SECTION A

ALL SERIES—WHEELS AND TIRES

CONTENTS

DIVISION I SPECIFICATIONS AND ADJUSTMENTS

100-1 WHEEL AND TIRE SPECIFICATIONS

a. Wheels

	43-44000 Exc. Gran Sport & Sportwagons	44000 Sportwagon	44000 Gran Sport	45000	46-48-49000
Standard Size	14 x 5.0	14 x 6.0	14 x 6.0	15 x 5.5	15 x 6.0
Optional Size	14 x 6.0	N.A.	N.A.	15 x 6.0	N.A.
Rim Type	Drop Center	Drop Center	Drop Center	Drop Center	Drop Center
Number of Attaching Studs	5	5	5	5	5
Stud Circle Diameter	4.750"	4.750"	4.750"	5.0"	5.0"
Stud Size	9/16-18	9/16-18	9/16-18	1/2-20	1/2-20

b. Tires

TIRE SIZE CHART

Series	Models	Standard Tire	Optional Tire
Special V-6 Special Deluxe V-6 Skylark V-6	Coupes & Pillar Sedans Without Air Conditioning	6.95 x 14	7.35 x 14
Special V-6 Special Deluxe V-6 Skylark V-6	Coupes & Pillar Sedans with Air Conditioning & All Convertibles & 4-Door Hardtops	7.35 x 14	7.75 x 14
Special V-6 Special Deluxe V-6	Station Wagons	7.75 x 14	8.25 x 14
Special V-8 Special Deluxe V-8 Skylark V-8	Sedans, Coupes, and Convertibles	7.35 x 14	7.75 x 14
Special V-8 Special Deluxe V-8	Station Wagons	7.75 x 14	8.25 x 14
Sportwagon	All	8.25 x 14	8.25 x 14 (4 ply, 8 ply rating)
Skylark Gran Sport	All	7.75 x 14	8.25 x 14
LeSabre	All	8.15 x 15	8.45 x 15
Wildcat	All	8.45 x 15	8.85 x 15
Electra 225	All	8.85 x 15	N.A.
Riviera	All	8.45 x 15	N.A.

NOTE: All tires are 4-ply rating - 2-ply unless otherwise specified.

TIRE PRESSURES

	Average Load Front - Rear	Full Rated Load Front - Rear
All Models (Except Station Wagons)	24 - 24 (Cool)	28 - 32 (Cool)
Station Wagons	22 - 26 (Cool)	24 - 32 (Cool)

DIVISION III

SERVICE PROCEDURES

100-2 TIRE SERVICE AND INSPECTION

a. Tire Inflation and Inspection

Maintenance of correct inflation pressure in all tires is one of the most important elements of tire care. Correct tire pressure is also of great importance to ease of handling and riding comfort. Overinflation is detrimental to tire life but not to the same degree as underinflation. Inflate all tires according to tire temperature as specified in paragraph 100-1.

Driving without valve caps contributes to underinflated tires. The valve cap keeps dirt and water out of the valve core and seals the valve against leakage. Whenever tires are inflated, be sure to install valve caps and tighten firmly by hand. Make sure that rubber washer in cap is not damaged or missing.

If tires are checked at frequent intervals and adjusted to correct inflation pressure, it is often possible to detect punctures and make a correction before a tire goes flat, which may severely damage tire if car is in motion. Slight differences in pressure between tires will always be found, but a tire that is found to be 3 or more pounds below the lowest of its running mates can be suspected of having a leaking valve or a puncture.

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

See that no metal or other foreign material is imbedded in the tread. Any such material should be removed to prevent damage to tread and tire carcass. Cuts in a tire which are deep enough to expose the cords will allow dirt and moisture to work into the carcass and ruin the tire unless promptly repaired.

b. Tubeless Tire Repairs

A leak in a tubeless tire may be located by inflating the tire to recommended pressure (par. 100-1) and then submerging tire and wheel assembly in water, or by applying water to tire with a hose if wheel is mounted on car. Remove water from area where air bubbles show and mark the area with crayon. After removal of the puncturing object from tire, the puncture must be sealed to prevent entrance of dirt and water which would cause damage to the tire carcass.

A small puncture of less than 3/32" diameter may be sealed without removal of tire from wheel by injecting sealing dough with a gun. Punctures up to 1/4" diameter may be sealed by installation of a rubber plug with cement after tire has been removed from wheel. Sealing dough with gun and rubber plugs with cement are contained in tire repair kits available through tire dealers. These materials should be used as directed in the instructions supplied with the kits. If a puncture is larger than 1/4" or there is other damage to the tire carcass, repairs should be made by authorized tire dealers in accordance with instructions of the tire manufacturer.

c. Wheel Leaks

Examine rim flanges for sharp dents. Any dent visible to the eye should be straightened. The rim flanges should be thoroughly cleaned with No. 3 coarse steel wool thereby removing all oxidized rubber, soap solution, etc. If the flange is rusted, it can be cleaned with a wire brush or in extreme cases of pitted rims, a file can be used.

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

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

d. Demounting and Mounting of Tubeless Tire

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

When tire is removed, inspect it carefully to determine whether loss of air was caused by puncture or by improper fit of beads against rim flanges. If improper fit is indicated, check wheel as follows:

1. Straighten wheel rim flanges if bent or dented.

2. Clean rims thoroughly, using No. 3 coarse steel wool, to remove all oxidized rubber, soap solution, etc. Remove rust with wire brush.

3. Inspect butt weld and other areas of rim contacted by tire beads to make certain there is no groove or high spot. Remove any groove or high spot by filing smooth.

4. Inspect valve stem and replace it if damaged. Make certain that valve stem is properly installed to provide an air tight joint.

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

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

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

e. Interchanging Tires

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

Tire life will be increased and uneven wear and noise will be less likely to occur if the tires, including the spare, are balanced and interchanged at regular intervals of approximately 6000 miles. The recommended method of interchanging tires is shown in Figure 100-1.

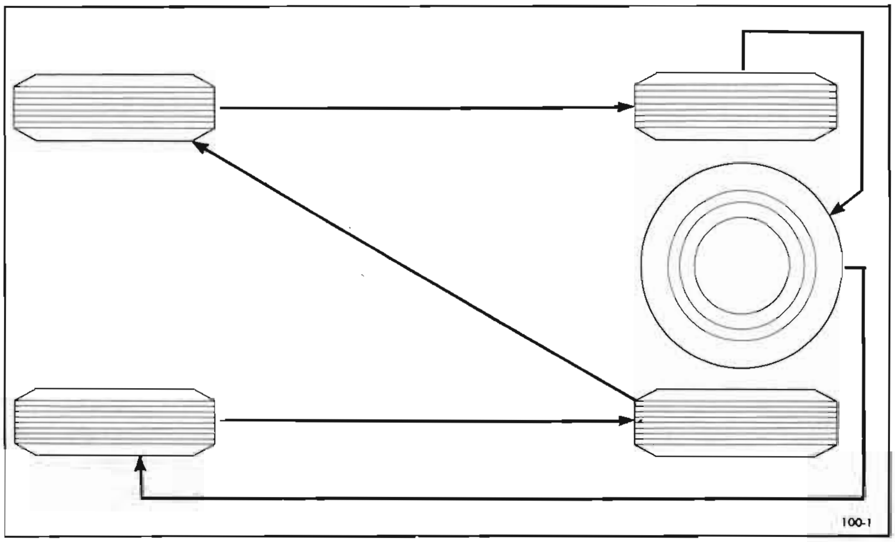


Figure 100-1—Interchanging Tires

f. Use of Tire Chains

Do not use tire chains on the front wheels under any circumstances because they will interfere with the steering mechanism. Any of the conventional full-type non-skid tire chains can be used on the rear wheels.

