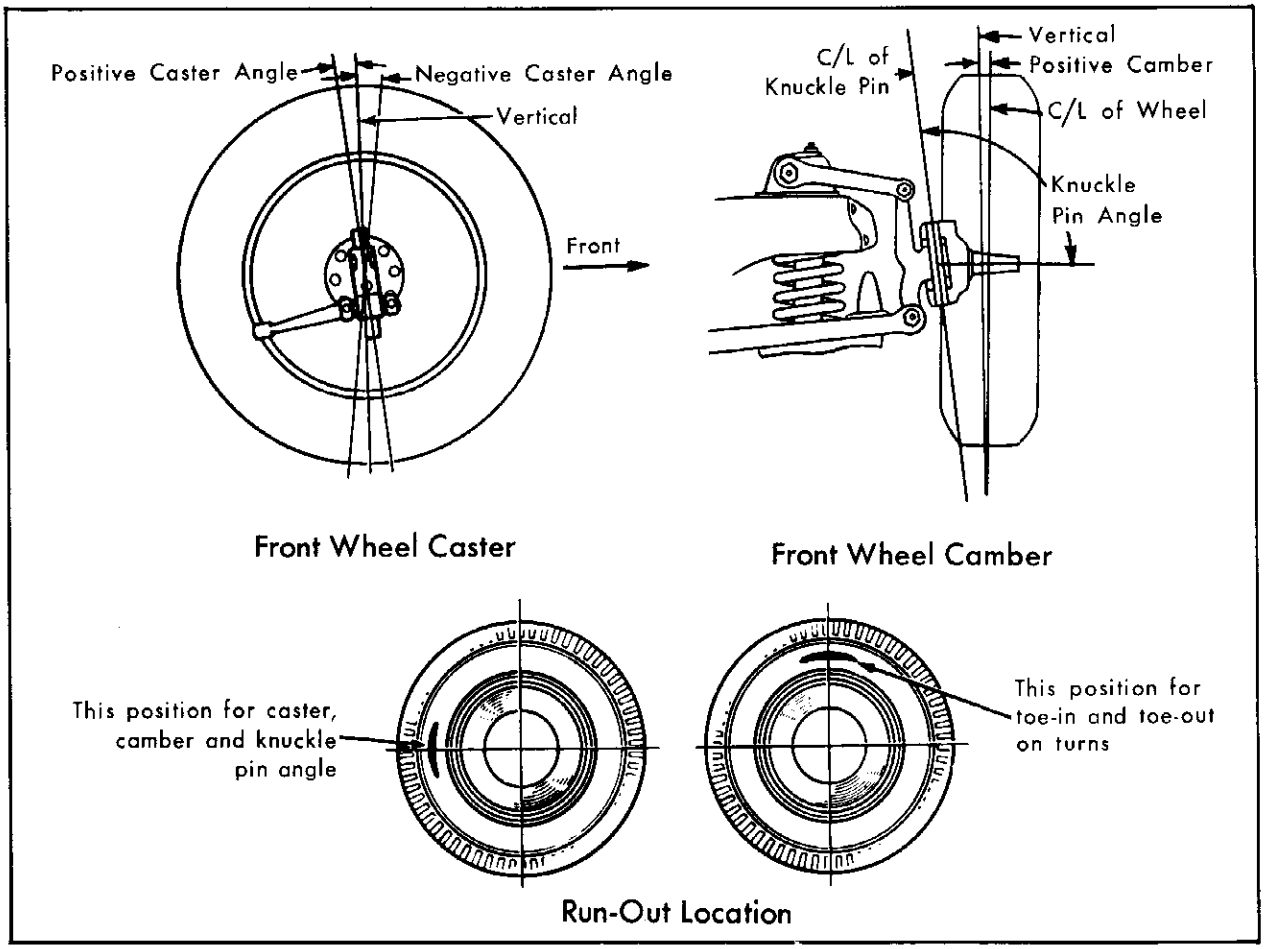


Fig. 6-6 Elements of Front Wheel Alignment

(7) Wheel Alignment Measuring Methods

All wheel alignment equipment manufacturers provide detailed instructions for checking equipment accuracy and measurement of alignment factors that should be followed exactly.

In addition to the manufacturers' instructions, be sure to observe the following general recommendations:

1. Check to see that there is no excess weight in the car.

2. Align the car on the moveable plates of the alignment machine carefully so that the wheels are in the center of the plates. In addition, the car should be square with the plates.

3. Inflate tires to proper pressure.

4. Block both rear wheels, in addition to setting the hand brake, to prevent any slight movement of the car.

5. Raise the front end and check the runout on the outer surface of the tire. Mark the spot where maximum runout occurs.

6. Place the maximum runout either to the front or rear as shown in Fig. 6-6. (This neutralizes the effect of runout on caster or camber.) Lower the wheels.

7. Normalize the position of front spring by working the bumper up and down to get normal height of front spring.

8. Caster and camber may now be checked.

9. Raise front wheels and set maximum runout at top or bottom to neutralize effect on toe-in and toe-out. Fig. 6-6.

10. Lower car, normalize springs and check toe-in.

11. If any of the measurements are beyond the recommended limits, make the necessary adjustments as outlined in Notes 8, 9, and 10.

(8) Caster Adjustment

1. Loosen clamp screw at upper end of steering knuckle support.

2. Turn eccentric bushing with Caster and Camber Adjusting Tool No. J-5343 in complete turns only until correct caster angle is obtained, Fig. 6-7. (0^{o} to -1^{o}, $-1/2^{o}$ preferred) - Adjustment readings (left and right) must be within $1/2^{o}$ or less.

If it is necessary to secure a greater range of adjustment than is provided, remove the inboard lower suspension arm mounting shaft from frame and turn shaft so that threaded ends move entire suspension arm assembly forward or rearward as required. Screwing shaft rearward moves the suspension arms forward and increases the amount of positive caster.

3. Tighten clamp screw on steering knuckle support.

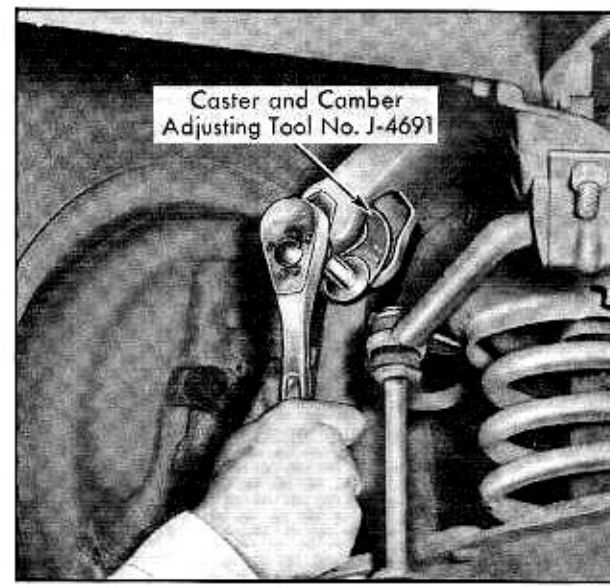


Fig. 6-7 Caster and Camber Adjustment

(9) Camber Adjustment

1. Loosen clamp screw at upper end of steering knuckle support.

2. Rotate eccentric bushing using Caster and Camber Adjusting Tool No. J-5343 to give correct camber setting at each front wheel, Fig. 6-7. The limits for this adjustment are 0^{o} to $-3/8^{o}$ (0^{o} preferred) and not to exceed $1/2^{o}$ difference from one side of car to the other with never more positive camber on the right wheel than the left.

NOTE: In order to avoid pulling to the left on high crowned roads it is recommended to set the camber so that the left wheel has $1/4^{o}$ more positive camber than the right. Do not rotate bushing more than 1/2 turn as this will give maximum camber adjustment possible at the eccentric pin; any additional turning will affect the caster adjustment.

If correct camber adjustment cannot be obtained, the angle of the steering knuckle pin should be checked. This should be 95^{o} 51'. An incorrect angle indicates damaged suspension arms or a bent steering knuckle support. Any damaged parts should be replaced.

3. After adjustment has been made, tighten clamp screw and recheck.

NOTE: It is adviseable after making a camber adjustment to change the tires, putting the front ones on corresponding rear wheels and rear tires on opposite front wheels to provide a normal tire contact.

