T-O-P-61-ST-2
T-O-P-61-ST-3

CAR *and* TRUCK WHEEL ALIGNMENT

FOREWORD

This booklet contains a complete review of the TWO discussional slidefilms (Part 1 and Part 2 — Car and Truck Wheel Alignment). Keep at least one copy of this booklet in the Service Department file of Technical Information.

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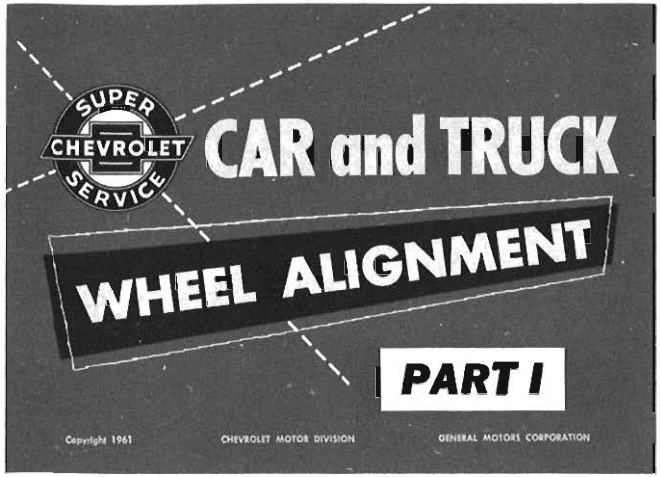
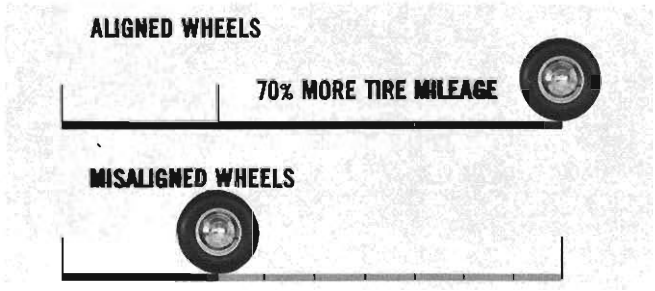




Properly aligned front wheels can provide as much as 70% more tire mileage than misaligned wheels. Therefore, alignment checking and service should be performed at regular mileage intervals to uncover and correct any misalignment condition before it seriously affects steering control or tire wear.

PART I

This presentation covers an explanation of alignment fundamentals and procedures of inspection and diagnosis for all 1961 Chevrolet suspension systems. Much of the information also applies to earlier models beginning with 1955.

The subjects are:

- **FUNDAMENTALS**
- **INSPECTION and DIAGNOSIS**

SEE PART II FOR:

- **CHECKING**
- **ADJUSTING**

Both films, PART I AND PART II, are combined and reprinted in your review booklet.

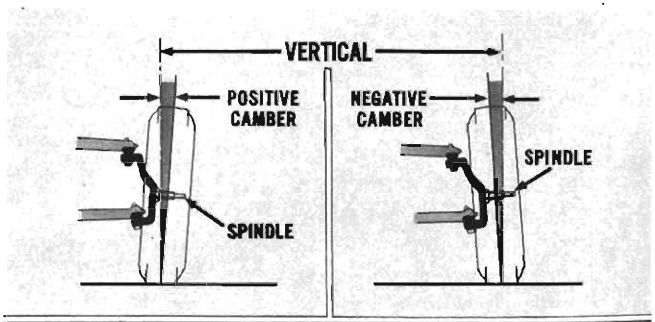
FUNDAMENTALS

Wheel alignment is simply the positioning of the front wheels and suspension parts at specific angles to provide good steering control of the vehicle for all driving conditions.

The angles which directly concern the service technician are listed in the order of discussion. They are:

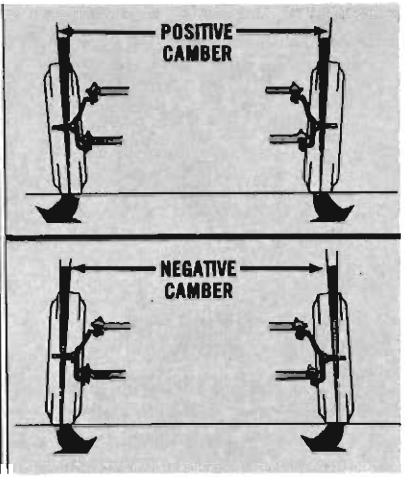
- Camber
- Ball Joint (or Kingpin) Inclination (further reference to this inclination angle will be called only Ball Joint Inclination)
- Caster
- Toe-out on Turns
- Toe-in

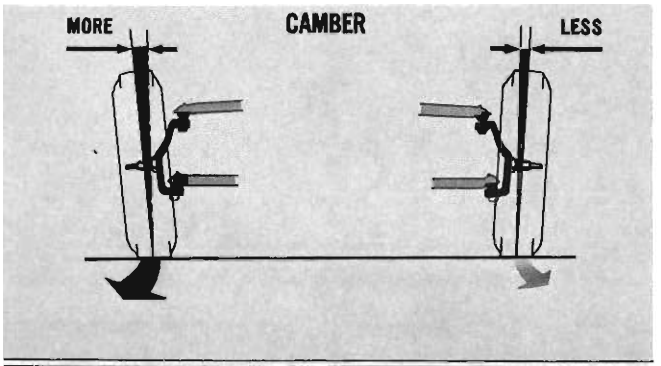
Each of the above angles will be discussed individually to provide a better understanding of its effects on steering control.



Camber is the angle in degrees at which the spindle is set to tilt the top of the wheel away from vertical. When the wheel tilts outward, camber is positive. When it tilts inward, camber is negative. A vertical wheel has zero camber.

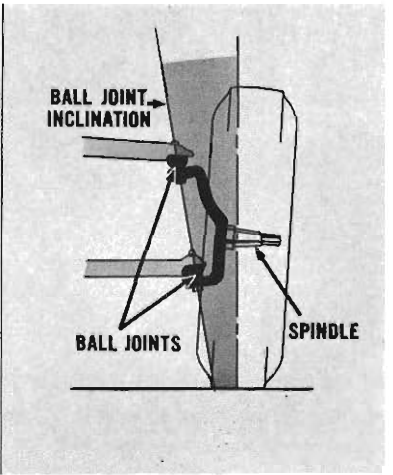
Positive camber tends to cause the wheels to roll in an outward arc. Negative camber tends to roll the wheels in an inward arc. Wheels with zero camber roll straight ahead.

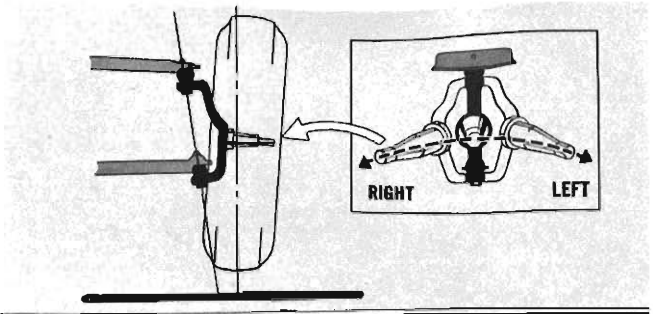




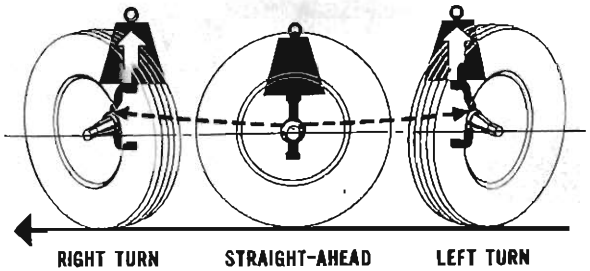
Wheels with unequal camber will tend to pull towards the side having the greatest amount of positive camber, and cause rapid tire tread wear.

Ball Joint Inclination is the angle in degrees at which the ball joints are tilted inward away from vertical. The ball joints provide the pivots around which the spindle rotates.

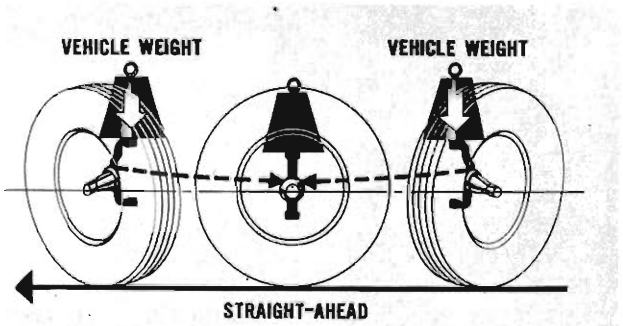




Now, let's take a look at the spindle action with the wheel raised off the floor. As the spindle turns to the right or left from the straight-ahead position, the angle of the ball joints causes the spindle to swing downward. However, when the . . .

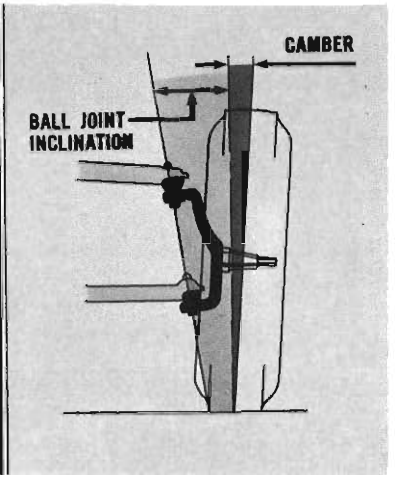


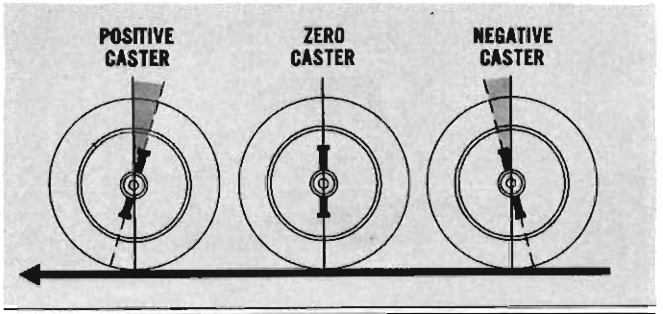
. . . wheel is on the floor and the spindle is turned to the right or left from straight-ahead, the outer end of the spindle cannot swing downward. As a result, the inner end of the spindle is forced to raise the weight of the vehicle.



Releasing the steering effort causes the weight of the raised vehicle to apply downward force (gravity) on the spindle and returns the wheel to its straight-ahead position.

When ball joint inclination and camber angles are combined, they form another angle that places the vehicle weight and wheel pivot point at a specific location on the road.

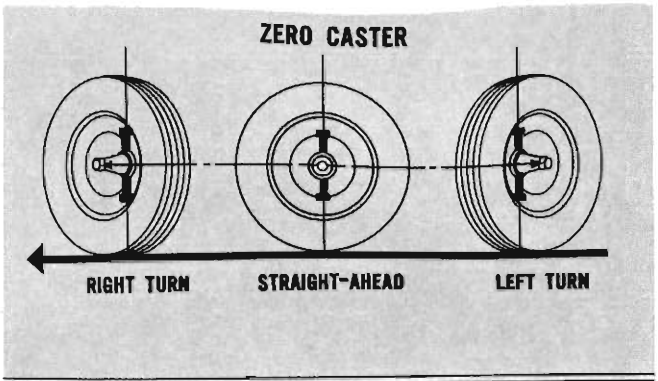




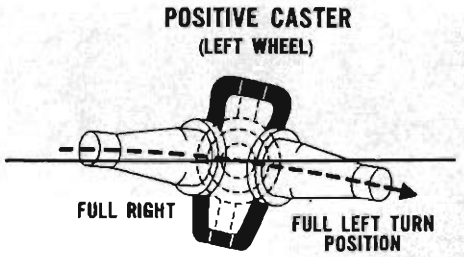
Caster is the angle in degrees that the ball joints are tilted away from a vertical line drawn through the center of the spindle. Positive caster is the rearward tilt, zero caster is vertical, and negative caster is the forward tilt.

It is extremely important to fully understand the effects of zero caster, positive caster, and negative caster on the vehicle's steering control.

