

2004 SUSPENSION

Tires And Wheels - Corvette

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Wheel Nuts In Sequence	140 N.m	100 lb ft

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - TIRES AND WHEELS

Begin the tire and wheel system diagnosis with **Diagnostic Starting Point - Vibration Diagnosis and Correction** in Vibration Diagnosis and Correction. The use of the Diagnostic Starting Point will determine if the concern is related to the tire and wheel system, and where the appropriate repair procedure is located.

TIRE DIAGNOSIS - IRREGULAR OR PREMATURE WEAR

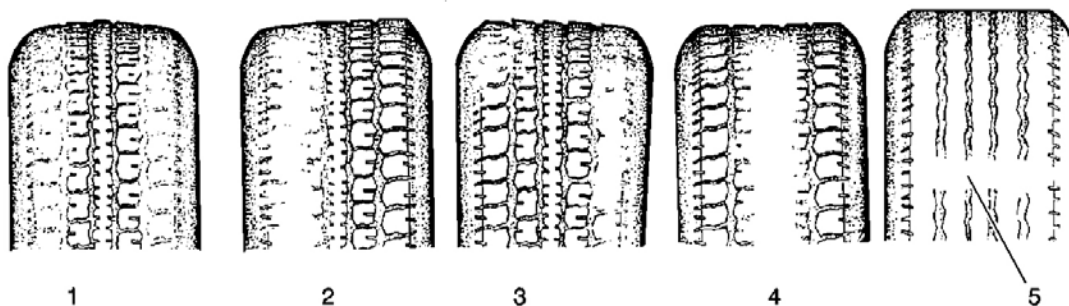


Fig. 1: Tire Wear

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 1

Callout	Component Name
1	Under-inflation, Hard Cornering, Lack of Regular Rotation
2	Incorrect Wheel Alignment, Hard Cornering, Lack of Regular Rotation
3	Incorrect Wheel Alignment, Shock Absorber Failure
4	Over-inflation, Heavy Acceleration, Lack of Regular Rotation

Inspection Procedure

1. Inspect the front tire wear.
2. Inspect the rear tire wear.
3. Rotate the tires if any of the following conditions exist:
 - The amount of time or mileage since the last tire rotation matches the maintenance schedule.
 - The outer tread blocks are worn more than the middle tread blocks (1).
 - The outer tread blocks are worn more than the inner tread blocks (2).
 - The middle tread blocks are worn more than the outer tread blocks (4).
4. Measure the wheel alignment if any of the following conditions exist:
 - The tread blocks have feathered edges (3).
 - The outer tread blocks are worn more than the inner tread blocks (2).
 - The inner tread blocks are worn more than the outer tread blocks (2).
5. Inspect the struts or the shock absorbers if the tire tread exhibits a cupped appearance (3).

TIRE DIAGNOSIS - WADDLE COMPLAINT

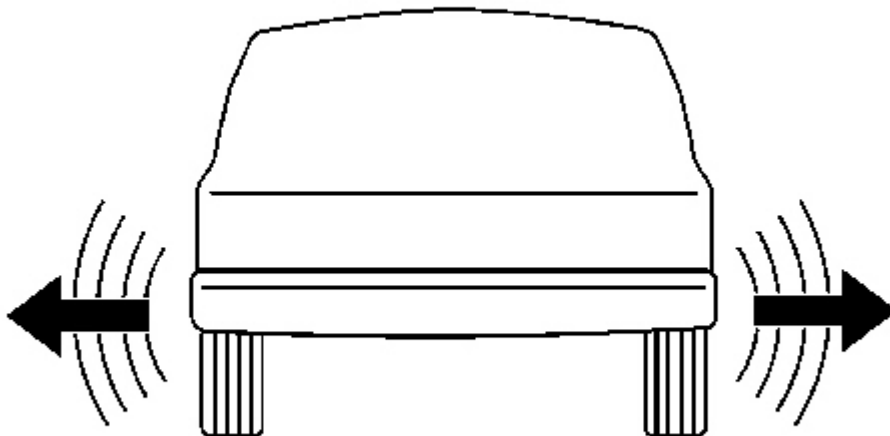


Fig. 2: Identifying Tire Waddle
Courtesy of GENERAL MOTORS CORP.

Tire waddle is a side to side movement at the front of the vehicle and/or the rear of the vehicle. Tire waddle can

be caused by the following conditions:

- A steel belt not being straight within the tire
- Excessive lateral runout of the tire
- Excessive lateral runout of the wheel

The tire waddle is most noticeable at a low speed of about 8-48 km/h (5-30 mph). Tire waddle may appear as ride roughness at 80-113 km/h (50-70 mph). Tire waddle may appear as a vibration at 80-113 km/h (50-70 mph).

Inspection Procedure

1. Raise and support the vehicle with safety stands. Refer to **Lifting and Jacking the Vehicle** in General Information.

CAUTION: Wear gloves when inspecting the tires in order to prevent personal injury from steel belts sticking through the tire.

2. Perform the following preliminary inspection:
 1. Mark the tire with a crayon in order to note the start and the stop position.
 2. Rotate each tire and wheel by hand.
 3. Inspect the tire for bulges or bent wheels. Replace as necessary.
3. Use tire substitution in order to identify the faulty tire. Perform the following steps for a tire substitution check:
 1. Use a comparable tire in order to replace each tire, one at a time.
 2. Test drive the vehicle.
 3. If the problem is tire or wheel related, you will eliminate the problem when you remove the faulty tire from the vehicle.

WHEEL MOUNTING SURFACE CHECK

Replace any wheels that are bent or dented, or have excessive lateral or radial runout. Wheels with runout greater than specified may cause objectionable vibrations.