(10) Toe-In Adjustment

The setting or adjustment of the front wheels where the distance between them is less at the front than at the rear is called "toe-in". The purpose of toe-in is to counteract the forces that tend to make the front wheels toe out while traveling forward.

Toe-in should be measured at the wheel rim with equipment that is used while the car is at rest. The correct setting should be between 3/16 and 1/4 inch toe-in.

When checking toe-in, the readings should be taken only when the front wheels are in a straight ahead position and with steering gear on its high spot. Maximum tire runout should be in a vertical plane, as shown in Fig. 6-6.

Toe-in adjustment is made by turning the tie rod adjusters at the outer ends of each tie rod after loosening clamp screws. Turning the adjusters in the direction the wheels revolve when the car moves forward, decreases toe-in. Be sure to turn both adjusters an equal amount when adjusting toe-in so that the relation of steering gear high spot to the straight ahead position of the front wheels will not be changed.

When adjustment has been completed according to recommended specifications, tighten all clamp screws.

NOTE: Be sure open side of clamp is over open side of adjuster before tightening clamp.

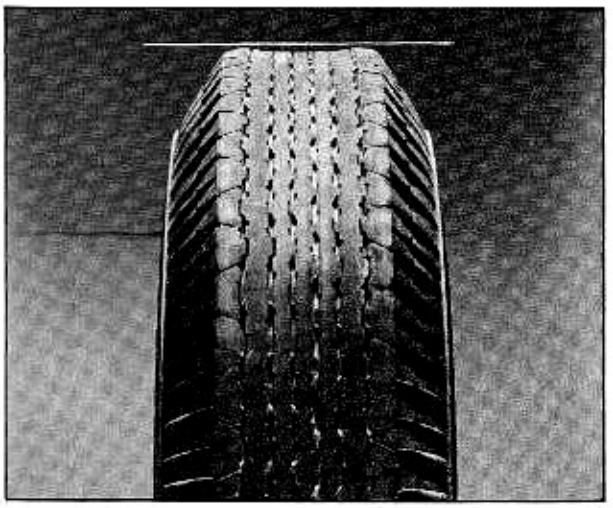


Fig. 6-8 Underinflation Wear

(11) Excessive Tire Wear—Causes and Corrections

a. Improper Tire Inflation

When tires do not carry the proper pressures as specified in Note 2, certain sections of the tread surface will be worn away more rapidly than others. Two kinds of uneven tire wear will result.

Underinflation causes the center section to scuff and wear away more rapidly than the side sections, due to lighter contact of this center section with the road, Fig. 6-8. In addition, soft, underinflated tires suffer from continual flexing, causing high internal temperatures and cracking of the sidewalls.

Overinflation causes the center section of the tires surface to receive too much driving and braking strain and the center tread is worn more than the outer tread and shoulders, Fig. 6-9. An overinflated, rigid, tire is more liable to get breaks in the fabric from severe impacts and is more easily cut or punctured.

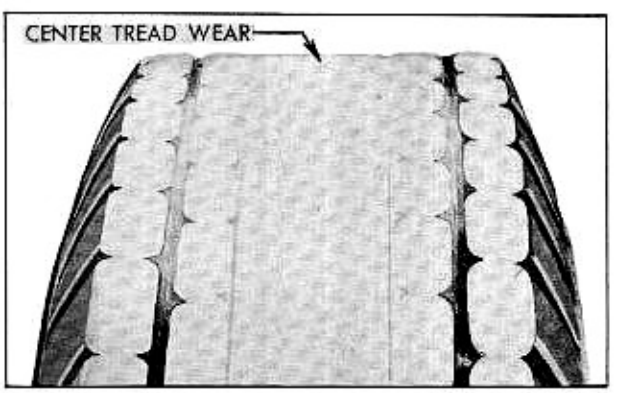


Fig. 6-9 Overinflation Wear

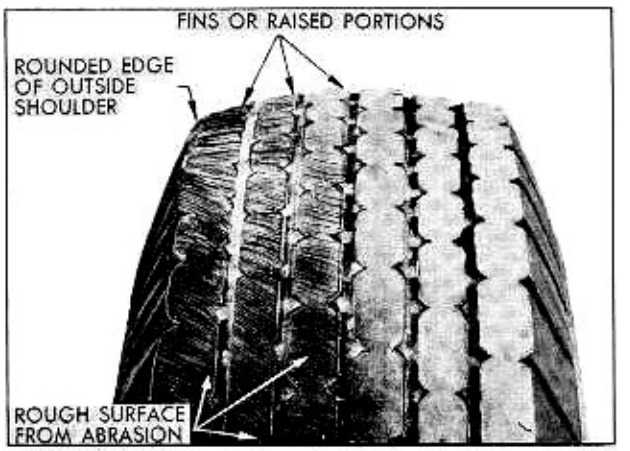


Fig. 6-10 Cornering Wear

b. Wear Caused by Owner Driving Habits

Modern engineering improvements, resulting in greater car handling ease, high engine torque and more efficient brakes permit owners to accelerate faster, drive around curves at higher speeds, and stop quicker than they could with older cars. Owners driving habits may cause cornering wear, rear tire inside wear, and front tire heel and toe wear even though all wheel alignment factors are within specifications and tires are properly inflated.

Cornering Wear, caused by high speeds on turns, is identified by the rounded outside shoulder of the tire and small rough abrasions and fins raised by "cornering" friction against the road, Fig. 6-10.

Rear Tire Inside Wear is caused by rapid acceleration, where the axle bends slightly in a horizontal plane to toe-in the rear tires. This results in excessive wear on the inner shoulder of the rear tires, Fig. 6-11.

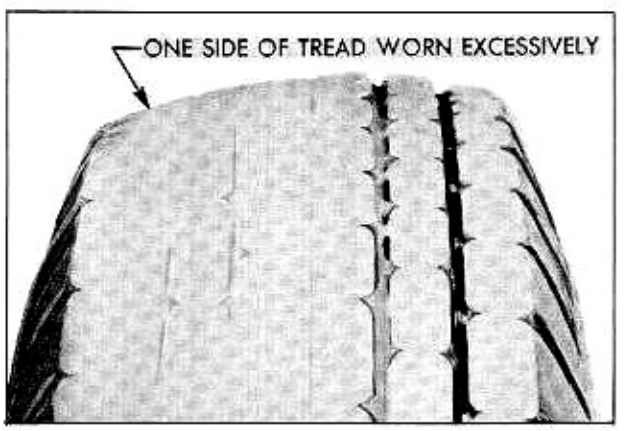


Fig. 6-11 Rear Tire Inside Wear

CHASSIS SUSPENSION

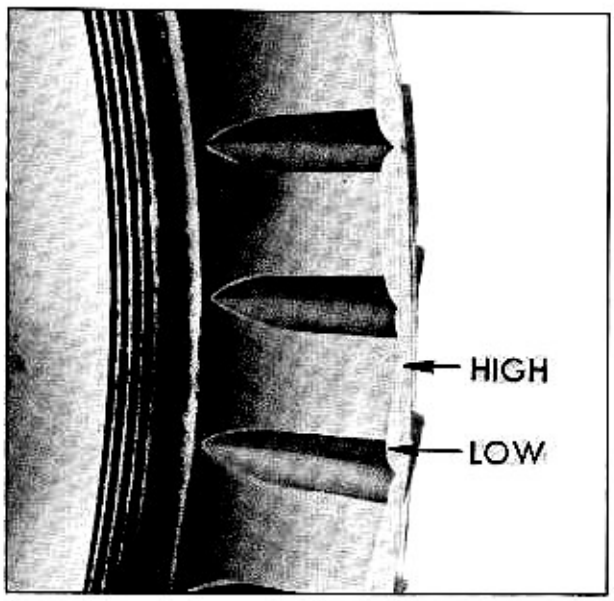


Fig. 6-12 Front Tire Heel and Toe Wear

Front Tire Heel and Toe Wear is caused by excessive high speed driving and braking. This is evident in the uneven wear of individual tread blocks, with the wear at the end of the block which first grips the road, Fig. 6-12.

