

2020 Carmel Service Manual

Suspension

13. Suspension

13.1. Front Suspension

13.1.1. Description and Operation

The front suspension has 2 primary purposes:

- Isolate the driver from irregularities in the road surface.
- Define the ride and handling characteristics of the vehicle.

The front suspension absorbs the impact of the tires travelling over irregular road surfaces and dissipates this energy throughout the suspension system. This process isolates the vehicle occupants from the road surface. The rate at which the suspension dissipates the energy and the amount of energy that is absorbed is how the suspension defines the vehicle's ride characteristics. Ride characteristics are designed into the suspension system and are not adjustable. The ride characteristics are mentioned in this description in order to aid in the understanding of the functions of the suspension system. The suspension system must allow for the vertical movement of the tire and wheel assembly as the vehicle travels over irregular road surfaces while maintaining the tire's horizontal relationship to the road.

This requires that the steering knuckle be suspended between an upper and a lower control arm. The lower control arm attaches from the steering knuckle at the outermost point of the control arm. The attachment is through a ball and socket type joint. The innermost end of the control arm attached at 2 points to the vehicle frame, through semi rigid bushings. The upper control arm attaches to the upper control arm bracket and is part of the Push rod shock assembly that bolts to the body.

This up and down motion of the steering knuckle as the vehicle travels over bumps is absorbed predominantly by the coil spring. The vertical movement of the steering knuckle as the vehicle travels over irregular road surfaces will tend to compress the spring and spring tension will lead the spring to return to the original, at rest state. This action isolates the vehicle from the road surface. The upper and lower control arms are allowed to pivot at the vehicle frame in a vertical fashion. The ball joint allows the steering knuckle to maintain the perpendicular relationship to the road surface.

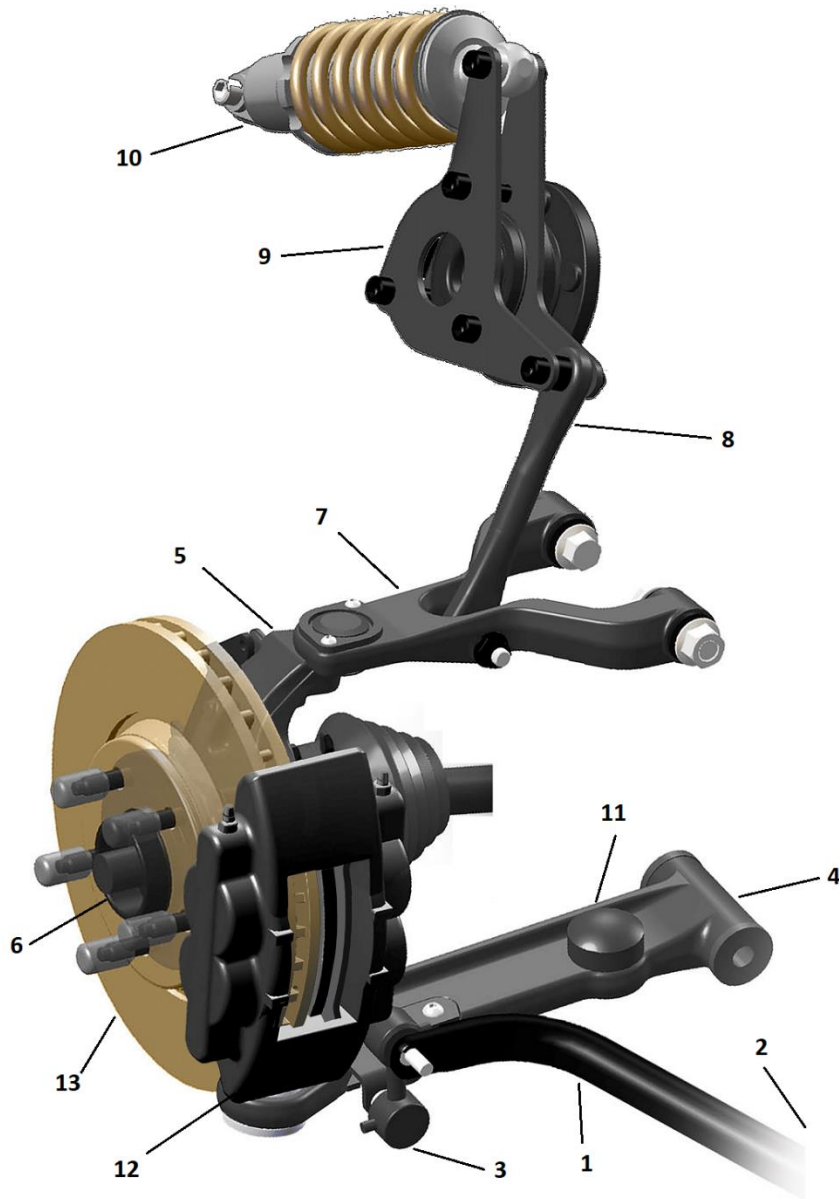
A shock absorber is used in conjunction with this system in order to dampen out the oscillations of the coil spring. A shock absorber is a basic hydraulic cylinder. The shock is filled with oil and has a moveable shaft that connects to a piston inside the shock absorber. Valves inside the shock absorber offer resistance to oil flow and consequently inhibit rapid movement of the piston and shaft. Each end of the shock absorber is connected in such a fashion to utilize this recoil action of a spring alone.