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

g. Wheel and Tire Balance

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

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

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

In some cases, off-the-car wheel and tire balance does not overcome wheel balance complaints because the brake drums themselves are out-of-balance. In this case, either balance the tire and wheel with an on-the-car spin balance or correct the brake drum balance as described in GROUP 50.

100-3 REPLACEMENT AND ADJUSTMENT OF FRONT WHEEL BEARINGS

a. Replacement of Bearings

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

2. Remove outer race and outer bearing assembly from hub. Remove oil seal from hub so that inner race and bearing assembly can be removed from hub. See Figure 100-2.

3. Clean and inspect all bearing parts. When inspecting or replacing race and bearing assemblies, make certain the assemblies are free to creep on spindle of steering knuckle. Wiping the spindle clean and applying bearing lubricant will permit creeping and prevent rust forming between races and spindle.

4. If bearings require replacement, drive the old outer races from the hub. Install new outer races with a soft (brass) drift being certain to start each squarely into hub to avoid distortion and possible cracking.

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

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

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

8. Adjust bearings as described in subparagraph b following.

b. Adjustment of Front Wheel Bearings — 43-44000 Series

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

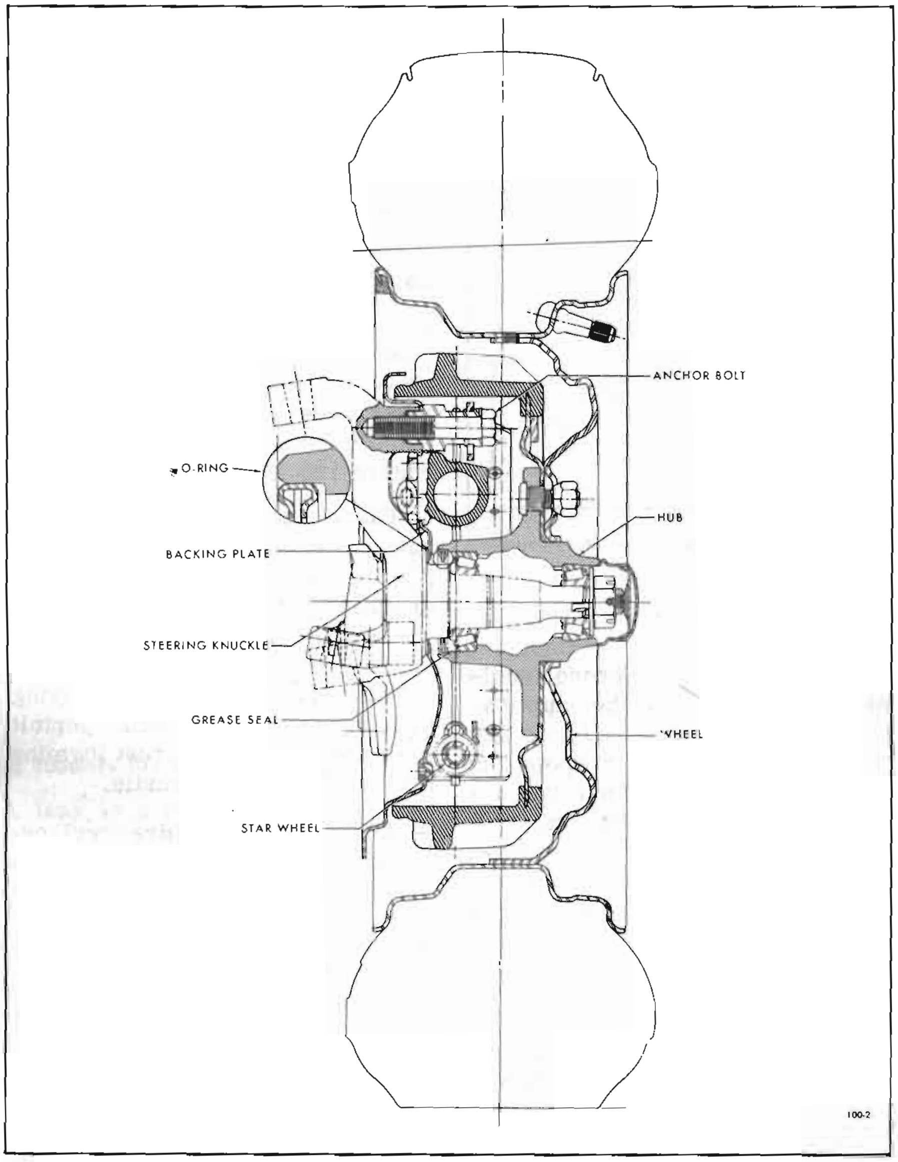


Figure 100-2—Front Wheel Hub Bearings

2. Back off nut and retorque to 11 lb. ft.

3. If a spindle hole lines up with one of the six slots in the nut, back off nut until the next slot is in line with the hole. Insert cotter pin.

4. If neither spindle hole lines up with a slot, back off nut no more than 1/4 turn until a slot is in line with the spindle hole. Install cotter pin.

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

c. Adjustment of Front Wheel Bearings — 45-46-48-49000 Series

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

2. Back off nut and retorque to 11 lb. ft.

3. If either cotter pin hole in spindle lines up with slot in nut, back off nut until next slot lines up with hole. Install cotter pin.

4. If neither hole in spindle lines up with slot in nut, back off nut no more than 1/6 turn until slot lines up with hole. Install cotter pin.

100-4 FRONT WHEEL ALIGNMENT

Wheel alignment is the mechanics of adjusting the position of the front wheels in order to attain the least steering effort with a minimal amount of tire wear.

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

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

Close limits on caster, front wheel camber, and theoretical king pin inclination are beneficial to car handling, but require only reasonable accuracy to provide normal tire life. With the type of front suspension used, the toe-in adjustment is much more important than caster and camber are as far as tire wear is concerned.