Therefore, to establish the effects of caster, the following discussion does not take into consideration the angles of camber and ball joint inclination.

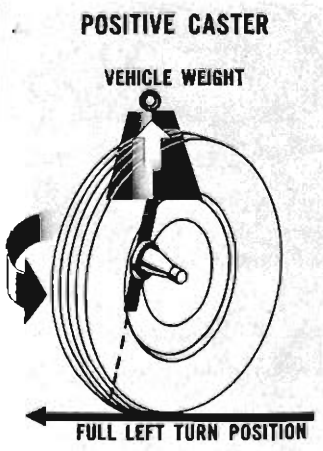


With zero caster, when the left front wheel is turned to the left or right, the spindle travels in a level plane.

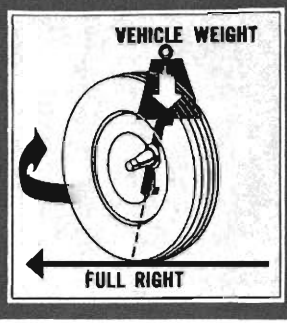


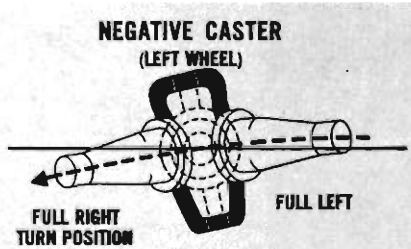
Let's see how positive caster affects left spindle travel if the wheel is removed. As the spindle turns from the full right to the full left turn position, a positive caster angle causes the outer end of the spindle to swing downward. Now —

— let's place the wheel on the spindle and lower the car to the road. As the wheel is turned to the full left turn position, the outer end of the spindle must travel at the height of the wheel center. As a result, the inner end of the spindle raises the weight of the vehicle. When turning effort is released —



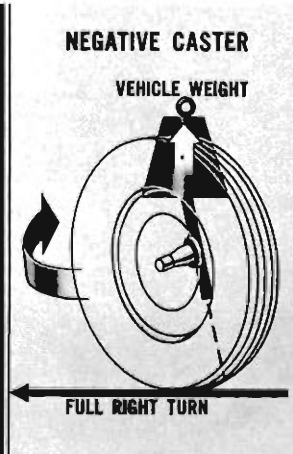
— the vehicle weight applies a downward force on the inner end of the spindle. This force swings the wheel from its full left turn position, through straight-ahead, towards full right or inward.



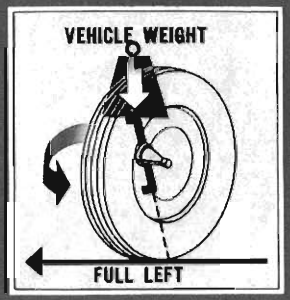


Now, let's see how negative caster affects the left spindle as it is being turned from the full left to the full right turn position. The negative caster angle causes the outer end of the spindle to swing downward. Now —

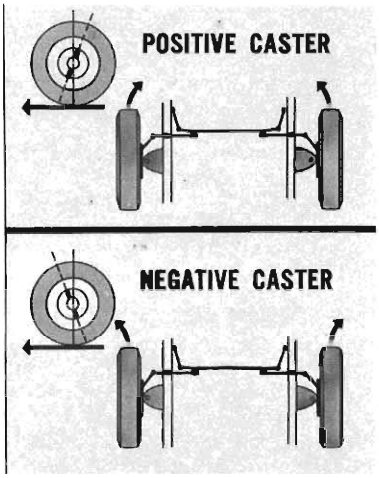
— let's place the wheel on the spindle and lower the car to the road. As the wheel is turned to the full right turn position, the outer end of the spindle must travel at the height of the wheel center. As a result, the inner end of the spindle raises the weight of the vehicle. When turning effort is released —

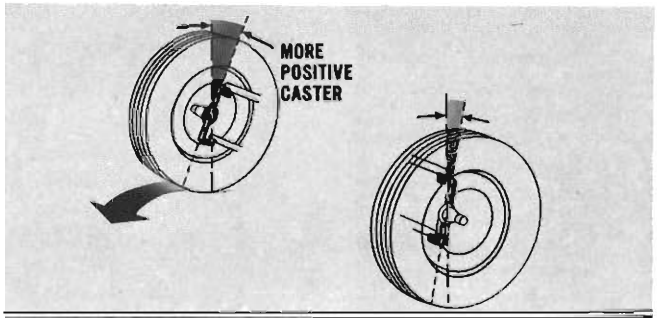


— the vehicle weight applies a downward force on the inner end of the spindle. This force swings the wheel from its right turn position, through straight-ahead, towards full left or outward.



These caster effects also apply to the right wheel. Therefore, if both front wheels have equal positive (or negative) caster, the inward (or outward) turning forces are transferred through the linkage. These opposing forces balance to maintain straight-ahead direction for both wheels.

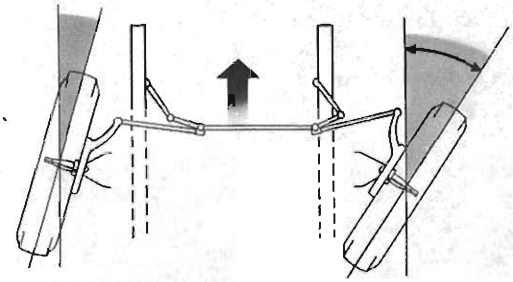




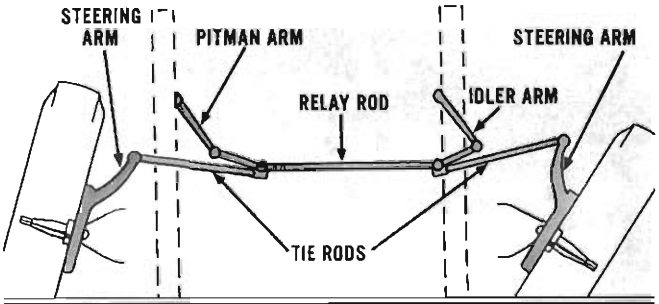
However, one front wheel with more positive caster than the other will have a tendency to turn inward because the opposing forces do not balance. This will force the vehicle in the direction of the wheel having the least amount of caster.

In summing up what we have just seen, both the ball joint inclination and caster angles have a direct influence on maintaining the wheels in a straight-ahead direction when steering effort is released.

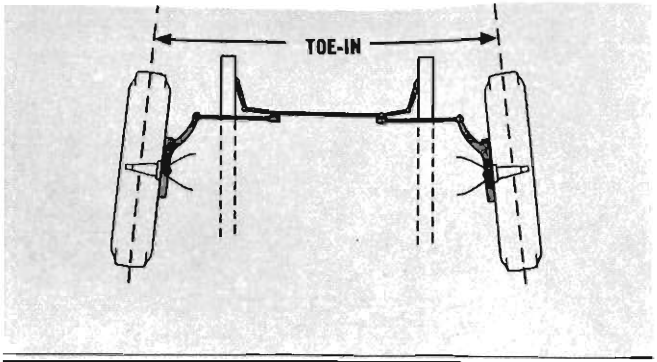
Of the two, the more important is ball joint inclination which, because of its greater angle, is the major controlling factor.



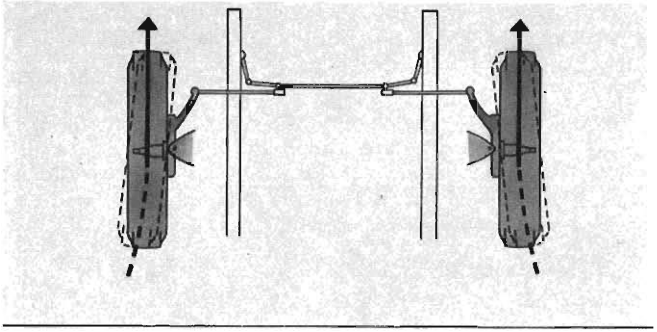
Toe-out on Turns is the angle in degrees that the front wheel nearest the turn pivots more than the outer wheel. Therefore, the inner wheel will roll in a smaller arc without tire slippage. This is accomplished by . . .



. . . the design and arrangement of the connecting linkage between both wheels, the angle of the steering arms, idler and pitman arms, and the various pivoting points in relationship to one another as the wheels are turned full right or left.



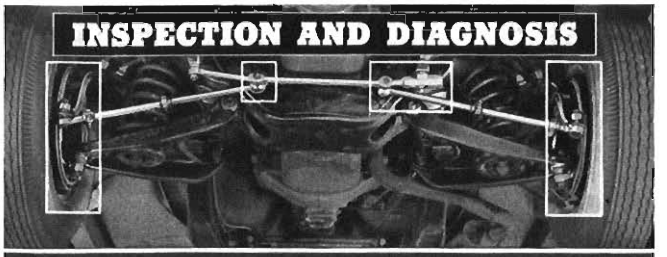
Toe-in is the amount, in fractions of an inch, that the front wheels are closer together at the front than they are at the rear.



Toe-in is required to compensate for the necessary clearances in the steering linkage and suspension components so that the wheels will roll parallel when the vehicle is in motion.

Let's review the degree that the five alignment angles affect steering stability and the results of misalignment when related to vehicle control and tire wear.

Alignment Angle	Steering Stability	Misalignment	
		Effect	Tire Wear
Camber	Minor Control	Wander	Rapid
Ball Joint Inclination	Major Control	Side Pull	Minor
Caster	Minor Control	Side Pull	Minor
Toe-Out on Turns	Turns Only	Squeal on Turns	Minor on Turns
Toe-In	Minor Control	Side Pull	Extreme

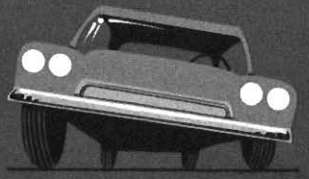


Fundamentals of wheel alignment can be of practical service value only after a preliminary inspection is made of the front suspension components. Corrective measures should be taken before any alignment checks or adjustments are attempted. Therefore, each of the following conditions should be inspected because they have an influence on wheel alignment and steering control.

If inspection reveals service work is needed for any of the items listed, it is generally considered as an extra charge. Advise customer of faulty conditions and explain the need for correction before an accurate alignment can be made. This will help build good will and customer satisfaction.

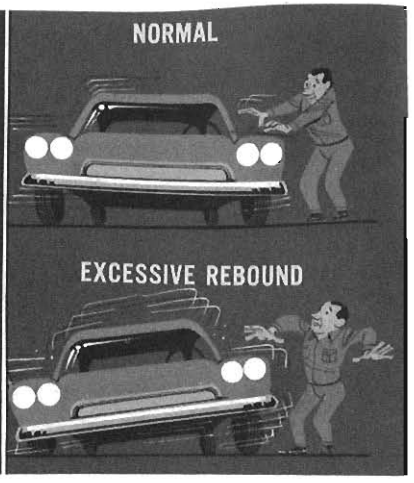
- Chassis Sag
- Shock Absorbers
- Tire Wear
- Wheel Bearings
- Wheel Run-out
- Suspension Ball Joints
- Steering Gear and Linkage

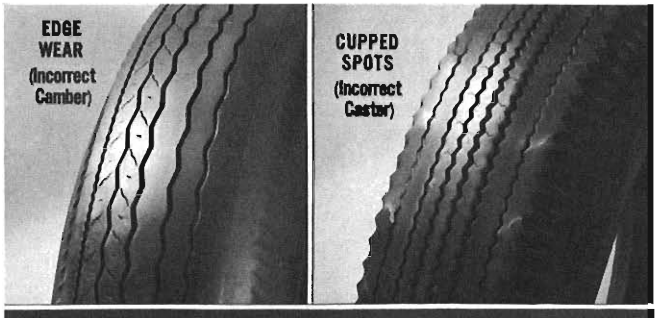
Only the passenger car is shown in the following examples although the procedures are applicable to all vehicles.



