WHEELS AND TIRES

CONTENTS

DESCRIPTION AND OPERATION

WHEELS

Standard wheels are of steel construction. The center or spider and rim are joined by spot welds or rivets. Wheels are attached with 5 right hand thread nust on X-A-B-C Series and 4 for H Series. Replacement wheels must be equivalent to original equipment wheels in load capacity, diameter, rim width, and offset.

USE OF TIRE CHAINS

Tire chains may be used on the rear wheels of all models equipped with standard size tires provided there is enough clearance. Do not use tire chains on the front wheels as they may interfere with steering. On models equipped with fender skirts, the skirt should be left off.

TIRES

The factory installed tires are designed to operate with loads up to the full rated load capacity, when inflated to the recommended pressures. Correct tire pressures and driving habits have an important influence on tire life. When replacement is necessary, the original equipment type tire should be used. Refer to the Tire Inflation placard on the car.

TIRE SIZE AND LOAD RATING

Tire sizes and load ratings are indicated by a combination of numbers and letters such as G78 x 14, load range B. Radial tire sizes have an R following the first letter such as GR78 x 14. The first letter designates the load the tire will carry at a given inflation pressure. The "higher" the letter, the bigger the tire and so the greater the load capacity. Load range replaces the ply-rating system. Load range B and load range D tires will carry the same load at the same pressure. Load range D tires may be inflated to higher pressures. At the higher pressures they will carry a greater load.

The first set of numbers (78) denotes the ratio of tire height to width. Height divided by width equals section ratio. For example, a G78 tire is 78 percent as high as it is wide. The lower the number, the wider the tire. The second set of numbers (14) shows the inner diameter of the tire.

A TPC specification number (Tire Performance Criteria) is molded into the sidewall of each radial tire next to the tire size designation. The TPC number indicates that the tire meets the GM size and performance specifications for each specific model.

REPLACEMENT TIRES

When replacing tires, only the size, load range, and con-

struction type (bias, bias-belted, or radial) originally installed on the vehicle are recommended. Use of any other tire size or type tire may seriously affect ride, handling, speedometer/odometer calibration, vehicle ground clearance and tire clearance to the body and chassis. The following also should be considered when replacing tires:

1. To achieve best all around vehicle performance, belted-bias tires and bias tires should not be mixed on the same car.

2. Because of possible adverse effects on vehicle handling, do not mix radial ply tires with other type tires on the same vehicle.

3. It is recommended that new tires be installed in pairs on the same axle.

4. When replacing only one tire, it should be paired with the tire having the most tread, to equalize braking traction.

5. When replacing original tires with an optional recommended size of different diameter, the speedometer must be recalibrated by installing the correct speedometer driven gear.

DIAGNOSIS

IRREGULAR AND/OR PREMATURE WEAR

Irregular and premature wear has many causes. Some of them are: incorrect inflation pressures, lack of tire rotation, driving habits, improper alignment.

If the following conditions are noted, rotation is in order:

1. Front tire wear is different from rear.
2. Uneven wear exists across the tread of any tire.
3. Left front and right front tire wear is unequal.
4. Left rear and right rear tire wear is unequal.
5. There is cupping, flat spotting, etc.

A wheel alignment check is in order if the following conditions are noted:

1. Left front and right front tire wear is unequal.
2. Wear is uneven across the tread of any front tire.
3. Front tires' treads have scuffed appearance with "feather" edges on one side of tread ribs or blocks.

WEAR INDICATORS

The original equipment tires have built-in tread wear indicators to show when tires need replacement. These indicators will appear as 1/2 inch wide bands when the tire tread depth becomes 1/16 of an inch. When the indicators appear in two or more adjacent grooves, at three locations around the tire, or when cord or fabric is exposed, tire replacement due to tread wear is recommended. Figure 3I-1.

Figure 3I-1 - Wear Indicators Showing

VIBRATION

Correcting tire balance and radial force variation solves 95% of car vibration problems. Wheel and tire out of balance causes 75% of highway speed vibrations, so balance should be checked first.

Radial Force Variation

For a tire-wheel assembly to cause car vibration, it must first cause movement in the spindle or axle of the car. The spindle or axle of car must be moved before the car can "feel" a vibration.

Think of a "perfectly" round tire as a number of identical "springs" (Figure 3I-2). As the tire and wheel rotate, each one of these springs contacts the road and flexes.

If the amount of flexing of each spring is uniform as the tire rolls over the smooth road surface, it does not cause the spindle to move. As long as all the springs have the same stiffness the spindle will not be moved and thus the car will not "feel" any vibration.

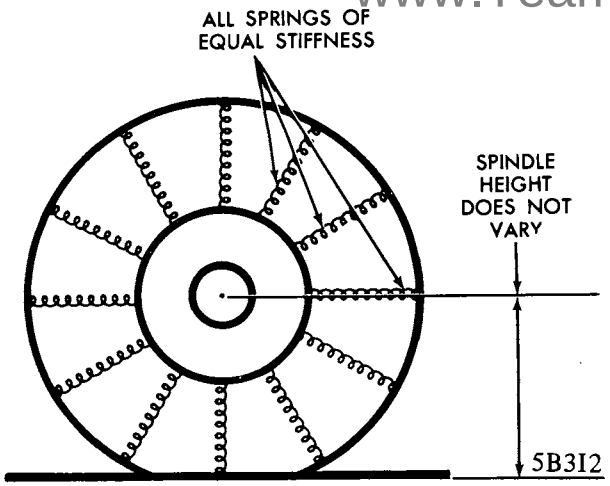


Figure 3I-2

If one of these springs is stiffer than the others, and the tire comes into contact with the road at this stiffer point, Figure 3I-3, the spindle will move upward because the stiffer spring does not "give" as much as the other springs in the tire.

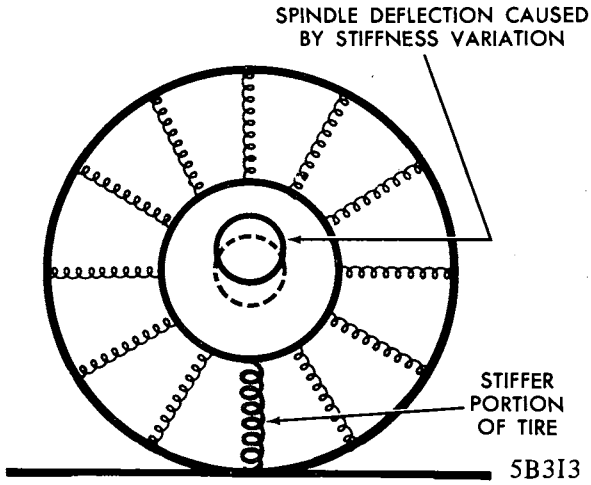


Figure 3I-3

Loaded Radial Runout

As the tire revolves faster, this spindle movement speeds up. At highway speed, it matches the resonant frequency of most cars' suspension systems and causes a shake-type ride or car vibration.

The differences in the stiffness of the tire is called tire "radial force variation" and is a cause of vehicle vibration. The more the spindle movement (loaded radial runout), the more the car will vibrate.

Lateral Force Variation (Radial Tire Waddle)

Complaint Description

Waddle is side to side movement at the front and/or rear of the car. Figure 3I-4. It is caused by the steel belt not being straight within the tire. It is most noticeable at low speed, 5 to 30 MPH. It may also appear as a ride roughness at 50 to 70 MPH.

It is possible to road test a car and tell on which end of the car the faulty tire is located. If the waddle tire is on the rear, the rear end of the car will shake from side to side or "waddle". From the driver's seat it feels as though someone is pushing on the side of the car.

If the faulty tire is on the front, the waddle is more visual. The front sheel metal appears to be moving back and forth and the driver feels as though he is at the pivot point in the car.

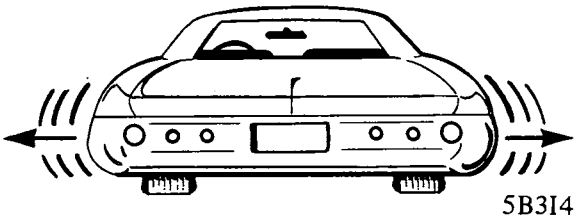


Figure 3I-4 - Waddle Condition

LEAD

"Lead", is the straying of the vehicle from a straight path on a level road with no pressure on the steering wheel.

Lead is usually caused by these conditions: (1) alignment, (2) uneven brake adjustment, and (3) tire construction. This diagnosis relates how to tell between tire lead and the need for alignment correction.

The way in which a tire is built can produce lead in a vehicle. An example of this is placement of the belt. Off center belts on radial tires can cause the tire to develop a side force while rolling straight down the road. If one side of the tire is a little larger diameter than the other, the tire will tend to roll to one side. This will develop a side force which can produce vehicle lead.

The procedure is Figure 3I-13 should be used to make sure that front alignment is not mistaken for tire lead.

- Part of the lead diagnosis procedure is different from the proper radial tire rotation pattern currently in the Owners Manual. The Owners Manual recommends front to rear rotation only. If a medium to high mileage tire is moved to the other side of the car, be sure to check that ride roughness has not developed.
- Rear Tires will not cause lead.

MAINTENANCE AND ADJUSTMENTS

WHEEL MAINTENANCE

Wheels must be replaced if they are bent, dented, have excessive lateral or radial runout, leak air through welds, have elongated bolt holes, if lug nuts won't stay tight, or if they are heavily rusted. Wheels with greater runout than shown in Figure 3I-14 may cause objectional vibrations.

Wheel repairs that use welding, heating, or peening are

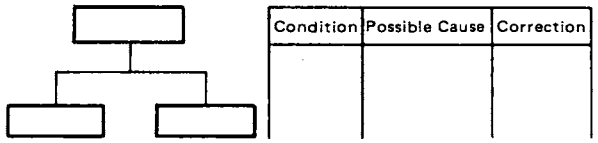
Figure 3I-5 - Examples of Tire Wear

DIAGNOSIS CHARTS

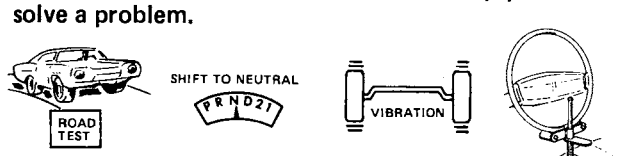
Using the TPD for RADIAL-LATERAL VIBRATION

Introduction

This section presents a systematic method of diagnosing and troubleshooting RADIAL–LATERAL VIBRATION. The charts you will be using are different from the ones you have used before. They aren't "go–no go" decision trees or tables.



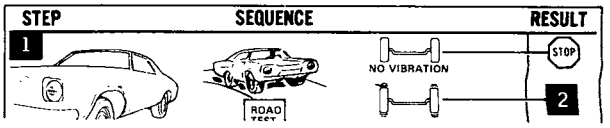
Instead the new diagnosis and troubleshooting charts use pictures plus a few words to help you solve a problem.



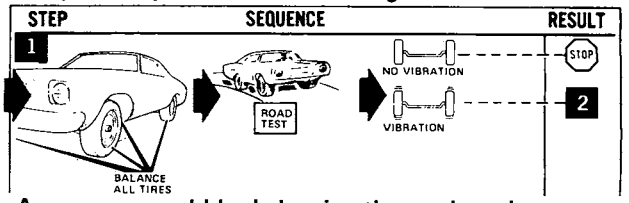
and symbols have replaced words.