The up and down motion of the upper control arm moves the pushrod which rotates the suspension rocker. The design of the suspension rocker allows for a progressive spring rate, with the spring, installed almost horizontal with the chassis, compressed by the motion of control arms. The force applied by the spring increases non-linearly, providing a "Sporty" ride feeling.

Vehicle Front suspension system utilize an anti-sway bar. The anti-sway bar is connected between the left and right lower control arm assemblies through the anti-sway bar end link and with chassis through the anti-sway bar bushings. This bar controls the amount of independent movement of the suspension when the vehicle turns. Limiting the independent movement defines the vehicle's handling characteristics on turns.

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1. Anti-sway bar
2. Anti-sway bar bushing
3. Anti-sway bar end Link
4. Lower control arm
5. Steering knuckle
6. Wheel bearing hub
7. Upper control arm
8. Pushrod
9. Suspension Rocker Assembly
10. Coil over Shock
11. Lower control arm bump stop
12. Brake Caliper
13. Brake Rotor

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13.1.2. Specifications

13.1.2.1. Trim Height



Trim Height Specifications

Application	Specifications	
	Metric	English
Front Valance to Ground (1)	140 mm	5.5 in
Rear Rocker to Ground (2)	140 mm	5.5 in

13.1.2.2.

Fastener Specifications

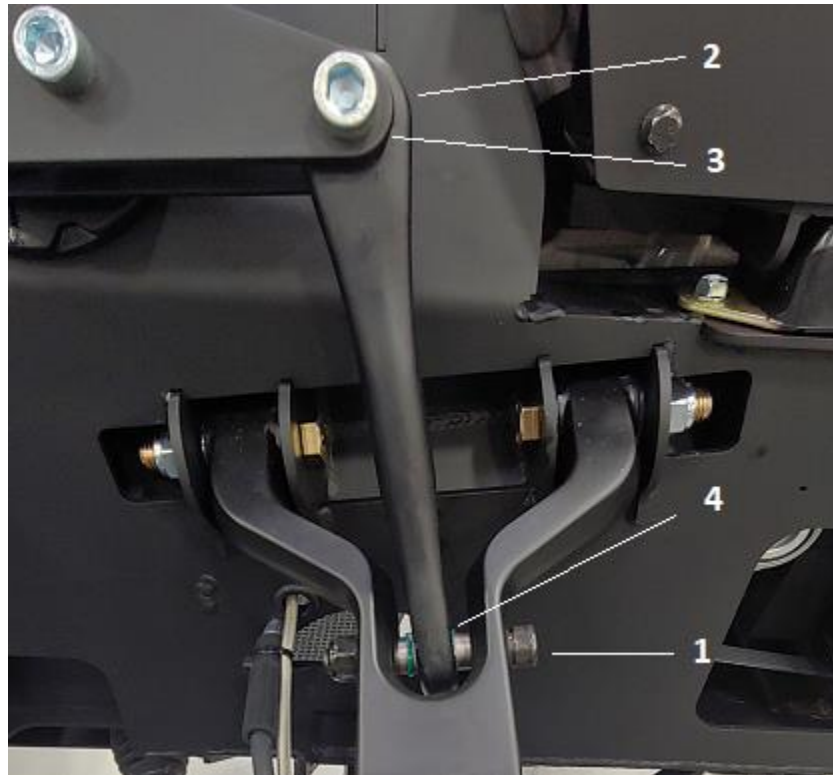
Application	Specifications	
	Metric	English
Lower Ball Joint Nut		
First Pass	40 Nm	30 lb. ft.
Second Pass	Plus 135°	
Lower Control Arm to Frame Nut	165 Nm	122 lb. ft.
Coil Over Shock to Frame	72 Nm	53 lb. ft.
Coil Over Shock to Rocker	72 Nm	53 lb. ft.
Sway bar End link Nuts	65 Nm	48 lb. ft.
Sway bar Bushings	55 Nm	41 lb. ft.
Tie Rod End Nut		
First Pass	30 Nm	22 lb. ft.
Second Pass	Plus 115°	
Upper Ball Joint Nut		
First Pass	30 Nm	22 lb. ft.
Second Pass	Plus 150°	
Upper Control Arm to Frame Bolt	110 Nm	81 lb. ft.
Wheel Hub Bolt	115 Nm	85 lb. ft.
Suspension Rocker to Frame	108 Nm	80 lb. ft.
Suspension Rocker Plates to Bearing	108 Nm	80 lb. ft.
Pushrod Upper nut	72 Nm	53 lb. ft.
Pushrod Lower Nut	72 Nm	53 lb. ft.

