

2017 SUSPENSION

Wheel Alignment - CT6

SPECIFICATIONS

WHEEL ALIGNMENT SPECIFICATIONS

Alignment Condition: Full tank of fuel, no passengers and placed on flat level surface.

RPO Restriction	Wheels	Caster		Cross Caster	Camber		Cross Camber	Total Toe	Steering Wheel Angle	Thrust Angle
		Left	Right	(Left - Right)	Left	Right	(Left - Right)	(Left + Right)		(Left - Right)/2
MRD,-F46	Front	6.1° ± 0.9°	6.1° ± 0.9°	0.0° ± 1.0°	-0.50° ± 0.8°	-0.50° ± 0.8°	0.0° ± 1.0°	0.2° ± 0.2°	0.0° ± 3.5°	-
	Rear	-	-	-	-1.4° ± 0.8°	-1.4° ± 0.8°	-	0.1° ± 0.2°	-	0.0° ± 0.3°
F46	Front	6.4° ± 0.9°	6.4° ± 0.9°	0.0° ± 1.0°	-0.50° ± 0.8°	-0.50° ± 0.8°	0.0° ± 1.0°	0.2° ± 0.2°	0.0° ± 3.5°	-
	Rear	-	-	-	-1.4° ± 0.8°	-1.4° ± 0.8°	-	0.1° ± 0.2°	-	0.0° ± 0.3°

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

NOTE:

All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Steering Linkage Inner Tie Rod Nut	75 N.m (55 lb ft)

REPAIR INSTRUCTIONS

WHEEL ALIGNMENT MEASUREMENT

Steering and vibration complaints are not always the result of improper alignment. One possible cause is wheel and tire imbalance. Another possibility is tire lead due to worn or improperly manufactured tires. Lead/pull is defined as follows: At a constant highway speed on a typical straight road, lead/pull is the amount of effort required at the steering wheel to maintain the vehicle straight path. Lead is the vehicle deviation from a straight path on a level road without pressure on the steering wheel.

Before performing any adjustment affecting wheel alignment, perform the following inspections and adjustments in order to ensure correct alignment readings:

- Inspect the tires for the proper inflation and irregular tire wear. Refer to [Vehicle Certification, Tire Placard, Anti-Theft and Service Parts ID Label](#) and [Tire Diagnosis - Irregular or Premature Wear](#).
- Inspect the runout of the wheels and the tires.
- Inspect the wheel bearings for backlash and excessive play.

- Inspect the ball joints and tie rod ends for looseness or wear.
- Inspect the control arms and stabilizer shaft for looseness or wear.
- Inspect the steering gear for looseness at the frame. Refer to [Fastener Specifications](#).
- Inspect the struts/shock absorbers for wear, leaks and any noticeable noises. Refer to [Suspension Strut and Shock Absorber Testing - On Vehicle](#).
- Inspect the vehicle trim height. Refer to [Trim Height Inspection](#).
- Inspect the steering wheel for excessive drag or poor return due to stiff or rusted linkage or suspension components.

Give consideration to the condition of the equipment being used for the alignment. Follow the equipment manufacturer instructions.

Satisfactory vehicle operation may occur over a wide range of alignment settings. However, if the setting exceeds the service allowable specifications, correct the alignment to the service preferred specifications. Refer to [Wheel Alignment Specifications](#).

Perform the following steps in order to measure the front and rear alignment angles:

1. Install the alignment equipment according to the manufacturer instructions.
2. Jounce the front and the rear bumpers 3 times prior to checking the wheel alignment.
3. Measure the alignment angles and record the readings.
4. Adjust alignment angles to vehicle specification, if necessary. Refer to [Wheel Alignment Specifications](#).

FRONT CASTER AND CAMBER ADJUSTMENT

1. Inspect the ride height requirements. Refer to [Trim Height Inspection](#)

NOTE: Vehicles equipped with NYS (Rear Steering) must be aligned with ignition in the accessories mode (engine off) and transmission in neutral. This will set the rear steering module to zero (center) to properly align front to rear suspensions. If not followed, the rear wheels will turn causing inaccurate reading within the alignment equipment.

2. Verify alignment equipment has the latest specifications. Refer to [Wheel Alignment Specifications](#)

NOTE: Before checking and adjusting the caster and camber angles, jounce the front bumper 3 times to allow the vehicle to return to normal ride height. Measure and adjust the caster and camber with the vehicle at curb height.

3. Inspect the tires for proper inflation and irregular wear. Refer to [Tire Diagnosis - Irregular or Premature Wear](#)
4. Verify the rear toe angle and adjust as necessary. Refer to [Rear Toe Adjustment \(Without NYS\)](#) and/or [Rear Toe Adjustment \(With NYS\)](#)

NOTE: The rear toe alignment must be adjusted prior to the front caster and camber alignment.