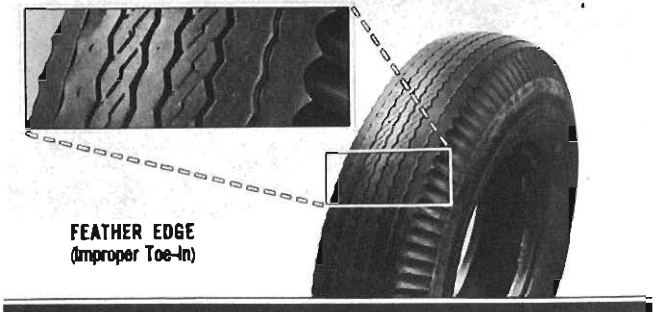
Chassis Sag. If the vehicle has an obvious sag and tire sizes and pressures are correct, then check the suspension system. Replace bent or broken parts. If weak springs are suspected, refer to the Shop Manual for checking procedures and riding height measurements.

Shock Absorbers. Vigorously bounce each end of car and listen for noises that indicate loose or worn parts. Too free a rebound action indicates excessively worn shock absorbers. On trucks, each shock absorber should be disconnected to check its action.

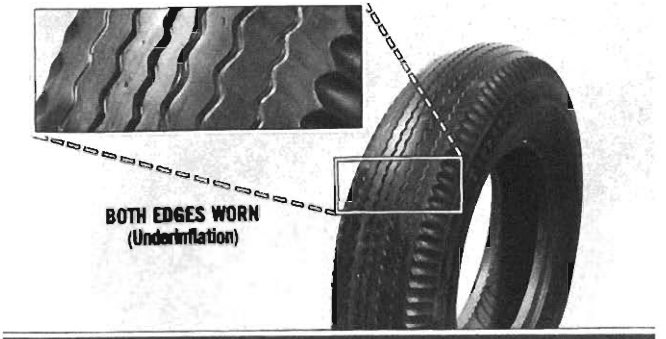




Tire Wear. Check wear pattern of tire tread for misalignment story and signs of sidewall breaks. A tread with pronounced wear on one edge indicates incorrect camber. Cupped spots indicate incorrect caster or excessive looseness in suspension parts.



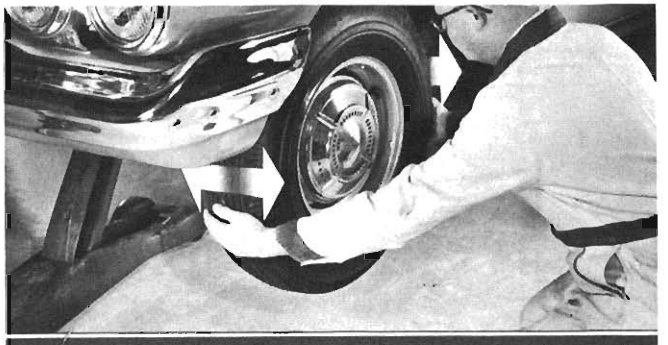
A tire tread with a feather edge indicates improper toe-in and can be felt by moving the palm of the hand back and forth across the tread. Moving a tire with a minor tread wear pattern to the rear will even out the tread condition.



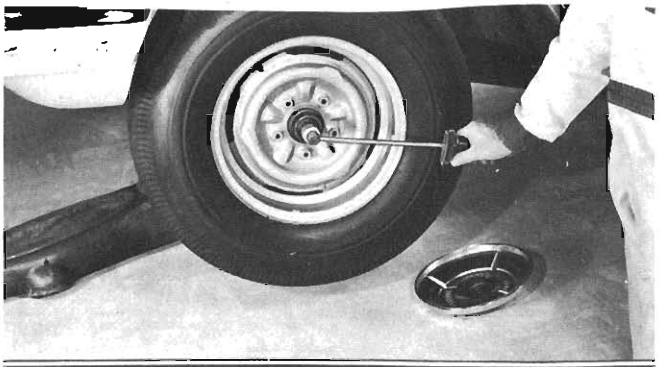
A tire tread having both edges worn more than in the center indicates underinflation. Underinflation can shorten tire life up to 50%.

General Note:

Tread wear patterns may occur because of road conditions, the type of driving, tire quality, loads carried or wheel unbalance. Therefore, these factors must be considered to determine if unusual wear is due to conditions other than alignment. The owner should be informed of the diagnosis.



Wheel Bearings. Raise front end and rotate each wheel. Listen for bearing noises. Rough bearings and races must be replaced. Next, attempt to move each wheel inward and outward. If play is excessive —



— the bearings should be adjusted. To make accurate adjustments, it is extremely important to torque bearings to the exact specifications that follow.

1961 CAR FRONT WHEEL BEARING ADJUSTMENTS

CAR MODELS	Initial Torque	Back Off Spindle Nut
Passenger Car**	15 ft. lbs. (180 in. lbs.)	One hex flat
Corvair**	7 ft. lbs. (80 in. lbs.)	One hex flat
Corvair 95**	15 ft. lbs. (180 in. lbs.)	One hex flat
Corvette*	28 ft. lbs.	Until nut is loose, then torque to 12 ft. lbs.

* Ball Bearings ** Tapered Roller Bearings

For models other than 1961, consult the appropriate Shop Manual.

NOTE: Rotate wheel while spindle nut is being torqued. If cotter pin slot does not align with one of the spindle holes, back off nut slightly, but not more than ½ flat. Then, install new cotter pin.

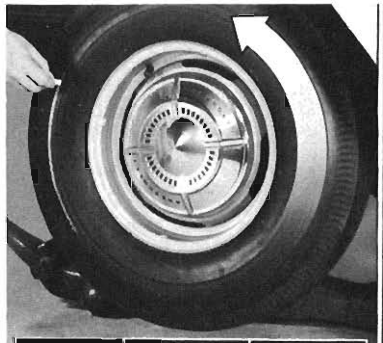
1961 TRUCK FRONT WHEEL BEARING ADJUSTMENTS

TRUCK SERIES	Initial Torque	Back Off Spindle Nut
10, 20, 30, 40*	33 ft. lbs.	To nearest slot
50 and 60**	40 ft. lbs.	At least 1⅓ hex flats (⅙ turn), but not more than 2 hex flats (⅓ turn), to align a slot with one of the spindle holes
70 and 80**	55 ft. lbs.	
P20 to P30*	33 ft. lbs.	To nearest slot

*Ball Bearings **Tapered Roller Bearings

For models other than 1961, consult the appropriate Shop Manual.

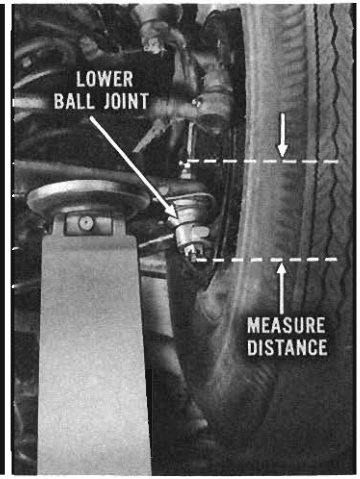
NOTE: Rotate wheel while spindle nut is being torqued. After adjustment, install new cotter pin.



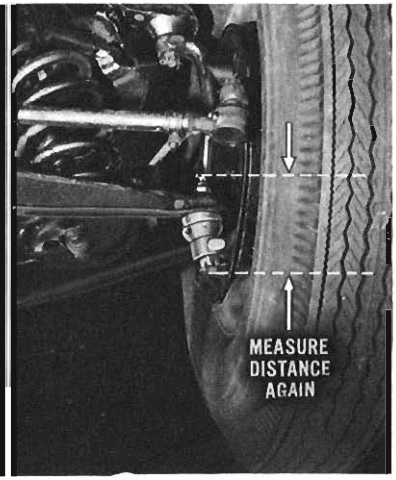
VEHICLES	MODELS OR SERIES	ALLOWABLE RUN-OUT
CARS	ALL	1/16"
TRUCKS	10, 20, 30	1/16"
TRUCKS	40 TO 80	⅛"

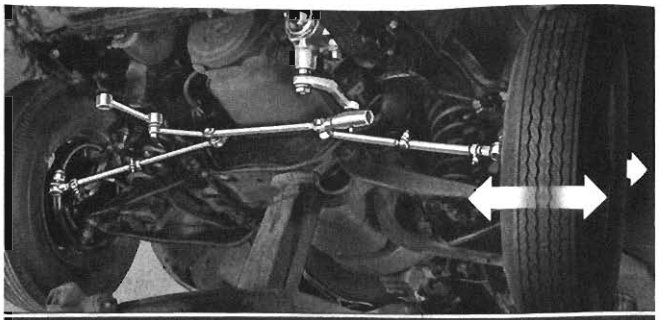
Wheel Run-Out. Rotate wheel while holding a piece of chalk in a fixed position close to the tire. If tire run-out appears excessive, make the same check at the wheel rim. If the wheel rim run-out is within limits, remount tire. If rim run-out is more than allowable, straighten wheel.

Suspension Ball Joints. If looseness is suspected in either of the lower ball joints, check as follows: Measure distance from top of lower ball joint lubrication fitting to bottom of ball stud, using calipers. Then —

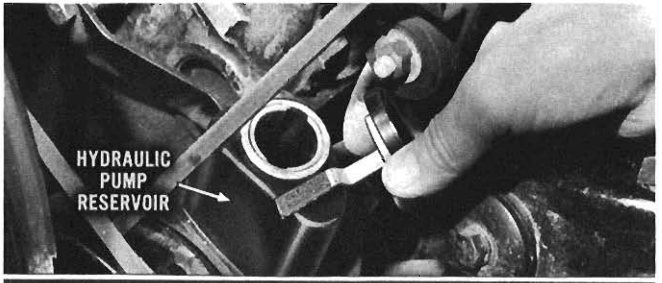


— lower the car to the floor and again measure the distance at the same location. Compare both readings. A difference of more than 3/32" indicates the lower ball joint is excessively worn and should be replaced. See procedures for checking the upper ball joints in the appropriate Shop Manual.





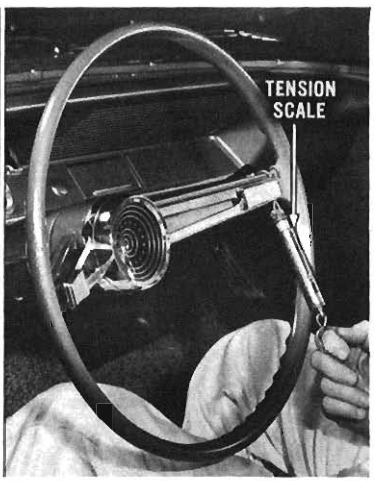
Steering Gear and Linkage. Grasp front and rear of tire and attempt to wobble each wheel from side to side. Excessive looseness in the movable parts of the steering system should be corrected before making alignment checks or adjustments. A complaint of . . .



. . . hard steering on power-equipped vehicles usually indicates difficulty in the hydraulic system. Check hydraulic pump reservoir oil level. Add fluid if necessary. If oil level is correct, then refer to specific Shop Manual to determine if adjustment or parts replacement is required. On vehicles with . . .

. . . standard steering, a binding condition may be caused by tightness in the steering gear assembly. Check steering gear lubricant level and add if necessary. If level is correct, raise front end and disconnect linkage at pitman arm. Using a . . .

. . . tension scale, check turning effort of steering wheel. Turning effort should comply with Shop Manual recommendations. If not, a steering gear adjustment or parts replacement is required. This completes the inspection and diagnosis procedures.



SUMMARY:

- CHASSIS SAG
- WORN SHOCK ABSORBERS
- ABNORMAL TIRE WEAR
- LOOSE WHEEL BEARINGS, BALL JOINTS, AND LINKAGE
- HARD STEERING

Checking for each of the above conditions and making the necessary service corrections will assure a quality alignment.