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13.1.3. Repair instructions

13.1.3.1. Pushrod



13.1.3.1.1.Tools

10mm Hex key
19 mm Wrench
18 mm Wrench

13.1.3.1.2.Removal

1. Remove pre-load from Coil Spring, Refer to [Front Coil over shock, Removing Spring Pre-Load](#)
2. Remove upper pushrod bolt (2)
3. Recover the aluminum spacers used holding the upper bolt (3)
4. Remove lower pushrod bolt (1)
5. Recover the aluminum spacers used holding the lower bolt (4)

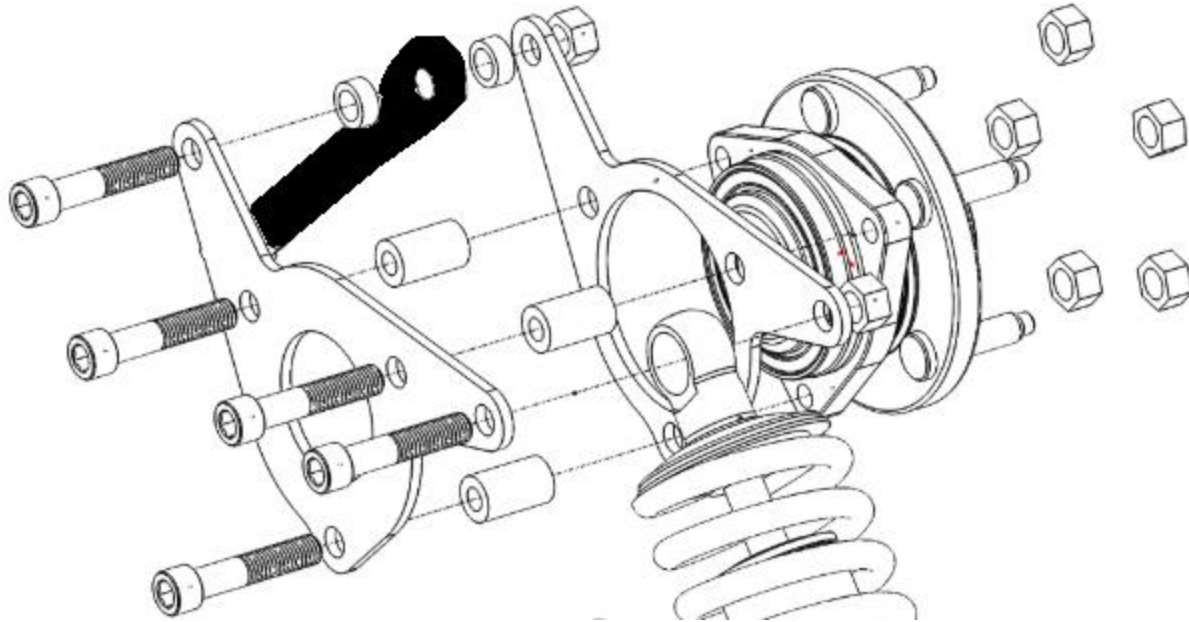
13.1.3.1.3.Installation

1. Apply grease to the pushrod end eyelets.
2. Insert the lower bolt (1) into the upper control arm (slide the aluminum spacers (4) along with the pushrod into the lower control arm, until they are in the right position to insert the bolt, you may want to use a small screwdriver to align the spacers with the pushrod.)
3. Insert the upper bolt (2) into the suspension rocker assembly. (to make this step even easier you may loose the suspension rocker bolt using the 10mm hex key, it will give you enough clearance to align the upper bolt with the aluminum spacers (3) and the pushrod eyelet)
4. Tight up the bolts using the right torque according to the Fastener Specifications table
5. Set Spring Pre-load, Refer to [Front Coil over shock, Setting Spring Pre-Load](#)

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13.1.3.2. Suspension Rocker Replacement



13.1.3.2.1.Tools

- 10mm Hex key
- 19 mm Wrench
- 18 mm Wrench
- 19 mm socket and ratchet

13.1.3.2.2.Removal Procedures

1. Remove pre-load from Coil Spring, Refer to Front Coil Front Coil over shock
2. Break the torque on the three bolts around the center of the rocker assembly
3. Remove upper push rod bolt
4. Remove shock bolt
5. Remove the three bolts of the rocker assembly
6. Remove the 5 bolts on the back side of the hub assembly

13.1.3.2.3.Installation Procedures

1. Install the bearing hub to the chassis and 5 nuts
2. Assemble the suspension rocker plates and spacers
3. Install shock bolt.
4. Install pushrod rocker bolt
5. Set Spring Pre-load, Refer to Front Coil over shock

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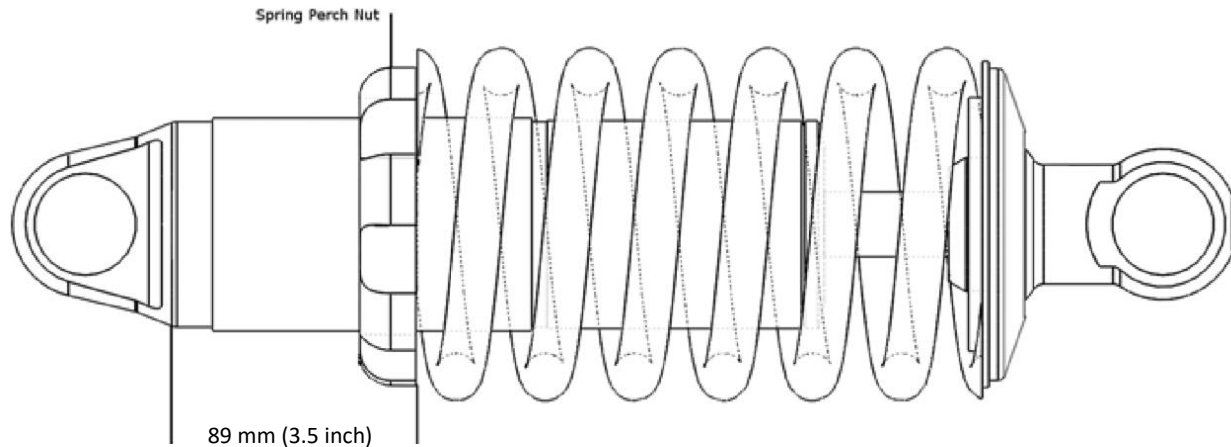
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13.1.3.3. Front coil over shock Replacement