If the above types of wear are noticed, they should be brought to the owners attention and tire crisscrossing recommended to compensate for the uneven wear - in addition to more considerate car handling by owner.

c. Front End Looseness or Camber Adjustment

A certain amount of "cupping", due to the independent front wheel suspension design, is normal

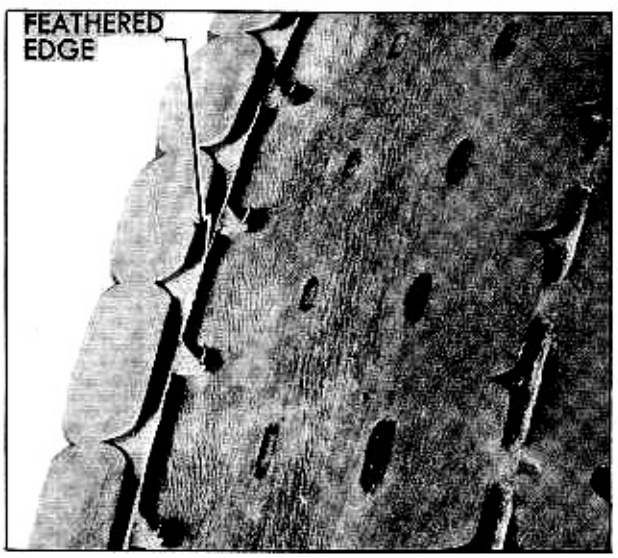


Fig. 6-13 Toe In or Toe Out Wear

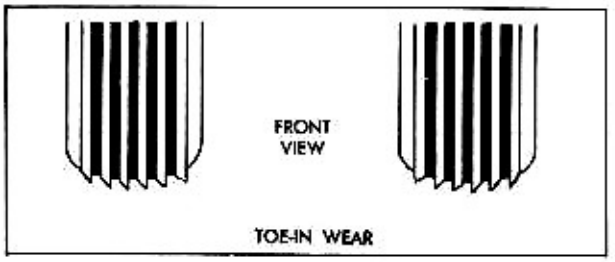


Fig. 6-14 Toe In Wear

and will wear the tires unevenly if they are not rotated regularly. If extreme cupping is noticed, the front end bushings should be checked for looseness, the drag link height should be checked according to specifications, and the wheels, tires, or brake drums checked for out of balance, and the camber adjustment should also be checked.

d. Toe-in and Toe-out Adjustment

Excessive toe-in or toe-out has the effect of dragging the tires sideways down the road, scraping the tread and feathering ribbed sections, Fig. 6-13.

Improper toe-in is indicated by feather edges on the inside of tire ribs, Fig. 6-14. Toe-out is indicated by feather edges on the outside of tire ribs, Fig. 6-15. Toe-in should be 3/16" to 1/4". This is an adjustment that should be checked before the new car is delivered to the owner.

e. High Temperature, Heavy Loads, Types of Roads

These are factors which contribute to excessive tire wear. When a car is driven in high temperature areas or under abnormal load conditions, premature failure or rapid wear may result. Since these factors generally produce even rather than uneven wear, the evidence of excessive wear may not be noticed for some time.

Continual driving over poor roads will produce abnormal tire wear. Numerous turns and grades will cause a certain amount of cornering and rapid, even wear, although traveled at reasonably normal speeds.

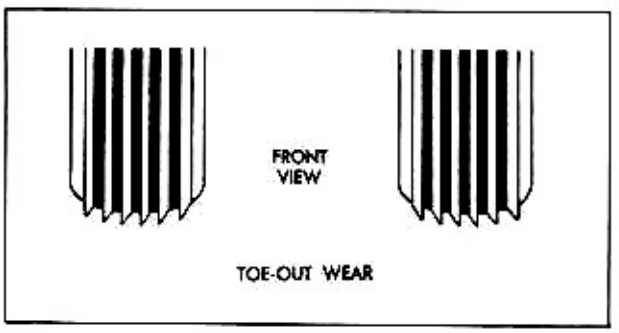


Fig. 6-15 Toe Out Wear

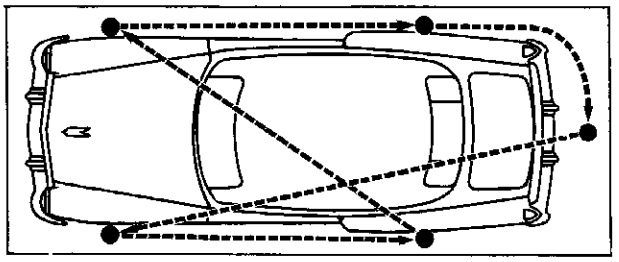


Fig. 6-16 Tire Switching Diagram

In all cases of tire wear, it is very important to know the owners driving habits, the type of roads usually travelled, and the average load in the car, to make an accurate diagnosis of tire trouble. Recommend tire rotation as required. In some cases it may be necessary to rotate the tires more frequently than 4,000 miles, especially in cases of heel and toe wear on the front tires, caused by high speed driving and severe braking.

(12) Interchanging Tires

Normal tire wear is uneven between the front and rear wheels because of the difference in the functions of the front and rear wheels. To minimize tire wear and noise, it is recommended that tires be interchanged at least every 4,000 miles, Fig. 6-16. In addition, utilizing the spare tire in rotation with the other four tires gives 20% more total car mileage before replacement tires are needed. The tires should be rotated as follows:

1. Place spare tire and wheel at the left front.

2. Move left front to the left rear.

3. The left rear to the right front.

4. The right front to right rear.

5. The right rear wheel and tire should be used as a spare.

(13) Testing for Tire Noise

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

To determine whether tires are causing the noise, drive car at various speeds and note the effect of part throttle, sudden acceleration, and deceleration on noise level. Axle and exhaust noise show definite variations under these conditions, while tire noise will remain constant. Tire noise is, however, more pronounced at speeds of approximately twenty to thirty miles per hour.

The tire noise may be further checked by driving the car over smooth pavements or dirt roads (not gravel) with the tires at normal pressure and again over the same stretch of road when the tires have been inflated to fifty pounds pressure. If the noise for which the test is being made is caused by tires, it will noticeably decrease when the tire pressure is increased, whereas rear axle noise should show no change in volume.

Thump is a noise that cannot be corrected by balancing or realignment of wheels and tires. It is a "beat" started by the tire on the road, transmitted and amplified by certain components of the car body, not to be confused with out of balance, radial or lateral run-out.

Thump is an audible reproduction of the tire moving over the irregularities of the road or the irregularities of the tire moving over the road. It is a periodic vibration, perceptible with varying intensity inside the car.

(14) Riding Complaints

In cases of complaints of hard riding, the correct tire pressure and the correct shock absorber action are the first items to investigate. If these are correct, the amount of friction in the front wheel suspension system and in the rear springs should be investigated.

The procedure for checking excessive friction in the front wheel suspension system is as follows: After lubricating the suspension system, first lift up on the front bumper, lifting the car as high as possible. Then slowly release the bumper and let the car assume normal position. Measure the height of the center of the bumper from the floor.

Next, push down on the bumper, pressing the car down as far as possible. Then release slowly, permit the car to assume its normal position and again measure the height of the bumper.

If the difference between these two measurements is 7/8" or more, it indicates excessive friction in the suspension system. Corrective measures include realigning the upper and lower control arms on their inner mounting shafts to permit adjustment of caster without excessive binding on the eccentric pins.

Occasional bottoming of the rear springs under conditions of heavy loads or high speeds over rough roads is entirely normal. Owners should be informed that springs heavy enough to prevent bottoming under all conditions would provide a very hard, uncomfortable ride.