END OF PART I

Car and Truck Wheel Alignment

SEE PART II

for:

- **CHECKING**
- **ADJUSTING**

SUPER CHEVROLET SERVICE

CAR and TRUCK WHEEL ALIGNMENT

PART II

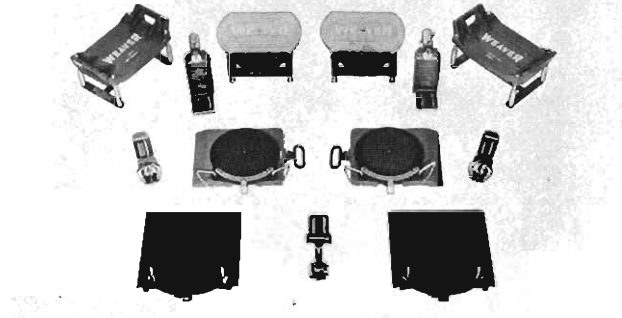
PART I
covered Car and Truck Wheel Alignment:

- **FUNDAMENTALS**
- **INSPECTION and DIAGNOSIS**

In this presentation,

PART II, the following subjects will be covered:

- **CHECKING**
  Procedures apply to all Chevrolet vehicles from 1955 to 1961.
- **ADJUSTING**
  Procedures apply to 1961 Passenger Cars, Corvair, Corvair 95, Corvette and Trucks.



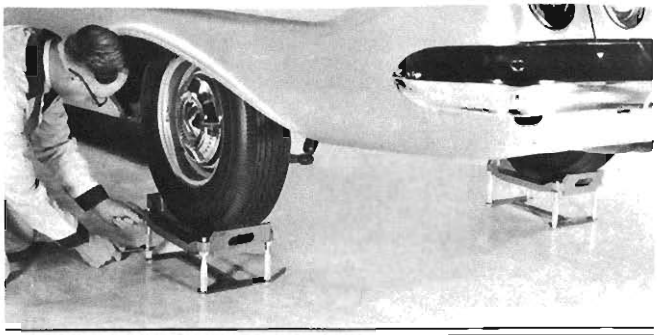
Although there are many makes and types of alignment equipment available, only one of the portable types will be used in this presentation. However, its use is not intended as a specific recommendation.

Some manufacturers have portable equipment designed specifically for checking alignment on heavy-duty trucks.

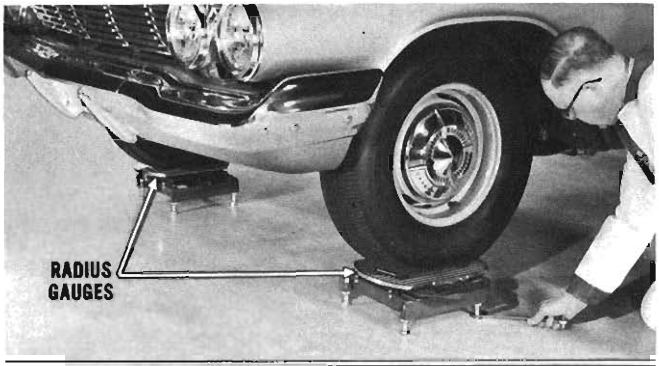
Equipment designed for checking alignment on passenger car and light-duty trucks may be damaged if used to check heavy-duty trucks.

Regardless of the make of equipment being used, it must be in good condition and the manufacturer's instructions must be followed to obtain accurate readings. Now let's get the car ready for alignment and install the gauges.

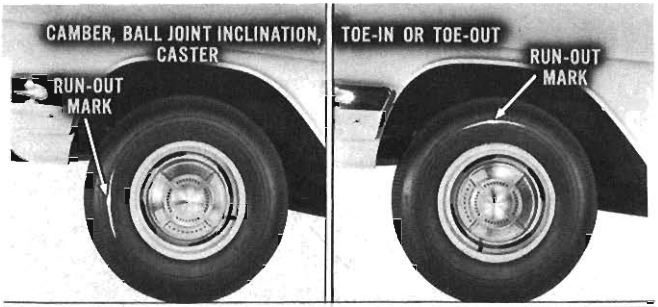
Check fuel gauge reading. Tank should be near full. Check all tires for proper pressure. Then, drive vehicle onto selected level floor area and, with wheels straight-ahead, apply the parking brake.



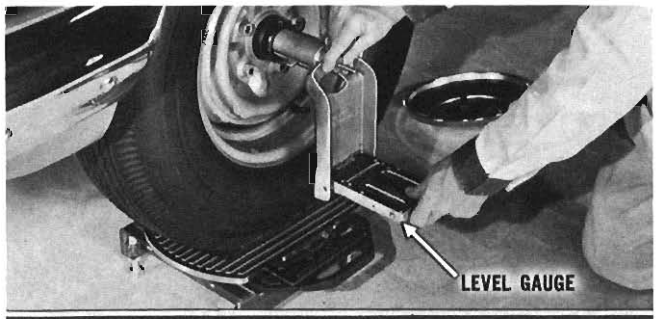
Adjust the rear stands, and front stands with radius gauges, to same height. Then, raise rear of vehicle and lower car onto rear stands. If necessary, level the legs of both stands to any slight unevenness of floor.



Raise front end. Then, lower car so that it is properly located on radius gauge turntables. If necessary, level radius gauge legs to any slight unevenness of floor.



On any manufacturers' equipment that contacts the wheel rims or tires, first determine the point of maximum run-out; then position the chalk mark towards the front before checking camber, ball joint inclination or caster. Position mark to the top of wheel before checking toe-in or toe-out on turns.

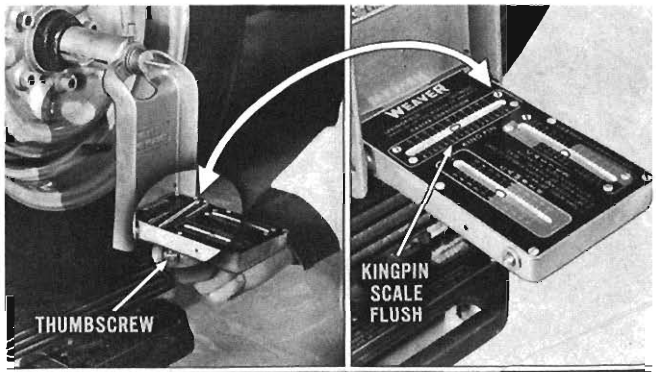


Remove wheel covers and dust caps. Wipe off grease and attach a level gauge to each spindle. Bounce car to settle the springs and shock absorbers. This completes the preparation of the vehicle and installation of equipment prior to checking.

CHECKING

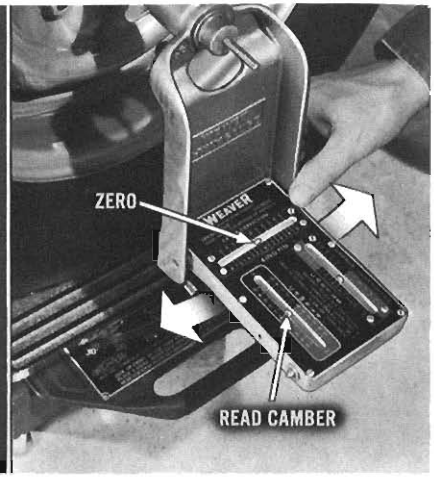
- Camber
- Ball Joint Inclination
- Toe-out on Turns
- Caster
- Toe-in

Gauge readings which do not fall within the limits of the specifications indicate a misalignment condition which must be corrected by proper adjustments or replacement of parts.



Checking Camber. With wheels straight-ahead, turn kingpin scale thumbscrew until kingpin scale is flush with face of level gauge.

Move level gauge until bubble centers at zero on kingpin scale. Read degrees of camber by noting the location of the bubble on the camber scale. Repeat procedure on opposite wheel and compare readings with following chart.

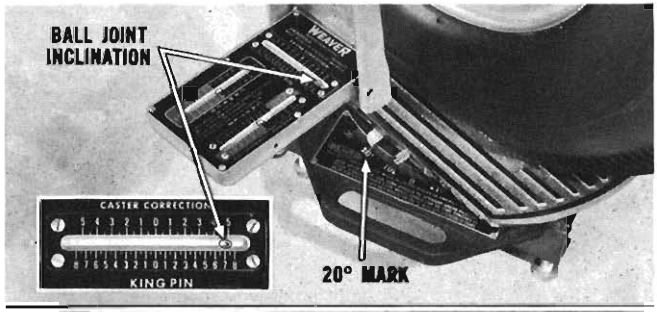


1961 CAMBER SPECIFICATIONS

Model or Series	Degrees	Plus or Minus Limits
Passenger Car	+ ½°	½°
Corvette	0°	½°
Corvair	+ ½°	½°
Corvair 95	+ ¼°	¼°
TRUCKS		
10, 20, 30 and 40 Series	+ ½°	½°
50, 60, 70 and 80 Series	0°	½°
P20 to P30	+1½°	½°

For models other than 1961, consult the appropriate Shop Manual.

Checking Ball Joint Inclination. With wheels straight-ahead, move left radius gauge pointer to zero. Turn wheels to the left to align 20° mark on radius gauge with pointer. Turn kingpin scale thumbscrew until bubble centers at zero on the kingpin scale. Then . . .



. . . turn wheels to right past zero on left radius gauge to align the 20° mark with pointer. Read ball joint inclination (left side) by noting bubble location on left kingpin scale. Repeat the procedure for the right side. Compare readings with following chart.

1961 BALL JOINT INCLINATION SPECIFICATIONS

Models or Series	Degrees	Plus or Minus Limits
Passenger Car	+ 7¼°	½°
Corvette	+ 4°	½°
Corvair	+ 7½°	½°
Corvair 95	+ 7¼°	½°
TRUCKS		
10, 20, 30 and 40 Series	+ 8½°	½°
50, 60, 70 and 80 Series	+ 7°	½°
P20 to P30	+ 7½°	½°

For models other than 1961, consult the appropriate Shop Manual.

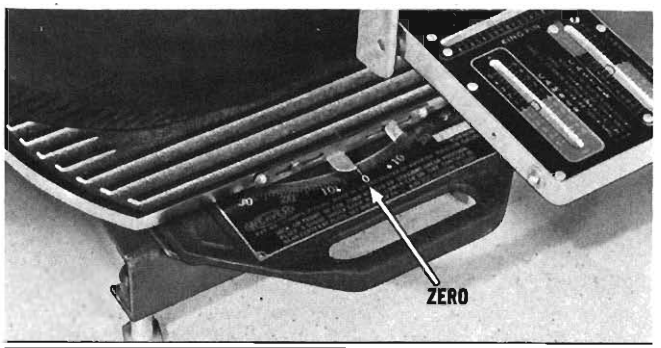
General Information:

Camber or ball joint inclination readings which are considerably more than the allowable limits indicate probable damage to the suspension system. Because the camber adjustment directly affects ball joint inclination, which is nonadjustable, this mechanical change occurs:

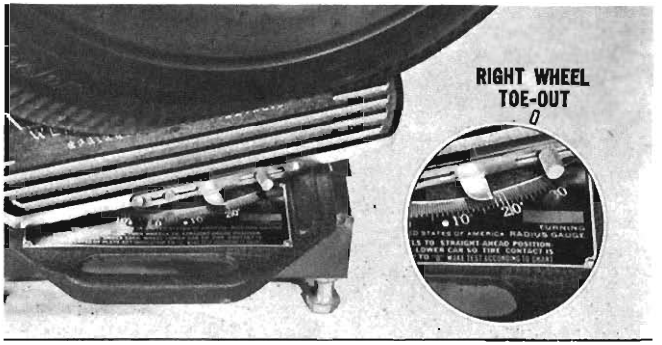
An increase in camber — decreases ball joint inclination

A decrease in camber — increases ball joint inclination.

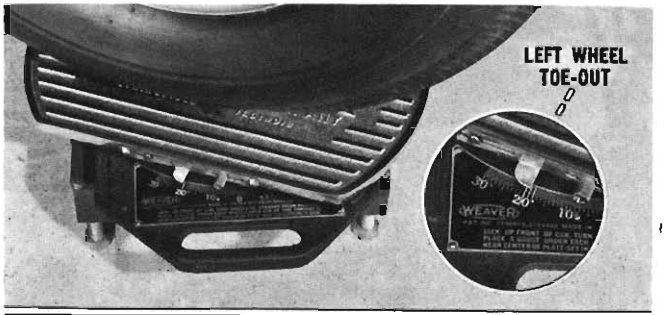
Therefore, when making a correction to camber, and the camber adjustment fails to bring both readings within allowable limits, it indicates that parts are damaged seriously enough to make replacement necessary.