Using the Charts

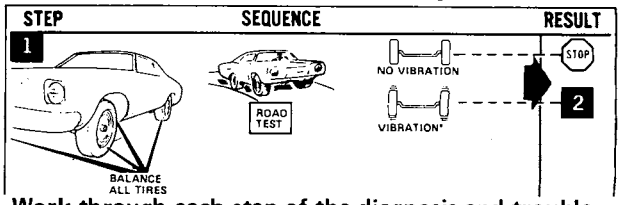
The charts are divided into three sections: step, sequence and result.



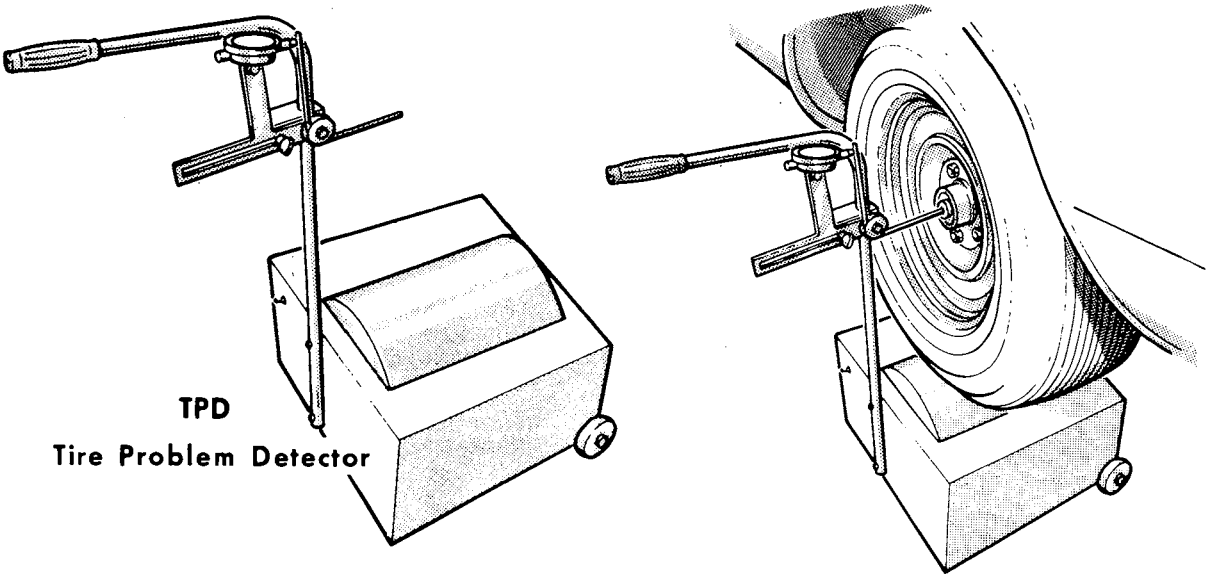
Always start at the first step and go through the complete sequence from left to right.



A sequence could be balancing tires and road testing for vibration. Each sequence ends with a result and tells you the next step to go to.



Work through each step of the diagnosis and trouble-shooting charts till the system is repaired. STOP



If TPD is not available use SUBSTITUTION METHOD shown at back of charts 5B316

Figure 3I-6

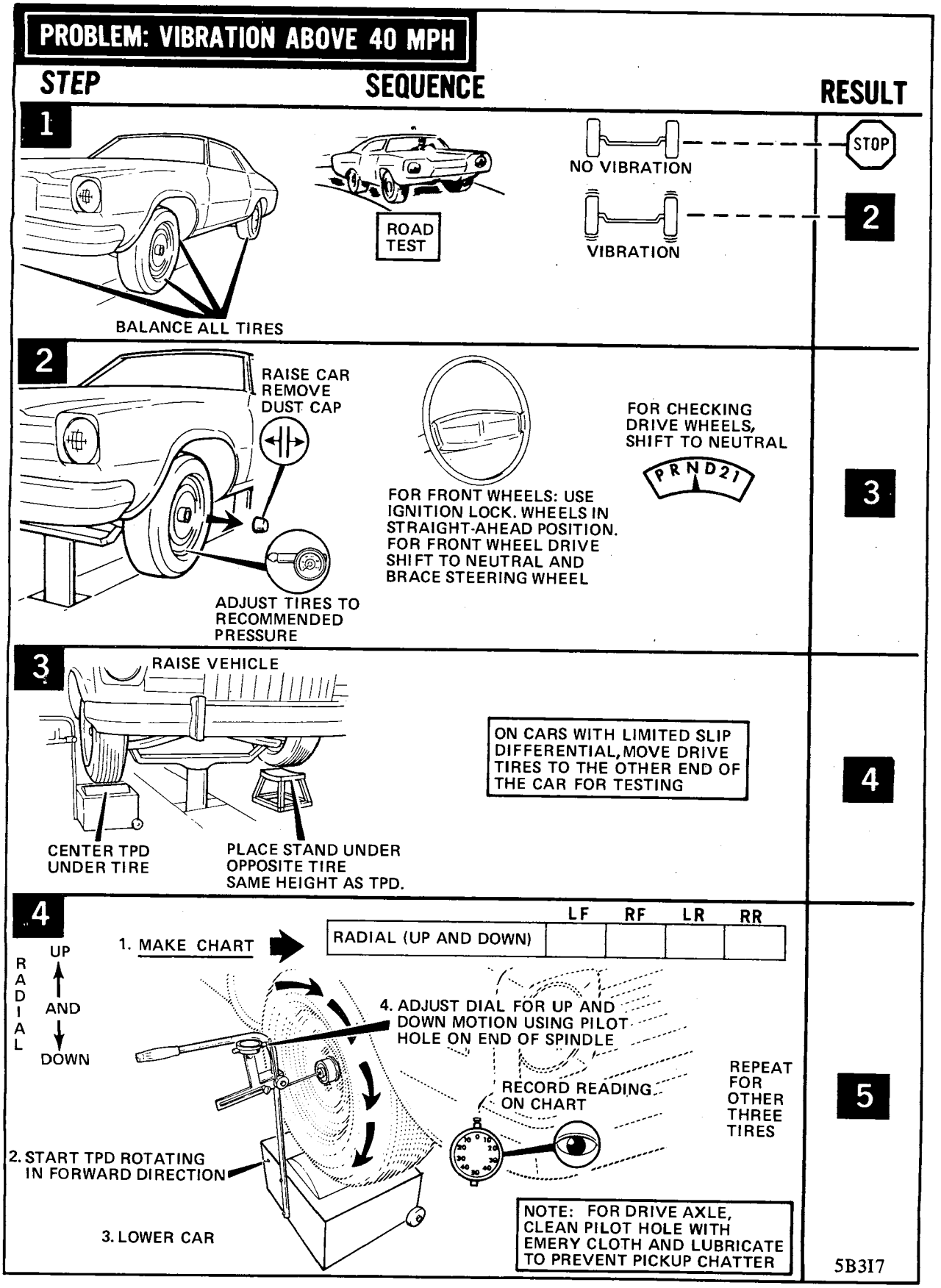


Figure 3I-7

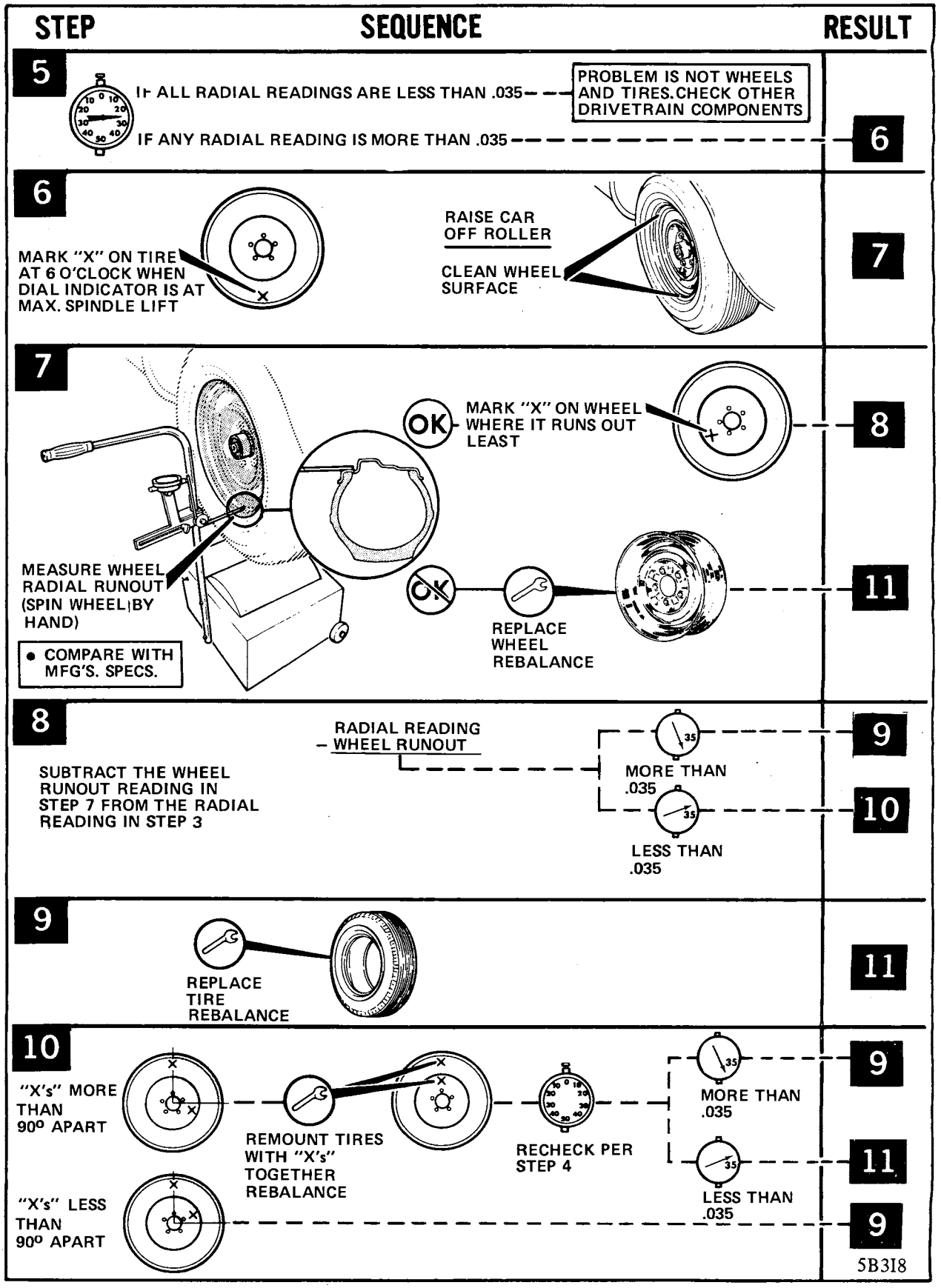
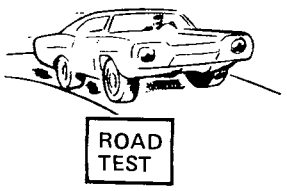
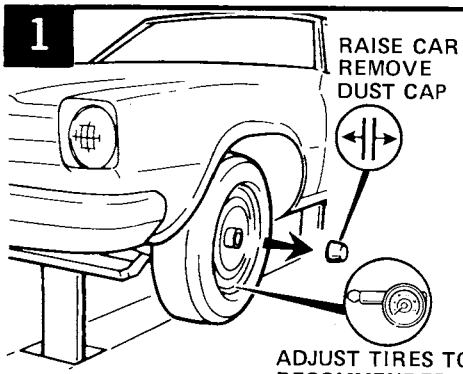
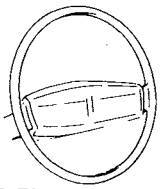
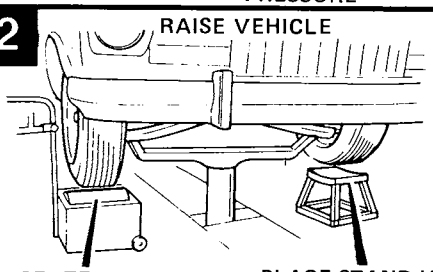
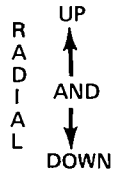
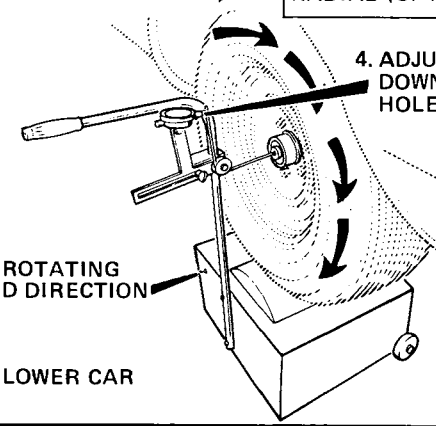
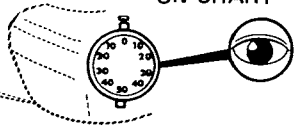