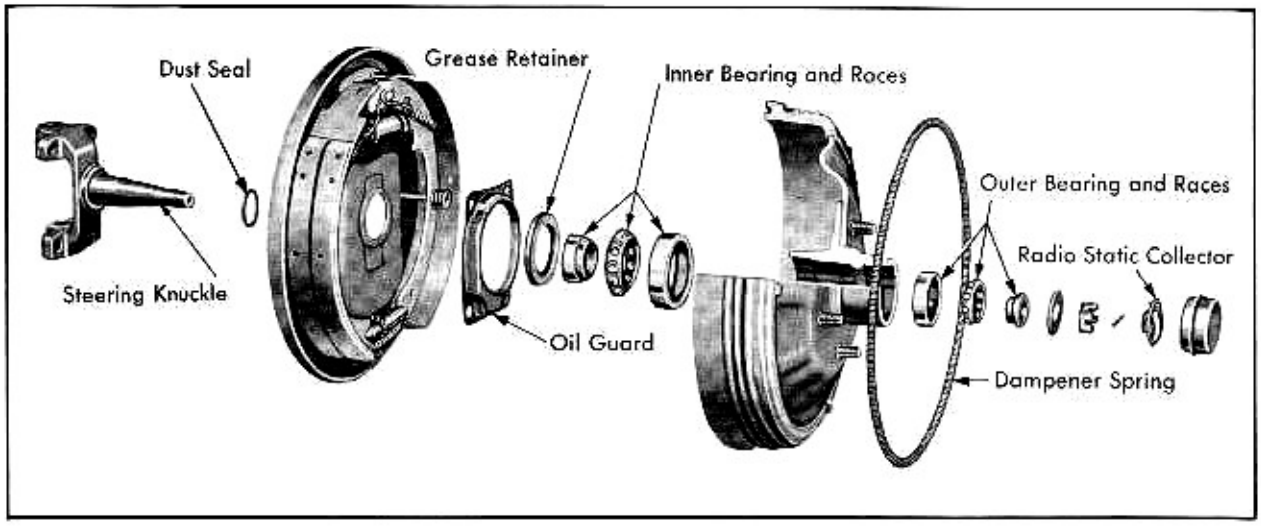


Fig. 6-17 Front Wheel - Disassembled

(15) Removal and Installation of Wheel Shields

The wheel shields in the rear fenders on all 1954 series cars are removed by turning the lower end of the locking rod (located on the lower edge of the center of the wheel shield) one quarter turn outward. Tap the protruding end of the locking rod down about one inch to release the top of the wheel shield from the fender. Move top of shield away from the fender and disengage hooks from retainers at fender.

To install the shield, engage the hooks at the lower ends of the shield into the fender retainers. Lift top edge of shield into position against fender and tap locking rod up to engage with lock at top of fender opening. Turn locking rod one quarter turn inward until it is even with wheel shield.

(16) Removal and Installation of Front Wheel, Hub and Bearings

a. Removal

1. Remove wheel disc.

2. Jack up car.

3. Remove dust cap and take out radio static collector. Fig. 6-17.

4. Remove cotter pin, wheel nut, washer, outer bearing cone and bearing retainer with balls.

5. Remove wheel from spindle.

6. Remove inner bearing packing, cone, and bearing retainer with balls.

7. The outer bearing cups are a press fit in the hub and may be removed by driving out from opposite side with a long punch.

b. Installation

1. Clean bearing and races thoroughly, replacing the complete bearing assembly if any parts are worn, pitted, or rough.

2. Pack bearing cages with G-12 wheel bearing lubricant. Cover cages well but avoid an excess of lubricant.

3. Install parts in the reverse order of disassembly and adjust wheel bearing as outlined in Note 3.

(17) Cleaning White Sidewall Tires

All white sidewall tires on 1954 series cars have a colored protective coating which should be removed from the tires before delivery of the car. In no case should the tires be driven more than 50 miles before this coating is removed.

To remove this coating, wet the tire surface thoroughly with warm water and allow it to soak for one minute, then wash, using a stiff brush or sponge with a stream of water playing on the tire surface.

New white sidewall tires with the protective coating, should be stored with care. Do not place a tire with a white sidewall against a tire with black sidewalls, as the protective coating may induce bleeding of the color by chemical reaction and permanently discolor the white tire.

A great deal of ordinary road dirt which collects on white sidewall tires may be sponged off with clear water or a mild soap solution. Under no circumstances should gasoline, kerosene, or any cleaning fluid containing a solvent derived from oil be used to clean white sidewall tires. Mineral oil in any form is detrimental to rubber, and a cleaner with an oil base will discolor or injure white sidewall tires.

(18) Removal and Installation of Front Shock Absorber

a. Removal

1. Raise hood and remove shock absorber upper retaining nut, retainer, and rubber grommet.

NOTE: The shock absorber upper stem is square at the top so that it may be held by a wrench to prevent the stem from turning when removing nut.

2. Remove two nuts holding lower shock absorber retaining bracket to spring seat.

3. Remove shock absorber and lower bracket from spring assembly, Fig. 6-18.

4. Remove lower bracket, rubber bushings, spacer, bolt, lock washer, and nut.

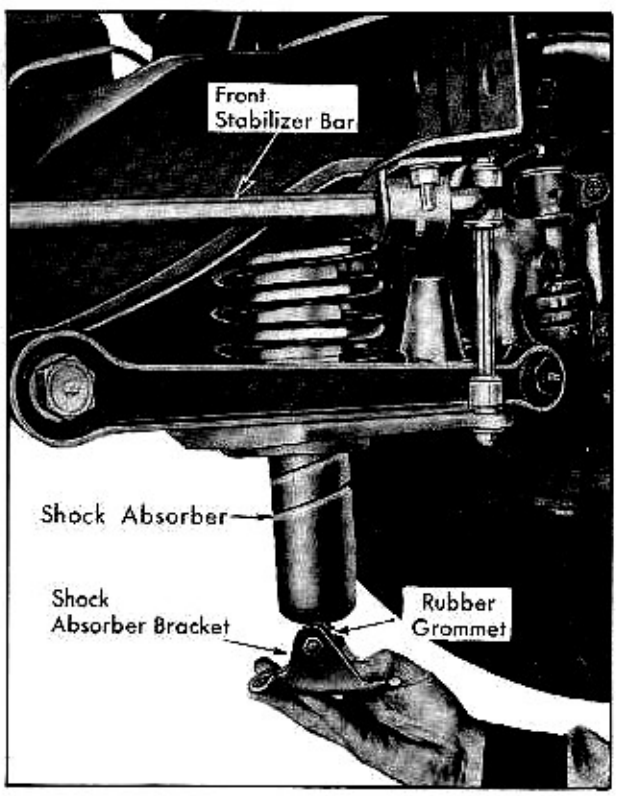


Fig. 6-18 Front Shock Absorber Removal

b. Installation

1. Install bracket, rubber bushings, spacer, bolt, lock washer, and nut on shock absorber.

2. Install retainer and rubber grommet on upper shock absorber stem.

3. Install shock absorber assembly up into coil spring and guide stem through tower in cross member then place lower support over mounting studs in lower spring seat.

4. Install lock washers and nuts to hold support in place.

5. Install grommet, retainer, and nut on upper shock absorber stem and tighten nut, holding stem from turning with wrench.

(19) Removal and Installation of Front Stabilizer

a. Removal

1. Remove nut, retainer, and bushing from bottom of each link, Fig. 6-19.

2. Remove bolts from brackets that hold stabilizer bar to frame and remove stabilizer.

3. The rubber bushings in which stabilizer bar is supported are serviced separately and can be removed at this time.

b. Installation

The installation procedure is the reverse of removal. When assembling link, use Fig. 6-19 as a

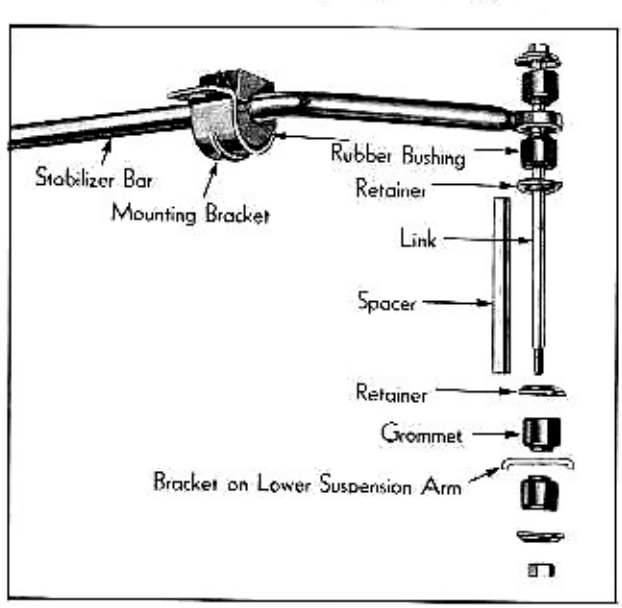


Fig. 6-19 Front Stabilizer Linkage

guide, making sure to arrange the steel retainers and rubber bushings exactly as shown.