Checking Toe-out on Turns. Turn wheels to straight-ahead position and make sure pointers of both radius gauges are set to zero. Before performing this check, refer to toe-out chart for specifications needed. Then —



— turn wheels to the left until left radius gauge aligns with pointer at the recommended setting for the left (inner) wheel. Now, go to opposite side of vehicle and read amount of toe-out for the right (outer) wheel.



Turn wheels to the right until right radius gauge aligns with pointer at the recommended setting for the right (inner) wheel. Now, go to the opposite side of vehicle and read amount of toe-out for the left (outer) wheel. Compare readings with the following chart.

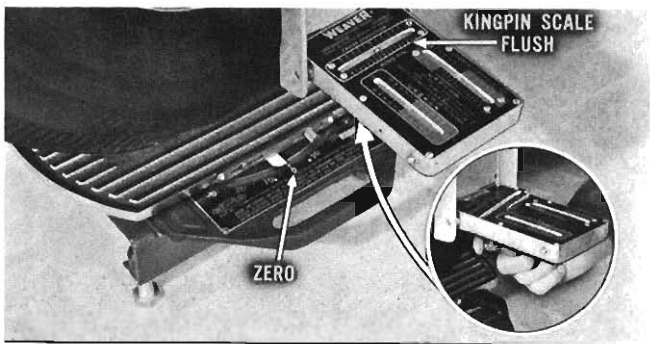
1961 TOE-OUT ON TURNS SPECIFICATIONS

	Wheel Angle			Wheel Angle	
Passenger Car	20°	17° to 19°	Corvair 95	20°	22° to 24°
Corvette	20°	16° to 18°	Series 10 to 40 Trucks	20°	20¾° to 22¾°
Corvair	20°	17° to 19°	Series 50 to 80 Trucks	20°	22° to 24°
			P20 to P30	20°	22½° to 24½°

set inner wheel — outer wheel should read — set outer wheel — inner wheel should read

NOTE

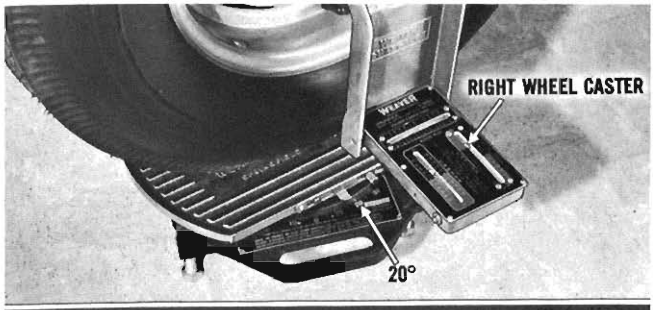
For models other than 1961, consult the appropriate Shop Manual.



Checking Caster (left side). Turn wheels to straight-ahead position and make sure pointers of both radius gauges are at zero. Turn **both** kingpin scale thumbscrews until the kingpin scales are flush with the faces of both level gauges.

Move both level gauges until bubbles center at zero on both kingpin scales.

Slowly turn wheels to the left until pointer aligns with 20° mark on left radius gauge. Turn left caster scale thumbscrew until bubble centers on zero on the caster scale. Then —



— slowly turn the wheels to the left past zero to align the 20° mark on right radius gauge with pointer. Read caster for the right wheel by noting location of the bubble on the right caster scale. Compare readings with the following chart.

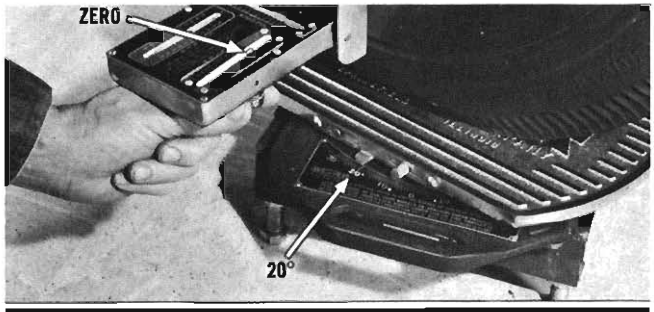
— slowly turn wheels to the right past zero to align 20° mark on left radius gauge with pointer. Read caster for the left wheel by noting location of the bubble on the left caster scale.

1961 CASTER SPECIFICATIONS

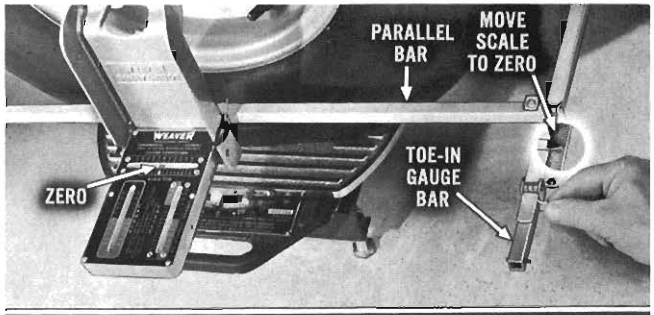
Models or Series	Degrees	Plus or Minus Limits
Passenger Car	0°	½°
Corvette	+2°	½°
Corvair	+2°	*
Corvair 95	+2½°	¼°
TRUCKS 10, 20, 30 and 40 Series	+1°	½°
50, 60, 70 and 80 Series	Left wheel −½° Right wheel +½°	½° ** ½°
P20 to P30	+2°	½°

*Caster must fall within the allowable range of +1½° to +2°.
**It is desirable to have left wheel caster ½° less than right wheel.

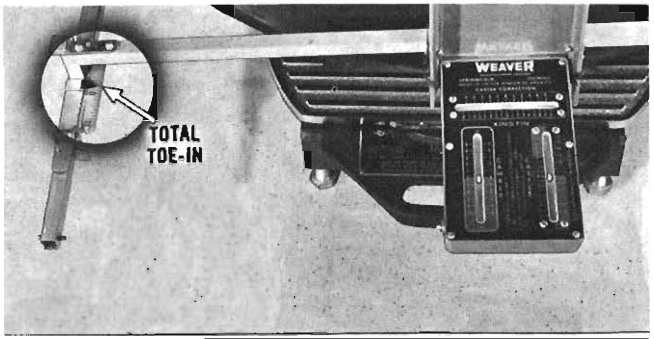
For models other than 1961, consult the appropriate Shop Manual.



Checking Caster (right side). Since the wheels are already turned to the right from the previous check, only a slight movement of the wheels will align the 20° mark on right radius gauge with pointer. Turn right caster scale thumbscrew until bubble centers at zero on the caster scale. Then—



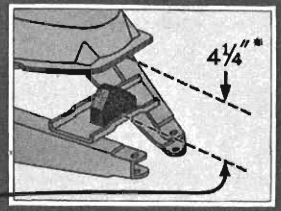
Checking Toe-In. Turn wheels straight-ahead. Install and level both parallel bars by moving each level gauge until each bubble centers at zero on the kingpin scales. Position toe-in gauge bar behind wheels and install in parallel bar holes. Move scale to align zero with pointer.



Carefully remove toe-in gauge bar and reinstall in front holes of parallel bars. Pointer will move and indicate the amount of total toe-in on scale. Compare reading with following chart.

1961 TOE-IN SPECIFICATIONS

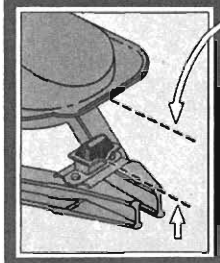
Models or Series	Total Setting Both Wheels
Passenger Car	1/8" to 1/4"
Corvette	1/8" to 3/8"
Corvair	1/4" to 3/8"
Corvair 95	1/16" to 3/16"
TRUCKS 10, 20, 30 and 40 Series	3/16" to 1/4" (Check Trim Height)
50, 60, 70 and 80 Series	See following chart
P20 to P30	1/4" to 5/16"



*A measurement less than 4 1/4" (+ or − 3/16") indicates truck is overloaded or torsion bars should be adjusted. Follow Shop Manual procedures.

For toe-in on models other than 1961, consult the appropriate Shop Manual.

1961 TRUCK SERIES 50 THROUGH 80 TOE-IN AND TRIM HEIGHT RELATIONSHIP



Trim Height Measurement	Total Setting — Both Wheels
0" to 3"	*Do not adjust
3" to 5 1/2"	1/16" Toe-out
5 1/2" to 6 1/2"	3/16" Toe-out
6 1/2" to 7 1/2"	1/4" Toe-out

*Truck is overloaded. Heavier torsion bars are required to raise trim height. NOTE: Compare both tie rod lengths. The measurements should be within 1/2" of each other.

For models other than 1961, consult the appropriate Shop Manual.

Now that all of the steps in CHECKING alignment are completed, let's proceed to:

ADJUSTING

Because of variations in caster, camber and toe-in adjustments and differences in the location of the adjustments, each model listed will be covered separately.

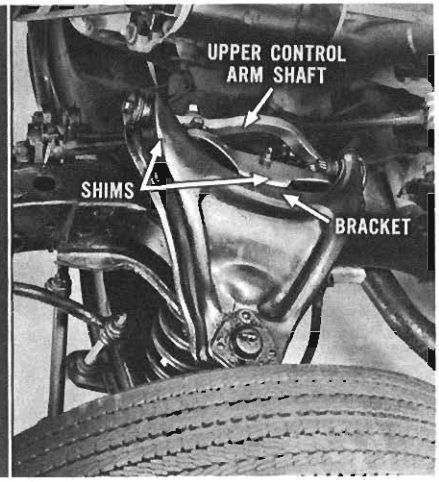
	TRUCKS
• Chevrolet Passenger Car • Corvair • Corvair 95 • Corvette	• Series 10 to 40 • Series 50 to 80 and Tilt Cab • Models P20 to P30 Forward Control

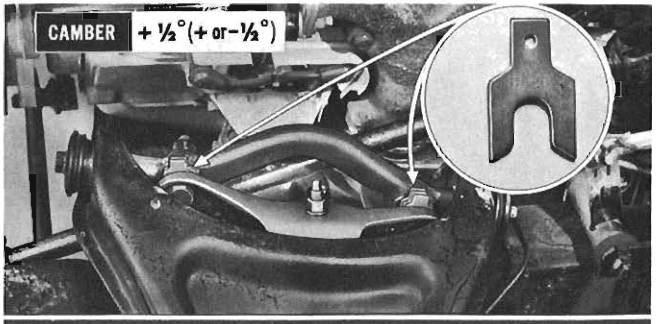
Before beginning the adjustment procedures, which should be followed in the sequence shown, let's review some very important information.

General Information:

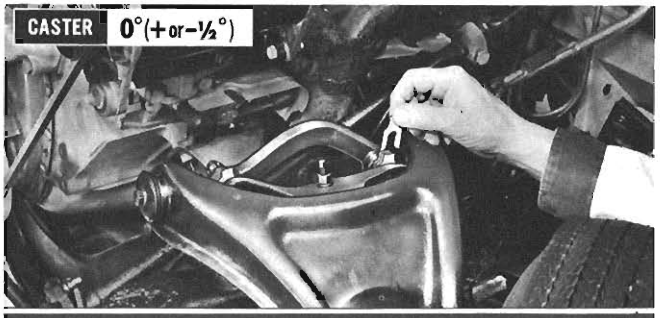
- Always recheck both camber and caster after making an adjustment to either one.
- It is usually desirable to have both camber readings, or both caster readings, within 1/4° of each other.
- A 1/32" shim changes camber 1/6° on the Chevrolet passenger car, Corvair, Corvair 95 and Series 10, 20, 30 and 40 trucks.
- When performing a complete alignment, always check toe-in after camber and caster adjustments are made.

Chevrolet Passenger Car. Camber and caster adjustments can be made in one operation by adding or removing shims between the upper control arm shaft and the support bracket.

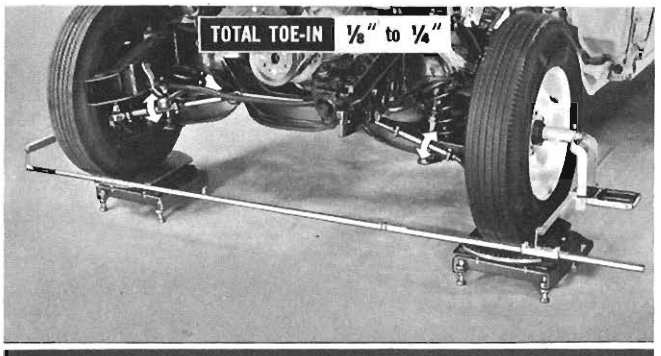




To increase camber, loosen bolts and remove the same number of shims of equal thickness from both bolt locations. To decrease camber, add shims of equal thickness to both bolt locations. Increasing or decreasing camber, as outlined, does not affect caster.