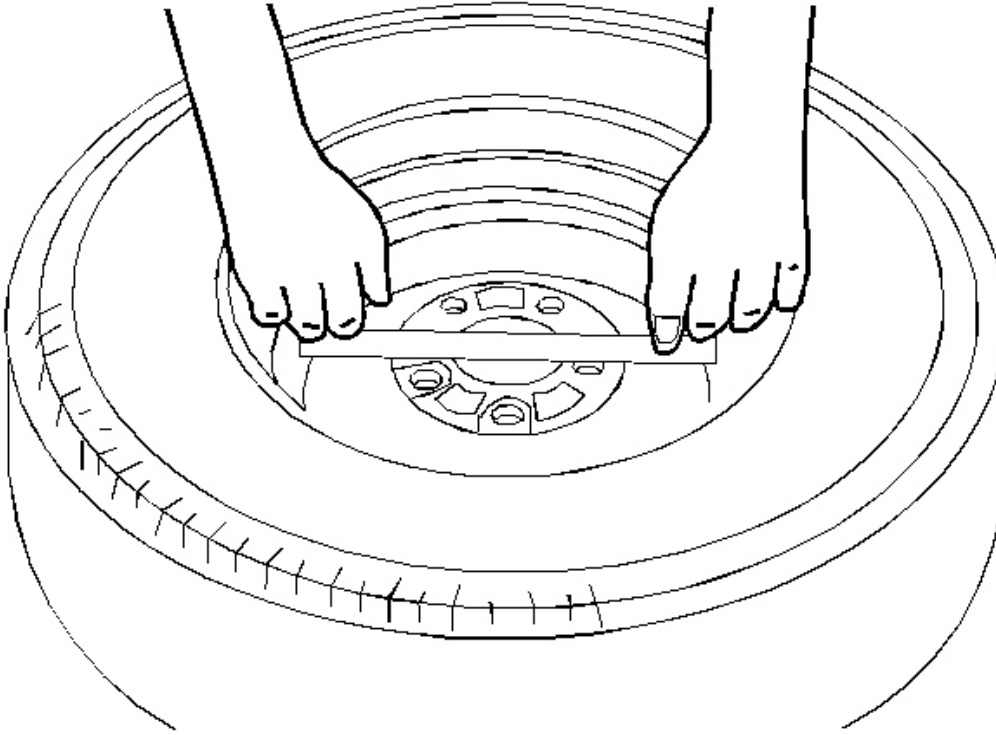


Fig. 3: Wheel Mounting Surface Check
Courtesy of GENERAL MOTORS CORP.

1. Use a straight edge 203-229 mm (8-9 in) long. Place the straight edge on the wheel inboard mounting surface. Try to rock the straightedge up and down within the mounting surface.

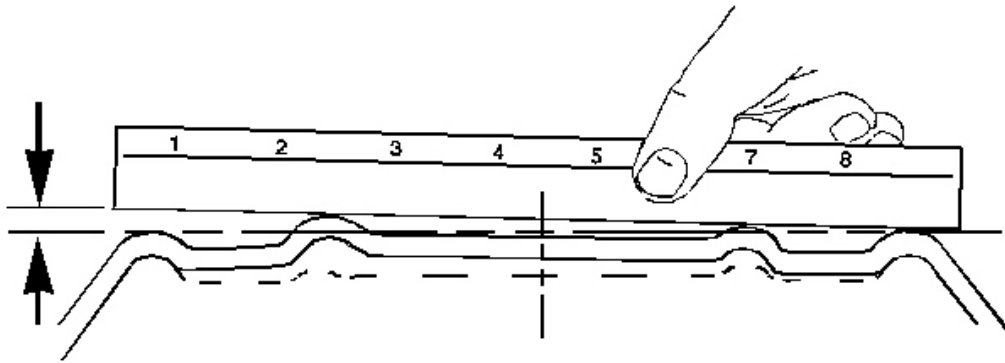


Fig. 4: Inspecting Wheel Mounting Surface
Courtesy of GENERAL MOTORS CORP.

2. Repeat this procedure on at least 3-4 different positions on the inboard mounting surface.
 - The outer ring of the mounting surface normally is raised above everything inside the mounting surface.
 - The mounting surface will be raised above the outer ring if the wheel mounting surface has been bent on a tire changer.
 - If you can rock the straight edge, the mounting surface is bent and you must replace the wheel.

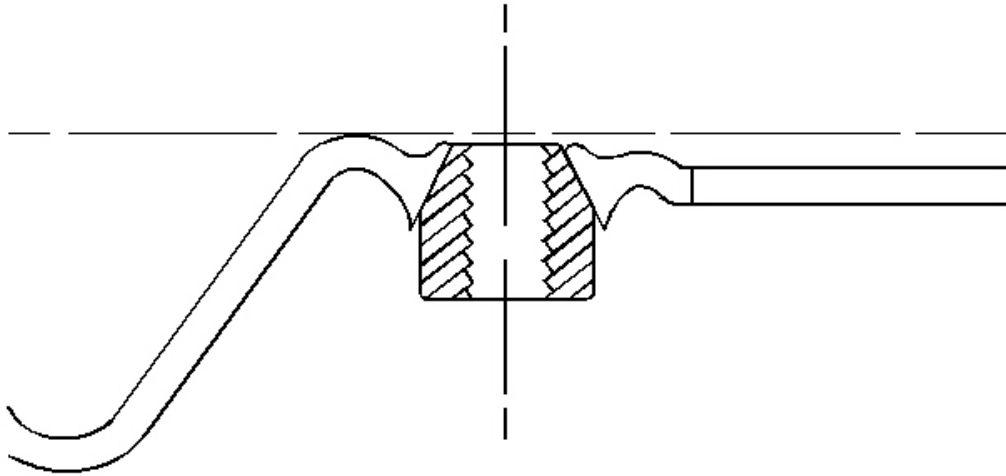


Fig. 5: Inspecting Mounting Wheel/Nut Holes
Courtesy of GENERAL MOTORS CORP.

3. Inspect the mounting wheel/nut holes for damage caused from over-torquing the wheel/nuts. Inspect for collapsed wheel/nut bosses. Inspect for cracked wheel bosses.