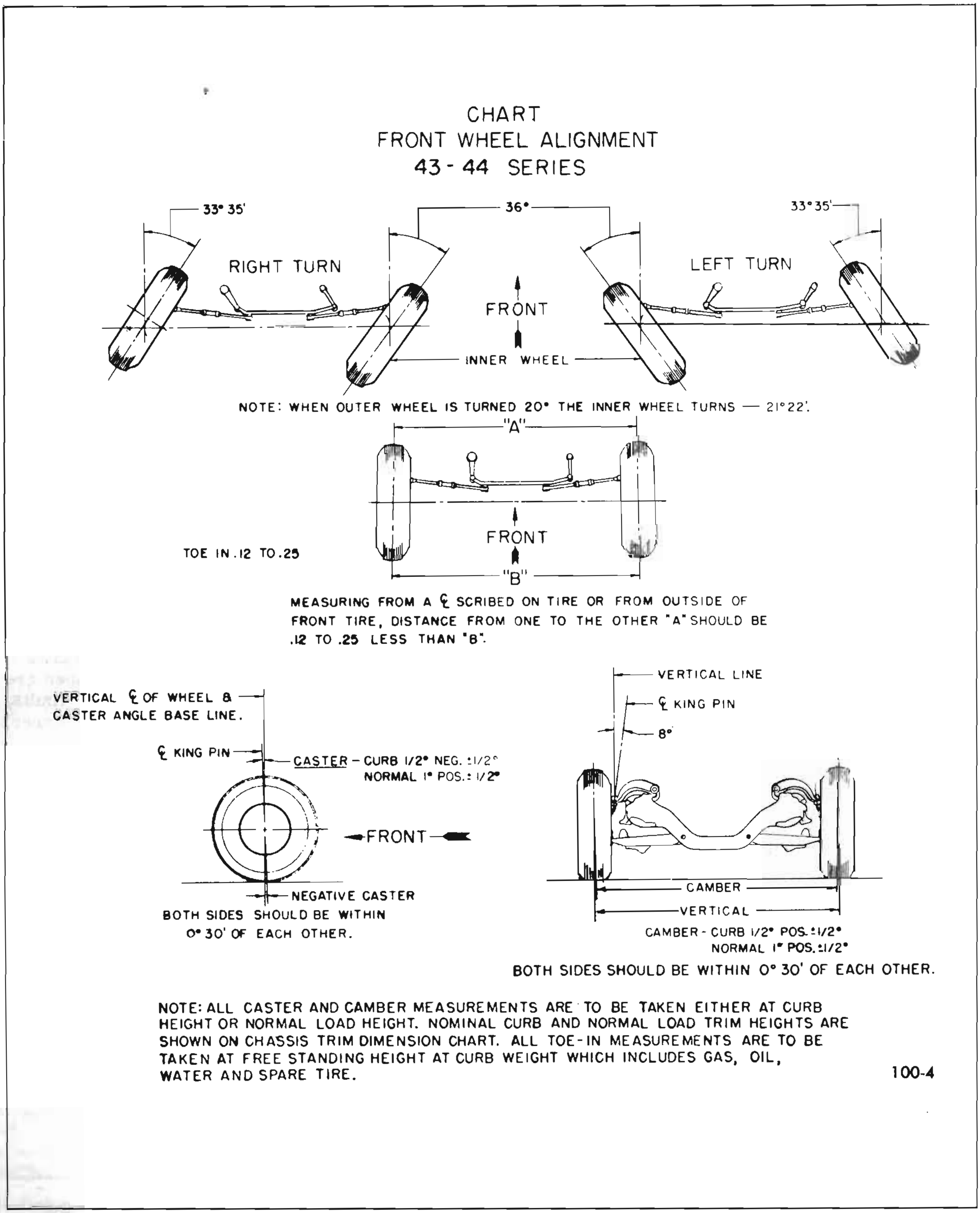
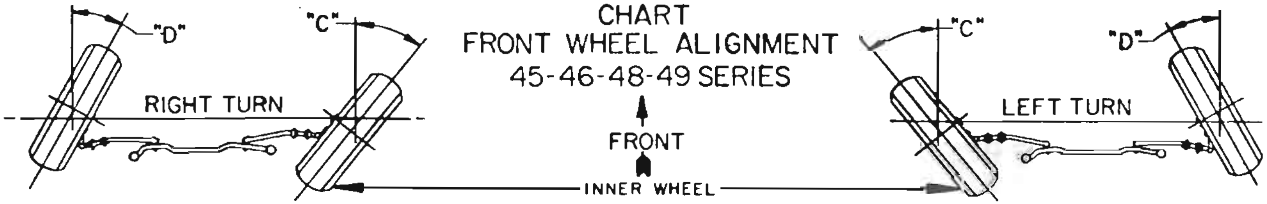
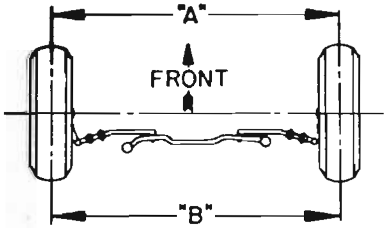


Figure 100-4—Front Wheel Alignment Chart - 43-44000 Series

CHART
FRONT WHEEL ALIGNMENT
45-46-48-49 SERIES



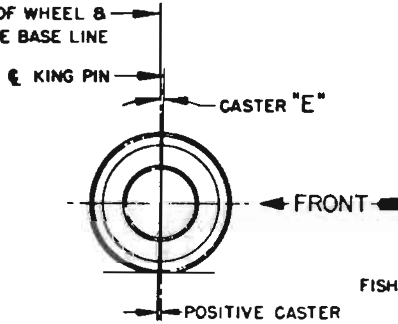


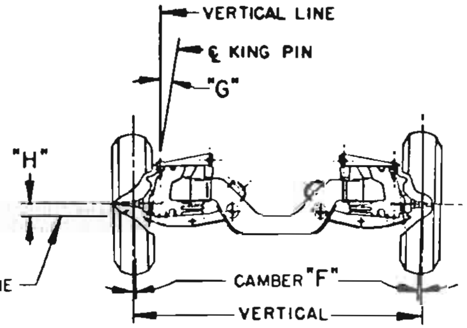
MEASURING FROM A ℄ SCRIBED ON TIRE OR FROM OUTSIDE OF FRONT TIRE DISTANCE FROM ONE TO THE OTHER "A" SHOULD BE .21 TO .31 LESS THAN "B".

TOE IN .21 TO .31

SERIES	FULL TURN INNER WHEEL "C"	FULL TURN OUTER WHEEL "D"	OUTER WHEEL ANGLE WITH INNER WHEEL AT 20°	CASTER "E" +1/2° -1/2°		CAMBER "F" +3/4° -1/4°		STEERING AXIS ANGLE "G"	TRIM HEIGHT "H"
				CURB	NORMAL	CURB	NORMAL		
45-MANUAL	39°	28° 30'	16° 28'	1° POS.	2°15' POS.	1/4° POS.	1/2° POS.	10°43' AT 0°53' CAMBER	2.51
45-POWER	39°	28° 52'	17° 14'	1° POS.	2°15' POS.	1/4° POS.	1/2° POS.	10°43' AT 0°53' CAMBER	2.51
46-MANUAL	37° 15'	27° 30'	17°	1° POS.	2°15' POS.	1/4° POS.	1/2° POS.	10°43' AT 0°53' CAMBER	2.71
46-48-POWER	37° 15'	29° 18'	18° 13'	1° POS.	2°15' POS.	1/4° POS.	1/2° POS.	10°43' AT 0°53' CAMBER	2.71
49-POWER	37° 15'	28° 10'	17° 49'	1° POS.	2°15' POS.	1/4° POS.	1/2° POS.	10°43' AT 0°53' CAMBER	2.08

FOR SERVICE ALIGNMENT USE CURB WEIGHT DIMENSIONS ONLY.





BOTH SIDES SHOULD BE WITHIN 0° 30' OF EACH OTHER.

NOTE: ALL CASTER AND CAMBER MEASUREMENTS ARE TO BE TAKEN EITHER AT CURB HEIGHT OR NORMAL LOAD HEIGHT. NOMINAL CURB AND NORMAL LOAD TRIM HEIGHTS ARE SHOWN ON CHASSIS TRIM DIMENSION CHART. ALL TOE-IN MEASUREMENTS ARE TO BE TAKEN AT FREE STANDING HEIGHT AT CURB WEIGHT WHICH INCLUDES GAS, OIL, WATER AND SPARE TIRE.