Figure 3I-8

STEP	SEQUENCE	RESULT
11	 ROAD TEST NO VIBRATION VIBRATION	STOP GO BACK TO 1

PROBLEM: WADDLE BELOW 40 MPH

STEP	SEQUENCE	RESULT
1	 RAISE CAR REMOVE DUST CAP ADJUST TIRES TO RECOMMENDED PRESSURE  FOR FRONT WHEELS: USE IGNITION LOCK. WHEELS IN STRAIGHT-AHEAD POSITION. FOR FRONT WHEEL DRIVE SHIFT TO NEUTRAL AND BRACE STEERING WHEEL FOR CHECKING DRIVE WHEELS, SHIFT TO NEUTRAL 	2
2	 RAISE VEHICLE CENTER TPD UNDER TIRE PLACE STAND UNDER OPPOSITE TIRE SAME HEIGHT AS TPD. ON CARS WITH LIMITED SLIP DIFFERENTIAL, MOVE DRIVE TIRES TO THE OTHER END OF THE CAR FOR TESTING	3
3	1. MAKE CHART RADIAL UP AND DOWN  2. START TPD ROTATING IN FORWARD DIRECTION 3. LOWER CAR  4. ADJUST DIAL FOR UP AND DOWN MOTION USING PILOT HOLE ON END OF SPINDLE RECORD READING ON CHART  NOTE: FOR DRIVE AXLE, CLEAN PILOT HOLE WITH EMERY CLOTH AND LUBRICATE TO PREVENT PICKUP CHATTER	4 5B3I9

	LF	RF	LR	RR
RADIAL (UP AND DOWN)				

Figure 3I-9

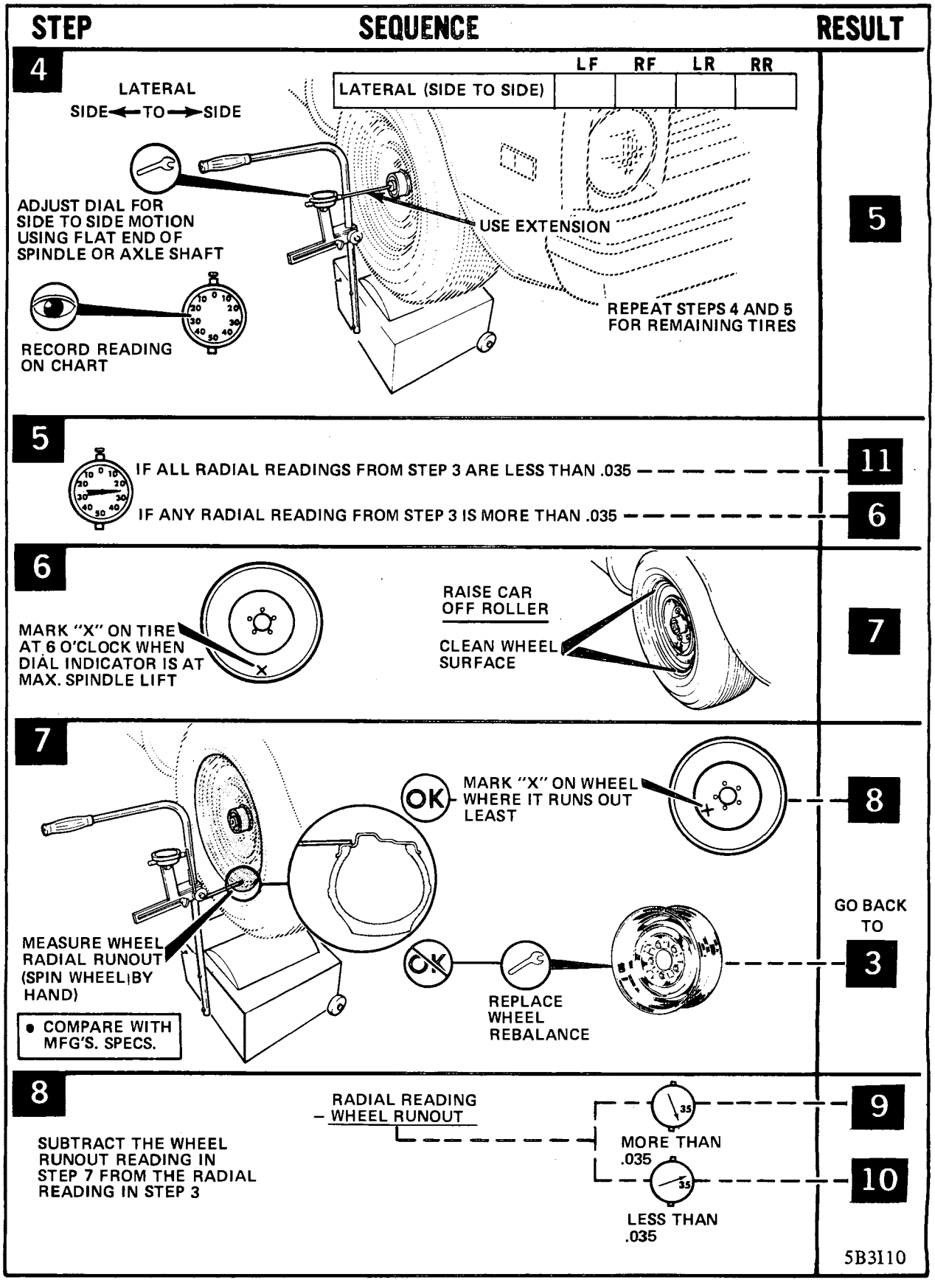


Figure 3I-10

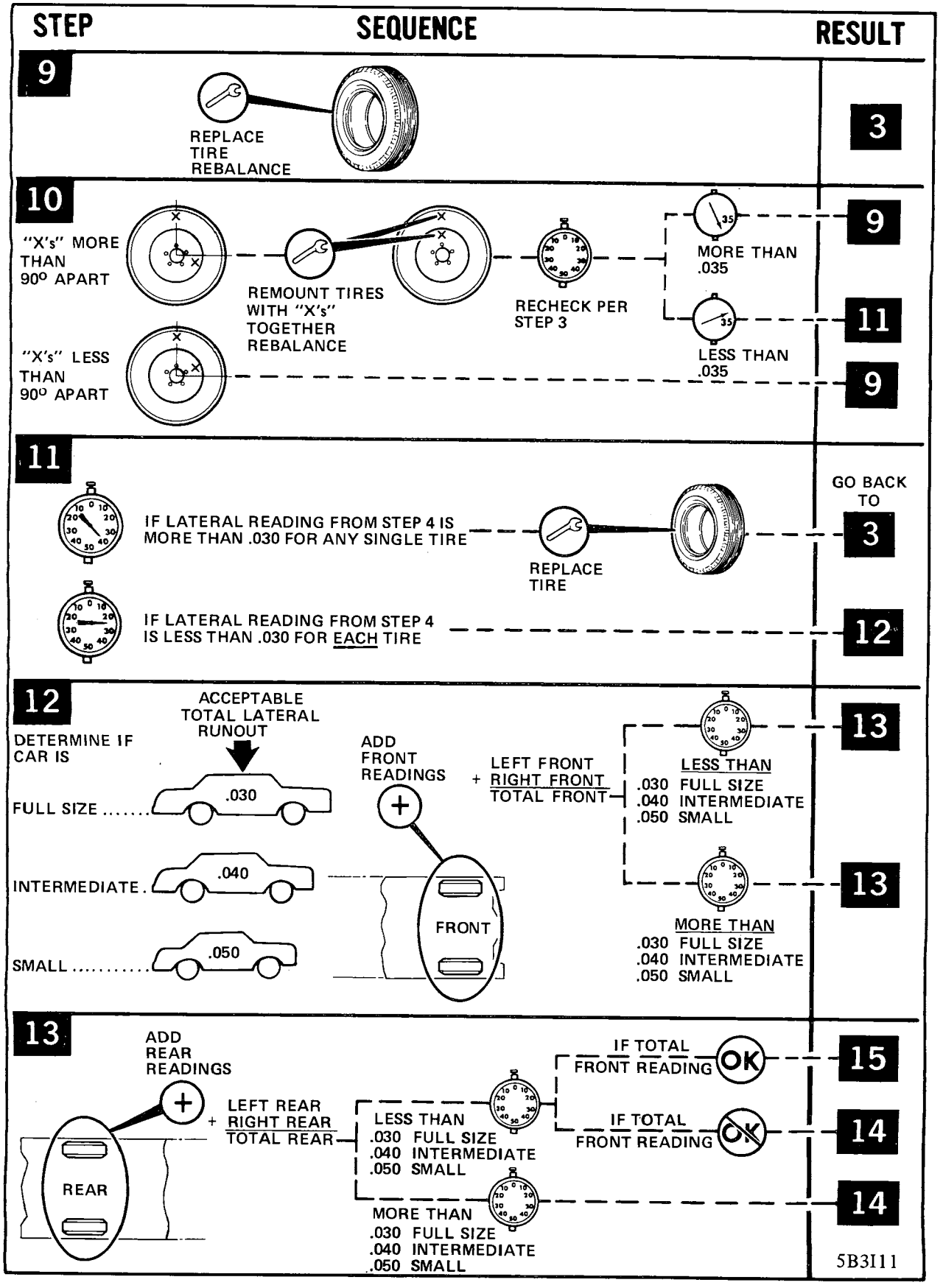
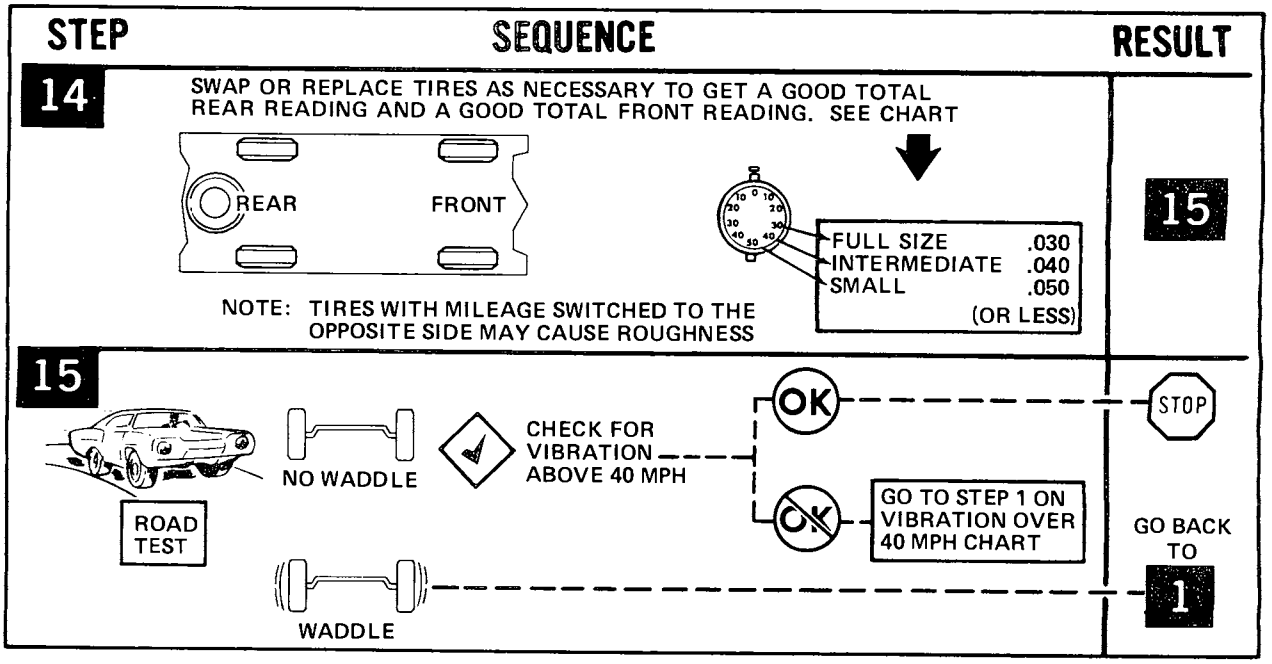
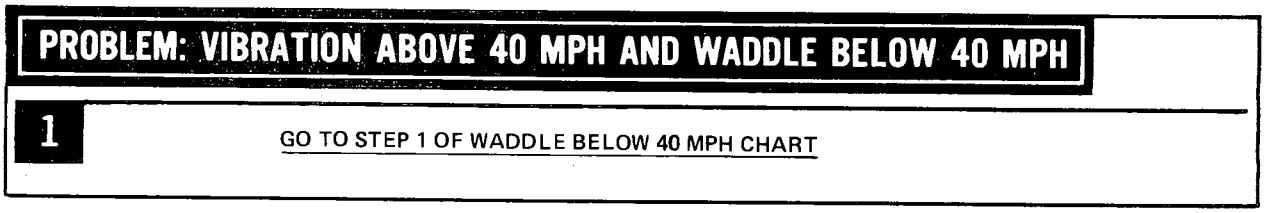