NOTE: **The use of non-GM original equipment wheels may cause:**

- **Damage to the wheel bearing, the wheel fasteners and the wheel**
- **Tire damage caused by the modified clearance to the adjacent vehicle components**
- **Adverse vehicle steering stability caused by the modified scrub radius**
- **Damage to the vehicle caused by the modified ground clearance**
- **Speedometer and odometer inaccuracy**

IMPORTANT:

- **Replacement wheels must be equivalent to the original equipment wheels in the following ways:**
 - **The load capacity**
 - **The wheel diameter**
 - **The rim width**
 - **The wheel offset**
 - **The mounting configuration**

- **A wheel of the incorrect size or type may affect the following conditions:**

- **Wheel and hub-bearing life**
- **Brake cooling**
- **Speedometer/odometer calibration**
- **Vehicle ground clearance**
- **Tire clearance to the body and the chassis**

4. Replace the wheel if the wheel is bent.
5. Replace the wheel if the wheel/nut boss area is cracked.

Identify steel wheels with a 2 or 3-letter code stamped into the rim near the valve stem. Aluminum wheels have the code, the part number, and the manufacturer identification cast into the back side of the wheel.

RADIAL TIRE LEAD/PULL CORRECTION

Radial Tire Lead/Pull Correction

Step	Action	Yes	No
DEFINITION: Lead/pull is the deviation of the vehicle from a straight path on a level road with no pressure on the steering wheel.			
1	Did you perform the Vehicle Leads/Pull diagnostic table in Suspension General Diagnosis?	Go to Step 2	Go to Vehicle Leads/Pulls in Suspension General Diagnosis
2	Road test the vehicle to verify the concern. Select a smooth level surface to perform the test. Does the condition exist?	Go to Step 3	System OK
3	Cross-switch the front tire and wheel assemblies. Did you complete the procedure?	Go to Step 4	-
4	Does the vehicle lead/pull in the opposite direction?	Go to Step 5	Go to Measuring Wheel Alignment in Wheel Alignment
5	Replace the tire that is pulling in the opposite direction and then install it to its original position. Refer to Tire Mounting and Dismounting . Did you complete the replacement?	Go to Step 6	-
6	Verify proper vehicle operation. Does the original condition still exist?	Go to Step 1	System OK

REPAIR INSTRUCTIONS

ALUMINUM WHEEL POROSITY REPAIR

1. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .

2. Inflate the tire to the manufacturer's specified pressure as stated on the tire.
3. Submerge the tire/wheel into a water bath in order to locate the leak.
4. Inscribe a mark on the wheel in order to indicate the leak areas.
5. Inscribe a mark on the tire at the valve stem in order to indicate the orientation of the tire to the wheel.
6. Remove the tire from the wheel. Refer to **Tire Mounting and Dismounting** .

IMPORTANT: Do not damage the exterior surface of the wheel.

7. Use number 80 grit sandpaper to scuff the inside of the rim surface at the leak area.
8. Use general purpose cleaner such as 3M(R), P/N 08984 or equivalent, to clean the leak area.
9. Apply 3 mm (0.12 in) thick layer of adhesive/sealant, GM P/N 12378478 (Canadian P/N 88900041) or equivalent, to the leak area.
10. Allow for the adhesive/sealant to dry.
11. Align the inscribed mark on the tire with the valve stem on the wheel.
12. Install the tire to the wheel. Refer to **Tire Mounting and Dismounting** .
13. Inflate the tire to the manufacturer's specified pressure as stated on the tire.
14. Submerge the tire/wheel into a water bath in order to ensure the leak is sealed.
15. Balance the tire and wheel. Refer to **Tire and Wheel Assembly Balancing - Off-Vehicle** in Vibration Diagnosis and Correction.
16. Install the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
17. Lower the vehicle.

ALUMINUM WHEEL REFINISHING

Finish Damage Evaluation Procedure

- IMPORTANT:**
- **If the wheels are chrome-plated, do not re-plate or refinish the wheels.**
 - **If the wheels are polished aluminum, do not refinish the wheels in the dealer environment. Utilize a refinisher that meets manufacturer guidelines.**

1. Inspect the wheels for damage from uncoated wheel balance weights or from automatic car wash facilities.
2. Inspect the wheels for the following conditions:
 - Corrosion
 - Scrapes
 - Gouges
3. Verify the damage is not deeper than what sanding can remove.
4. Inspect the wheels for cracks. If a wheel has cracks, discard the wheel.

5. Inspect the wheels for bent rim flanges. If a rim flange is bent, discard the wheel.

Refinishing Procedure

CAUTION: To avoid serious personal injury when applying any two part component paint system, follow the specific precautions provided by the paint manufacturer. Failure to follow these precautions may cause lung irritation and allergic respiratory reaction.

1. Remove the tire and wheel assembly from the vehicle. Refer to **Tire and Wheel Removal and Installation**.
2. Remove the balance weights from the wheel.
3. Remove the tire from the wheel. Refer to **Tire Mounting and Dismounting**.
4. Use a suitable cleaner in order to remove the following contaminants from the wheel:
 - Lubricants
 - Wax
 - Dirt

IMPORTANT:

- Do not re-machine the wheel.
- Do not use chemicals in order to strip the paint from the wheel.

5. Use plastic media blasting in order to remove the paint from the wheel.
6. If the wheel had a machined aluminum finish, spin the wheel and use sand paper in order to restore the circular machined appearance.

IMPORTANT: The wheel mounting surface and the wheel nut contact surface must remain free of paint.

7. Mask the wheel mounting surface and the wheel nut contact surface.
8. Follow the paint manufacturer's instructions for painting the wheel.
9. Unmask the wheel.
10. Install a new valve stem.

IMPORTANT: Use new coated balance weights in order to balance the wheel.

11. Install the tire to the wheel. Refer to **Tire Mounting and Dismounting**.
12. Use a suitable cleaner in order to remove the following contaminants from the wheel mounting surface:
 - Corrosion
 - Overspray
 - Dirt
13. Install the tire and wheel assembly to the vehicle. Refer to **Tire and Wheel Removal and Installation**.

