TIRES


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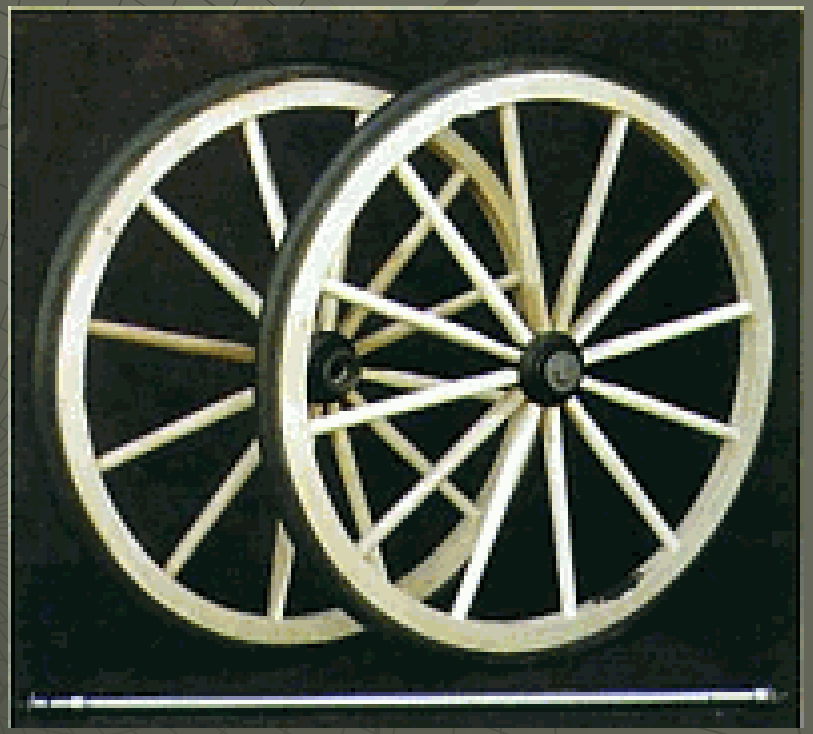
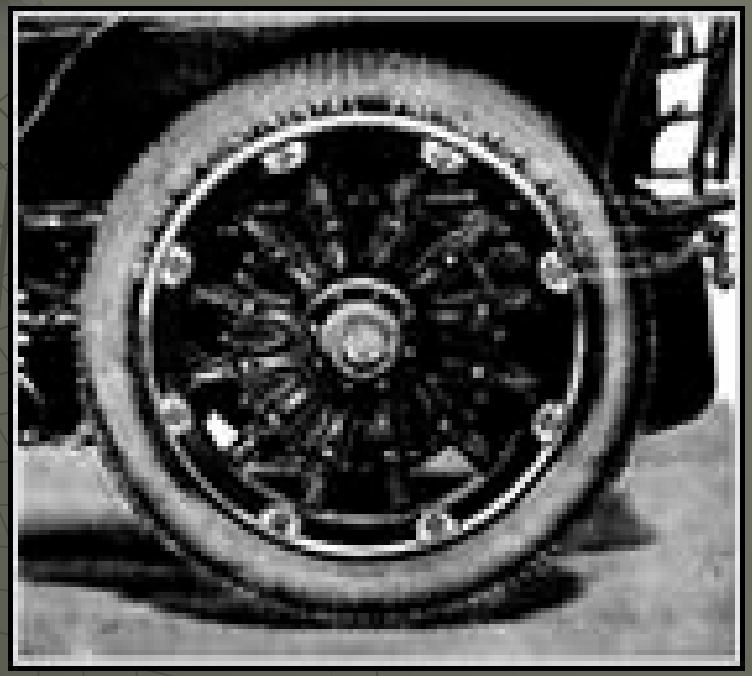
Back in the day…



