

2017 SUSPENSION

Suspension General Diagnosis - Bolt EV

SPECIFICATIONS

TRIM HEIGHT SPECIFICATIONS

For description see Trim Height Inspection, refer to [Trim Height Inspection](#)

Model	Tire Size	Z +/- 10 mm (0.39 in)	D +/- 10 mm (0.39 in)	P +/- 12 mm (0.47 in)	R +/- 12 mm (0.47 in)
1FB48/0FB48	215/50R17	22 mm (0.87 in)	207 mm (8.15 in)	687.1 mm (27.05 in)	686.9 mm (27.04 in)
0FB48	205/55R16	22 mm (0.87 in)	207 mm (8.15 in)	679.1 mm (26.74 in)	678.9 mm (26.73 in)

The conditions refers to full fluid levels (fuel, windshield washer fluid and etc.) with no driver or passenger mass, and no luggage/cargo mass.

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - SUSPENSION GENERAL DIAGNOSIS

NOTE: The following step must be completed before using the symptom tables.

Review the system description and operation in order to familiarize yourself with the system functions. Refer to the appropriate description and operation:

- [Front Suspension Description and Operation](#)
- [Rear Suspension Description and Operation](#)

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of any of the suspension subsystems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect for correct tire size and inflation pressure.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- [Ride Diagnosis](#)
- [Vehicle Leads/Pulls](#)
- [Body Leans or Sways in Corners](#)
- [Suspension Bottoms](#)
- [Torque Steer](#)
- [Memory Steer](#)
- [Noise Diagnosis - Front Suspension](#)
- [Noise Diagnosis - Rear Suspension](#)

RIDE DIAGNOSIS

Step	Action	Yes	No
1	Did you review the General Description and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Suspension General Diagnosis
2	NOTE: Verify the vehicle suspension package RPO. Verify that the ride is too soft or too hard. Does the vehicle ride normally?	System OK	Go to Step 3
3	Inspect the tire inflation and adjust to specifications. Refer to Tire Inflation Description Did you adjust the tire pressure?	Go to Step 6	Go to Step 4
4	Inspect the vehicle trim height. Refer to Trim Height Inspection Did you find and correct the condition?	Go to Step 6	Go to Step 5
5	Inspect the following suspension components for wear or damage: - Shock absorbers - Suspension Strut and Shock Absorber Testing - On Vehicle - Springs Did you find and correct the condition?	Go to Step 6	-
6	Drive the vehicle in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

VEHICLE LEADS/PULLS

Step	Action	Yes	No
DEFINITION: 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.			
1	Did you review the General Description and perform the visual/physical inspections?	Go to Step 2	Go to Symptoms - Suspension General Diagnosis
2	Road test the vehicle in order to verify the complaint. Does the vehicle operate normally?	System OK	Go to Step 3
3	Inspect the tire/wheel assemblies for the following conditions: - Correct tire pressure - Refer to the tire placard. - Correct tire size - Refer to the tire placard. - Abnormal tire wear or damage Did you find and correct the condition?	Go to Step 9	Go to Step 4
4	Perform the radial tire lead/pull correction procedure. Refer to Radial Tire Lead/Pull Correction Did you find and correct the condition?	Go to Step 9	Go to Step 5

Step	Action	Yes	No
5	Inspect and correct/adjust the suspension and steering systems for the following conditions: - Vehicle trim height - Trim Height Specifications - Excessively worn, loose, or damaged components Did you find and correct the condition?	Go to Step 9	Go to Step 6
6	Inspect the brake system for brake drag. With the vehicle suspended on a hoist, brake drag can be identified by rotating each wheel several times and observing whether more force is needed to rotate the left wheel or the right wheel. Did you find and correct the condition?	Go to Step 9	Go to Step 7
7	Inspect the wheel alignment and adjust as necessary. Refer to Wheel Alignment Measurement . Did you correct the condition?	Go to Step 9	Go to Step 8
8	Inspect the steering gear for unequal effort. The vehicle must be suspended on a hoist, the engine running, and the transmission in PARK or NEUTRAL. Grasp the tire assembly and manually simulate a turn from the left of center and the right of center observing whether more force is needed to turn to the left or to the right. If this condition exists replace the steering gear. Did you correct the condition?	System OK	Go to Step 3
9	Operate the vehicle in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

