PHASE 7
TABLE OF CONTENTS

PHASE 7: CHASSIS

INSTRUCTOR________________

UNIVERSAL TECHNICAL INSTITUTE

STUDENT'S NAME________________

LIST OF LAB PROJECTS

								VEHICLE OR ENGINE IDENTIFICATION
								DATE
								BALANCE WHEELS STATICALLY OR DYNAMICALLY
								INSPECT, PACK, AND ADJUST FRONT WHEEL BEARINGS
								CHECK SHOCK ABSORBERS
								CHECK AND ADJUST CURB HEIGHT
								INSPECT FRONT END FOR WORN OR DAMAGED PARTS
								MAKE LIST OF REPLACEMENT PARTS NECESSARY FOR REPAIR
								REPAIR FRONT END
								REMOVE AND REPLACE A SPRING
								ALIGN FRONT END USING SNAP-ON EQUIPMENT
								CALCULATE SHIM ADJUSTMENT
								DISASSEMBLE, INSPECT, REASSEMBLE, AND ADJUST A MANUAL STEERING GEAR
								CENTER STEERING WHEEL AND CHECK WHEELS FOR STRAIGHT AHEAD POSITION
								DISASSEMBLE, INSPECT, AND REASSEMBLE A POWER STEERING GEAR
								DISASSEMBLE, INSPECT, AND REASSEMBLE LINKAGE TYPE POWER STEERING COMPONENTS
								DISASSEMBLE, INSPECT, AND REASSEMBLE POSER STEERING PUMP

UNIVERSAL TECHNICAL INSTITUTE

PHASE 7: BRAKES

LIST OF LAB PROJECTS

INSTRUCTOR_____

STUDENT'S NAME_____

								VEHICLE OR ENGINE IDENTIFICATION
								DATE
								PERFORM A BRAKE INSPECTION
								PERFORM A MINOR BRAKE ADJUSTMENT
								MANUAL BLEED A HYDRAULIC BRAKE SYSTEM
								REBUILD WHEEL CYLINDERS
								REBUILD A MASTER CYLINDER
								RECONDITION A BRAKE DRUM
								ARC BRAKE SHOE TO FIT FORM
								PERFORM A MAJOR BRAKE ADJUSTMENT
								PERFORM SELF ADJUSTER SERVICE
								PRESSURE BLEED HYDRULIC BRAKE SYSTEM
								ADJUST DRIVE LINE TYPE PARKING BRAKE
								ADJUST REAR WHEEL TYPE PARKING BRAKE
								USE BRAKE DRUM PULLER TO PULL BRAKE DRUM FROM TAPERED AXLE
								REPACK FRONT WHEEL BEARINGS

PRINCIPLES OF WHEEL ALIGNMENT

The purpose of correct wheel alignment is to make the front wheels roll without scuffing, dragging, or slipping under all road operating conditions. The result is safer driving, easier steering, longer tire life and less strain on front end parts.

The term steering geometry refers to the angular relationships of the suspension steering linkage and tires with regard to the road surface. The common angles are caster, camber, toe-in, turning radius (toe-out on turns) and steering axis inclination.

In the following sections, we will discuss each of these five subjects in detail as well as give instructions on proper setting.

Caster

Caster is the forward or backward tilt of the ball joint centerline (spindle support or king pin) at the top as viewed from the side of the vehicle. Caster is not a tire wearing angle. It is a directional control angle measured in degrees and is the amount the ball joint centerline is tilted from the true vertical. The backward tilt of the top of the ball joint centerline is called "positive caster," and the forward tilt is called "negative caster." (See Figure 1.)

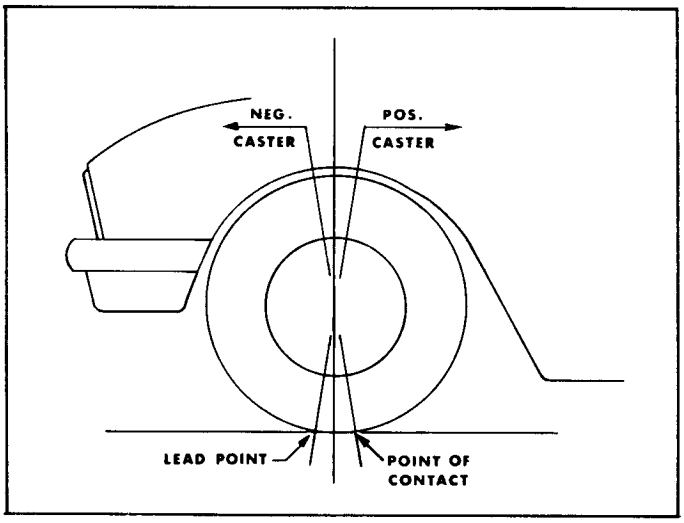


Figure 1 — Principles of Caster

The reason a bicycle can be ridden with "no hands" is because the bicycle has positive caster. Positive caster, as shown in Figure 2, gives the front wheels the tendency to maintain a straight ahead position by projecting the centerline of the support arm forward and establishing a lead point ahead of the contact or load point of the tire. With negative caster, the steering axis centerline would fall behind the tire road contact point.

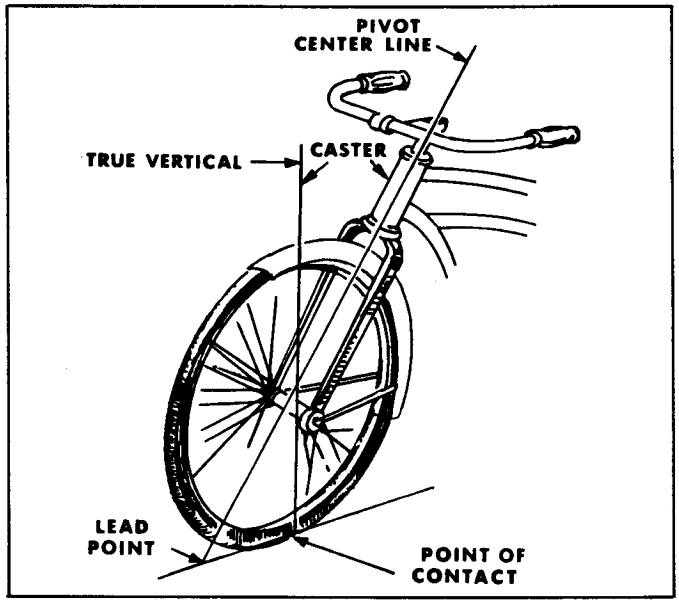


Figure 2 — Example of Positive Caster

The Purpose of Caster: Caster gives directional stability to the vehicle by causing the front wheels to maintain a straight ahead position and by causing the front wheels to return to a straight ahead position out of a turn.

The Harmful Effects of Incorrect Caster Are:

1. Unequal caster from side to side will cause the vehicle to pull toward the side of the more negative caster.
2. Too little caster causes wonder or weave.
3. Too much caster causes hard steering and excessive road shock and shimmy.

Note: Caster is the first setting to be made and should be set as nearly equal as possible within the manufacturer's specification. To save time and unnecessary adjustments, always check the settings for both wheels first. Often, one side is already within the recommended specifications.

Camber

Camber is the inward or outward tilt of the wheel as viewed from the front of the vehicle (Figure 3). The amount the centerline of the wheel is tilted from the true vertical is measured in degrees. The outward tilt is positive camber and the inward tilt is negative camber.

Camber is a load carrying angle which acts to keep the vehicle's weight over the wheel bearings. It is also a tire wearing angle and must be adjusted carefully in order

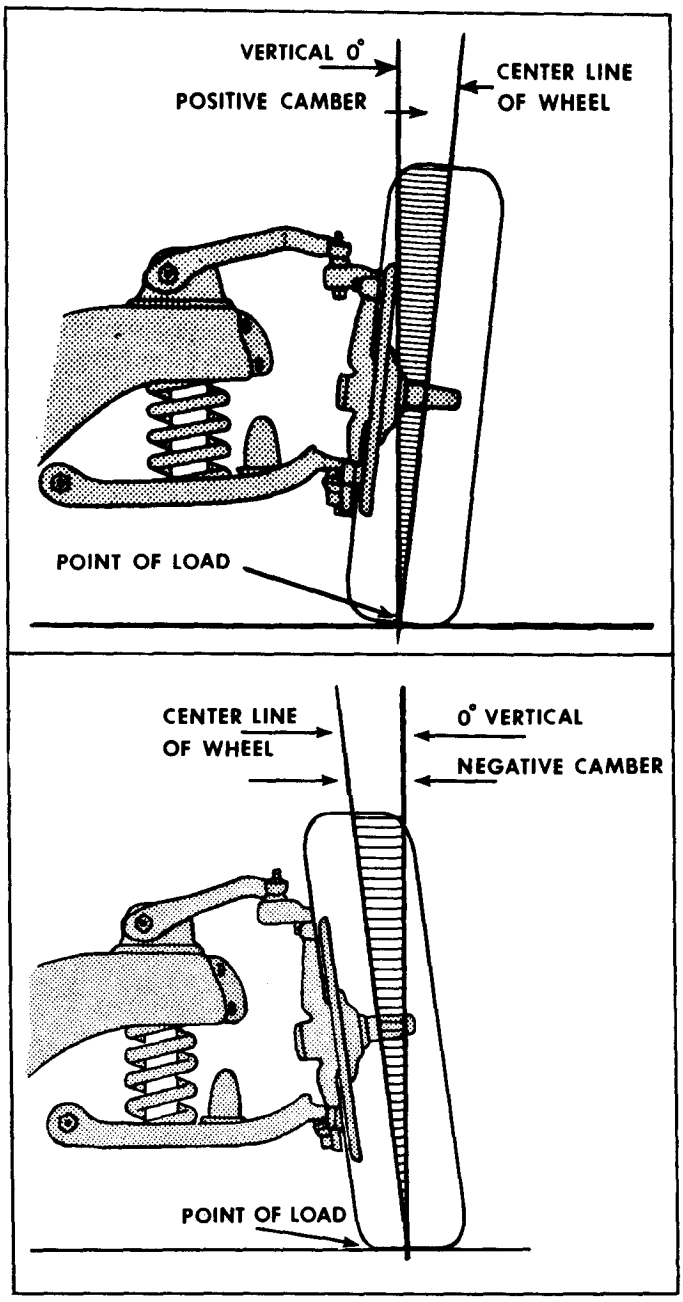


Figure 3 — Principles of Camber

to prevent excessive tire wear. Additionally, the camber angle changes with the vehicle load or suspension movement. Taking into account these normal load changes, the manufacturer's specifications are designed to meet all road conditions. The ideal camber setting for most cars would be the middle of the manufacturer's specification for both wheels. Here again, check both wheel settings first. Often times one side may already be within the recommended specifications.

Some manufacturers' specifications allow for crown of the road. If not, and an adjustment for crown of road is required, a 1/4° more positive camber could be allowed on the left front wheel, while still remaining within manufacturer's specifications.

The Purpose of Camber: Camber brings the road contact portion of the tire more nearly under the point of load. This provides easier steering by having the weight of the vehicle borne by the wheel bearings and spindle.

The Harmful Effects of Incorrect Camber Are:

1. Too much positive camber causes wear on the outside edge of the tire.
2. Too much negative camber causes wear on the inside edge of the tire.
3. Too much positive or too much negative camber causes wear to ball joints and wheel bearings.

Note: Some cars with independent rear suspension have camber specifications for both the front and rear wheels. Some of these are adjustable, while others can only be corrected by replacing damaged parts. Refer to manufacturer's specification for detailed instructions.

Toe

Toe is the difference in the distances between the front of the front wheels and that of the back of the front wheels. Toe-in is when the front of the front wheels is closer together than the rear of the front wheels and toe-out is when the front of the front wheels is farther apart than the rear of the front wheels. Refer to Figure 4. The actual amount of toe-in is normally small and is measured in inches, mm, or degrees. Also, the steering wheel is set for straight ahead position as toe is being adjusted.

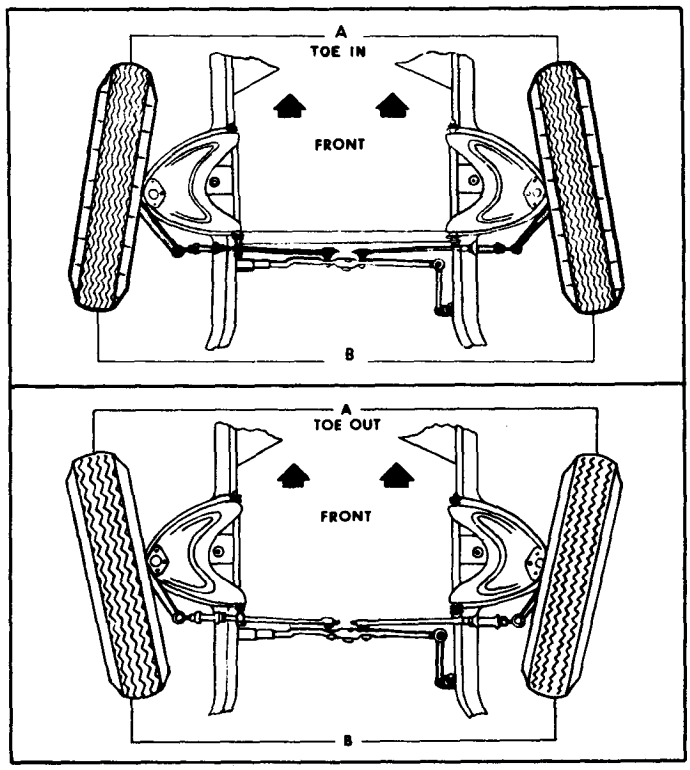


Figure 4 — Principles of Toe

Toe, the most serious tire wearing angle, can be checked with the WA110 Optical Toe Gauge or WA151A Trammel Bar (detailed instructions included). It is also the last alignment factor to be set because other adjustments will affect it. Manufacturers give toe-in specifications due to the slight amount of slack in the steering linkage. This is taken up as the vehicle gains momentum and as the resistance of the road forces the tires into a straight ahead position.

Wear from improper toe adjustment appears as a feather-edged scuff across the face of both tires. Figure 7 illustrates the effects of improperly set toe on front wheels.

Steering Axis Inclination

Steering axis inclination is sometimes referred to as king pin inclination or angle (kpi or kpa). It is the amount measured in degrees that the top of the ball joint centerline is tilted towards the center of the vehicle from the true vertical line (See Figure 5).

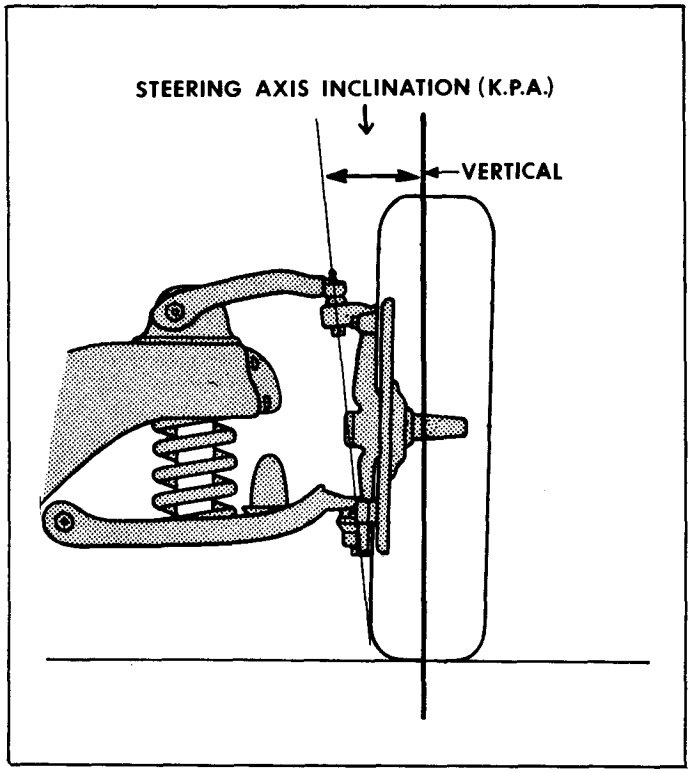


Figure 5 — Steering Axis Inclination

The specifications for this angle are always given with a zero degree camber reading. It is important, therefore, to take the actual camber reading into consideration when checking ball joint inclination. If camber is positive, add this reading to KPA angle. If camber is negative, subtract it. Since this angle is non-adjustable, it can only be corrected by replacing bent or damaged parts. Thus, if ball joint inclination is not according to specifications when caster and camber is correct, look for a bent spindle.

The Purpose of Steering Axis Inclination: It reduces the need for excessive caster, thus distributing the weight of the vehicle more nearly under the road contact portion of the tire. Also it provides a pivot point about which the wheel will turn producing easier steering and improved steering stability.

Toe-out on Turns

Toe-out on Turns (turning radius) is the amount one front wheel turns sharper than the other on a turn. To avoid dragging or scuffing the tire as a car turns, the wheel on the inside of the turn must angle in slightly more than the outside wheel. In other words, the inside wheel must turn at a sharper angle than the outside wheel in order to travel a shorter radius during the turn. This non-adjustable angular difference is measured in degrees and is determined by vehicle design. See Figure 6.

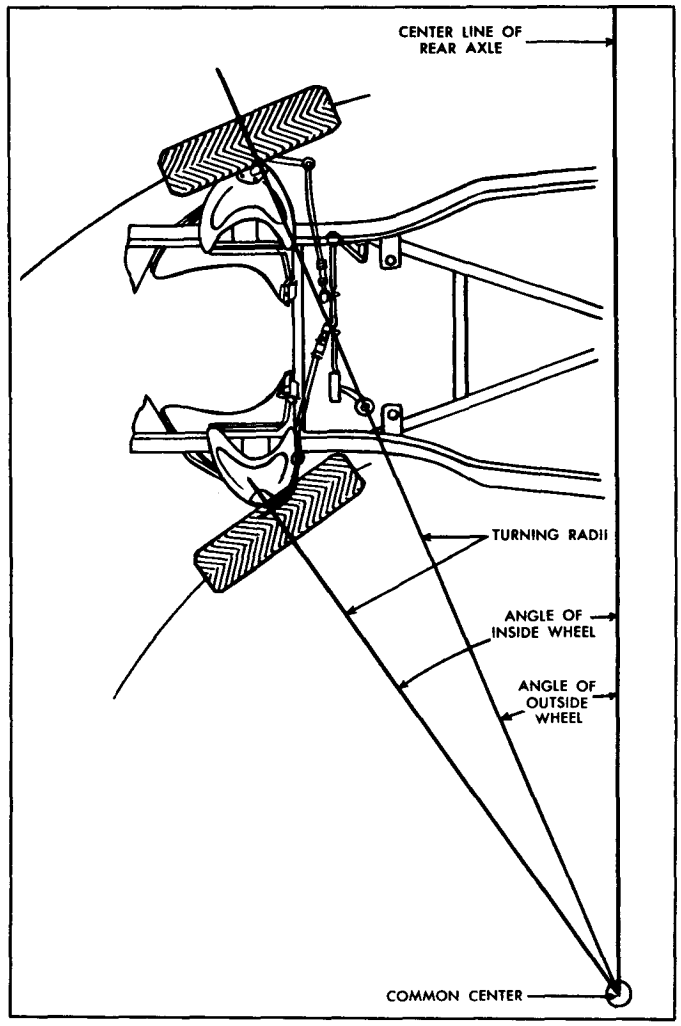


Figure 6 — Toe-out on Turns

Toe-out on turns is a tire wearing angle. And since 60% or more of average driving is on turns of some degree — corners, curves and pulling out to pass, correct toe-out on turns is extremely important. Improper toe-out on turns causes tire squealing and excessive tire wear. It should be corrected by replacing the bent steering arm.

TIRE WEARING FACTORS

An inspection of the tires will usually help locate any abnormal wear and its causes. Various types of abnormal tire wear with their causes and corrective actions are shown in Figure 7.

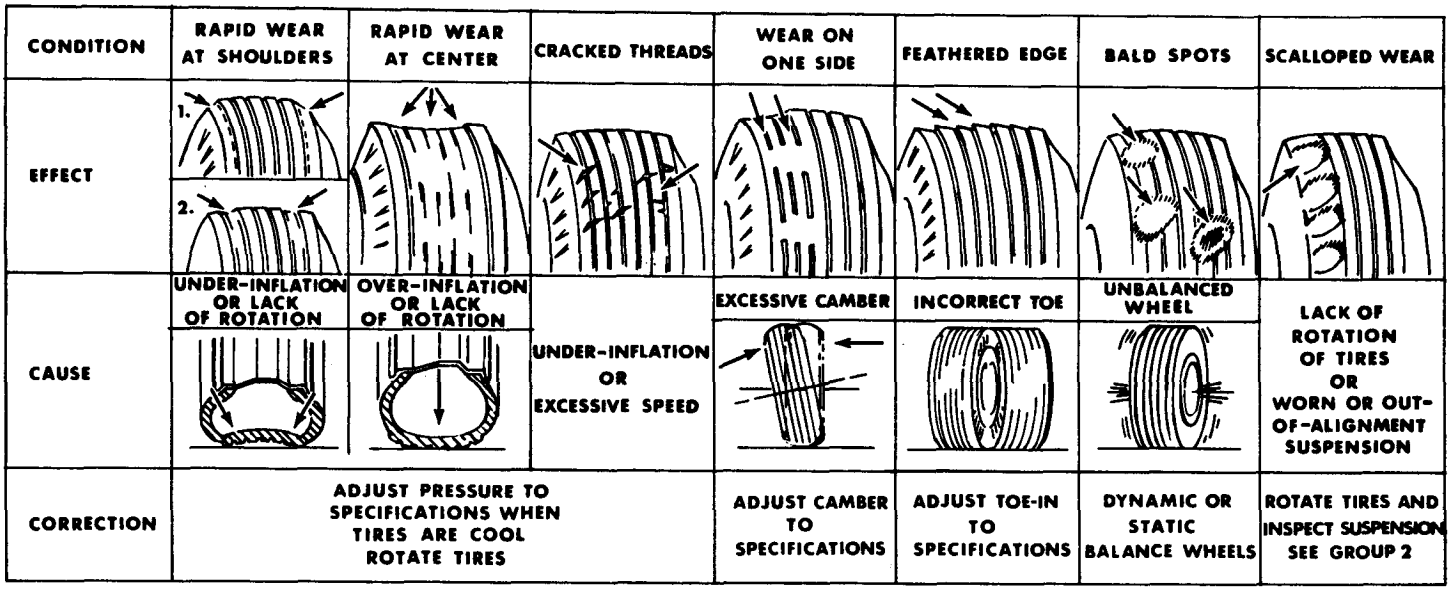


Figure 7 — Tire wear factors and corrections

PRELIMINARY ALIGNMENT CHECK

Do not start wheel alignment before the following items are checked and corrected to manufacturer's specifications.

1. Check tires and wheels-
   a. Tire pressure
   b. Tire condition-especially the wear on both front tires
2. Check vehicle standing height-
   a. Unnatural load in trunk
   b. Broken or sagging springs
   c. Torsion bar suspension adjustment (pages 6-7)
3. Check for worn or bent parts-
   a. Ball joint looseness (pages 7-8)
   b. Tie rod ends
   c. Idler arm bushings
   d. Excessive play in steering gear
   e. Shock absorbers
   f. Proper wheel bearing adjustment

TORSION BAR ADJUSTMENT

Check Torsion Bar Height on late model Chrysler Products as follows:

1. Grasp the rear bumper and bounce the car up and down several times. Bounce the car at the front bumper the same number of times and release the bumper at the same point in the cycle each time.
2. On 1975-79 models except 1976-79 Aspen and Volare, 1978-79 LeBaron and Diplomat, and 1979 Caravelle,

measure the distance from a point 1" forward of the rear face of the torsion bar anchor to the floor or ground. The distance should be as listed on page 7.

3. On 1976-79 Aspen and Volare, 1978-79 LeBaron and Diplomat, and 1979 Caravelle, measure the distance from the lowest point of the lower control arm pivot pushing to the floor or ground. The distance should be as listed on page 7.
4. Measure both sides of the car in the same manner. Adjust by turning the torsion bar anchor adjusting nut clockwise to increase the height or counterclockwise to decrease the height. The difference from side to side should not exceed 1/8".
5. After adjusting, bounce the car and recheck the measurements on both sides, even if only one side may have been adjusted.

Riding Height Specifications

1975-79	Aspen	10¼
	Caravelle	10¼
	Charger	10¾
	Chrysler	10⅛
	Cordoba	10¾
	Coronet Sta. Wag	11¼
	Coronet Ex. Wag	10¾
	Dart	10¼
	Diplomat	10¼
	Fury	10¾
	Gran Fury	10⅛
	Imperial	10⅛
	LeBaron	10¼
	Magnum	10¾
	Monaco	10⅛
	1978 Monaco	10⅛
	Newport	10⅛
	1979 Newport	10¾
	New Yorker	10⅛
	1979 New Yorker	10¾
	St. Regis	10¾
	Suburban	11¼
	Valiant	10¼
	Volare	10¼

BALL JOINT CHECKS

Ball joints can quickly be checked by using the procedures and specifications given. This is a fast method to check for excessive wear or looseness.

Front suspensions are divided into two general types. The first has the coil spring or torsion bar attached to the lower control arm (Figure 8). The second has the spring mounted on the upper control arm and should have the support point shown in Figure 9. Both types are tested by moving the wheel up and down to check axial play and rocking it at the top and bottom to measure radial play.

Spring on Lower Control Arm:

- Upper ball joint should be replaced if there is any noticeable looseness at the joint.
- Lower ball joint should be replaced if radial play exceeds .250 in.
- Lower ball joint should be replaced if axial play between lower control are and spindle exceeds the following tolerances:

AMC Pacer	1975-79	Zero
Buick	1961-72	.100 in.
Special, Skylark	1962-72	.070 in.
Buick, All	1973-79	.050 in.
Cadillac	1968-73	.062 in.
Cadillac	1974-79	.050 in.
Eldorado	1968-79	.125 in.
Chevrolet	1964-72	.060 in.
Chevrolet	1973-79	.050 in.

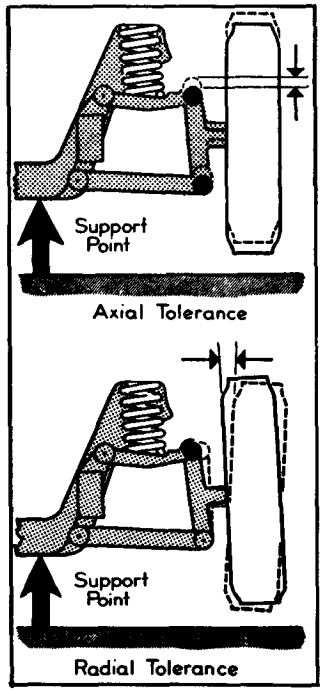


Figure 8 — Lower Ball Joint Tolerance

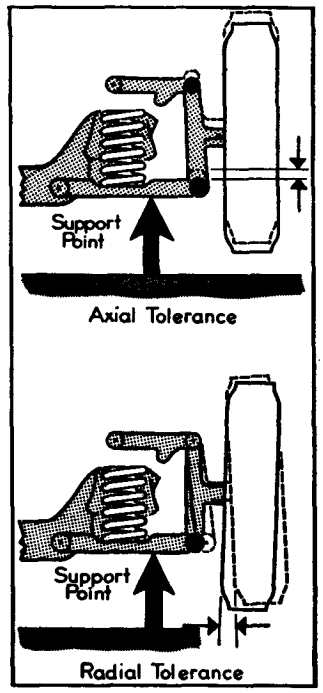


Figure 9 — Upper Ball Joint Tolerance

Chrysler, Dodge	1969-74	.070 in.
Chrysler Imperial	1969-74	Zero
Chrysler, Dodge	1975-76	.020 in.
Chrysler, Dodge, Plymouth	1977-79	.030 in.
Dart	1969-76	.070 in.
***Ford**	1962-77	Zero

Ford	1978-79	.250 in.
***Torino, Mustang, Cougar**	1972-78	Zero
***Meteor**	1964-77	Zero
***Lincoln**	1962-77	Zero
Lincoln	1978-79	.250 in.
***Mercury**	1962-77	Zero
Mercury (All)	1978-79	.250 in.
***Montego**	1972-77	Zero
Oldsmobile	1967-72	.125 in.
Oldsmobile	1973-79	.050 in.
Plymouth, Valiant	1967-68	.050 in.
	1969-76	.070 in.
Plymouth, All	1977	.050 in.
Pontiac	1965-71	.050 in.
Catalina, Firebird	1972	Zero
Others	1972	.050 in.
Lemans, Grand Prix, Firebird	1973	Zero
Pontiac (Others)	1973	.050 in.
Pontiac, All	1974-79	.050 in.
Tempest	1965-70	.050 in.
Thunderbird	1961-77	Zero
Thunderbird	1978-79	.125 in.

Spring on Upper Control Arm:

- Lower ball joint should be replaced if there is any noticeable looseness at the joint.
- Upper ball joint should be replaced if radial play exceeds .250 in.
- Upper ball joint should be replaced if axial play between upper arm and spindle exceeds the following tolerances:

AMC (Except Pacer)	1970-79	.080 in.
Chevy II	1962-68	.093 in.
***Comet, Maverick**	1966-78	Zero
Cougar, Torino, Montego, Comet	1963-71	Zero
Cougar, Mustang	1972-73	Zero
Fairlane	1962-69	Zero
Falcon	1963-70	Zero
Oldsmobile	1978-79	.125 in.
***Versailles, Granada, Monarch**	1978-79	Zero

*Entire suspension arm must be replaced

BASIC ALIGNMENT PROCEDURE USING FLOOR STANDS or DRIVE-ON RAMPS

1. Equalize the tire pressure.
2. Road-test the car.
3. Raise the vehicle on the hoist to approximately shoulder height.
4. Make the preliminary alignment check (see page 6).
5. Place the WA204C Stands in place and lower the car onto the stands, making certain front wheels are centered on turntables. Or if so equipped, drive the vehicle onto the permanently installed WA201C Drive-on Ramp. (See detailed instructions for setup and use included with each unit.)
6. Check the steering gear for play and adjust if necessary.
7. Place the B240A brake Pedal Jack in position and remove the pins from the turntables.
8. Remove the hub cap and bearing dust cap. Inspect for nicks and burrs on the machined surface of the hub flange and wipe off excess grease and dirt. Place the WA402A Set of Alignment Gauges on the wheels, making sure they are on securely.
9. Bounce the car down in the front, from the center of the bumper, so that the shock absorbers are in their normal position.
10. Take the initial caster and camber readings, and check both readings against manufacturer's recommended specifications. Make adjustments as necessary.
11. Tighten all the adjustment nuts to manufacturer's recommended torque. Remove the gauges, stands and brake pedal jack and replace the dust covers and hub caps.
12. Check toe and make the necessary corrections.
13. Road test the vehicle.

SAFETY TIPS FOR ALIGNMENT TOOLS

- Always wear safety goggles when using pneumatic hammers.
- Keep arms clear of upper control arm shaft when loosening bolts . . . engine weight can quickly shift the arm.
- Always use rear wheel stops on WA201C Ramp.
- Make sure top and bottom of GA257 Air Alignment Jacks are secure before lifting.
- Center all four tires on WA204C Car Stands before lowering.
- Keep hands clear of magnetic edges when fastening WA40A Caster-Camber Gauges or WA110 Optical Toe Gauge.
- Make certain B240A Brake Pedal Jack is in place before beginning work on vehicles.
- Keep hands clear when applying wrench to GA469, S8699B, S8702, WA25A and WA35 Caster-Camber Tools.
- Secure WA64B Turntables with locking pins when driving onto pad.
- Make sure wrench fits properly and is secure on all fasteners before applying pressure.

Wheel Alignment Diagnostic Chart

The following chart can be used for troubleshooting front end performance and tire wear. Other problems may exist, but this chart will diagnose the majority of the common ones.

PROBABLE CAUSES	SYMPTOMS							
	Hard Steering	Pull To One Side	Wander	Excessive Play	Front End Shimmy	Recovery On Turns	Front End Noise	Abnormal Tire Wear
Tire Condition	X	X	X	X	X	X	X	X
Tire Pressure	Low or Uneven	Low or Uneven	Low or Uneven					Incorrect
Power Steering Fluid Low	X							
Brakes		X						
Springs		X	X				X	X
Caster Improper	X	X	X		X	X		
Camber Improper		X						X
Toe Improper		X						X
Steering Gear Adjustment	X		X	X		X		X
Shocks			X				X	X
Ball Joints	Tight		Worn	Worn	Worn	Tight	Worn	Worn
Steering Linkage	Binding		Worn	Worn	Worn	Binding		X
Idler Arm	Tight	Tight	Worn	Worn	Worn	Tight		Worn
Strut Rod Bushings Worn or Loose		X	X		X		X	X
Control Arm Bushings Worn or Loose		X	X		X		X	X
Stabilizer Assembly			X				X	
Wheel Bearings Worn or Loose		X	X	X	X		X	X
Tires out of Balance					X			X

HOW TO CHECK CASTER-CAMBER

Positioning the Gauge

1. Remove the hub cap or wheel cover and the dust cap from the front wheels.
2. Wipe off the machined end of the hub flange.
3. Holding the *Snap-on* WA40A Magnetic Caster and Camber Gauge (Figure 10) near the hub flange, set the self-centering plunger in the lathe center hole in the end of the front wheel spindle (See Figure 11). Powerful alnico magnets will attach the gauge to the machined hub flange of the wheel. Twist the gauge about a quarter-turn several times to let it get a positive seat on the flange. (If there is a rocking motion, remove the gauge and check the flange and the gauge for grit or foreign particles. The self-centering plunger makes sure that readings will be taken from the exact center of the spindle.

NOTE: For wheels with inaccessible hubs use the *Snap-on* WA702A Universal Rim Adaptor Set as explained below.