Way back in the day…

Pneumatic Tires

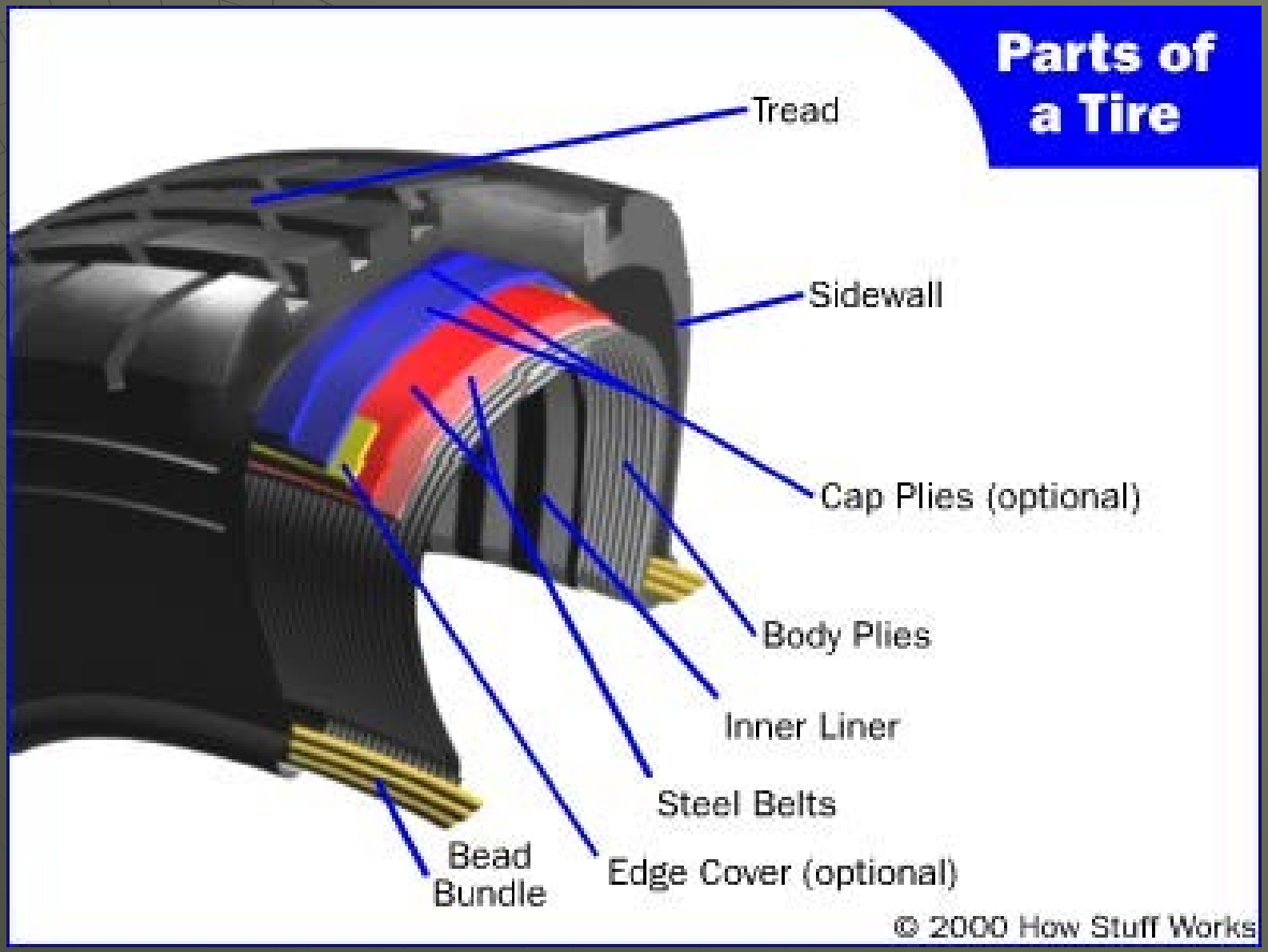
- Dunlop patented them for bicycles in 1888
- Michelin put them on cars in 1895
- Goodyear was started in 1898. Named after the inventor of vulcanized rubber.



Inner tube tires

- Tires with inner tubes were used until the 50s.

Tire Construction



Parts of the Tire

Beads

- Beads: Two rings that are made of steel wire and encased in rubber.
- Hold sidewall tightly against rim.

Parts of the Tire

- Body Plies: Rubberized fabrics and cords wrapped around the beads.
- They form the body of the tire.
- Gray and white portions of the picture

Parts of the Tire

- Tread: Outer surface of the tire that contacts the road.

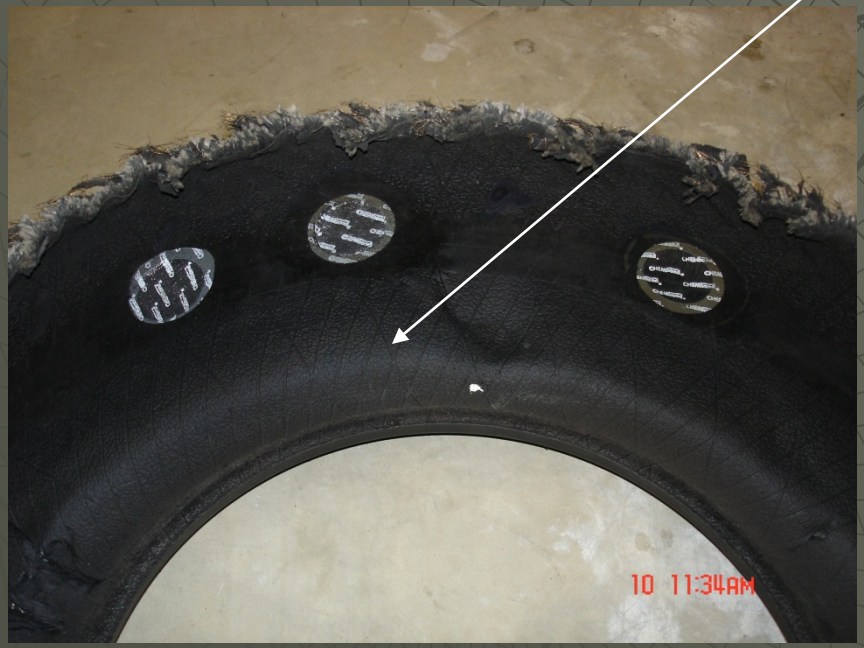
Parts of the Tire

- Sidewall: Outer part of the tire that extends from the bead to the tread.
- Contains the side markings with information on the tire.
- Main support for the tire.
- More plies = carry more load, less side movement
- Less plies = softer ride

Parts of the Tire

- Belts: Used to strengthen the body of the plies and stiffen the tread. They lie between the tread and the plies.