Figure 3I-11





SUBSTITUTION METHOD

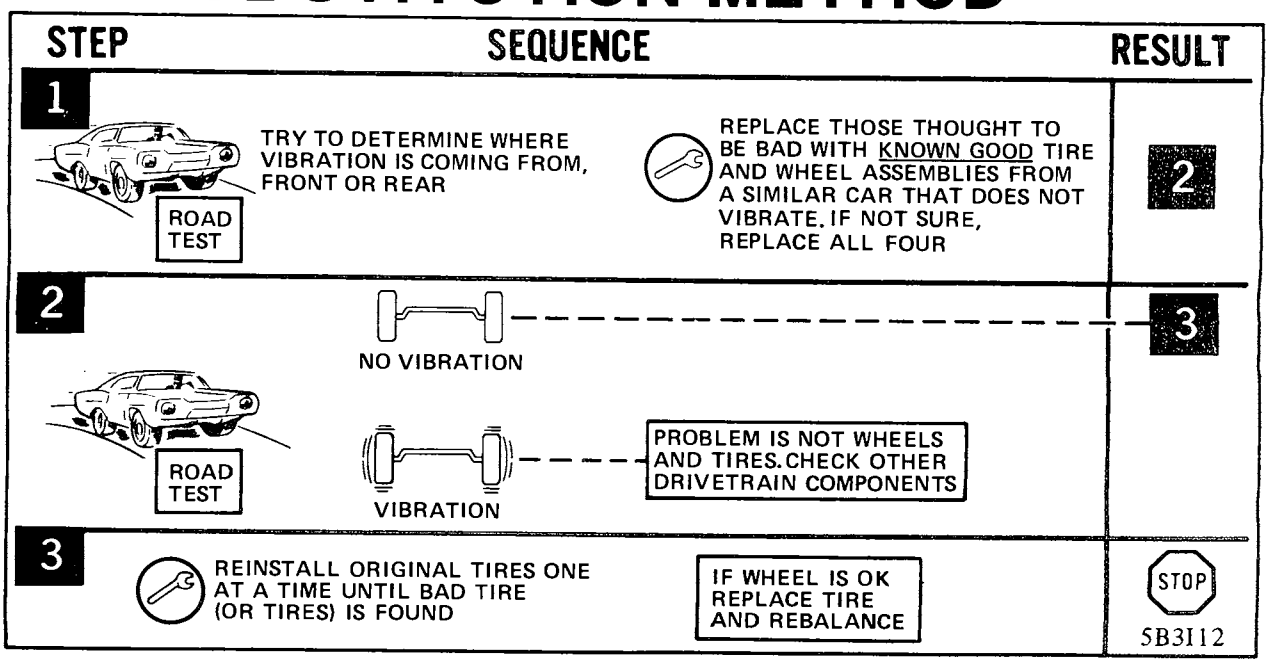


Figure 3I-12

RADIAL TIRE LEAD DIAGNOSIS CHART

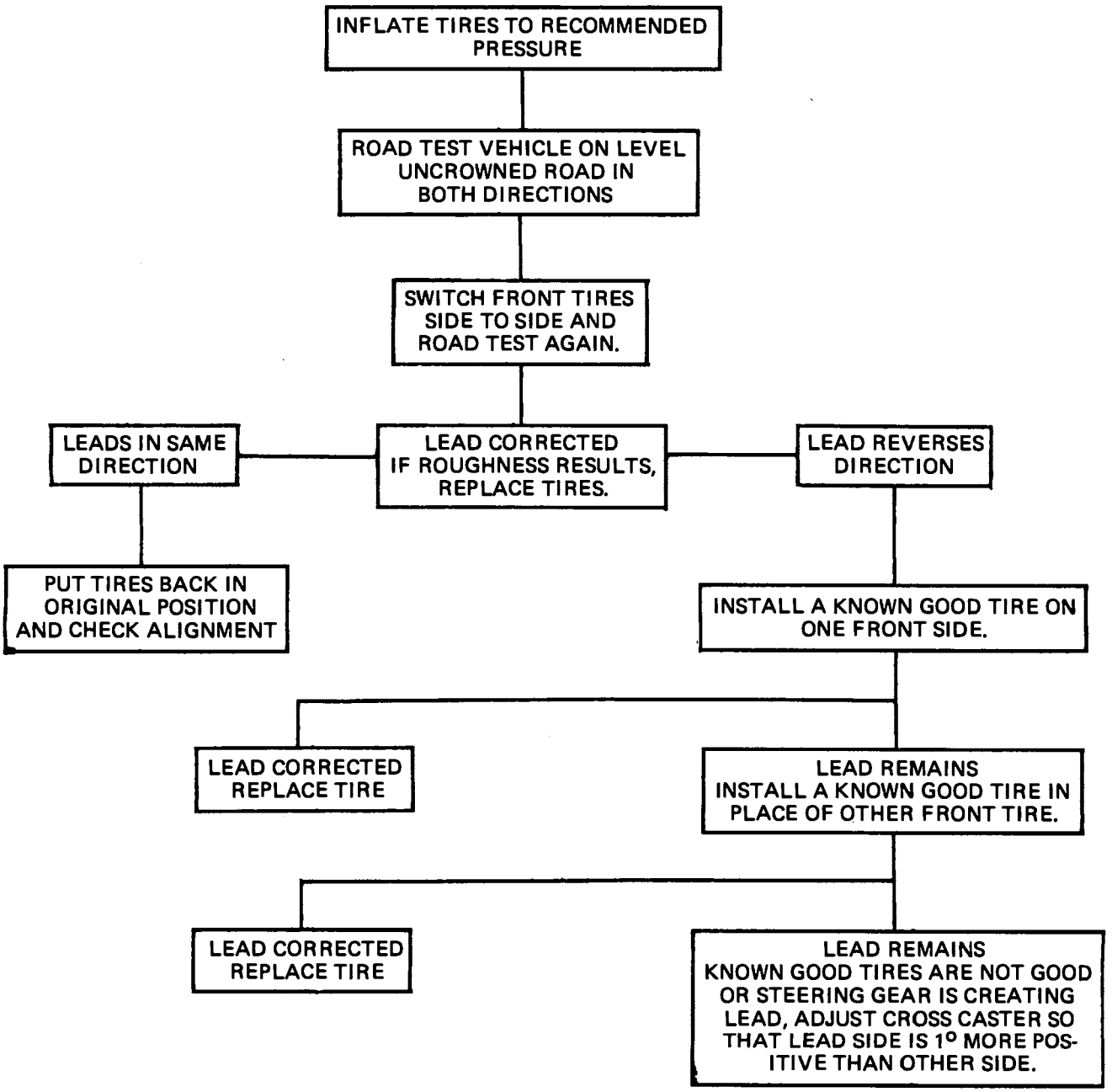


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Figure 3I-13 Radial Tire Lead Diagnosis

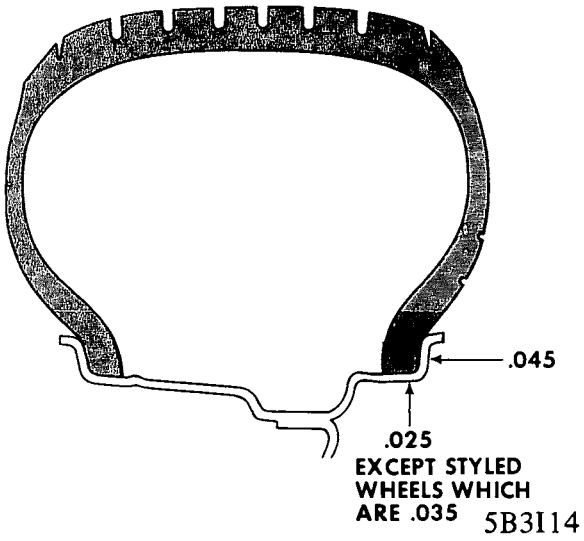

Figure 3I-14 Wheel Runout

not approved. An inner tube is not an acceptable repair for leaky wheels or tires.

Wheel nuts must be tightened in sequence and to proper torque to avoid bending wheel or brake drum or rotor. Figure 3I-15.

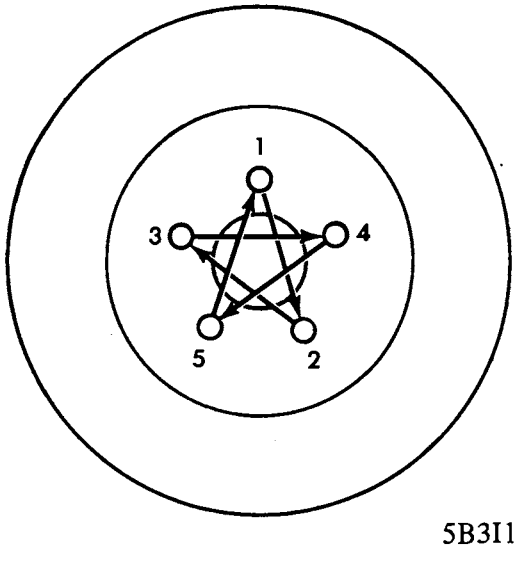

Figure 3I-15 Wheel Nut Tightening Sequence

INFLATION OF TIRES

Correct inflation pressure is an important item of tire care. The pressure recommended for any model is carefully calculated to give a satisfactory ride, stability, steering, tread wear, cord life and resistance to bruises.