13.1.3.3.1.Tools

10mm Hex key
19 mm Wrench
Spring wrench

13.1.3.3.2.Removing and setting spring Pre-load



13.1.3.3.2.1.Removing Spring Pre-load

Lift and support the vehicle
Loosen the spring perch nut until the spring can be moved by hand

13.1.3.3.2.2.Setting Spring Pre-load

Center spring on spring perches
Tighten spring perch nut until the spring as shown.
Perform the Vehicle Trim Height Inspection, Refer to [Trim Height Inspection](#)

13.1.3.3.3.Removal Procedures

Remove pre-load from Coil Spring, see above
Remove the shock

13.1.3.3.4.Installation Procedures

Install the shock Tightening to 72 Nm (53 lb. ft.)
Set Spring Pre-load, see above

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13.1.3.4. Anti-sway bar End Link Replacement

CAUTION

Excessive rotation of end link shaft can tear the end link boot. Hand tools must be used to keep the ball stud from rotating. Insert a Hex key in to prevent rotation during removal and installation see figure



13.1.3.4.1.Tools

- 5 mm Hex key
- 14mm Wrench

13.1.3.4.2.Removal Procedures

- Remove upper and lower end link nuts
- Remove end link

13.1.3.4.3.Installation Procedures

- Install end link
- Tighten Nuts to 65 Nm (48 lb. ft.)

13.1.3.5. Anti-sway bar Replacement

13.1.3.5.1.Tools

- 5 mm Hex key
- 4mm Hex key
- 14mm Wrench
- 15mm offset box end Wrench
- 15 mm Socket and Ratchet
- 2 additional Jack Stand

13.1.3.5.2.Removal Procedure

- Lift and support the vehicle
- Remove at least one of the front tires Refer to [Front Wheel Replacement](#)
- Using the 4mm Hex key, remove the 6 M6 button bolts holding the front valance
- Disconnect Anti-sway bar End Link from Anti-sway bar, Refer to [Anti-sway bar End link Replacement](#)
- Place the 2 jack stands below the radiator frame
- Using the 15mm wrench, socket and ratchet remove the 6 bolts holding the radiator frame
- Separate the radiator frame from the chassis approximate 3 inches to have access to the anti-sway bar bushing
- M10 hidden bolt, then remove the hidden bolts right and left side using a M15 socket and ratchet.
- Remove the Anti-sway bar Bushings lower bolts.

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13.1.3.5.3. Installation Procedure

Lubricate the inside of the anti-sway bar bushing by applying synthetic water-resistant marine-grade grease

Slide in the anti-sway bar bushings into the far end part of the straight center section of the anti-sway bar

Place the anti-sway bar bushing brackets in position covering the anti-sway bar bushings

Install the anti-sway bar into the radiator frame by attaching the anti-sway bar bushings with the four (4) M10 bolts using the 15mm socket and ratchet

- *The radiator frame needs to be disconnected and separated from the chassis at least 3 inches*

Install the radiator frame to the chassis at the same time the anti-sway bar end links must be connected to the anti-sway bar.

Install anti-sway bar end link nut

Install the front valance

Install back the front tire if it was removed

13.1.3.6. Anti-sway bar Bushing Replacement

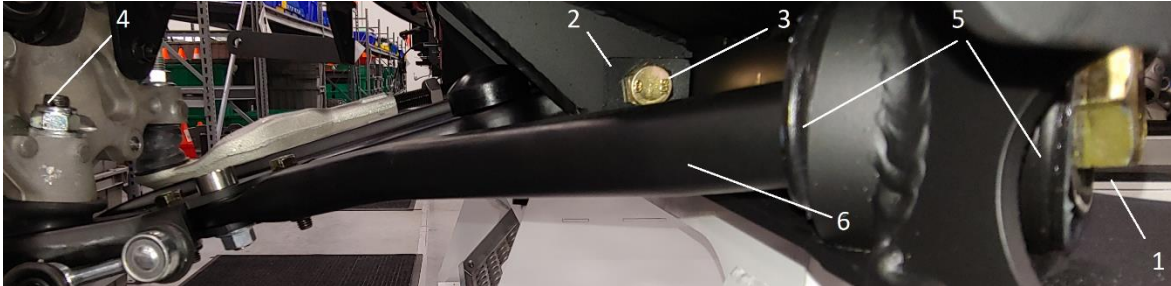
Follow the [Anti-sway bar removal procedure in the Anti-sway bar Replacement Section](#)

Replace the Anti sway bar bushing, pushing out softly the bushings out of the anti-sway bar

Slide in the new bushings

Follow the [Anti-sway bar installation procedure in the Anti-sway bar Replacement Section.](#)

13.1.3.7. Lower control Arm Replacement



13.1.3.7.1. Tools

Vanderhall Alignment Rack

24mm Wrench

21mm Wrench

14mm Wrench

5mm Hex key

24 mm socket

15mm socket

Ratchet

Ball Joint Separator

13.1.3.7.2. Removal Procedures

Remove pre-load from Coil Spring, Refer to [Front Coil Over Shock, Removing Spring Pre-Load](#)