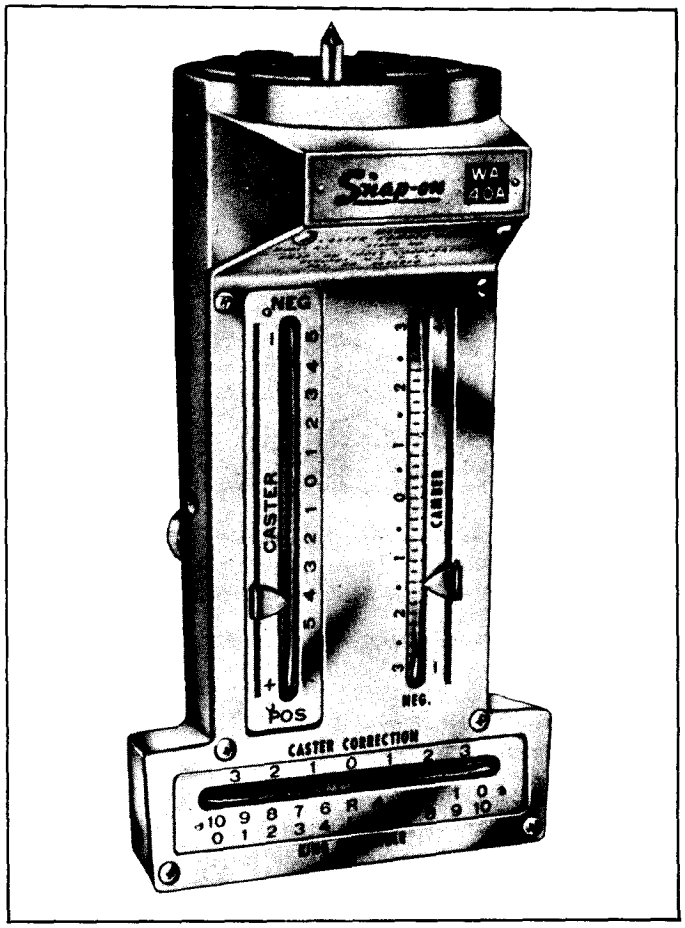


Figure 10 — WA40A Caster-Camber Gauge

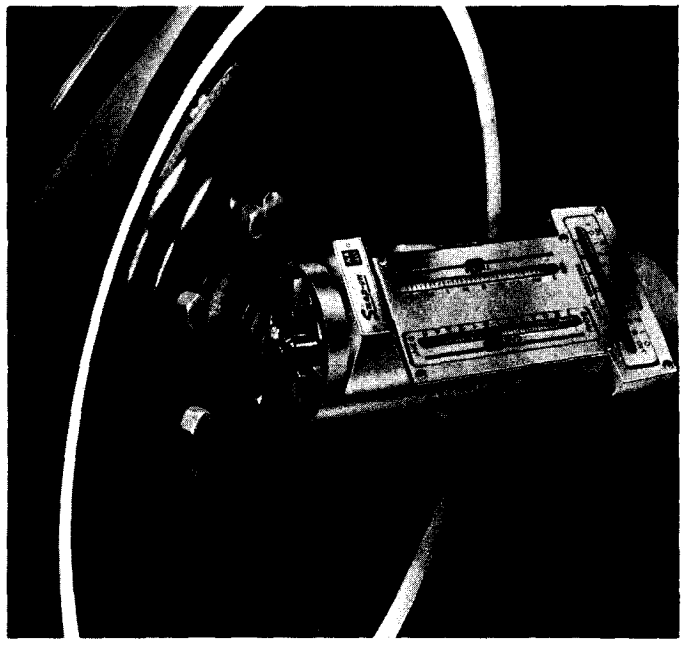


Figure 11 — Positioning the Gauge

Attaching the Universal Rim Adaptor Set

These adaptors will fit the rims of most wheels from 6 to 22 inches in diameter which do not have machined hubs.

For small wheels (down to 8 inches), loosen the two knurled screws at the base that fits against the lower part of the wheel rim (See Figure 12). Slide it to the upper set of screw holes. Be sure that the tips of the knurled screws are in the holes before tightening them. For wheels down to 6 inches, remove the two screws at the bar that fits against the upper part of the rim. Reverse the bar and refasten with the two screws. If the fender obstructs the adaptor, move the lower base to the upper set of screw holes.

For large wheels, remove the two screws at the bar that fits against the upper part of the rim. Use the holes at the end of this bar and refasten it with the screws.

The adaptors are equipped with three knife-edged rollers for attachment to the wheel rim. These rollers are used for shallow rims. For deep rims, use the black steel washers next to the rollers. Put the adaptor on the rim with the two legs at the bottom as shown in the illustration. When the adaptor is snugly in place on the wheel rim, press the lever down, which locks the adaptor to the wheel.

To Check For Wheel Runout — with Rim Adaptor Set

Before making any caster-camber checks on the vehicle, it is necessary to check for wheel runout. Do this as follows:

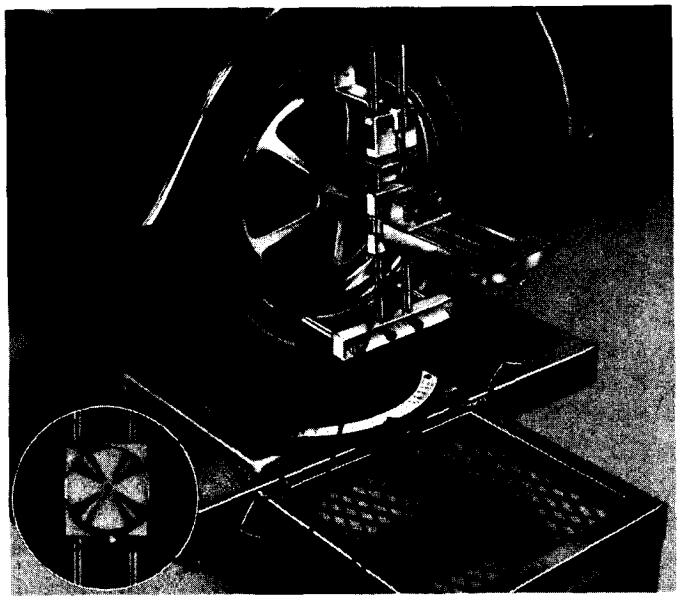


Figure 12 — Universal Rim Adaptor

1. Raise the car so the front wheels are free to turn.
2. Place the magnetic gauge on the adaptor as shown in Figure 12.
3. Zero the bubble in the caster vial by turning the adjusting nut on the caster gauge.
4. Turn the wheel 180°. Turn the gauge back 180° and read caster. If there is a change in the caster reading, reduce it to one-half by adjusting the runout screw. For example, if this reading is 4°, adjust it to 2°.
5. Set the bubble in the caster vial to zero again by turning the adjusting nut on the caster gauge.
6. Turn the wheel 180° again. Turn the gauge back 180°. The bubble in the caster vial should still be on zero. If not, carefully repeat steps 3 through 6.
7. Lower the car on the turntables, while keeping the rim adaptors in an upright position and perform all wheel alignment tests except toe.

Checking Caster and Steering Axis Inclination (K.P.A.)

1. Be sure the pointers on both turntables are on 0°. Turn the front of the wheel being checked out to 20° on the turntable dial (Figure 13).
2. Zero the caster bubble and the K.P.A. bubble. For the right wheel, the 0 is the extreme right of the scale and for the left wheel, it is at the extreme left.
3. Turn the front of wheel in 20° on the turntable dial.
4. Take a reading on the caster and K.P.A. scale.

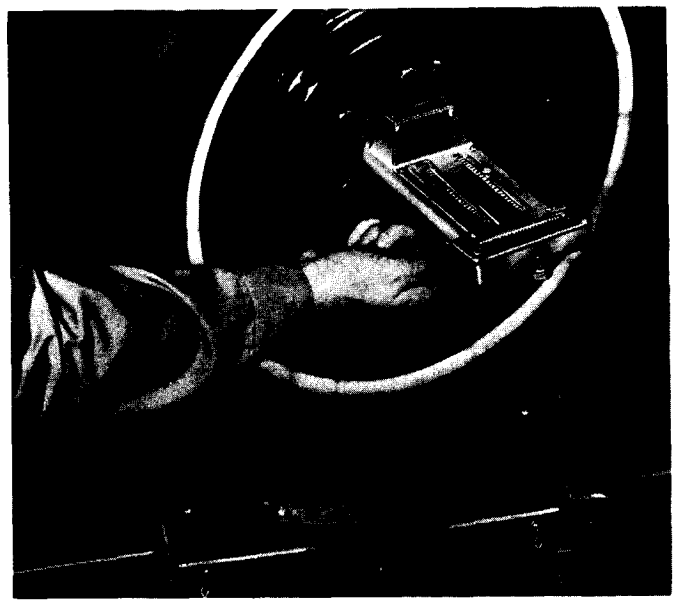


Figure 13 — Checking Caster, 20° Out

Compare these with specifications. K.P.A. specifications are usually given at zero camber, so take the camber reading into consideration. The caster pointer can be set to the desired setting to aid in making adjustments (Figure 14).

5. Note the turntable reading on the opposite wheel. This is toe-out on turns. If improper, the bent steering arm will have to be replaced.
6. Repeat the procedure on the opposite wheel.
7. Above the K.P.A. vial is a scale marked "caster correction" which has readings of 3° on each side of zero. With the wheels in the straight ahead position, this can be used to make caster corrections. Set the bubble to the amount of correction needed. When

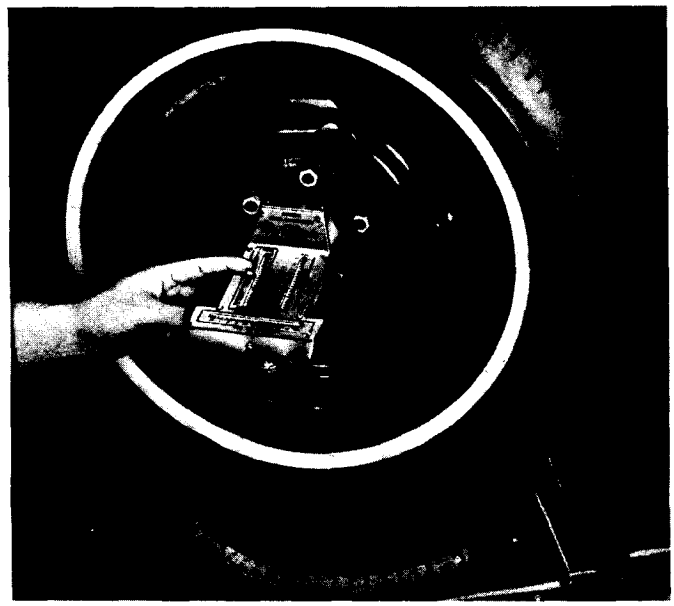


Figure 14 — Checking Caster, 20° In

working on the right side of the vehicle, set the bubble to the left of zero for more positive caster. For more negative caster, set it to the right of zero. Reverse this procedure for use on the left side of the vehicle. Then when the bubble settles at zero during adjustment, caster will be correct.

NOTE: K.P.A. readings greater than 10° can be checked as follows:

1. With the gauge attached to the hub, turn the wheel out 20°. Set the King Pin Angle Gauge to zero and turn the wheel to a straight ahead position. Read the K.P.A. gauge.
2. Zero the K.P.A. gauge, then turn the wheel in 20° and read the gauge again. Add the two readings to get the total king pin angle.

Checking Camber

1. With the gauge in position on the wheel, turn the turntable until the pointer is on zero.
2. Read the camber scale on the right-hand side of the gauge. The position of the bubble will indicate the camber of the wheel being checked.
3. Write down the camber reading.
4. Check the camber reading against specifications and set the camber pointer on the reading desired.
5. Check the other front wheel in the same manner described above. Corrections for caster and camber should be made at the same time since changing one affects the other. The pre-set pointers help to make caster-camber adjustments easier since they show the readings which should be obtained.

HOW TO ADJUST CASTER AND CAMBER

Most caster-camber adjustments on American passenger cars and light trucks are made by one of the following methods:

1. Use of shims
2. Use of eccentrics
3. Moving upper control arm in slotted holes
4. Use of adjustable strut and eccentric bushing
5. Moving serrated upper arm shaft.

Adjustment with Shims

In many cases, both caster and camber can be adjusted at the same time by adding or removing shims. The cars which use shims and the location of these shims is given in the charts on pages 29 and 30.

As a general guide for setting caster-camber on cars with shim location as in Figure 15, the following suggestions will be of help:

1. **To change camber more positive** — remove an equal amount of shims at the front and rear bolt.
2. **To change camber more negative** — add an equal amount of shims at the front bolt and increase by an equal amount at the rear bolt.
3. **To change caster more positive** — decrease the amount of shims at the front bolt and increase by an equal amount at the rear bolt.
4. **To change caster more negative** — increase the amount of shims at the front bolt, and decrease by an equal amount at the rear bolt.
5. **To change caster and camber toward positive simultaneously** — remove shims at the front bolt only.
6. **To change caster and camber toward negative simultaneously** — add shims at the front bolt only.

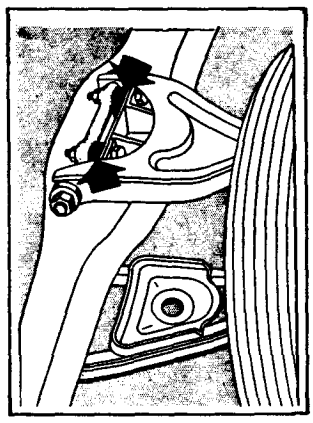


Figure 15 — Shims

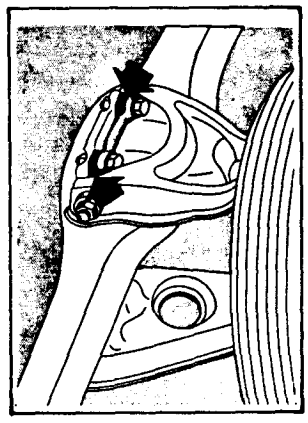


Figure 16 — Shims

Some vehicles using shims are adjusted in just the opposite manner because the shims are placed as in Figure 16. These cars are adjusted as follows:

1. **To change camber more positive** — add an equal amount of shims at the front and rear bolt.
2. **To change camber more negative** — remove an equal amount of shims at the front and rear bolt.
3. **To change caster more positive** — increase the amount of shims at the front bolt and decrease by an equal amount at the rear bolt.
4. **To change caster more negative** — decrease the amount of shims at the front bolt and increase by an equal amount at the rear bolt.
5. **To change caster and camber toward positive simultaneously** — add shims at the front bolt only.
6. **To change caster and camber toward negative simultaneously** — remove shims at the front bolt only.

The amount of caster or camber change depends upon the size of the shims added or removed. It varies somewhat with different models but in general a 1/16" shim at both front and rear bolts changes camber about 1/4 degree This same size shim at only one bolt changes caster about 1/4 degree..

Time Saving Tips When Making Caster-Camber Adjustments with Shims

Before making any adjustments, be sure to take initial caster-camber readings on both wheels. At this point, an analysis of these readings can result in reduced labor time if adjustments can be confined to only one side. Here is an example to illustrate this point.

Caster specification	0° ± 1/2°
Camber specification	1/2° ± 1/2°

Initial Readings	Left Side	Right Side
Caster	0°	—1/4°
Camber	+1/2°	+1/4°

We have previously stated that caster should be the middle of manufacturer's specifications and as nearly equal as possible. By studying the specifications in the example above and our initial readings, we can see that caster on our left side can remain as is since we are at the middle of the specifications. By setting caster on the right at 0°, we would have equal settings within specifications.

Now let's consider camber. Camber should also be as nearly equal as possible and at the middle of manufacturer's specification unless crown of the road is allowed for. Thus, our +1/2° reading in the example above is the middle of specifications for this car so here again we can leave camber as is on the left side and confine the adjustments to the right side only.

Initial Readings	Left Side	Right Side Present	Reading Desired
Caster	0°	—1/4°	0°
Camber	+1/2°	+1/4°	+1/2°

Thus far, we have eliminated adjustments on the left side, saving time and effort. Let's continue with this example to show how additional work can be eliminated in making adjustments on the right side.

Caster is -1/4° and we want approximately 0°. Camber is +1/4° and we want +1/2°. Thus, caster and camber must be changed 1/4° toward positive. At this point, study the General shim assembly in Figure 15. Note that we can change both caster and camber toward positive by removing shims at the front shim assembly. A 1/16" shim will usually change caster approximately 1/4° and camber 1/4°. Therefore, by removing one 1/16" in shim at the front shim assembly, caster should change approximately 1/4° toward positive and camber should change 1/4° toward positive. We would now have the following:

Caster specification	0° ± 1/2°
Camber specification	1/2° ± 1/2°

Alignment Readings	Left Side	Right Side
Caster	0°	0°
Camber	+1/2°	+1/2°

We accomplished all of this with **only one shim change.** Although this may not hold true in all cases, considerable time can be saved if it does hold true.

Use of Eccentrics

Almost every car previous to ball joint systems used some form of eccentric bolt in the upper end of the spindle support for adjusting caster and camber. Some vehicles used both an eccentric bolt in the upper end of

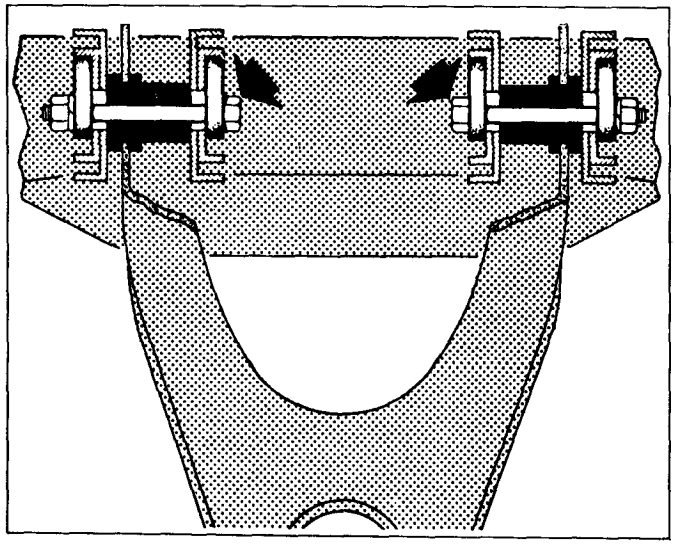


Figure 17 — Eccentric Adjusting Bolts

the spindle support and a threaded bolt in the lower end. The threaded bolt in the lower end controlled caster while the eccentric controlled camber.

Other cars use eccentric bolts or washers at the inner end of the upper control arm to make caster-camber adjustments. Access holes in fender shields have usually been provided to reach the cam adjusting bolts.

Some older vehicles have the eccentrics on the upper control arm attaching bolts. Loosening the attaching bolt nuts will permit turning the bolt and eccentrics to provide caster-camber adjustments. See Figure 17. The caster correction feature on the *Snap-on* caster-camber gauge is especially helpful in speeding adjustments on cars having eccentrics.

Adjusting by Moving Upper Control Arm in Slotted Holes

On **Ford and Chrysler Products**, caster and camber can be adjusted by loosening the bolts that attach the upper suspension arm inner shaft to the frame side rail, and moving the arm assembly in or out in the elongated bolt holes. Use the **Snap-on WA171D, WA25A,** or **WA35 Caster-Camber Tool** to make the adjustments.

Adjusting a Strut and Eccentric Ball Joint

Caster is adjusted by turning the lock nuts on the forward ends of the tie-struts at the frame front cross member. To provide more negative caster, lengthen the tie-strut. One turn of the lock nuts results in approximately 1/2 degree change in caster.

Camber is adjusted at the camber eccentric located in the upper ball joint support. Loosen the lock nut and turn the eccentric to adjust camber. Tighten the lock nut to 60 foot-pounds when finished. (See Figure 18.)

Adjusting Serrated Upper Arm Shaft

Loosen the bolts that secure the upper suspension arm shaft to the frame member and, with the aid of a pry bar, move the shaft as required. Movement of 3/32" at front or rear bolt changes caster about 1/2 degree. A movement of the entire shaft of 3/64" changes camber about 1/4 degree. The retaining bolts should be tightened to 100-125 ft. lbs. after adjustments have been made. See Figure 19.

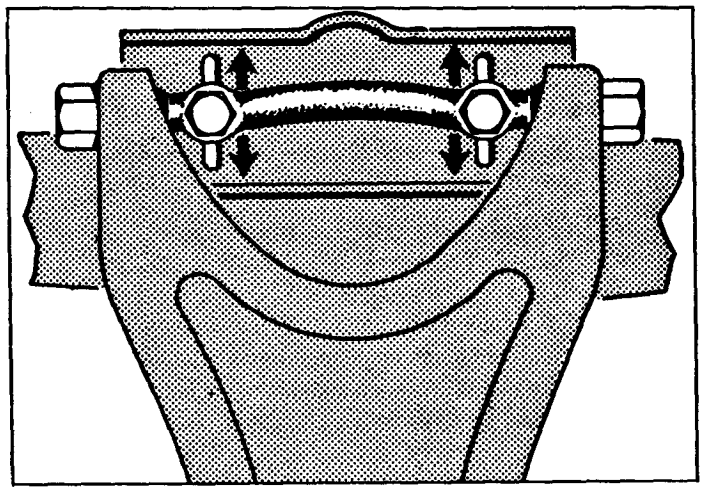


Figure 19 — Serrated Upper Arm Shaft Adjustment

Adjusting Chevrolet Caster-Camber

Some Chevrolets have a strut at the lower control arm for adjusting caster and a cam to move the lower control arm for camber. Adjust caster by turning the two nuts at the front of the lower control arm strut rod (Figure 20). Adjust camber by loosening the lower control arm pivot bolt and rotating the cam. Tighten the pivot volt securely while maintaining the camber setting (Figure 21).

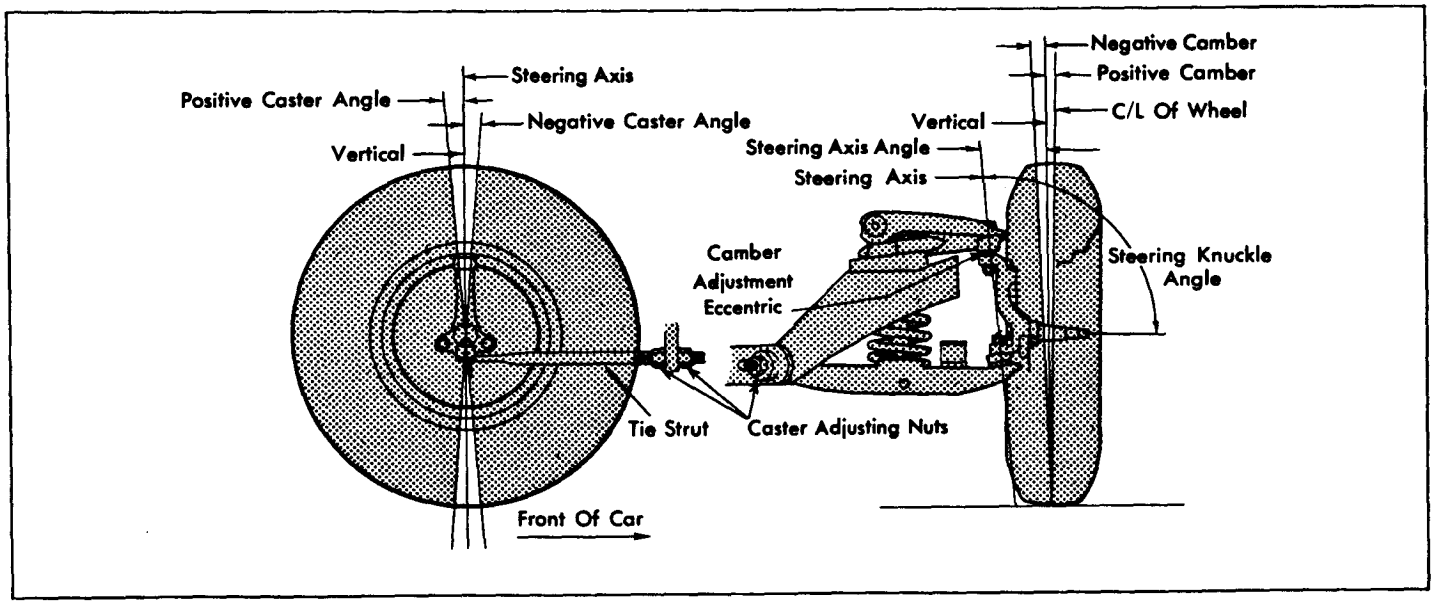


Figure 18 — Location of Strut and Eccentric Ball Adjustment

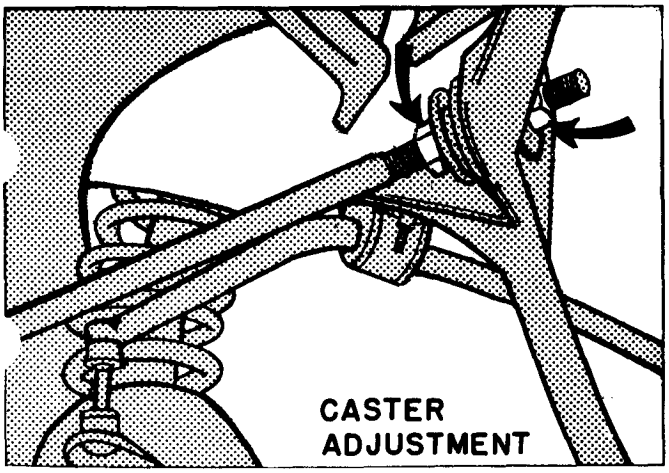


Figure 20 — Chevrolet Caster Adjustment

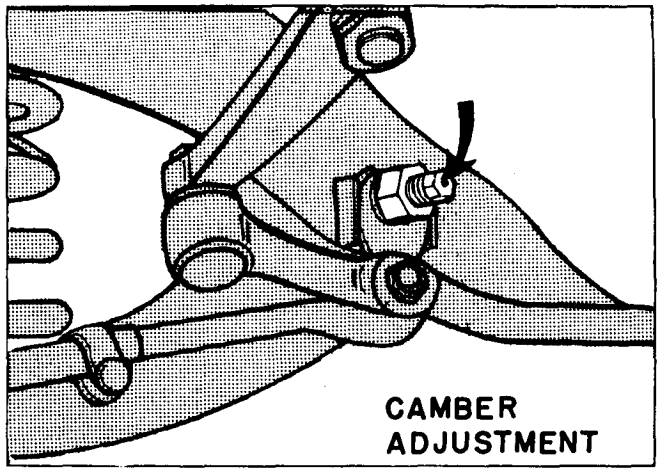


Figure 21 — Chevrolet Camber Adjustment

Adjusting Chevette Caster-Camber

To adjust caster on the Chevette, it is necessary to rearrange the washers on the upper inner control arm. Factory installed washers are 6 mm thick and the total of any two additional washer combination must always be 12 mm. The smaller diameter shim goes to the front (A in Figure 22).

Camber is determined by the mounting of the upper ball joints. Rotate the upper ball joint flange a half-turn to adjust camber approximately one degree (Figure 22).

Vehicles with Radial Tires

To obtain the best caster-camber settings for vehicles equipped with radial tires, use manufacturer's specifications.

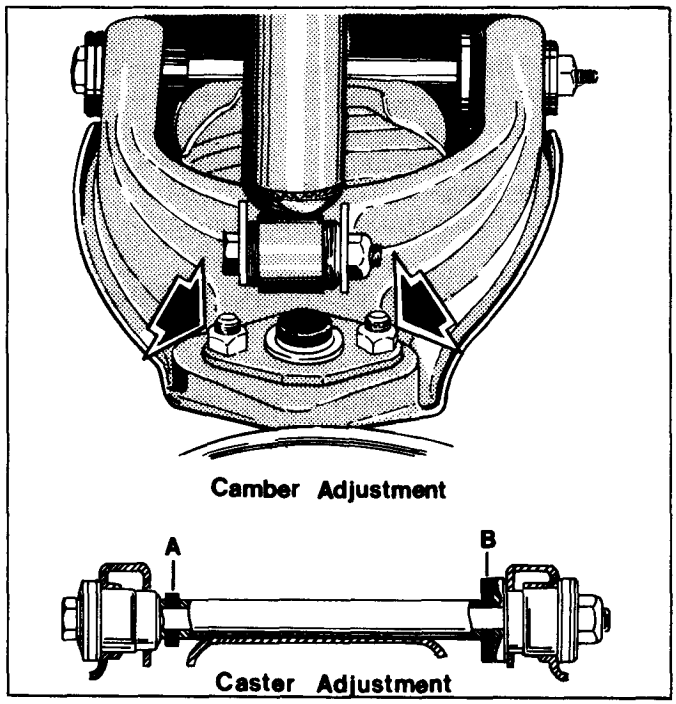


Figure 22 — Chevette Adjustment

Shim = Deg°
1/16" = 1/2°
1/32" = 1/4°

Shim Pack

Left wheel

	FP	RP
Cam		
Caster		
Combo		

Right wheel

	FP	RP
Cam		
Caster		
Combo		

1/16 shim = 1/2°

MANUFACTURER'S SPECIFIED ALIGNMENT TOLERANCES

U.S. PASSENGER CAR SECTION

All vehicles should be set to the preferred (PREF.) specification when being realigned. The minimum and maximum settings specified are a guide to use when checking alignment. The manufacturers consider alignment within these tolerances acceptable for safe vehicle operation while still limiting abnormal tire wear.