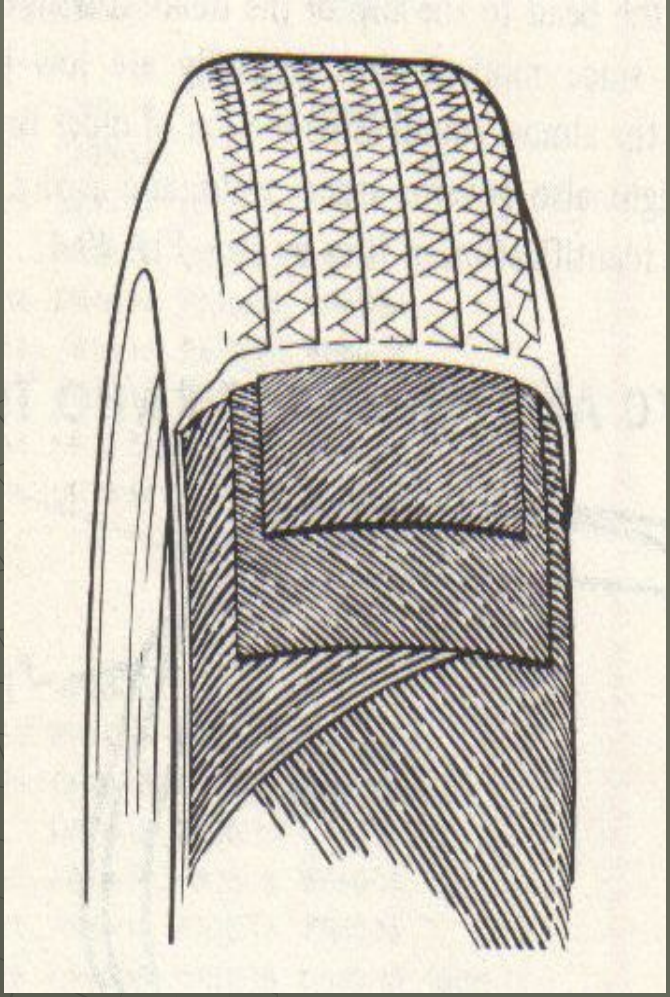
Parts of the Tire



- Liner: Thin layer of rubber that is bonded to the inside of the plies.
- Provides a leak proof membrane for tubeless tires.

Bias-Ply tires

- Had plies of cords that ran at 55 degree angles to the rim.
- Pliable, but lots of rolling resistance.
- Is weak in the plies and tread

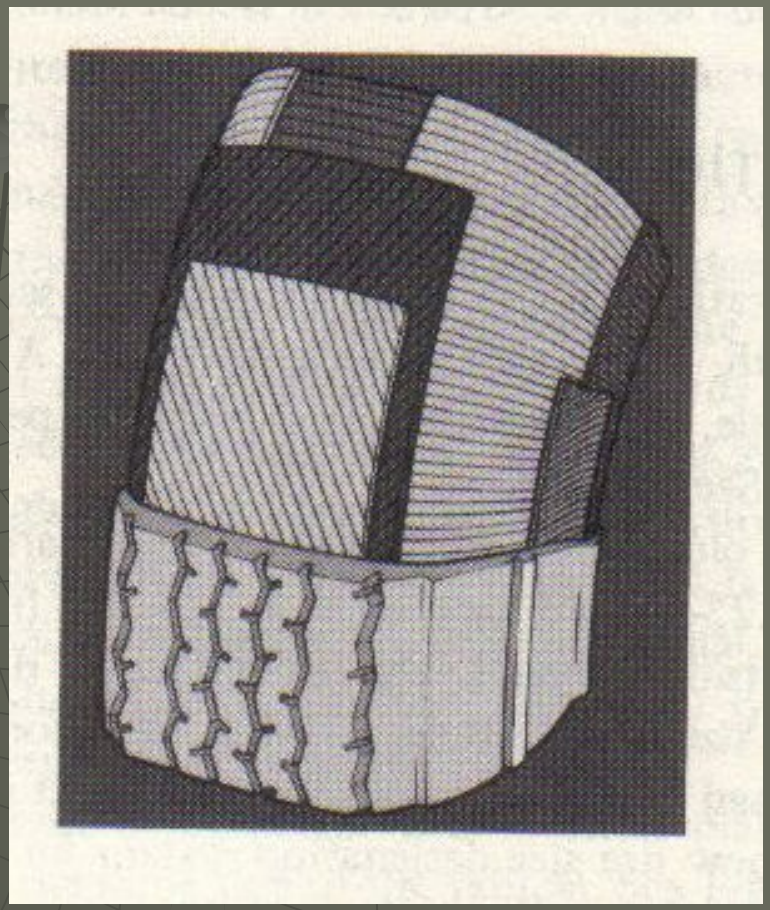


Belted Bias Ply Tires

- A bias ply tire with belts added to increase tread stiffness.
- Belts and Plies run at different angles.
- Belts do not run on the sidewalls
- Provides smooth ride and good traction.