100-5

Figure 100-5—Front Wheel Alignment Chart - 45-46-48-49000 Series

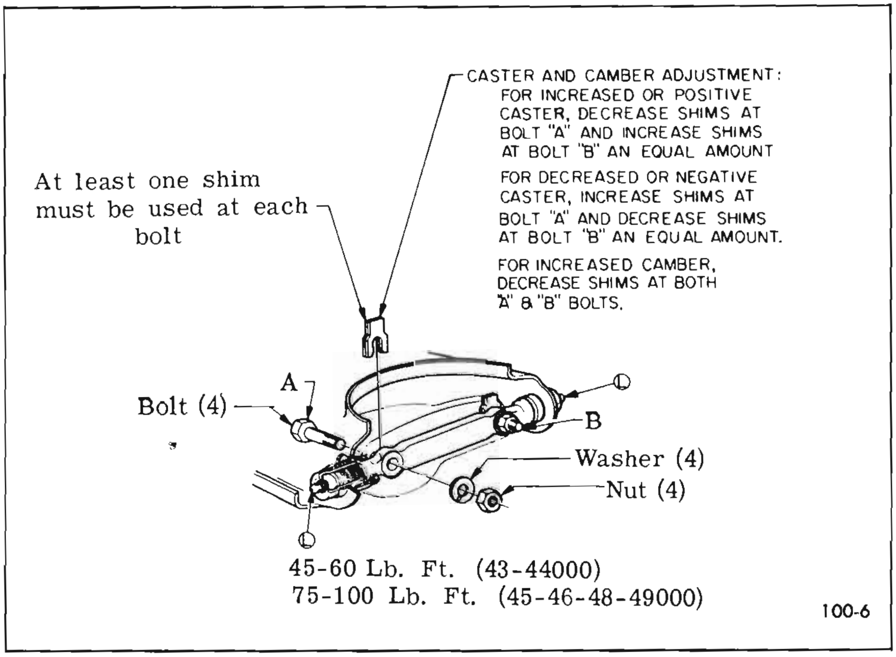


Figure 100-6—Upper Control Arm Shimming Locations

1. To increase camber only - (More positive) Remove an equal amount of shims from front and rear bolt.

2. To decrease camber only - (Less positive) Add an equal amount of shims to front and rear bolt.

3. To increase caster only - (More negative) Add an amount of shims at front bolt and remove an equal amount of shims from rear bolt.

4. To decrease caster only - (Less negative) Remove an amount of shims from the front bolt and add an equal amount of shims to the rear bolt.

5. To increase caster and camber at the same time - remove an amount of shims at rear bolt only.

6. To decrease caster and camber at the same time - add an amount of shims at rear bolt only.

The following guide lines will help you select and correctly shim with minimum effort. Shim thickness limit for any one stack for 43-44000 Series is .750 of an inch and for 45-46-48-49000 Series is .600 of an inch.

Shims are available in .030", .060", and .100" thicknesses with an additional .200" shim for 45-46-48-49000 Series.

By adding a pack of shims .090" thick at both sides, camber will be increases by 1/2 degree.

By adding a .030" shim on one bolt and removing a .030" shim from the other, caster will change 1/2 degree on 43-44000 Series and 3/8 degree on all other series.

Torque control arm shaft nuts to:

45-60 lb. ft. on 43-44000 Series
75-100 lb. ft. on 45-46-48-49000 Series

It is imperative that these torque specifications be closely adhered to.

d. Checking Theoretical Kingpin Inclination

CAUTION: When checking theoretical king pin inclination, car must be on a level surface, both transversely and fore and aft.

With camber known to be within specified limits, theoretical king pin inclination should check within specified limits given in Figures 100-4 and 100-5.

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

There is no adjustment for theoretical king pin inclination as this factor depends on the accuracy of the front suspension parts. Distorted parts should be replaced with new parts.

CAUTION: The practice of heating and bending front suspension parts to correct errors must be avoided as this may produce soft spots in the metal in which fatigue and breakage may develop in service.

e. Checking and Adjusting Toe-In

CAUTION: Car must be at normal curb weight and running height. Bounce front end and allow it to settle to running height. Steering gear and front wheel bearings must be properly adjusted with no looseness at tie rod ends. The car should be moved forward one complete revolution of the wheels before the toe-in check and adjustment are started and the car should never be moved backward while making the check and adjustment.

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

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

3. Using a suitable toe-in gauge, measure the distance between outside walls of tires at the front

at a height approximately horizontal to floor and through the centerline of the wheel assembly. See Figures 100-4 and 100-5.

NOTE: An accurate check also can be made by raising and rotating front wheels to scribe a fine line near the center of each tire, then, with tires on the floor and front end at running height, measure between scribed lines with a suitable trammel.

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

The measurement at the front should be 7/32" to 5/16" less than the measurement at the rear.

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

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

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

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

f. Checking Steering Geometry (Turning Angles)

CAUTION: Be sure that caster, camber, and toe-in have all been properly corrected before checking steering geometry. Steering geometry must be checked with the weight of the car on the wheels.

1. With the front wheels resting on full floating turntables, turn wheels to the right until the outside (left) wheel is set at 20 degrees. The inside (right) wheel should then set at the angle specified in Figures 100-4 or 100-5.

2. Repeat this test by turning front wheels to the left until the outside (right) wheel sets at 20 degrees; the inside (left) wheel should then set at angle specified in Figures 100-4 or 100-5.

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

DIVISION IV

TROUBLE DIAGNOSIS

100-5 CAR ROUGHNESS AND VIBRATION

a. Possible Causes

Car roughness or vibration may be caused by road surface conditions. Testing the car on different types of road will indicate if the road surfaces are causing the vibration.

Some types of tire treads, tires with more than two plies of fabric or tires heavier than those chosen for production, may cause abnormal vibration or roughness. If car is equipped with tires other than those which have been selected for production equipment, it is advisable to test the car with the recommended tire size before deciding that a mechanical condition is the cause of roughness.

The following procedure should be used to determine cause of roughness or vibration with car in operation at various speeds.

1. Jack up all wheels having jack support rear end of car at center of rear axle housing.

2. Check runout of front and rear wheels and tires. Runout should not exceed specifications shown in Figure 100-3.

3. With transmission in Drive run engine at various car speeds to note speeds at which vibration or roughness occurs.

4. Remove rear wheels and run engine again at the critical speeds noted in Step 3. If roughness is gone, the condition is caused by unbalanced wheel and tire assemblies.

5. If roughness still exists with rear wheels removed, remove rear brake drums and repeat the running test. Elimination of the roughness indicates out of balance brake drums.

6. If roughness still exists with brake drums removed, run engine with transmission in Neutral. Elimination of the roughness indicates that propeller shaft is out-of-balance. Continued roughness indicates an out-of-balance engine.

100-6 IMPROPER STEERING ACTION

Steering action is dependent upon the chassis suspension members as well as the steering gear assembly and tie rods. Improper steering actions which are most likely to be caused by chassis suspension are covered in this paragraph, while conditions most likely to be caused by the steering gear assembly or tie rods are covered in GROUP 90.

a. Car Pulls or Leads to One Side

1. High crowned roads.
2. Low or uneven tire pressure (par. 100-1).
3. Front tires of unequal diameter due to wear.
4. Brakes dragging on one side (GROUP 50).
5. Shock absorbers leaking or inoperative (GROUP 30).
6. Incorrect caster, camber, or toe of front wheels (GROUP 30).
7. Frame bent or broken.

b. Steering Affected by Application of Brakes

1. Oil or other foreign matter on brake lining (See GROUP 50).
2. Low or uneven tire pressure (par. 100-1).
3. Front tires of unequal diameter due to wear.
4. Incorrect or uneven caster or bent steering knuckle (GROUP 30).

c. Car Wander or Lack of Steering Stability

1. Heavy cross wind.
2. Type of road surface.
3. Low or uneven tire pressure (par. 100-1).
4. Wheels toe out in straight ahead position (GROUP 30).
5. Incorrect or uneven caster or camber (par. 100-4).
6. Steering gear or tire rods adjusted too loose or worn, or adjusted too tight (GROUP 90).
7. No lubrication in ball joints or upper ball joint worn (GROUP 30).

d. Road Shocks Transmitted to Steering Wheel

1. High tire pressure (par. 100-1).
2. Wrong type or size of tires used (par. 100-1).
3. Uneven tire wear (especially shoulder or corner wear).
4. Steering gear or tie rods loosely adjusted. Broken tie rod spring (GROUP 90).
5. Shock absorbers inoperative or leaking; wrong valving (GROUP 30).
6. Steering knuckle upper ball joint worn (GROUP 30).

e. Front Wheel Shimmy (Low Speed)

Low speed shimmy is a rapid series of oscillations of the front wheel and tire assembly as the wheels attempt to point alternately to the right and left. This movement is often transmitted through the steering linkage to the steering gear. Low speed shimmy usually occurs below 30 MPH.