(20) Removal and Installation of Steering Knuckle

a. Removal

1. Lift front end of car from floor with jack.

2. Remove front wheel, hub and brake drum assembly, and wheel bearings.

3. Remove brake dust shield mounting screws and remove dust shield, with brake shoe assembly attached, from knuckle and support assembly. Do not damage hydraulic line which will not have to be removed from dust shield in this operation.

4. Drive lock pin from steering knuckle support.

5. Remove dust caps at upper or lower knuckle pin holes, tap out steering knuckle pin, and remove steering knuckle and thrust bearing from steering knuckle support, Fig. 6-1.

6. If knuckle pin bushings are to be replaced, slot the bushings lengthwise with a hacksaw and drive them out with a chisel.

b. Installation

1. Press new bronze bushings (if required) into steering knuckle, making certain that the oil hole in each bushing lines up with the oil hole in the knuckle and that the short groove leads from the oil hole to the outer ends of the knuckle in each instance as shown in Fig. 6-20.

2. Assemble steering knuckle to support with thrust bearing in position between support and lower face of steering knuckle, Fig. 6-1.

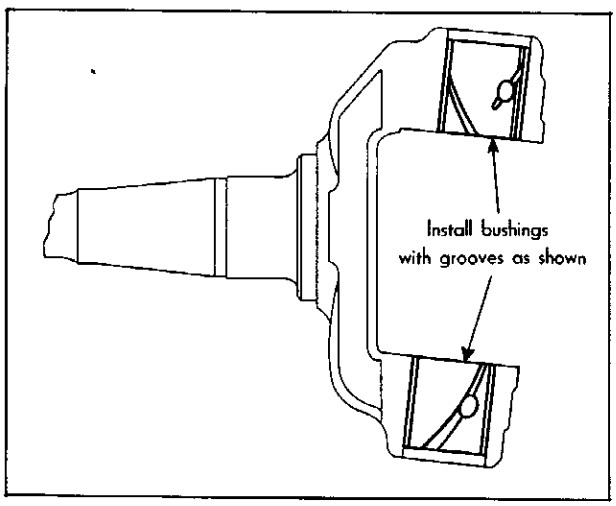


Fig. 6-20 Knuckle Pin Bushing Installation

3. Install knuckle pin through bushings, steering knuckle, and thrust bearing.

4. Drive lock pin in from front of support.

5. Install new dust caps and lubricate both fittings thoroughly.

6. Complete assembly by reversing disassembly procedure.

(21) Removal and Installation of Steering Knuckle Support

a. Removal

1. Raise car, drive lock pin out of steering knuckle support, remove dust caps from top and bottom of steering knuckle, and drive out knuckle pin.

2. Place jack under lower suspension arm to support coil spring while disconnecting knuckle support.

3. Remove nut from rear end of upper pivot pin.

4. Remove threaded pivot pin and rubber dust seals.

5. Remove nut from rear of lower pivot pin.

6. Remove lower pivot pin and rubber dust seals.

7. Place support in vise and loosen clamp screw at upper end of knuckle support and remove upper and lower bushings from support.

b. Installation

1. Install eccentric bushing in knuckle support so that it is centralized and tighten clamp screw lightly.

2. Install bushing in lower end of knuckle support, tightening bushing firmly so that there is no clearance between bushing shoulder and knuckle support.

3. Install lower end of knuckle support, with bushing, between outer ends of lower suspension arm and install rubber dust seals between suspension arm and support.

4. Install threaded pivot pin, holding support so that space between support and arms is equal on both sides.

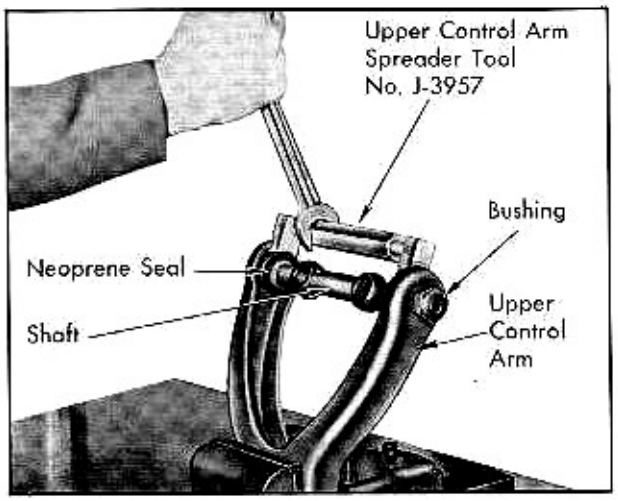


Fig. 6-21 Spreading Upper Control Arm

5. Install upper end of support in position between ends of upper suspension arms and install rubber seals.

6. Install upper pivot pin and nut with upper end of support centralized between ends of upper suspension arms.

7. Position steering knuckle on support and install knuckle pin and dust caps.

8. Check caster, camber, and toe-in.

(22) Removal and Installation of Upper Suspension Arm

a. Removal

1. Jack up car at front frame cross member and also place a jack under the lower suspension arm, on side on which upper arm is to be removed, to support spring.

2. Remove upper steering knuckle support pivot pin and nut.

3. Remove upper suspension arm inner shaft mounting bolts and cross member.

4. Remove arm and shaft assembly from the car as a unit.

5. Place mounting shaft in a vise and remove bushings from arm and shaft and remove shaft from assembly.

b. Installation

1. Install new seals on mounting shaft and lubricate threads of shaft.

2. Install shaft in position in suspension arm and install bushing into arm and onto one end of shaft.

3. Tighten bushing to 140-150 ft. lbs. torque.

4. Install Upper Control Arm Spreader, Tool No. J-3957, between arms as shown in Fig. 6-21 and tighten finger tight. Then, using a wrench, tighten tool two additional flats.

5. Install bushing in arm and onto shaft, tightening to 140-150 ft. lbs. torque.

6. Remove tool from arms and center shaft between arms by turning shaft in bushings.

7. Install lubrication fittings in bushings.

8. Install upper suspension arm assembly in position on cross member and install mounting bolts through shaft into cross member, tightening to 150-160 ft. lbs. torque.

9. Position knuckle support in fork of upper suspension arm and install rubber seals on both sides of support.

10. Install upper pivot pin while holding knuckle support so that space between arm and support is equal on both sides.

11. Tighten pivot pin nut to 70-90 ft. lbs. torque.

12. Remove jacks and check caster and camber.

NOTE: When replacing either upper or lower inner suspension arm bushings it is necessary to remove the arms from the cross member. Outer arm bushings may be replaced by disconnecting knuckle support from arm.

(23) Removal and Installation of Lower Suspension Arm and Front Spring

a. Removal

1. Jack up car at center of front cross member and also place a jack under suspension arm which is to be removed, to support spring.

2. Disconnect front stabilizer link on side from which spring is to be removed.

3. Remove shock absorber. Note 18a.

4. Remove lower pivot pin and nut from steering knuckle support.

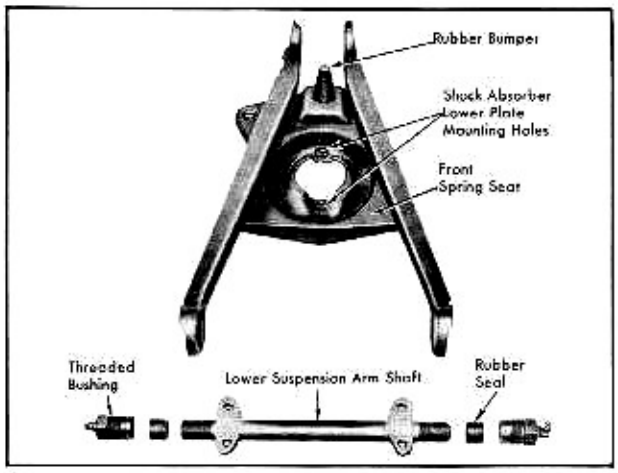


Fig. 6-22 Lower Suspension Arm - Disassembled

5. Lower jack under suspension arm to remove spring and upper and lower rubber insulators.

6. Remove four mounting shaft support bolts at frame cross member and remove arm and shaft.

7. Place assembly on bench and remove threaded bushings, rubber seals, and shaft from arm, Fig. 6-22.

b. Installation

1. Assemble mounting shaft in lower suspension arm, center shaft between ends of arm, install rubber seals, and threaded bushings. Tighten bushings to 195-205 ft. lbs. torque.