Radial Tires

- Have Plies running strait across from bead to bead, with the belts directly beneath the tread.
- Belts can be made of steel, flexten, fiberglass, or other materials.
- Has very flexible sidewall but stiff tread.
- Has harsher ride at low speeds.



Tire Markings

- Traction – AA A B C

  Straight ahead braking traction on a wet surface from 40mph.
- Temperature – A B C

  Represent a tire's ability to withstand heat due to speed.
- Treadwear – between 60- 720: Lower number will have softer tread and not last as long. Higher number will have harder tread and last longer.
- Speed Rating- Maximum amount of allowable sustained road speed a tire can handle- Rated from Q to Z

Tire Markings

- Speed Ratings-
- Q 100 MPH
- S 112 MPH
- T 118 MPH
- U 124 MPH
- H 130 MPH
- V 149 MPH
- W 168 MPH
- Y 186 MPH
- Z Over 149 MPH

Tire Markings

- Maximum Load Rating- Indicates the amount of weight the tire can carry at the recommended inflation pressure.
- Maximum Inflation Pressure- The highest air pressure that should be in the tire.
- Tread Plies- Number of Plies and strength of the plies in the tire.
- D.O.T number- Department of Transportation, provides manufacturer information such as plant location, construction, and date of manufacturer.

Tire Markings

- Tire Size- P195/60/R16
- P- Passanger Tire, C- Commercial, T- Temporary
- 195- Width of the Tread in Millimeters
- 60- Height of Tire- Aspect Ratio- Sidewall is 60% of tread width.
- R- Radial Tire; B- Bias belted; D-Diagonal Bias
- 16- Rim size in inches

How to Read a Sidewall

1. 205 - Width of the tire in milimeters.
2. 55 - Aspect ratio (this sidewall's height is roughly 55% of the tire width).
3. R - For Radial construction.
4. 16 - Diameter of the wheel (in inches) on which the tire fits.
5. 88 - Numerical code associated with the maximum load a tire can carry.
6. V - Speed rating (this tire could sustain speeds up to 149 mph).
7. XGT V - Manufacturer's name for tread design and architecture.

NOTE:
Some size designations may be preceded by a "P," signifying Passenger.

Wear bars

- Tires can use bars or dots to indicate wear

Spare Tires

- Full size Spare- Exact rim and tire that is on the rest of the car.
- Compact or Donut spares- 50/50 rule
- Space Saver- Compact that is in car deflated. Has can of propellant to fill tire when needed. Found in hatchback cars. 50/50 rule