Tire pressure should be checked monthly or before any extended trips and set to specifications on the placard lable. Check the tires cold (after car has set for 3 hours, or driven less than one mile).

Valve caps or extensions should be on the valve to keep dust and water out.

For continuous high speed operation (over 75 MPH) increase pressures 4 PSI up to maximum of 32 PSI cold, for load range B tires, 36 PSI for load range C, or 40 PSI for D rated tires. (Sustained speeds above 75 MPH are not recommended when the 4 PSI adjustment would require pressures greater than maximum.)

Tire pressures may increase as much as 6 PSI when hot.

Higher Than Recommended Pressure Can Cause:

1. Hard ride.
2. Tire bruising or carcass damage.
3. Poor traction at rear wheels.
4. Rapid tread wear at center of tire.

Lower Than Recommended Pressure Can cause:

1. Tire squeal on turns.
2. Hard steering.
3. Rapid and uneven wear on the edges of the tread.
4. Tire rim bruises and rupture.
5. Tire cord breakage.
6. Tramp and shimmy.
7. High tire temperatures.
8. Poor handling.
9. High fuel consumption.

Unequal Pressure On Same Axle Can Cause:

1. Uneven braking.
2. Steering lead.
3. Poor handling.
4. Swerve on acceleration.

TIRE ROTATION

To equalize wear, rotate tires according to Figure 3I-16 for bias tires or radial tires. Do not use the X method on radials as roughness and irregular wear can result. Radial tires should be rotated at the first 7,500 miles and then at least every 15,000 miles. Bias belted tires should be rotated tires should be rotated every 7,500 miles.

Due to their design, radial tires tend to wear at a faster rate in the shoulder area, particularly in front positions. This makes regular rotation necessary.

There are two rotation plans; one for four tires and one for five tires. See rotation chart Figure 3I-16.

Unusual wear such as flat spots, cups, gouges, and wavy wear can be caused by loose or neglected suspension or tire balance.

Use 4 wheel rotation only when vehicle is equipped with a stowaway spare.

The importantce of regular rotation and alignment check cannot be over-emphasized.

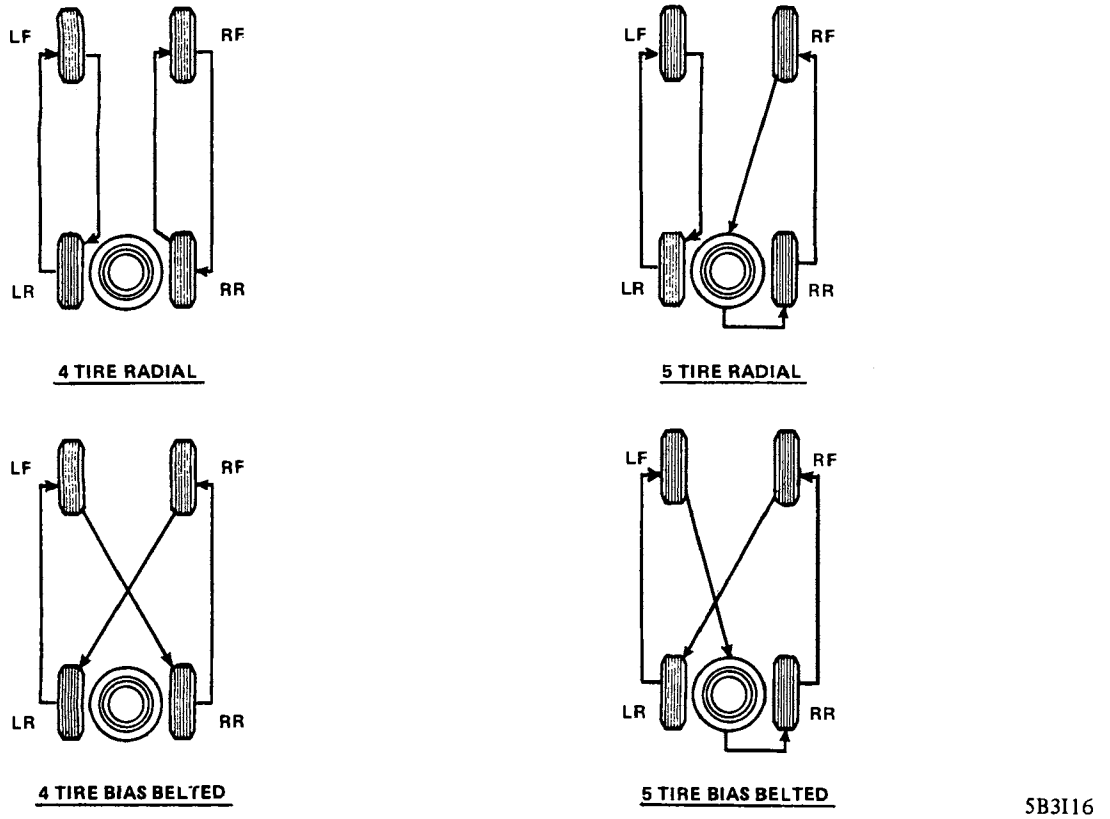

Figure 3I-16 Tire Rotation

BALANCING WHEELS

There are two types of wheel and tire balance: static and dynamic. Static balance is the equal distribution of weight around the wheel. Wheels that are statically unbalanced cause a bouncing action called wheel tramp. This condition will eventually cause wear and damage to the tire. Figure 3I-17.

Dynamic balance is the equal distribution of weight on each side of the centerline so that when the tire spins, there is no tendency for the assembly to move from side to side. Wheels that are dynamically unbalanced may cause a vibration at any speed. Figure 3I-18.

General Balance Precautions

Deposits of mud, etc. must be cleaned from the inside of the rim. Stones should be pried from the tread in order to

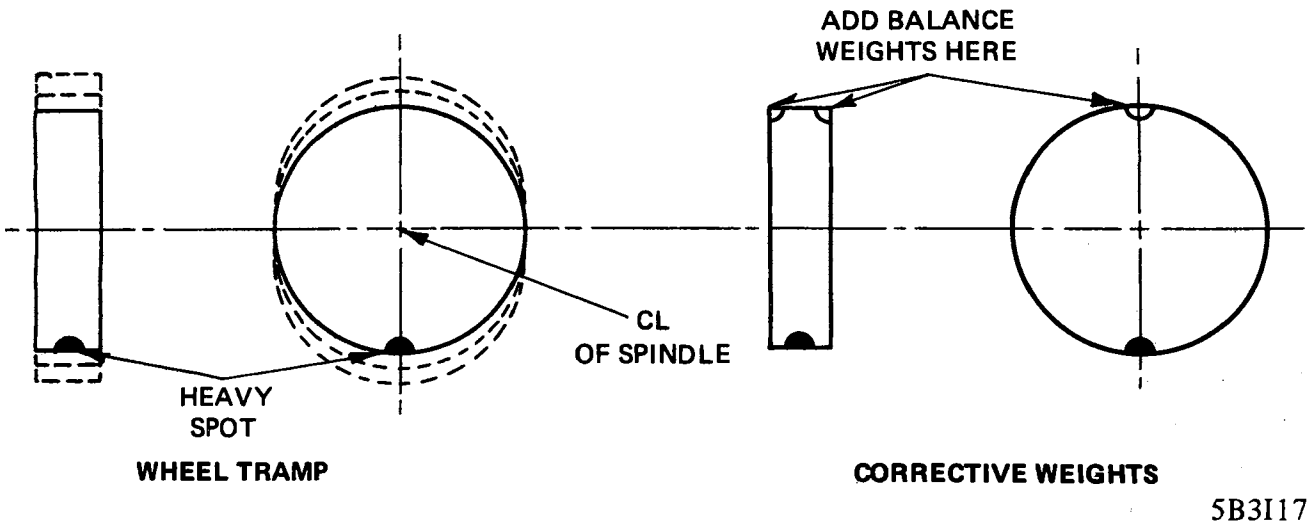

Figure 3I-17 Static Unbalance

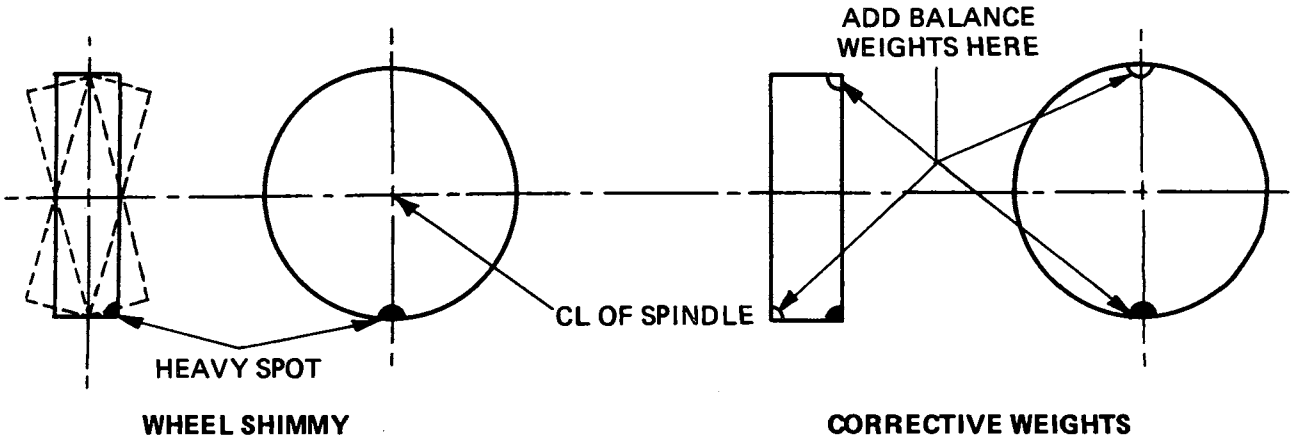

Figure 3I-18 Dynamic Unbalance

avoid operator injury during spin balancing and to obtain a good balance. The tire should be inspected for any damage, then balanced according to the equipment manufacturer's recommendation.

WARNING: ON CARS WHICH DO NOT HAVE LIMITED SLIP DIFFERENTIAL, DRIVE WHEEL SPIN SHOULD BE LIMITED TO 35 MPH AS INDICATED ON THE SPEEDOMETER. THIS LIMIT IS NECESSARY BECAUSE THE SPEEDOMETER ONLY INDICATES ONE-HALF OF THE ACTUAL WHEEL SPEED WHEN ONE DRIVE WHEEL IS SPINNING AND THE OTHER DRIVE WHEEL IS STOPPED. UNLESS CARE IS TAKEN IN LIMITING DRIVE WHEEL SPIN, THE SPINNING WHEEL CAN REACH EXCESSIVE SPEEDS. THIS CAN RESULT IN POSSIBLE TIRE DISINTEGRATION OR DIFFERENTIAL FAILURE, WHICH COULD CAUSE SERIOUS PERSONAL INJURY OR EXTENSIVE VEHICLE DAMAGE.

On cars equipped with a limited slip differential, the following procedure should be used:

1. Raise both rear wheels with a jack under the differential. Put jack stands under axle as a safety measure, but do not put car weight on stands.