BODY LEANS OR SWAYS IN CORNERS

Step	Action	Yes	No
1	Did you review the General Description and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Suspension General Diagnosis
2	Verify the vehicle leans or sways in corners. Does the vehicle operate normally?	System OK	Go to Step 3
3	Inspect the following components for wear or damage: - Front coil springs - Rear coil springs Are the components worn or damaged?	Go to Step 5	Go to Step 4
4	1. Inspect the stabilizer shaft link for wear or damage. 2. Replace as necessary. Did you find and correct the condition?	Go to Step 6	Go to Step 2
5	Replace the springs as necessary. Did you complete the repair?	Go to Step 6	-
6	Operate the vehicle in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

SUSPENSION BOTTOMS

Step	Action	Yes	No
DEFINITION: A loud bang or thump that can usually be felt and/or heard when the vehicle is driven over bumps. This condition is commonly noticed when the vehicle trim height is too low.			
1	Did you review the General Description and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Suspension General Diagnosis
2	Verify that the suspension bottoms. Does the vehicle operate normally?	System OK	Go to Step 3
3	Inspect for vehicle overloading and correct the overloading condition as necessary. Did you find and correct the condition?	Go to Step 6	Go to Step 4
4	Inspect the following components: - Inspect the shock absorbers. Refer to Suspension Strut and Shock Absorber Testing - On Vehicle - Inspect for damaged coil springs and torsion bar, and replace as necessary. Did you find and correct the condition?	Go to Step 6	Go to Step 5
5	Inspect the vehicle trim height. Refer to Trim Height Inspection Did you complete the trim height inspection procedure?	Go to Step 6	-
6	Operate the vehicle in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

TORQUE STEER

Step	Action	Yes	No
DEFINITION: On a dry, smooth, flat road, the vehicle has a left or right steering force only during acceleration.			
1	Did you review the General Description and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Suspension General Diagnosis
2	- Drive the vehicle on a straight, smooth, flat road. - Press the accelerator and determine if any additional steering input is required to maintain a straight ahead direction. - Repeat this test with the vehicle traveling in the opposite direction in order to eliminate crosswind effects. Lead/pull caused by unlevel roads and crosswinds are considered normal. Does the vehicle exhibit torque steer when the accelerator is pressed?	Go to Step 3	System OK

Step	Action	Yes	No
3	1. Drive the vehicle on a straight, smooth, flat road at 64 - 97 km/h (40 - 60 mph). 2. Remove your foot from the accelerator. 3. Shift the transmission into NEUTRAL in order to allow the vehicle to coast. 4. Is any additional steering input required to maintain a straight ahead direction? 5. Repeat this test with the vehicle traveling in the opposite direction in order to eliminate crosswind effects. Lead/pull caused by unlevel roads and crosswinds are considered normal. Does the vehicle direction change when the steering wheel is momentarily released?	Go to Vehicle Leads/Pulls	Go to Step 4
4	Inspect the front suspension and powertrain mounts for worn or damaged components and repair as necessary. Did you find and correct the condition?	Go to Step 6	Go to Step 5
5	Inspect the vehicle trim height. Refer to Trim Height Inspection Did you find and correct the condition?	Go to Step 6	-
6	Operate the vehicle in order to verify the repair. Did you correct the condition?	System OK	-

MEMORY STEER

Step	Action	Yes	No
DEFINITION: A 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.			
1	Did you review the General Description and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Suspension General Diagnosis
2	Verify that memory steer is present. Does the system operate normally?	System OK	Go to Step 3
3	1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle 2. Lubricate the tie rod ends and the ball joints if applicable. 3. Inspect the suspension system for worn or damaged components. 4. Repair as necessary. Did you find and correct the condition?	Go to Step 7	Go to Step 4
4	Inspect for binding strut bearings. 1. Disconnect the strut from the steering knuckle. 2. If the strut is abnormally difficult to rotate, repair or replace the upper bearing mount. Did you find and complete the repair?	Go to Step 7	Go to Step 5

Step	Action	Yes	No
5	Inspect for binding in the lower ball joints. If the joint is binding, replace the joint. Did you find and complete the repair?	Go to Step 7	Go to Step 6
6	Inspect the wheel alignment and adjust as necessary. Refer to <u>Wheel Alignment Measurement</u> Did you complete the wheel alignment?	Go to Step 7	-
7	Operate the vehicle in order to verify the repair. Did you correct the condition?	System OK	-