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	CASTER (Degrees) PREF.	CASTER (Degrees) MAX.	CAMBER (Degrees) MIN.	CAMBER (Degrees) PREF.	CAMBER (Degrees) MAX.	TOE-IN (Inches) MIN.	TOE-IN (Inches) PREF.	TOE-IN (Inches) MAX.	TOE-IN (Millimeters) MIN.	TOE-IN (Millimeters) PREF.	TOE-IN (Millimeters) MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	TOE-OUT ON TURNS (Degrees) INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
RESET VEHICLE ALIGNMENT AS CLOSE TO PREFERRED SETTINGS AS POSSIBLE FOR BEST RESULTS.																
AMERICAN MOTORS																
(A) 1980 Eagle: king pin inclination 11½° • Wheels at Full Turning Angle																
83-82 Spirit, Concord	(1)(2)	3½	4½	5				1/16	1/8	3/16	1.6	3.2	4.8	NA	38°	7¾
Left Wheel					1/8	3/8	3/4									
Right Wheel					– 1/8	1/8	1/2									
81-80 Spirit, Concord, AMX	(1)(2)	0	1	2½				1/16	1/8	3/16	1.6	3.2	4.8	NA	38°	7¾
Left Wheel					1/8	3/8	3/4									
Right Wheel					– 1/8	1/8	1/2									
84-82 Eagle	(1)(2)	3	4	5	– 1/8	3/8	5/8									
w/Select Drive								1/16	1/8	3/16	1.6	3.2	4.8	NA	38°	11 27/32
81-80 Eagle (A)	(1)(2)	2	2½	3	– 1/8	3/8	5/8	1/16 (out)	1/8 (out)	3/16 (out)	1.6 (out)	3.2 (out)	4.8 (out)	NA	38°	11 27/32
80-79 Pacer	(3)	1	2	3½	0	1/4	3/4	1/16	1/8	3/16	1.6	3.2	4.8	NA	35°	7¾
79 AMX, Concord, Spirit	(1)(2)	0	1	2½	0	1/4	3/4	1/16	1/8	3/16	1.6	3.2	4.8	NA	35°	7¾
78 Matador, AMX, Concord, Gremlin	(1)(2)	0	1	2				1/16	1/8	3/16	1.6	3.2	4.8	22	25	7¾
Left Wheel					1/8	3/8	5/8									
Right Wheel					0	1/8	1/2									
78 Pacer	(3)	1	2	3				1/16	1/8	3/16	1.6	3.2	4.8	22	25	7¾
Left Wheel					1/8	3/8	5/8									
Right Wheel					0	1/8	1/2									
77-75 Gremlin, Hornet	(1)(2)	– ½	0	½				1/16	1/8	3/16	1.6	3.2	4.8	22	25	7¾
Left Wheel					1/8	3/8	5/8									
Right Wheel					0	1/8	1/2									
77-75 Pacer	(3)	½	1	1½				1/16	1/8	3/16	1.6	3.2	4.8	22	25	7¾
Left Wheel					1/8	3/8	5/8									
Right Wheel					0	1/8	1/2									
77-75 Matador, Javelin, Ambassador, AMX	(1)(2)	½	1	1½				1/16	1/8	3/16	1.6	3.2	4.8	22	25	7¾
Left Wheel					1/8	3/8	5/8									
Right Wheel					0	1/8	1/2									
CHECKER MOTORS CORP.																
82-81 All Models	(24)	1½	2	2½	1/4	½	3/4	1/16	3/32	1/8	1.6	2.4	3.2	17½	20	7
80-75 All Models	(24)	1½	2	2½	½	1	1½	1/16	3/32	1/8	1.6	2.4	3.2	17½	20	7
CHRYSLER CORP.																
(A) Check vehicle suspension height before performing alignment.																
(B) Maximum left to right variation in caster not to exceed 1¼° when checking alignment.																
(C) The engine must be running during toe adjustment of vehicles with power steering.																
CHRYSLER (A) (B) (C)																
84-83 Newport, New Yorker 5th Ave. (RWD)	(7)	1¼	2½	3¾	– 1/4	½	1¼	0	1/8	5/16	0	3.2	8.0	18	20	8
82 New Yorker	(7)	1¼	2½	3¾	– 1/4	½	1¼	0	1/8	5/16	0	3.2	8.0	18	20	8
81-80 Newport, New Yorker	(7)	– 1/4	1	2¼	– 1/4	½	1¼	0	1/8	5/16	0	3.2	8.0	18	20	8
79 Newport, New Yorker	(7)	– ½	¾	2				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	½	1									
Right Wheel					– 1/4	1/4	3/4									
78-77 Newport, New Yorker	(7)	– ½	¾	2				1/16	1/8	1/4	1.6	3.2	6.4	18 5/16	20	9
Left Wheel					0	½	1									
Right Wheel					– 1/4	1/4	3/4									
76-75 Newport, New Yorker	(7)	– ½	¾	1¾				1/16	1/8	1/4	1.6	3.2	6.4	18 5/16	20	9
Left Wheel					0	½	1									
Right Wheel					– 1/4	1/4	3/4									
83-80 Cordoba	(7)	1¼	2½	3¾	– 1/4	½	1¼	0	1/8	5/16	0	3.2	8.0	18	20	8
79-77 Cordoba	(7)	– ½	¾	2				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	½	1									
Right Wheel					– 1/4	1/4	3/4									
76-75 Cordoba	(7)	– ½	¾	1¾				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	½	1									
Right Wheel					1/4	1/4	3/4									

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	CASTER (Degrees) PREF.	CASTER (Degrees) MAX.	CAMBER (Degrees) MIN.	CAMBER (Degrees) PREF.	CAMBER (Degrees) MAX.	TOE-IN (Inches) MIN.	TOE-IN (Inches) PREF.	TOE-IN (Inches) MAX.	TOE-IN (Millimeters) MIN.	TOE-IN (Millimeters) PREF.	TOE-IN (Millimeters) MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	TOE-OUT ON TURNS (Degrees) INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
84-82 LeBaron (FWD), E-Class, New Yorker, Laser (FWD)																
Front	(4) ★		Fixed		– 1/4	5/16	3/4	7/32 (out)	1/16 (out)	1/8 (in)	5.6 (out)	1.6 (out)	3.2 (in)	NA	NA	13 5/16
Rear	(48)				– 1	– 1/2	0	3/16 (out)	0	3/16 (in)	4.8 (out)	0	4.8 (in)			
81-80 LeBaron	(7)	1 1/4	2 1/2	3 3/4	– 1/4	1/2	1 1/4	0	1/8	5/16	0	3.2	8.0	18	20	8
79-77 LeBaron	(7)	1 1/2	2 1/2	3 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
83-81 Imperial	(7)	1 1/4	2 1/2	3 3/4	– 1/4	1/2	1 1/4	0	1/8	5/16	0	3.2	8.0	18	20	8
75 Imperial	(7)	– 1/2	3/4	1 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18 1/4	20	9
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
DODGE DIV. (A) (B) (C)																
81-80 St. Regis	(7)	– 1/4	1	2 1/4	– 1/4	1/2	1 1/4	0	1/8	5/16	0	3.2	8.0	18	20	8
79 St. Regis	(7)	– 1/2	3/4	2				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
80 Aspen	(7)	1 1/4	2 1/2	3 3/4	– 1/4	1/2	1 1/4	0	1/8	5/16	0	3.2	8.0	18	20	8
79-76 Aspen	(7)	1 1/2	2 1/2	3 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
83-80 Mirada	(7)	1 1/4	2 1/2	3 3/4	– 1/4	1/2	1 1/4	0	1/8	5/16	0	3.2	8.0	18	20	8
84-80 Diplomat	(7)	1 1/4	2 1/2	3 3/4	– 1/4	1/2	1 1/4	0	1/8	5/16	0	3.2	8.0	18	20	8
79-77 Diplomat	(7)	1 1/2	2 1/2	3 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1 1/4	1/4	3/4									
79-77 Charger, Charger SE Magnum XE, Monaco, Royal Monaco																
W/Power Steering	(7)	– 1/2	3/4	2				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
W/Manual Steering	(7)	– 1 3/4	– 1/2	3/4				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
Coronet, Charger																
W/Power Steering	(7)	– 1/2	3/4	1 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
W/Manual Steering	(7)	– 1 3/4	– 1/2	1/2				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
84-82 Aries, "400", "600", "600 ES", Daytona																
Front	(4) ★		Fixed		– 1/4	5/16	3/4	7/32 (out)	1/16 (out)	1/8 (in)	5.6 (out)	1.6 (out)	3.2 (in)	NA	NA	13 5/16
Rear	(48)		Fixed		– 1	– 1/2	0	3/16 (out)	0	3/16 (in)	4.8 (out)	0	4.8 (in)			
81 Aries																
Front	(4)		Fixed		– 1/4	5/16	3/4	5/32 (out)	1/16 (out)	1/8 (in)	4.0 (out)	1.6 (out)	3.2 (in)	NA	NA	13 3/8
Rear	(48)		Fixed		– 1	– 1/2	0	3/16 (out)	0	3/16 (in)	4.8 (out)	0	4.8 (in)			
84-82 Omni, 024, Rampage, Charger																
Front	(4)		Fixed		– 1/4	5/16	3/4	7/32 (out)	1/16 (out)	1/8 (in)	5.6 (out)	1.6 (out)	3.2 (in)	NA	NA	13 3/8
Rear, exc. Rampage	(48)		Fixed		– 1 1/4	– 3/4	– 1/4	5/32 (out)	3/32 (in)	1 1/32 (in)	4.0 (out)	2.4 (in)	8.7 (in)			
Rear, Rampage	(48)		Fixed		– 1 1/8	– 5/8	– 1/8	5/32 (out)	3/32 (in)	1 1/32 (in)	4.0 (out)	2.4 (in)	8.7 (out)			
81-78 Omni, 024																
Front	(4)		Fixed		– 1/4	5/16	3/4	5/32 (out)	1/16 (out)	1/8 (in)	4.0 (out)	1.6 (out)	3.2 (in)	NA	NA	13 3/8
Rear	(48)		Fixed		– 1/2	– 1	– 1 1/2									

★ Use Ill. No. 34 for 1984 Models.

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	CASTER (Degrees) PREF.	CASTER (Degrees) MAX.	CAMBER (Degrees) MIN.	CAMBER (Degrees) PREF.	CAMBER (Degrees) MAX.	TOE-IN (Inches) MIN.	TOE-IN (Inches) PREF.	TOE-IN (Inches) MAX.	TOE-IN (Millimeters) MIN.	TOE-IN (Millimeters) PREF.	TOE-IN (Millimeters) MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	TOE-OUT ON TURNS (Degrees) INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
76-75 Monaco,																
Royal Monaco	(7)	– 1/2	3/4	1 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18 1/4	20	9
Left Wheel	(7)				0	1/2	1									
Right Wheel	(7)				– 1/4	1/4	3/4									
76-75 Dart, Swinger, Challenger																
W/Power Steering	(6)	– 1/2	3/4	1 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18 1/2	20	7 1/2
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
W/Manual Steering	(6)	– 1 3/4	– 1/2	1/2				1/16	1/8	1/4	1.6	3.2	6.4	18 1/2	20	7 1/2
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
PLYMOUTH (A) (B) (C)																
84-82 Gran Fury	(7)	1 1/4	2 1/2	3 3/4	– 1/4	1/2	1 1/4	0	1/8	5/16	0	3.2	8.0	18	20	8
81-80 Gran Fury	(7)	– 1/4	1	2 1/4	– 1/4	1/2	1 1/4	0	1/8	5/16	0	3.2	8.0	18	20	8
77 Gran Fury	(7)	– 1/2	3/4	2				1/16	1/8	1/4	1.6	3.2	6.4	18	20	9
Left Wheel					0	1/2	1									
Right Wheel	(7)				– 1/4	1/4	3/4									
76-75 Gran Fury	(7)	– 1/2	3/4	1 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18 5/16	20	9
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
80 Volare	(7)	1 1/4	2 1/2	3 3/4	– 1/4	1/2	1 1/4	0	1/8	5/16	0	3.2	8.0	18	20	8
79-76 Volare	(7)	1 1/2	2 1/2	3 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
84-82 Reliant, Caravelle																
Front	(4) ★		Fixed		– 1/4	5/16	3/4	7/32 (out)	1/16 (out)	1/8 (in)	5.6 (out)	1.6 (out)	3.2 (in)	NA	NA	13 5/16
Rear	(48)		Fixed		– 1	– 1/2	0	3/16 (out)	0	3/16 (in)	4.8 (out)	0	4.8 (in)			
81 Reliant																
Front	(4)		Fixed		– 1/4	5/16	3/4	5/32 (out)	1/16 (out)	1/8 (in)	4.0 (out)	1.6 (out)	3.2 (in)	NA	NA	13 3/8
Rear	(48)		Fixed		– 1	– 1/2	0	3/16 (out)	0	3/16 (in)	4.8 (out)	0	4.8 (in)			
84-82 Horizon, TC3, Turismo, Scamp																
Front	(4)		Fixed		– 1/4	5/16	3/4	7/32 (out)	1/16 (out)	1/8 (in)	5.6 (out)	1.6 (out)	3.2 (in)	NA	NA	13 3/8
Rear exc. Scamp	(48)		Fixed		– 1 1/4	– 3/4	– 1/4	5/32 (out)	3/32 (in)	1/32 (in)	4.0 (out)	2.4 (out)	8.7 (in)			
Rear, Scamp	(48)		Fixed		– 1 1/8	– 5/8	– 1/8	5/32 (out)	3/32 (in)	1 1/32 (in)	4.0 (out)	2.4 (in)	8.7 (in)			
81-78 Horizon, TC3																
Front	(4)		Fixed		– 1/4	5/16	– 3/4	5/32 (out)	1/16 (out)	1/8 (in)	4.0 (out)	1.6 (out)	3.2 (in)	NA	NA	13 3/8
Rear	(48)		Fixed		– 1 1/2	– 1	– 1/2	5/32 (out)	3/32 (in)	1 1/32 (in)	4.0 (out)	2.4 (in)	8.7 (in)			
78-77 Fury																
W/Power Steering	(7)	– 1/2	3/4	2				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
W/Manual Steering	(7)	– 1 3/4	– 1/2	3/4				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
76-75 Fury																
W/Power Steering	(7)	– 1/2	3/4	1 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
W/Manual Steering	(7)	– 1 3/4	– 1/2	1/2				1/16	1/8	1/4	1.6	3.2	6.4	18	20	8
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
76-75 Valiant, Duster																
W/Power Steering	(6)	– 1/2	3/4	1 3/4				1/16	1/8	1/4	1.6	3.2	6.4	18 1/2	20	7 1/2
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									
W/Manual Steering	(6)	– 1 3/4	– 1/2	1/2				1/16	1/8	1/4	1.6	3.2	6.4	18 1/2	20	7 1/2
Left Wheel					0	1/2	1									
Right Wheel					– 1/4	1/4	3/4									

★ Use Ill. No. 34 for 1984 Models.

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	CASTER (Degrees) PREF.	CASTER (Degrees) MAX.	CAMBER (Degrees) MIN.	CAMBER (Degrees) PREF.	CAMBER (Degrees) MAX.	TOE-IN (Inches) MIN.	TOE-IN (Inches) PREF.	TOE-IN (Inches) MAX.	TOE-IN (Millimeters) MIN.	TOE-IN (Millimeters) PREF.	TOE-IN (Millimeters) MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	TOE-OUT ON TURNS (Degrees) INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
FORD MOTOR CO.																
(A) Maximum side to side variation; caster ± ¾°, camber, (Left minus right) within - ½° to 1°.																
(B) Maximum side to side variation; caster and camber ± ¾°.																
(C) Maximum side to side variation; caster and camber 1°.																
(D) Maximum side to side variation; caster 1° camber ½°.																
(E) Caster measurement must be done for each wheel regardless of the equipment being used.																
(F) Maximum side to side variation; caster ± ⅞°, camber ± ¾°																
(G) Maximum side to side variation; caster and camber ± ⅞°.																
(H) 84 Continental, Mark VII Set Vehicle Ride Height prior to checking alignment.																
FORD DIVISION																
84 Escort, EXP (E)	N/A															
Front		5/8	1 13/32	2 1/8				1/64 (in)	1/8 (out)	7/32 (out)	0.4	2.4	5.6			
Left Wheel					1 3/8	2 1/8	2 7/8							20	20	14 21/32
Right Wheel					15/16	1 1/16	2 7/16							18 7/32	20	15 3/32
Rear								1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)			
Left Wheel					- 2 1/8	- 1 1/4	- 3/8									
Right Wheel					- 1 1/2	- 5/8	- 1/4									
83-82 Escort, EXP (E)	N/A															
Front		9/16	1 5/16	2 1/16				1/32 (in)	3/32 (out)	7/32 (out)	0.7 (in)	2.4 (out)	5.6 (out)			
Left Wheel					1 13/32	2 5/32	2 29/32							20	20	14 21/32
Right Wheel					31/32	1 23/32	2 15/32							17	20	15 3/32
Rear					- 17/16	- 19/32	1/4	0	3/16	3/8	0.0	4.8	9.5			
81 Escort, EXP (E)	N/A															
Front		9/16	1 5/16	2 1/16				1/32 (in)	3/32 (out)	7/32 (out)	0.7 (in)	2.4 (out)	5.6 (out)			
Left Wheel					1 13/32	2 5/32	2 29/32							19 31/32	20	14 21/32
Right Wheel					31/32	1 23/32	2 15/32							17 1/32	20	15 3/32
Rear					- 17/16	- 19/32	1/4	0	3/16	3/8	0.0	4.8	9.5			
84 Tempo																
Front (E)	N/A	9/16	1 5/16	2 1/16				1/32 (in)	1/8 (out)	7/32 (out)	0.7 (in)	3.2 (out)	5.6 (out)	18 7/32	20	
Left Wheel					1 1/8	1 7/8	2 5/8									14 5/8
Right Wheel					1 1/16	1 1/2	2 3/16									15 1/8
Rear	N/A				- 1	- 1/4	1/2	1/8 (out)	1/16 (in)	1/4 (in)	3.2 (out)	1.6 (in)	12.7 (in)			
84-83 Mustang (B)	(69)	1/2	1 1/4	2	- 3/4	0	3/4	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
82 Mustang (B)	N/A	3/8	1 1/8	1 7/8	- 1/2	1/4	1	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 11/16
81 Mustang (B)	N/A	1/4	1	1 3/4	- 1/2	1/4	1	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 11/16
84 Thunderbird (B)	(69)	1/4	1	1 3/4	- 1/2	1/4	1	1/16	3/16	5/16	1.6	4.8	8.0	19 23/32	20	15 23/32
83 Thunderbird (B)	(69)	1/2	1 1/4	2	- 1/2	1/4	1	1/16	3/16	5/16	1.6	4.8	8.0	19 23/32	20	15 23/32
82-81 Thunderbird (B)	N/A	1/8	1	1 7/8	- 1/2	3/8	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 3/4	20	15 23/32
83 Fairmont Futura (F)	(69)	1/8	1 1/8	2 1/8	- 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
82 Fairmont (B)	N/A	1/8	1	1 7/8	- 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
81 Fairmont																
Sedan (B)	N/A	1/8	1	1 7/8	- 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
Wagon (B)	N/A	- 1/8	3/4	1 5/8	- 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
82-81 Granada Sedan (B)	N/A	1/8	1	1 7/8	- 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
82 Granada Wagon (B)	N/A	- 1/8	3/4	1 5/8	- 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 11/16
84 Crown Victoria (B)	(47)	2 3/8	3 1/8	4 1/8	- 1/4	1/2	1 1/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	4.8 (in)	8.0 (in)	18 1/2	20	NA
83 Crown Victoria & SW (B)	(47)	2 1/4	3	4	- 1/4	1/2	1 1/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	11
84 LTD Sedan (B)	(69)	1/4	1	2 1/4	- 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 23/32	20	15 23/32
Wagon (B)	(69)	1/4	1	2 1/4	- 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 23/32	20	15 23/32
83 LTD																
Sedan (G)	(69)	1/8	1 1/8	2 1/8	- 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
Wagon (G)	(69)	- 1/8	7/8	1 7/8	- 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
82-81 LTD (B)	(47)	2 1/4	3	3 3/4	- 1/4	1/2	1 1/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	10 31/32
80 LTD (B)	(47)	2 1/4	3	3 3/4	- 1/4	1/2	1 1/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	10 7/8
80 Thunderbird (A)	N/A	1/8	1	1 7/8	- 1/2	3/8	1 1/4	1/8	1/4	3/8	3.2	6.4	9.5	24 29/32	20	9 1/2
80 Fairmont																
Sedan (A)	N/A	1/8	1	1 7/8	- 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 3/4	20	15 1/4
Wagon (A)	N/A	- 1/8	3/4	1 5/8	- 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 3/4	20	15 1/4
80-79 Granada (B)	(1)(2)	- 1 1/4	- 1/2	1/4	- 1/2	1/4	1	0	1/8	1/4	0	3.2	6.4			7 1/2
W/Power Steering														18 3/16	20	
W/Manual Steering														18 7/16	20	

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	CASTER (Degrees) PREF.	CASTER (Degrees) MAX.	CAMBER (Degrees) MIN.	CAMBER (Degrees) PREF.	CAMBER (Degrees) MAX.	TOE-IN (Inches) MIN.	TOE-IN (Inches) PREF.	TOE-IN (Inches) MAX.	TOE-IN (Millimeters) MIN.	TOE-IN (Millimeters) PREF.	TOE-IN (Millimeters) MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	TOE-OUT ON TURNS (Degrees) INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
80-79 Mustang (B)	N/A	1/4	1	1 3/4	- 1/2	1/4	1	3/16	5/16	7/16	4.8	8.0	11.1	19 3/4	20	15 1/4
80-79 Pinto Sedan (B)	(8)	1/4	1	1 3/4	- 1/4	1/2	1 1/4	0	1/8	1/4	0	3.2	6.4	18 7/8	20	10
80 Pinto Wagon (B)	(8)	- 3/4	1/4	1 1/4	- 1/4	1/2	1 1/4	0	1/8	1/4	0	3.2	6.4	18 7/8	20	10
79 Pinto Wagon (B)	(8)	- 1/2	1/4	1	- 1/4	1/2	1 1/4	0	1/8	1/4	0	3.2	6.4	18 7/8	20	10
79 LTD (B)	(47)	2 1/4	3	3 3/4	- 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	18 1/2	20	11 3/16
79-78 Fairmont (A)	N/A	1/8	7/8	1 5/8	- 3/8	3/8	1 1/8	3/16	5/16	7/16	4.8	8.0	11.1	19 3/4	20	15 1/4
79-77 LTD II (A)	(46)	3 1/4	4	4 3/4				0	1/8	1/4	0	3.2	6.4	18	20	9
Left Wheel					- 1/4	1/2	1 1/4									
Right Wheel					- 1/2	1/4	1									
79-77 Thunderbird (A)	(46)	3 1/4	4	4 3/4				0	1/8	1/4	0	3.2	6.4	18	20	9 1/2
Left Wheel					- 1/4	1/2	1 1/4									
Right Wheel					- 1/2	1/4	1									
78-77 Pinto Sedan (B)	(8)	1/4	1	1 3/4	- 1/4	1/2	1 1/4	0	1/8	1/4	0	3.2	6.4	18 7/8	20	10
78-77 Pinto Wagon (B)	(8)	- 1/2	1/4	1	- 1/4	1/2	1 1/4	0	1/8	1/4	0	3.2	6.4	18 7/8	20	10
78-77 LTD (A)	(8)	1 1/4	2	2 3/4				1/16	3/16	5/16	1.6	4.8	8.0	18 3/4	20	9 3/4
Left Wheel					- 1/4	1/2	1 1/4									
Right Wheel					- 1/2	1/4	1									
79-77 Granada (B)	(1)(2)	- 1 1/4	- 1/2	1/4	- 1/2	1/4	1	0	1/8	1/4	0	3.2	6.4			6 3/4
W/Power Steering														18 3/16	20	
W/Manual Steering														18 7/16	20	
78-75 Mustang (B)	(8)	1/8	7/8	1 5/8	- 1/4	1/2	1 1/4	0	1/8	1/4	0	3.2	6.4	18 7/8	20	9 3/4
77 Maverick (B)	(1)(2)	- 1 1/4	- 1/2	1/4	- 1/2	1/4	1	0	1/8	1/4	0	3.2	6.4			6 3/4
W/Power Steering														18 1/8	20	
W/Manual Steering														18 3/8	20	
76-75 LTD (A)	(8)	1 1/4	2	2 3/4				1/16	3/16	7/16	1.6	4.8	11.1	18 3/4	20	9 3/4
Left Wheel					- 1/4	1/2	1 1/4									
Right Wheel					- 1/2	1/4	1									
76-75 Thunderbird (A)	(8)	3 1/4	4	4 3/4				1/16	3/16	7/16	1.6	4.8	11.1	18 1/8	20	9
Left Wheel					- 1/4	1/2	1 1/4									
Right Wheel					- 1/2	1/4	1									
76-75 Granada (B)	(1)(2)	- 1 1/4	- 1/2	+ 1/4	- 1/2	1/4	1	0	1/8	3/8	0	3.2	9.5			
W/Power Steering														18 3/16	20	6 3/4
W/Manual Steering														18 7/16	20	6 3/4
76-75 Maverick (B)	(1)(2)	- 1 1/4	- 1/2	+ 1/4	- 1/2	1/4	1	0	1/8	3/8	0	3.2	9.5			
W/Power Steering														18 1/8	20	6 3/4
W/Manual Steering														18 3/8	20	6 3/4
76-75 Torino, Elite (A)	(8)	3 1/4	4	4 3/4				0	1/8	3/8	0	3.2	9.5	18	20	9
Left Wheel					- 1/4	1/2	1 1/4									
Right Wheel					- 1/2	1/4	1									
76-75 Pinto Sedan (B)	(8)	1/2	1 1/4	2	0	3/4	1 1/2	1/8	1/4	3/8	3.2	6.4	9.5	18 7/8	20	10
76-75 Pinto Wagon (B)	(8)	3/4	1 1/2	2 1/4	0	3/4	1 1/2	1/8	1/4	3/8	3.2	6.5	9.5	18 7/8	20	10
LINCOLN (H) 84 Continental, Mark VII Set Vehicle Ride Height prior to checking alignment.																
84 Continental, MarkVII (G)	(69)	7/8	1 3/4	2 15/16	- 7/8	0	7/8	0	1/8	1/4	0	3.2	6.4	17 1/8	20	11
83 Continental (F)	(69)	3/8	1 1/4	2 1/8	- 1/2	3/8	1 1/4	0	1/8	1/4	0	3.2	6.4	19 1/8	20	NA
82 Continental	(47)	1/8	1	1 7/8	- 1/2	3/8	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 1/8	20	NA
84 Lincoln Town Car (B)	(47)	2 3/8	3 1/8	4 1/8	- 1/4	1/2	1 1/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	4.8 (in)	8.0 (in)	18 1/2	20	NA
83 Lincoln Town Car, Mark VI (B)	(47)	2 1/4	3	4	- 1/4	1/2	1 1/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	11
82-81 Lincoln Town Car, Mark VI (B)	(47)	2 1/4	3	3 3/4	- 1/4	1/2	1 1/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	11
80 Continental, Mark VI (B)	(47)	2 1/4	3	3 3/4	- 1/4	1/2	1 1/4	1/16 (out)	1/16 (out)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	10 7/8
80-77 Versailles (B)	(1)(2)	- 1 1/4	- 1/2	1/4	- 1/2	1/4	1	0	1/8	1/4	0	3.2	6.4			
W/Power Steering														18 3/16	20	6 3/4
W/Manual Steering														18 7/16	20	6 3/4
79-78 Continental (A)	(8)	1 1/4	2	2 3/4				0	1/8	1/4	0	3.2	6.4	18 1/8	20	9 1/2
Left Wheel					- 1/4	1/2	1 1/4									
Right Wheel					- 1/2	1/4	1									
79-78 Mark V (A)	(8)	3 1/4	4	4 3/4				1/16	3/16	5/16	1.6	4.8	8.0	18 1/8	20	9 1/2
Left Wheel					- 1/4	1/2	1 1/4									
Right Wheel					- 1/2	1/4	1									
77-75 Continental (A)	(8)	1 1/4	2	2 3/4				0	1/8	3/8	0	3.2	9.5	18 5/32	20	9 1/2
Left Wheel					- 1/4	1/2	1 1/4									
Right Wheel					- 1/2	1/4	1									
77 Mark V (A)	(8)	1 1/4	2	2 3/4				1/16	3/16	5/16	1.6	4.8	8.0	18 1/8	20	9 1/2
Left Wheel					- 1/4	1/2	1 1/4									
Right Wheel					- 1/2	1/4	1									

•82 Granada - 15 11/16

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	CASTER (Degrees) PREF.	CASTER (Degrees) MAX.	CAMBER (Degrees) MIN.	CAMBER (Degrees) PREF.	CAMBER (Degrees) MAX.	TOE-IN (Inches) MIN.	TOE-IN (Inches) PREF.	TOE-IN (Inches) MAX.	TOE-IN (Millimeters) MIN.	TOE-IN (Millimeters) PREF.	TOE-IN (Millimeters) MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	TOE-OUT ON TURNS (Degrees) INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
76 Mark IV (A)	(8)	1 1/4	2	2 3/4				1/16	3/16	5/16	1.6	4.8	8.0	18 1/8	20	9 1/2
Left Wheel					– 1/4	1/2	1 1/4									
Right Wheel					– 1/2	1/4	1									
75 Mark IV (A)	(8)	1 1/4	2	2 3/4				1/16	3/16	7/16	1.6	4.8	11.1	18 1/8	20	9
Left Wheel					– 1/4	1/4	1 1/4									
Right Wheel					– 1/2	1/4	1									
MERCURY																
84 Lynx								1/64	1/8	7/32	0.4	2.4	5.6			
Front (E)	N/A	5/8	1 13/32	2 1/8				(in)	(out)	(out)	(in)	(out)	(out)			
Left Wheel					1 3/8	2 1/8	2 7/8							20	20	14 21/32
Right Wheel					15/16	1 1/16	2 7/16							18 7/32	20	15 3/32
Rear								1/16	1/16	3/16	1.6	1.6	4.8			
Left Wheel					– 2 1/8	– 1 1/4	– 3/8	(out)	(in)	(in)	(out)	(in)	(in)			
Right Wheel					– 1 1/2	– 5/8	– 1/4									
83-82 Lynx, LN7 (E)	N/A															
Front		9/16	1 5/16	2 1/16				1/32	3/32	7/32	.7	2.4	5.6			
								(in)	(out)	(out)	(in)	(out)	(out)			
Left Wheel					1 13/32	2 5/32	2 29/32							20	20	14 21/32
Right Wheel					3 1/32	1 23/32	2 15/32							17	20	15 3/32
Rear					– 1 7/16	– 19/32	1/4	0	3/16	3/8	0.0	4.8	9.5			
81 Lynx, LN7 (E)	N/A															
Front		9/16	1 5/16	2 1/16				1/32	3/32	7/32	.7	2.4	5.6			
								(in)	(out)	(out)	(in)	(out)	(out)			
Left Wheel					1 13/32	2 5/32	2 29/32							19 31/32	20	14 21/32
Right Wheel					3 1/32	1 23/32	2 15/32							17 1/32	20	15 3/32
Rear					– 1 7/16	– 19/32	1/4	0	3/16	3/8	0.0	4.8	9.5			
84 Grand Marquis (B)	(47)	2 3/8	3 1/8	4 1/8	– 1/4	1/2	1 1/4	1/16	1/16	3/16	1.6	4.8	8.0	18 1/2	20	NA
								(out)	(in)	(in)	(out)	(in)	(in)			
83 Grand Marquis (B)	(47)	2 1/4	3	4	– 1/4	1/2	1 1/4	1/16	1/16	3/16	1.6	1.6	4.8	18 1/2	20	11
								(out)	(in)	(in)	(out)	(in)	(in)			
84 Marquis Sedan (B)	(69)	1/4	1	2 1/4	– 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 23/32	20	15 23/32
Wagon (B)	(69)	1/4	1	2 1/4	– 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 23/32	20	15 23/32
83 Marquis																
Sedan (G)	(69)	1/8	1 1/8	2 1/8	– 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
Wagon (G)	(69)	– 1/8	7/8	1 7/8	– 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
82-81 Mercury (B)	(47)	2 1/4	3	3 3/4	– 1/4	1/2	1 1/4	1/16	1/16	3/16	1.6	1.6	4.8	18 1/2	20	10 31/32
								(out)	(in)	(in)	(out)	(in)	(in)			
84-83 Capri (B)	(69)	1/2	1 1/4	2	– 3/4	0	3/4	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
82 Capri (B)	N/A	3/8	1 1/8	1 7/8	– 1/2	1/4	1	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 11/16
81 Capri (B)	N/A	1/4	1	1 3/4	– 1/2	1/4	1	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 11/16
84 Topaz																
Front (E)	N/A	5/8	1 5/16	2 1/16				1/32	1/8	7/32	0.7	3.2	5.6	18 7/32	20	
								(in)	(out)	(out)	(in)	(out)	(out)			
Left Wheel					1 1/8	1 7/8	2 5/8									14 5/8
Right Wheel					1 1/16	1 1/2	2 3/16									15 1/8
Rear	N/A				– 1	– 1/4	1/2	1/8	1/16	1/4	3.2	1.6	12.7			
								(out)	(in)	(in)	(out)	(in)	(in)			
83 XR7 (B)	(69)	1/2	1 1/4	2	– 1/2	1/4	1	1/16	3/16	5/16	1.6	4.8	8.0	19 23/32	20	15 23/32
82-81 XR7 (B)	N/A	1/8	1	1 7/8	– 1/2	3/8	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 3/4	20	15 23/32
83 Zephyr (F)	(69)	1/8	1 1/8	2 1/8	– 5/16	7/16	1 13/16	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
82 Zephyr (B)	N/A	1/8	1	1 7/8	– 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
81 Zephyr Sedan (B)	N/A	1/8	1	1 7/8	– 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
81 Zephyr Wagon (B)	N/A	– 1/8	3/4	1 5/8	– 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32
84 Cougar (B	(69)	1/4	1	1 3/4	– 1/2	1/4	1	1/16	3/16	5/16	1.6	4.8	8.0	19 23/32	20	15 23/32
82-81 Cougar Sedan (B)	N/A	1/8	1	1 7/8	– 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 23/32*
82 Cougar Wagon (B)	N/A	– 1/8	3/4	1 5/8	– 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 27/32	20	15 11/16
80-79 Capri (B)	N/A	1/4	1	1 3/4	– 1/2	1/4	1	3/16	5/16	7/16	4.8	8.0	11.1	19 3/4	20	15 1/4
80 Zephyr Sedan (A)	N/A	1/8	1	1 7/8	– 5/16	7/16	1 3/16	1/16	3/16	5/16	1.6	4.8	8.0	19 3/4	20	15 1/4
80 Zephyr Wagon (A)	N/A	– 1/8	3/4	1 5/8	– 1/4	1/2	1 1/4	1/16	3/16	5/16	1.6	4.8	8.0	19 3/4	20	15 1/4
80 Bobcat Sedan (B)	(8)	1/4	1	1 3/4	– 1/4	1/2	1 1/4	0	1/8	1/4	0	3.2	6.4	18 7/8	20	10
80 Bobcat Wagon (B)	(8)	– 3/4	1/4	1 1/4	– 1/4	1/2	1 1/4	0	1/8	1/4	0	3.2	6.4	18 7/8	20	10
80 Cougar (A)	N/A	1/8	1	1 7/8	– 1/2	3/8	1 1/4	1/8	1/4	3/8	3.2	6.4	9.5	24 29/32	20	15 3/8
80 Monarch (B)	(1)(2)	– 1 1/4	– 1/2	1/4	– 1/2	1/4	1	0	1/8	1/4	0	3.2	6.4			
W/Power Steering														18 3/16	20	7 1/2
W/Manual Steering														18 7/16	20	7 1/2
80-79 Mercury (B)	(47)	2 1/4	3	3 3/4	– 1/4	1/2	1 1/4	1/16	1/16	3/16	1.6	1.6	4.8	18 1/2	20	10 7/8
								(out)	(in)	(in)	(out)	(in)	(in)			
79-78 Zephyr (A)	N/A	1/8	7/8	1 5/8	– 3/8	3/8	1 1/8	3/16	5/16	7/16	4.8	8.0	11.1	19 3/4	20	15 1/4
79-77 Bobcat Sedan (B)	(8)	1/4	1	1 3/4	– 1/4	1/2	1 1/4	0	1/8	1/4	0	3.2	6.4	18 7/8	20	10

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	CASTER (Degrees) PREF.	CASTER (Degrees) MAX.	CAMBER (Degrees) MIN.	CAMBER (Degrees) PREF.	CAMBER (Degrees) MAX.	TOE-IN (Inches) MIN.	TOE-IN (Inches) PREF.	TOE-IN (Inches) MAX.	TOE-IN (Millimeters) MIN.	TOE-IN (Millimeters) PREF.	TOE-IN (Millimeters) MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	TOE-OUT ON TURNS (Degrees) INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
79-77 Bobcat Wagon . . . (B)	(8)	– ½	¼	1	– ¼	½	1¼	0	⅛	¼	0	3.2	6.4	18⅞	20	10
79-77 Cougar . . . . . (A)	(46)	3¼	4	4¾					⅛	¼	0	3.2	6.4	18	20	9
Left Wheel					– ¼	½	1¼									
Right Wheel					– ½	¼	1									
79-77 Monarch . . . . . (B)	(1)(2)	– 1¼	– ½	¼	– ½	¼	1	0	⅛	⅜	0	3.2	9.5			
W/Power Steering														18 3/16	20	6¾
W/Manual Steering														18 7/16	20	6¾
78-77 Mercury . . . . . (A)	(8)	1¼	2	2¾				1/16	3/16	5/16	1.6	4.8	8.0	18¾	20	9½
Left Wheel					– ¼	½	1¼									
Right Wheel					– ½	¼	1									
77 Comet . . . . . (B)	(1)(2)	– 1¼	– ½	¼	– ½	¼	1	0	⅛	¼	0	3.2	6.4			
W/Power Steering														18⅛	20	6¾
W/Manual Steering														18⅜	20	6¾
76-75 Bobcat Sedan. . . . (B)	(8)	½	1¼	2	0	¾	1½	⅛	¼	⅜	3.2	6.4	9.5	18⅞	20	10
76-75 Bobcat Wagon . . . (B)	(8)	¾	1½	2¼	0	¾	1½	⅛	¼	⅜	3.2	6.4	9.5	18⅞	20	10
76-75 Cougar, Montego . (A)	(46)	3¼	4	4¾				0	⅛	⅜	0	3.2	9.5	18	20	9
Left Wheel					– ¼	½	1¼									
Right Wheel					– ½	¼	1									
76-75 Monarch . . . . . (B)	(1)(2)	– 1¼	– ½	¼	– ½	¼	1	0	⅛	⅜	0	3.2	9.5			
W/Power Steering														18 3/16	20	6¾
W/Manual Steering														18 7/16	20	6¾
76-75 Comet . . . . . (B)	(1)(2)	– 1¼	– ½	¼	– ½	¼	1	0	⅛	⅜	0	3.2	9.5			
W/Power Steering														18 5/32	20	6¾
W/Manual Steering														18 13/32	20	6¾
76-75 Mercury . . . . . (A)	(8)	1¼	2	2¾				1/16	3/16	7/16	1.6	4.8	11.1	18¾	20	9½
Left Wheel					– ¼	½	1¼									
Right Wheel					– ½	¼	1									
•82 Cougar - 15 11/16																

GENERAL MOTORS CORPORATION

BUICK MOTOR DIVISION (A)

(A) Maximum side to side variation; caster and camber ½ °.
(B) 1982-79 Riviera F.W.D. trim height is measured from the edge of the wheel well opening directly over the center of the wheel to the floor.
(C) 1984-83 Riviera trim heights measured from: front; 24.4" to rear of front wheel center line. Rear; 18.7" to front of rear wheel center line. Trim height is measured at point specified (above) from lower outer edge of rocker panel to ground.
(See block to right for detail).