WARNING: DO NOT ATTEMPT TO BALANCE A TIRE ON A DRIVE WHEEL WITH THE OTHER DRIVE WHEEL ON THE GROUND. THE CAR MAY DRIVE THROUGH THIS WHEEL AND CAUSE THE VEHICLE TO MOVE UNEXPECTEDLY, RESULTING IN PERSONAL INJURY AND PROPERTY DAMAGE.

2. Remove one wheel.

3. Reinstall lug nuts and tighten securely to retain the brake drum.

4. Balance the remaining wheel using engine power to spin the wheel.

WARNING: ON CARS WHICH HAVE LIMITED SLIP DIFFERENTIAL DRIVE WHEEL SPIN SHOULD BE LIMITED TO 70 MPH. THIS IS TO PREVENT TIRE DISINTEGRATION RESULTING IN SERIOUS PERSONAL INJURY AND EXTENSIVE PROPERTY DAMAGE.

5. Reinstall the second wheel and balance.

TIRE REPAIR

Punctured tires should be removed from the wheel and permanently repaired from the inside. (Follow tire manufacturer's recommendations).

Punctures in the tread area up to 1/4" in diameter can be repaired. Figure 3I-19. A head type of plug repair is recommended as it not only patches the injury from the inside, but it also plugs the injury.

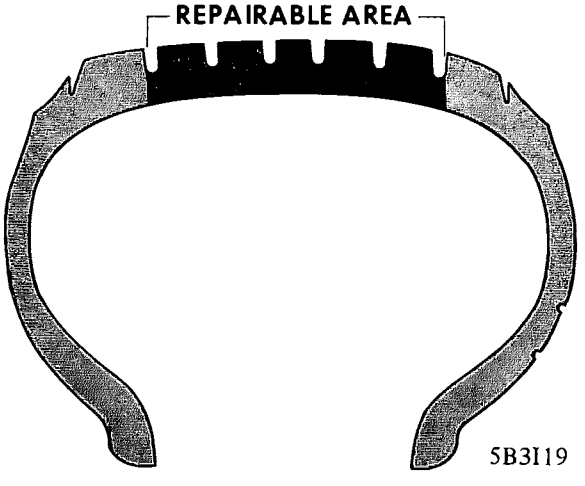

Figure 3I-19 - Repairable Area of Tire

Externally applied plug type repairs should be considered temporary and the tire should be permanently repaired as soon as possible.

Never Repair A Tire With:

1. Ply separation.
2. Broken or damaged bead wires.
3. Loose cords.
4. Tread separation.
5. Cracks which extend into the tire fabric.
6. Sidewall puncture.
7. Tires with tread wear indicators showing.

Demounting and Mounting of Tubeless Tire

Use a tire changing machine to mount or demount tubeless tires. Follow the equipment manufacturer's instructions.

Rim bead seats should be cleaned with a wire brush or coarse steel wool to remove lubricants, old rubber, and light rust.

CAUTION: *Do not use hand tools or tire irons to change tires as they may damage the tire beads or wheel rim.*

WARNING: DO NOT STAND OVER TIRE WHEN INFLATING. BEAD WIRE MAY BREAK WHEN BEAD SNAPS OVER SAFETY HUMP AND CAUSE SERIOUS INJURY.

Inflate to 40 PSI, so that beads are completely seated.

WARNING: DO NOT EXCEED 40 PSI PRESSURE WHEN INFLATING. IF 40 PSI PRESSURE WILL NOT SEAT BEADS, DEFLATE, RELUBRICATE AND REINFLATE. OVERINFLATION MAY CAUSE THE BEAD WIRE TO BREAK AND CAUSE SERIOUS PERSONAL INJURY.

Install valve core and inflate to proper pressure. Check the locating rings of the tire to be sure they show around the rim flanges on both sides.

STOWAWAY SPARE

It is recommended that repair or replacement of the stowaway spare tire be made by the authorized tire dealer.

SPECIFICATIONS

BOLT TORQUE SPECIFICATIONS

Use a reliable torque wrench when tightening the parts listed below. This will prevent strain or distortion of the parts or damage to the threads. The specifications given are for clean and lubricated threads only. Dry or dirty threads produce increased friction and prevent accurate measurement of tightness. It is important that these specifications be strictly observed. Overtightening may damage threads and prevent the attainment of the proper torque.

Wheel Attaching Nuts	Torque Lb. Ft.
H-X-A Series All Wheels	
Front	70
Rear	70
B-C-E Series All Wheels	
Front	90
Rear	90

WHEEL USAGE CHART

	H Series	X Series	A Series	B-C-E Series
Standard Size	13-6JJ	14 x 6JJ	SR, G.S., Wag. 15 x 7JJ All Others 15 x 6JJ	15 x 6JJ
Optional Size	–	14 x 5JJ	15 x 7JJ 14 x 6JJ	–
Rim Type	Drop Center	Drop Center	Drop Center	Drop Center
No. of Studs	4	5	5	5
Stud Circle Dia.	4.0″	4.75″	4.75″	5.0″
Stud Size	7/16-20	7/16-20	7/16-20	1/2-20

TIRE SIZE CHART

H Series

	Standard	Optional
Skyhawk	BR78-13 B/W B78-13 SSS	BR78-13 W/W BR78-13 W/L

X Series

Apollo, Skylark	FR78-14 B/W F78-14 SSS on Hatchback	FR78-14 W/W FR78-14 W/L E78-14 B/W E78-14 W/W E78-14 SSS on Hatchback
Apollo SR, Skylark SR	FR78-14 W/W	

A Series

Century Special	FR78-15 B/W F78-14 SSS	FR78-15 W/W G-78-14 W/W
Century, Regal	GR78-15 B/W	GR78-15 W/W GR70-15 W/L G78-14 W/W G78-14 SSS
Regal SR	GR70-15 W/W	G78-14 SSS
Gran Sport	GR70-15 B/W	GR70-15 W/W GR70-15 W/L G78-14 SSS
Wagon	HR78-15 B/W	HR78-15 W/W

B-C-E Series

LeSabre 350 Engine	HR78-15 B/W	HR78-15 W/W H78-15 W/W
LeSabre 400, 455 Engine	JR78-15 B/W	JR78-15 W/W J78-15 W/W
Wagon	LR78-15 B/W Load Range C	LR78-15 W/W Load Range C
Electra, Riviera	JR78-15 B/W	JR78-15 W/W

B/W = Blackwall

W/W = Whitewall

W/L = White Lettered

SSS = Stowaway Spare

Unless otherwise noted, all tires are load range B. Non-radial tires are bias belted.

TIRE PRESSURE CHART

		*5 Passengers up to 750 Lbs.		Max. Capacity	
Series	Tires	Front	Rear	Front	Rear
H	B	24	26	26	28
X	F	24	24	24	28
	E	26	26	28	32
A	F	32	32	32	32
	G	26	26	28	28
	H	24	28	26	32
B	L	24	28	26	36
	H	24	24	26	28
	J	24	24	26	28
C	J	24	24	26	28
E	J	24	24	26	28

*H Series is 2-Passenger up to 300 Lbs.

TIRE PERFORMANCE CRITERIA SPECIFICATIONS

Tire Size	T. P. C. Number
BR78 x 13	1008
FR78 x 14	1004
FR78 x 15	1010
GR78 x 15	1003
GR70 x 15	1007
HR78 x 15	1001
JR78 x 15	1002
LR78 x 15	1006
Load Range C	