5. Front Tire Front Air Deflector (1)» Remove [2x] - [Front Tire Front Air Deflector Replacement](#)

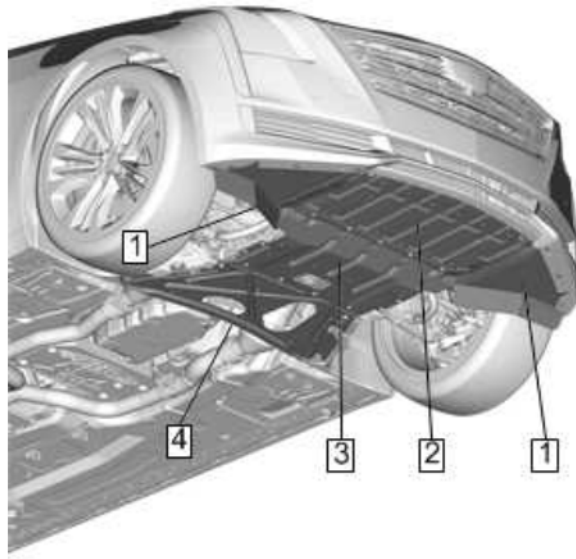


Fig. 1: Front Tire Front Air Deflector

Courtesy of GENERAL MOTORS COMPANY

6. Front Bumper Fascia Lower Stiffener (2)» Remove - [**Front Bumper Fascia Lower Stiffener Replacement**](#)
7. Underbody Front Air Deflector (3)» Remove - [**Underbody Front Air Deflector Replacement**](#)
8. Drivetrain and Front Suspension Cradle Plate (4)» Remove - [**Drivetrain and Front Suspension Cradle Plate Replacement**](#)
9. Raise the front wheels. Follow alignment machine instructions.
10. Apply protection to the stabilizer bar (1) prior to loosening the front link fasteners.

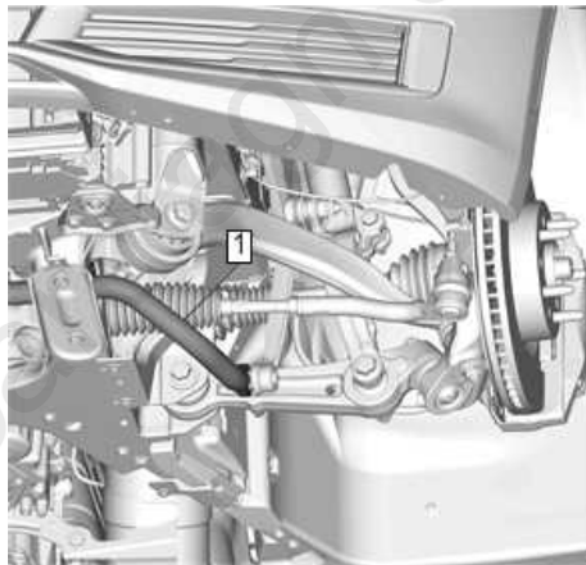


Fig. 2: Stabilizer Bar

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Use care when removing or installing the stabilizer bar as coating can be removed by contact with tools or other vehicle components. Alignment tools must not rub against the front stabilizer bar. Duct tape can be used to protect the surface.

11. Front Lower Control Front Link Bolt (1)» Loosen - [**Front Lower Control Front Link Replacement \(RWD\)**](#) and/or [**Front Lower Control Front Link Replacement \(AWD\)**](#)

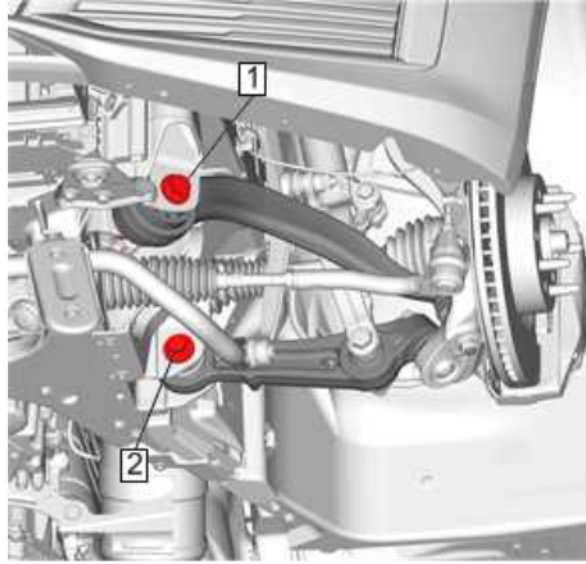


Fig. 3: Front Lower Control Front Link Bolt
Courtesy of GENERAL MOTORS COMPANY

12. Front Lower Control Rear Link Bolt (2)» Loosen - [Front Lower Control Rear Link Replacement \(RWD\)](#) and/or [Front Lower Control Rear Link Replacement \(AWD\)](#)
13. Adjust the camber and caster to specification. Refer to [Wheel Alignment Specifications](#)

NOTE: Assistance may be required to hold specification when tightening the link bolts. Do not fully tighten the bolts at this time.