RIVIERA F.W.D. TRIM HEIGHTS (B) or (C)

Model and Year	Front Suspension Inches	Front Suspension MM	Rear Suspension Inches	Rear Suspension MM
84-83	9.69	246	9.57	243
82-80	28⅛	726	27 5/16	694
79	28½	724	28	709

84-83 Skyhawk (F.W.D.) . . .	(67)	Fixed			7/32	23/32	17/32	¼ (out)	⅛ (out)	0	6.4 (out)	3.2 (out)	0.0	NA	NA	NA
82 Skyhawk (F.W.D.).	(67)	Fixed			1/16	9/16	1 1/16	¼ (out)	⅛ (out)	0	6.4 (out)	3.2 (out)	0.0	NA	NA	13½
84-83 Skylark (F.W.D.) and Century (F.W.D.)	(67)	Fixed			– ½	0	½	3/16 (out)	0	3/16 (in)	5.0 (out)	0.0	5.0 (in)	NA	NA	NA
82 Skylark (F.W.D.)	(67)	1	2	3	– ½	0	½	0	5/32	3/16	0.0	2.5	5.0	NA	NA	14½
82 Century (F.W.D.).	(67)	1	2	3	– ½	0	½	0	3/32	3/16	0.0	2.5	5.0	NA	NA	14½
84-82 Regal (R.W.D.)-All . . .	(10)	2	3	4	– 5/16	½	1 5/16	1/16	⅛	¼	1.6	3.2	6.4	NA	NA	8
84-83 Estate, Electra, LeSabre and LeSabre Wagon	(10)	2	3	4	0	13/16	1 5/8	1/16	⅛	3/16	1.6	3.2	4.8	NA	NA	NA
82-77 Electra, Le Sabre. . . .	(10)	2	3	4	0	13/16	1 5/8	1/16	⅛	¼	1.6	3.2	6.4	NA	NA	9 9/16
82-77 Estate, Electra, & LeSabre Wagon	(10)	2	3	4	0	13/16	1 5/8	1/16	⅛	¼	1.6	3.2	6.4	NA	NA	10¾
84-79 Riviera																
Front	(6)	1½	2½	3½	– 13/16	0	13/16	⅛ (out)	0	⅛ (in)	3.2 (out)	0	3.2 (in)	NA	NA	11
Rear	(9)	Fixed			Fixed			0	5/32	5/16	0	4.0	8.0			
81-80 Skylark	(34)	– 2	0	2	½	1	1½	0	3/32	3/16	0	2.5	5.0	NA	NA	14½
81-78 Century, Regal-All . . .	(10)				– 5/16	½	1 5/16	1/16	⅛	¼	1.6	3.2	6.4	NA	NA	8
W/Power Steering		2	3	4												
W/Manual Steering		0	1	2												
80-76 Skyhawk	(11)	– 1¾	– ¾	¼	– ½	¼	1	-1/16 (out)	1/16 (in)	3/16 (in)	4.8 (out)	1.6 (in)	1.6 (in)	NA	NA	8½
79-77 Skylark	(10)				0	¾	1 5/8	1/16	⅛	¼	1.6	3.2	6.4	NA	NA	10
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	PREF.	MAX.	CAMBER (Degrees) MIN.	PREF.	MAX.	TOE-IN (Inches) MIN.	PREF.	MAX.	TOE-IN (Millimeters) MIN.	PREF.	MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
77 Century, Regal-All	(10)															
W/Radial Tires		1	2	3				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	8
W/Bias Tires		0	1	2												
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 1/4									
76 LeSabre, Electra, Riviera	(10)	1/2	1 1/2	2 1/2				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	9 9/16
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 1/4									
76 Estate, Electra, & LeSabre Wagon	(10)	1/2	1 1/2	2 1/2				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	10 3/4
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 1/4									
76 Skylark	(10)				0	3/4	1 1/2	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												
76-75 Century, Regal-All	(10)	1	2	3				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)			8
Left Wheel					1/4	1	1 3/4							19 3/16	20	
Right Wheel					– 1/4	1/2	1 1/4							18 13/16	20	
75 Skyhawk	(11)	– 1 3/4	– 3/4	1/4	– 1/4	1/2	1 1/4	1/8	1/4	3/8	3.2	6.4	9.5	NA	NA	8 1/2
75 Electra, Le Sabre, Riviera, Estate Wagon	(10)	1/2	1 1/2	2 1/2				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	10 1/2
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 1/4									
75 Appollo, Skylark	(10)				1/4	3/4	1 1/2	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	8 3/4
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												

CADILLAC MOTOR DIVISION (A) (B)

(A) Maximum side-to-side variation; after reset caster and camber 1 1/2 °.

(B) Check suspension height before performing alignment.

84-83 Cimarron	(67)		Fixed		7/32	23/32	1 7/32	1/4 (out)	1/8 (out)	0	6.4 (out)	3.2 (out)	0.0	NA	NA	NA
82 Cimarron	(67)		Fixed		1/16	9/16	1 1/16	1/4 (out)	1/8 (out)	0	6.4 (out)	3.2 (out)	0.0	NA	NA	14 1/2
84-80 Cadillac except Eldorado and Seville	(10)	2	3	4	– 5/16	1/2	1 5/16	0	1/8	1/4	0	3.2	6.4	NA	NA	10 19/32
84-80 Seville																
Front	(6)	1 1/2	2 1/2	3 1/2	– 13/16	0	13/16	1/8 (out)	0	1/8 (in)	3.2 (out)	0	3.2 (in)	NA	NA	11
Rear	(9)		Fixed			Fixed		0	5/32	5/16	0	4.0	8.0			
84-79 Eldorado																
Front	(6)	1 1/2	2 1/2	3 1/2	– 13/16	0	13/16	1/8 (out)	0	1/8 (in)	3.2 (out)	0	3.2 (in)	NA	NA	11
Rear	(9)		Fixed			Fixed		0	5/32	5/16	0	4.0	8.0			
79-77 Cadillac except Eldorado and Seville	(10)	2	3	4	– 1/4	1/2	1 1/4	1/8 (out)	0	1/8 (in)	3.2 (out)	0	3.2 (in)	NA	NA	10 19/32
79-77 Seville	(10)	1	2	3	– 3/4	0	3/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10 5/8
76 Seville	(10)	1	2	3				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10 5/8
Left Wheel					– 1/4	1/2	1 1/4									
Right Wheel					– 1/2	1/4	1									
76-75 Cadillac except Eldorado, Seville and Fleetwood 75	(1)(12)	– 1	0	1				0	1/8	1/4	0	3.2	6.4	NA	NA	6
Left Wheel					– 3/4	0	3/4									
Right Wheel					– 1	– 1/4	1/2									
76-75 Fleetwood 75	(1)(2)	– 2	– 1	0				0	1/8	1/4	0	3.2	6.4	NA	NA	6
Left Wheel					– 3/4	0	3/4									
Right Wheel					– 1	– 1/4	1/2									

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	PREF.	MAX.	CAMBER (Degrees) MIN.	PREF.	MAX.	TOE-IN (Inches) MIN.	PREF.	MAX.	TOE-IN (Millimeters) MIN.	PREF.	MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
78-77 Eldorado	(6)	– 1	0	1	– 3/4	0	3/4	1/8 (out)	0	1/8 (in)	3.2 (out)	0	3.2 (in)	NA	NA	6
76-75 Eldorado	(6)	– 1	0	1				1/8 (out)	0	1/8 (in)	3.2 (out)	0	3.2 (in)	NA	NA	11
Left Wheel					– 3/4	0	3/4									
Right Wheel					– 1	– 1/4	1/2									
CHEVROLET MOTOR DIVISION (A) (A) Maximum side to side variation after reset caster and camber; All except Chevette ½ °, Chevette 2 °. (B) Measure ride height at points 32.5" to the rear of front wheel center line and 17.2" forward of rear wheel center line. Height from ground to rocker panel is 8.3" ± 0.3" front & rear.																
84-82 Chevette	(13)	3	5	7	– 1/2	3/16	29/32	1/32 (out)	1/16 (in)	1/8 (in)	0.8 (out)	1.6 (in)	3.2 (in)	NA	NA	7 9/16
84 Cavalier	(67)		Fixed		7/32	7/8	1 17/32	1/4 (out)	1/8 (out)	0	6.4 (out)	3.2 (out)	0	NA	NA	13 1/2
83 Cavalier	(67)	23/32	1 23/32	2 23/32	7/32	23/32	17/32	5/16 (out)	1/8 (out)	1/16 (in)	8.0 (out)	3.2 (out)	1.6 (in)	NA	NA	13 1/2
82 Cavalier	(67)		Fixed		1/16	9/16	1 1/16	1/4 (out)	1/8 (out)	0	6.4 (out)	3.2 (out)	0.0	NA	NA	13 1/2
84 Celebrity	(67)		Fixed		– 1/2	0	1/2	3/16 (out)	0	3/16 (in)	5.0	0	5.0	NA	NA	14 5/8
84 Citation	(67)		Fixed		– 1/2	0	1/2	3/16 (out)	0	3/16 (in)	5.0	0	5.0	NA	NA	14 1/2
83 Citation, Celebrity	(67)	0	2	4	– 1/2	0	1/2	3/16 (out)	0	3/16 (in)	5.0	0.0	5.0	NA	NA	14 1/2
82 Citation, Celebrity	(67)	1	2	3	– 1/2	0	1/2	3/16 (out)	0	3/16 (in)	5.0 (out)	0.0	5.0 (in)	NA	NA	14 1/2
84-83 Camaro exc. Z28	(B) (70)	2	3	4	3/16	1	1 13/16	3/32	7/32	5/16	2.5	5.5	8.0	NA	NA	NA
84-83 Z28	(B) (70)	2	3	4	3/16	1	1 13/16	1/16	5/32	1/4	1.6	4.0	6.4	NA	NA	NA
82 Camaro exc. Z28	(70)	2 1/2	3	3 1/2	1/2	1	1 1/2	1/16	1/8	3/16	1.6	3.2	5.0	NA	NA	NA
82 Z28	(70)	2 1/2	3	3 1/2	1/2	1	1 1/2	0	1/16	1/8	0.0	1.6	3.2	NA	NA	NA
84 Corvette																
Front	(10)	2 1/2	3	3 1/2	5/16	1 3/16	1 5/16	1/32	1/8	7/32	0.8	3.2	5.5	NA	NA	8 3/4
Rear	(58)(72)				– 1/2	0	1/2	1/16	1/8	3/16	1.6	3.2	5.0			
82 Corvette																
Front	(10)	1 1/4	2 1/4	3 1/4	0	3/4	1 1/2	1/8	1/4	3/8	3.2	6.4	9.5	NA	NA	7 11/16
Rear	(57)(58)				3/16	1 1/16	1 3/16	0	1/16	1/8	0	1.6	3.2			
84 Chevrolet (full size)	(10)	2	3	4	0	1/32	1/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	9 25/32
83-77 Chevrolet (full size)	(10)	2	3	4	0	1 3/16	1 5/8	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	9 25/32
84-78 Malibu, El Camino, Monte Carlo	(10)				– 5/16	1/2	1 5/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	7 7/8
W/Power Steering		2	3	4												
W/Manual Steering		0	1	2												
81-80 Corvette																
Front	(10)	1 1/4	2 1/4	3 1/4	0	3/4	1 1/2	1/8	1/4	3/8	3.2	6.4	9.5	NA	NA	7 11/16
Rear	(57)(58)				3/16	1 1/16	1 3/16	1/16 (out)	0	1/16 (in)	1.6 (out)	0	1.6 (in)			
81-80 Camaro	(10)	0	1	2	3/16	1	1 13/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	10 3/8
81-80 Citation	(34)	– 2	0	2	1/2	1	1 1/2	0	3/32	3/16	0	2.5	5.0	NA	NA	14 1/2
81-80 Chevette	(13)	2 1/2	4 1/2	6 1/2	– 1/2	3/16	29/32	1/32 (out)	1/16 (in)	1/8 (in)	0.8 (out)	1.6 (in)	3.2 (in)	NA	NA	7 9/16
80-77 Monza	(11)	– 1 13/16	– 13/16	3/16	– 5/8	3/16	1	3/16 (out)	1/16 (out)	1/16 (in)	4.8 (out)	1.6 (out)	1.6 (in)	NA	NA	8 9/16
79-78 Camaro	(10)	0	1	2	3/16	1	1 13/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	10 3/64
79-78 Chevette	(13)	2 1/2	4 1/2	6 1/2	– 1/2	3/16	7/8	0	3/32	7/32	0	2.5	5.5	NA	NA	7 1/2
79-78 Nova	(10)				0	1 3/16	1 5/8	0	1/8	1/4	1.6	3.2	6.4	NA	NA	10
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												
79 Corvette																
Front	(10)	1 1/4	2 1/4	3 1/4	0	3/4	1 1/2	1/8	1/4	3/8	3.2	6.4	9.5	NA	NA	7 11/16
Rear	(57)(58)				– 1	– 1/2	0	1/16	3/32	1/8	1.6	2.4	3.2	NA	NA	
78-77 Corvette																
Front	(10)	1 1/4	2 1/4	3 1/4	0	3/4	1 1/2	1/8	1/4	3/8	3.2	6.4	9.5	NA	NA	7 11/16
Rear					– 1 1/8	– 7/8	– 5/8	1/32 (out)	0	1/32 (in)	0.8 (out)	0	0.8 (in)	NA	NA	
77 Chevette	(13)	2 1/2	4 1/2	6 1/2	– 1/2	3/16	1	1/32 (out)	1/16 (in)	5/32 (in)	0.8 (out)	1.6 (in)	4.0 (in)	NA	NA	7 1/2

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	CASTER (Degrees) PREF.	CASTER (Degrees) MAX.	CAMBER (Degrees) MIN.	CAMBER (Degrees) PREF.	CAMBER (Degrees) MAX.	TOE-IN (Inches) MIN.	TOE-IN (Inches) PREF.	TOE-IN (Inches) MAX.	TOE-IN (Millimeters) MIN.	TOE-IN (Millimeters) PREF.	TOE-IN (Millimeters) MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	TOE-OUT ON TURNS (Degrees) INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
77 Chevelle, El Camino. . . .																
W/Power Steering	(10)							1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	9 19/32
W/Radial Tires		2	2	3												
W/Bias Tires.		0	1	2												
Left Wheel					3/16	1	1 13/16									
Right Wheel					– 5/16	1/2	1 5/16									
W/Manual Steering	(10)	0	1	2				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	9 19/32
Left Wheel					3/16	1	1 13/16									
Right Wheel					– 5/16	1/2	1 5/16									
77 Monte Carlo.	(10)	4	5	6				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	9 19/32
Left Wheel					3/16	1	1 13/16									
Right Wheel					– 5/16	1/2	1 5/16									
77 Camaro	(10)	0	1	2	3/16	1	1 13/16	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10 11/32
76-75 Monza	(11)	– 1 3/4	– 3/4	1/4	– 3/4	1/4	1 1/4	3/16 (out)	1/16 (out)	1/16 (in)	4.8 (out)	1.6 (out)	1.6 (in)	NA	NA	8 9/16
76-75 Chevrolet (full size) . .	(10)							1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10
W/Radial Tires		1/2	1 1/2	2 1/4												
W/Bias Tires.		0	1	2												
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 1/4									
76-75 Chevelle, El Camino .																
W/Power Steering	(10)	1	2	3				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	9 5/8
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 1/4									
W/Manual Steering	(10)	0	1	2				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	9 5/8
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 1/4									
77 Nova	(10)				0	13/16	1 5/8	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												
76-75 Nova	(10)				0	3/4	1 1/2	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												
76 Chevette	(13)	2 1/2	4 1/2	6 1/2	– 1/2	1/4	1	1/32 (out)	1/16 (in)	5/32 (in)	0.8 (out)	1.6 (in)	4.0 (in)	NA	NA	7 9/16
77 Vega	(11)	– 1 13/16	– 13/16	3/16	5/8	3/16	1	3/16 (out)	1/16 (out)	1/16 (in)	4.8 (out)	1.6 (out)	1.6 (in)	NA	NA	8 9/16
76 Vega	(11)	– 1 3/4	– 3/4	1/4	– 3/4	1/4	1 1/4	3/16 (out)	1/16 (out)	1/16 (in)	4.8 (out)	1.6 (in)	1.6 (in)	NA	NA	8 9/16
76-75 Camaro.	(10)	0	1	2	1/4	1	1 3/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10 5/32
76-75 Monte Carlo	(10)	4	5	6				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	9 19/32
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 1/4									
76-75 Corvette	(10)															
W/Power Steering		1 1/4	2 1/4	3 1/4	0	3/4	1 1/2	1/8	1/4	3/8	3.2	6.4	9.5	NA	NA	7 11/16
W/Manual Steering		0	1	2				1/8	1/4	3/8	3.2	6.4	9.5	NA	NA	7 11/16
Rear	57)(58)				– 1 1/8	– 7/8	– 5/8	1/32	1/16	3/32	0.8	1.6	2.4	NA	NA	
75 Vega	(11)	– 1 3/4	– 3/4	1/4	– 3/4	1/4	1 1/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	8 9/16

OLDSMOBILE MOTOR DIVISION (A)

(A) Maximum side-to-side variation after reset; caster and camber ½ °

(B) Toronado F.W.D. trim height is measured between the bottom of the rocker moulding to the floor. The measurement positions are:
84-83 Measure trim height from bottom of wheel opening moulding.
82-79 at the front edge of the door, and at 71" (1775 mm) behind the front edge of the door.
78-75 at 6" (152 mm) behind the front edge of the door, and at 66" (1676 mm) behind the front edge of the door. (See chart to right).

TORONADO F.W.D. TRIM HEIGHT (B)

	Front		Rear		Maximum Side-to-Side, Front-to-Rear Deviation		
Year	Inches	mm	Inches	mm	Year	Inches	mm
84-83	9 5/8	245	9 5/8	245	83	7/16	10
82-79	9 1/2	242	9 1/2	242	82-77	3/4	19
78-75	9	229	9 1/4	235	76-75	1/2	12.7

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	CASTER (Degrees) PREF.	CASTER (Degrees) R MAX.	CAMBER (Degrees) R MIN.	CAMBER (Degrees) PREF.	CAMBER (Degrees) MAX.	TOE-IN (Inches) R MIN.	TOE-IN (Inches) PREF.	TOE-IN (Inches) MAX.	TOE-IN (Millimeters) R MIN.	TOE-IN (Millimeters) PREF.	TOE-IN (Millimeters) MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	TOE-OUT ON TURNS (Degrees) INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
84 Firenza	(67)	1 1/16	1 3/16	1 11/16	3/16	1 1/16	1 3/16	1/4 (out)	1/8 (out)	0	6.4	3.2	0.0	NA	NA	NA
83 Firenza	(67)	23/32	1 23/32	2 23/32	7/32	23/32	17/32	5/16 (out)	1/8 (out)	1/16 (in)	8.0 (out)	3.2 (out)	1.6 (in)	NA	NA	13 1/2
82 Firenza	(67)		Fixed		1/16	9/16	1 1/16	1/4 (out)	1/8 (out)	0	6.4 (out)	3.2 (out)	0.0	NA	NA	13 1/2
84 Omega, Ciera	(67)	29/32	1 29/32	2 3/16	– 1/2	0	1/2	3/16 (out)	0	3/16 (in)	5.0	0.0	5.0	NA	NA	NA
83-82 Omega, Ciera	(67)	1	2	3	– 1/2	0	1/2	3/16 (out)	0	3/16 (in)	5.0 (out)	0.0	5.0 (in)	NA	NA	14 1/2
81-80 Omega	(34)	– 2	0	2	1/2	1	1 1/2	0	3/32	3/16	0	2.5	5.0	NA	NA	14 1/2
84 Cutlass w/R.W.D.	(10)	2	3	4	– 5/16	1/2	1 5/16	1/16	1/8	3/16	1.6	3.2	4.8	NA	NA	NA
83-78 Cutlass w/R.W.D.	(10)				– 5/16	1/2	1 5/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	7
W/Power Steering		2	3	4												
W/Manual Steering		0	1	2												
84 88 & 98 Series	(10)	2	3	4	0	1 3/16	1 5/8	1/16	1/8	3/16	1.6	3.2	4.8	NA	NA	NA
83 88 & 98 Series	(10)	2	3	4	0	1 3/16	1 5/8	1/16	1/8	3/16	1.6	3.2	4.8	NA	NA	10 9/16
82-78 88 & 98 Series	(10)	2	3	4	0	3/4	1 5/8	0	1/8	1/4	0	3.2	6.4	NA	NA	10 1/2
84-79 Toronado																
Front	(6)	1 1/2	2 1/2	3 1/2	– 1 3/16	0	1 3/16	1/8 (out)	0	1/8 (in)	3.2 (out)	0	3.2 (in)	NA	NA	11
Rear	(9)		Fixed			Fixed		0	5/32	5/16	0	4.0	8.0			
80-75 Starfire	(11)	– 1 3/4	– 3/4	1/4	– 1/2	1/4	1	3/16 (out)	1/16 (out)	1/16 (in)	4.8 (out)	1.6 (out)	1.6 (in)	NA	NA	8 1/2
79-78 Omega	(10)				0	3/4	1 5/8	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	10 1/2
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												
78 Toronado	(6)	– 1	0	1				1/8 (out)	0	1/8 (in)	3.2 (out)	0	3.2 (in)	NA	NA	11
Left Wheel					– 1/2	5/16	1									
Right Wheel					– 1	– 5/16	1/2									
77 88 & 98 Series	(10)	2	3	4	0	3/4	1 1/2	0	1/8	1/4	0	3.2	6.4	NA	NA	10 1/2
77-75 Omega	(10)				0	3/4	1 1/2	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10 1/2
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												
77-75 Cutlass	(10)	1	2	3				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10 1/2
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 1/4									
77-75 Toronado	(6)	– 1	0	1				1/8 (out)	0	1/8 (in)	3.2 (out)	0	3.2 (in)	NA	NA	11
Right Wheel					– 1	– 1/4	– 1/2									
Left Wheel					– 1/2	1/4	1									
76-75 88 & 98 Series	(10)	1/2	1 1/2	2 1/2				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10 1/2
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 3/4									

PONTIAC MOTOR DIVISION (A)

(A) Maximum side to side variation after reset; caster and camber 1/2 °.

(B) Measure ride height at points 32.5" to the rear of front wheel centerline and 17.2" forward of rear wheel centerline. Height from ground to rocker panel is 8.3" + 0.3" front and rear.

84-82 T1000	(13)	3	5	7	– 1/2	3/16	29/32	1/32 (out)	1/16 (in)	1/8 (in)	0.8 (out)	1.6 (in)	3.2 (in)	NA	NA	7 9/16
84 Fiero																
Front	(13)	3	5	7	– 5/16	1/2	1 5/16	1/16	1/8	3/16	1.6	3.2	4.8	NA	NA	NA
Rear	(67)		Fixed		– 1 1/2	– 1	– 1/2	1/16	1/8	3/16	1.6	3.2	4.8	NA	NA	NA
84 J2000	(67)		Fixed		3/16	1 1/16	1 3/16	1/4 (out)	1/8 (out)	0	6.4 (out)	3.2 (out)	0.0	NA	NA	NA
83 J2000	(67)	23/32	1 23/32	2 23/32	7/32	23/32	17/32	5/16 (out)	1/8 (out)	1/16 (in)	8.0 (out)	3.2 (out)	1.6 (in)	NA	NA	13 1/2
82 J2000	(67)		Fixed		1/16	9/16	1 1/16	1/4 (out)	1/8 (out)	0	6.4 (out)	3.2 (out)	0.0	NA	NA	13 1/2
84 Phoenix, A6000	(67)		Fixed		– 1/2	0	1/2	3/16 (out)	0	3/16 (in)	5.0 (out)	0	5.0 (in)	NA	NA	NA
83-82 Phoenix, A6000	(67)	1	2	3	– 1/2	0	1/2	3/16 (out)	0	3/16 (in)	5.0 (out)	0	5.0 (in)	NA	NA	14 1/2
84 Parisenne	(10)	2	3	4	0	1 3/16	1 5/8	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	NA

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	CASTER (Degrees) PREF.	CASTER (Degrees) MAX.	CAMBER (Degrees) MIN.	CAMBER (Degrees) PREF.	CAMBER (Degrees) MAX.	TOE-IN (Inches) MIN.	TOE-IN (Inches) PREF.	TOE-IN (Inches) MAX.	TOE-IN (Millimeters) MIN.	TOE-IN (Millimeters) PREF.	TOE-IN (Millimeters) MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	TOE-OUT ON TURNS (Degrees) INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
84 Grand Prix, Bonneville					– 5/16	1/2	1 5/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	NA
W/Manual Steering	(10)	– 1	0	1												
W/Power Steering	(10)	3	3 1/2	4												
83-82 Grand Prix	(10)	2	3	4	– 5/16	1/2	1 5/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	8
83-82 Bonneville	(10)	2	3	4	– 5/16	1/2	1 5/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	8
84 Firebird	(70)	2	3	4	3/16	1	1 13/16	3/32	7/32	5/16	2.5	5.5	8.0	NA	NA	NA
83 Firebird exc. Trans Am	(70)	2	3	4	1/8	1	1 13/16	3/32	7/32	5/16	2.5	5.5	8.0	NA	NA	NA
83 Trans Am	(70)	2	3	4	1/8	1	1 13/16	1/16	5/32	1/4	1.6	4.0	6.4	NA	NA	NA
82 Firebird exc. Trans Am	(70)	2 1/2	3	3 1/2	1/2	1	1 1/2	1/16	1/8	3/16	1.6	3.2	5.0	NA	NA	NA
82 Trans Am	(70)	2 1/2	3	3 1/2	1/2	1	1 1/2	0	1/16	1/8	0.0	1.6	3.2	NA	NA	NA
81-80 Phoenix	(34)	– 2	0	2	1/2	1	1 1/2	0	3/32	3/16	0	2.5	5.0	NA	NA	14 1/2
81-80 Grand Prix, LeMans					– 5/16	1/8	1 5/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	8
W/Manual Steering	(10)	0	1	2												
W/Power Steering	(10)	2	3	4												
81-78 Firebird	(10)	0	1	2	3/16	1	1 13/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	10 3/8
81-78 Catalina, Bonneville	(10)	2	3	4	0	13/16	1 5/8	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	10 19/32
80-78 Sunbird	(10)	– 1 13/16	– 13/16	3/16	– 5/8	– 3/16	1	3/16 (out)	1/16 (out)	1/16 (in)	4.8 (out)	1.6 (out)	1.6 (in)	NA	NA	8 9/16
79-78 Phoenix	(10)				0	13/16	1 5/8	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	10
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												
79-78 Grand Prix	(10)				– 5/16	1/2	1 5/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	8
W/Power Steering		2	3	4												
W/Manual Steering		0	1	2												
79-78 LeMans, Grand AM	(10)				– 5/16	1/2	1 5/16	1/16	1/8	1/4	1.6	3.2	6.4	NA	NA	8
W/Power Steering		2	3	4												
W/Manual Steering		0	1	2												
77-76 Phoenix, Ventura	(10)				0	3/4	1 1/2	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	10
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												
77 Grand Prix	(10)	4	5	6				1/8 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10 3/8
Left Wheel					1/4	1	1 3/4									
Right Wheel					– 1/4	1/2	1 1/4									
77 LeMans, Grand LeMans *W/Power Steering*	(10)							1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)			10 3/8
W/Belted Tires		0	1	2												
W/Radial Tires		1	2	3												
Left Wheel					1/4	1	1 3/4							19 3/16	20	
Right Wheel					– 1/4	1/2	1 1/4							18 13/16	20	
W/Manual Steering	(10)	0	1	2				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)			10 3/8
Left Wheel					1/4	1	1 3/4							19 3/16	20	
Right Wheel					– 1/4	1/2	1 1/4							18 13/16	20	
77 Firebird	(10)	0	1	2	3/16	1	1 3/4	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10 3/8
77-76 Sunbird, Astre	(11)	– 1 3/4	– 3/4	1/4	– 9/16	3/16	1	3/16 (out)	1/16 (out)	1/16 (in)	4.8 (out)	1.6 (out)	1.6 (in)	NA	NA	8 9/16
77 Catalina, Bonneville, Brougham, Grandville	(10)	2	3	4	0	3/4	1 9/16	1/16	3/16	5/16	1.6	4.8	8.0	NA	NA	10 3/8
76 Ventura	(10)				0	3/4	1 1/2	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	18 1/2	20	10
W/Power Steering		0	1	2												
W/Manual Steering		– 2	– 1	0												
76-75 Grand Prix	(10)	2	3	4				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)			10 1/2
Left Wheel					1/4	1	1 3/4							19 3/16	20	
Right Wheel					– 1/4	1/2	1 1/4							18 13/16	20	
76-75 LeMans, Grand LeMans *W/Power Steering*	(10)	1	2	3				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10 3/8
Left Wheel					1/4	1	1 3/4							19 3/16	20	
Right Wheel					– 1/4	1/2	1 1/4							18 13/16	20	
W/Power Steering	(10)	0	1	2				1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)			10 3/8
Left Wheel					1/4	1	1 3/4							19 3/16	20	
Right Wheel					– 1/4	1/2	1 1/4							18 13/16	20	

U.S. PASSENGER CAR SECTION

VEHICLE IDENTIFICATION YEAR MODEL	ADJ. ILL. NO.	CASTER (Degrees) MIN.	PREF.	MAX.	CAMBER (Degrees) MIN.	PREF.	MAX.	TOE-IN (Inches) MIN.	PREF.	MAX.	TOE-IN (Millimeters) MIN.	PREF.	MAX.	TOE-OUT ON TURNS (Degrees) OUTSIDE WHEEL	INSIDE WHEEL	STRG. AXIS INCL. (DEG.)
76-75 Firebird	(10)	−1	0	1	¼	1	1¾	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10⅜
76-75 Catalina, Bonneville, Grandville, Brougham	(10)	½	1½	2½				1/16 (out)	1/16 (out)	3/16 (in)	1.6 (out)	1.6 (out)	4.8 (in)	NA	NA	8⁹/16
Left Wheel					¼	1	1¾									
Right Wheel					− ¼	½	1¼									
75 Astre	(11)	−1¾	− ¾	¼	− ¾	¼	1¼	⅛	¼	⅜	3.2	6.4	9.5	NA	NA	8⁹/16
75 Ventura	(10)				0	¾	1½	1/16 (out)	1/16 (in)	3/16 (in)	1.6 (out)	1.6 (in)	4.8 (in)	NA	NA	10⅞
W/Power Steering		0	1	2												
W/Manual Steering		−2	−1	0												

U.S. LIGHT TRUCK SECTION

AMERICAN MOTORS:

JEEP: (A) 77 models, 28°-29°; 28°; 75 w/std. tires 31°; w/F78 × 15 tires - 34°; 1981 CJ models 31°-32°; 1980-81 except CJ 37°-38°.

84 Sportwagon, Cherokee, Wagoneer	(17)	7	7½	8	− ½	0	½	1/16 (out)	0	1/16 (in)	1.6 (out)	0	1.6 (in)	NA		NA
83-82 CJ-5	(17)	6	6	7	0	0	½	3/64		3/32	1.2		2.4	29		8½
84-82 CJ-7 and Scrambler	(17)	6	6	7	0	0	½	3/64		3/32	1.2		2.4	32		8½
84-82 Cherokee, Wagoneer and Pickup Truck	(17)	4	4	5	0	0	½	3/64		3/32	1.2		2.4	36-37		8½
81 "CJ" Models	(17)	6	6	7	1½	1½	2	3/64		3/32	1.2		2.4	(A) 31		8½
81-80 Cherokee, Wagoneer and Pickup Trucks	(17)		4			0		3/64		3/32	1.2		2.4	(A) 37		8½
80-75 "CJ" Models	(17)		3			1½		3/64		3/32	1.2		2.4	(A) 31½		8½
79-75 Cherokee, Wagoneer and Pickup Trucks	(17)		4			1½		3/64		3/32	1.2		2.4	37½		8½

GENERAL MOTORS LIGHT TRUCKS
CHEVROLET & GMC VERSIONS

(A) Vehicle ride heights must be checked and corrected before alignment is performed.

(B) With JB8 or JF9 add .3°; with R05 subtract .4° for caster.

(C) Front torsion bar adjusts ride height (see end of GM Truck Section.)

