

SECTION 4A

FRONT WHEEL ALIGNMENT

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GENERAL DESCRIPTION

Front wheels are installed on front axle at an angle considering drivability, stability and steering ability. Namely, geometrical angular relation of front wheel position is called as front wheel alignment.

CAMBER

Inclined degree of wheel to inward or outward, that is angle between center line of wheel and vertical line.

* Purposes of camber

1. It prevents front wheel opening downward when it is loaded.
2. It prevents escape of wheel during driving.
3. It helps operating of steering wheel.
4. It prevents bending or deformation of spindle or knuckle.

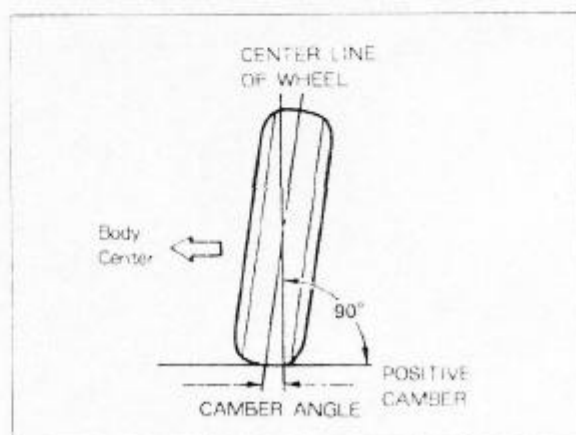


FIG. 4A — 1 POSITIVE CAMBER

CASTER

Inclined degree of steering axis forward or backward to vertical line when viewed from between vertical line and steering axis.

* Purposes of caster

1. Steering wheel returnability
2. Trend of going straight

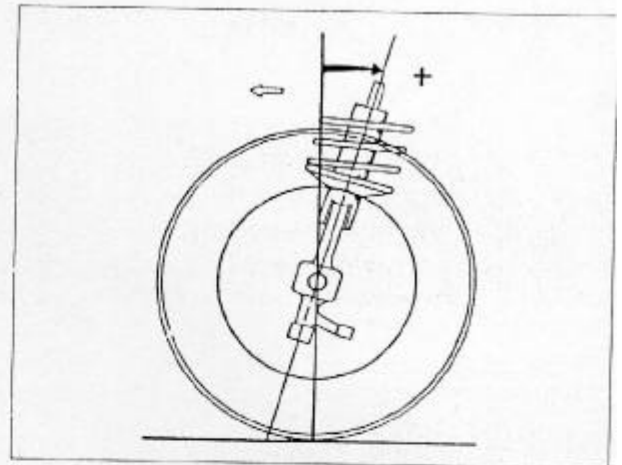


FIG. 4A — 2 POSITIVE CASTER

TOE-IN

A state that front wheel's front is shrunken than back, viewed from above in forward direction.

* Purposes of toe-in

1. It prevents toe-out due to camber.
2. It prevents toe-out from rolling resistance and reaction of traction force.

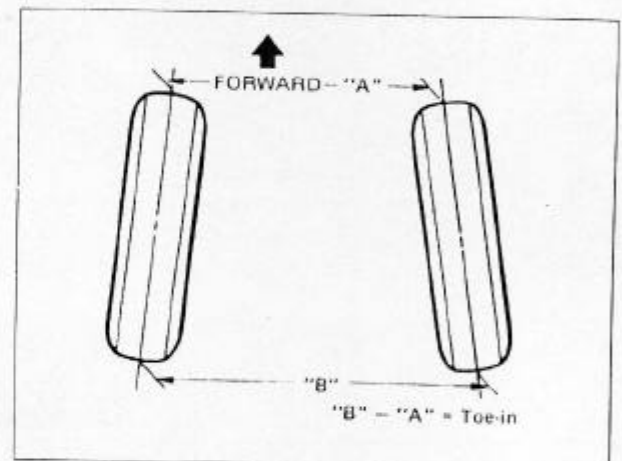


FIG. 4A — 3 TOE-IN

* Toe-out of 20° steering

It means oversteering of outer wheel to inner wheel during steering and toe-out of 20° steering is necessary to check fault in steering trapezoid mechanism.