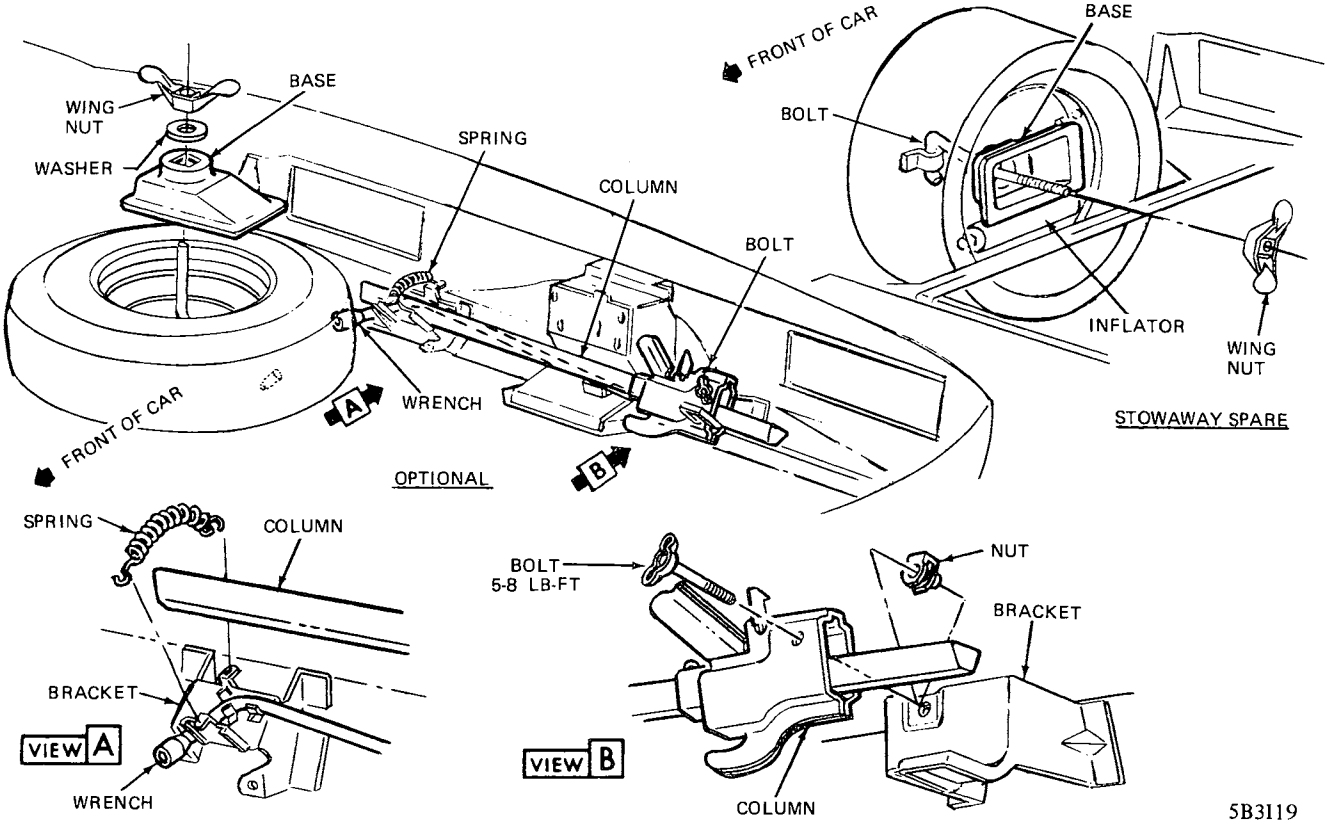

Figure 3I-19A - H Series Spare Tire and Jack Stowage

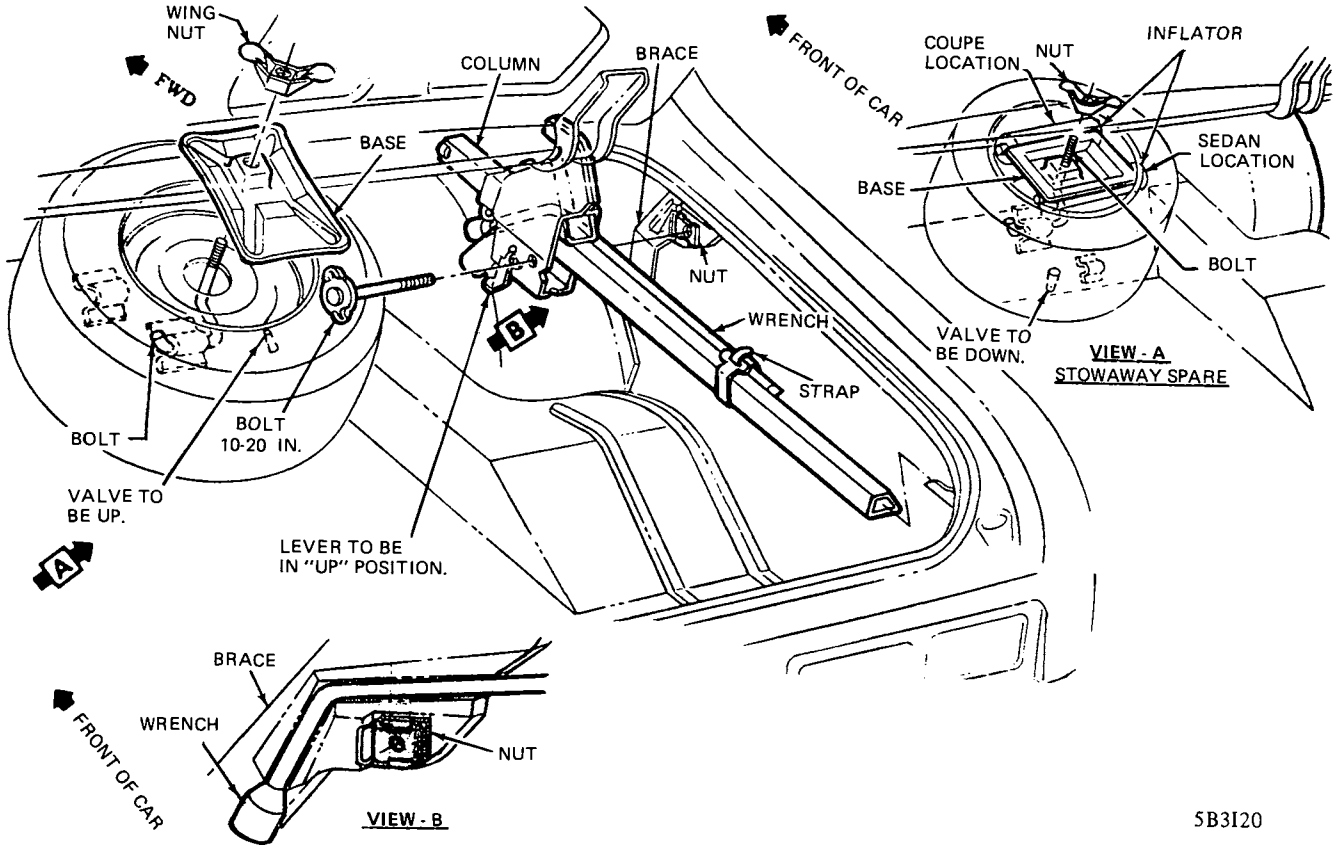

Figure 3I-20 - X Series Coupe and Sedan Spare Tire and Jack Stowage

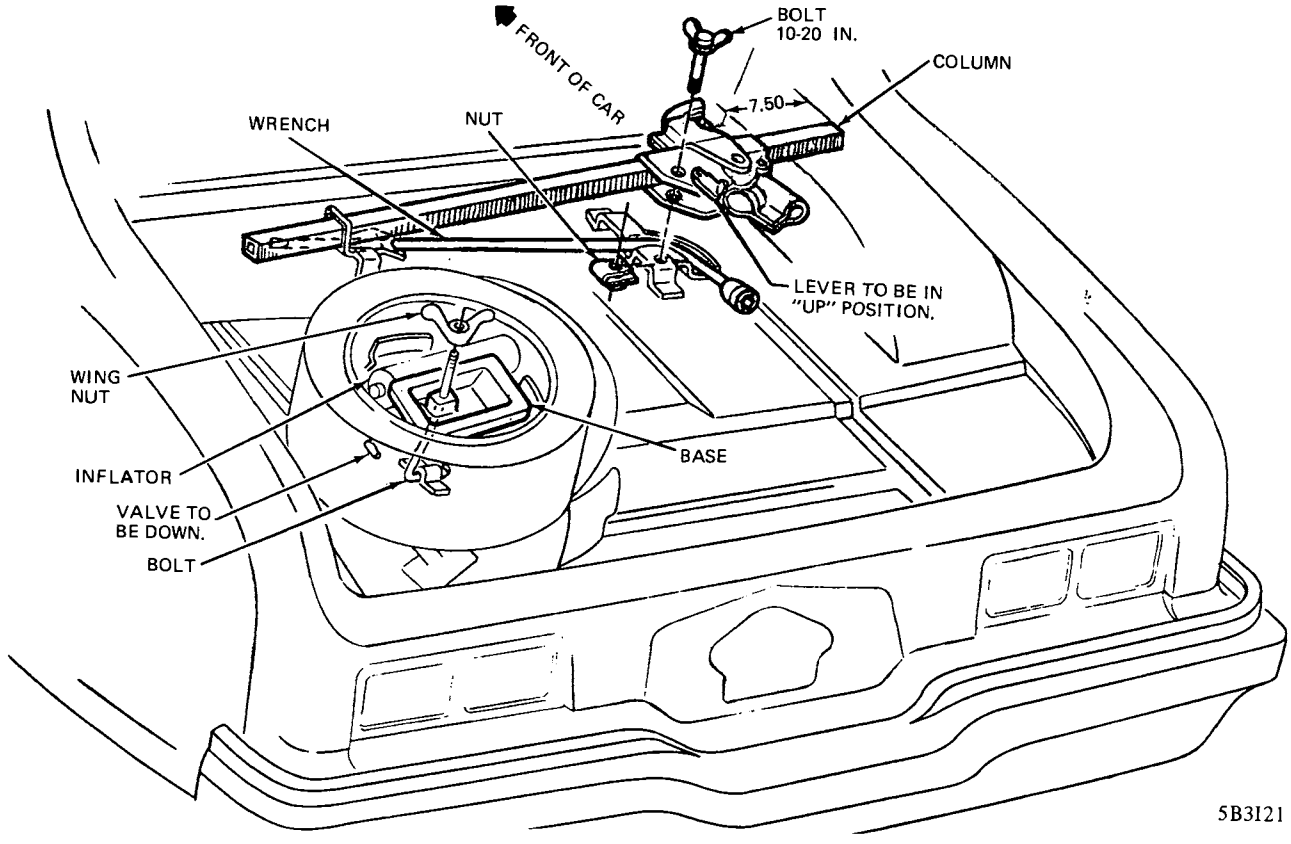

Figure 3I-21 - X Series Hatchback Spare Tire and Jack Stowage

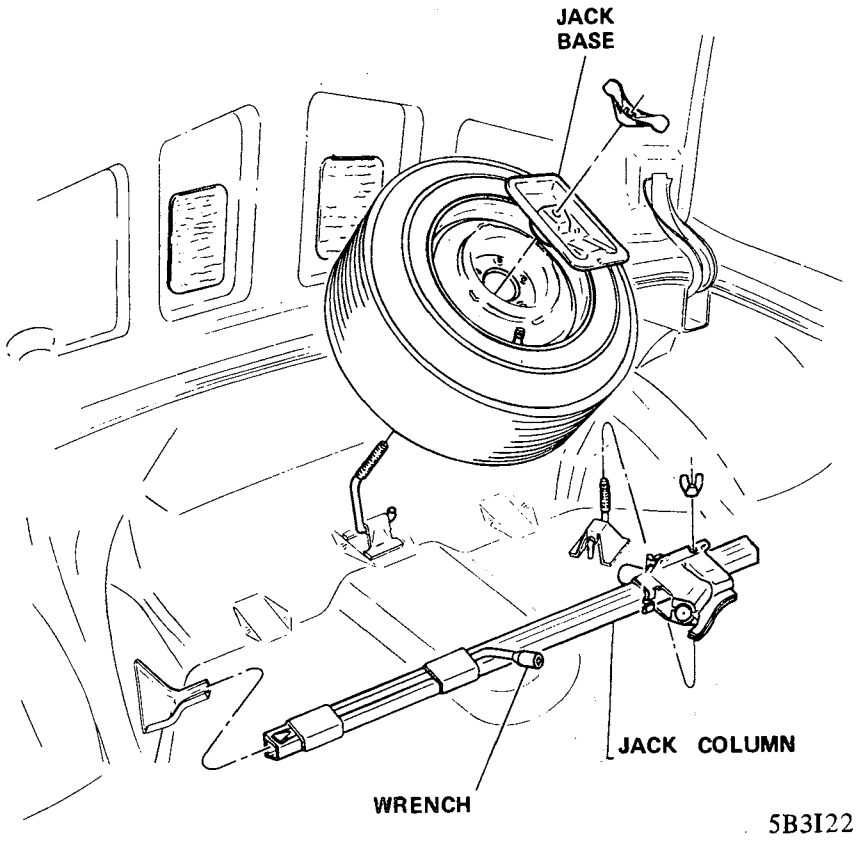

Figure 3I-22 - A Series Spare Tire and Jack Stowage