84 S10, S15 4 × 2	(10)	1	2	3	0	13/16	1⅝	1/16	⅛	3/16	1.6	3.2	4.8	NA	NA	NA
84 S10, S15 4 × 4	(6)	1	2	3	0	13/16	1⅝	1/16	⅛	3/16	1.6	3.2	4.8	NA	NA	NA
83-82 S10, S15 4 × 2	(10)	1	2	3	0	13/16	1⅝	1/16	⅛	¼	1.6	3.2	6.4	NA	NA	NA
83 S10, S15 4 × 4	(6)	1	2	3	0	13/16	1⅝	1/16	⅛	¼	1.6	3.2	6.4	NA	NA	NA

GENERAL MOTORS LIGHT TRUCKS
CHEVROLET & GMC VERSIONS
CHART 1

VEHICLE IDENTIFICATION CHEVROLET YEAR MODEL	GMC MODEL	ADJ. ILL. NO.	CASTER@HEIGHT MEASUREMENT (Degrees) Suspension Height Measurement (M) 1½	2	2½	3	3½	3¾	4	CAMBER (Degrees) MIN.	PREF.	MAX.	TOE-IN (Inches)	TOE-IN (Millimeters)
1984-82														
C-10	C-1500	(24)	—	—	3⅝	3⅛	2⅝	2⅜	2	0	1/16	1⅜	3/16 ± ⅛	4.8 ± 3.2
C-20, 30	C-2500, 3500	(24)	—	—	1½	15/16	5/16	⅛	0	− ½	3/16	⅞	3/16 ± ⅛	4.8 ± 3.2
1984-82														
K-10, 20	K-1500, 2500	N/A	—	—	8	8	8	8	8	5/16	1	1 11/16	3/16 ± ⅛	4.8 ± 3.2
K-30	K-3500	N/A	—	—	8	8	8	8	8	− 3/16	½	1 3/16	3/16 ± ⅛	4.8 ± 3.2
1984-82														
G-10, 20	G-1500, 2500	(24)	3½	3⅛	2 11/16	2⅜	2⅛	1 15/16	1⅞	− 3/16	½	1 3/16	3/16 ± ⅛	4.8 ± 3.2
G-30	G-3500	(24)	2⅞	2 3/16	1⅝	1	½	3/16	0	− ½	3/16	⅞	3/16 ± ⅛	4.8 ± 3.2
1984-82														
P-10	P-1500	(24)	—	—	2 5/16	1 11/16	1 3/16	1 5/16	⅝	− ½	3/16	⅞	3/16 ± ⅛	4.8 ± 3.2
P-20, 30	P-2500, 3500	(24)	—	—	2 5/16	1 11/16	1 3/16	1 5/16	⅝	− ½	3/16	⅞	3/16 ± ⅛	4.8 ± 3.2
1984-82														
P-30 Motor Home	P-3500 Motor Home	(24)	—	—	5½	5	4⅜	4⅛	3⅞	− ½	3/16	⅞	5/16 ± ⅛	7.9 ± 3.2

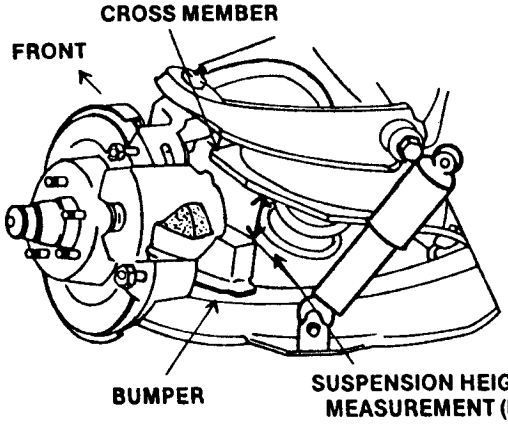
CHART 2

VEHICLE IDENTIFICATION		ADJ. ILL. NO.	CASTER @ HEIGHT MEASUREMENT (Degrees) Suspension Height Measurement (M)							CAMBER (Degrees)			TOE-IN (Inches)	TOE-IN (Millimeters)
CHEVROLET YEAR MODEL (A)	GMC MODEL (A)		1½	2	2½	3	3½	4¾	4½	MIN.	PREF.	MAX.		
1981-80														
G-10, 20	G-1500, 2500	(24)	3½	3⅛	2 11/16	2 13/32	2⅛	1 13/16	—	– 3/16	½	1 3/16	3/16 ± ⅛	4.8 ± 3.2
G-30	G-3500	(24)	2 3/16	2 3/16	1⅝	1	½	0	—	– ½	3/16	⅞	3/16 ± ⅛	4.8 ± 3.2
1981-79														
C-10	C-1500	(24)	—	—	2 13/32	1 13/16	1 3/16	1 1/16	3/16	– ½	3/16	1⅞	3/16 ± ⅛	4.8 ± 3.2
C-20, 30	C-2500, 3500	(24)	—	—	1½	29/32	5/16	0	– 1 1/16	– ½	3/16	⅞	3/16 ± ⅛	4.8 ± 3.2
K-10, 20	K-1500, 2500	N/A	—	—	8	8	8	8	8	5/16	1	1 1/16	0 ± ⅛	0 ± 3.2
K-30	K-3500	N/A	—	—	8	8	8	8	8	– 3/16	½	1 3/16	0 ± ⅛	0 ± 3.2
P-10	P-1500	(24)	—	—	2 5/16	1 11/16	1 3/16	5/8	⅛	– ½	3/16	⅞	3/16 ± ⅛	4.8 ± 3.2
P-20, 30 (B)	P-2500, 3500 (B)	(24)	—	2 29/32	2 11/16	1 11/16	1 3/16	5/8	3/16	– ½	3/16	⅞	3/16 ± ⅛	4.8 ± 3.2
P-30 Motor Home (B)	P-3500 Motor Home (B)		—	—	5½	5	4 13/32	3 13/16	3 5/16	– ½	3/16	⅞	5/16 ± ⅛	7.9 ± 3.2
1979														
G-10, 20	G-1500, 2500	(24)	2 29/32	2 5/16	2	1⅝	1 5/16	29/32	—		N/A		3/16 ± ⅛	4.8 ± 3.2
G-30	G-3500	(24)	3 13/32	2 11/16	2⅛	1½	1	13/32	—		N/A		3/16 ± ⅛	4.8 ± 3.2

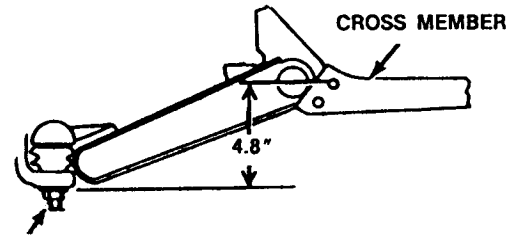
CHART 3

VEHICLE IDENTIFICATION		ADJ. ILL. NO.	CASTER @ HEIGHT MEASUREMENT (Degrees) Suspension Height Measurement (M)							CAMBER (Degrees)			TOE-IN (Inches)	TOE-IN (Millimeters)
CHEVROLET YEAR MODEL (A)	GMC MODEL (A)		2½	3	3½	4	4½	4¾	5	MIN.	PREF.	MAX.		
1978-75														
C-10	C-1500	(24)	—	2	1¼	¾	¼	0	– ½		¼		3/16 ± ⅛	4.8 ± 3.2
1978-75														
C-20, 30	C-2500, 3500	(24)	1½	1	½	0	– ½	¾	– 1		¼		3/16 ± ⅛	4.8 ± 3.2
1978-76														
K-10, 20, 30	K-1500, 2500, 3500	N/A	8	8	8	8	8	8	8		¼		0 ± ⅛	0 ± 3.2
1978														
G-10, 20	G-1500, 2500	(24)	3¼	2¾	2½	2	1¾	1½	1½		¼		3/16 ± ⅛	4.8 ± 3.2
G-30	G-3500	(24)	2¼	1½	1	½	0	– ¼	– ½		¼		3/16 ± ⅛	4.8 ± 3.2
1978-75														
P-10	P-1500	(24)	2½	2	1½	¾	¼	0	– ¼		Chart 4		3/16 ± ⅛	4.8 ± 3.2
P-20, 30	P-2500, 3500	(24)	2½	2	1½	¾	¼	0	– ¼		Chart 4		3/16 ± ⅛	4.8 ± 3.2
1977-75														
G-10, 20, 30	G-1500, 2500, 3500	(24)	2¼	1½	1	½	0	– ¼	– ½		¼		3/16 ± ⅛	4.8 ± 3.2
1976-75														
K-10, 20	K-1500, 2500	N/A	4	4	4	4	4	4	4		½		0 ± ⅛	0 ± 3.2

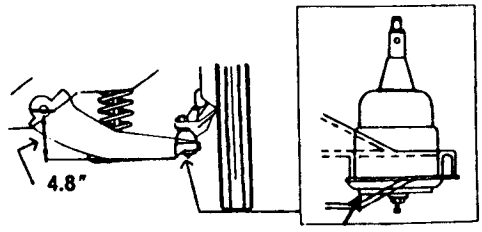
NOTE: With vehicle level, measure frame angle with a bubble protractor. Record the suspension height measurement.
a. Subtract an up-in-rear frame angle from a positive caster specification.
b. Subtract a down-in-rear frame angle from a negative caster specification.
c. Add an up-in-rear frame angle to a negative caster specification.
d. Add a down-in-rear frame angle to a positive caster specification.



FRONT SUSPENSION HEIGHT
S10/S15 (4 x 4)



FRONT SUSPENSION HEIGHT
1983 S10/S15 (4 x 2)



CASTER/CAMBER REFRESHER GUIDE

MAKE AND MODEL	YEAR	MANNER OF CASTER ADJUSTMENT	MANNER OF CAMBER ADJUSTMENT
American Motors			
All models except Pacer	84-75	Lengthen strut to increase positive caster, shorten strut to decrease positive caster. Rotate rear cam to achieve desired measurement.	Rotate cam to achieve desired measurement. Rotate both eccentric cams to achieve desired measurements.
Pacer	80-75		
Chrysler Corporation - Slotted mounting type adjustment (see illustration 7)			
Gran Fury, Diplomat	84-82	Increase positive caster by sliding front adjusting bolt away from engine and rear adjusting bolt toward engine. Decrease positive caster by sliding front adjusting bolt toward engine and rear adjusting bolt away from engine.	Increase positive camber by moving both adjusting bolts away from the engine. Decrease positive camber by moving both adjusting bolts toward the engine.
New Yorker (RWD), Caravelle	84-82		
Full sized Chrysler, Dodge and Plymouth vehicles	81-75		
Cordoba, Mirada	83-75		
LeBaron, Diplomat	81-77		
Volare, Aspen, Caravelle	81-76		
Charger, Coronet, Magnum	80-75		
Satellite, Monaco, Fury	78-75		
St. Regis	81-79		
Chrysler Corporation - Cam adjustment type			
Dart, Valiant	76-75	Increase positive caster by rotating front cam in the proper direction to move the front of the control arm away from the engine and rotate rear cam to move rear of the control arm toward the engine. Decrease positive caster by reversing the above procedure.	Increase positive camber by rotating both cams to move the control arm away from engine. Decrease positive camber by rotating both cams to move the control arm toward the engine.
Chrysler Corporation - McPherson strut vehicles.			
All w/FWD	84-83	Caster is not adjustable.	Turn eccentric cam, which is mounted on the strut attaching bracket, as necessary.
Omni, 024, Horizon, TC3	82-78		
Reliant, Aries	82-81		
400, LeBaron (FWD), Rampage	82		
Ford Motor Company - Models that are not adjustable.			
Tempo/Topaz, Escort/ Lynz, EXP	84	Not adjustable.	Not adjustable.
Lincoln Continental	82		
Zephyr/Fairmont	82-78		
Capri/Mustang	82-79		
Cougar XR7/Thunderbird	82-80		
Escort/Lynx, Granada/Cougar	82-81		
Ford Motor Company - Models with front coil spring mounted on lower control arm with McPherson strut and air suspension. (Note: Ride height must be set before checking alignment. For illustrations and procedures for setting ride height refer to page 45).			
Continental, Mark VII	84	Not adjustable.	Remove the pop-rivet fastening the fender apron to the upper strut mount. Loosen the three nuts on the camber plate, and move the plate until the desired camber is achieved.
Ford Motor Company - Models with front coil spring mounted on lower control arm with McPherson strut.			
Continental, Thunderbird/ Cougar XR7, LTD/Marquis, Fairmont Futura/Zephyr, Mustang/Capri	84-83	Not adjustable.	Remove the pop-rivet fastening the fender apron to the upper strut mount. Loosen the three nuts on the camber plate, and move the plate until the desired camber is achieved.
Mark VII, Continental	84		
Ford Motor Company - Models with front coil spring mounted on upper control arm.			
Maverick/Comet	77-75	Increase positive caster by shortening the lower control arm strut. Decrease positive caster by lengthening the lower control arm strut.	Increase positive camber by rotating lower control arm adjusting cam to move the arm inward. It may be necessary to slightly spread the body bracket at the adjusting cam. Decrease positive camber by reversing the above procedure.
Granada/Monarch	80-75		
Versailles	80-77		
Ford Motor Company - Models with front coil spring mounted on lower control arm and slotted upper control arm adjustment.			
Lincoln Town Car	84-82	Increase positive caster by moving front adjusting bolt away from engine, rear adjusting bolt toward engine. Decrease positive caster by moving rear adjusting bolt away from engine, front adjusting bolt toward engine.	Increase positive camber by moving both adjusting bolts away from engine. Decrease positive camber by moving both adjusting bolts toward engine.
Continental Mark VI	83-82		
Full sized Ford/Mercury	84-75		
All Lincoln models	81-75		
Torino/Montego	76-75		
Thunderbird, Meteor	79-75		
Pinto/Bobcat	80-75		
Mustang	78-75		
Cougar/LTD II	79-75		

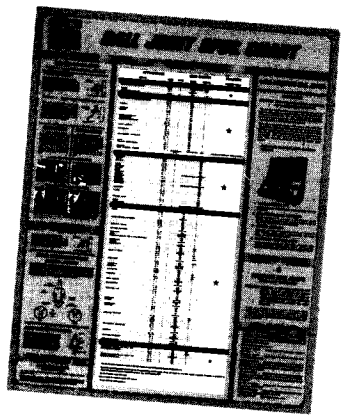
CASTER/CAMBER REFRESHER GUIDE

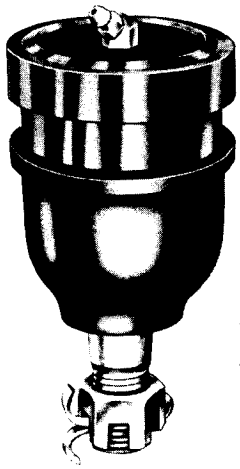
MAKE AND MODEL	YEAR	MANNER OF CASTER ADJUSTMENT	MANNER OF CAMBER ADJUSTMENT
GENERAL MOTORS CORPORATION:			
Buick Motor Division - Models with McPherson strut front suspension without strut mounted eccentric cam.			
Skyhawk (FWD), Skylark (FWD), Century (FWD)	84-82	Caster is not adjustable.	Loosen the lower strut retaining bolts. Grasp the top of the tire firmly and move tire in or out to obtain correct reading. Tighten bolts to final torque specs. (140 ft/lbs.).
Buick Motors Division - Models with shim pack upper control arm adjustment.			
All Buick models except Skyhawk, 1983-79 Riviera and 1983-80 (FWD) Skylark and 1983-82 Century	84-75	Increase positive caster by adding shims to rear shim pack and removing shims from front shim pack. Decrease positive caster by removing shims from rear shim pack and adding shims to front shim pack.	Increase positive camber by removing shims equallly from front and rear shim packs. Decrease positive camber by adding shims equally to front and rear shim pack.
Buick Motor Division - Models with McPherson strut front suspension and strut mounted eccentric cam.			
Skylark (FWD)	81-80	Caster is not adjustable.	Turn eccentric cam on strut mounting bracket as necessary.
Buick Motor Division - Models with cam type adjustment.			
Skyhawk	80-75	Turn rear cam as necessary.	Turn front cam as necessary.
Buick Motor Division - Models with upper control arm cam adjustment.			
Riviera (FWD)	84-79	Turn front and rear cams as necessary.	Turn front and rear cams as necessary.
Cadillac Motor Division - Models with McPherson strut front suspension without strut mounted eccentric cam.			
Cimarron	84-82	Caster is not adjustable.	Loosen the lower strut retaining bolts. Grasp the top of the tire firmly and move tire in or out to obtain correct reading. Tighten bolts to final torque specs. (140 ft/lbs.).
Cadillac Motor Division - Models with shim pack upper control arm adjustment.			
All models except Eldorado, 1983-80 Seville and Cimarron Seville	84-77 79-76	Increase positive caster by adding shims to rear shim pack and removing shims from front shim pack. Decrease positive caster by removing shims from rear shim pack and adding shims to front shim pack.	Increase positive camber by removing shims equally from front and rear shim packs. Decrease positive camber by adding shims equally to both front and rear shim packs.
Cadillac Motor Division - Models with upper control arm cam adjustment.			
Eldorado (FWD) Seville (FWD)	84-75 83-80	Turn front and rear cams as necessary.	Turn front and rear cams as necessary.
Cadillac Motor Division - Models with eccentric on upper ball joint.			
All models except Eldorado and Seville	76-75	Increase positive caster by shortening lower control arm strut. Decrease positive caster by lengthening lower control arm strut.	Turn ball joint eccentric as necessary.
Chevrolet Motor Division - Models with adjustable upper McPherson Strut Mount			
Camaro	84-82	Loosen the uppermost to apron bolts, move the mount rearward to increase caster or foward to decrease caster.	Loosen the upper mount to apron bolts, move the mount outboard to increase camber or inboard to decrease camber.
Chevrolet Motor Division - Models with shim pack upper control arm adjustment.			
All models except Vega, Monza, 1983-80 Citation, Celebrity, Cavalier and 1983 Camaro	84-75	Increase positive caster by adding shims to rear shim pack and removing shims from front shim pack. Decrease positive caster by removing shim from rear shim pack and adding shims to front shim pack.	Increase positive camber by removing shims equally from front and rear shim packs. Decrease positive camber by adding shims equally to front and rear shim packs.
Chevrolet Motor Division - Models with cam type adjustment.			
Vega, Monza	80-75	Turn rear cam as necessary.	Turn front cam as necessary.
Chevrolet Motor Division - Models with McPherson Strut front suspension and strut mounted eccentric cam.			
Citation (FWD)	81-80	Caster is not adjustable.	Turn eccentric cam on strut mounting bracket as necessary.
Chevrolet Motor Division - Models with McPherson Strut front suspension without strut mounted eccentric cam.			
Celebrity, Citation and Cavalier	84-82	Caster is not adjustable.	Loosen the lower strut retaining bolts. Grasp the top of the tire firmly and move tire in or out to obtain correct reading. Tighten bolts to final torque specs. (140 ft/lbs.).

CASTER/CAMBER REFRESHER GUIDE

MAKE AND MODEL	YEAR	MANNER OF CASTER ADJUSTMENT	MANNER OF CAMBER ADJUSTMENT
Chevrolet Motor Division - Models with adjustable upper ball joints.			
Chevette	84-76	Change the thickness or the configuration of the shims between the control arm locating tube, and the legs of the control arm.	To increase camber, disconnect, and rotate the upper ball joint 180°.
Oldsmobile Motor Division - Models with McPherson Strut front suspension without strut mounted eccentric cam.			
Ciera, Omega, Firenza	84-82	Caster is not adjustable.	Loosen the lower strut retaining bolts. Grasp the top of the tire firmly and move tire in or out to obtain correct reading. Tighten bolts to final torque specs. (140 ft/lbs.).
Oldsmobile Division - Models with shim pack upper control arm adjustment.			
All models except Starfire, Toronado, 1981-80 Omega (FWD), Ciera, and Firenza	84-75	Increase positive caster by adding shims to rear shim pack and removing shims from front shim pack. Decrease positive caster by removing shim from rear shim pack and adding shims to front shim pack.	Increase positive camber by removing shims equally from front and rear shim packs. Decrease positive camber by adding shims equally to front and rear shim packs.
Oldsmobile Division - Models with cam type adjustment.			
Starfire	80-75	Turn rear cam as necessary.	Turn front cam as necessary.
Oldsmobile Division - Models with McPherson Strut suspension and strut mounted eccentric cam.			
Omega (FWD)	81-80	Caster is not adjustable.	Turn eccentric cam on strut mounting bracket as necessary.
Oldsmobile Division			
Toronado	84-75	Turn front and rear cams as necessary.	Turn front and rear cams as necessary.
Pontiac Motor Division - Models with adjustable upper McPherson Strut Mount.			
Firebird	84-83	Loosen the upper mount to apron bolts, move the mount rearward to increase caster or forward to decrease caster.	Loosen the upper mount to apron bolts, move the mount outboard to increase camber or inboard to decrease camber.
Pontiac Motor Division - Models with McPherson Strut front suspension without strut mounted eccentric cam.			
Phoenix (FWD), J2000, A6000	84-82	Caster is not adjustable.	Loosen the lower strut retaining bolts. Grasp the top of the tire firmly and move tire in or out to obtain correct reading. Tighten bolts to final torque specs. (140 ft/lbs.)
Pontiac Motor Division - Models with shim pack upper control arm adjustment.			
All models except Astre, Sunbird, 1983-80 Phoenix (FWD), J2000, A6000 and 1983 Firebird	84-75	Increase positive caster by adding shims to rear shim pack and removing shims from front shim pack. Decrease positive caster by removing shims from rear shim pack and adding shims to front shim pack.	Increase positive camber by removing shims equally from front and rear shim packs. Decrease positive camber by adding shims equally to front and rear shim pack.
Pontiac Motor Division - Models with McPherson strut front suspension and strut mounted eccentric cam.			
Phoenix (FWD)	81-80	Caster is not adjustable.	Turn eccentric cam on strut mounting bracket as necessary.
Pontiac Motor Division - Models with cam type adjustment.			
Astre, Sunbird	80-75	Turn rear cam as necessary.	Turn front cam as necessary.
Pontiac Motor Division - Models with adjustable upper ball joints.			
Fiero, T1000	84-82	Change the thickness or the configuration of the shims between the control arm locating tube, and the legs of the control arm.	To increase camber, disconnect, and rotate the upper ball joint 180°.

BALL JOINT INSPECTION

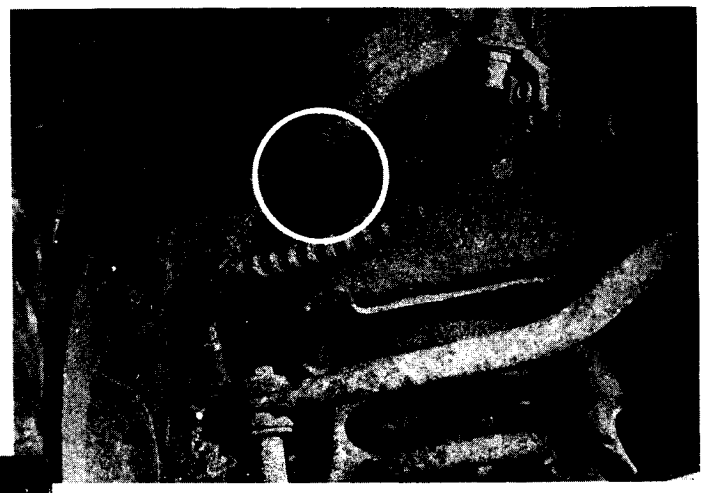




Begin ball joint inspection by determining if the vehicle is equipped with wear indicator type load carrying ball joints.

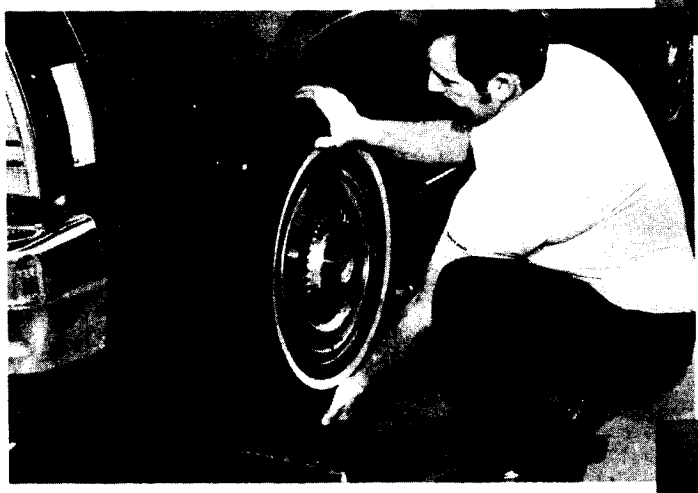
This information can be found in Moog Forms 2349, ADV-193 or the vehicle's service manual.

If the vehicle is not equipped with wear indicator type ball joints proceed and unload the load carriers.

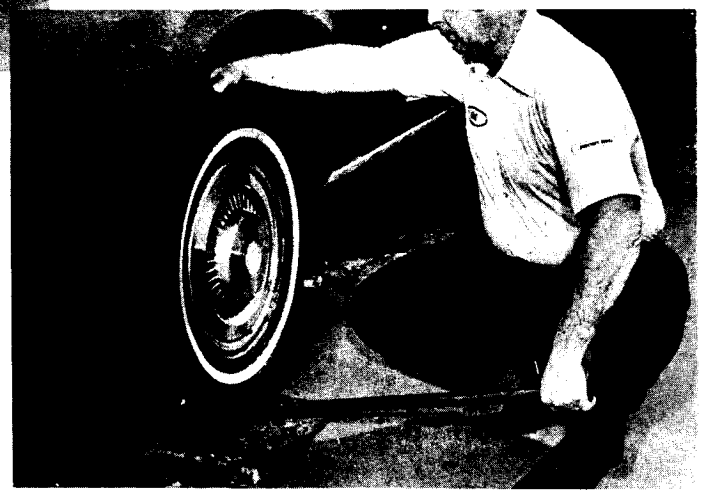


SPRING ON LOWER CONTROL ARM

Raise the vehicle by jacking under the control arm as close to the ball joint as possible. This will give you the maximum amount of leverage against the spring. You can tell when the ball joint is unloaded when the upper strike out bumper is not in contact with the control arm or frame.

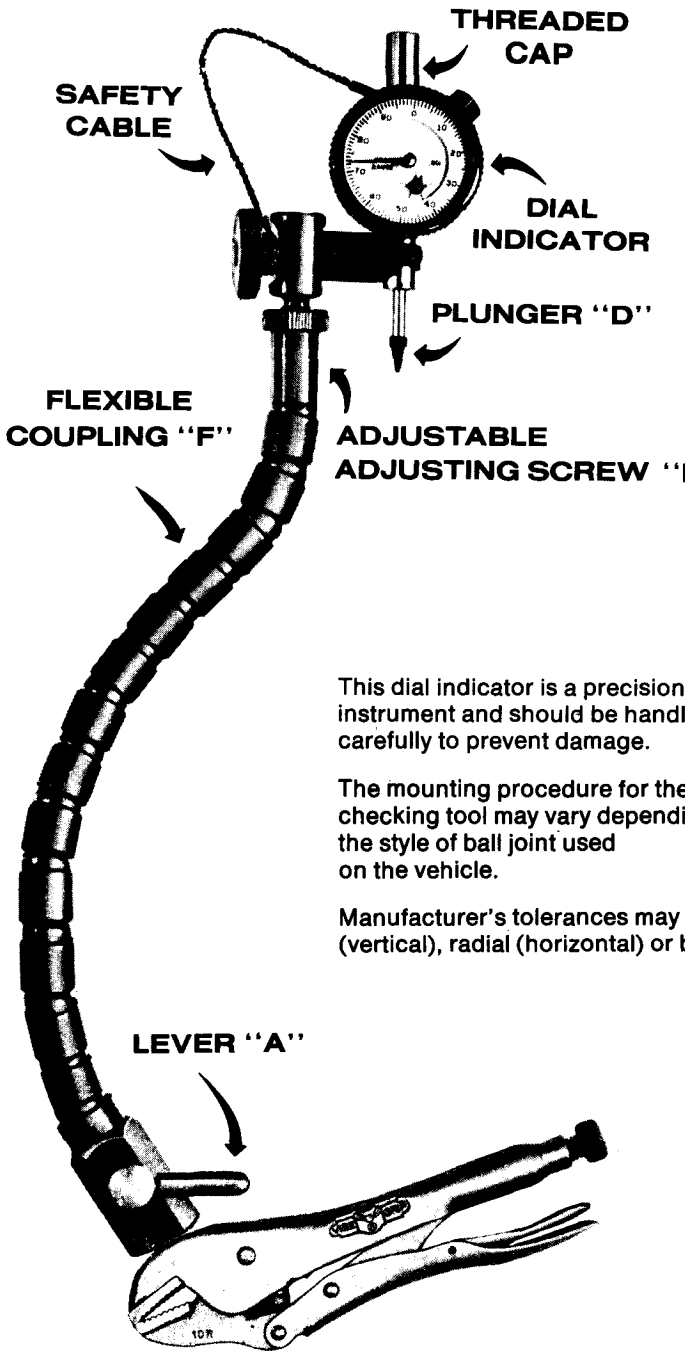


Grasp the tire at the top and bottom and rock it to check for excessively loose wheel bearings.



A quick check for looseness can be made by using a pry bar between the tire and the ground. To find out if the ball joint is loose beyond manufacturer's specifications use an accurate measuring device. The following checking procedures demonstrate the use of the Dial Indicator Tool.

T-475V ball joint checking gauge

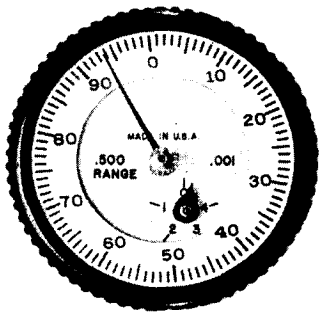


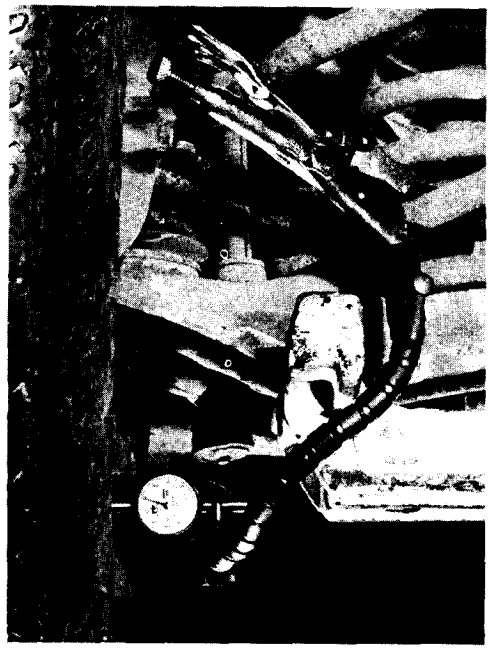
This dial indicator is a precision instrument and should be handled carefully to prevent damage.

The mounting procedure for the checking tool may vary depending on the style of ball joint used on the vehicle.

Manufacturer's tolerances may be axial (vertical), radial (horizontal) or both.

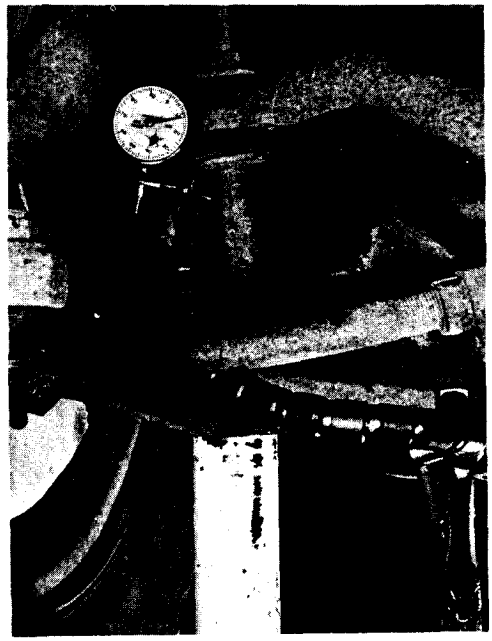
If the ball joint looseness reading on the indicator exceeds specifications, the ball joint should be replaced.





A TYPICAL RADIAL CHECK

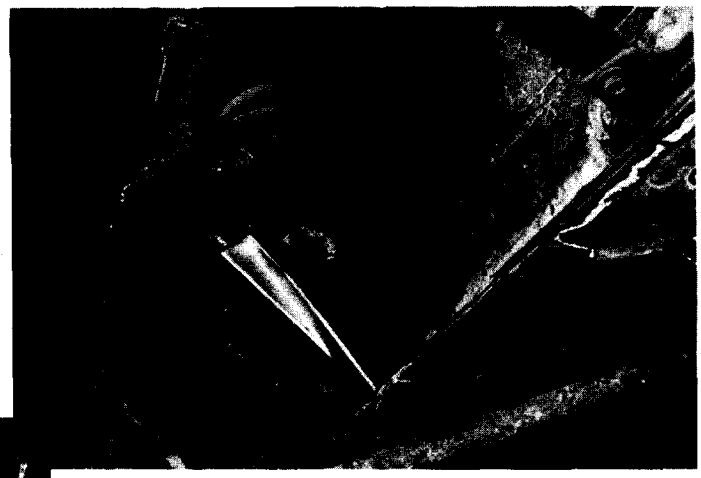
For a radial check, attach dial indicator to the control arm of the ball joint being checked. Position and adjust plunger of dial indicator against edge of wheel rim nearest to ball joint being checked. Slip dial ring to zero marking. Move the wheel in and out and note the amount of ball joint radial looseness registered on the dial.



A TYPICAL AXIAL CHECK

For an axial check first, position the dial indicator on the control arm, then clean off the flat on the spindle next to the ball joint stud nut. Position the dial indicator on the spindle flat and depress the plunger approximately .250 of an inch. Turn lever to tighten indicator in place. Pry bar between floor and tire and record reading.