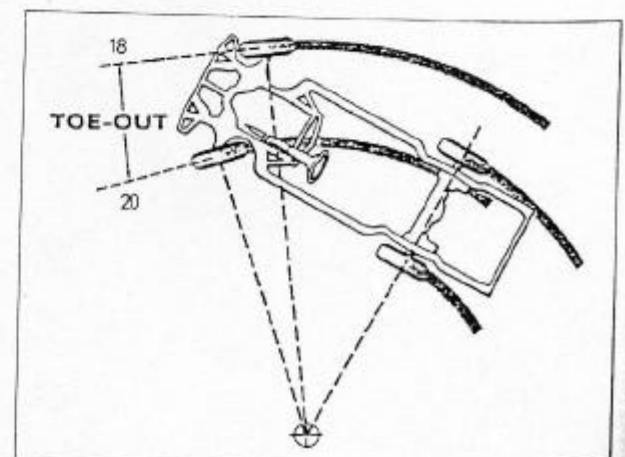


FIG. 4A — 4 TOE-OUT OF 20° STEERING

KING PIN INCLINATION(OR STEERING AXIS INCLINATION)

Inclined degree of king pin center line(steering axis center line) to vertical line view from front.

- Purposes of king pin inclination
 1. It reduces shock during driving and braking.
 2. It increases returnability of steering wheel.
 3. It prevents shimmy of wheels.

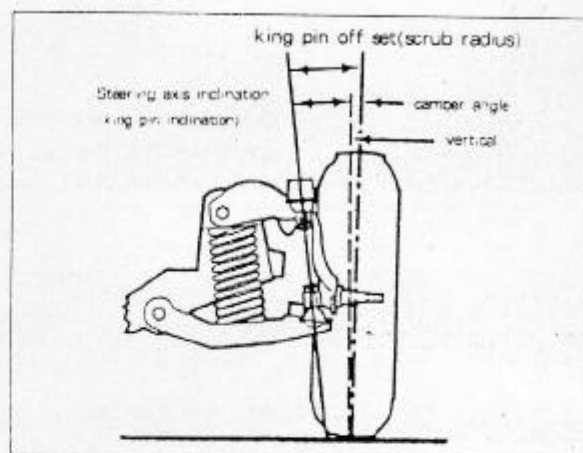


FIG. 4A — 5 KING PIN INCLINATION AND OFF SET

KING PIN OFFSET(SCRUB RADIUS)

This is distance from the contact point of wheel center line and road surface to king pin center line and road surface and is determined by king pin inclination and camber.

MEASUREMENT

Camber, caster and king pin inclination are measured together.

CAMBER

1. Locate front wheel to straight forward direction.
2. Remove front wheel cap and hub cap.
3. Wipe out grease on hub cap installed surface and check if there is any dent or damage.
4. When installing gauge(camber, caster, king pin gauge), set center rod to center hole of spindle.
5. After installing gauge, set the indicator of turn table to zero.
6. Adjust gauge leveler horizontally and read camber value on camber leveler.

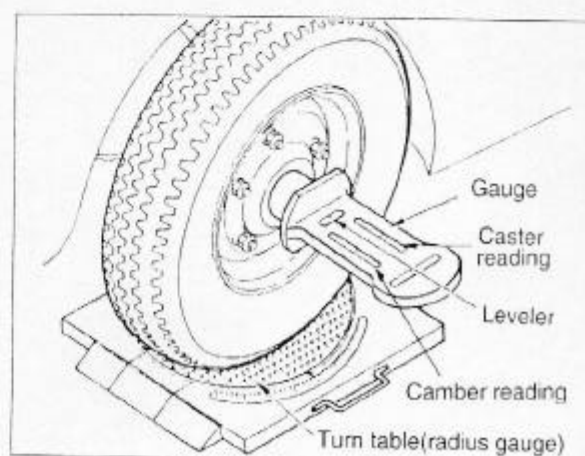


FIG. 4A — 6 CAMBER, CASTER, KING PIN INCLINATION

CASTER

1. Set the indicators of left and right turn tables to zero and rotate front wheel 20° (turn table reading) outward.
2. Level gauge leveler (set the bubble to zero).
3. Set the bubble of caster leveler to zero reading by rotating adjusting screw.
4. Rotate front wheel 20° inward.
5. Level gauge leveler.
6. Read caster reading from caster leveler.

KING PIN INCLINATION

1. Set the bubble of traverse direction to zero by moving gauge.
2. Rotate wheel 20° outward.
3. Set to zero reading by rotating the adjusting screw on the back of king pin inclination scale, in case of left wheel take left reading as reference and in case of right wheel take right reading as reference.
4. Rotate wheel to forward direction (20° steering) and read king pin inclination scale.