Remove the Front wheel, Refer to [Front Wheel Replacement](#)

Using the 4mm Hex key, remove the 6 M6 button bolts holding the front valance

Disconnect Anti-sway bar End Link from Anti-sway bar, Refer to [Anti-sway bar End link Replacement](#)

Place the 2 jack stands below the radiator frame

Using the 15mm wrench, socket and ratchet remove the 6 bolts holding the radiator frame

Separate the radiator frame from the chassis approximate 3 inches to have access to the anti-sway bar bushing

Remove the hidden M16 lower control arm front bolt (1) located at the front of the chassis

Pull the Lower control arm radius rod (6) to the front, liberating the radius rod bushing (5) and spring disks

Remove nut from Lower Ball Joint (4)

- Loosen but DO NOT remove the nut until the ball stud has been separated from the knuckle.

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Separate lower ball joint from the steering knuckle using the ball joint separator tool
Remove rear lower control arm M16 bolt (3) and the camber washers (2)

13.1.3.7.3. Installation Procedures

Insert the lower control arm into the chassis, pushing it back until it sits in the right position
Place the camber rectangular washers (2) inside the chassis slot
Insert the M16 rear lower control arm bolt (3) adjusting to the right torque
Insert the lower control arm radius rod bushing (5)
Push back in the radius rod (6) in until it is aligned with the radius rod bushing (5) and spring disks
Insert and adjust the M16 lower control arm front bolt (1)
Install lower ball joint nut (4)
Install the radiator frame to the chassis at the same time the anti-sway bar end links must be connected to the anti-sway bar.
Install anti-sway bar end link nut
Install the front valance
Install anti-sway bar end link, Refer to [Anti-Sway bar end link Replacement](#)
Install the Front wheels, Refer to [Front Wheel Replacement](#)
Set Spring Pre-load, Refer to [Front Coil Over Shock, Setting Spring Pre-Load](#)
Check the vehicle alignment Refer to [Wheel Alignment](#)

13.1.3.8. Bump stop Replacement

13.1.3.8.1. Tools

14mm socket and ratchet

13.1.3.8.2. Removal Procedures

Remove nut
Remove bump stop

13.1.3.8.3. Installation Procedures

Install bump stop

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13.1.3.9. Upper Control Arm Replacement



13.1.3.9.1.Tools

- 24mm wrench
- 24mm socket
- 19mm socket
- 18 mm wrench
- 19mm wrench
- 10mm hex key
- Ball Joint Separator

13.1.3.9.2.Removal Procedures

Remove pre-load from Coil Spring, Refer to [Front Coil over Shock, Removing spring Pre-load](#)
Remove Front wheel, Refer to [Front Wheel Replacement](#)
Remove lower pushrod bolt (2) using the 10mm hex key on the bolt and the M19 socket and ratchet on the nut
Recover the aluminum spacers used holding the pushrod lower bolt
Remove nut from upper control arm ball joint (3) using the m19 socket and ratchet
Remove front and rear upper control arm M16 nuts and bolts (1) using the 24mm wrench, socket and ratchet

13.1.3.9.3.Installation Procedures

Install front and rear upper control arm M16 nuts and bolts (1) using the 24mm wrench, socket and ratchet
Insert the lower bolt (2) into the upper control arm (slide the aluminum spacers along with the pushrod into the lower control arm, until they are in the right position to insert the bolt, you may want to use a small screwdriver to align the spacers with the pushrod.)
Install upper control arm ball joint to knuckle
Install the Front wheel, Refer to [Front Wheel Replacement](#)
Set Spring Pre-load [Refer to Front Coil over Shock, Setting Spring Pre-load](#)

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13.1.3.10. Wheel Bearing Replacement



13.1.3.10.1. Tools

19 mm Socket
15 mm Socket
13mm Socket
10mm wrench
36mm socket
4mm hex key
Ratchet

13.1.3.10.2. Removal Procedures

Remove pre-load from Coil Spring, [Refer to Removing Spring Pre-load](#)
Remove Front wheel, [Refer to Front Wheel Replacement](#)
Remove the front brake hose (3) from the front fender bracket (Cut the zip ties used to keep the hose and sensor cable together.
Disconnect wheel speed sensor harness (2)
Remove nut from CV axel using the M36 socket.
Remove the front wheel fender
Remove brake caliper bots (5)
Remove brake rotor taking out the flat head bolt (6) using the 4mm hex key
Remove three bolts holding wheel bearing (4)

13.1.3.10.3. Installation Procedures

Install wheel bearing on to steering knuckle
Install brake rotor
Install brake caliper
Install CV axel nut

- a new CV axel nut must be installed

Connect Wheel Speed sensor
Install wheel
Install wheel fender

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13.1.3.11. Steering Knuckle Replacement

13.1.3.11.1. Removal Procedures

Remove Wheel Bearing, [Refer to Front Wheel Bearing Replacement](#)

Remove anti-sway bar end link, [Refer to anti-sway bar end link Replacement](#)

Disconnect the Tie rod end, Refer to Tie Rod End Replacement

- Remove the upper control arm ball joint Loosen but DO NOT remove the nut until the ball stud has been separated from the knuckle.