NOISE DIAGNOSIS - FRONT SUSPENSION

Step	Action	Yes	No
DEFINITION: Any noise emitted from the front of the vehicle that is induced by VEHICLE SPEED or DRIVING TERRAIN as related to the front suspension.			
1	Did you review the General Description and perform the necessary Inspections?	Go to Step 2	Go to <u>Symptoms - Suspension General Diagnosis</u>
2	Attempt to duplicate the condition. Road test the vehicle. Did you duplicate the condition?	Go to Step 3	System OK
3	Is the noise reactive to vehicle load or speed?	Go to Step 4	Go to Step 7
4	Inspect the tires for the following condition: • Proper tire inflation and adjust as necessary - <u>Tire Inflation Description</u> • Unusual tire wear - <u>Tire Diagnosis - Irregular or Premature Wear</u> • Inspect the wheel nuts for looseness and tighten as necessary. <u>Fastener Specifications</u> Did you find and correct the condition?	Go to Step 14	Go to Step 5
5	Inspect the front wheel bearings. Refer to <u>Wheel Bearings Diagnosis</u> Did you find and correct the condition?	Go to Step 14	Go to Step 6
6	Inspect for front axle or transaxle noises. Refer to <u>Symptoms - Automatic Transmission</u> Did you find and correct the condition?	Go to Step 14	Go to Step 7
7	Bounce the front of the vehicle in order to duplicate the noise. Did you duplicate the noise?	Go to Step 8	Go to Step 9
8	1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> 2. Inspect the front suspension components for looseness. Refer to <u>Fastener Specifications</u> 3. Inspect the front suspension components for damage and repair as necessary. Did you find and correct the condition?	Go to Step 14	Go to Step 9

Step	Action	Yes	No
9	1. Install the CH-39570 chassis ear or equivalent. 2. Bounce the front of the vehicle, using CH-39570 chassis ear or equivalent in order to locate the source of the noise. If necessary road test the vehicle. 3. Repair or replace any damaged components as necessary. Did you find and correct the condition?	Go to Step 14	Go to Step 10
10	Inspect the ball joints and steering components for the following conditions: • Lack of lubrication where applicable • Looseness in the ball joints • Looseness in the tie rods Did you find and correct the condition?	Go to Step 14	Go to Step 11
11	Inspect for damaged shock absorbers. Refer to <u>Suspension Strut and Shock Absorber Testing - On Vehicle</u> Did you find and correct the condition?	Go to Step 14	Go to Step 12
12	Inspect the front stabilizer shaft and stabilizer shaft links for damage and repair as necessary. Refer to <u>Stabilizer Shaft Replacement</u> , or <u>Stabilizer Shaft Link Replacement</u> Did you find and correct the condition?	Go to Step 14	Go to Step 13
13	Inspect for control arm damage and repair as necessary. Refer to <u>Lower Control Arm Replacement</u> Did you find and correct the condition?	Go to Step 14	-
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

NOISE DIAGNOSIS - REAR SUSPENSION

Step	Action	Yes	No
DEFINITION: Any noise emitted from the rear of the vehicle that is induced by VEHICLE SPEED or DRIVING TERRAIN as related to the rear suspension.			
1	Did you review the General Description and perform the necessary inspections?	Go to Step 2	Go to <u>Symptoms - Suspension General Diagnosis</u>
2	Attempt to duplicate the condition. Road test the vehicle. Did you duplicate the condition?	Go to Step 3	System OK
3	Is the noise reactive to vehicle load or speed?	Go to Step 4	Go to Step 6

Step	Action	Yes	No
4	Perform the following inspections: - Inspect and adjust the tire inflation. Refer to Tire Inflation Description - Inspect for unusual tire wear. Refer to Tire Diagnosis - Irregular or Premature Wear - Inspect the wheel nuts for looseness. Refer to Fastener Specifications Did you find and correct the condition?	Go to Step 10	Go to Step 5
5	Inspect the rear wheel bearings. Refer to Wheel Bearings Diagnosis Did you find and correct the condition?	Go to Step 10	Go to Step 6
6	Bounce the rear of the vehicle in order to duplicate the noise. Did you duplicate the noise?	Go to Step 7	Go to Step 9
7	1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle 2. Inspect the rear suspension components for looseness. Refer to Fastener Specifications 3. Inspect the rear suspension components for damage and repair as necessary. Did you find and correct the condition?	Go to Step 10	Go to Step 8
8	Inspect the rear shock absorber. Refer to Suspension Strut and Shock Absorber Testing - On Vehicle Did you find and correct the condition?	Go to Step 10	Go to Step 9
9	1. Install the CH-39570 chassis ear or equivalent. 2. Bounce the rear of the vehicle, using CH-39570 chassis ear or equivalent, in order to locate the source of the noise. If necessary, road test the vehicle. 3. Repair or replace any defect component as necessary. Did you find and correct the condition?	Go to Step 10	System OK
10	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