1. Uneven or low tire pressure, or highly worn tires (par. 100-1).
2. One or both wheel and tire assemblies out of balance (GROUP 30).
3. Front wheel bearings loose or worn (GROUP 30).
4. Incorrect alignment of front wheels (GROUP 30).
5. Steering knuckle upper ball joint worn (GROUP 30).
6. Steering gear or tie rods incorrectly adjusted or worn (GROUP 90).

100-7 WHEEL TRAMP, FRONT OR REAR

Wheel tramp, sometimes called high speed shimmy, is a rapid up and down movement of a wheel and tire assembly, as though the tire was decidedly eccentric. In severe cases, the tire actually hops clear of the road surface. Wheel tramp may develop in either front or rear wheels and occurs at speeds above 35 MPH.

a. Wheel, tire, or brake drum out of balance (GROUP 30).

b. Excessive tire and wheel runout (GROUP 30).

c. Shock absorber inoperative (GROUP 30).

d. Items a, b, or c in combination with one or more items listed under Front Wheel Shimmy (subpar. e above).

100-8 ABNORMAL TIRE WEAR

a. General Operating Conditions

Assuming that there is no misalignment condition to cause unnatural wear, the life of tires depends largely upon car operation conditions and driving habits.

Tires wear at a much faster rate in some localities than in others because of road and operating conditions. Some types of roads are much more abrasive than others. Tire wear is also dependent upon the number of hills and mountains which the car must go up and down, the severity of grades, the number of starts and stops, driving speeds, the amount of rain and snow, and prevailing temperatures. Tire wear increases rapidly with speed, temperature, and load on tire. Tires used at low speeds, in cool climates, or with light loads will have longer life than tires used for high speed driving in hot climates with heavy loads.

Driving habits have a very important bearing on tire life. A careful driver may obtain much greater mileage from a set of tires than would be obtained by a severe or careless driver. Rapid acceleration and deceleration, severe application of brakes, taking turns at excessive speed, high speed driving, and striking curbs or other obstructions which lead to misalignment are driving habits which will shorten the life of any tire.

Maintenance of proper inflation pressure and periodic interchanging of tires to equalize wear are within the control of the driver. Underinflation raises the internal temperature of a tire greatly due to the continual friction caused by the flexing of the side walls. Tire squealing on turns is an indication of underinflation or excessive speed on the turns. A combination of underinflation, high road temperatures, and high speed driving will quickly ruin the best tire made.

High speed on straight highways or expressways normally causes more rapid wear on the rear than on the front tires, although cupping of front tires can result if the tires are not periodically switched from wheel to wheel. Driving turns and curves at too high a rate of speed causes the front tires to wear much faster than the rear tires.

An inspection of the tires, together with information as to locality in which the car has been operated will usually indicate whether abnormal wear is due to the operating conditions described above or to mechanical faults which should be corrected.

The various types of abnormal tire wear and their causes are described in the following subparagraphs.

b. Shoulder or Underinflation Tread Wear

When a tire is underinflated, the side walls and shoulders of the tread carry the load while the center of tread folds in or compresses due to the low internal air pressure. This action causes the shoulders to take all of the driving and braking load, resulting in much faster wear of shoulders than of the center of tread. See Figure 100-7, Example A. For maximum results in handling, riding and tire life, tire inflation pressures should never be allowed to go below the specified minimum pressure.

Continuous high speed driving on curves, right and left, may produce tread wear very similar to underinflation wear and might very easily be mistaken for such. Side thrust when rounding turns causes wear on the sides of tire tread. In making a turn to the left, especially at high speeds, the outside shoulder of the right tire and the inside shoulder of the left tire take the side thrust and naturally receive the most wear. The only possible correction is to advise slower speeds on curves. Do not increase tire inflation pressures beyond specified limits as this will cause center or overinflation wear (subpar. c, below).

c. Center or Overinflation Tread Wear

On a tire that is overinflated, the center of the tread received much more driving and braking strain than the sides or shoulders. The center of the tread, therefore, wears away much faster than the shoulder and if tire is continuously overinflated, it may be worn thin while the shoulders have plenty of tread material left. See Figure 100-7, Example B.

When tire inflation pressures are maintained within the specified limits, the tire will make a full

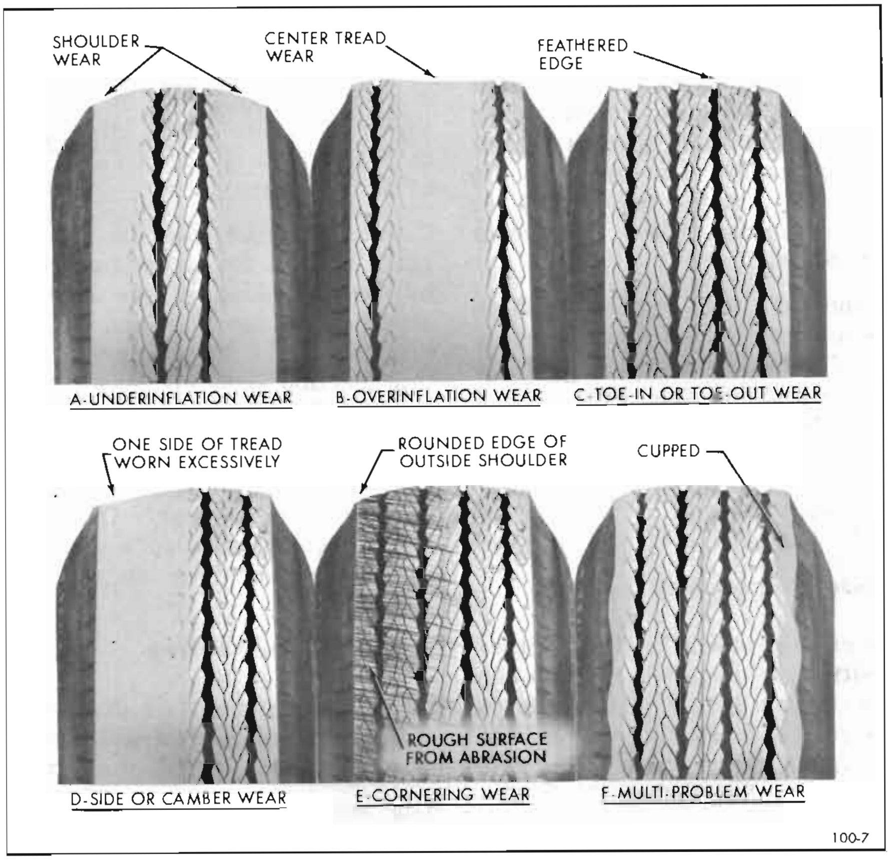


Figure 100-7—Abnormal Tire Tread Patterns

contact across the entire width of tread, thereby distributing the wear evenly over the total surface of the tread area.

d. Cross or Toe Tread Wear

When the front wheels have an excessive amount of either toe-in or toe-out, the tires are actually dragged sideways when they travel straight down the road and cross wear or scraping action takes place rapidly wearing away the tread of tires. This cross wear condition will usually produce a tapered or feathered edge on the ribs of the tire tread. See Figure 100-7, Example C. In most cases, this can be detected by rubbing the hand across the tire tread.