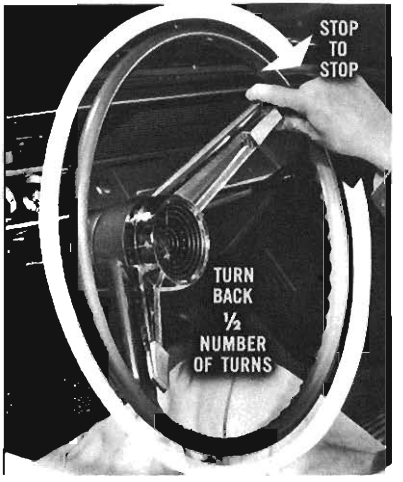


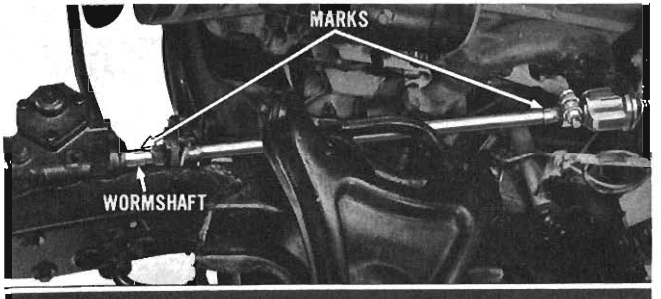
To increase caster ¼°, loosen bolts and remove a 1/32" shim from the front bolt or add a 1/32" shim to the rear bolt. To decrease caster ¼°, add a 1/32" shim to the front bolt or remove a 1/32" shim from rear bolt. Tighten bolts. Recheck camber.



Position wheels straight-ahead for toe-in adjustment. To increase toe-in, loosen clamps and turn both sleeves to shorten both tie rods an equal amount. Remove toe-in gauge bar. Before tightening clamps —

— turn steering wheel from stop to stop and count number of complete turns. Then, turn steering wheel back from either stop one-half the number of turns to position steering gear wormshaft at the highpoint.

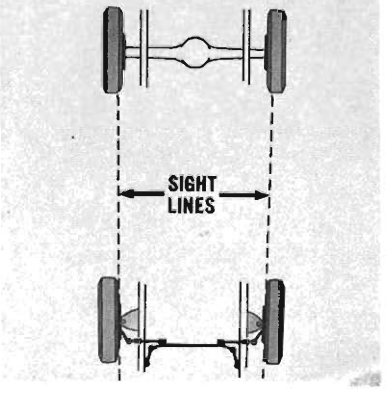




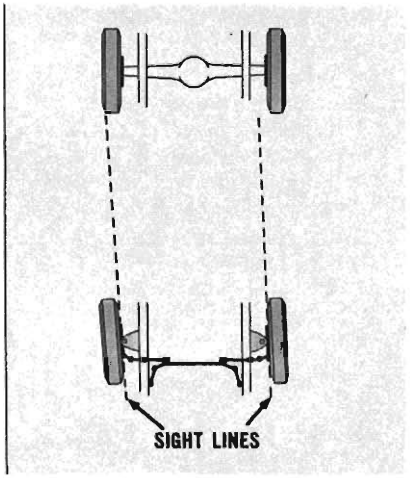
Check highpoint mark on the steering gear wormshaft and all other shaft assembly marks. They must point to 12 o'clock. Turn wormshaft slightly to bring high-point mark straight up. Remove horn button. Mark on end of shaft must also be at 12 o'clock. If necessary, remove and reposition steering wheel on shaft.

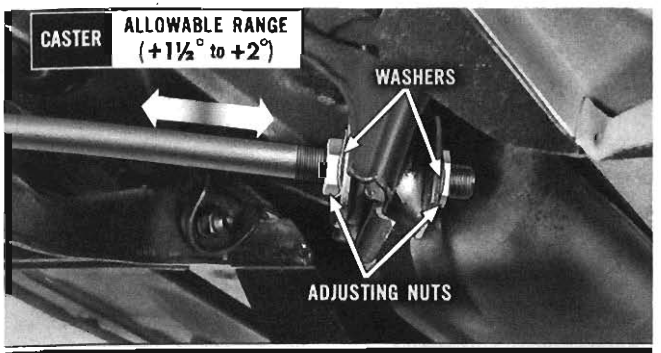
One method for determining if both front wheels are straight ahead is to sight towards the rear tires along the inside of one front tire sidewall, then the other. If sightings show equal amounts of rear tread, the front wheels are positioned properly.

POSITIONING WHEELS STRAIGHT-AHEAD



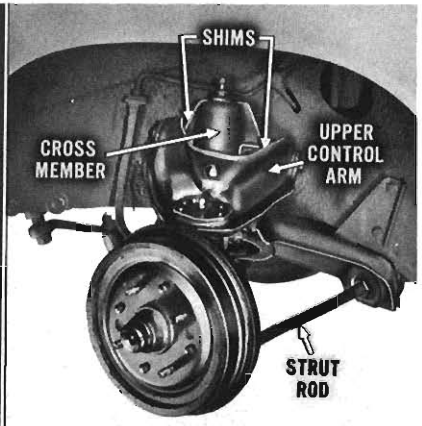
If sightings show unequal rear tread, shorten one tie rod and lengthen the other in exact equal amounts by turning the sleeves until the same amounts of rear tread are visible. Clamps must not interfere with tie rod movement. Recheck toe-in and tighten clamps.

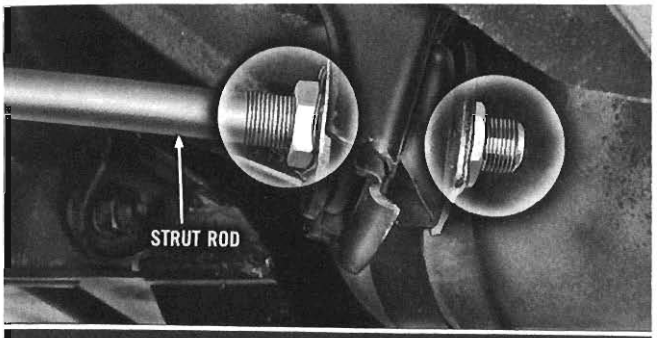




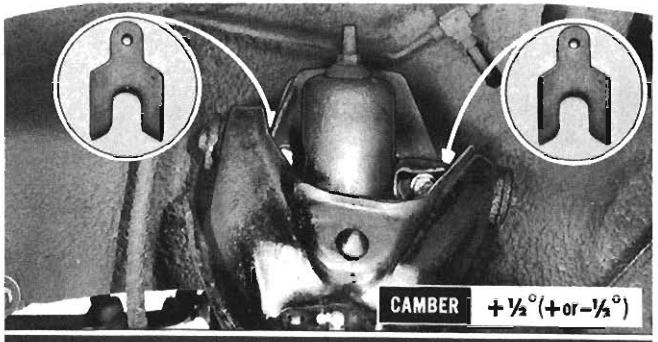
To increase caster, straighten the lock-type flat washers and turn both adjusting nuts on the strut rod in equal amounts to lengthen the rod. To decrease caster, shorten the strut rod.

Corvair. Camber adjustment is made by adding or removing shims between the upper control arm shaft and front cross member. Caster adjustment is made by lengthening or shortening the strut rod.



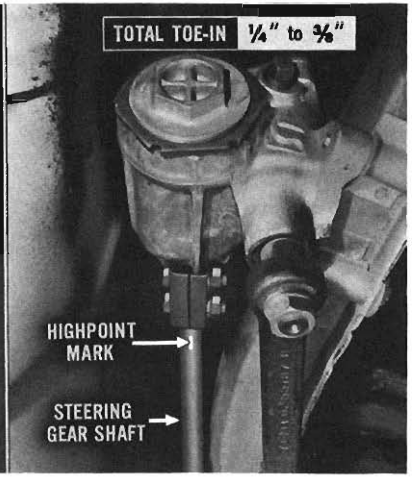


Should a condition arise where the adjustment nuts "run-out" of threads before reaching proper caster, it is then permissible to shim unequally at upper control shaft bolt locations. Recheck camber.

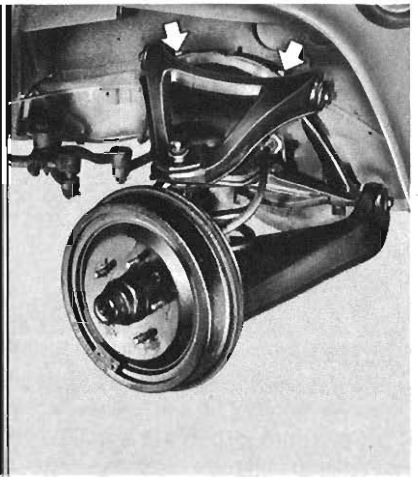


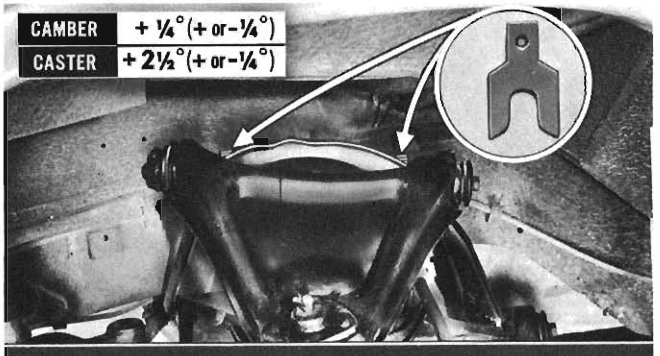
To increase camber, loosen bolts and remove the same number of shims of equal thickness from both bolt locations. To decrease camber, add shims of equal thickness to both locations.

The toe-in adjustment and steering wheel repositioning procedures are the same as for the Chevrolet passenger car with only one minor difference. The steering gear shaft highpoint mark can be seen from underneath and must be straight down at the 6 o'clock position.

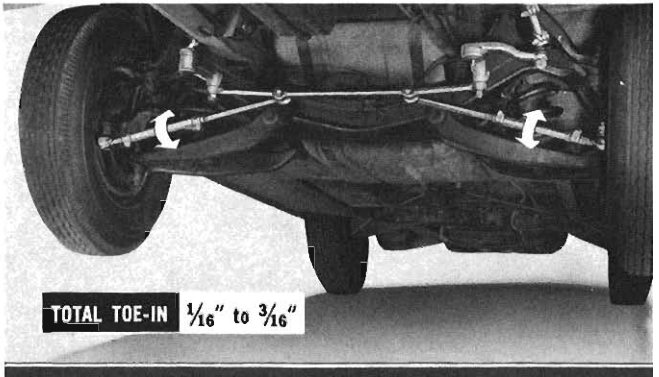


Corvair 95. The camber adjustment is made at the same location as the Chevrolet passenger car. The caster adjustment is also made the same as for the Chevrolet passenger car since it does not have a strut rod like the Corvair.





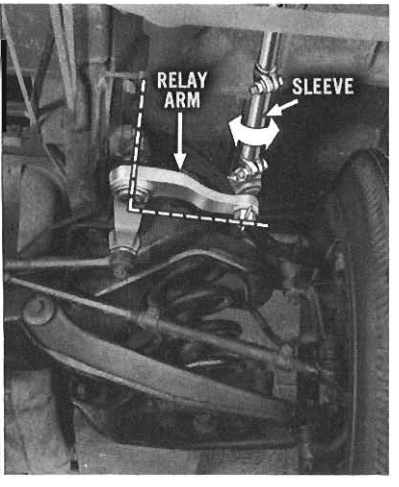
Removing or adding shims of equal thickness at both bolt locations changes camber without affecting caster. Removing or adding a shim at either the front or the rear bolt locations changes caster.