14. Lower the front wheels. Follow alignment machine instructions.
15. Re-check the adjustment to verify camber and caster are within specification.
16. Front Lower Control Front Link Bolt (1)» Tighten - [Front Lower Control Front Link Replacement \(RWD\)](#) and/or [Front Lower Control Front Link Replacement \(AWD\)](#)

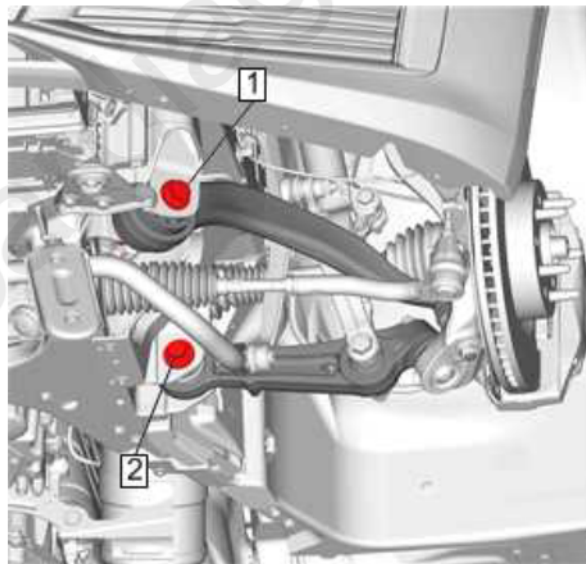


Fig. 4: Front Lower Control Front Link Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#) .

17. Front Lower Control Rear Link Bolt (2)» Tighten - [Front Lower Control Rear Link Replacement \(RWD\)](#) and/or [Front Lower Control Rear Link Replacement \(AWD\)](#)
18. Adjust the front toe. Refer to [Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment](#)
19. Driveline and Front Suspension Cradle Plate (4)» Install - [Drivetrain and Front Suspension Cradle Plate Replacement](#)

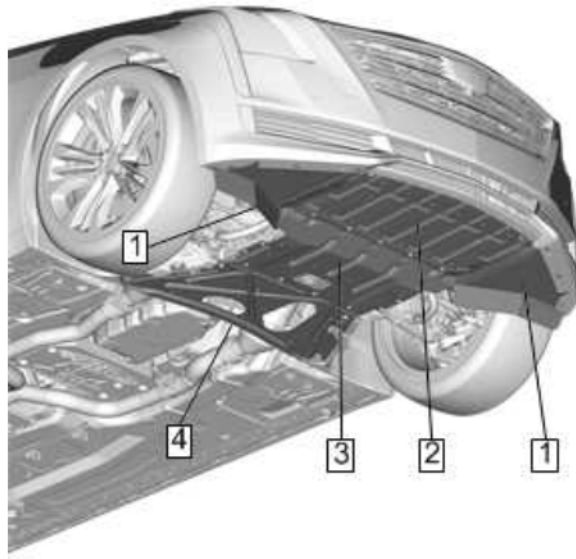


Fig. 5: Front Tire Front Air Deflector

Courtesy of GENERAL MOTORS COMPANY

20. Underbody Front Air Deflector (3)» Install - [Underbody Front Air Deflector Replacement](#)
21. Front Bumper Lower Stiffener (2)» Install - [Front Bumper Fascia Lower Stiffener Replacement](#)
22. Front Tire Front Air Deflector (1)» Install [2x] - [Front Tire Front Air Deflector Replacement](#)