If the tapered or feathered edges are on the inner sides of the ribs on one or both sides, it indicates that one or both tires have excessive toe-in, while the same condition in the outer sides of ribs indicate excessive toe-out. Usually, excessive toe-in causes excessive tire wear on the outer edge of the right front tire and toe-out causes tire wear on the inner edge of the left front tire. See paragraph 100-4 for toe-in correction.

Cornering wear caused by high speed driving on curves (subpar. f. following) sometimes has the appearance of toe wear. Care must be used to distinguish between these two types of wear so that the proper corrective measures will be used.

e. Side or Camber Wear

Excessive wheel camber, either positive or negative, causes the tire to run at such an angle to the road surface that one side of the tread wears much more than the other. See Figure 100-7, Example D.

The amount or angle of the camber wear will be governed by the amount of positive or negative camber. Tire tread wear very similar in appearance to camber wear may be caused by driving on turns at excessive speeds. This "cornering" tread wear (subpar. f, below) cannot be corrected by change of camber angle.

Adjustments for specified camber is covered in paragraph 100-4.

f. Cornering Tread Wear

The modern independently sprung automobile allows the driver to negotiate turns at a high rate of speed with a greater feeling of safety. This fact is responsible for a comparatively new type of tread wear that can easily be mistaken for toe or camber wear.

When a car is making a turn, the tires are supposed to be rolling in a circle. When the turn is made at high speed, however, centrifugal force acting on the car causes the tires to be distorted sideways and to slip or skid on the road surface. This produces a diagonal cross type of wear, which in severe cases will result in a fin or sharp edge on each rib of the tire treads.

Cornering wear can be distinguished from toe or camber wear by the rounding of the outside shoulder of the tire and by the roughening of tread surface in this section denoting severe abrasion. See Figure 100-7.

No alignment or tire pressure change can be made that will relieve cornering wear. Only the driver can effect a cure and that is by slowing down on curves.

g. Heel and Toe Tread Wear

Heel and toe wear is a saw-tooth effect with one end of each tread block worn more than the other.

The end which wears is the one that first grips the road when the brakes are applied. High speed driving and excessive use of the brakes will cause this type of irregular tire wear. This type of wear will occur on any type of block tread design. See Figure 100-7, Example F.

Heel and toe wear is not so prevalent on the rear tires because of the propelling action which creates a counteracting force which wears the opposite end of the tread block. These two stresses on the rear tires wear the tread blocks in opposite directions and result in more even wear, while on the front tires, the braking stress is the only one which is effective. This may be counteracted by interchanging tires.

A small amount of irregular wear, slightly saw-toothed in appearance, at the outer segments of tires is a normal condition and is due to the difference in circumference between the center and the outer edges of the tire tread. This saw-toothed appearance, however, will be exaggerated by underinflation, improper toe-in, or both.

h. Cupped or Scalloped Type Tire Wear

Cupping or scalloping is associated with wear on a car driven mostly at highway speeds without recommended tire rotation. Factors which promote cupping include underinflation, incorrect toe-in setting or camber setting, and steady highway speeds on smooth, paved surfaces as opposed to gravel or rough asphalt.

The following recommendations suggest action that may be taken to help prevent cupping.

1. Rotate tires as recommended in GROUP 00.

2. Frequently inspect front tires for irregular wear due to underinflation, improper toe-in setting, or camber setting.

Regardless of the original cause of cupped tread wear on either front tire, no alignment or balance job, however perfect, can prevent future excessive wear of the spots. Once a front tire acquires flat or cupped spots, additional wear will continue at a rapid rate. At the time of correction, however, the cupped tire should be interchanged with a rear tire on which the tread runs true. The cupped tire will, to a certain degree, true itself on a rear wheel.

Although not normally the cause of cupping, the following factors can contribute to the problem.

Looseness of parts in the suspension system such as worn steering knuckle ball joints, loose wheel bearings, inoperative shock absorbers, and any excessive looseness throughout the steering system all tend to allow the front wheels to kick around, and if any of the wheel alignment factors are incorrect, irregular spotty tire tread wear of one type or another may result.

Wobble or runout of a tire, either front or rear, due to bent wheel or to tire being improperly

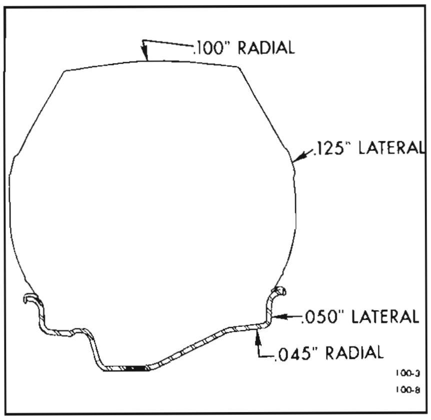


Figure 100-8—Wheel Run-Out Specifications

mounted will cause uneven wear. The runout of wheel and tire when rotated should not exceed specification shown in Figure 100-8.

100-9 WHEEL AND TIRE RUN-OUT

Excessive vibration or shake similar to out-of-balance tires can be caused by excessive tire or wheel runout. This runout may be both radial and lateral. Radial runout usually has greater affect on vibration or shake than lateral runout.

A dial indicator may be used to check runout on wheel and tire assemblies at points shown on Figure 100-8. Tire runout should be checked immediately after the car has been driven, as tires take a "set" after standing for a short period.

NOTE: It should be stressed that the runout found is a mere indication and not proof of the source of trouble.

Procedure:

1. Make certain that the wheel lug nuts are tightened adequately and evenly.

2. If checking front wheels and tires, make certain that wheel bearings are correctly adjusted.

3. Mount the dial indicator on a firm base and check total indicator runout at the points indicated in Figure 100-8.

4. If runout exceeds specifications, check for the source of the trouble and correct as necessary.

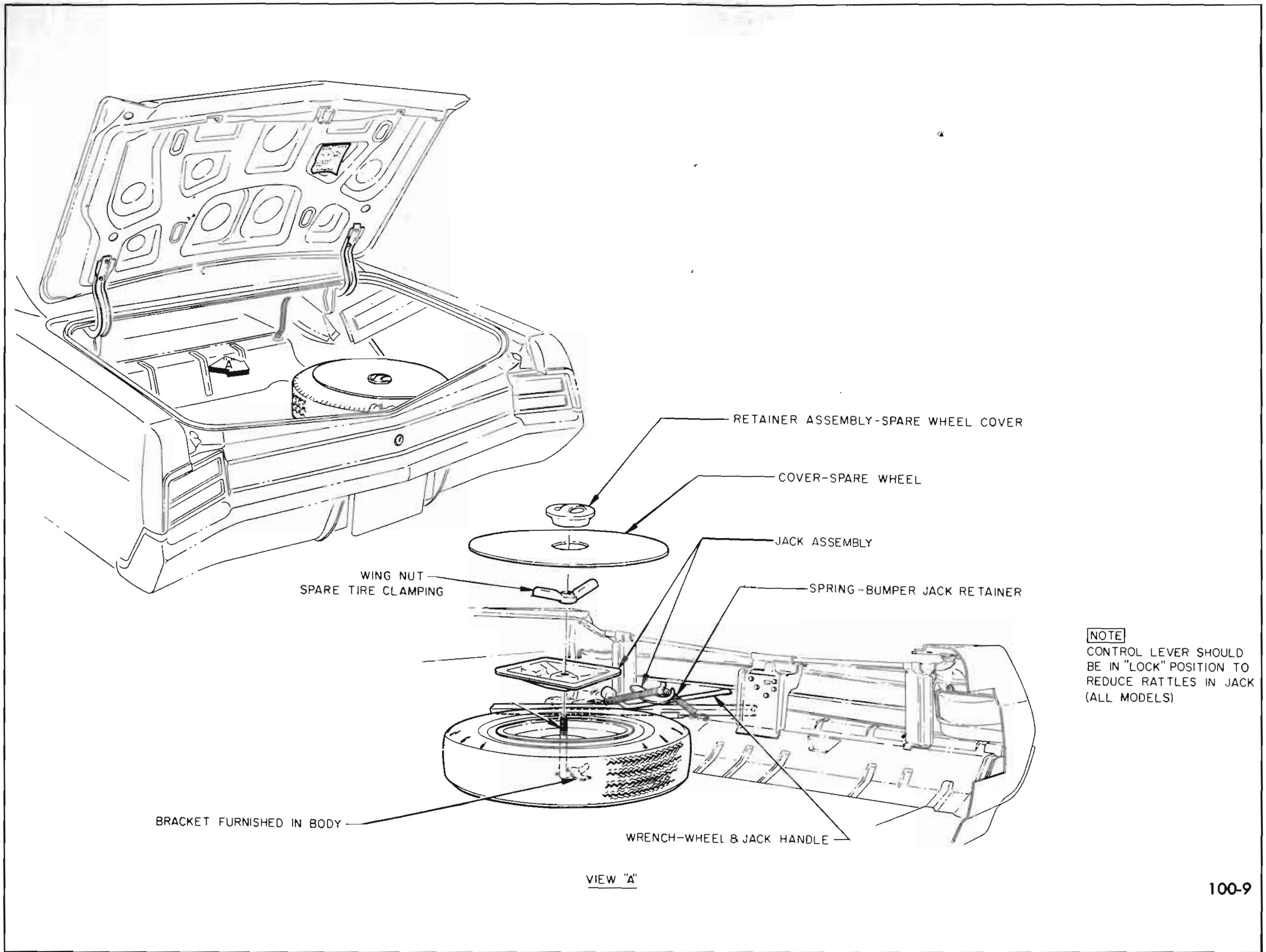


Figure 100-9—Spare Tire and Jack Installation 43-44000 Series Except Station Wagons