TOE-IN

1. Prior to measuring, check looseness of steering link and wheel bearing and tire pressure.
2. Check the level of measuring place.
3. Lift front wheels using jack and draw line on the center of tire tread.
4. Set front wheels to forward direction.
5. Set the height of toe-in gauge indicator to center of tire (spindle).
6. Reset micrometer to zero.
7. After locating gauge in the front of front wheels and after setting the indicator tip of gauge to left and right tire center line by releasing center sleeve, tighten the sleeve.
8. After releasing locking screw of fine movement mechanism and adjusting the indicator tip of gauge to tire center line, tighten the locking screw.
9. Locate the gauge in the back of wheels and adjust micrometer and indicator tip of opposite gauge with tire center line.
10. After setting indicator tip of micrometer side gauge to tire center line by rotating micrometer, read the micrometer reading.

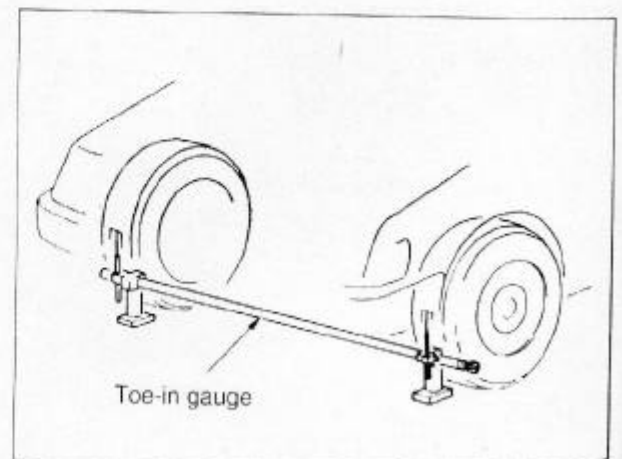


FIG. 4A — 7 TOE-IN GAUGE

SIDE SLIP TEST

Side slip test is a test checking if front wheel alignment is precisely adjusted, and carried out by measuring side slip amount when the car passes over the plate of tester slowly. Standard value is less than 5m of side slip on driving of 1km. Testers are divided into cylinder indicating type and remote indicating type.

1. Set the car to drive forward along the center line of tester.
2. Pass through tester slowly and during test do not steer or brake. Apply no load beside driver.
3. Read the value during passing through tester and decide if it is positive or negative.
4. After testing, hold the plate with locking pin.

ADJUSTMENT

- When the side slip amount is above standard, toe-in or front wheel alignment is not correct.
- Toe - in is adjusted by changing the length of tie rod. Firstly release left and right tie rod ends and rotate left and right tie rods to standard. After adjusting, tighten lock nuts to specified torque.
- In case of changing tie rod or tie rod end, check maximum steering angle by rotating radius gauge.

Side slip amount(mm)	IN 0.5 ± 1.5
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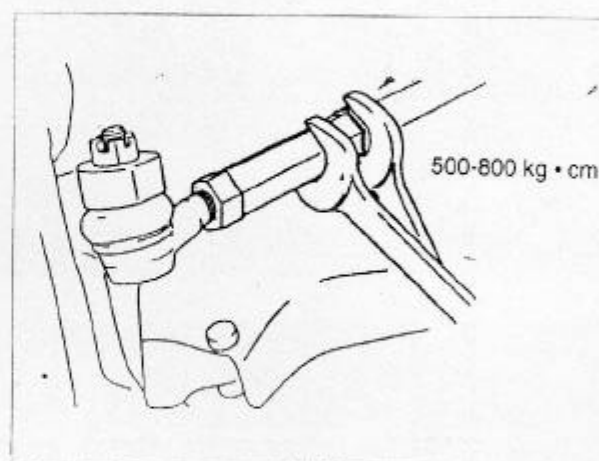


FIG. 4A — 8 ADJUSTING TOE-IN

Max. steering angle(°)	Inner	40
	Outer	35

- When camber or caster is out of standard, check the cause. In case of damaged, loosened, deformed or worn suspension parts, replace or repair them. To measure camber and caster correctly, check after moving upward and downward several times.

Toe-in(mm)	1 ± 2
Camber(°)	$0^{\circ} 30' \pm 1^{\circ}$
Caster(°)	$3^{\circ} 35' \pm 1^{\circ}$
King pin(°)	12.5