2. Bolt mounting shaft to frame cross member, tightening bolts to 60-70 ft. lbs. torque.

3. Install lower rubber insulator in spring seat in lower suspension arm, with molded projections on insulator inserted in holes in spring seat and hole in insulator lined up with hole in seat.

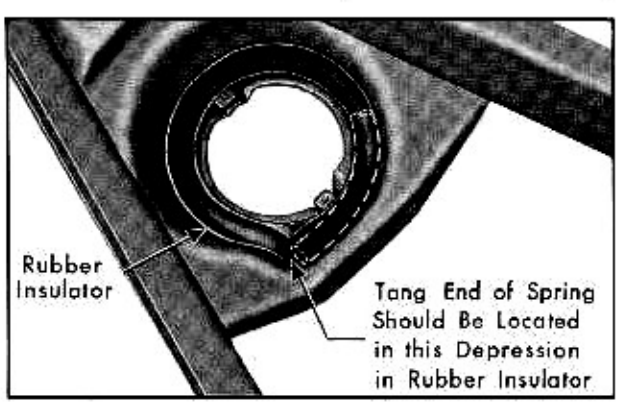


Fig. 6-23 Spring Location in Lower Seat

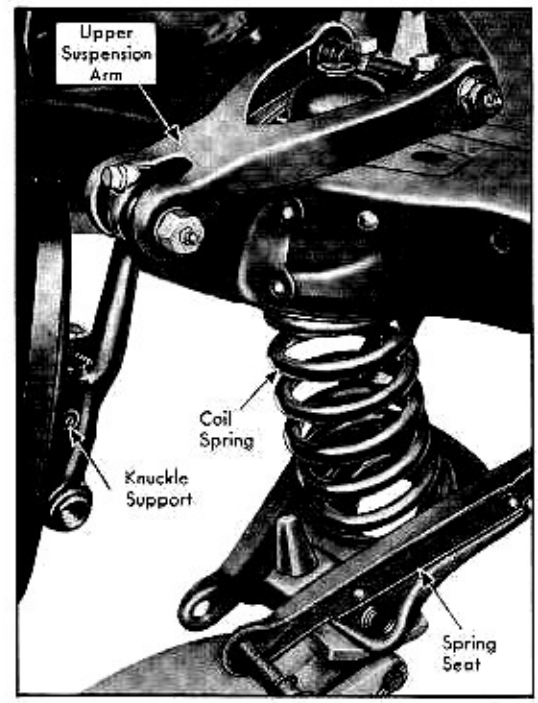


Fig. 6-24 Install Front Spring

4. Tape upper rubber insulator to top (flat end) of spring and install spring in upper seat in cross-member. Rotate spring so that lower tanged end will fit in formed depression, Fig. 6-23, in insulator when lower suspension arm is raised into position.

5. Place jack under lower suspension arm and raise arm into position. Guide spring into position on insulator with tanged end in formed depression. Fig. 6-24.

6. Install rubber seals between support and arms, and install pivot pin and nut, while holding support midway between the outer arms.

7. Connect stabilizer link to lower spring seat.

8. Install shock absorber, Note 18b.

9. Remove jacks and check caster, camber, and toe-in.

(24) Straightening Bent Parts

The straightening of bent parts in the front wheel suspension system should be attempted only within the following limits:

Parts should not be straightened if they are sprung out of alignment more than five degrees. Excessive bending of parts when cold may result in stresses or cracks invisible to the naked eye,

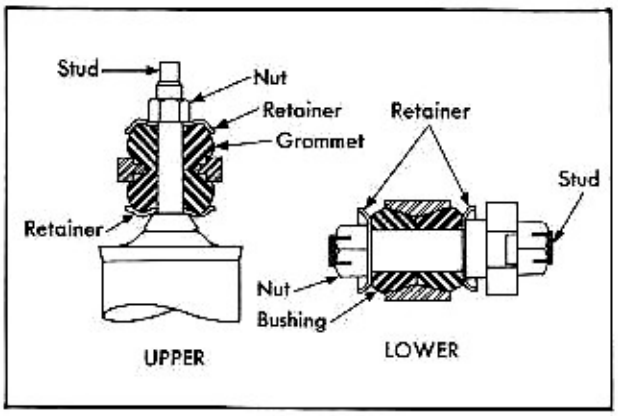


Fig. 6-25 Rear Shock Absorber Bushing Installation

which render the part unsafe for use. Straightening with heat will destroy the effect of previous heat treatment, leaving the steel seriously weakened.

Welding of parts subjected to high stresses should never be permitted because the welding process will change the grain structure of the metal, rendering it unsafe.

(25) Removal and Installation of Rear Shock Absorbers

1. Remove shock absorber upper retaining nut, retainer and rubber grommet.

NOTE: The shock absorber upper stem is square at the top so that it may be held by a wrench to prevent the stem from turning when removing the retaining nut.

2. Remove nut from shock absorber mounting stud on spring "U" bolt plate and remove bushing retainer and outer rubber bushing.

3. Remove shock absorber from stud and guide stem out of upper mounting bracket.

4. To install, reverse the above procedure, being sure the cupped shaped retainers are installed with the convex side next to the bushing, Fig. 6-25, and nuts are tightened to insure proper compression of the rubber bushings.

Shock absorbers are serviced as an assembly. If noisy or leaking, replace the unit.