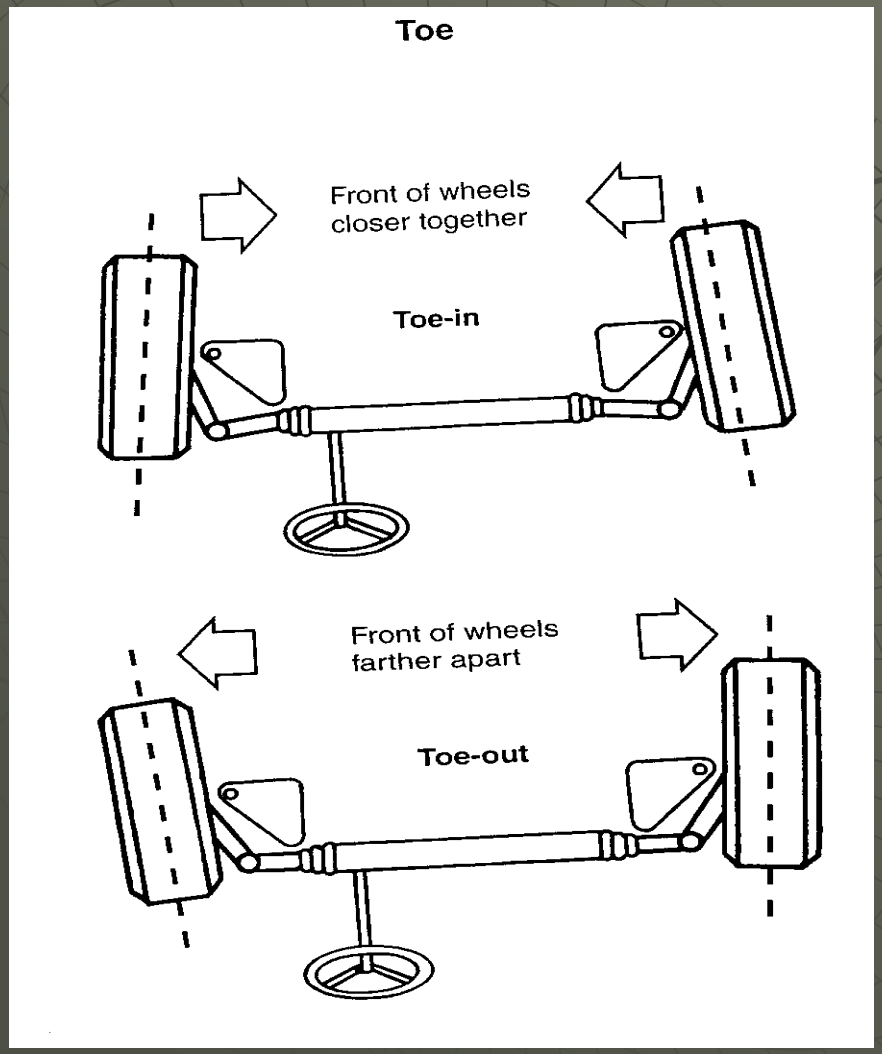
Other Tire Features

- Self Sealing Tires- Have slime inside that fill any leaks in tire and harden under the tire pressure and air.
- Run Flat Tires- Tires that have strong enough sidewall to support vehicle weight for a short period of time.
- Tire Pressure Monitoring System- Uses radio signals to send pressure reading to computer.

Alignments

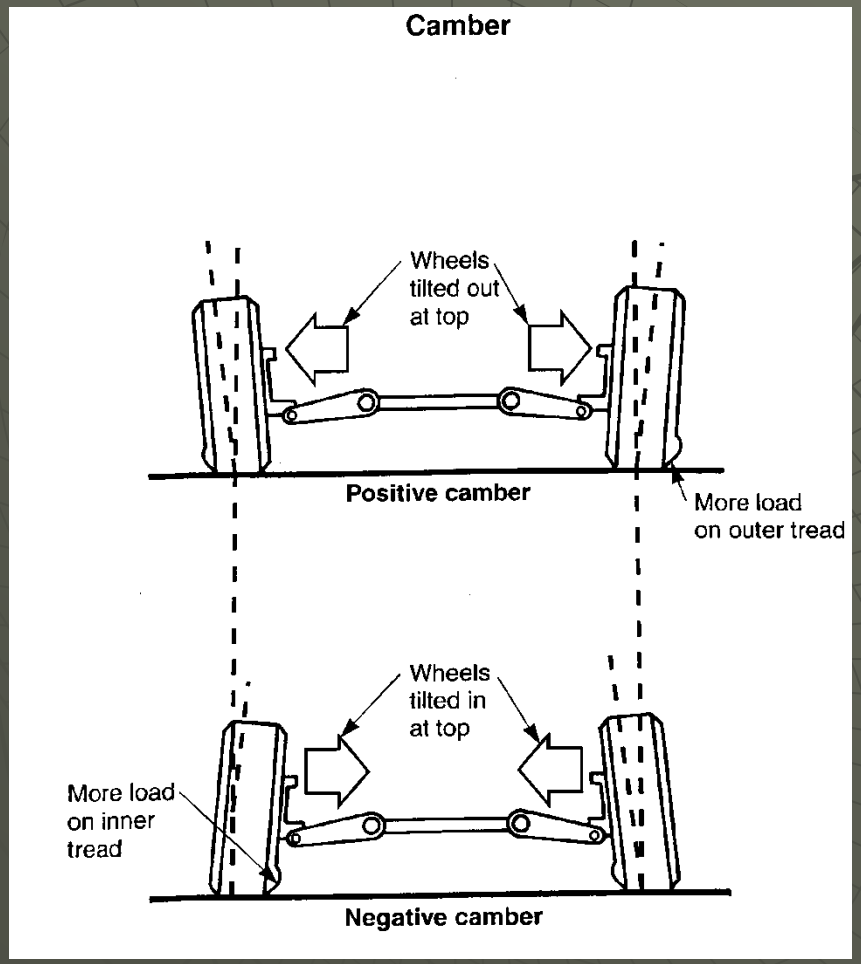
- Alignments make sure that the tires are in proper angle to the frame of the car.
- Help car drive straight and handle properly.
- There are 2 wheel alignments, 4 wheel alignments, and thrust alignment.
- Four wheel thrust alignment is the best and most accurate way to set up a car. It will make all tires line up with the centerline (thrust line) of the vehicle. Especially important after an accident when frame damage may have taken place.