TIRE AND WHEEL REMOVAL AND INSTALLATION

Tools Required

J 39544-KIT Complete Torque Socket Set - 10 Pieces

Removal Procedure

NOTE: Use care when positioning the tire and wheel assembly on the tire changer. The upper/lower bead breaker or tire changing tools may damage the TPM sensor. To prevent damage, position the valve stem/sensor 90 degrees away from the two bead breakers. For rim clip tire changers, position the bead breakers approximately 180 degrees away from the valve stem/sensor.

IMPORTANT: This vehicle is equipped with tire and wheel assemblies specific to the front and rear axles. Ensure that the correct tire and wheel assembly is installed on the corresponding axle.

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.

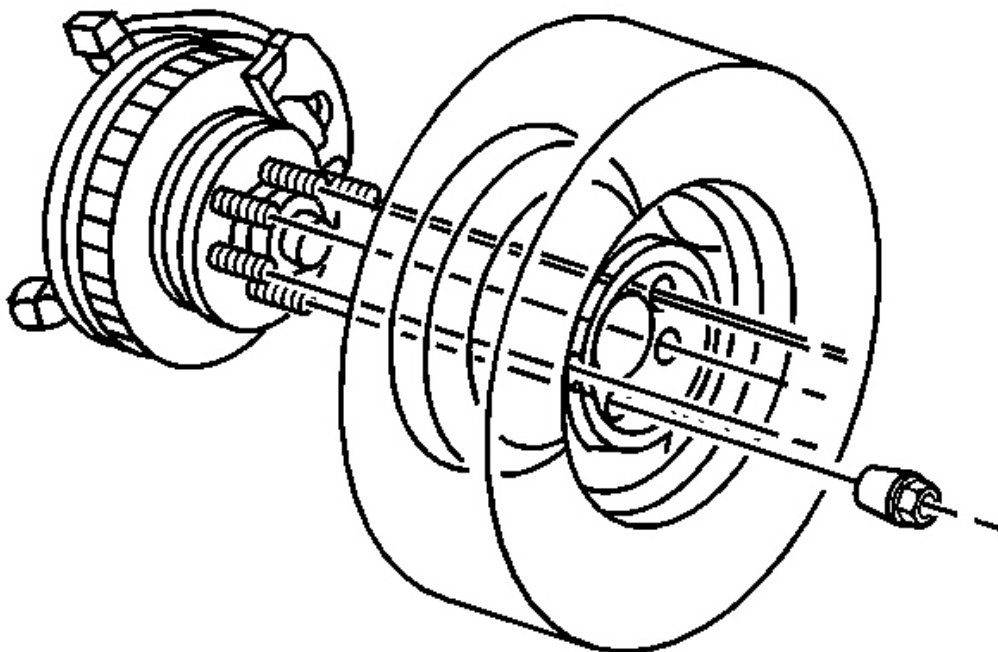


Fig. 6: View Of Tire & Wheel Assembly
Courtesy of GENERAL MOTORS CORP.

2. Remove the wheel center cap, if equipped.
3. Remove the wheel nut caps, if equipped.
4. Mark the relationship of the wheel to the hub.
5. Remove the wheel nuts.

CAUTION: If penetrating oil gets on the vertical surfaces between the wheel and the rotor or drum it could cause the wheel to work loose as the vehicle is driven, resulting in loss of control and an injury accident.

NOTE: Removing the wheel may be difficult because of foreign materials or a tight fit between the wheel and the hub/rotor. Slightly tap the tire side wall with a rubber mallet in order to remove the wheel. Failure to follow these instructions may result in damage to the wheel.

6. Remove the tire and wheel assembly from the vehicle. If the tire and wheel assembly is difficult to remove, perform the following steps:
 1. Install and tighten all wheel nuts on the affected wheel.
 2. Loosen each wheel nut 2 turns.
 3. Lower the vehicle.
 4. Rock the vehicle from side to side.
 5. Repeat this procedure, if necessary.
7. If the tire and wheel assembly still does not loosen, perform the following steps:
 1. Start the engine.
 2. Drive the vehicle forward and rearward slightly while applying quick, hard jabs of the brakes prior to changing direction.
 3. Repeat this procedure, if necessary.

Installation Procedure

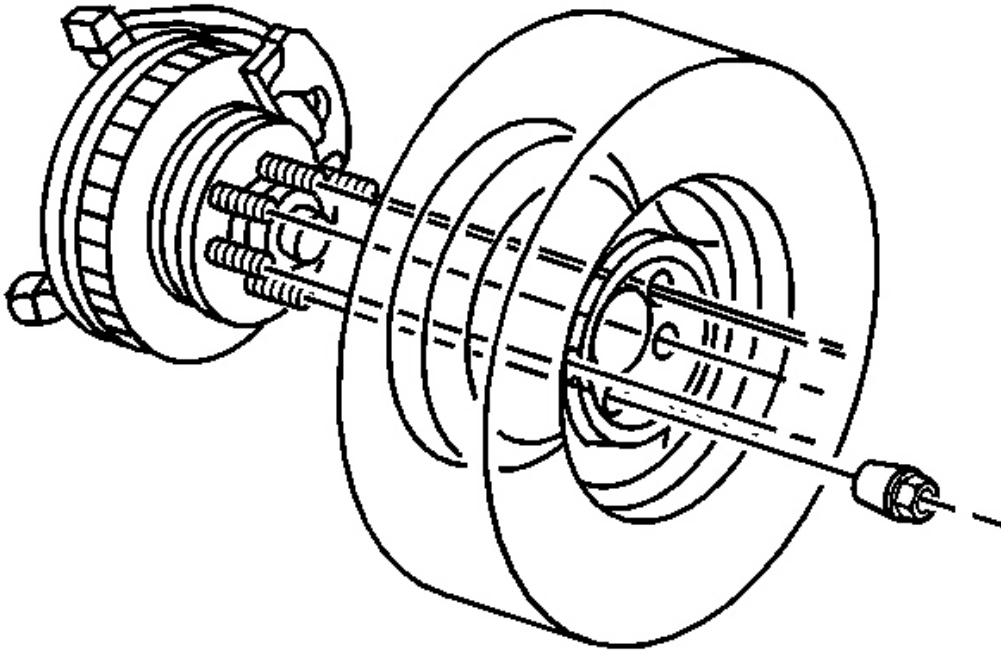


Fig. 7: View Of Tire & Wheel Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Before installing the wheels, remove any buildup of corrosion on the wheel mounting surface and brake drum or disc mounting surface by scraping and wire brushing. Installing wheels with poor metal-to-metal contact at the mounting surfaces can cause wheel nuts to loosen. This can cause a wheel to come off when the vehicle is moving, causing loss of control and possibly personal injury.

