

Summary

- Tires are a common source of trouble. Normal wear, damage from road debris, and improper inflation pressure commonly cause tire failures.
- Tire problems usually show up as vibration, abnormal tread wear patterns, steering wheel pull, abnormal noises, and other similar symptoms.
- A tire wear pattern (area of tread worn off) can usually be studied to determine the cause of abnormal wear.
- Tire underinflation (low air pressure) is a very common and destructive problem that wears the outer corners of the tread.
- Tire overinflation (too much air pressure) causes the center area of the tread to wear.
- Tire vibration is commonly caused by an out-of-balance condition, ply separation, tire runout, a bent wheel, or tire cupping wear.
- Tire noise usually shows up as a thumping sound caused by ply separation or as a whine caused by abnormal tread wear (cupping, for example).
- Wheel bearing noise is normally produced by a dry, worn wheel bearing. The bearing will make a steady humming sound.
- Tire rotation is needed to ensure maximum tire life.
- Lug nut torque is very important, especially on vehicles using mag wheels and lightweight hubs.
- Lateral runout is side-to-side movement. It is measured by placing a dial indicator against the side of the rim or on the tire sidewall.
- Radial runout is caused by a difference in diameter from the center axis of rotation.
- Static imbalance causes the tire to vibrate up and down.
- Dynamic imbalance makes the tire vibrate up and down and from side to side.
- A wheel assembly is balanced by adding wheel weights to the side opposite the heavy area.
- When mounting or dismounting a tire, a tire changing machine is used to force the tire on and off the wheel.
- Wheel bearings are normally filled with grease. If the grease dries out, the bearing will fail.
- Never use all-purpose wheel-bearing grease in wheel bearings on cars with disc brakes. The heat generated by the brakes can liquefy the grease and cause leakage out of the grease seals.

- When pressing a wheel bearing in or out, apply force to the correct bearing race (one press fit into part).

Important Terms

Tire problems	Tire runout
Tire impact damage	Wheel runout
Road damage	Lateral runout
Tire wear pattern	Radial runout
Underinflation	Improper wheel balance
Overinflation	Static imbalance
Proper tire inflation	Dynamic imbalance
Steering wheel pull	Wheel hop
Tire vibration	Wheel shimmy
Tire noise	Wheel weights
Wheel bearing noise	Wheel balancing machine
Wheel cover	Bubble balancer
Tire maintenance	Off-car balancer
Tire pressure gauge	On-car balancer
Tire load index number	Tire changing machine
Tire rotation	Bearing packer
Lug nut torque	Stake
Lug studs	

Review Questions—Chapter 66

Please do not write in this text. Place your answers on a separate sheet of paper.

1. What are four common symptoms of tire problems?
2. Why is a tire wear pattern useful?
3. A customer complains of excessive right-front tire wear. The tread is worn along the outer edges. The center of the tread shows little wear. Technician A says that incorrect alignment is causing the wear and that the car needs a wheel alignment. Technician B says that underinflation could be the problem and that tire pressure should be checked. Who is correct?
(A) A only.
(B) B only.
(C) Both A and B.
(D) Neither A nor B.
4. What is ply separation?
5. A metal ball peen hammer should be used to install wheel covers. True or False?
6. Why is periodic tire rotation important?
7. Excessive lug nut _____ can cause wheel or hub distortion.

- An electronic shock absorber system uses various vehicle sensors, an electronic control module, and shock absorber actuators to control ride stiffness.
- An active suspension system uses computer-controlled hydraulic rams instead of conventional suspension system springs and shock absorbers.

Important Terms

Suspension system	Self-leveling shock absorber
Body roll	Adjustable shock absorbers
Body squat	Strut assembly
Body dive	Strut shock absorber
Chassis stiffness	Dust shield
Chassis hertz	Lower spring seat
Independent suspension	Upper spring seat
Nonindependent suspension	Strut bearing
Understeer	Rubber bumpers
Oversteer	Rubber isolators
Neutral steering	Upper strut retainer
Lateral acceleration	Strut rod nut
Skidpad	Damper unit
Suspension system springs	Sway bar
Jounce	Stabilizer bar
Rebound	Sway bar links
Travel	Track rod
Coil spring	Lateral control rod
Leaf spring	Jounce bumpers
Eye	Long-short arm suspension
Shackle	Torsion bar suspension
Insulators	Curb height
Leaf spring windup	Macpherson strut suspension
Air spring	Modified strut suspension
Torsion bar	Dead axle
Spring rate	Semi-independent suspension
Sprung weight	Suspension leveling system
Unsprung weight	Attitude
Control arm	Manual suspension leveling system
Control arm bushings	Automatic suspension leveling systems
Strut rod	Electronic height control system
Ball joints	Height sensor
Shock absorbers	Compressor assembly
Oscillations	
Shock absorber compression	
Shock absorber extension	
Gas-charged shock absorbers	

Pressure lines	Brake sensor
Air shocks	Acceleration sensor
Sensor link	Mode switch
Solenoid valve	Electronic control module
Suspension control module	Shock actuators
Electronic suspension system	Active suspension system
Steering sensor	

Review Questions—Chapter 67

Please do not write in this text. Place your answers on a separate sheet of paper.

- List eight functions of a suspension system.
- List and explain the six major parts of a suspension system.
- _____ suspension allows one wheel to move up and down with a minimum effect on the other wheels.
- The most common type of suspension system spring is the _____ spring.
 - leaf
 - coil
 - air
 - torsion
- A(n) _____ fastens the rear of a leaf spring to the car frame.
- Define the phrase "leaf spring windup."
- How does a torsion bar work?
- The _____ weight of a car is the weight of the parts *not* supported by the springs.
- A strut rod is used to keep the steering knuckle from swiveling. True or False?
- Why are ball joints needed?
- Summarize the basic operation of a conventional shock absorber.
- What is the advantage of gas-charged shocks?
- List and explain the eleven major parts of a strut assembly.
- The _____ is used to keep the car body from rolling or leaning excessively in turns or corners.
 - strut rod
 - jounce bumper
 - track rod
 - sway bar
- Describe a MacPherson strut suspension.