Toe Angle



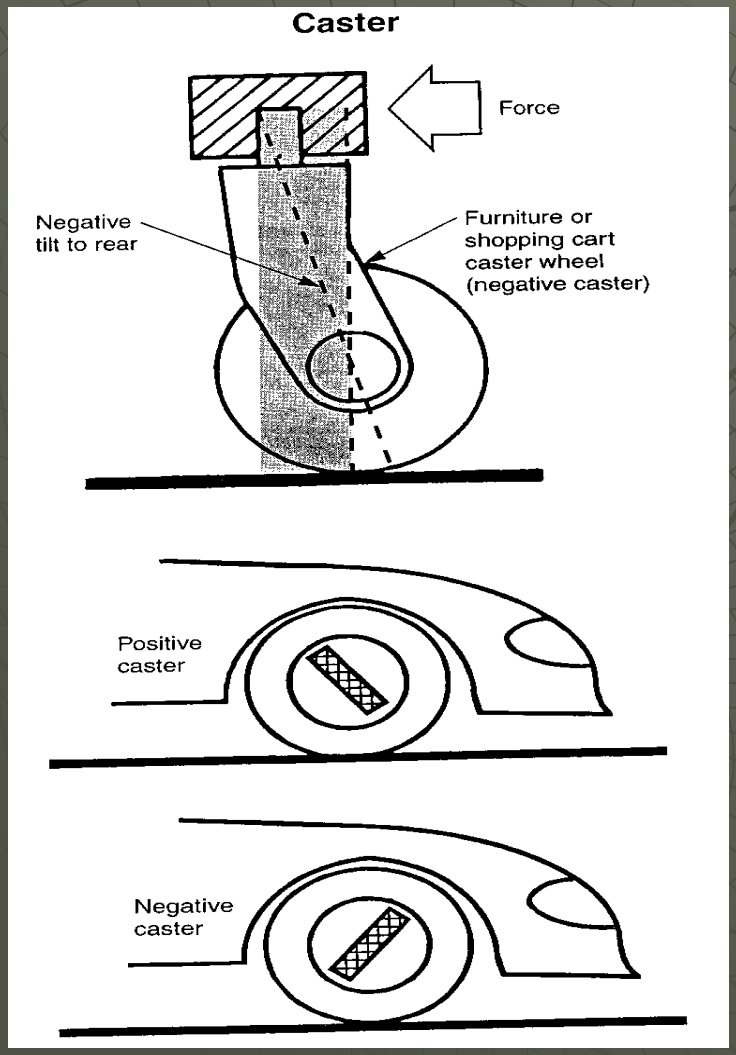
- Toe is the tilt in or out of the front of the tires.
- Usually adjusted by changing length of the tie rods.

Camber Angle



- Camber is the tilt in or out of the top of the tire.
- Usually adjusted by moving upper control arm or strut mount in or out.

Caster Angle



- Caster is the forward or rearward tilt of the steering knuckle when viewed from the side of the car.
- Controls tires load distribution.
- Caster helps car return straight after turning.
- Most cars do not have adjustable caster.