IMPORTANT: If the vehicle is equipped with directional tread tires, ensure that the directional arrow on the outboard side of the tire is pointed in the direction of forward tire rotation prior to installation on the vehicle.

1. Remove any corrosion or foreign material from the wheel and the hub mounting surfaces.
2. Clean the threads on the wheel studs and wheel nuts.
3. Align the reference mark and install the tire and wheel assembly to the hub.

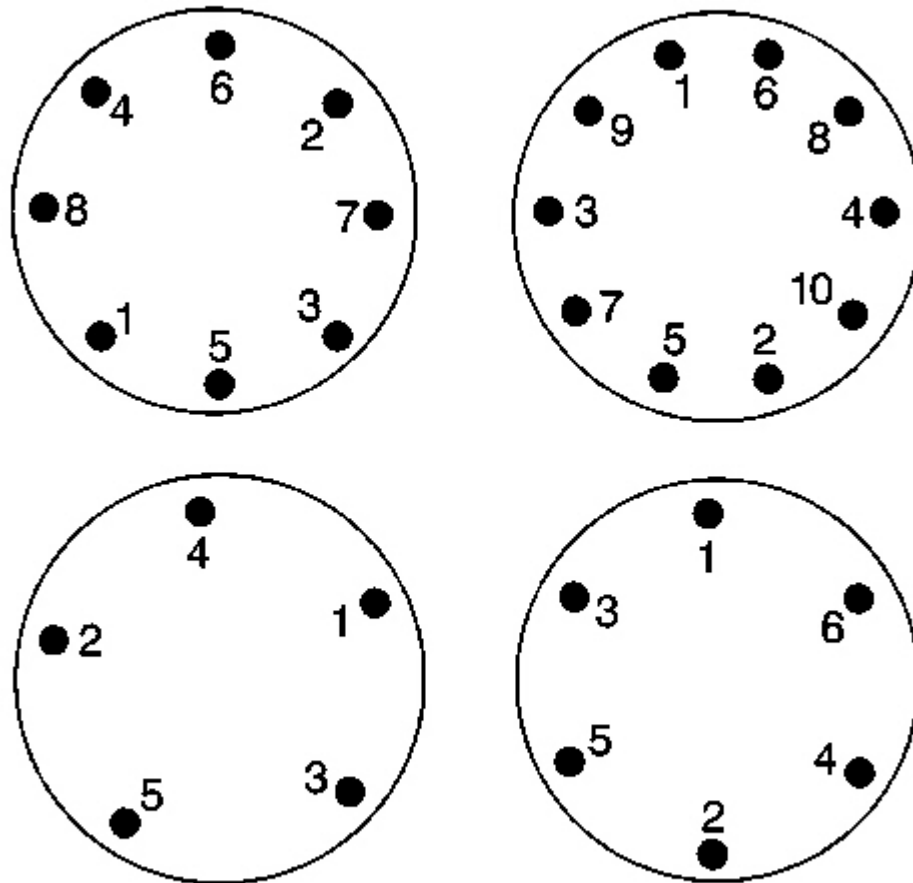


Fig. 8: Installing Wheel Nuts
 Courtesy of GENERAL MOTORS CORP.

4. Install the wheel nuts.

NOTE: A torque wrench or J 39544 must be used to ensure that wheel nuts are tightened to specification. Never use lubricants or penetrating fluids on wheel stud, nuts, or mounting surfaces, as this can raise the actual torque on the nut without a corresponding torque reading on the torque wrench. Wheel nuts, studs, and mounting surfaces must be clean and dry. Failure to follow these instructions could result in wheel, nut, and/or stud damage.

NOTE: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: Tighten the nuts evenly and alternately in order to avoid excessive runout of the tire and wheel assembly.

5. Using the **J 39544-KIT** , tighten the wheel nuts in the appropriate sequence shown.

Tighten: Tighten the nuts in sequence to 140 N.m (100 lb ft).

6. Install the wheel nut caps, if equipped.
7. Install the wheel center cap, if equipped.
8. Lower the vehicle.

EXTENDED MOBILITY TIRES REPLACEMENT

Standard Extended Mobility Tires (EMT) are capable of operating for limited distances at very low or zero tire inflation. Because of this capability, the Tire Pressure Monitoring (TPM) system is standard with extended mobility tires. Check the inflation of the tires if the LOW/FLAT TIRE indicator is ON. Inspect the affected tire for possible repair or replacement if any of the following occurs:

- Inspect the affected tire if the LOW/FLAT TIRE indicator reappears.
- Inspect the affected tire if an EMT has been operated at a pressure significantly below 172 kPa (25 psi).

It is recommended that repair or replacement of extended mobility tires be made only by an authorized tire dealer. Extended mobility tires are designed to be used only with original equipment wheels equipped with the low tire pressure warning system (TPM).

TIRE REPAIR

Many different materials and techniques are available on the market in order to repair tires. Not all of the materials and techniques work on some types of tires. Tire manufacturers have published detailed instructions on how and when to repair tires. Obtain the instructions from the manufacturer. If the vehicle is equipped with a compact spare tire, do not repair the compact spare.

TIRE MOUNTING AND DISMOUNTING

NOTE: Use a tire changing machine in order to dismount tires. Do not use hand tools or tire irons alone in order to remove the tire from the wheel. Damage to the tire beads or the wheel rim could result.