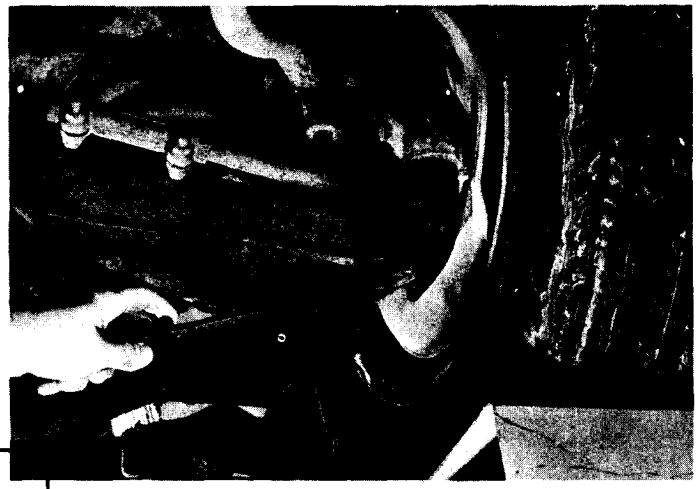
When the load carrying ball joints are on the upper control arm (spring mounted on upper arm), raise the vehicle by its frame using Moog T-458 support tools to unload the ball joints and hold them in their normal position.

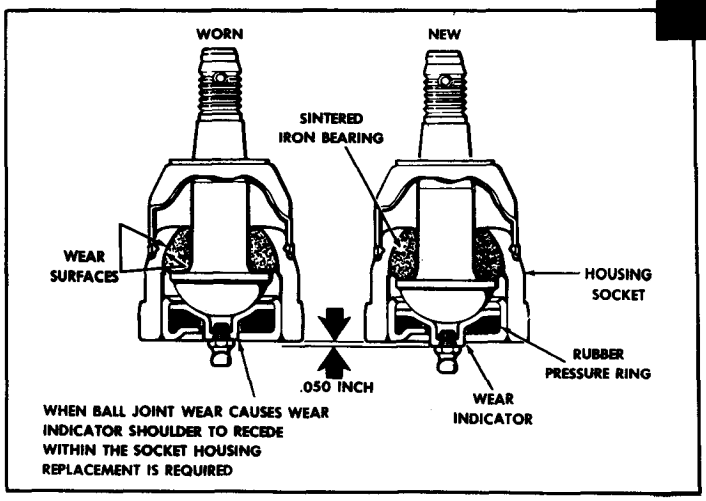


To determine the condition of the non-load carrying (or follower) ball joint, vigorously push and pull on the tire while watching the ball joint for signs of movement. Refer to manufacturer's specifications for tolerances.

INSPECTION OF WEAR INDICATORS

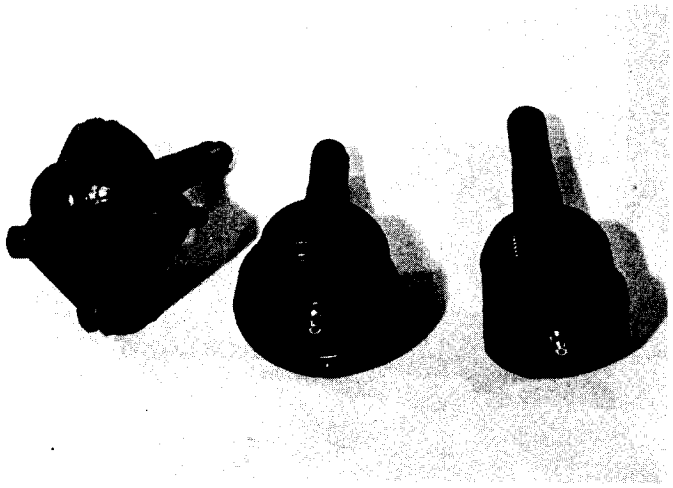
Wear indicator type ball joints must remain loaded to check for wear. The vehicle should be checked with the suspension at curb height.





The most common type has a small diameter boss which protrudes from the center of the lower housing.
As wear occurs internally this boss will recede very gradually into the housing.
When it is flush with the housing the ball joint should be replaced.

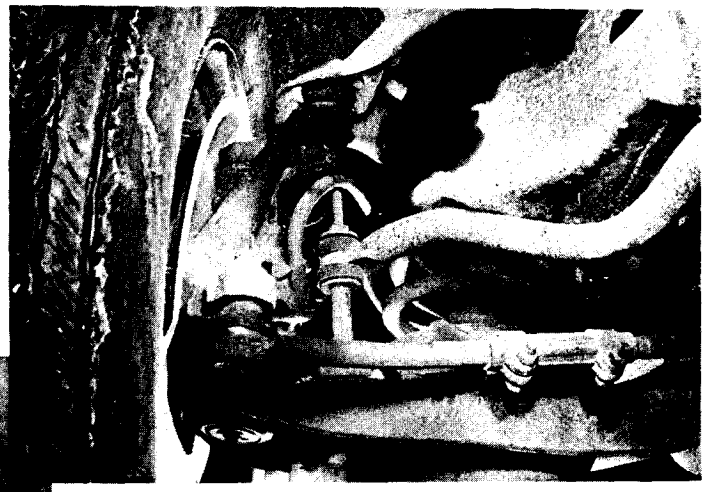
servicing ball joints

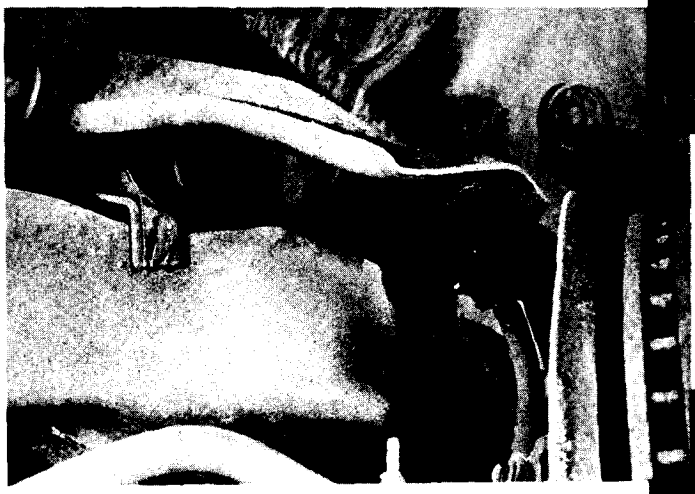


There are three basic ways of mounting ball joints to control arms: rivets (or bolts), press fit, and threaded. The most popular is the press fit.

There are some standard service steps which apply to all three.

Remove the wheels and other hardware which might obstruct access to the ball joints.

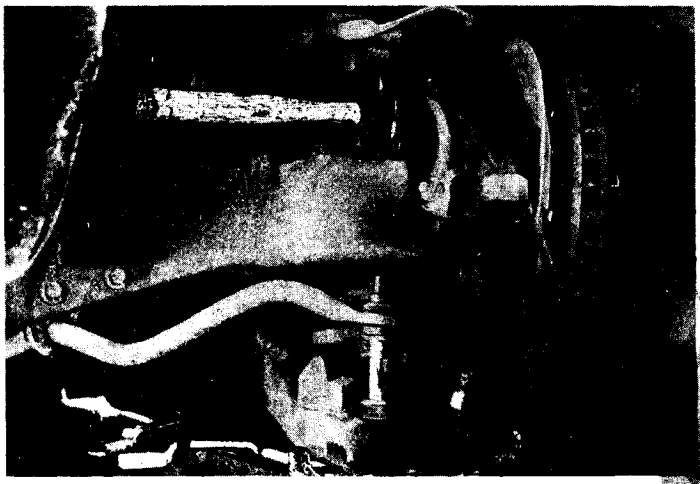




Unload the ball joints as previously described in the inspection procedures.

Remove the cotter keys and ball joint stud nuts. Use a suitable taper breaking tool to break the ball joint tapers. *(Moog T-484 Taper Breaking Tool shown).*

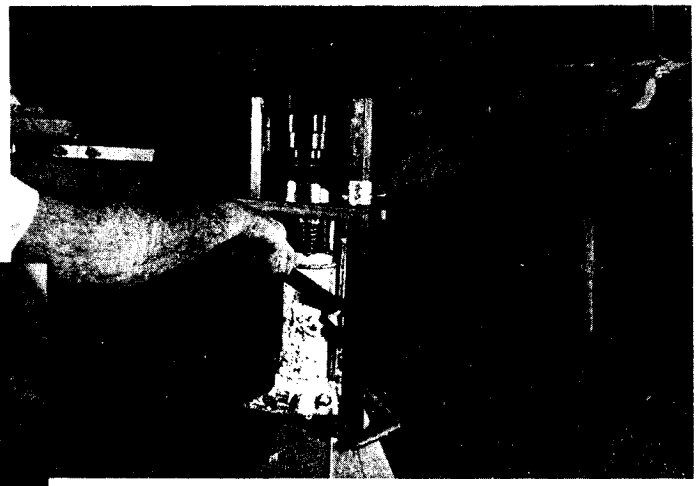
NOTE: Improper tool usage can cause damage to associated parts and lead to parts failure.



Lift the hub and spindle support arm clear of the ball joint and support in some manner.

When removing rivets, care should be taken not to damage the control arm.

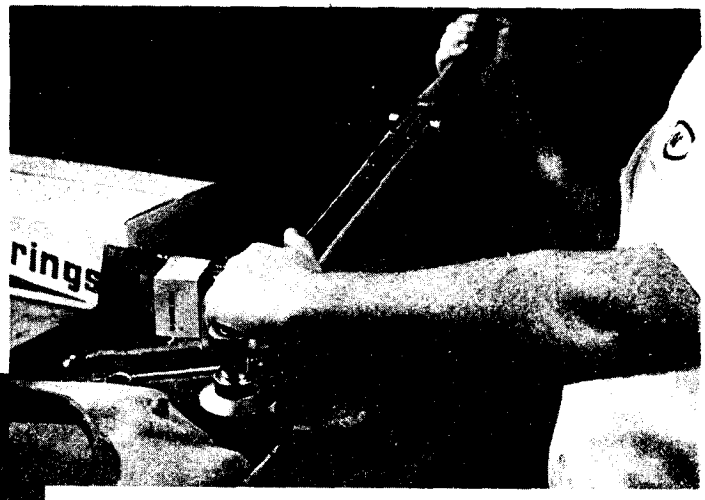
When installing the new ball joint, tighten the mounting nuts to the torque specified in the instruction sheet.



Use a press tool (the Moog T-468 ball joint press tool is shown) to remove and install press fit ball joints.

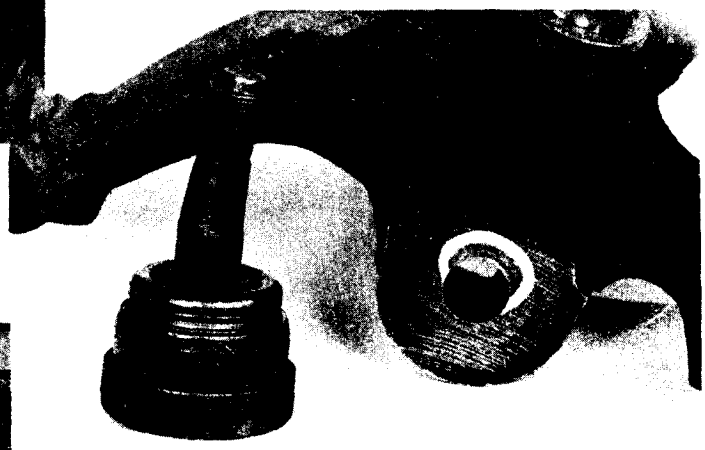
Before pressing the new ball joint into the control arm, inspect it to make sure it is in sound condition. If damage is found, cracks or distortion, the control arm should be replaced.

Use the proper size socket to remove and install threaded ball joints.

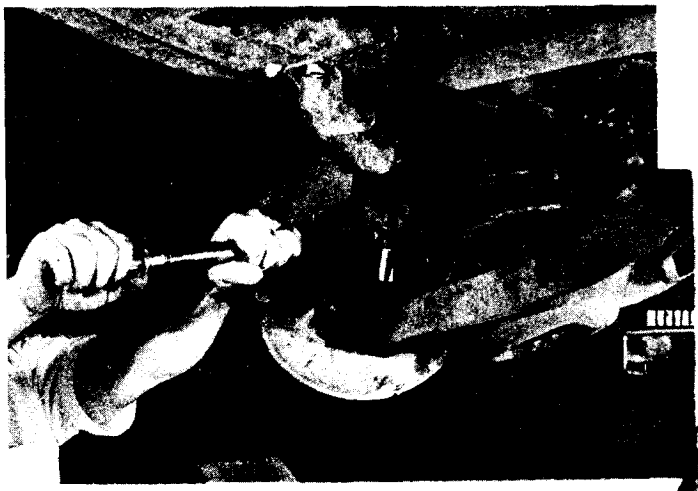


In most cases a torque value must be obtained when installing the new threaded ball joint. If this torque cannot be attained the control arm must be replaced. Therefore, extreme caution must be exercised when removing the original ball joint.

In all cases of ball joint replacement the taper hole in the spindle support arm should be cleaned and inspected.

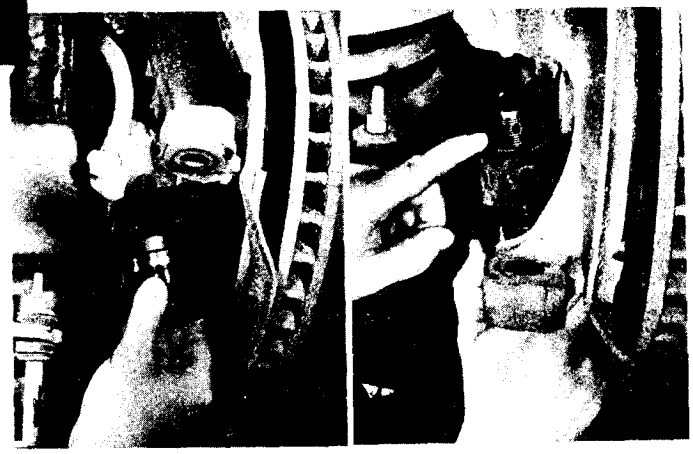


If found to be out of round or damaged in any way it *must* be replaced.



Carefully torque ball joint stud nuts to specifications and insert a new cotter key.

NOTE: Never back off to align the cotter key. Always tighten to the next position.

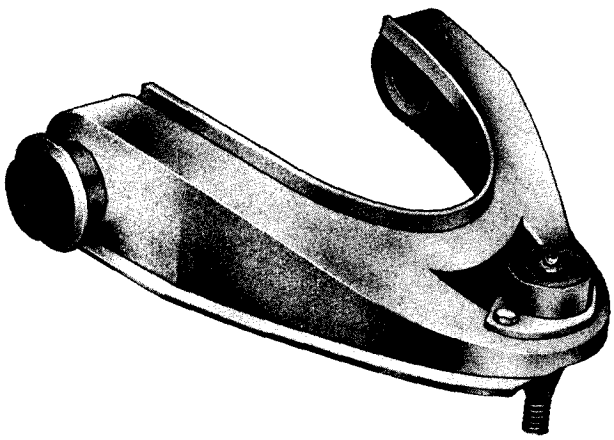


IMPORTANT

STEERING KNUCKLE INSPECTION

After cleaning the knuckle taper and the stud of the new ball joint, insert the new ball joint stud into the steering knuckle by hand. Check the fit of the stud taper to the knuckle. The stud should seat firmly without rocking. Only threads of the ball joint stud should extend through the steering knuckle. If the parts do not meet these requirements, either the steering knuckle is worn and needs replacement, or incorrect parts are being used.

servicing bushings



control arm bushings

CONTROL ARM BUSHINGS ARE THE INNER PIVOT POINTS FOR THE CONTROL ARMS. THEY CAN BE OF EITHER RUBBER OR STEEL CONSTRUCTION.

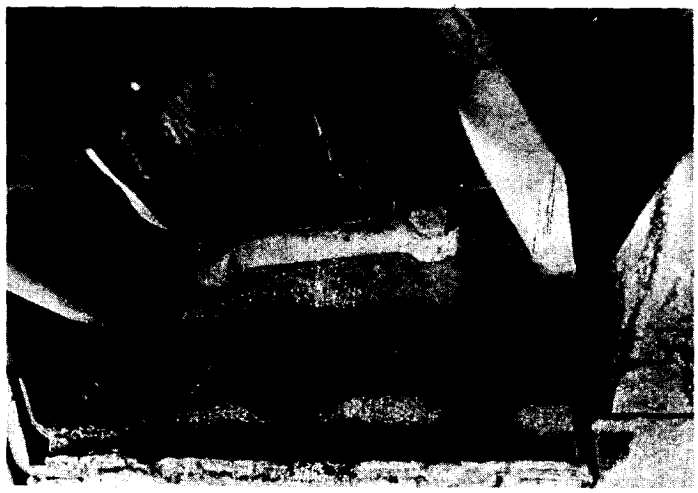
INSPECTION
RUBBER BUSHINGS

Visually inspect rubber bushings for signs of distortion, movement, off center condition and presence of heavy cracks.

INSPECTION
METAL BUSHINGS

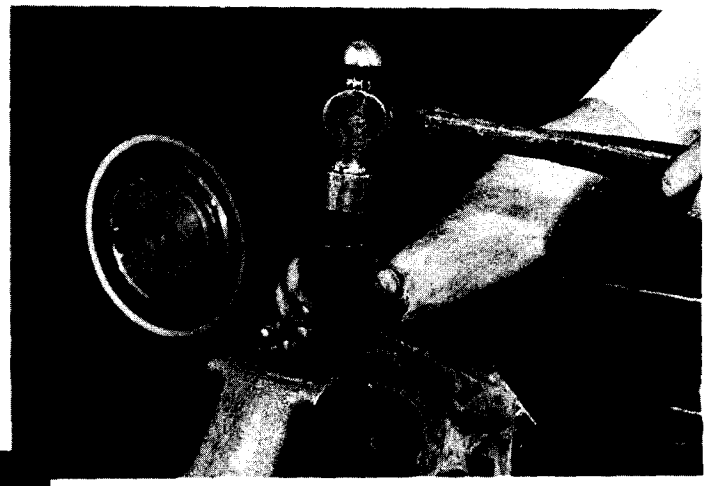
Check metal bushings for looseness, condition of seals, and noise. Noise is a sign of internal friction and wear.

In most instances it is necessary to remove the control arm from the vehicle. In any event little time is gained by attempting to install them on the vehicle.

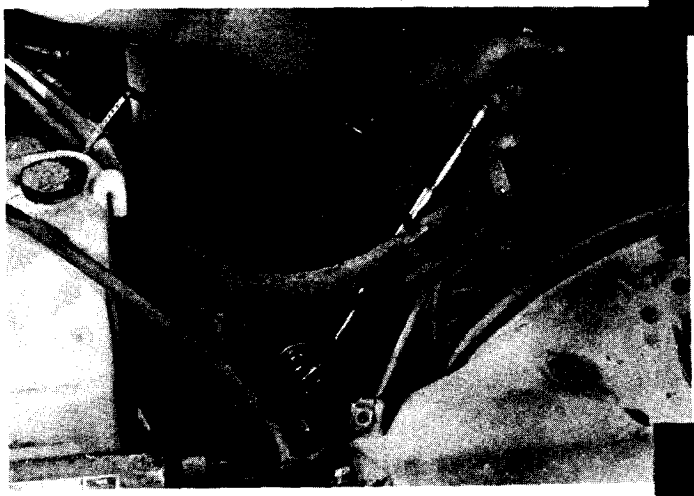


REPLACEMENT

Rubber bushings may be pressed or driven out once the control arm has been removed.



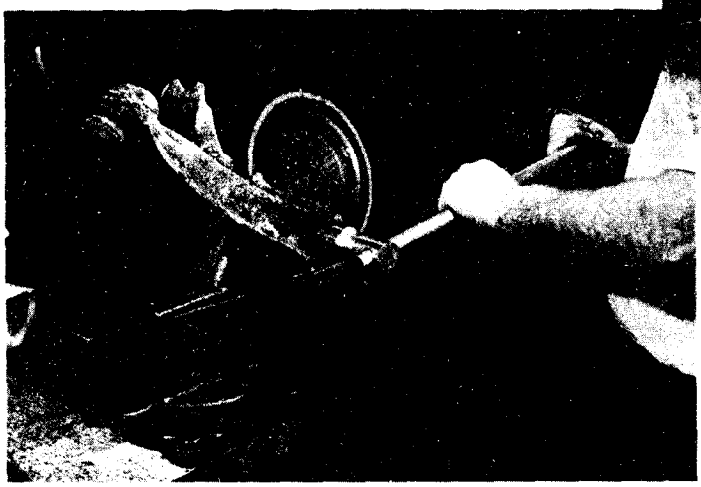
New bushings can be installed with a vice or driven in with a suitable driver. The T-477 bushing driver set is shown here. When installing new bushings ensure they are driven in straight. A poor installation could enlarge the hole in the control arm.



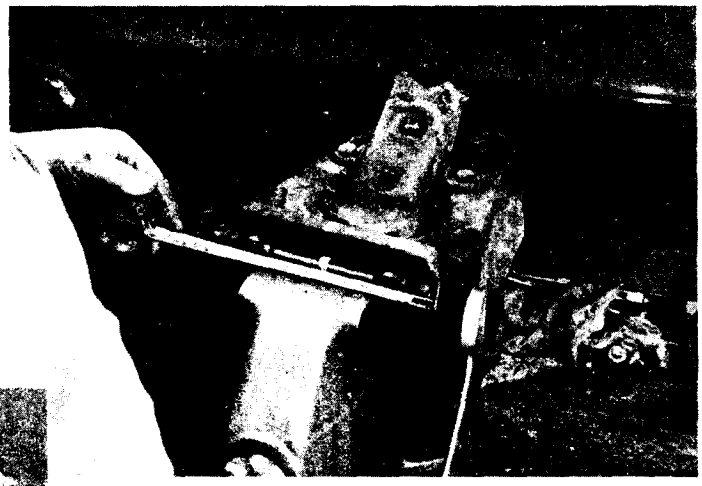
End cap nuts or bolts should not be torqued until the vehicle is at curb height and the suspension has been jounced and allowed to settle out.

In many cases the coil spring will have to be compressed to service metal bushings.

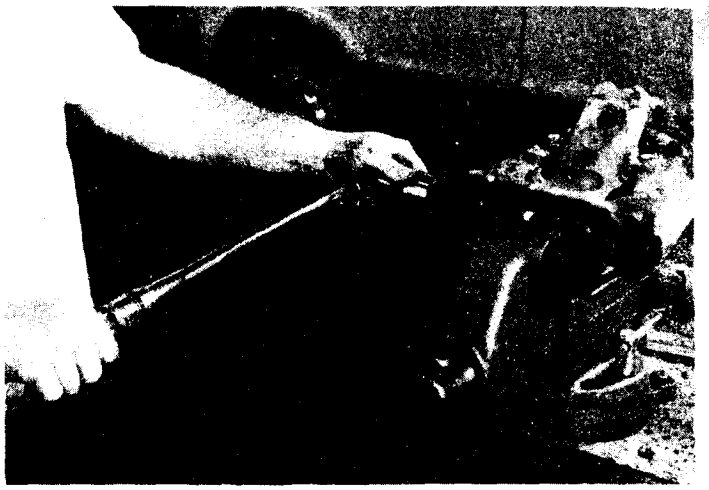
As shown here the T-469 spring compressor can be used to hold the spring in compression in the spring tower while the control arm is being serviced.



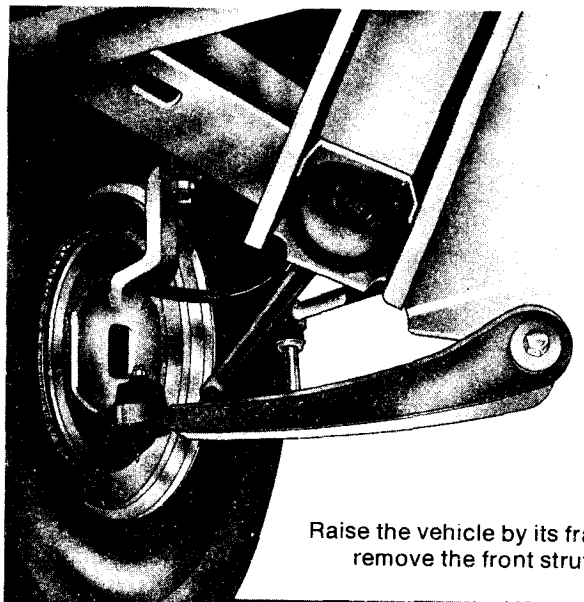
When the control arm is removed from the vehicle the bushings can be removed with a socket and breaker bar.



Once the new bushings are started into the control arm, measure and mark the center between mounting holes and center of the control arm. Now alternately tighten the bushings keeping the reference marks aligned. This is to ensure that the shaft will not be off center and cause binding.



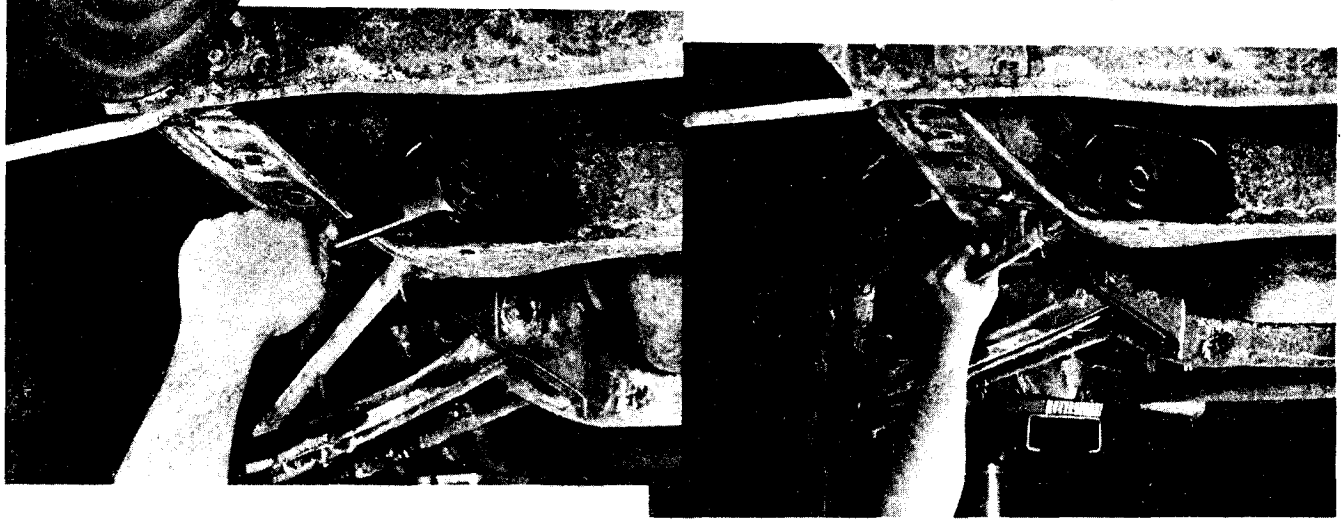
Torque the bushings to specifications and lubricate.



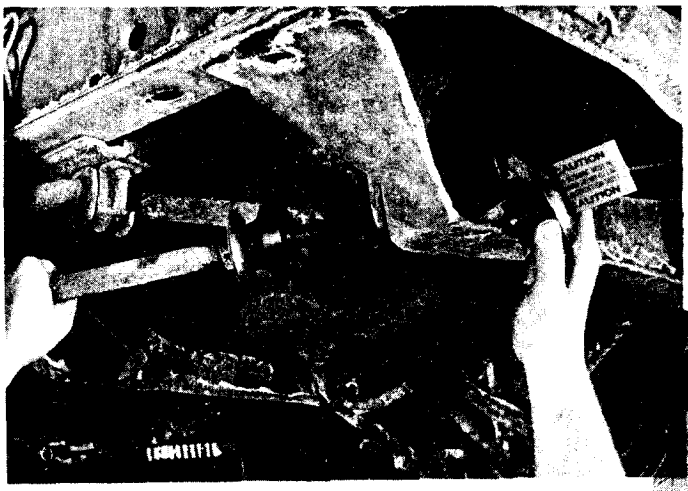
strut rod bushings

STRUT ROD BUSHINGS ARE MOUNTED BETWEEN THE FRAME AND STRUT ROD AND HOLD THE CONTROL ARM IN POSITION. THESE BUSHINGS ARE SUBJECT TO ROAD FORCES, BRAKE AND ACCELERATION TORQUE AND ACT AS A CUSHION TO DAMPEN THESE FORCES.

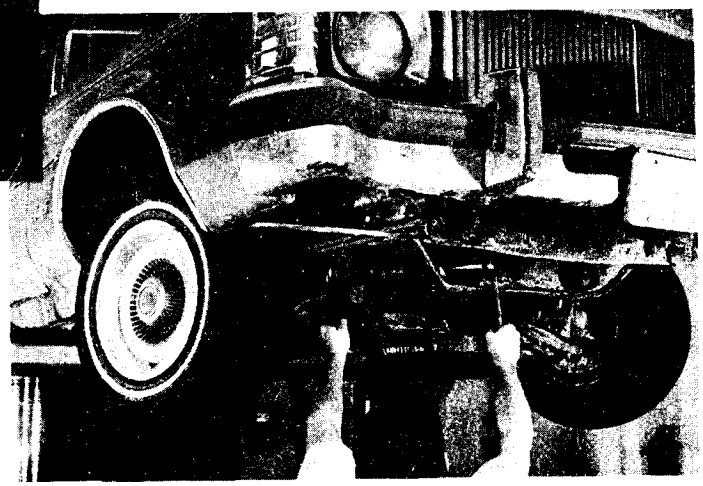
Raise the vehicle by its frame and remove the front strut rod nut.



Then remove the control arm bolts. The strut rod is now free from the control arm. Slide the rod back out of the frame and remove the bushings.



Install the new bushings. Read the instructions for each installation because there are differences in installation for the various designs.

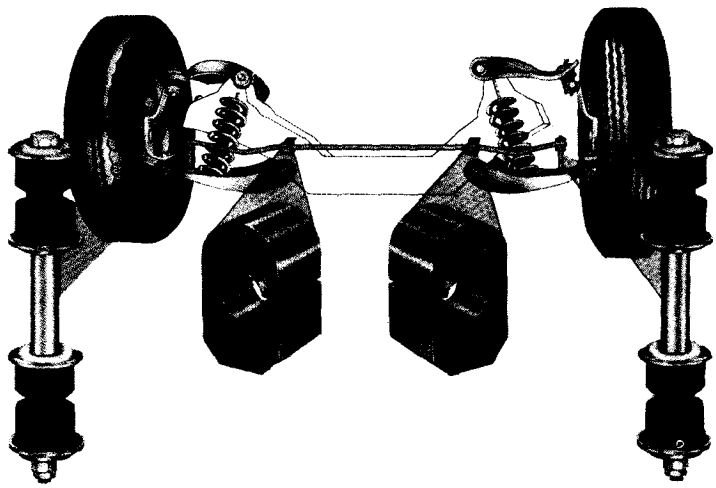


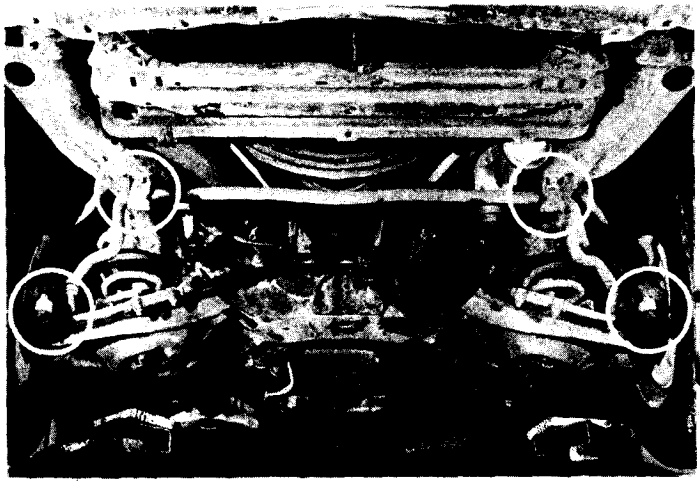
Hold the rod up in the rear and tigthen the front nut. This is to assure proper seating of the bushings.

Pull the rear down and reconnect to the control arm. Torque all nuts to the specifications on the instruction sheet. Caster and toe are affected by strut bushings, so check alignment after the installation is completed.

sway bar bushings

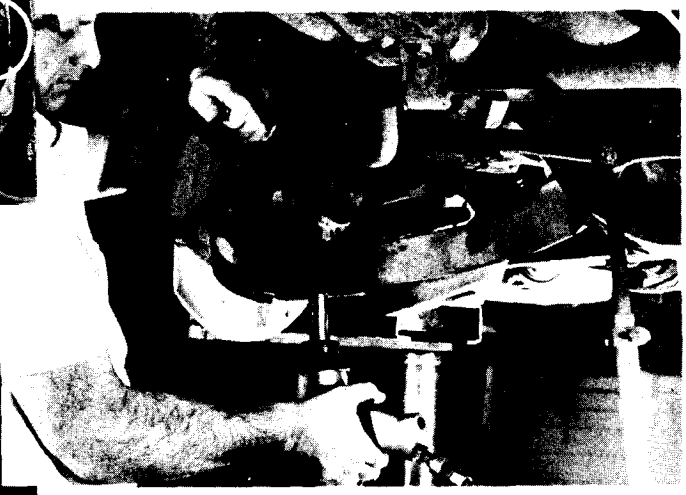
THESE BUSHINGS ANCHOR THE BAR SECURELY TO THE VEHICLE FRAME AND THE CONTROL ARMS ON EACH SIDE. THE PURPOSE OF THE BAR IS TO REDUCE BODY ROLL AND SWAY. THE CONDITION OF THE BUSHINGS WILL AFFECT THE PERFORMANCE OF THE BAR.