SUSPENSION STRUT AND SHOCK ABSORBER TESTING - ON VEHICLE

Step	Action	Yes	No
1	Did you review the General Description and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Suspension General Diagnosis
2	Verify that the customer concern is present. Does the vehicle operate normally?	System OK	Go to Step 3

Step	Action	Yes	No
3	NOTE: A light film of oil on the top portion of the shock reservoir is normal. Inspect each strut or shock absorber for external fluid leakage. Is a strut or shock absorber leaking?	Go to Step 5	Go to Step 4
4	1. Use your hands in order to lift up and push down each corner of the vehicle 3 times. 2. Remove your hands from the vehicle. 3. Locate a shock or strut that exceeds 2 cycles. Did you locate a shock or strut that exceeds 2 cycles?	Go to Step 5	Go to Step 6
5	NOTE: Inspect the vehicle trim height in order to correct any possible causes of shock/strut failures. Refer to <u>Trim Height Inspection</u> Replace the strut or shock absorber. Refer to <u>Strut, Strut Component, or Spring Replacement</u> , or <u>Shock Absorber Replacement</u> Did you complete the repair?	Go to Step 6	-
6	Operate the vehicle in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

WHEEL BEARINGS DIAGNOSIS

Step	Action	Yes	No
1	Did you review the General Description and perform the necessary inspections?	Go to Step 2	Go to <u>Symptoms - Suspension General Diagnosis</u>
2	Road test the vehicle in order to verify the customer's complaint. Does the vehicle operate normally?	System OK	Go to Step 3
3	1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> 2. Inspect for tire or wheel damage. Did you find and correct the condition?	Go to Step 7	Go to Step 4
4	1. Install the CH-39570 chassis ear. 2. Road test the vehicle to verify the location of the wheel bearing noise. Did you find and correct the condition?	Go to Step 6	Go to Step 5

Step	Action	Yes	No
5	NOTE: Support the vehicle by the lower control arms or the rear axle to prevent movement during wheel bearing/hub inspection. 1. Mount and secure the J-8001 dial indicator. 2. Ensure that the dial indicator contacts the vertical surface of the wheel as close as possible to the top wheel stud. 3. Push and pull on the top of the tire in order to inspect the total travel indicated by the dial indicator. Specification Maximum allowable wheel bearing end play: 0.127 mm (0.005 in) Is the measurement greater than the specified value?	Go to Step 6	System OK
6	Replace the wheel bearing. Refer to Front Wheel Bearing and Hub Replacement , or Rear Wheel Bearing and Hub Replacement Did you complete the repair?	Go to Step 7	-
7	Road test the vehicle to verify the repair. Does the vehicle operate normally?	System OK	Go to Step 3

TRIM HEIGHT INSPECTION

Trim Height Measurement

Trim height is a predetermined measurement relating to vehicle ride height. Incorrect trim heights can cause the vehicle to bottom 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:

- Set the tire pressure to the specifications shown on the certification label. Refer to [Vehicle Certification, Tire Placard, Anti-Theft, and Service Parts ID Label](#) .
- Check the fuel level. Add additional weight if necessary to simulate a full tank.
- Make sure the passenger and rear compartments are empty, except for the spare tire.
- Make sure the vehicle is on a flat and level surface, such as an alignment rack.
- Check that all the vehicle doors are securely closed.
- Check that the vehicle hood and rear deck lids are securely closed.
- Check for installed after market accessories or modifications that could affect trim height measurement:
 - Larger or smaller than production wheels and tires.
 - Lifting or Lowering Kits
 - Wheel Opening Flares or Ground Affects

Measuring the P and R Dimension



Fig. 1: Identifying P and R Dimensions

Courtesy of GENERAL MOTORS COMPANY

Measurement Definitions

P Height: The vertical distance from the ground to the top of the front wheel opening through the center line of the front wheel

R Height: The vertical distance from the ground to the top of the rear wheel opening through the center line of the rear wheel

Use the following procedures to measure the P and R dimensions:

NOTE:

- **Measure from the center of the wheel well opening to the ground.**
- **The left and right P and R height differences should be no more than 10 mm (0.39 in).**

1. Push the front bumper down a minimum of 38 mm (1.59 in) and release. Perform this step three times.
2. Measure and record the trim height per the "Measurement Definitions" above.
3. Lift the bumper up a minimum of 38 mm (1.59 in) and release. Perform this step three times.
4. Measure and record the trim height per the "Measurement Definitions" above.
5. The true P height measurement is the average of the measurements taken in step 2 and 4. Refer to **Trim Height Specifications**
6. Repeat the above steps at the rear of the vehicle for the R heights.