Remove lower control arm ball joint

- Loosen but DO NOT remove the nut until the ball stud has been separated from the knuckle.

13.1.3.11.2. Installation Procedures

Connect lower control arm ball joint

Insert CV Axel through Steering knuckle

Connect upper control arm ball joint

Connect Tie Rod End Link

Install wheel bearing, Refer to [Front Wheel Bearing Replacement](#)

Connect anti-sway bar end link

Install brake rotor

Install brake caliper

Install CV axel nut

- a new CV axel nut must be installed

Connect Wheel Speed sensor

Install wheel

Install wheel fender

Set Spring Pre-load, [Refer to Setting the Spring Pre-Load](#)

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13.1.3.12. Trim Height Inspection

13.1.3.12.1. Trim Height Measurements

Trim height is a predetermined measurement relating to vehicle ride height. Incorrect trim heights can cause bottoming out over bumps, damage to the suspension components, and symptoms similar to wheel alignment problems. Check the trim heights when diagnosing suspension concerns and before checking the wheel alignment.

Perform the following before measuring the trim heights:

1. Set the tire pressures to the pressure shown on the certification label and/or in the Owners Manual.
2. Check the fuel level. Add additional weight if necessary to simulate a full tank.
3. Make sure the vehicle is on a level surface,
4. All dimensions are measured vertical to the ground. Trim heights should be within -10 mm to +10 mm to be considered correct.

13.1.3.12.2. Measuring the front and rear dimension



Use the following procedure to check the front and rear dimensions:

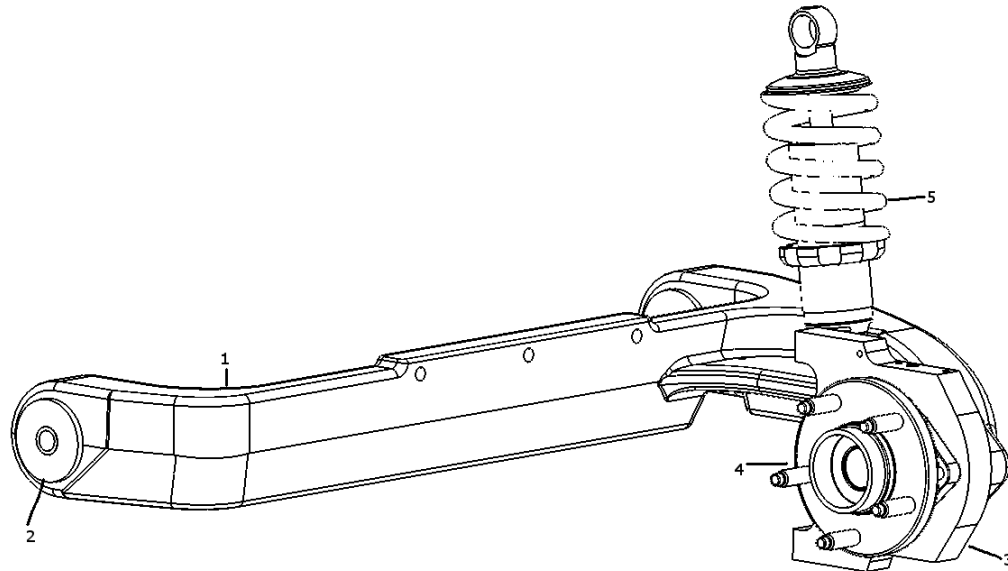
1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle**.
2. Set the front spring preload to 89 mm (3.5 in), Refer to **Front Coil over shock**
3. Fully loosen the rear spring perch
4. Lower the vehicle
5. Drive the vehicle for a minimum of 1 mile to settle the suspension
6. Park the vehicle on a hard level surface
7. Measure each of the corners of the valance to the ground
 1. Compare the measurement to the specification table. Refer to **Trim Height Specifications**.
 2. Adjust front spring preload to raise and lower the valance
8. Measure each of the corners of the rear rocker to the ground
 1. Compare the measurement to the specification table. Refer to **Trim Height Specifications**.
 2. Adjust rear spring preload to raise and lower the rocker
9. Drive the vehicle for a minimum of 1 mile to settle the suspension
10. Repeat steps 6-9 as necessary to achieve the appropriate Trim height

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13.2. Rear Suspension

13.2.1. Description and Operation



1. Trailing arm
2. Trailing arm bushing
3. Rear brake and hub adaptor
4. Wheel hub
5. Coil over shock

13.2.2. Fastener Specifications

Application	Specifications	
	Metric	English
Trailing Arm to Frame	215 Nm	158 lb. ft.
Coil Over Shock to Frame	72 Nm	53 lb. ft.
Coil Over Shock to Trailing Arm	72 Nm	53 lb. ft.