WHEEL ALIGNMENT - STEERING WHEEL ANGLE AND/OR FRONT TOE ADJUSTMENT

1. Ensure that the steering wheel is set in a straight ahead position.

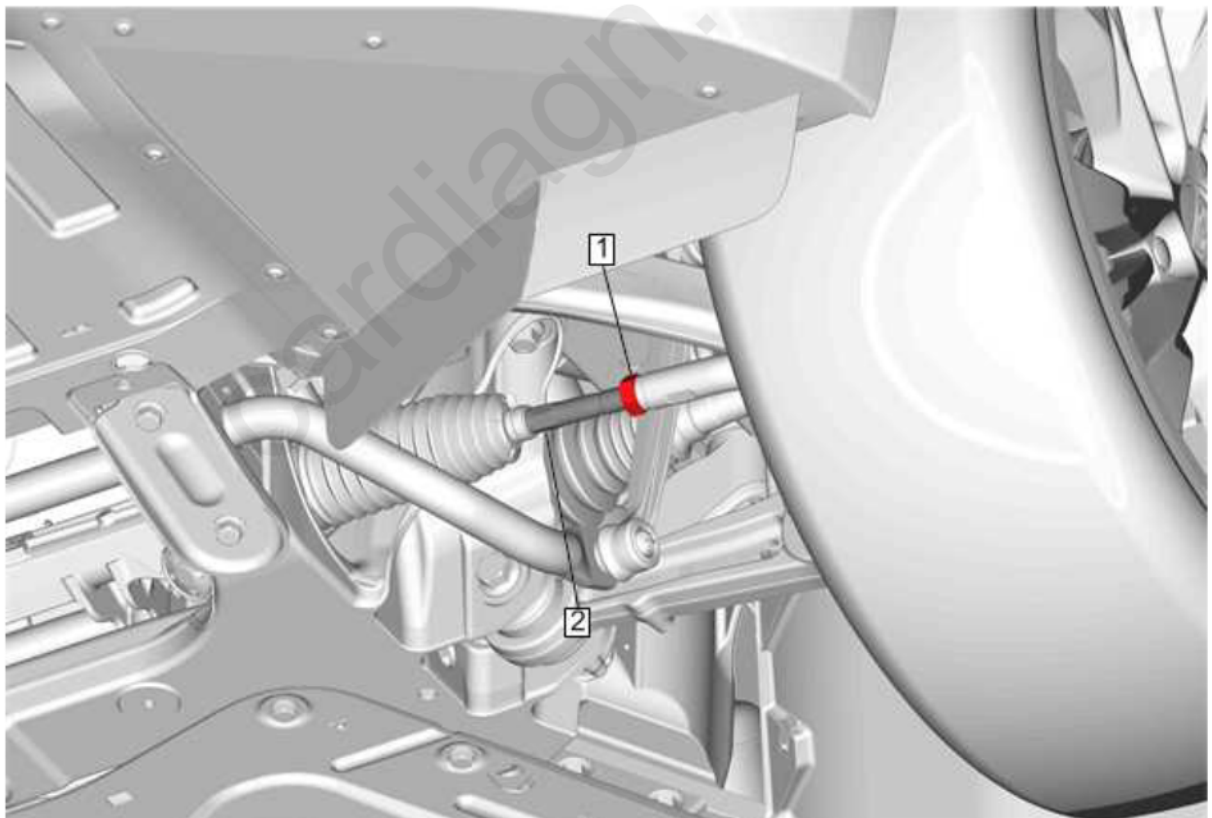


Fig. 6: Steering Linkage Inner Tie Rod Nut

Courtesy of GENERAL MOTORS COMPANY

2. Loosen the steering linkage inner tie rod nut (1).
3. Adjust the toe to specification by turning the steering linkage inner tie rod (2). Refer to [Wheel Alignment Specifications](#)
4. Tighten the steering linkage inner tie rod nut (1) to 75 N.m (55 lb ft).

CAUTION: Refer to [Fastener Caution](#) .

5. The steering angle sensor must be re-centered. Refer to [Steering Wheel Angle Sensor Centering](#)

REAR TOE ADJUSTMENT (WITHOUT NYS)

1. Measure the alignment angles and record the readings. Refer to [Wheel Alignment Measurement](#).
2. Rear Suspension Adjust Link Nut (1)» Loosen

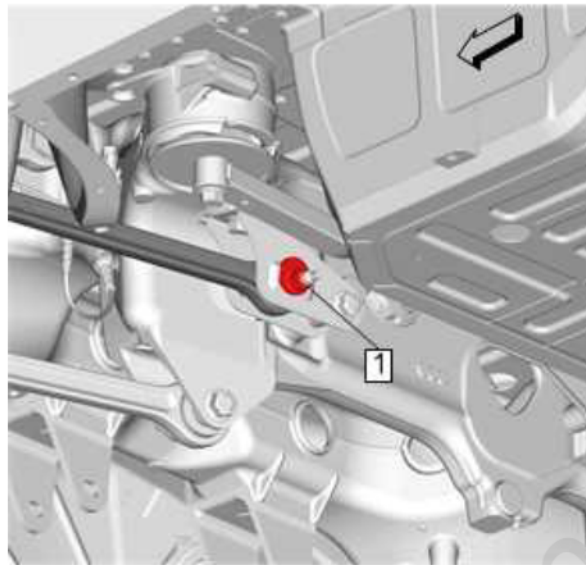


Fig. 7: Rear Suspension Adjust Link Nut
Courtesy of GENERAL MOTORS COMPANY

3. Rotate the rear suspension adjust link inner bolt (1) until the proper toe measurement is achieved.
Refer to [Wheel Alignment Specifications](#).

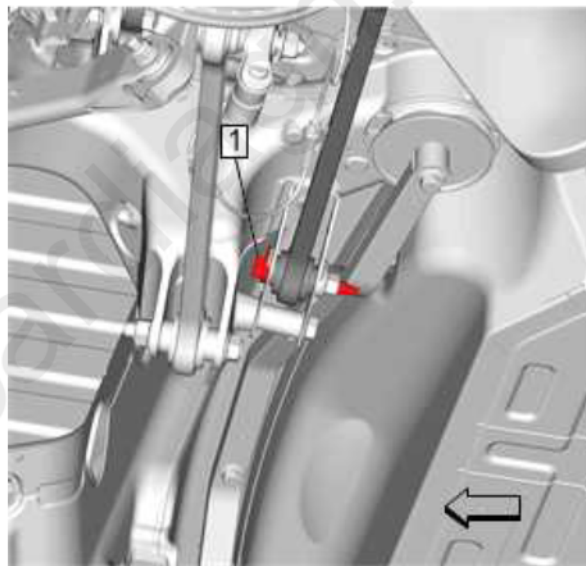


Fig. 8: Rear Suspension Adjust Link Inner Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Hold the rear suspension adjust link inner bolt and tighten the rear suspension adjust link nut (1).
Refer to [Adjust Link Replacement \(Without NYS\)](#)