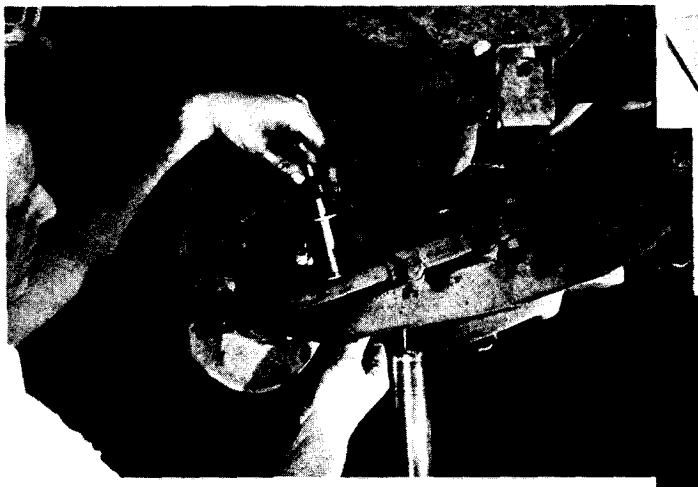


Check for loose and missing links. Inspect frame bushings for tightness, distortion and signs of movement.

To replace raise the vehicle and remove the nuts and bolts holding the bushings.



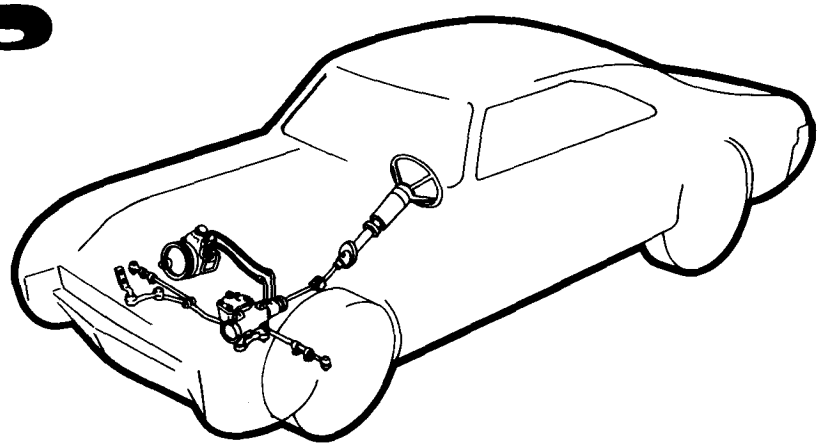
When removing link bushings note the direction, up or down, that the bolt is facing.



Install the new bolt in the same direction.

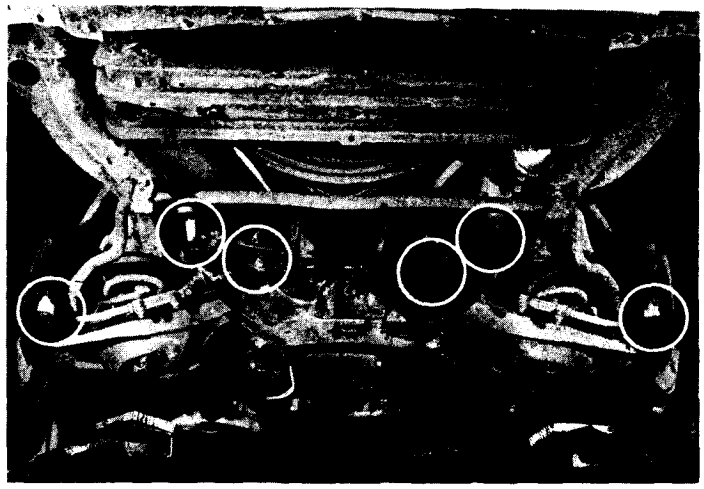
When installing frame bushings the preferred time for final tightening of the brackets is when the vehicle is at curb height, wheels on the ground.

steering linkage



MOST PASSENGER CARS USE PARALLELOGRAM LINKAGE.

THIS LINKAGE USES A PITMAN ARM AND IDLER ARM TO SUPPORT THE CENTER LINK WHICH HOLDS THE TIE RODS IN POSITION.



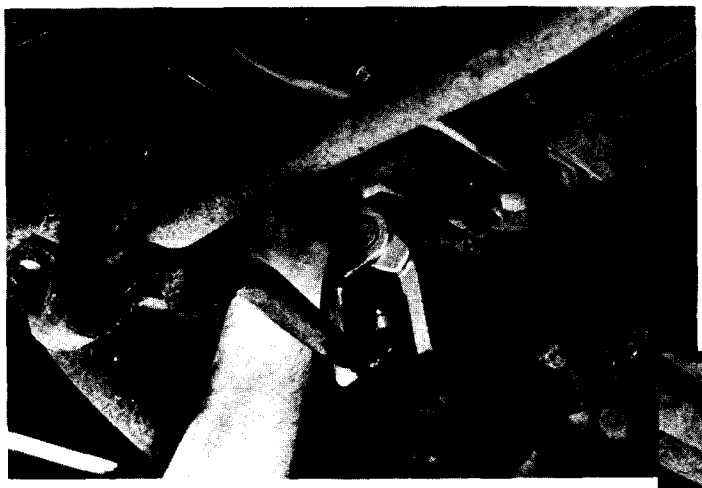
All pivot points should be carefully inspected for looseness. Looseness here can cause toe change which is the most serious of the tire wearing angles.

idler arms

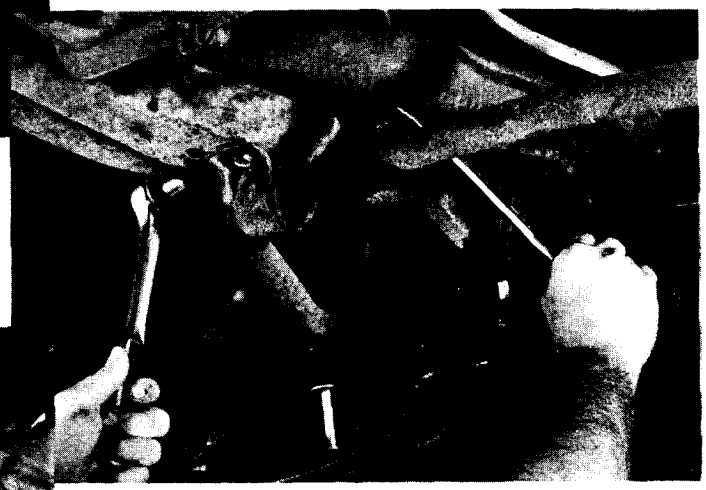
To check idler arms grasp the center link as close to the idler arm as possible and vigorously move it up and down. Excessive vertical looseness indicates the idler arm is worn and should be replaced.

NOTE: 1975 and later G.M. light trucks and passenger cars have an idler arm inspection procedure with a measurable tolerance. Refer to Page 28.

servicing idler arm



First separate the idler arm from the center link, using a taper breaking tool if required. *(Moog Taper Breaker T-485 shown).*



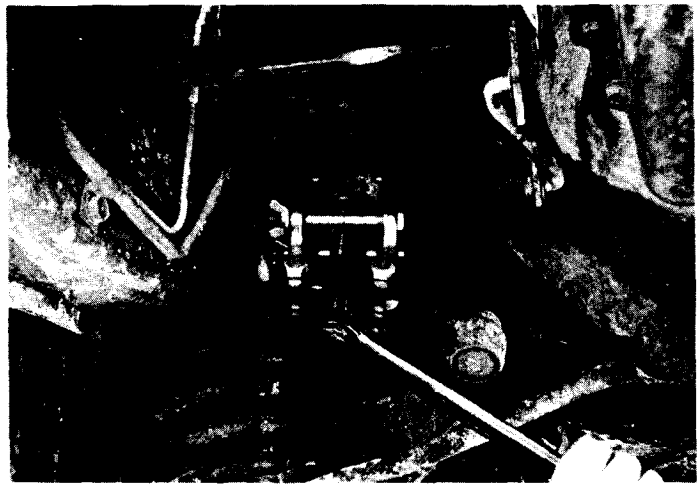
Then unbolt the frame bracket and remove the arm.

Before installing the new arm check tapers and stud condition. Reconnect and torque to specifications. An alignment check is recommended.

pitman arms

Pitman arms are checked in a manner similar to idler arms. An additional important check is to rotate the steering column. If there is movement between the stud and the housing bowl it can be detected at this time. Movement here is often misinterpreted as looseness in the steering gear box.

Pitman arm removal at the gear box requires a special puller.



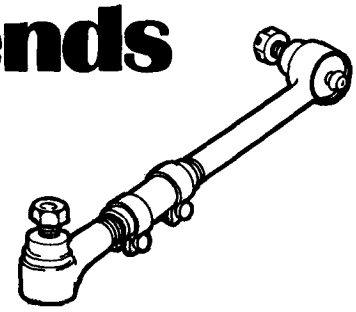
steering dampers

If the vehicle is equipped with a steering damper (horizontal shock absorber), check for leakage, cylinder damage and the condition of the mounting points.

When replacing steering dampers torque mounting points and then turn the wheels through to extreme right and left to ensure proper operation.

tie rod ends

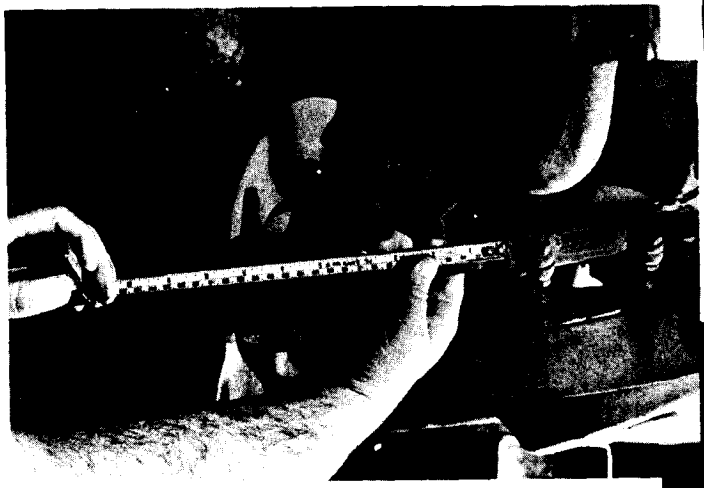
Tie rod ends are swivel pivots which connect the steering arms to the rest of the steering linkage.



Checking tie rods requires the hand force test. Looseness will usually be caused by weak take up springs or other worn internal parts.

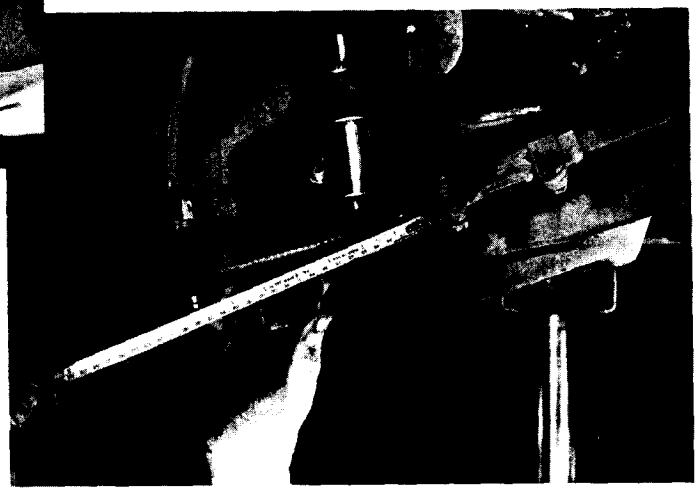
NOTE: Some G.M. vehicles have an inspection procedure involving the use of a dial indicator. Refer to the service manuals for complete inspection procedure.

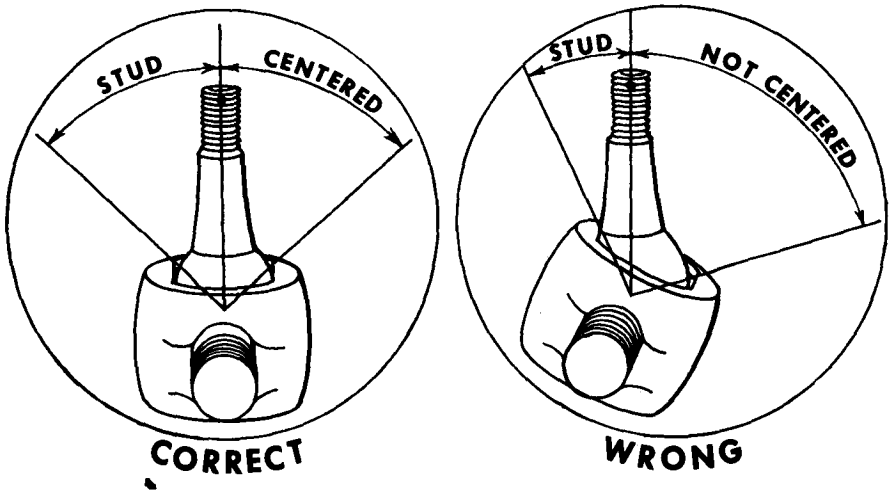
Start by removing the cotter pin and nut. Then break the taper with a taper breaking tool as shown. *(Moog T-485).*



Measure from the edge of the tie rod sleeve to the center of the tie rod bowl and note the dimension.

When the new tie rod is threaded into this dimension it will give an approximate toe setting.





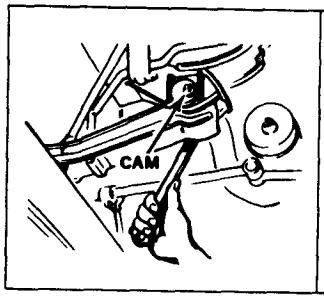
When installing the new tie rod, be sure to center the tie rod end stud in the bowl before clamping the sleeve. This will ensure adequate stud swing. Toe can now be set to specifications.

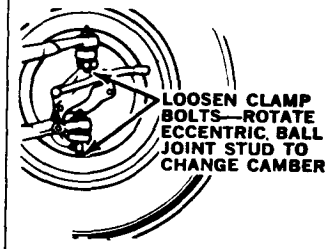
Checking and servicing of rack and pinion steering linkage is covered in other Moog publications.

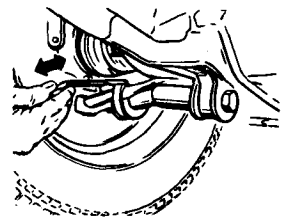
alignment procedures

ON MANY MODELS OF DATSUN AND TOYOTA, AND SOME VOLKSWAGENS, THERE ARE NO CAMBER AND CASTER ADJUSTMENTS, ONLY TOE ANGLE ADJUSTMENTS.

NOTE: In these cases, if caster or camber is out of specifications, parts may need to be replaced to obtain desired alignment angles.

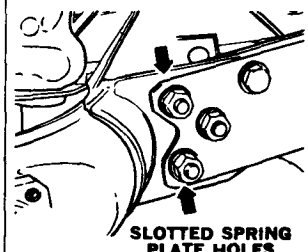


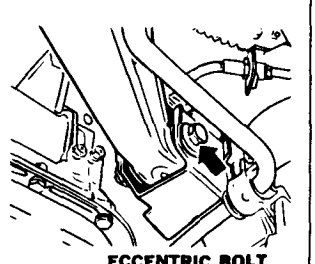


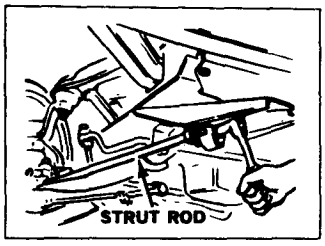


Volkswagen offers several methods of front alignment adjustments . . .

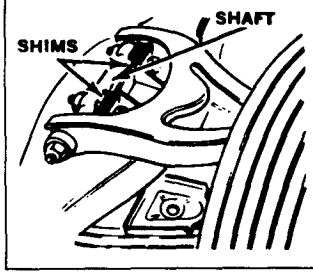
. . . as well as adjustments for the rear wheels.

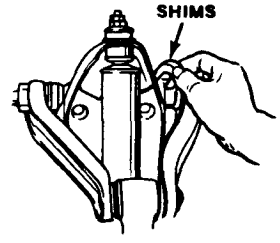






Some Toyota models have shim adjustment between shaft and frame (similar to Datsun) and an adjustable strut rod.



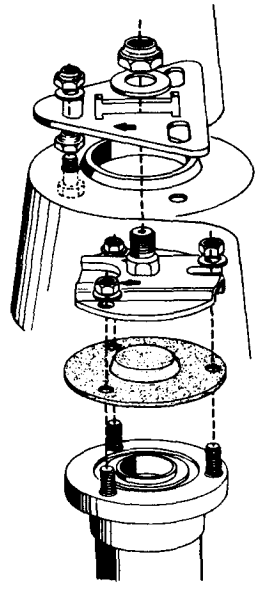


Some Datsun models allow adjustments by shims as shown . . .

KF-39 CASTER-CAMBER ADJUSTMENT KIT

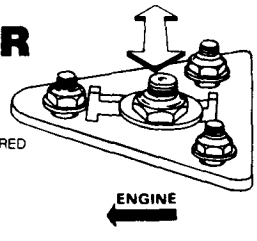
Some vehicles equipped with McPherson struts have no means for adjusting caster and camber and if alignment specs are wrong, tires wear excessively. Installation of the KF-39 Caster-Camber Adjusting Kit is made only once and alignment is a very simple adjustment — from under the hood — any time thereafter.

The strut is loosened so a plate can be bolted thru the existing holes in the inner fender. The strut is returned to its original position and held in place by the two plates. The vehicle is now ready for alignment.



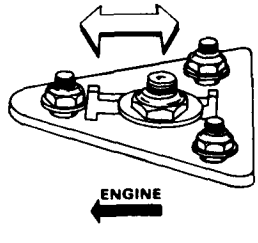
CASTER

SLIDE THE UPPER PLATE TOWARD THE FRONT OR REAR OF THE CAR UNTIL THE DESIRED CASTER READING IS OBTAINED.



CAMBER

SLIDE THE LARGE LOCKNUT TOWARD OR AWAY FROM THE ENGINE UNTIL THE DESIRED CAMBER READING IS OBTAINED.



SUN WHEEL ALIGNMENT CHECK SHEET

NAME _____ MAKE _____ YEAR _____

ADDRESS _____ MODEL _____ COLOR _____

CITY _____ STATE _____ ZIP _____ LICENSE _____

PHONE _____ OFFICE PHONE _____ MILEAGE _____ DATE _____

PRE-ALIGNMENT INSPECTION

- ☐ NORMAL VEHICLE LOAD
- ☐ TIRE PRESSURES
- ☐ UNEVEN & WORN TIRES
- ☐ WHEEL BEARINGS
- ☐ DRAGGING BRAKES
- ☐ SHOCK ABSORBERS
- ☐ BALL-JOINTS (KING-PINS)
- ☐ IDLER-ARM
- ☐ STABILIZER
- ☐ TIE RODS & ENDS
- ☐ STEERING ARMS
- ☐ PITMAN ARM
- ☐ SPINDLE
- ☐ BUSHINGS
- ☐ REAR-AXLE
- ☐ STEERING WHEEL

LEFT **RIGHT**

LEFT SIDE	CASTER ANGLE	CAMBER ANGLE
• INITIAL READING		
• FACTORY SPEC.		
• FINAL SETTING		

CAMBER ANGLE	CASTER ANGLE	RIGHT SIDE
		• INITIAL READING
		• FACTORY SPEC.
		• FINAL SETTING

	TOE
• INITIAL READING	
• FACTORY SPEC.	
• FINAL SETTING	

TOTAL TOE

TOE	
	• INITIAL READING
	• FACTORY SPEC.
	• FINAL SETTING

STEERING AXIS INCLIN.	INCLUDED ANGLE	TURNING ANGLE	WHEEL SET-BACK

WHEEL SET-BACK	TURNING ANGLE	INCLUDED ANGLE	STEERING AXIS INCLIN.

• CHECK ALL WHEELS & TIRES...

CONDITION	LF	RF	LR	RR
PRESSURE				
RUN-OUT				
OUT-OF-ROUND				
EXCESSIVE WEAR				
BALANCE				

• TORSION-BAR VEHICLES ONLY...

SUSPENSION HEIGHT	LEFT	RIGHT
INITIAL READINGS		
FACTORY SPECS.		
FINAL SETTINGS		

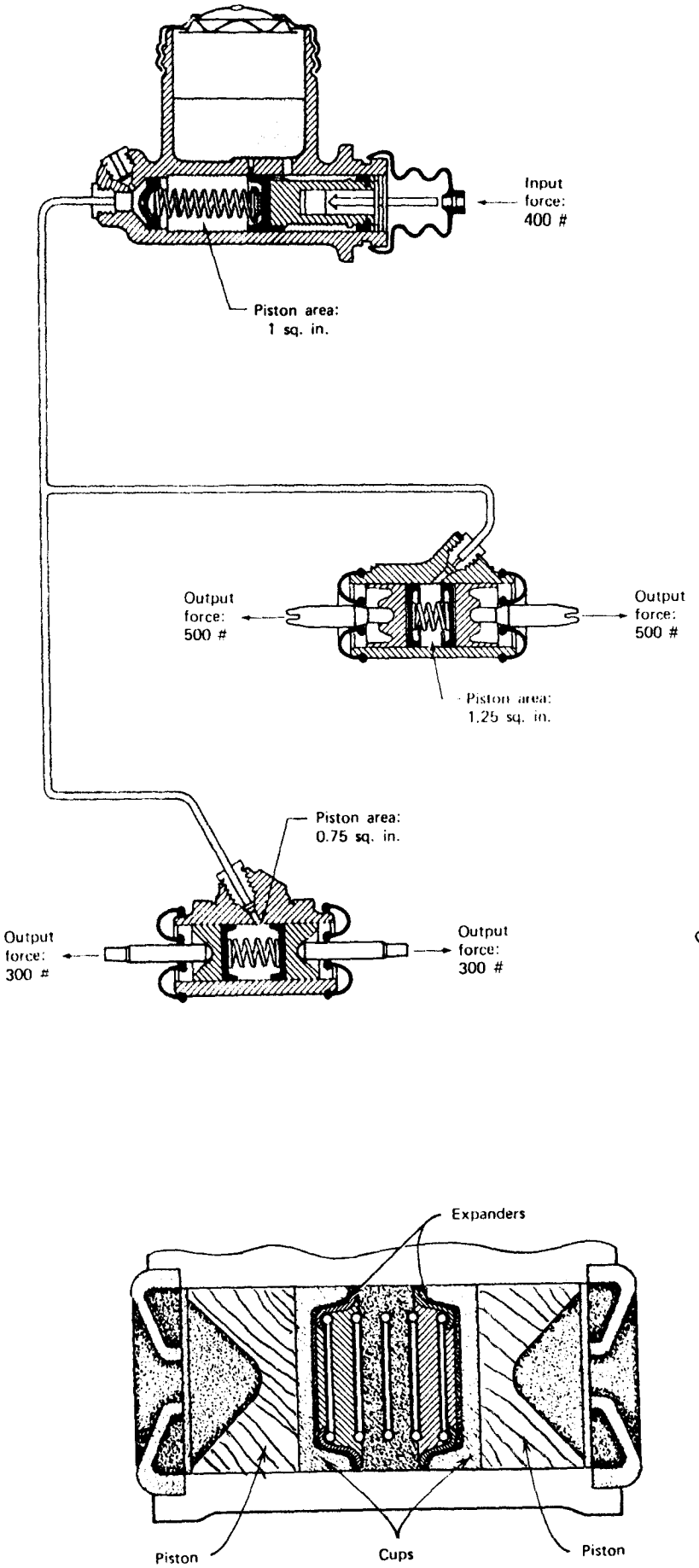
• TRUCKS ONLY...