If the P and R heights are outside of the specifications, measure the Z & D heights.

Measuring the Z Dimension

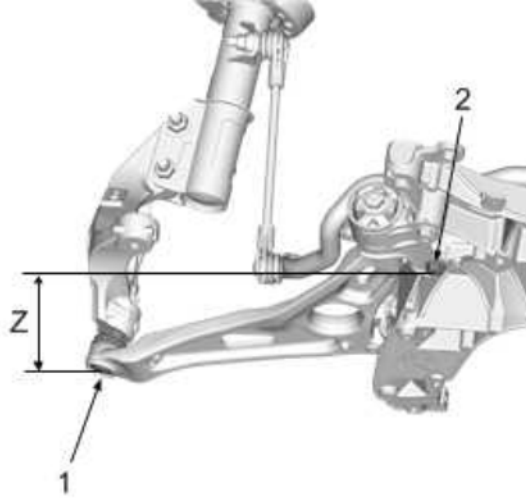


Fig. 2: Identifying Z Dimension

Courtesy of GENERAL MOTORS COMPANY

Measurement Definitions

The Z Height: The vertical distance from the center of lower control arm rear bolt head (2) to the center of the ball joint cup (1)

The Z Height dimension measurement determines the proper ride height for the front end of the vehicle. There is no adjustment procedure. Repair may require replacement of suspension parts.

Use the following procedures to check the Z height dimension:

1. Using your hands, lift the front bumper approximately 38 mm (1.59 in).
 2. Gently remove your hands and allow the vehicle to settle.
 3. Repeat the jouncing operation a total of 3 times.
 4. Measure and record the suspension height per the "Measurement Definitions" above.
 5. Using your hands, jounce the front of the vehicle downward approximately 38 mm (1.59 in).
 6. Gently remove your hands and allow the vehicle to settle.
 7. Repeat the jouncing operation a total of 3 times.
 8. Measure and record the suspension height per the "Measurement Definitions" above.
 9. The true Z height dimension number is the average of the measurements taken in steps 4 and 8.
- Refer to [Trim Height Specifications](#).

Measuring the D Dimension

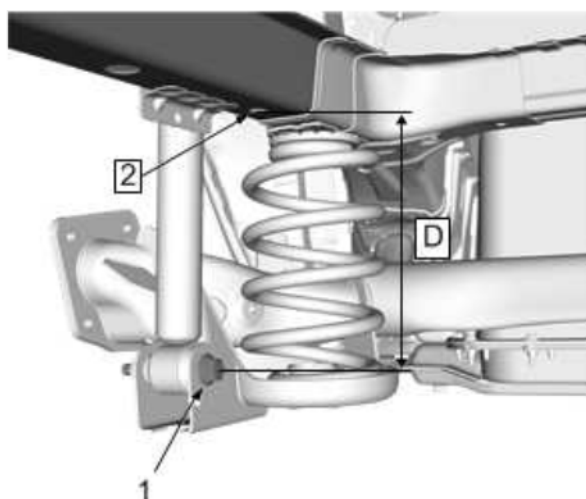


Fig. 3: Identifying D Dimension

Courtesy of GENERAL MOTORS COMPANY

Measurement Definitions

The D Height: The vertical distance from the bottom surface of underbody side rail (2) which is vertically located above the shock absorber lower bolt head to the center of rear shock absorber lower bolt (1)

The D Height dimension measurement determines the proper rear end ride height. There is no adjustment procedure. Repair may require replacement of suspension parts.

Use the following procedure to check the D height dimension:

1. With the vehicle on a flat surface, lift upward on the rear bumper 38 mm (1.59 in).
 2. Gently remove your hands and allow the vehicle to settle.
 3. Repeat the jouncing operation a total of 2 times.
 4. Measure and record the suspension height per the "Measurement Definitions" above.
 5. Repeat this task for the other side of the vehicle.
 6. Using your hands, jounce the front of the vehicle downward approximately 38 mm (1.59 in).
 7. Gently remove your hands and allow the vehicle to settle.
 8. Repeat the jouncing operation a total of 2 times.
 9. Measure and record the suspension height per the "Measurement Definitions" above.
 10. The true D height dimension number is the average of the high and the low measurements. Refer to **Trim Height Specifications**.
 11. If these measurements are out of specifications, inspect for the following conditions:
 - Worn or damaged suspension components
 - Collision damage
-