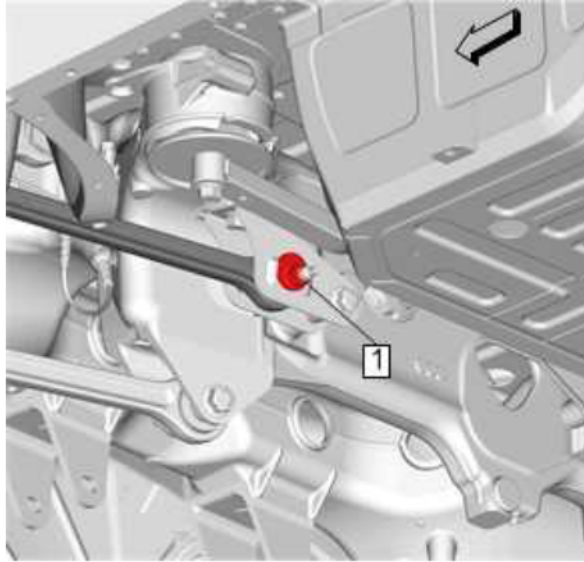


Fig. 9: Rear Suspension Adjust Link Nut

Courtesy of GENERAL MOTORS COMPANY

NOTE: Tighten the rear suspension adjust link nut enough to maintain the adjustment. Verify the rear toe reading prior to tightening the bolt to its final torque.

CAUTION: Refer to [Fastener Caution](#) .

5. Check the alignment specification and readjust if necessary. Refer to [Wheel Alignment Specifications](#)

REAR TOE ADJUSTMENT (WITH NYS)

1. Measure the alignment angles and record the readings. Refer to [Wheel Alignment Measurement](#).

NOTE: Vehicles equipped with NYS (Rear Steering) must be aligned with ignition in the accessories mode (engine off) and transmission in neutral. This will set the rear steering module to zero (center) to properly align front to rear suspensions. If not followed, the rear wheels will turn causing inaccurate reading within the alignment equipment.

2. Rear Suspension Adjust Link Nut (1) » Loosen

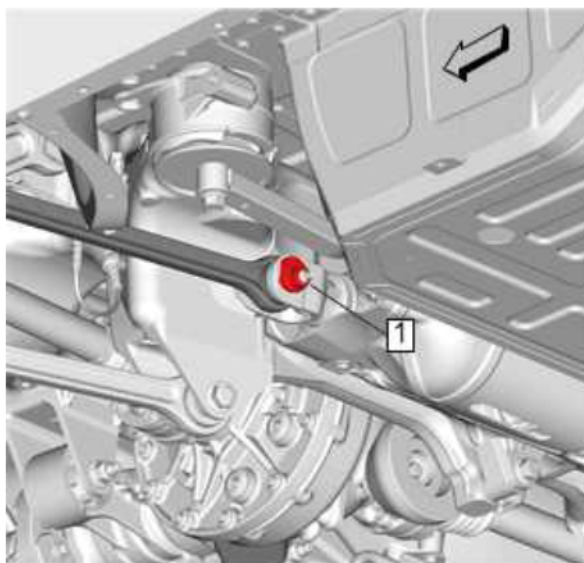


Fig. 10: Rear Suspension Adjust Link Nut

Courtesy of GENERAL MOTORS COMPANY

3. Rotate the rear suspension adjust link inner bolt (1) until the proper toe measurement is achieved. Refer to [Wheel Alignment Specifications](#).

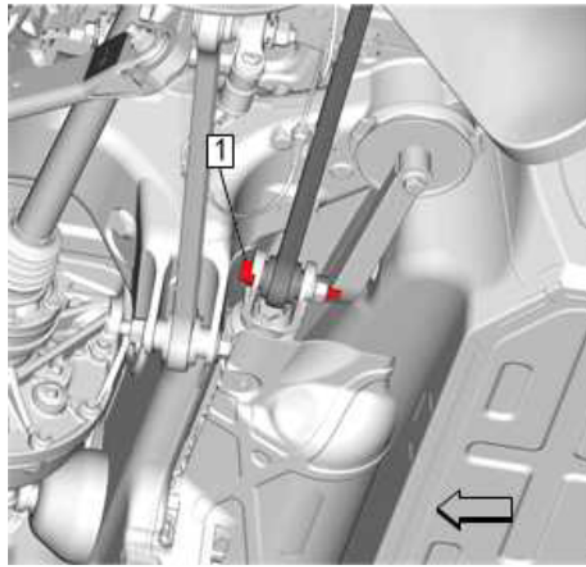


Fig. 11: Rear Suspension Adjust Link Inner Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Hold the rear suspension adjust link inner bolt and tighten the rear suspension adjust link nut (1). Refer to [Adjust Link Replacement \(With NYS\)](#).

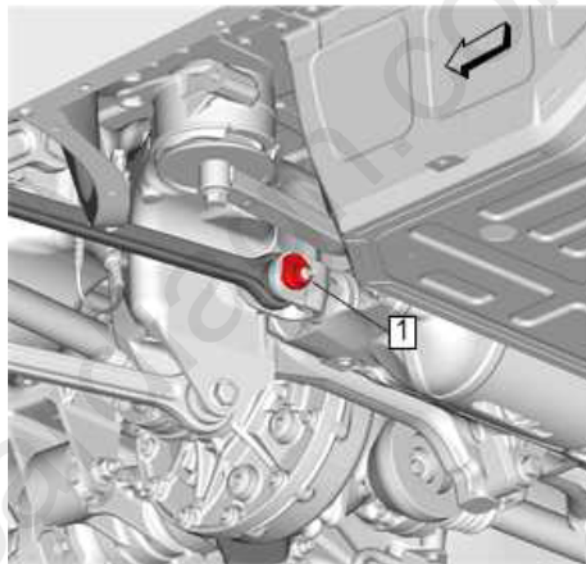


Fig. 12: Rear Suspension Adjust Link Nut
Courtesy of GENERAL MOTORS COMPANY

NOTE: Tighten the rear suspension adjust link nut enough to maintain the adjustment. Verify the rear toe reading prior to tightening the bolt to its final torque.