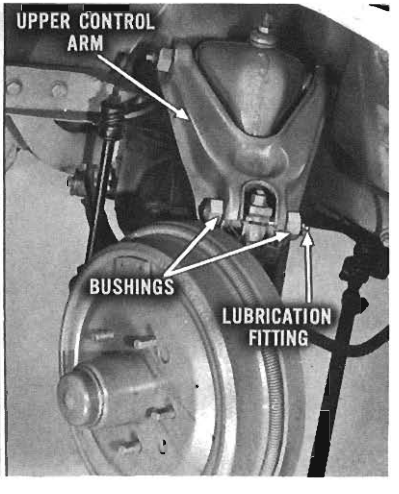
To obtain correct toe-in, lengthen or shorten both tie rods following the same procedure as for the Chevrolet passenger car.

To center the steering gear wormshaft, determine the number of turns the steering wheel travels from stop to stop. Return wheel one-half the number of turns. Remove horn button. Turn shaft as required to place highpoint mark at the 6 o'clock position. Then, if necessary, remove and reposition steering wheel to straight-ahead.

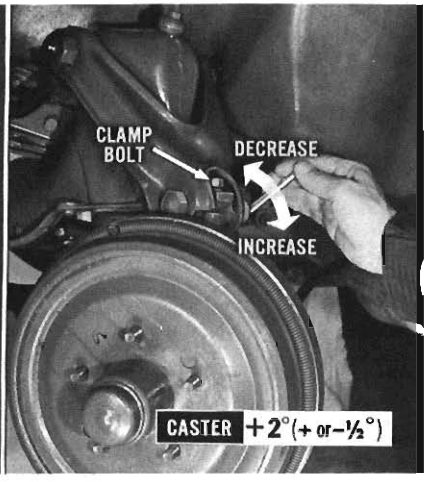
Now, check to see if the relay arm is positioned outward 90° from side rail. If not, loosen clamps and turn sleeve to lengthen or shorten the steering connecting rod. Retighten clamps. Then recheck wheels for straight-ahead position and correct as shown for the Chevrolet passenger car.



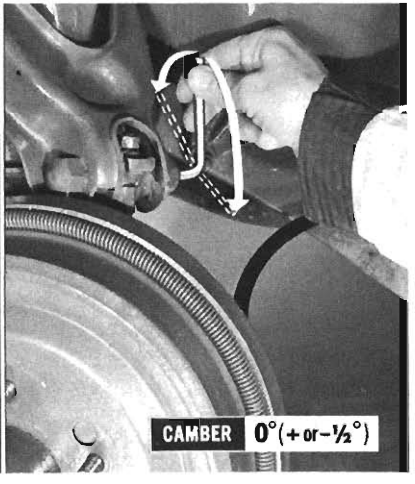
Corvette. Camber and caster adjustments are performed by removing the lubrication fitting and turning the pivot pin threaded inside the bushings of the upper control arm. On this model, the caster adjustment is made before making camber changes.

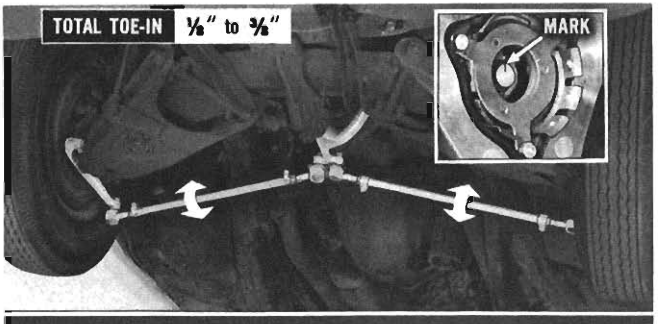


To increase caster, loosen clamp bolt and remove lubrication fitting. Insert an Allen wrench through fitting hole and turn eccentric pivot pin counterclockwise. To decrease caster, turn eccentric pivot pin clockwise.

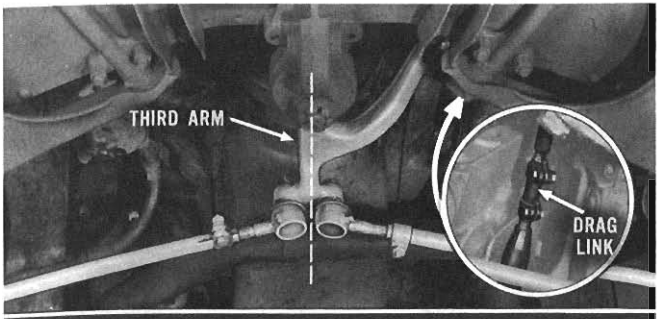


To adjust camber after setting caster, again turn eccentric pivot pin in either direction. If pivot pin is turned less than ½ turn, caster will not be affected. Tighten clamp bolt and install lubrication fitting.



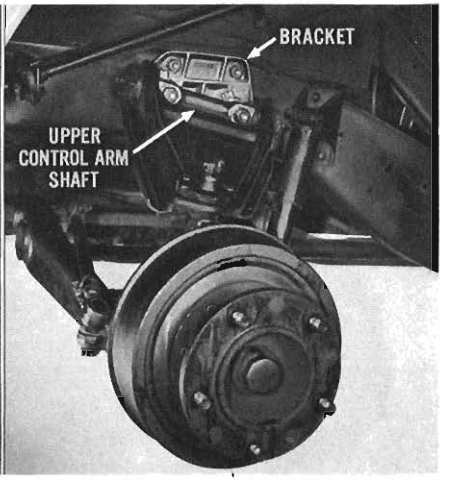


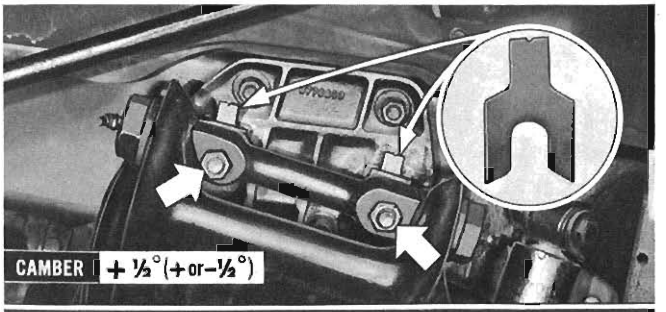
To obtain correct toe-in, lengthen or shorten both tie rods, following the same procedure as for the Chevrolet passenger car. The wormshaft highpoint mark is located on the upper end of the steering shaft underneath the horn button and is correctly positioned at 12 o'clock.



Now check to see if the third arm is pointed directly to the rear. If not, loosen clamps and turn sleeve to lengthen or shorten the drag link. Retighten clamps. Then, recheck wheels for straight-ahead position and correct as shown for the Chevrolet passenger car.

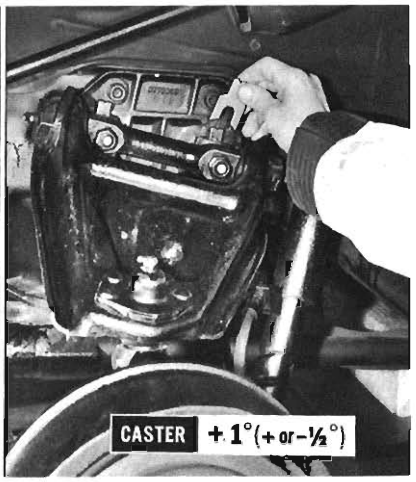
Series 10 to 40 Trucks. Camber and caster adjustments are made by adding or removing shims between the upper control arm shaft and frame bracket.



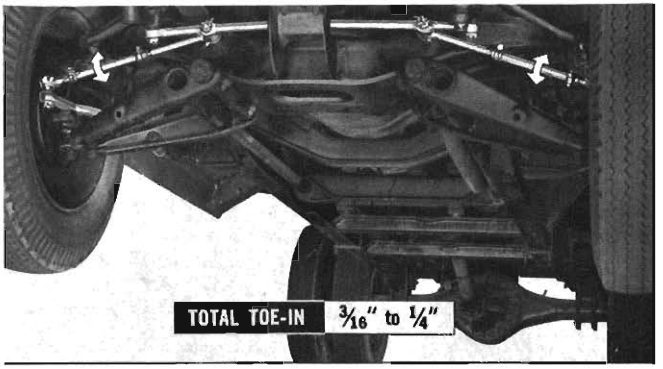


Loosen the two bolts. Pry upper control arm shaft away from frame bracket. To increase camber, add the same number of shims of equal thickness to both bolt locations. To decrease camber, remove shims of equal thickness from both bolt locations.

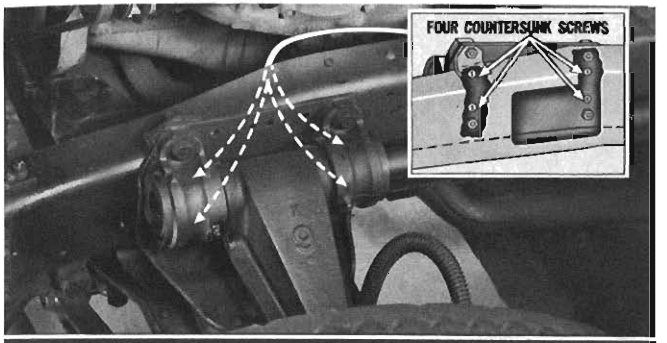
To increase caster ¼°, add a 1/32" shim at front bolt or remove a 1/32" shim from rear bolt. To decrease caster ¼°, remove a 1/32" shim from front bolt or add a 1/32" shim at rear bolt. Recheck camber after adjusting caster.



It is extremely important to make alignment adjustments on trucks exactly to specifications. This is especially required on Series 50, 60, 70 and 80, because of the heavy loads these vehicles carry and the high cost of truck tire replacement.

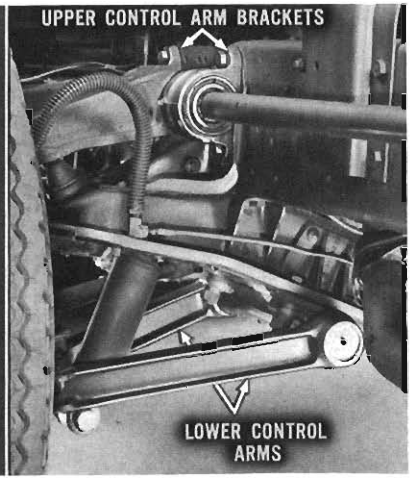


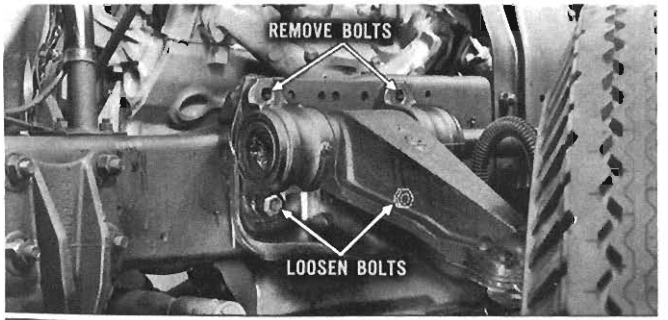
The toe-in adjustment and steering wheel repositioning procedures are the same as for the Chevrolet passenger car.



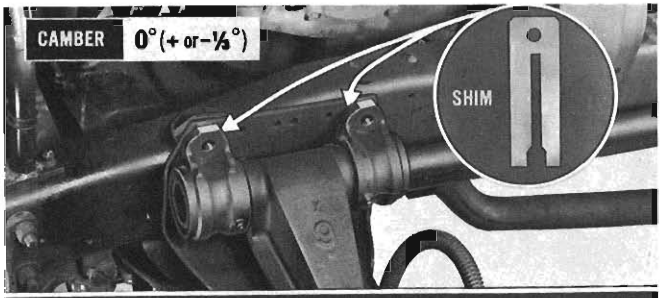
Before making a camber adjustment on the 50 to 80 Series, it should be determined that the four countersunk screws located inside the frame side rails have been removed. If not, remove and discard.

Series 50 to 80 Trucks. Camber adjustment is made by adding or removing shims between the upper control arm brackets and the frame. Caster adjustment is made by shifting the lower control arms forward or rearward on the frame.