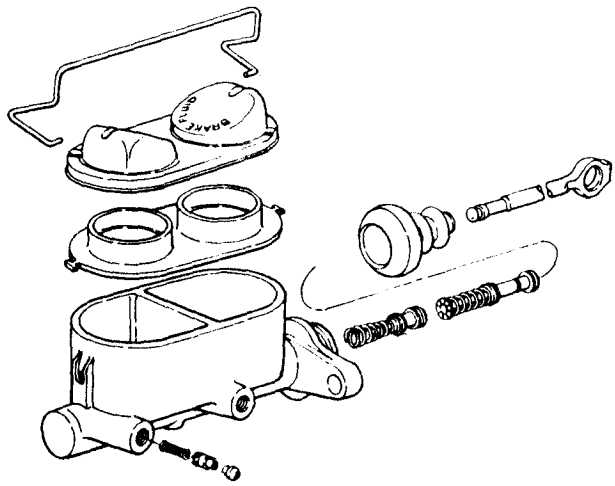
FRAME ANGLE LEFT	FRAME ANGLE RIGHT

SUSPENSION HEIGHT LEFT	SUSPENSION HEIGHT RIGHT

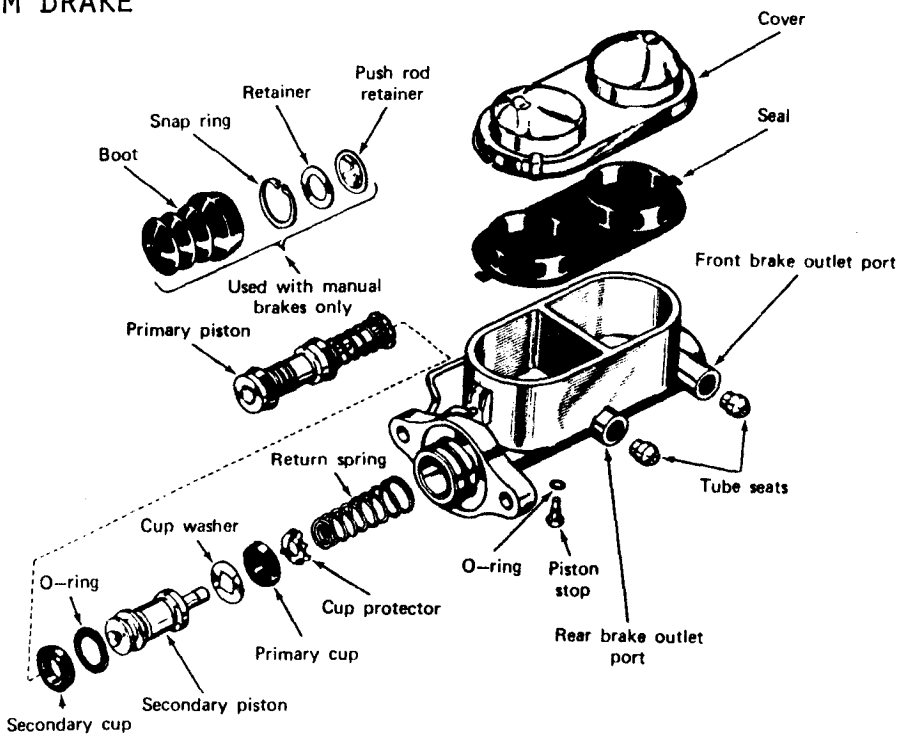
REMARKS _____

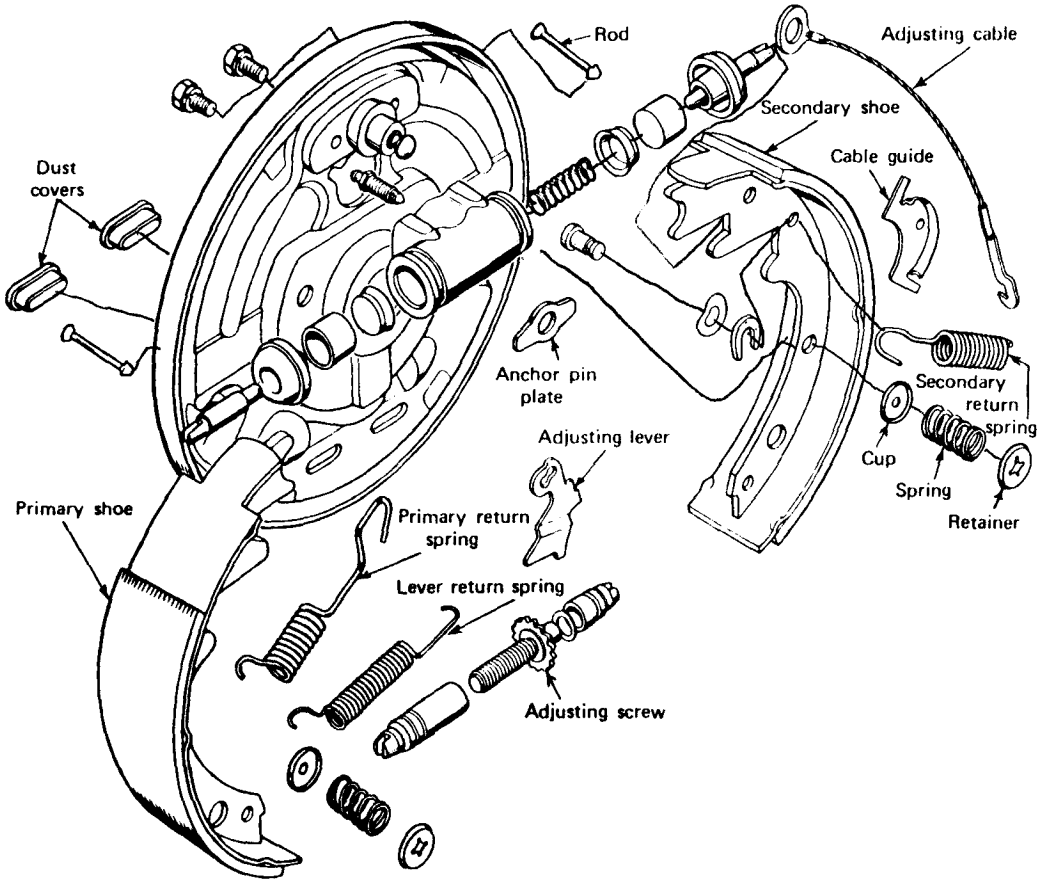
HYDRAULIC BRAKE COMPONENTS



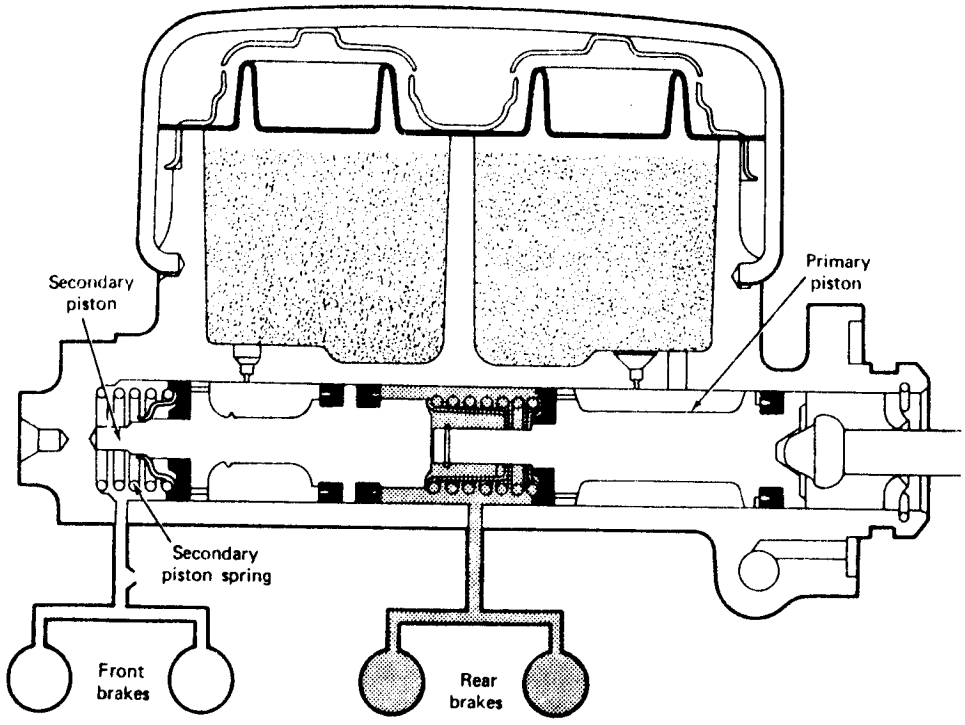


MASTER CYLINDER AND DRUM BRAKE COMPONENTS

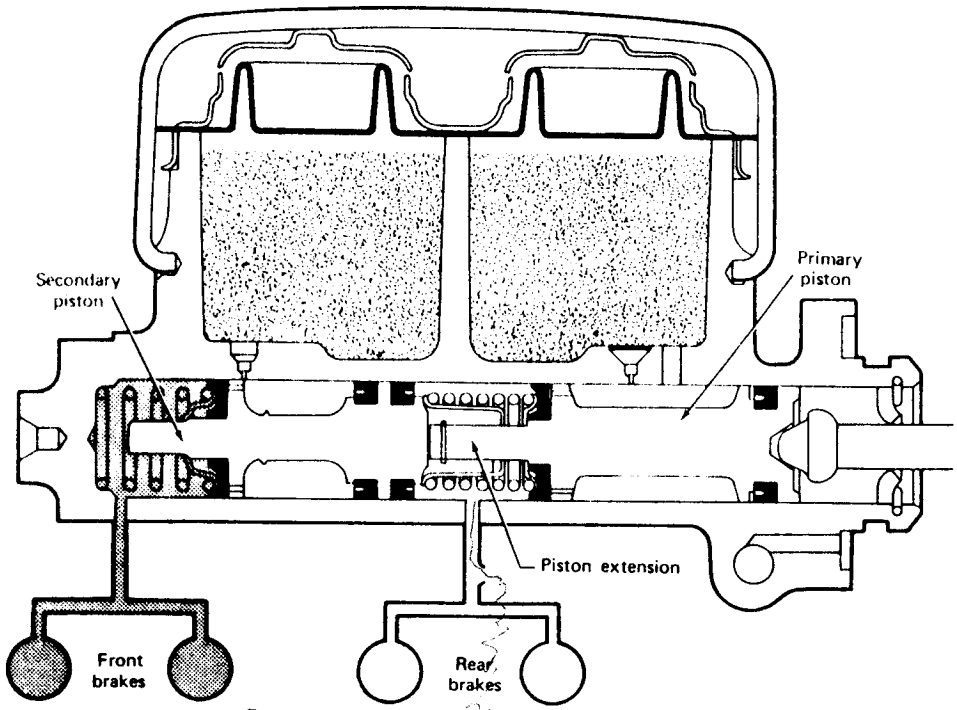




DUAL MASTER CYLINDER ACTION
ACTION DURING SYSTEM FAILURES

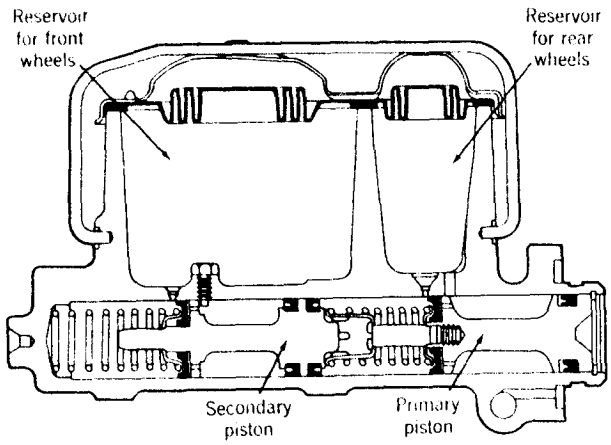


FRONT BRAKES FAILED

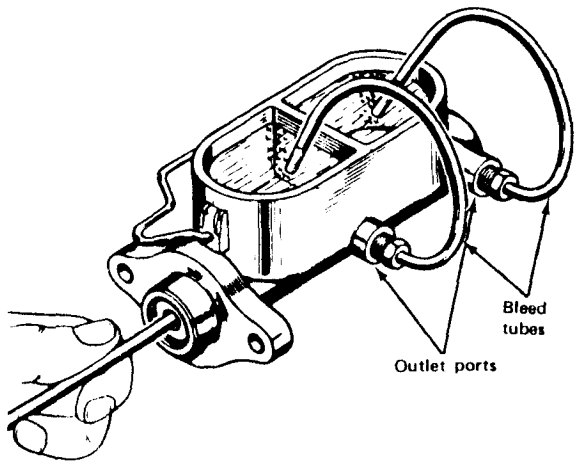


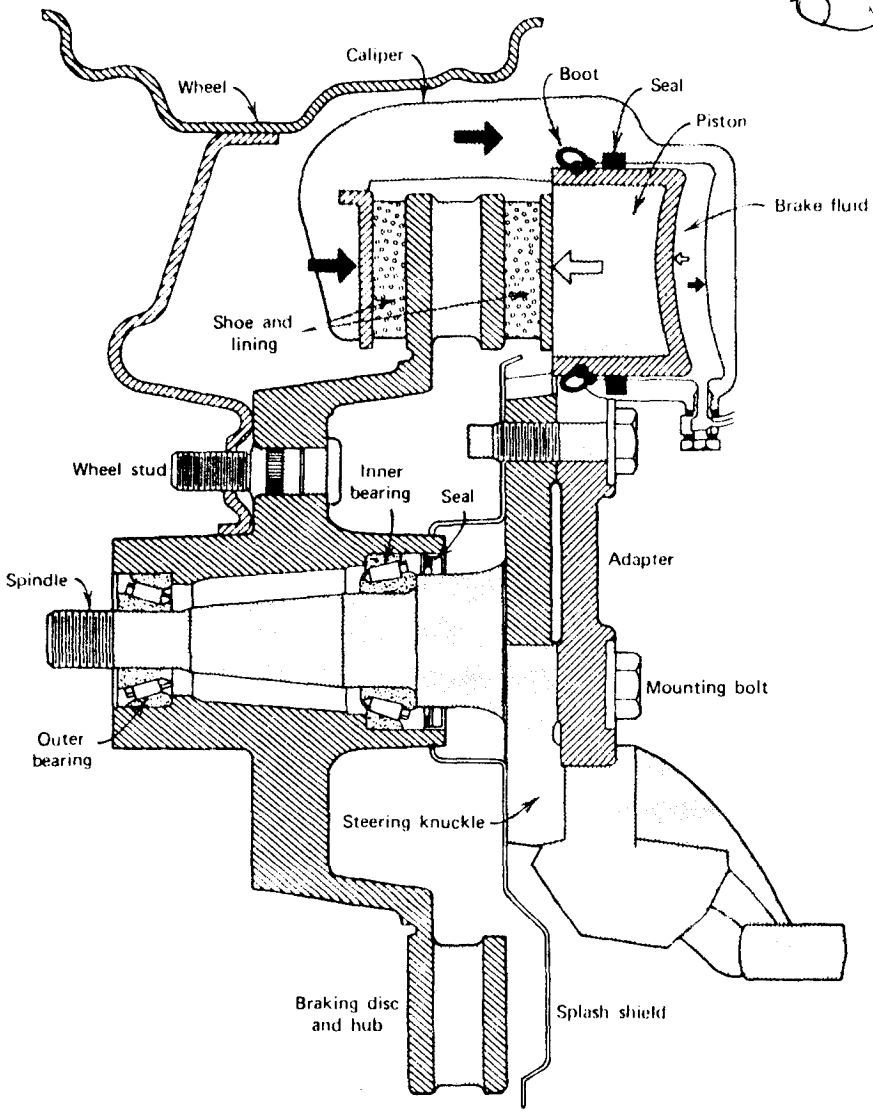
REAR BRAKES FAILED

Disc/Drum Master Cylinder

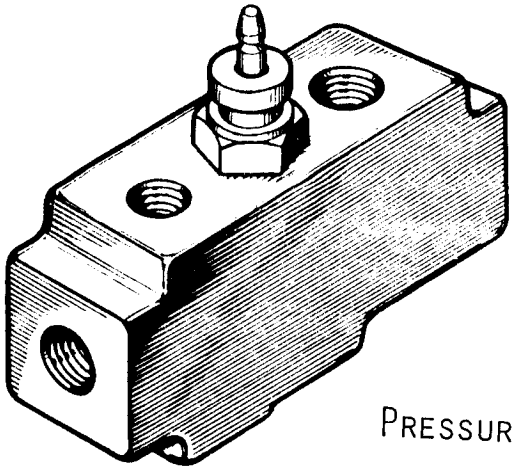


Bench Bleeding Master Cylinder

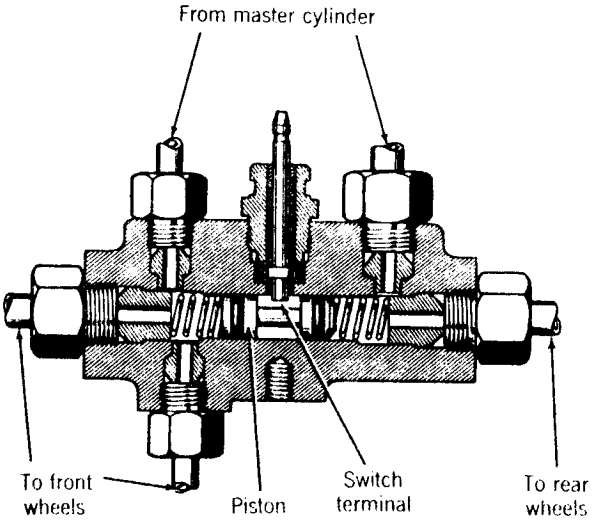




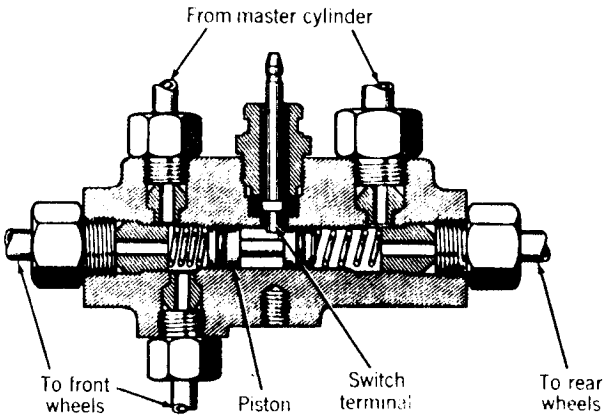
Disc Brake Components



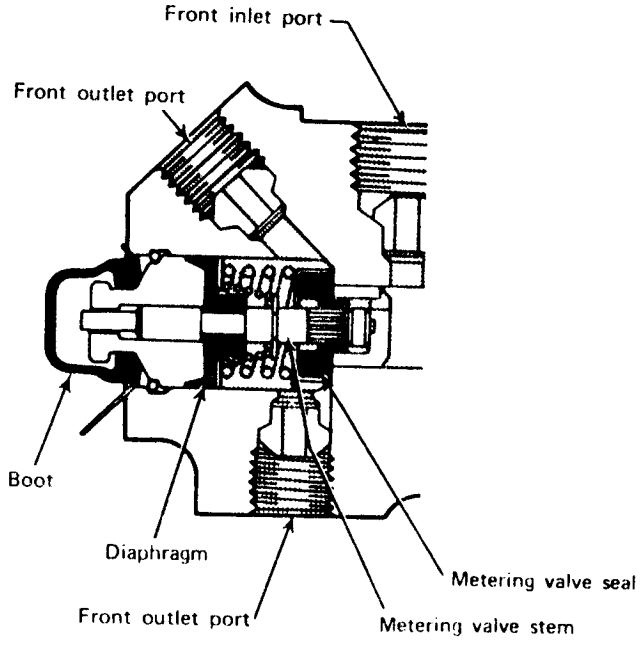
PRESSURE DIFFERENTIAL VALVE



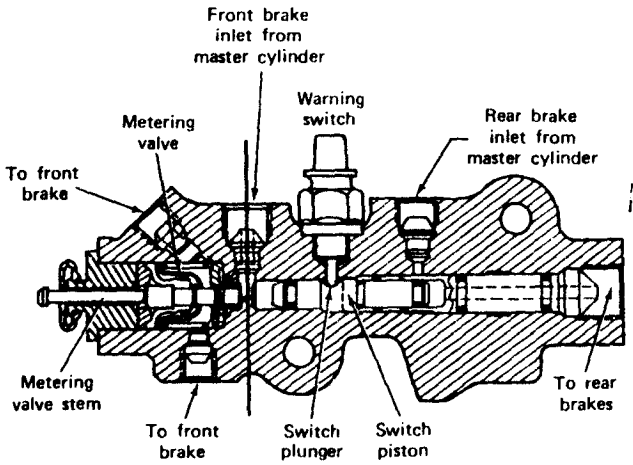
VALVE CENTERED



VALVE OFF-CENTER
(FRONT BRAKE FAILURE)

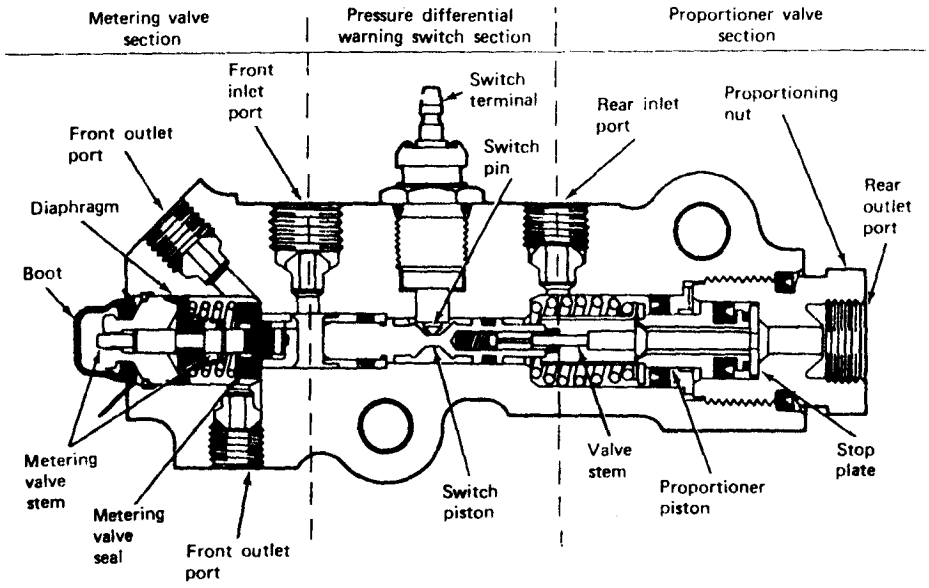


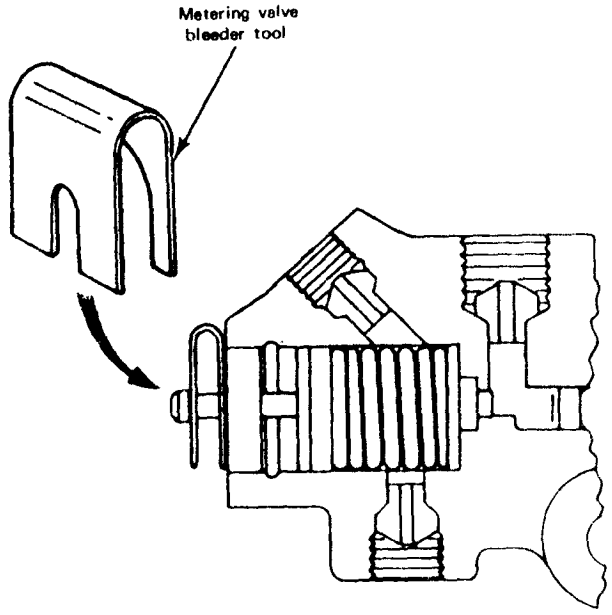
METERING VALVE



COMBINATION VALVE (PRESSURE DIFFERENTIAL AND METERING)

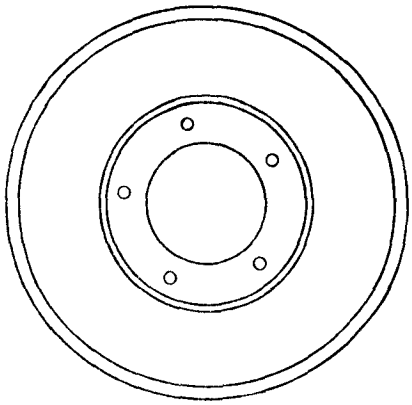
COMBINATION VALVE (PRESSURE DIFFERENTIAL, METERING AND PROPORTIONING)



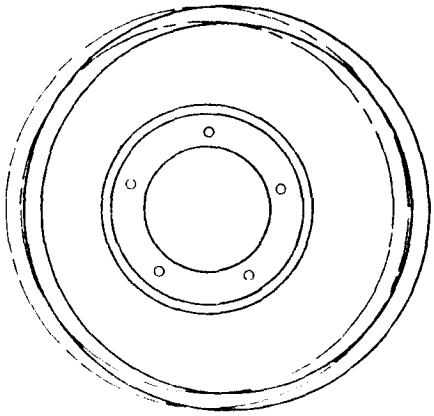


TOOL TO HOLD METERING VALVE WHILE BLEEDING

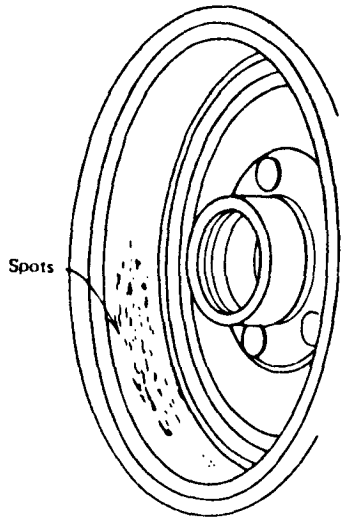
Brake Drum Problems



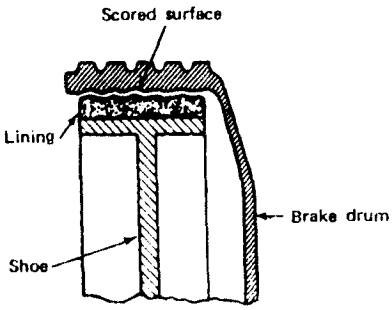
Out-of-round brake drum.



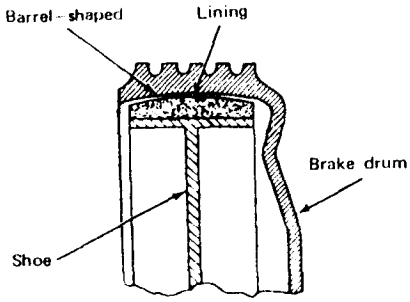
Eccentric brake drum.



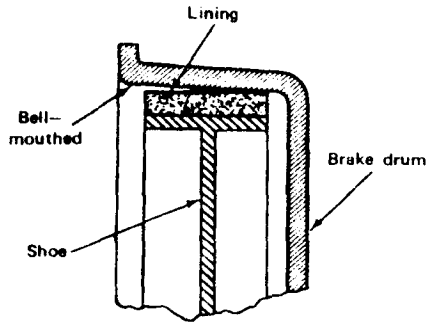
Hard spots on the drum surface.



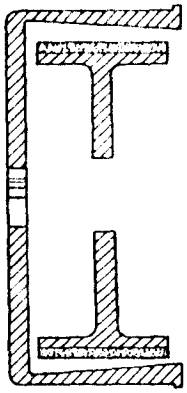
Scored brake drum



Barrel shaped brake drum

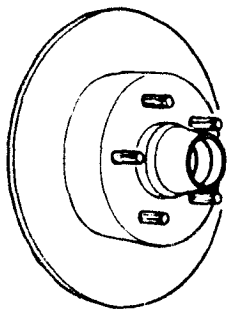


Bell-mouthed brake drum

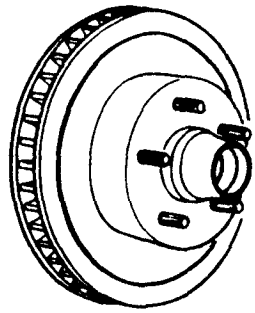


Taper drum wear.

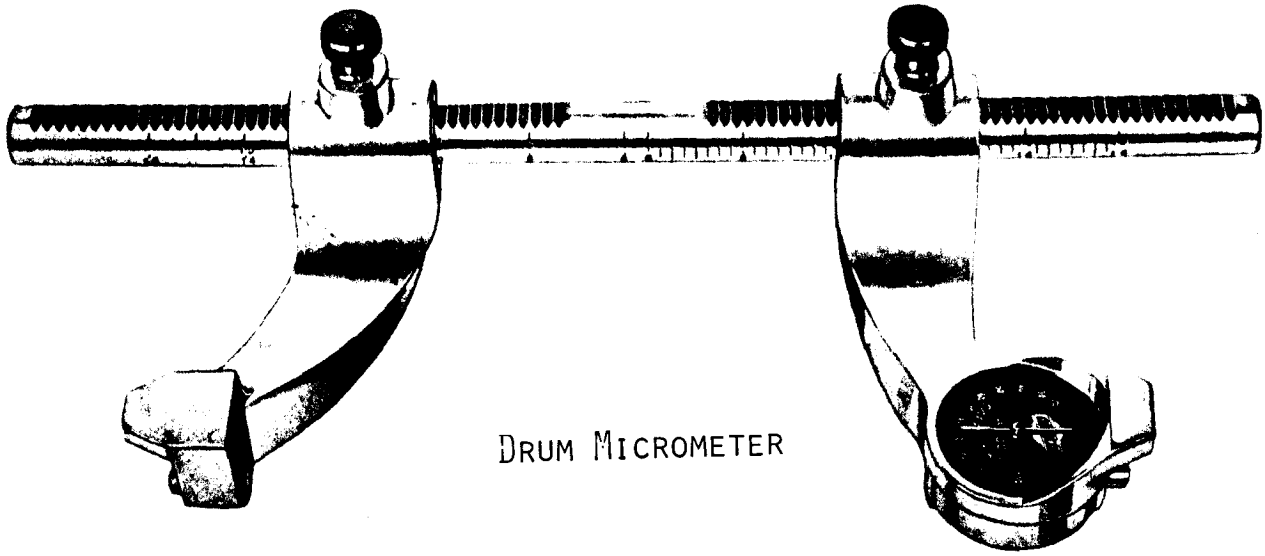
Disc Brake Rotors



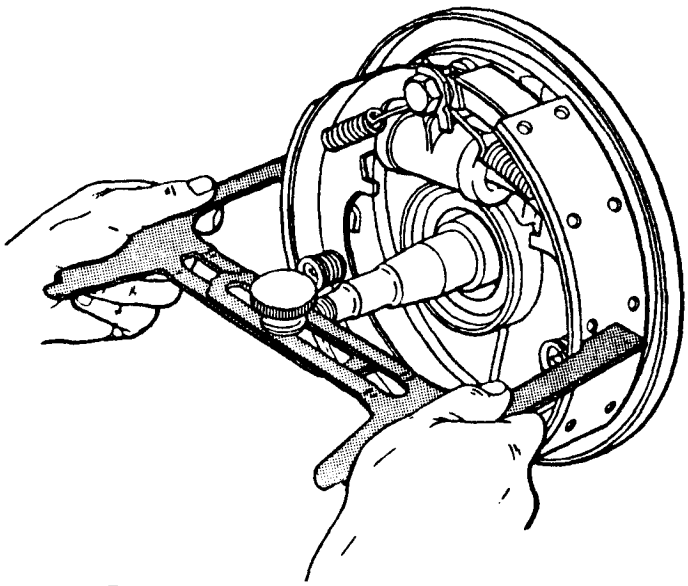
Solid



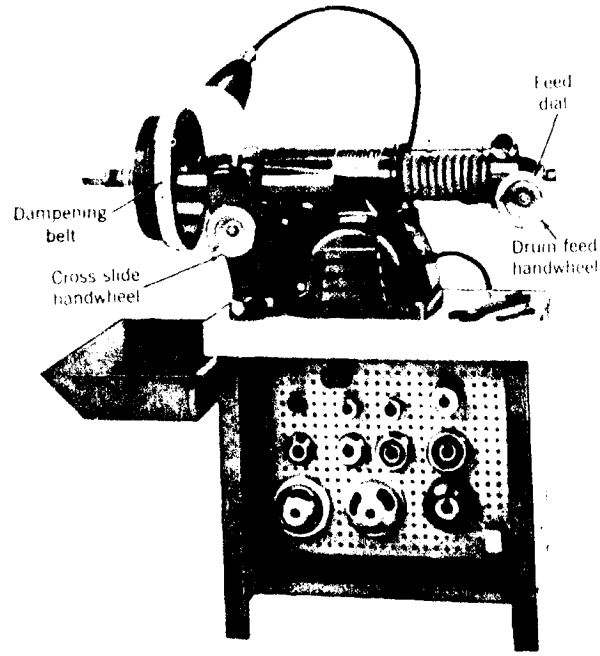
Vented



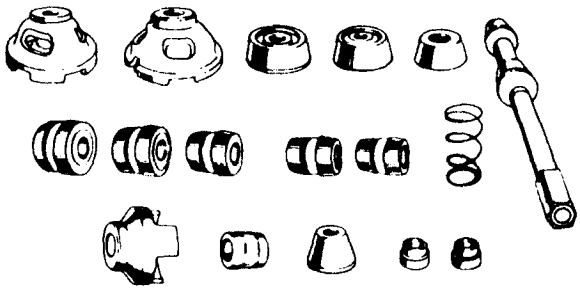
DRUM MICROMETER



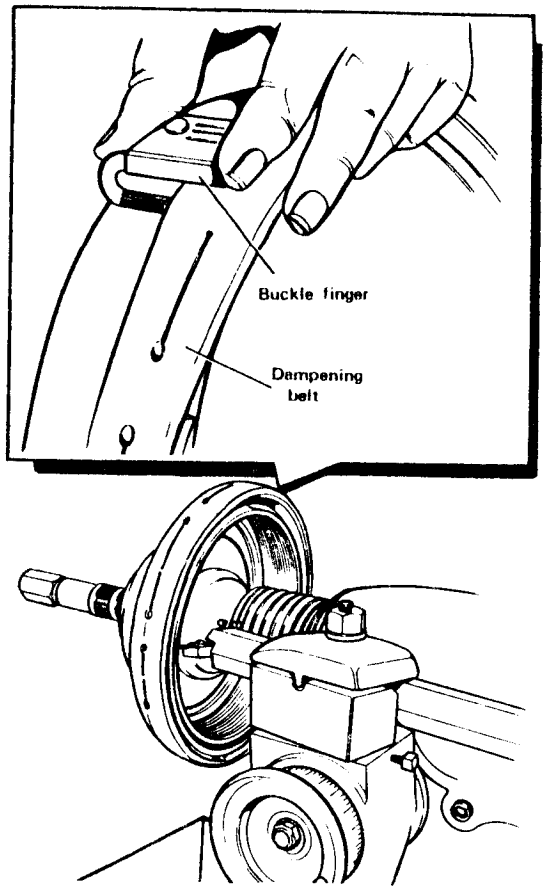
DRUM TO SHOE CLEARANCE GAUGE



BRAKE DRUM LATHE

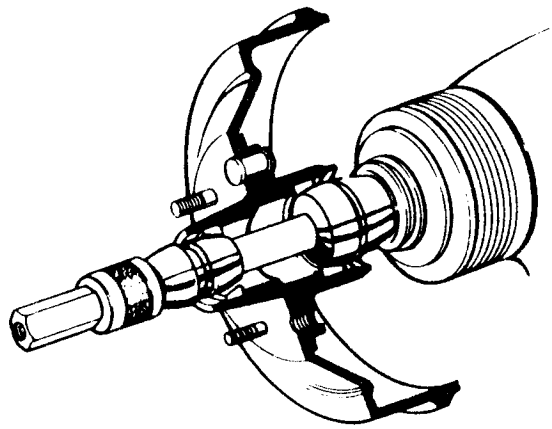


BRAKE LATHE ADAPTERS

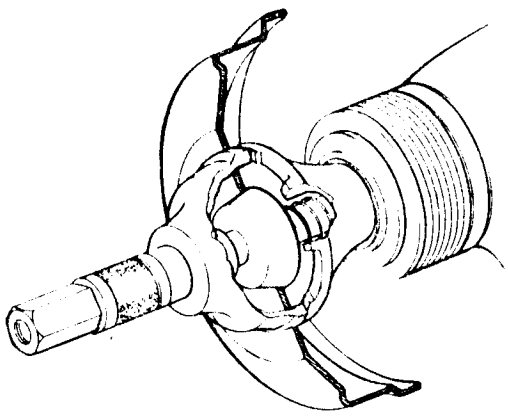


BRAKE LATHE ANTI-CHATTER BELT

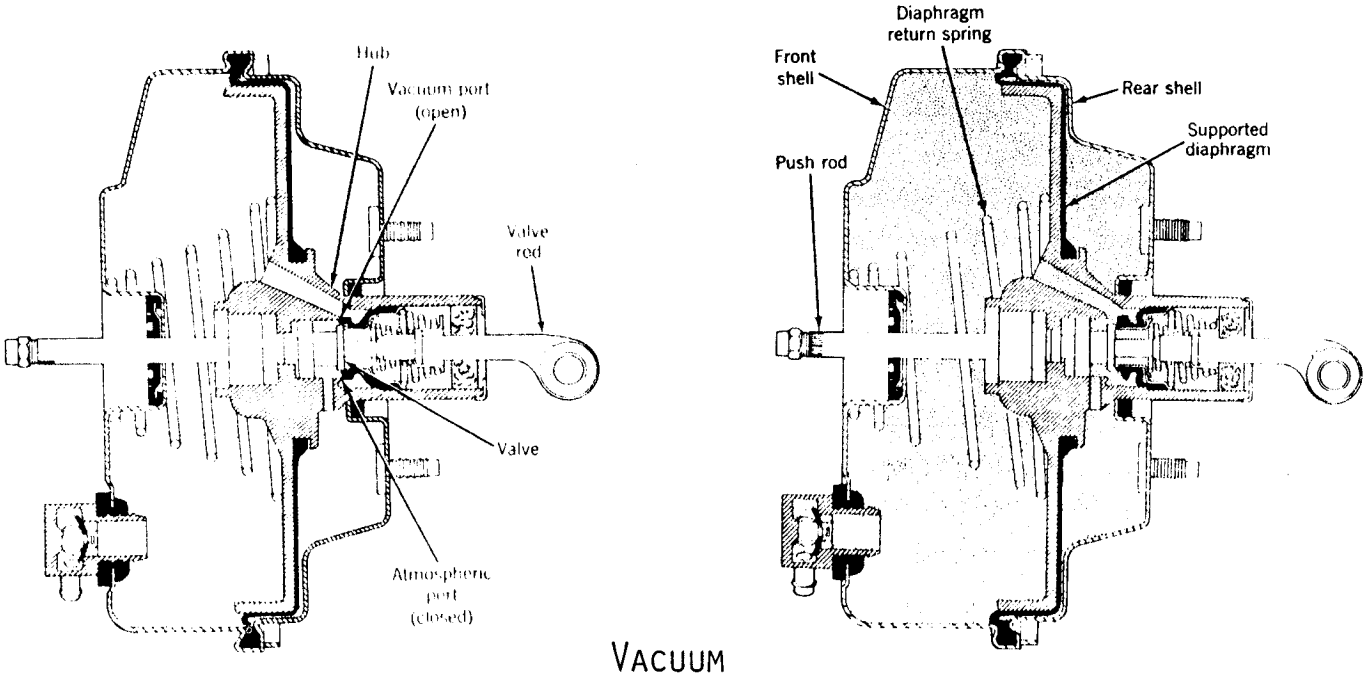
Front brake drum



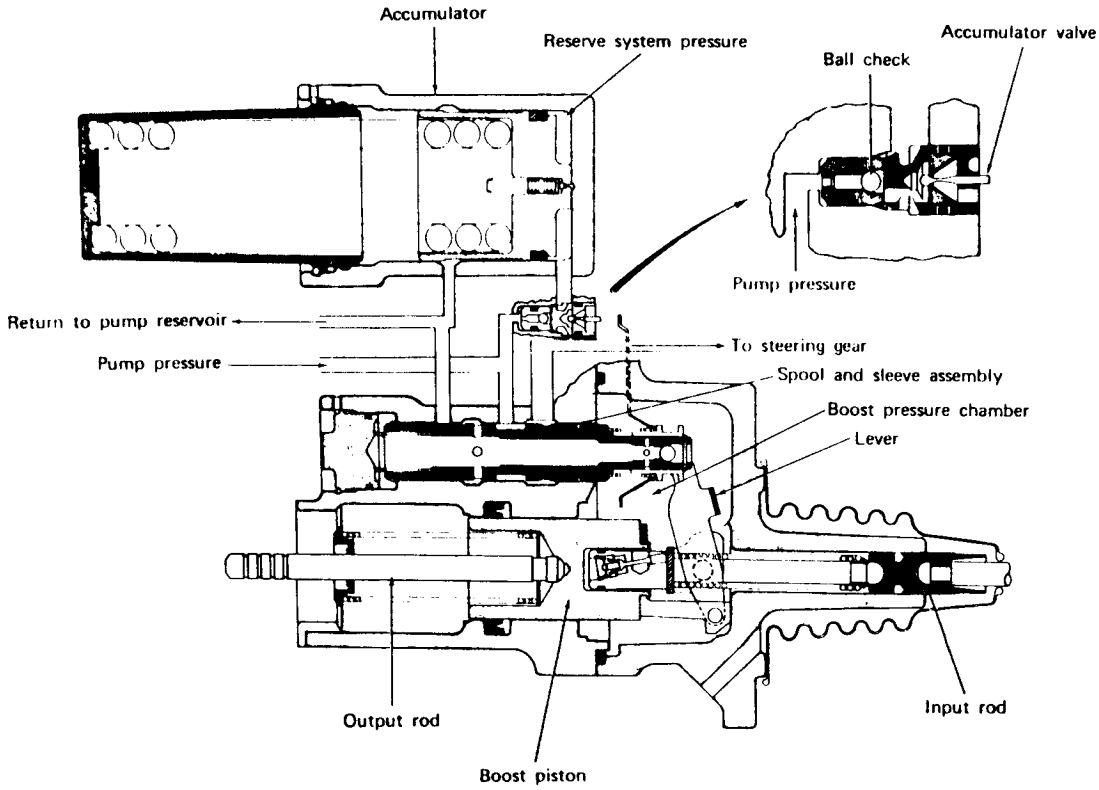
Hubless brake drum



Brake Power Booster Components



Vacuum



Hydro-Boost

ASSIGNMENT
JOB REPORT SHEET

COMPLETE DISC/DRUM BRAKE SERVICE

Student name _____ Date _____

Make of car _____ Model _____ Year _____

Time started _____ Time finished _____ Total time _____

Flat rate time _____

1. List the parts used on brake jobs:
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____
   g. _____
2. Manufacturer's rotor specifications:
   a. Lateral run-out _____
   b. Parallelism _____
   c. Refinishing minimum thickness _____
   d. Discard minimum wear thickness _____
   e. Microfinish _____
3. Actual measurements on rotor before refinishing:

	Left Front	*Right Front*
a. Lateral run-out		
b. Parallelism		
c. Thickness		

4. Actual measurement on rotor after refinishing:

a. Lateral run-out		
b. Parallelism		
c. Thickness		

5. Describe what condition the calipers were in: _____

_____

_____

_____

6. Original drum size was: _____

7. Did you turn both rear drums? _____ (yes, no)

   a. If yes, list the size of each drum after turning:

      LR _____ RR _____

   b. If no, why? _____

   _____

8. Were the brake shoes preground? _____ (yes, no)

   If no, did you grind them? _____ (yes, no)

9. Wheel cylinder bore size: Rear _____

10. Master cylinder bore size: _____

11. Explain how you adjusted the brakes: _____

    _____

    _____

    _____

12. Explain how you adjusted the parking brake: _____

    _____

    _____

    _____

13. Spindle nut torque:

    (a) First setting _____

    (b) Second setting _____

14. Lug nut torque: _____

DATE COMPLETED _____ INSTRUCTOR'S SIGNATURE _____