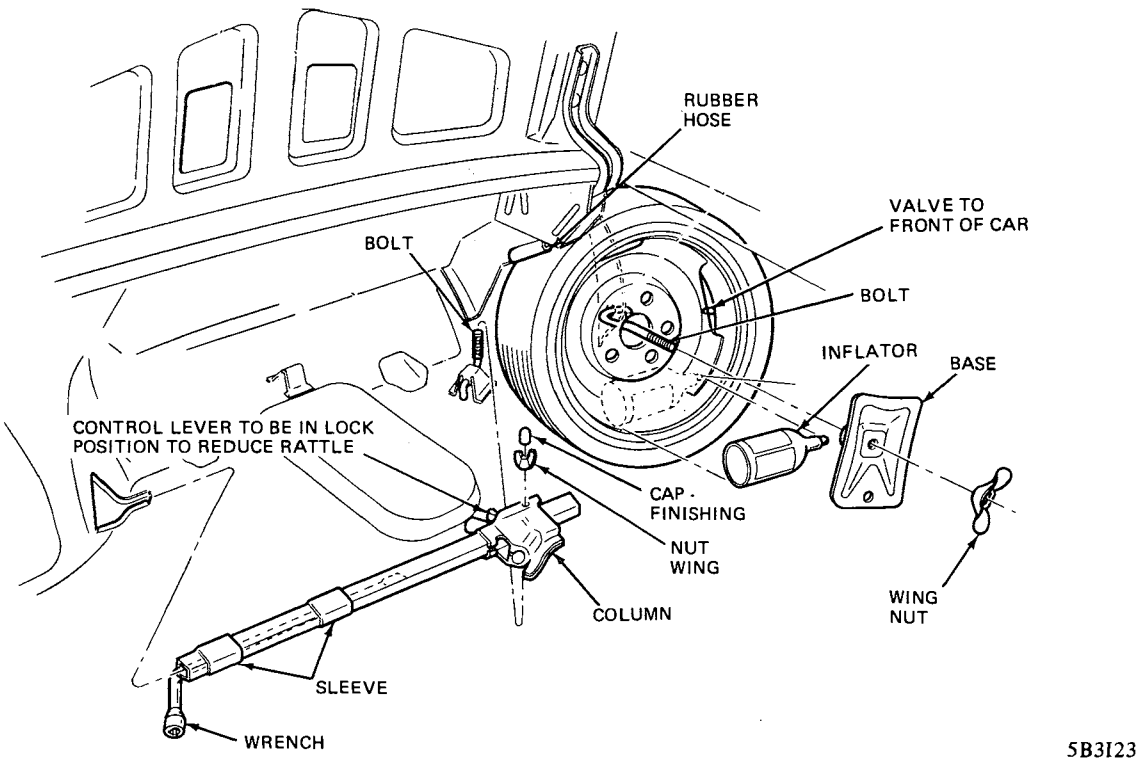

Figure 3I-23 - A Series Stowaway Spare and Jack Stowage

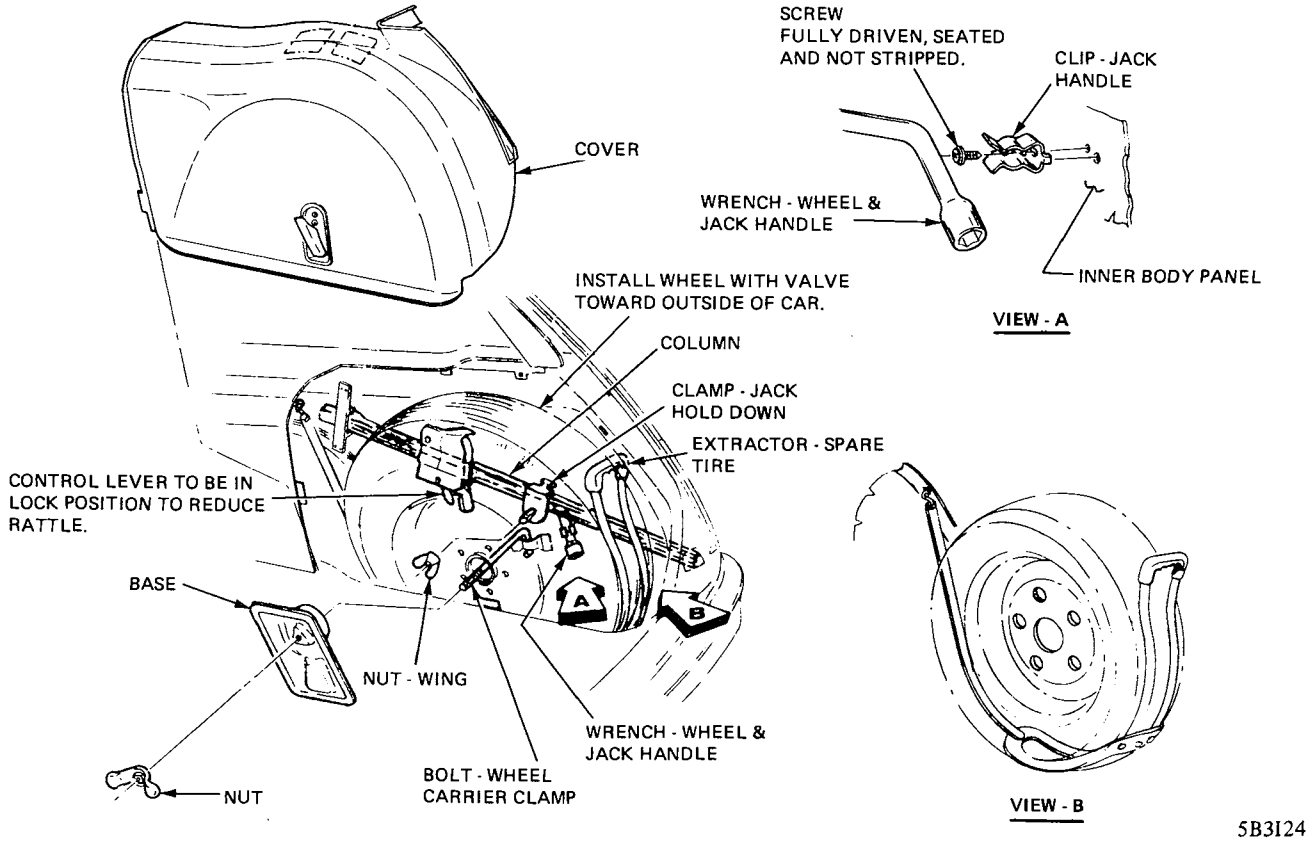

Figure 3I-24 - A Series Wagon Spare Tire and Jack Stowage

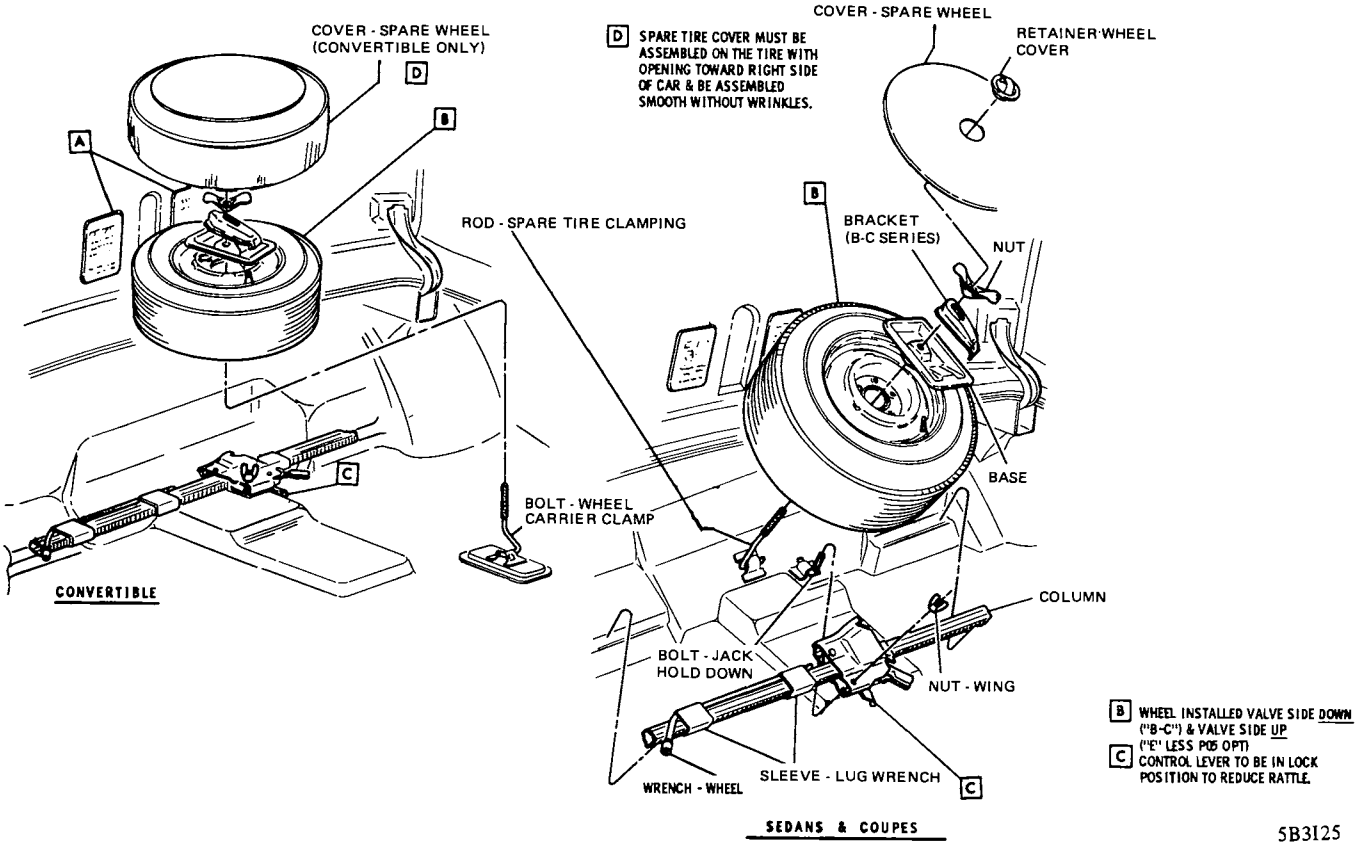

Figure 3I-25 - B-C-E Series (Less Wagon) Spare Tire and Jack Stowage

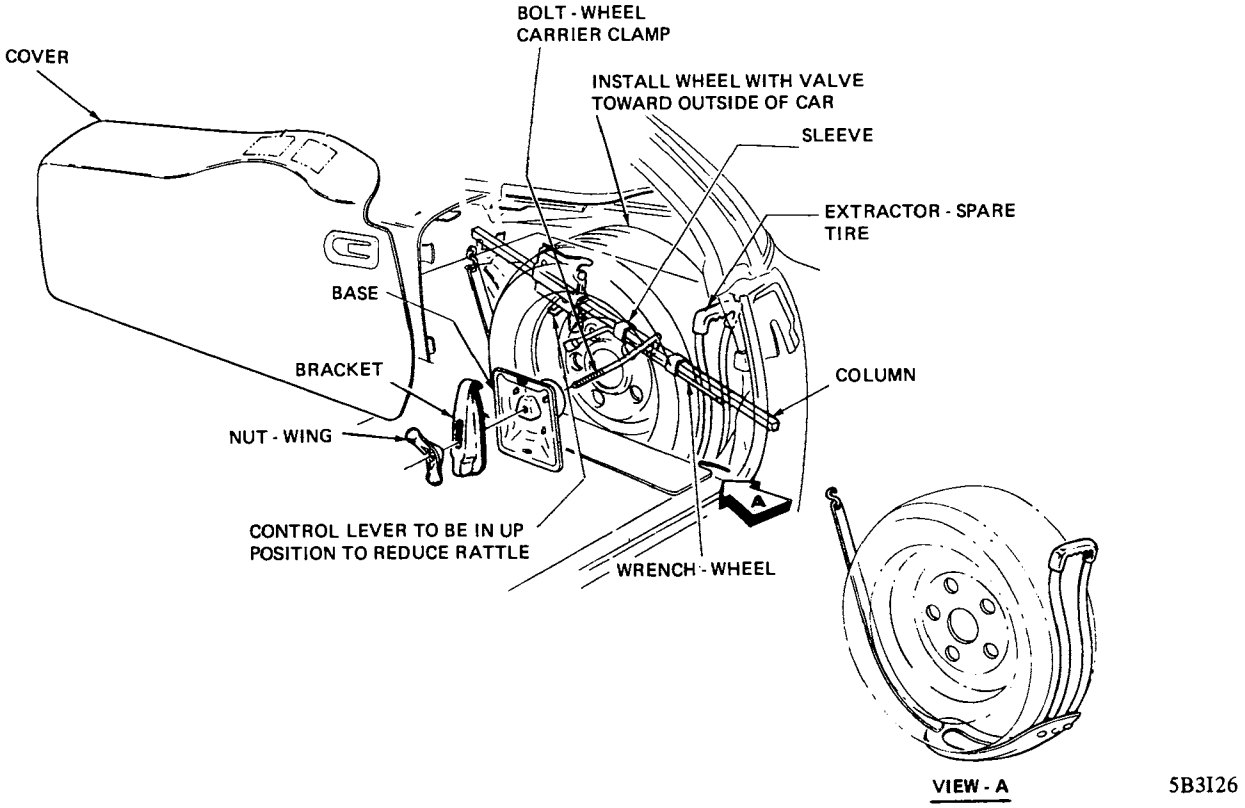

Figure 3I-26 - B Series Wagon Spare Tire and Jack Stowage