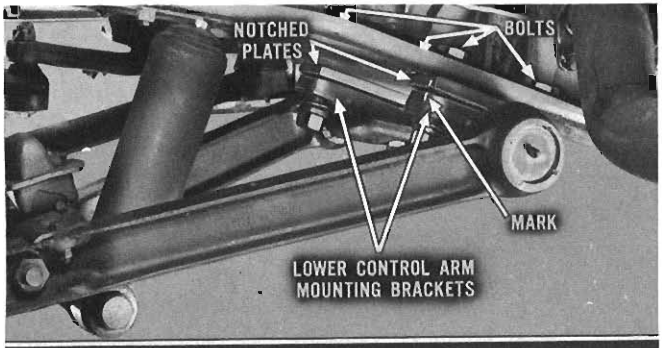




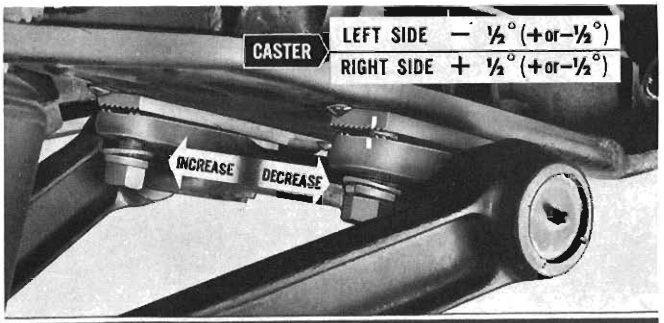
To adjust camber, raise truck at front cross member and remove the two upper bolts and only loosen the two lower bolts that attach the upper control arm brackets to the frame. Pry the control arm brackets away from the frame.



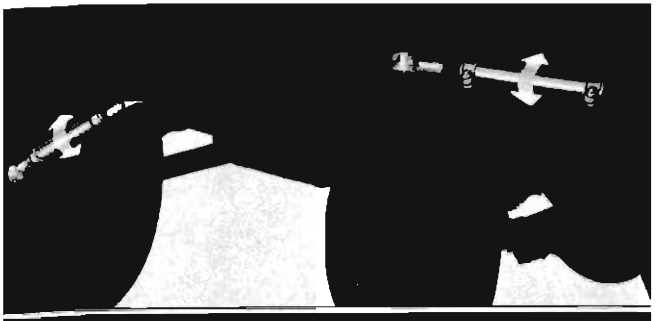
To increase camber, add the same number of shims of equal thickness between both brackets and the frame. To decrease camber, remove shims of equal thickness between both brackets and the frame. Adding or removing a 1/16" shim between both bracket and frame changes camber about ½°.



To adjust caster, mark location of the lower control arm mounting brackets to the notched plates at the frame cross member. Loosen the four attaching bolts until bracket and plate notches are free of each other.

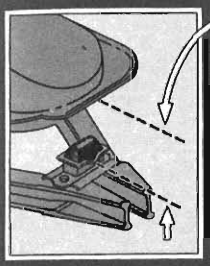


To decrease caster, shift brackets and shaft rearward. To increase caster, shift brackets and shaft forward. One notch change in either direction affects caster approximately ½°. Left wheel caster must be ½° less than right wheel. Tighten bolts. Recheck camber.



To obtain correct toe-in on both the conventional and Tilt Cab Series, lengthen or shorten both tie rods, following the procedure used for the Chevrolet passenger car. Refer to the specification chart which follows, because of trim height and toe-in relationship.

1961 TRUCK SERIES 50 THROUGH 80 TOE-IN AND TRIM HEIGHT RELATIONSHIP

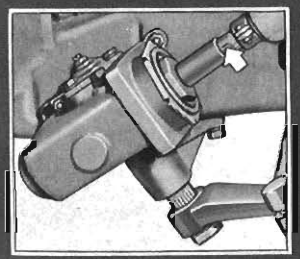


Trim Height Measurement	Total Setting — Both Wheels
0" to 3"	*Do not adjust
3" to 5½"	1/16" Toe-out
5½" to 6½"	3/16" Toe-out
6½" to 7½"	¼" Toe-out

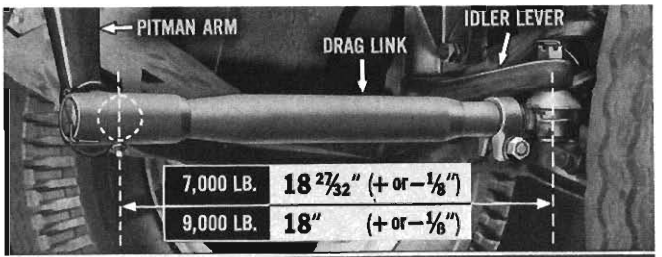
*Truck is overloaded. Heavier torsion bars are required to raise trim height. NOTE: Compare both tie rod lengths. The measurements should be within ½" of each other.

For models other than 1961, consult the appropriate Shop Manual.

Conventional Cab. Make the stop-to-stop steering wheel turning check to bring the wormshaft highpoint mark to the 9 o'clock position (pointing outward). If not, turn wormshaft slightly. Remove horn button. If steering shaft mark is not at 12 o'clock, disconnect the upper shaft coupling. Turn shaft to position mark correctly and reinstall. If required, also reposition steering wheel on shaft to straight-ahead. Then, follow procedures shown for the Chevrolet passenger car to position wheels straight-ahead.

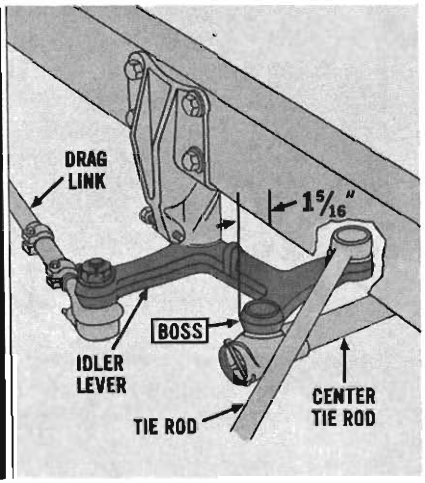


Tilt Cab. To determine if steering wheel and wormshaft highpoint are properly positioned, turn steering wheel from stop to stop. Return the wheel one-half the number of turns. Highpoint mark on top of wormshaft must point directly forward. Remove horn button. Steering shaft mark should be at 12 o'clock. If not, disconnect universal joint and reinstall to position steering shaft mark correctly. It may be necessary to reposition steering wheel on shaft to straight-ahead. Now —

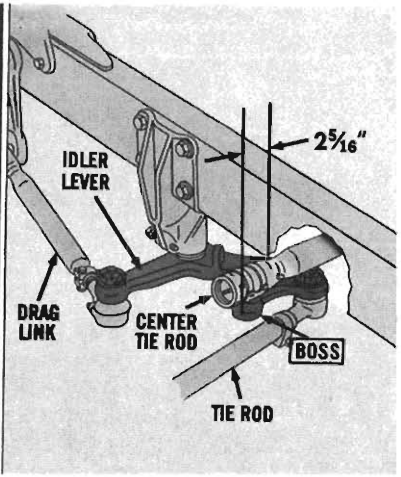


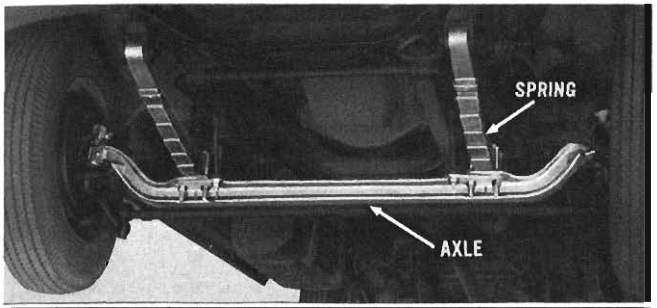
— on the 7,000-lb. and 9,000-lb.-rated suspension, Series 50 to 80 Tilt Cab, an additional step is required before positioning the wheels straight-ahead, as shown for the Chevrolet passenger car. Make sure wormshaft is at its highpoint and measure drag link length. If incorrect, adjust drag link to length indicated for the particular rated suspension. Now, on the —

— 7,000-lb. suspension units, measure the distance from the outer edge of the idler lever boss of the center tie rod, to the frame. This dimension should be 1 5/16". Readjust drag link if required. Wormshaft must be at highpoint during this check.



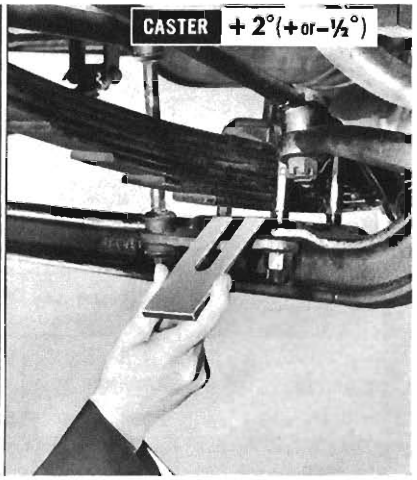
On the 9,000-lb. suspension units, measure the distance from the outer edge of the idler boss of the center tie rod, to the frame. If incorrect, readjust drag link to the final measurement of 2 5/16". Wormshaft must be at its highpoint during this check.

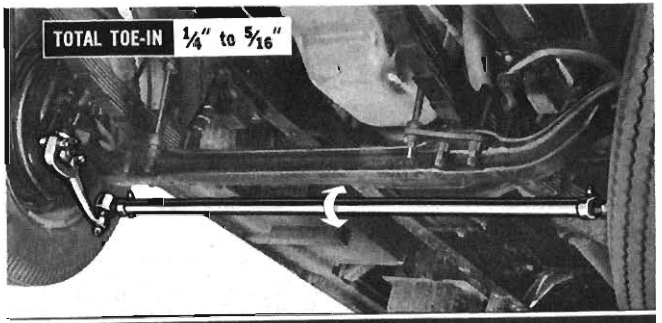




P20 to P30 Forward Control Trucks. Alignment angles are forged into the "I" beam axle. Camber is not adjustable. Caster is adjusted by inserting a tapered shim between the axle and spring to tilt the axle. Bent or twisted axles should be aligned and reformed using special equipment.

To increase caster, loosen the "U" bolts and insert a tapered shim with the thick end to the rear between the spring and the axle. To decrease caster, insert the tapered shim with the thick end to the front. Tighten "U" bolts.





Toe-in adjustment is made by lengthening or shortening a single tie rod. To increase toe-in, loosen both clamps and lengthen the tie rod. To decrease toe-in, shorten the tie rod. It is unnecessary to check and reposition the steering wheel for straight-ahead driving.

SUMMARY OF 1961 CAR ADJUSTMENTS

Model or Series	CAMBER		CASTER	
	Increase	Decrease	Increase	Decrease
Passenger Car	Remove shims Equally	Add shims Equally	Remove shims from front bolt or add shims at rear bolt location	Add shims at front bolt or remove shims from rear bolt location
Corvair			Lengthen strut rod	Shorten strut rod
Corvair 95			Remove shims from front bolt or add shims at rear bolt location	Add shims at front bolt or remove shims from rear bolt location
Corvette	Turn eccentric less than ½ turn		Turn eccentric counterclockwise	Turn eccentric clockwise

For models other than 1961, consult the appropriate Shop Manual.

SUMMARY OF 1961 TRUCK ADJUSTMENTS

Model or Series	CAMBER		CASTER	
	Increase	Decrease	Increase	Decrease
10 to 40 Series	Add shims equally	Remove shims equally	Add shims at front bolt or remove shims from rear bolt location	Remove shims from front bolt or add shims at rear bolt location
50 to 80 Series	Add shims equally	Remove shims equally	Shift brackets forward	Shift brackets rearward
P20 to P30	Not adjustable		Insert tapered shim, thick end to rear	Insert tapered shim, thick end to front

For models other than 1961, consult the appropriate Shop Manual.

Road Test and Final Inspection

After alignment adjustments have been completed, make a road test of the vehicle's steering control. Check for signs of wheel unbalance at various speeds and also note if the steering wheel is in the straight-ahead position. The vehicle's steering control characteristics on the road may make it necessary to tailor the linkage. Return to the service area and make any minor adjustments. If wheel unbalance was noted, suggest corrections be made. This completes the procedures for alignment checking and adjusting.

NOTES

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