13.2.3. Repair instructions

13.2.3.1. Coil over shock Replacement

13.2.3.1.1. Tools

- 19 mm Wrench
- 10 mm Hex key

13.2.3.1.2. Removal Procedures

- Lift and support the vehicle, [Refer to Lifting the Vehicle](#)
- Remove the rear wheel, [Refer to Rear Wheel Replacement](#)
- Remove rear fender, [Refer to Rear Fender Replacement](#)
- Support trailing arm
- Remove Lower bolt from coil over shock assembly
- Remove Upper bolt from coil over shock assembly

13.2.3.1.3. Installation Procedures

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- Install Lower Bolt through shock
- Install upper bolt through shock
- Install rear fender, [Refer to Rear Fender Replacement](#)
- Install rear wheel, [Refer to Rear Wheel Replacement](#)

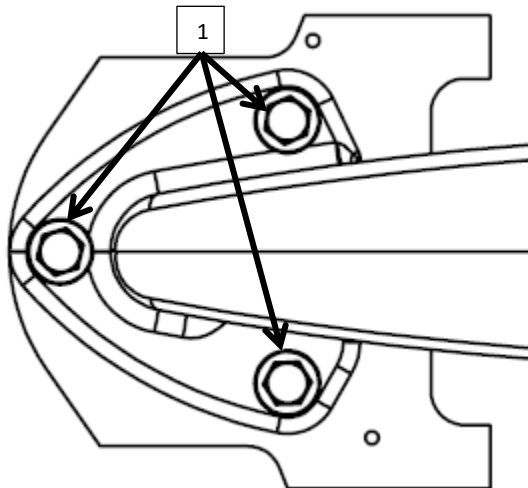
13.2.3.2. Rear brake and hub adaptor

13.2.3.2.1.Tools

- 10 mm Allen
- 8 mm Allen
- 10 mm Wrench

13.2.3.2.2.Removal procedures

1. Lift and support the vehicle, Refer to [Lifting the Vehicle](#)
2. Remove the Rear Hub Cover, Refer to [Rear Hub Cover](#)
3. Remove the Rear Wheel, Refer to [Rear Wheel](#)
4. Remove Rear Brake Caliper bolts, Refer to [Rear Brake Caliper Replacement](#)
5. Remove the Rear Brake Caliper and position it out of the way
6. Remove Rear Brake Rotor
7. Remove the upper and lower Vehicle Speed Sensor, Refer to [Rear Wheel Speed Sensor Replacement](#)

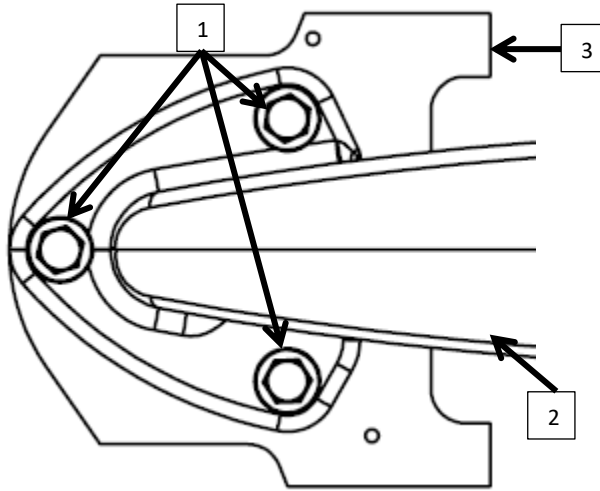


8. Remove the three bolts (1) from the Wheel Hub

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13.2.3.2.3. Installation Procedures



1. Install the three bolts (1) through the Trailing Arm (2) and the new Rear Brake and Hub Adaptor (3) in to the Wheel Hub and tighten to: 115 Nm (85 lb. ft.)
2. Install Vehicle speed sensors, Refer to [Rear Wheel Speed Sensor Replacement](#)
3. Install rear brake Rotor
4. Install rear brake Caliper, Refer to [Rear Brake Caliper Replacement](#)
5. Install rear wheel, Refer to [Rear Wheel](#)

13.2.3.3. Wheel hub Replacement

See Removal and Installation of Rear brake and hub adaptor, Refer to [Rear Hub and Adaptor Replacement](#)

13.2.3.4. Trailing arm Replacement

13.2.3.4.1. Tools

Two 24 mm Wrenches

13.2.3.4.2. Removal Procedures

- Lift and support the vehicle [Refer to Lifting the Vehicle](#)
- Remove rear wheel, [Refer to Rear Wheel Replacement](#)
- If equipped remove rear fender, [Refer to Rear Fender Replacement](#)
- Remove Rear Brake Caliper, [Refer to Rear Brake Caliper Replacement](#)
- Remove Rear Brake Rotor
- Remove Rear Hub and hub adaptor, [Refer to Rear Hub and Adaptor Replacement](#)
- Remove the Body Rocker Panels, [Refer to Body Repair in Body Repair](#)
- Support hub end of trailing arm
- Remove rear shock, Refer to [Rear Shock Replacement](#)
- Using a pair of 24mm wrenches remove bolts through trailing arm bushings on both left and right sides of vehicle
- The Trailing Arm can be removed from vehicle

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13.2.3.4.3. Installation Procedures

- Insert Trailing arm into chassis
- Install bolts through trailing arm bushings
- Install Rear shock, [Refer to Rear Shock Replacement](#)
- Install Rear Hub and Hub adaptor plate, [Refer to Rear Hub and Hub Adaptor Plate Replacement](#)
- Install the Rear Brake Rotor, [Refer to Rear Brake Rotor Replacement](#)
- Install the Rear Brake Caliper, [Refer to Rear Brake Caliper Replacement](#)
- If equipped install rear fender, [Refer to Rear Fender Replacement](#)
- Install rear wheel, [Refer to Rear Wheel Replacement](#)
- Install the Body Rocker Panels, [Refer to Body Rocker Panels in Body Repair](#)

13.2.3.5. Trailing arm bushing Replacement

13.2.3.5.1. Tools

Hammer
Dead blow hammer
3/4" cold chisel

13.2.3.5.2. Removal Procedures

Remove Trailing Arm, [Refer to Trailing Arm in this section](#)
Knock out bushing sleeve
Knock out both bushing halves

13.2.3.5.3. Installation Procedures

Thoroughly clean trailing arm bushing pockets
Using dead blow hammer install bushings halves
Install bushing sleeve
Install Trailing Arm, [Refer to Trailing Arm in this section](#)

13.3. Tires and Wheels

13.3.1. Description and Operation

The factory installed tires are designed to operate satisfactorily with loads up to and including the full rated load capacity when these tires are inflated to the recommended pressures.