CAUTION: Refer to [Fastener Caution](#) .

5. Check the alignment specification and readjust if necessary. Refer to [Wheel Alignment Specifications](#)

DESCRIPTION AND OPERATION

CAMBER DESCRIPTION

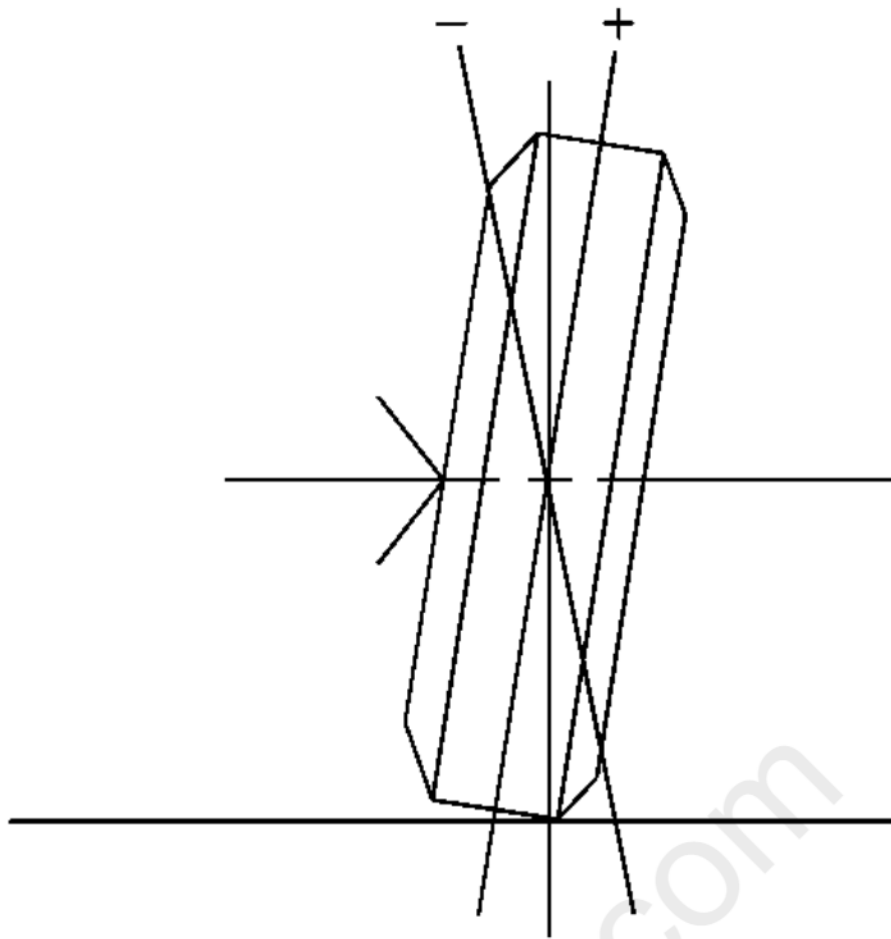


Fig. 13: Illustrating Camber Angle

Courtesy of GENERAL MOTORS COMPANY

Camber is the tilting of the wheels from the vertical when viewed from the front of the vehicle. When the wheels tilt outward at the top, the camber is positive (+). When the wheel tilts inward at the top, the camber is negative (-). The amount of tilt is measured in degrees from the vertical. Camber settings influence the directional control and the tire wear.

Too much positive camber will result in premature wear on the outside of the tire and cause excessive wear on the suspension parts.

Too much negative camber will result in premature wear on the inside of the tire and cause excessive wear on the suspension parts.

Unequal side-to-side camber of 1 degree or more will cause the vehicle to pull or lead to the side with the most positive camber.

Cross Camber is the difference between the left camber value and the right camber value.