NOTE: Do not scratch or damage the clear coating on aluminum wheels with the tire changing equipment. Scratching the clear coating could cause the aluminum wheel to corrode and the clear coating to peel from the wheel.

NOTE: Use care when positioning the tire and wheel assembly on the tire changer. The upper/lower bead breaker or tire changing tools may damage

the TPM sensor. To prevent damage, position the valve stem/sensor 90 degrees away from the two bead breakers. For rim clip tire changers, position the bead breakers approximately 180 degrees away from the valve stem/sensor.

NOTE: Damage to either the tire bead or the wheel mounting holes can result from the use of improper wheel attachment or tire mounting procedures. It takes up to 70 seconds for all of the air to completely exhaust from a large tire. Failure to follow the proper procedures could cause the tire changer to put enough force on the tire to bend the wheel at the mounting surface. Such damage may result in vibration and/or shimmy, and under severe usage lead to wheel cracking.

1. Deflate the tire completely.

IMPORTANT: Rim-clamp European-type tire changers are recommended.

2. Use the tire changer in order to remove the tire from the wheel.
3. Use a wire brush or coarse steel wool in order to remove any rubber, or corrosion from the wheel bead seats.

NOTE: When mounting the tires, use an approved tire mounting lubricant. **DO NOT use silicon or corrosive base compounds to lubricate the tire bead and the wheel rim. A silicon base compound can cause the tire to slip on the rim. A corrosive type compound can cause tire or rim deterioration.**

4. Apply GM P/N 12345884 (Canadian P/N 5728223) or equivalent to the tire bead and the wheel rim.

IMPORTANT: If the vehicle is equipped with directional tread tires, ensure that the directional arrow on the tire is mounted to the outboard side of the rim in the direction of forward rotation when installed onto the vehicle.

5. Use the tire changer in order to install the tire to the wheel.

CAUTION: To avoid serious personal injury, do not stand over tire when inflating. The bead may break when the bead snaps over the safety hump. Do not exceed 275 kPa (40 psi) pressure when inflating any tire if beads are not seated. If 275 kPa (40 psi) pressure will not seat the beads, deflate, relubricate the beads and reinflate. Overinflation may cause the bead to break and cause serious personal injury.

6. Inflate the tire to the proper air pressure.
7. Ensure that the locating rings are visible on both sides of the tire in order to verify that the tire bead is fully seated on the wheel.

TIRE ROTATION

Due to dissimilar front and rear wheel and tire sizes, tire and wheel assemblies cannot be rotated.

DESCRIPTION AND OPERATION

GENERAL DESCRIPTION

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

TREAD WEAR INDICATORS DESCRIPTION

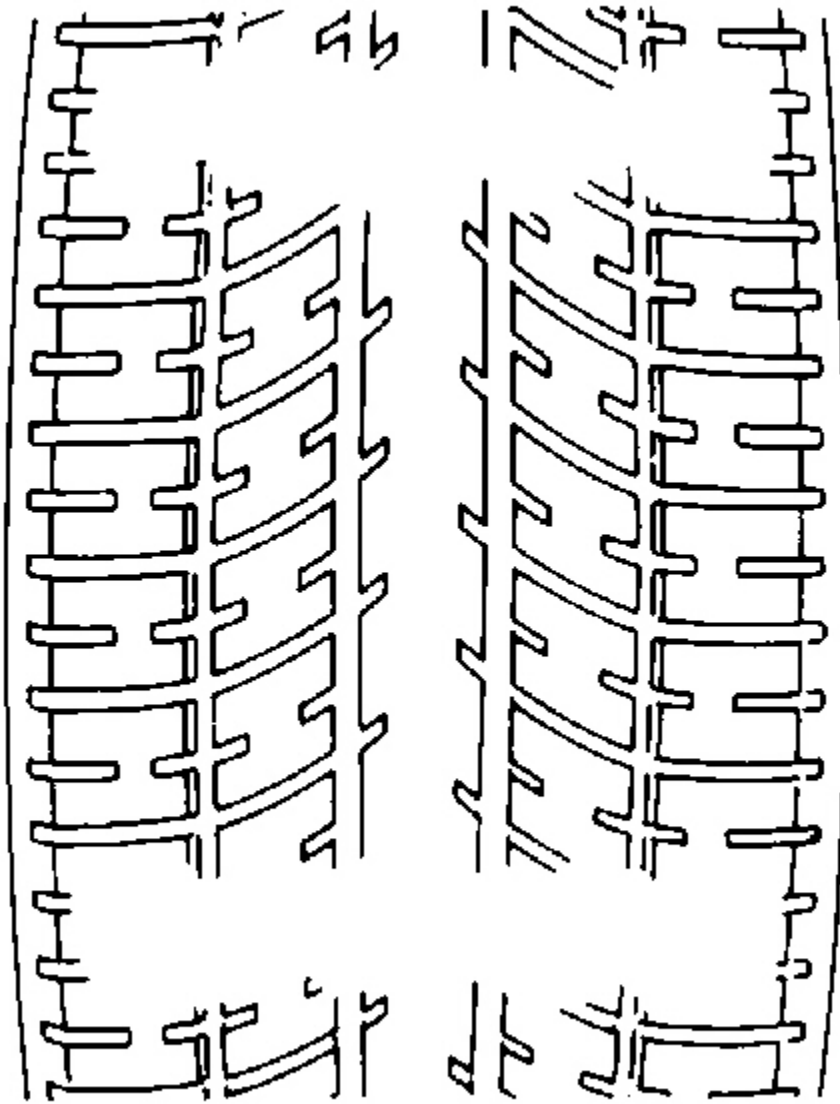


Fig. 9: Tread Wear Indicators
Courtesy of GENERAL MOTORS CORP.

The original equipment tires have tread wear indicators that show when you should replace the tires.

The location of these indicators are at 72 degree intervals around the outer diameter of the tire. The indicators appear as a 6 mm (0.25 in) wide band when the tire tread depth becomes 1.6 mm (2/32 in).