(26) Removal and Installation of Rear Wheel and Brake Drum

a. Removal

1. Jack up car, remove wheel shield and wheel disc.

2. Remove road wheel.

3. Remove screws holding brake drum to axle shaft flange. Fig. 6-26.

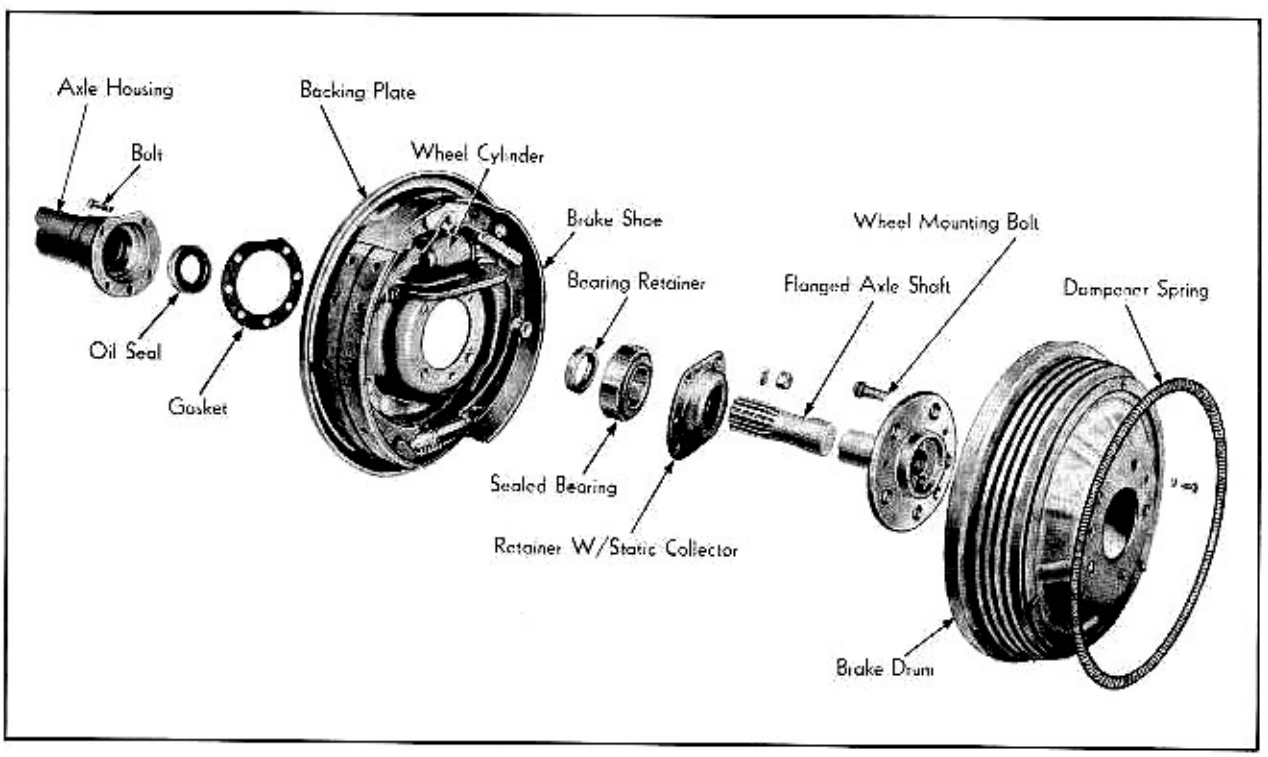


Fig. 6-26 Rear Wheel - Disassembled

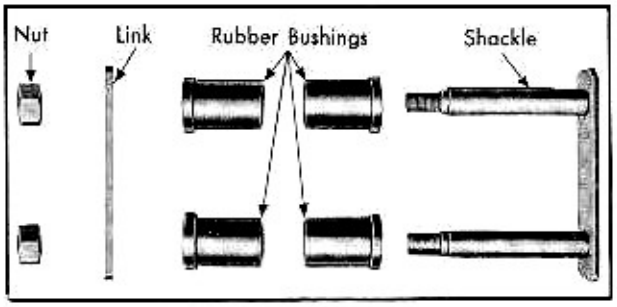


Fig. 6-27 Rear Spring Shackle Disassembled

4. Remove drum.

b. Installation

Installation is the reverse of the removal operation.

(27) Servicing Rear Spring Liners

Replacement rear spring liner tips are available for installation between the spring leaves when original liners wear at the outer ends.

To install these replacement liner tips, it is necessary to use a hardwood wedge 2-1/2" wide, 5" long, and tapered from 1/8" to 3/4" thick in 2" of length. Proceed as follows:

1. Remove spring rebound clips.

2. Raise rear of car until springs are in full rebound position.

3. Mark off length of replacement liner tip on main spring leaf, allowing 1/2" projection beyond second leaf.

4. After placing a piece of sheet metal between liner and spring leaf to protect leaf, pry first and second leaves apart and insert wedge under liner just beyond the point where the old liner is to be cut off.

5. Cut off worn end of original liner with a hacksaw blade. Grinding off a 4-inch section of the back of the saw blade to 1/4" width will permit sawing liner without spreading spring leaves too far apart.

6. Install new liner tip with button end toward axle and work out wedge, keeping liner tip in position.

7. Repeat above operation at each end of the two upper liners in each rear spring.

(28) Removal and Installation of Rear Spring

a. Removal

1. Jack up car so that weight of body is entirely off the spring.

2. Remove spring front shackle bolt nut through hole in frame side bar and drive out shackle bolt.

3. Disconnect shock absorber from lower mounting stud located on spring "U" bolt plate.

4. Remove rear spring shackle nuts and link, Fig. 6-27.

5. Remove spring U-bolt nuts, washers, lower spring plate, lower insulator retainer and insulator pad.

6. Remove spring from rear shackle by removing shackle from frame on left side of car, or driving spring off shackle on right side of car.

b. Installation

1. Install new bushings in spring eyes at front and rear.

2. Install spring on rear lower shackle bolt.

3. Line up front spring eye in bracket on frame and install bolt from inner side of frame and install nut, but do not tighten until car is lowered.

4. Install rear shackle link and shackle nuts.

5. Install insulator pad and retainer on top of spring with hole in pad and retainer over spring center bolt.

6. Position center of spring under rear axle housing bracket with spring center bolt located in hole provided in bracket.

7. Install insulator pad, retainer, and rear spring U-bolt pad on under side of spring over center bolt and install U-bolt nuts and lock washers.

8. Connect rear shock absorber at spring pad stud.

9. Lower car and check torque of front spring eye bolt and rear shackle spring U-bolt nuts which should be 45-52 ft. lbs.

CHASSIS SUSPENSION

DIAGNOSIS CHART

EFFECT	CAUSE	REMEDY
Hard Steering (Indicated by tightness in steering system).	Low or uneven tire pressure.	Inflate tires to proper pressure.
	Steering gear or connections adjusted too tight.	Test steering system for binding with front wheels off floor. Adjust as necessary and lubricate.
	Insufficient or incorrect lubricant used.	Check lubricant in steering gear and lubricate steering system as required.
		Lubricate front suspension.
	Excessive caster or toe-in.	Check caster and toe-in.
	Suspension arms bent or twisted	Check wheel camber, king pin inclination, and caster. Replace bent arms with new ones.
	Front springs sagged.	Check spring height. Sagged springs should be replaced with new ones. See Note 6.
	King pin bushings scored.	Replace with new bushings.
	Steering knuckle bent.	Replace with new knuckle.
	Thrust bearing scored or worn.	Replace with new bearing.
	Frame bent or broken.	Check frame for proper alignment or breakage. Repair or replace frame as necessary.
Excessive Play or Looseness in Steering System	Steering gear connections adjusted too loose or worn.	Adjust or install new parts as necessary.
	Steering knuckle bearings worn.	Install new bearings.
	Front wheel bearings incorrectly adjusted or worn.	Adjust bearings or replace with new parts as necessary.
Car pulls to one side.	Uneven tire pressure.	Inflate tires to proper pressure.
	Uneven tire wear.	Interchange tires.
	Uneven camber.	Check and adjust camber as necessary.
	Uneven caster.	Check caster and adjust as necessary.
	Rear wheels not tracking with front wheels.	Check alignment of rear wheels with front wheels.
	Shock absorbers inoperative.	Check shock absorbers.

DIAGNOSIS CHART (Continued)

EFFECT	CAUSE	REMEDY
Car Pulls to one side (Cont.)	Wheel bearings adjusted too tight.	Check for binding with front wheels off floor. Adjust bearings and lubricate.
	Front springs sagged.	Check spring height and replace if necessary.
	Rear axle shifted. (Spring U-bolts loose or center bolt sheared).	Check U-bolts for looseness. Also measure from rear spring shackle bolt to axle housing. This distance should be equal on both sides of a car.
	Steering knuckle bent.	Replace with new knuckle.
	Steering knuckle arm bent.	Replace with new arm.
	Frame bent or broken.	Check frame for proper alignment or breakage. Repair or replace as necessary.
Scuffed Tires.	Excessive speed on turns.	Caution driver.
	Tires improperly inflated	Inflate tires to proper pressure.
	Wheels or tires out of true.	Check for wheel and tire wobble. See that wheels and tires are properly mounted.
	Toe-in incorrect	Adjust toe-in to specifications.
	Suspension arm bent or twisted.	Check wheel alignment.
	Steering knuckle bent.	Replace with new knuckle.
Cupped Tires.	Normal cupping of tires.	Explain to owner that such cupping is due to normal action.
	Tires improperly inflated.	Inflate tires to proper pressure.
	Wheels, tires, or brake drums out of balance.	Balance wheels and tires.
	Incorrect drag link height.	Correct according to specifications.
	Worn steering knuckle bearings or wheel bearings incorrectly adjusted or worn.	Adjust or replace parts as necessary.
Front Wheel Shimmy	Wheels, tires, or brake drums out of balance.	Balance wheels and tires.
	Wheels or tires eccentric.	Check for tire and wheel wobble or eccentricity. See that wheels and tires are properly mounted.
	Steering gear or steering connections incorrectly adjusted or worn.	Adjust or install new parts if necessary.
	Front wheel bearings incorrectly adjusted or worn.	Adjust or replace if necessary.
	Shock absorbers inoperative.	Check and replace if necessary.

CHASSIS SUSPENSION

DIAGNOSIS CHART (Continued)

EFFECT	CAUSE	REMEDY
Front Wheel Shimmy (Cont.)	Steering knuckle bearings worn.	Install new bearings.
Car Wanders	Steering gear or connections adjusted too loose or worn.	Adjust or install new parts as necessary.
	Drag link height incorrect	Check and adjust to specifications.
	Steering knuckle bearings worn.	Install new bearings.
	Toe-in or caster incorrectly adjusted.	Adjust toe-in and caster.
	Excess friction in front suspension.	Lubricate.
	Front spring height incorrect.	Check spring height and adjust or replace as necessary.
	Rear axle shifted. (Spring U-bolts loose or center bolt sheared off).	Check spring U-bolts for looseness. Also measure from rear spring shackle bolt to housing. This distance should be equal on both sides of car.
Road Shocks	High tire pressure.	Deflate tires to proper pressure.
	Steering gear or connections incorrectly adjusted.	Adjust steering gear and connections.
	Shock absorbers inoperative.	Check shocks and replace if necessary.
	Front springs weak or sagged.	Check spring height and replace if necessary.
	Wrong type or size of tires used.	Install new tires of correct type and size.