Cross Camber = L camber - R camber

CASTER DESCRIPTION

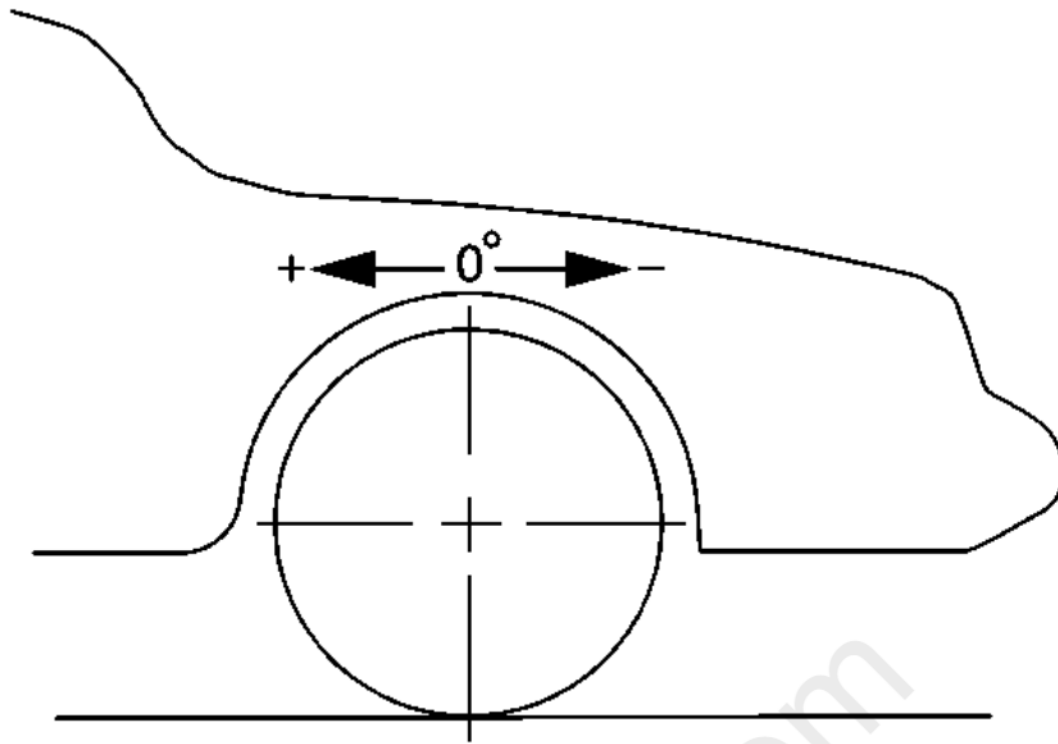


Fig. 14: Illustrating Caster Angle

Courtesy of GENERAL MOTORS COMPANY

Caster is the tilting of the uppermost point of the steering axis either forward or backward, when viewed from the side of the vehicle. A backward tilt is positive (+) and a forward tilt is negative (-). Caster influences directional control of the steering but does not affect the tire wear. Caster is affected by the vehicle height, therefore it is important to keep the body at its designed height. Overloading the vehicle or a weak or sagging rear spring will affect caster. When the rear of the vehicle is lower than its designated trim height, the front suspension moves to a more positive caster. If the rear of the vehicle is higher than its designated trim height, the front suspension moves to a less positive caster.

With too little positive caster, steering may be touchy at high speed and wheel returnability may be diminished when coming out of a turn. If one wheel has more positive caster than the other, that wheel will pull toward the center of the vehicle. This condition will cause the vehicle to pull or lead to the side with the least amount of positive caster.

Cross Caster is the difference between the left caster value and the right caster value.

Cross caster= L caster - R caster

LEAD/PULL DESCRIPTION

At a constant highway speed on a typical straight road, lead/pull is the amount of effort required at the steering wheel to maintain the vehicle's straight path.

IMPORTANT: Vehicles will tend to lead/pull in the direction of the road slope as part of normal operation.

Lead/pull is usually caused by the following factors:

- Road slope
- Variability in tire construction
- Wheel alignment (front cross caster and camber)
- Unbalanced steering gear
- Electronic Power Steering (EPS) steering position and torque sensors not calibrated correctly, if equipped.

MEMORY STEER DESCRIPTION

Memory steer is when the vehicle wants to lead or pull in the direction the driver previously turned the vehicle. Additionally, after turning in the opposite direction, the vehicle will want to lead or pull in that direction.

SCRUB RADIUS DESCRIPTION

Ideally, the scrub radius is as small as possible. Normally, the SAI angle and the centerline of the tire and the wheel intersect below the road surface, causing a positive scrub radius. With struts, the SAI angle is much larger than the long arm/short arm type of suspension. This allows the SAI angle to intersect the camber angle above the road surface, forming a negative scrub radius. The smaller the scrub radius, the better the directional stability. Installing aftermarket wheels that have additional offset will dramatically increase the scrub radius. The newly installed wheels may cause the centerline of the tires to move further away from the spindle. This will increase the scrub radius.

A large amount of scrub radius can cause severe shimmy after hitting a bump. Four-wheel drive vehicles with large tires use a steering damper to compensate for an increased scrub radius. Scrub radius is not directly measurable by the conventional methods. Scrub radius is projected geometrically by engineers during the design phase of the suspension.