METRIC WHEEL NUTS AND BOLTS DESCRIPTION

Metric wheel/nuts and bolts are identified in the following way:

- The wheel/nut has the word Metric stamped on the face.
- The letter M is stamped on the end of the wheel bolt.

The thread sizes of metric wheel/nuts and the bolts are indicated by the following example: M12 x 1.5.

- M = Metric
- 12 = Diameter in millimeters
- 1.5 = Millimeters gap per thread

TIRE INFLATION DESCRIPTION

IMPORTANT: This vehicle is equipped with a tire pressure monitoring system. Refer to Tire Pressure Monitor Description and Operation in Tire Pressure Monitoring.

This vehicle has been engineered to operate up to the stated load capacity with wheel and tire assemblies of the type, size, construction, and configuration as originally installed. Maintenance of the tire inflation pressures is critical to the continued satisfactory performance, handling, and operating economy of the vehicle. Operation with incorrectly or improperly inflated tires can adversely affect vehicle performance and may contribute to the following:

- Reduced fuel economy
- Tire overloading
- Shortened tire life
- Excessive tire wear
- Uneven tire wear
- Vehicle handling concerns

Inspect the tire pressures when the vehicle has not been driven for at least 3 hours or not more than 1.6 km (1 mi) and when the tires are cool to the touch.

Tire inflation pressures should be inspected monthly and before an extended trip and adjusted to meet the specifications listed for the particular vehicle. Replace any missing or damaged tire valve stem extensions and/or caps to prevent the intrusion of water and contaminants.

One pound per square inch (psi) equals 6.9 kilopascals (kPa). The following table illustrates the conversion of kilopascals to pounds per square inch:

Inflation Pressure Conversion (Kilopascals to PSI)

kPa	psi	kPa	psi
140	20	215	31

145	21	220	32
155	22	230	33
160	23	235	34
165	24	240	35
170	25	250	36
180	26	275	40
185	27	310	45
190	28	345	50
200	29	380	55
205	30	415	60
Conversion: 6.9 kPa = 1 psi			

For the correct inflation pressures refer to the vehicle tire placard.

Tires inflated to a higher than recommended pressure can contribute to the following conditions:

- A hard ride
- Tire bruising
- Rapid tread wear at the center of the tire

Tires inflated to a lower than recommended pressure can contribute to the following conditions:

- Tire squeal on turns
- Hard steering
- Rapid and/or uneven wear on the outer edges of the tread
- Tire rim bruises and tire rim rupture
- Tire cord breakage
- High tire temperatures
- Sluggish vehicle handling
- Higher fuel consumption

Unequal pressure on the same axle can cause the following conditions:

- Uneven braking action
- Steering lead
- Imprecise vehicle handling

ALL SEASONS TIRES DESCRIPTION

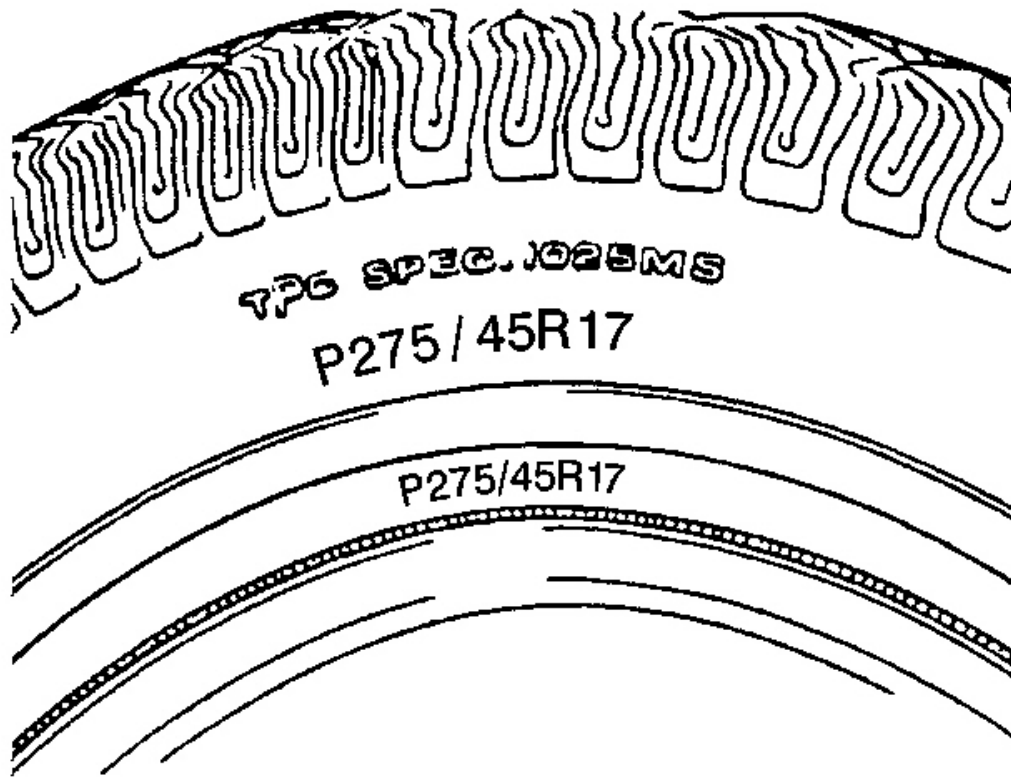


Fig. 10: Identifying All Seasons Tires
Courtesy of GENERAL MOTORS CORP.

Most GM vehicles are equipped with steel belted all-season radial tires as standard equipment. These tires qualify as snow tires, with a higher than average rating for snow traction than the non-all season radial tires previously used. Other performance areas, such as wet traction, rolling resistance, tread life, and air retention, are also improved. This is done by improvements in both tread design and tread compounds. These tires are identified by an M + S molded in the tire side wall after the tire size. The suffix MS is also molded in the tire side wall after the TPC specification number.