TORQUE TIGHTNESS

Application	Size	Ft. Lbs. Min.	Ft. Lbs. Max.
Knuckle to brake plate and steering arm	7/16-20	60	70
Knuckle support arm - fixed threaded bushings --			
In lower end of knuckle support	Special	200 Min.	
In lower suspension arm	Special	195	205
In upper suspension arm	Special	140	150
Knuckle support, upper and lower, nut	Special	70	90
Rubber bumper to lower suspension arm	3/8-24	16	20
Spring bolt (front end)	Special	65	75
Spring shackle bushings and hanger bushings	Special	65	75
Stabilizer bracket to frame	3/8-24	25	30
Steering idler arm threaded bushing	Special	110	115
Steering tie rod adjuster clamp bolts	5/16-24	20	20
Steering tie rod pivots to steering arms	1/2-20	50	55
Suspension arm shaft to frame (lower)	7/16-20	60	70
Suspension arm shaft to frame (upper)	9/16-18	150	160
Wheel mounting nuts	1/2-20	90	100

CHASSIS SUSPENSION

SPECIFICATIONS

Subject and Remarks	54-62, 60S	54-75	54-86 Comm.
King Pin inclination	5° 51'	5° 51'	5° 51'
*Camber of front wheels	-3/8° to +3/8°	-3/8° to +3/8°	-3/8° to +3/8°
*Caster angle	0° to -1°	0° to -1°	0° to -1°
Toe in (Car standing)	3/16" to 1/4"	3/16" to 1/4"	3/16" to 1/4"
Turning radius	23" 24"	27-1/2"	29"
*Adjustment must be within 1/2° or less on both sides of car			
SHOCK ABSORBERS -- Front			
Type	Delco Hydraulic Direct Acting		
Bore	1"	1"	1"
Model No. (Replacement Type)	873G	873G	873G
SHOCK ABSORBERS -- Rear			
Type	Delco Hydraulic Direct Acting		
Bore	1"	1"	1"
Model No. (Replacement Type)	873X	873X	873X
RIMS			
Diameter	15"	15"	15"
Width	6"	6"	6"
Eccentricity	3/64" max.	3/64" max.	3/64" max.
Runout	3/64" max.	3/64" max.	3/64" max.
TIRES			
Inflation pressure, in pounds --			
Front	24	28	24
Rear	24	28	30
Ply rating	4	6	6
Size (Black Walls)	8.00 x 15	8.20 x 15	8.90 x 15
Size (White Walls)	8.20 x 15	8.20 x 15	
WHEELS			
Type	Slotted Disc Optional - Wire Wheels	Slotted Disc	Slotted Disc
Make	Kelsey-Hayes	Kelsey-Hayes	Kelsey-Hayes

FRONT SPRING DATA CHART

Series	Part No.	Color Daub	Normal Load	Rate Per In.
54-6019 (Without Air Conditioner)	1460194	Light Blue	2240	350
54-6219, 6237 and 6237D) (Without A.C.)	1460193	Green	2180	350
54-6267 and 6267S (Without A.C.)	1460195	Pink	2320	375
54-6019, 6219, 6237 and 6237D (With A.C.)	1460195	Pink	2320	375
54-7523 and 7533 (Without A.C.)	1460191	Purple	2430	400
54-7523 and 7533 (With A.C.)	1460192	Orange	2550	400
54-86	1460189	None	2500	540

Inside diameter of springs is 4.00 inches.

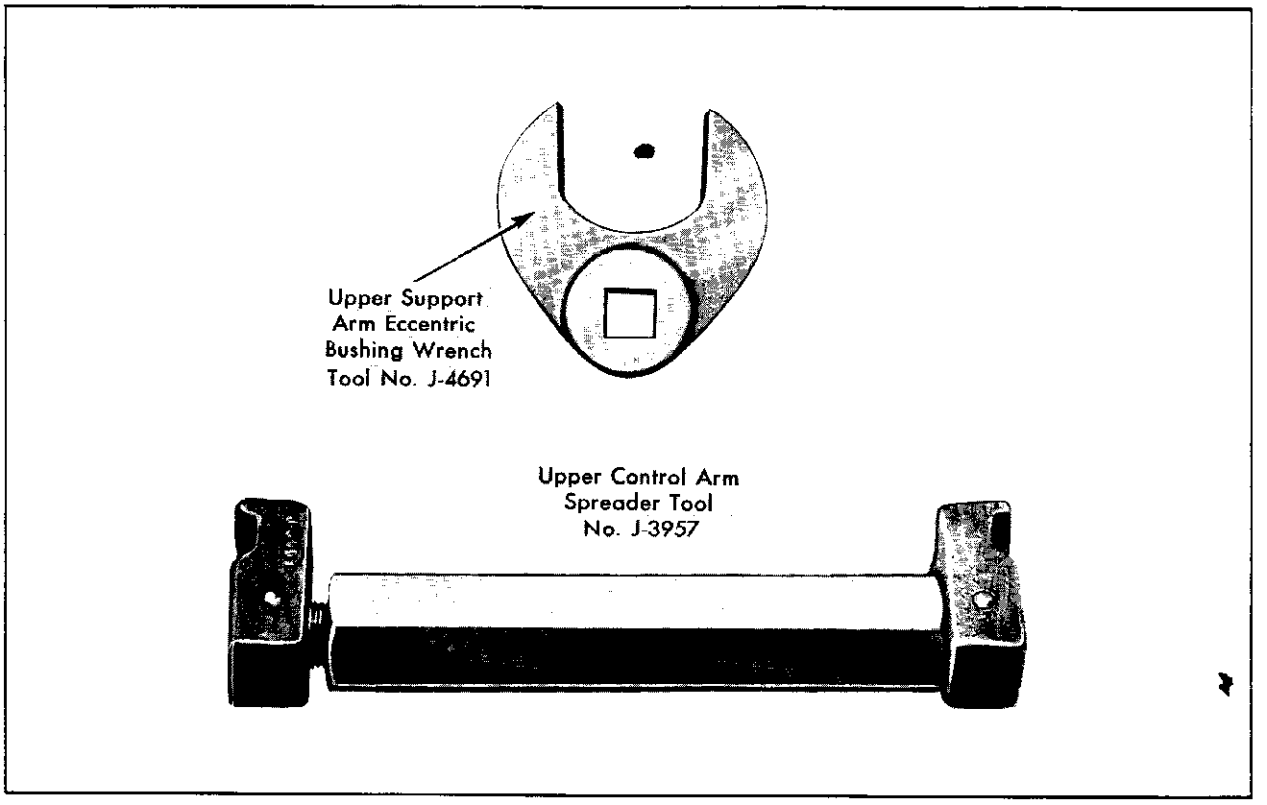
NOTE: On cars equipped with Air Conditioner, Spring 1460192 or 1460195 is used on both sides, with Shim 1457838 on R.H. side only.

CHASSIS SUSPENSION

REAR SPRING DATA CHART

Series	Part No.	Color Daub	Normal Load	Rate Per In.	No. of Leaves
54-6019 and 6237D (Without Air Conditioner)	1460924	Light Blue	1190	115	5
54-6219 and 6237 (With Air Conditioner)	1460924	Light Blue	1190	115	5
54-6219 and 6237 (Without Air Conditioner)	1460926	Green	1160	110	5
54-6267 and 6267S (Without Air Conditioner)	1460925	Pink	1260	120	5
54-6019 and 6237D (With Air Conditioner)	1460925	Pink	1260	120	5
54-60 and 62 - Heavy Duty	1460930	Dark Red	1330	140	6
54-7523 and 7533 (Except Exports)	1460927	Purple	1440	140	6
54-7523 and 7533 - Export	1460929	Yellow	1430	170	7
54-86	1460928	None	1700	235	9
54-86-Heavy Duty	1460931	White	1900	235	9

All springs are 2.50 inches in width. Color daub to appear on rear eye only.



Chassis Suspension Special Tools