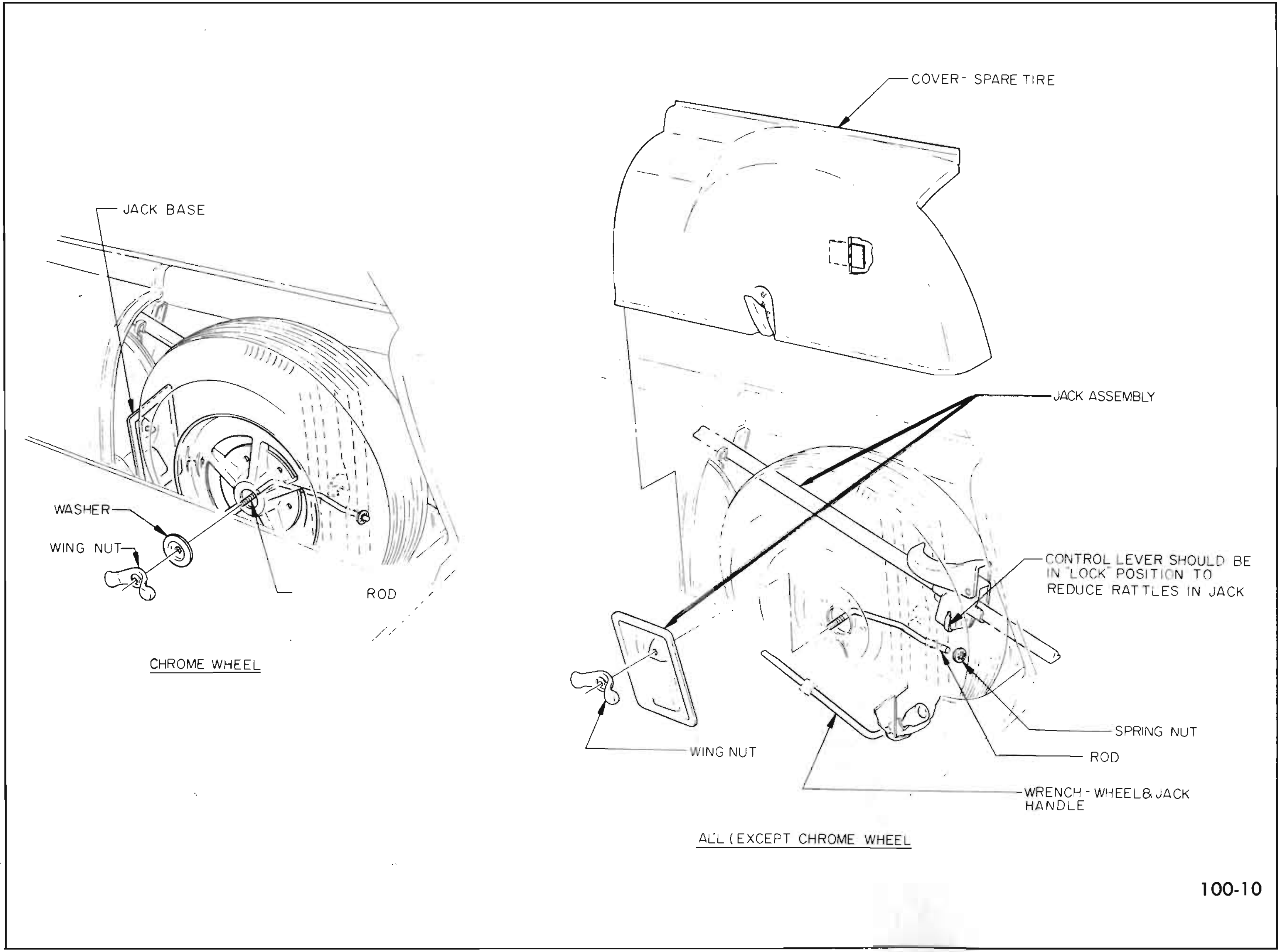


Figure 100-10—Spare Tire and Jack Installation 43-44000 Series Station Wagons

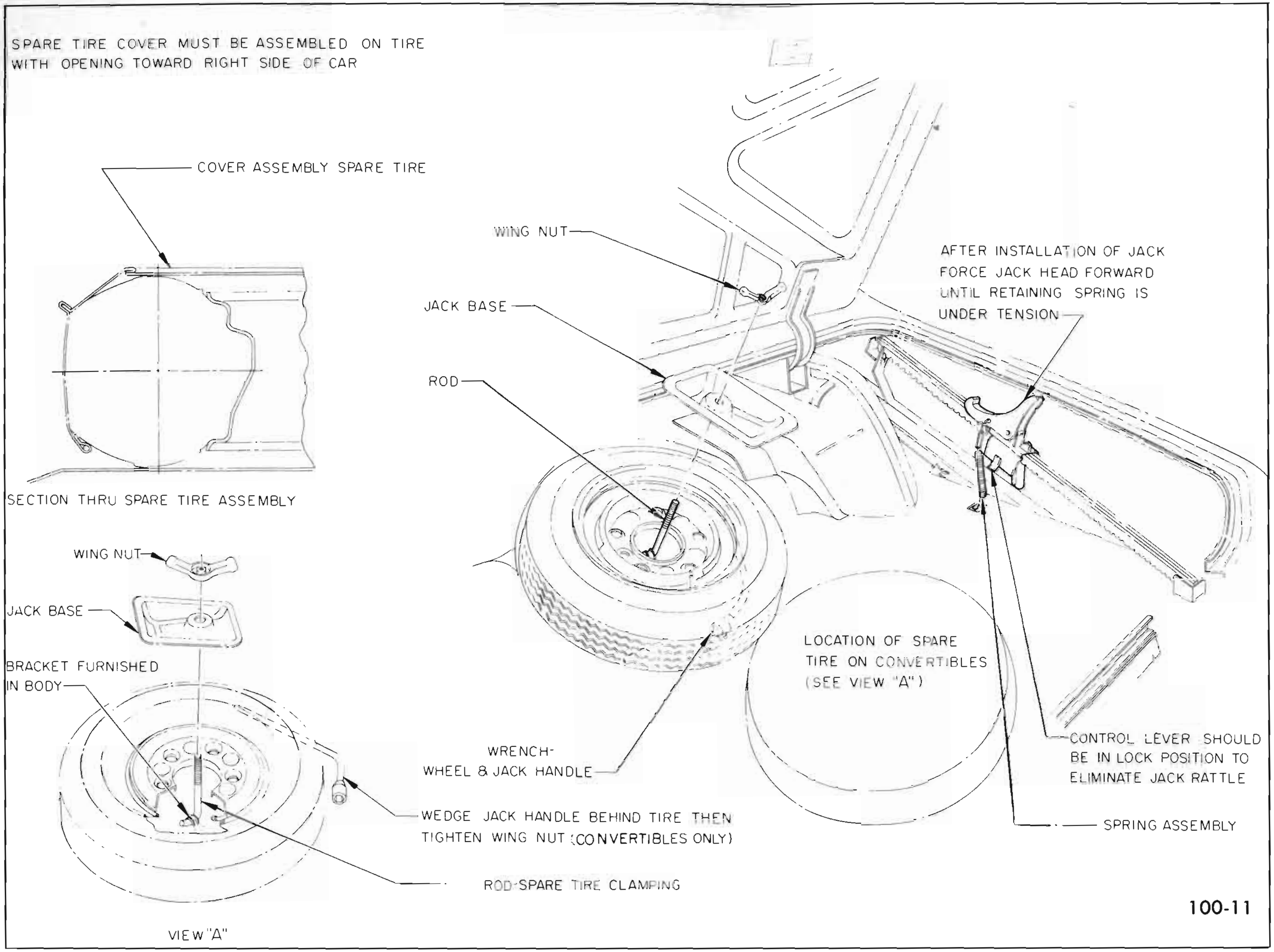


Figure 100-11—Spare Tire and Jack Installation 45-46-48000 Series

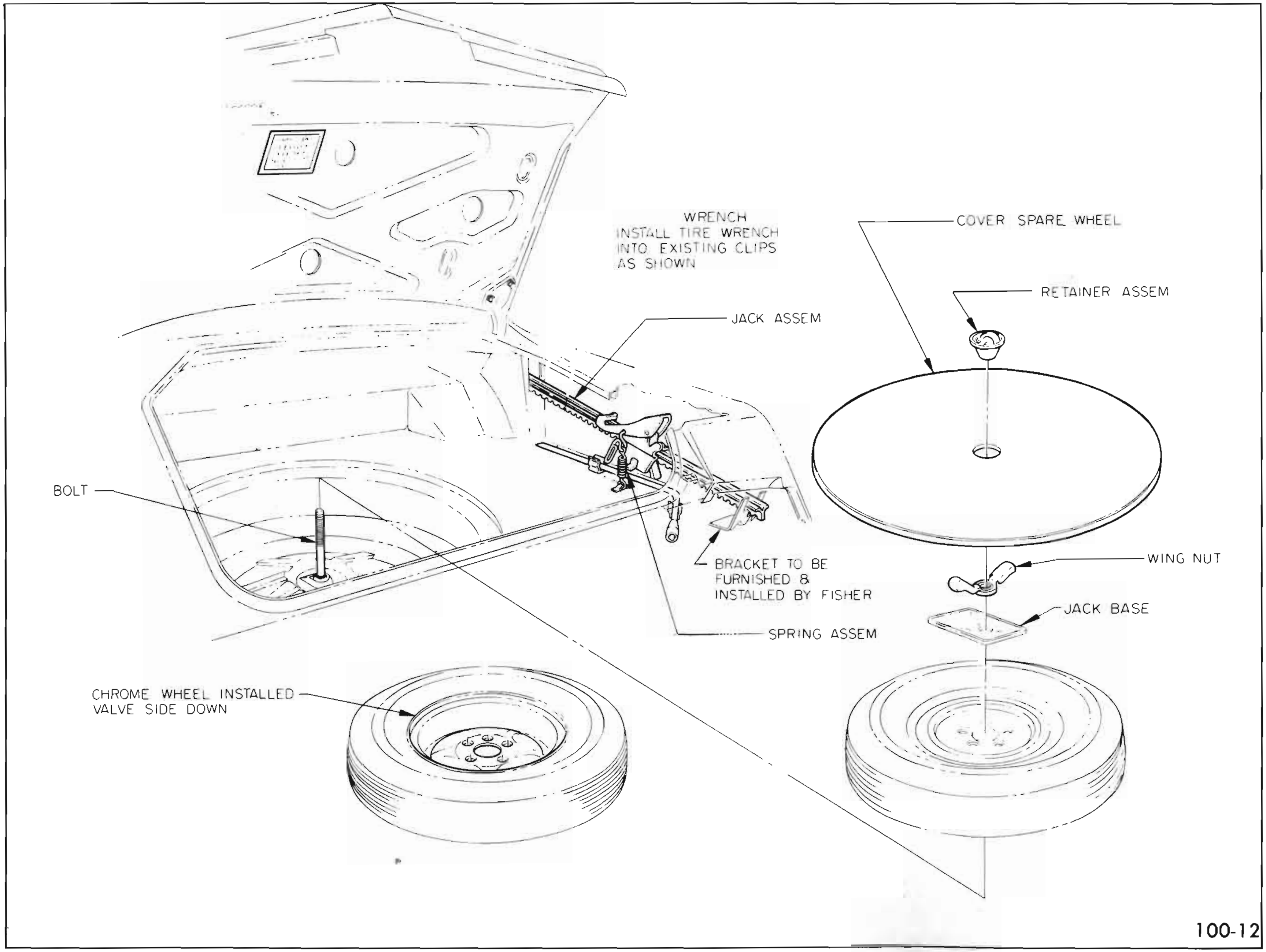


Figure 100-12—Spare Tire and Jack Installation 49000 Series