THRUST ANGLES DESCRIPTION

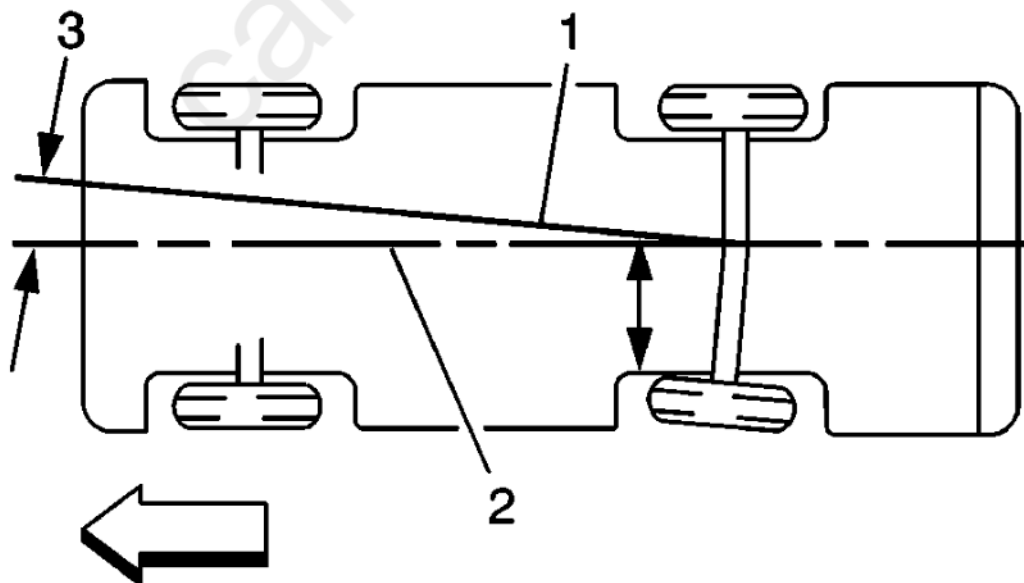


Fig. 15: Illustrating Thrust Angles

Courtesy of GENERAL MOTORS COMPANY

The front wheels aim or steer the vehicle. The rear wheels control tracking. This tracking action relates to the thrust angle (3). The thrust angle is the path that the rear wheels take. Ideally, the thrust angle is geometrically aligned with the body centerline (2).

In the illustration, toe-in is shown on the left rear wheel, moving the thrust line (1) off center. The resulting deviation from the centerline is the thrust angle.

If the thrust angle is not set properly the vehicle may "dog track" the steering wheel may not be centered or it could be perceived as a bent axle. Thrust angle can be checked during a wheel alignment.

Positive thrust angle means the thrust line is pointing to the right hand side (RHS) of the vehicle.

Negative thrust angle means the thrust line is pointing to the left hand side (LHS) of the vehicle.

If the thrust angle is out of specification, moving the axle to body relationship will change the thrust angle reading.

If the vehicle is out in the Positive (+) direction-moving the RHS forward and/or LHS rearward will move the thrust angle towards zero degrees.

If the vehicle is out in the Negative (-) direction-moving the RHS rearward and/or LHS forward will move the thrust angle towards zero degrees.

TOE DESCRIPTION

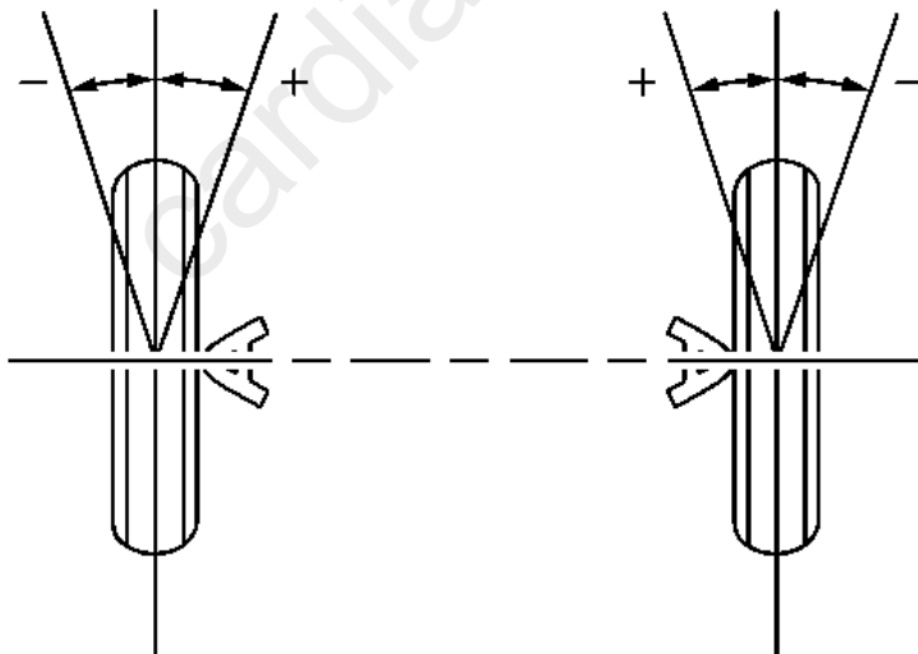


Fig. 16: Illustrating Toe Angle

Courtesy of GENERAL MOTORS COMPANY

Toe is a measurement of how much the front and/or rear wheels are turned in or out from a straight-ahead position. When the wheels are turned in, toe is positive (+). When the wheels are turned out, toe is negative (-). The actual amount of toe is normally only a fraction of a degree. The purpose of toe is to ensure that the wheels roll parallel.

Toe also offsets the small deflections of the wheel support system that occur when the vehicle is rolling forward. In other words, with the vehicle standing still and the wheels set with toe-in, the wheels tend to roll parallel on the road when the vehicle is moving.

Improper toe adjustment will cause premature tire wear and cause steering instability.

WANDER DESCRIPTION

Wander is the undesired drifting or deviation of a vehicle to either side from a straight path with hand pressure on the steering wheel. Wander is a symptom of the vehicle's sensitivity to external disturbances, such as road crown and crosswind and accentuated by poor on-center steering feel.

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