The following factors have an important influence on tire life:

- Correct tire pressures
- Correct wheel alignment
- Proper driving techniques
- Tire rotation

The following factors increase tire wear:

- Heavy cornering
- Excessively rapid acceleration
- Heavy braking

13.3.2. Fastener Specifications

Application	Specifications	
	Metric	English
Wheel Lug Nut	140 Nm	100 lb. ft.

13.3.3. Tire and Wheel Specifications

Base Model

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Tires	Wheels	Size	Pressure		Conditions
			kPa	Psi	
Front	19x8.5	235/35-R19	172	25	Cold
Rear	19x11	275/35-R19	172	25	Cold

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13.3.4. Repair instructions

13.3.4.1. Front wheel Replacement

13.3.4.1.1.Tools

- Lug nut key
- 21 mm socket and wrench

13.3.4.1.2.Removal Procedures

- Lift and support the vehicle **Refer to Lifting the Vehicle**
- Remove the 5 wheel lug nuts
- Remove the wheel and tire assembly

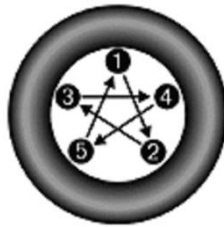
13.3.4.1.3.Installation Procedures

Warning

Never grease or lubricate wheel nuts, studs and mounting surfaces. Wheel nuts, studs, and mounting surfaces must be clean and dry. Tightening the lubricated parts can cause damage to the wheel studs. This can cause a wheel to come off when the vehicle is moving, causing loss of control and possibly personal injury.

Caution

Improperly tightened wheel bolts or nuts can lead to brake pulsation and rotor damage. In order to avoid expensive brake repairs, evenly tighten the wheel bolts or nuts to the proper torque specification following a star pattern.



1. Place wheel and tire assembly on the wheel bearing lug studs
2. Hand tighten wheel lug nuts in a star pattern
3. Torque wheel lug nuts in a star pattern

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13.3.4.2. Rear wheel Replacement

13.3.4.2.1.Tools

- Lug nut key
- 21 mm socket and wrench

13.3.4.2.2.Removal Procedures

1. Lift and support the vehicle **Refer to Lifting the Vehicle**
2. Remove the 5-wheel lug nuts
3. Remove the wheel and tire assembly

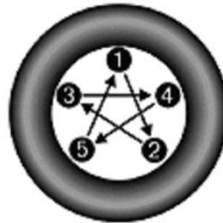
13.3.4.2.3.Installation Procedures

Warning

Never grease or lubricate wheel nuts, studs and mounting surfaces. Wheel nuts, studs, and mounting surfaces must be clean and dry. **Tightening** the lubricated parts can cause damage to the wheel studs. This can cause a wheel to come off when the vehicle is moving, causing loss of control and possibly personal injury.

Caution

Improperly tightened wheel bolts or nuts can lead to brake pulsation and rotor damage. In order to avoid expensive brake repairs, evenly tighten the wheel bolts or nuts to the proper torque specification following a star pattern.



1. Place wheel and tire assembly on the wheel bearing lug studs
2. Hand tighten wheel lug nuts in a star pattern
3. Torque wheel lug nuts in a star pattern

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13.4. Wheel Alignment

13.4.1. Description and Operation

Wheel Alignment is the process of adjusting the angle of the front wheels, To ensure the vehicle drives and brakes straight without pulling to one side. Beyond keeping the vehicle straight Proper wheel alignment is important for:

- Vehicle ride quality
- Braking Distance
- Tire wear
- Fuel Economy

13.4.2. Specifications

Application	Specification
Toe Angle	0°

13.4.2.1. Special Tool

- Vanderhall Alignment bars pack
- Tape Measure
- 21mm Wrench
- 15mm Wrench

13.4.3. Alignment Procedures setting the toe

1. Lock the steering column in the straight-ahead position.



2. Using the 21mm wrench, loosen the tie end rod nuts



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3. Attach the alignment bars to the front wheels (you may have to move a little bit the car to provide a flat surface for the alignment bar.)



4. Using the tape measure, get the distance between the outer end of the two bars, both sides front and rear (An optimal reading should be around 70 ¾")



5. If the distance between the bar front and rear are different, use the 15mm wrench to adjust the inner end rods in or out both side until the distance between bars front and rear are the same (the steering wheel need to be in straight ahead position all the time during this procedure)
6. Remove the Alignment bars
7. Tighten the tie rod lock nut (1) to 30 Nm (22 lb ft) +128 degrees
8. Drive the vehicle for at least 1 mile
9. Repeat steps 3-4 to verify the alignment