The optional handling tires used on some vehicles now also have the MS marking after the tire size and the TPC specification number.

P-METRIC SIZED TIRES DESCRIPTION

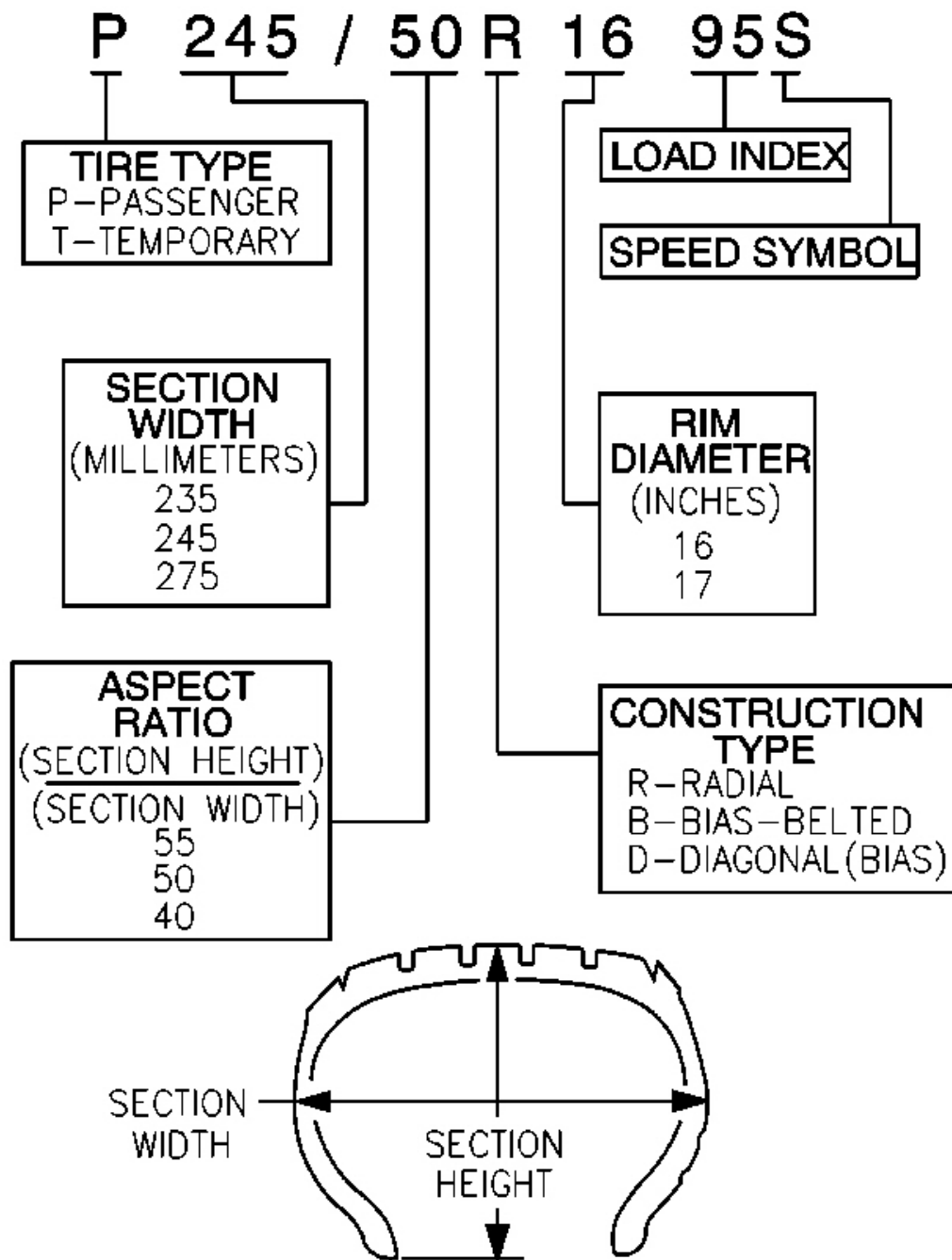


Fig. 11: P-Metric Sized Tire Marking
Courtesy of GENERAL MOTORS CORP.

Most P-metric tire sizes do not have exact corresponding alphanumeric tire sizes. Replacement tires should be of the same tire performance criteria (TPC) specification number including the same size, the same load range, and the same construction as those originally installed on the vehicle. Consult a tire dealer if you must replace the P-metric tire with other sizes. Tire companies can best recommend the closest match of alphanumeric to P-metric sizes within their own tire lines.

REPLACEMENT WHEELS DESCRIPTION

Replace the wheel if any of the following conditions exist:

- The wheel exhibits excessive runout.
- The wheel is bent.
- The wheel is cracked.
- The wheel is severely rusted.
- The wheel is severely corroded.

IMPORTANT: Air leaks caused by porosity on aluminum wheels are repairable.

CAUTION: If you are replacing the wheel(s), the wheel stud(s), the wheel nut(s) or the wheel bolt(s), install only new GM original equipment parts. Installation of used parts or non-GM original equipment parts may cause the wheel to loosen, loss of tire air pressure, poor vehicle handling and loss of vehicle control resulting in personal injury.

- The wheel leaks air.

NOTE: The use of non-GM original equipment wheels may cause:

- **Damage to the wheel bearing, the wheel fasteners and the wheel**
- **Tire damage caused by the modified clearance to the adjacent vehicle components**
- **Adverse vehicle steering stability caused by the modified scrub radius**
- **Damage to the vehicle caused by the modified ground clearance**
- **Speedometer and odometer inaccuracy**

Replace the wheel, the wheel studs and the wheel/nuts, or the wheel bolts if applicable, if any of the following conditions exist:

- The wheel has elongated bolt holes.
- The wheel/nuts, or bolts if applicable, loosen repeatedly.


Steel wheel identification is stamped into the wheel near the valve stem.

Aluminum wheel identification is cast into the inboard side of the wheel.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
	<p data-bbox="922 522 1289 586">J 39544-KIT Complete Torque Socket Set</p>