Why Tires Wear Out

Alignment Issues

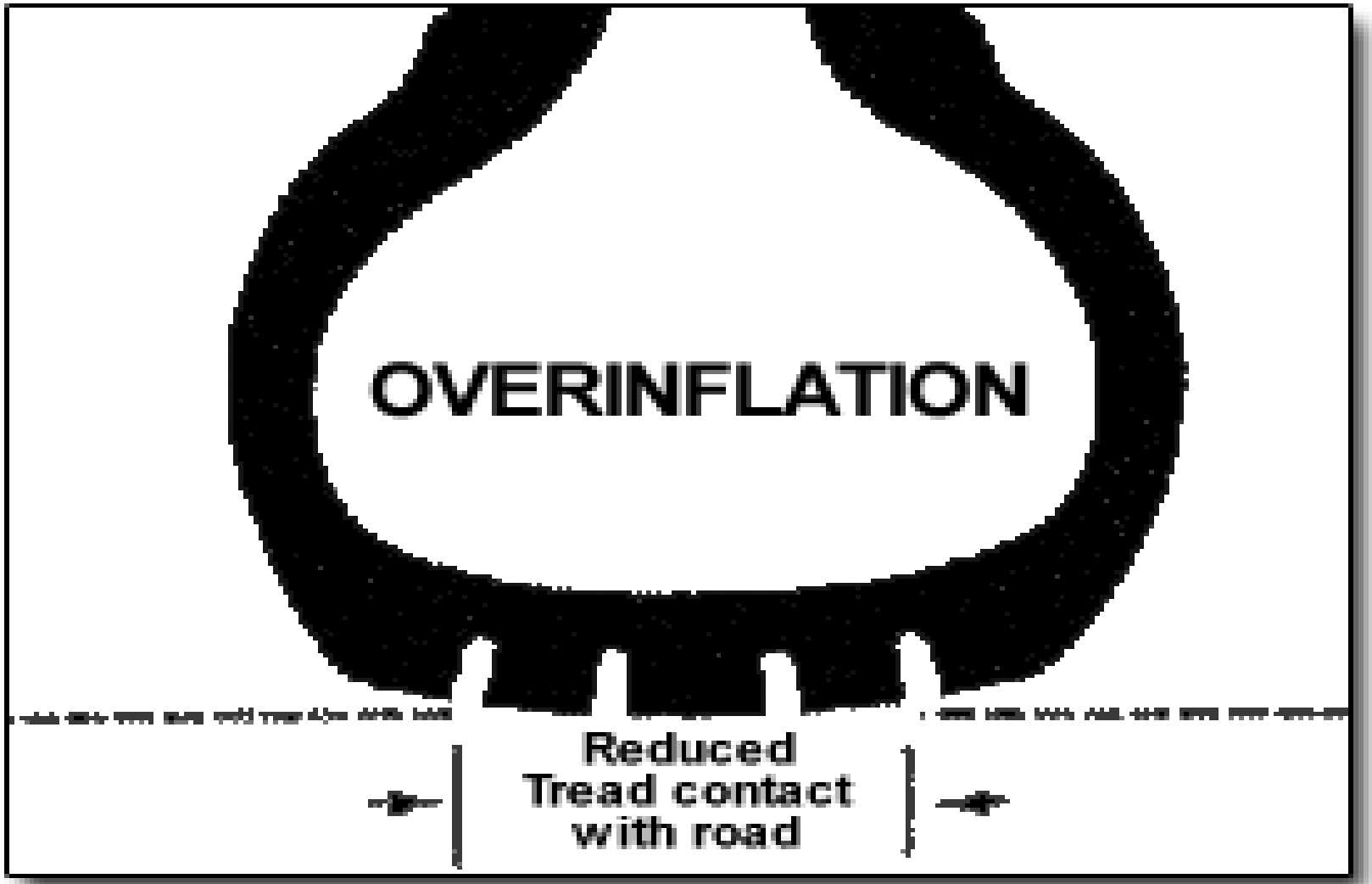
Bad steering parts

Bad shocks

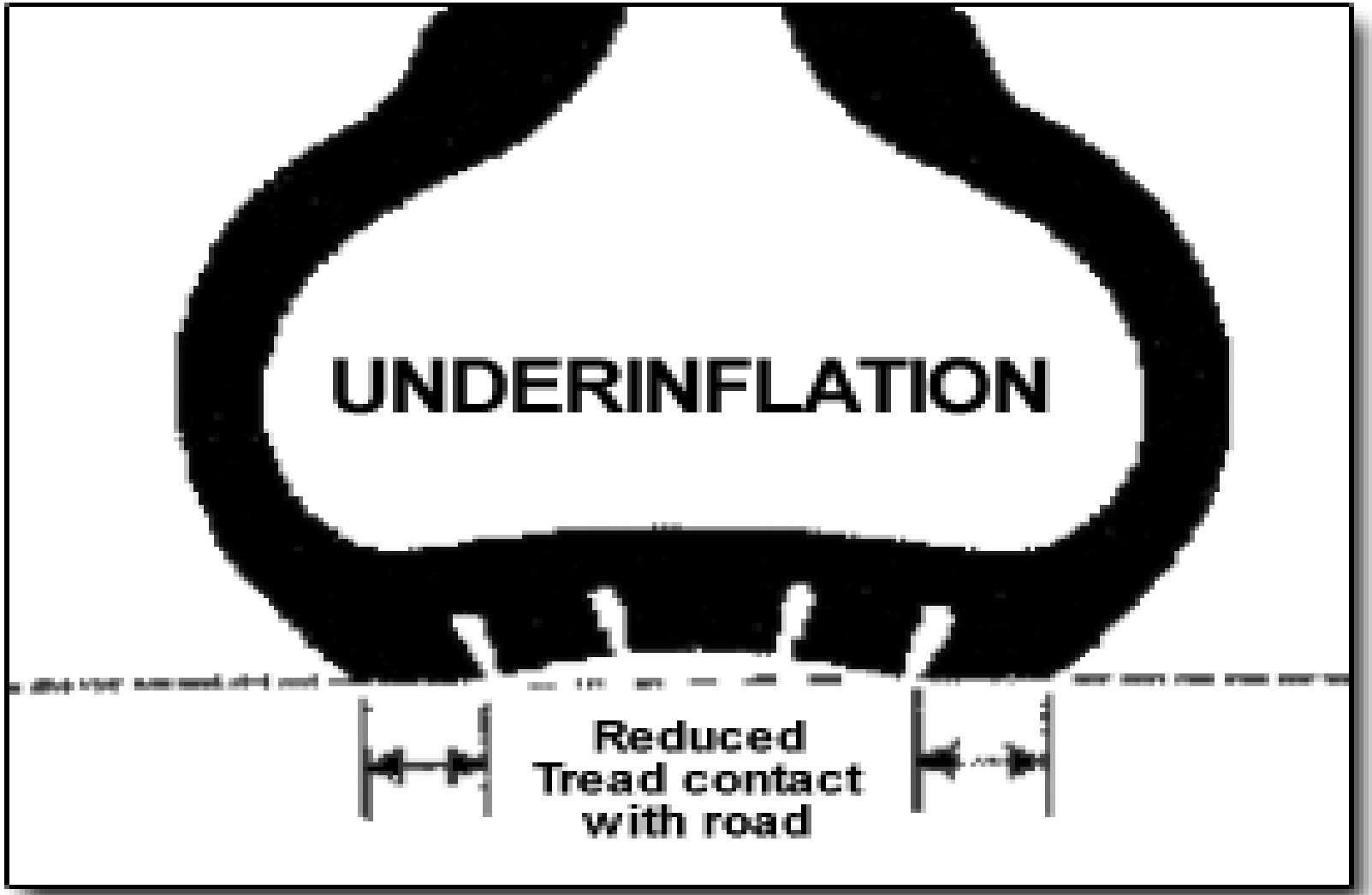
Scuffing

Skidding

Overinflation



Underinflation

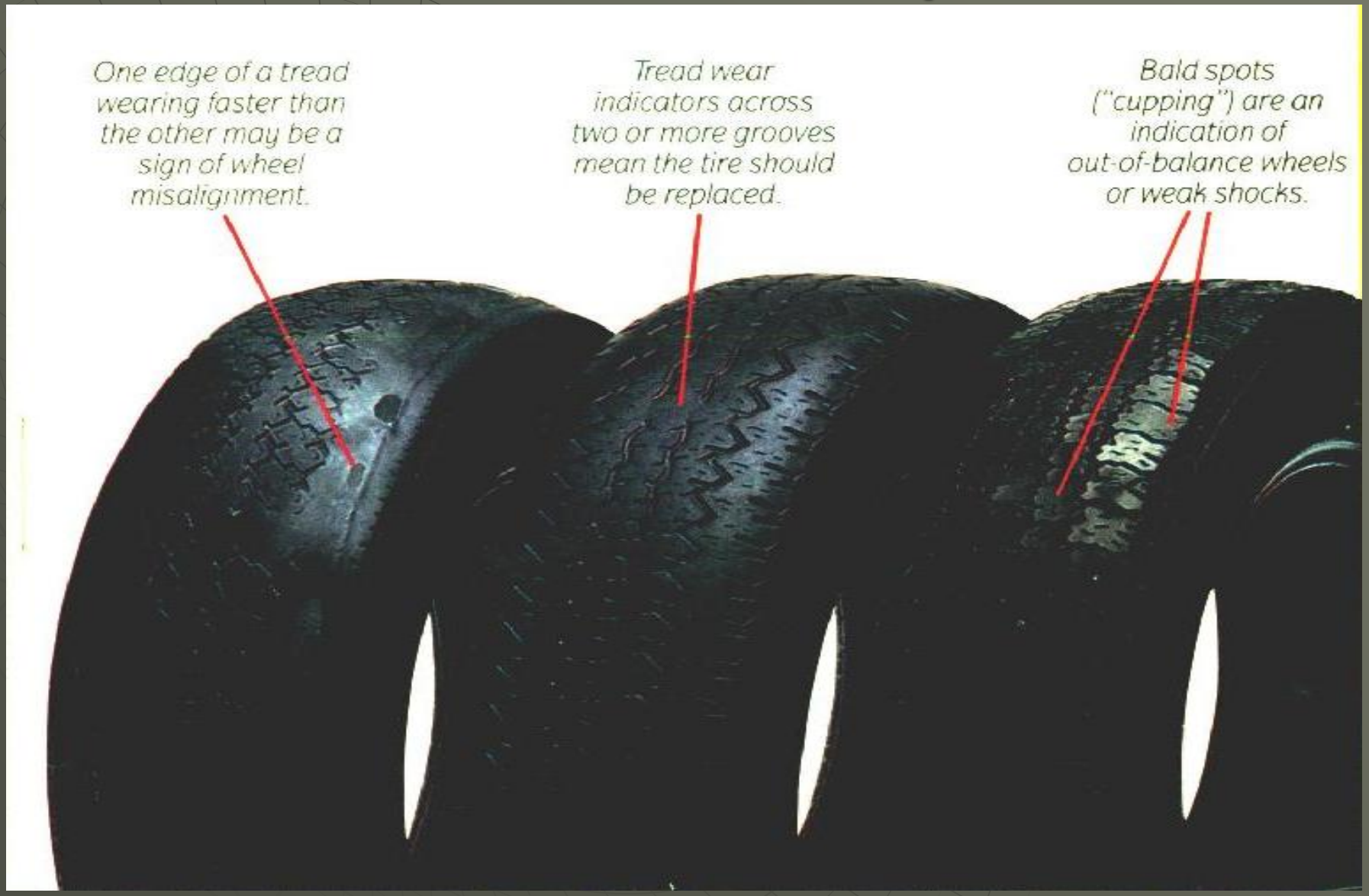


What should your tire pressure be?

Manufacturer suggested pressure on the door pillar tag.

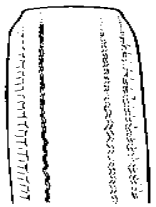
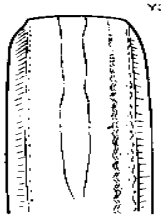
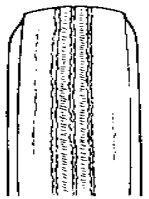
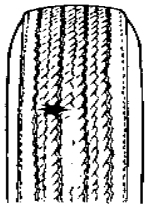
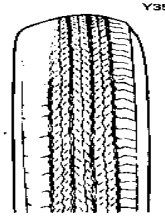
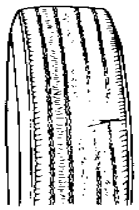
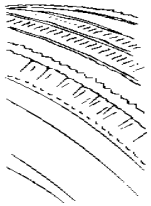
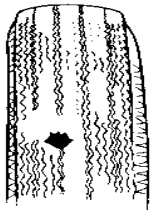
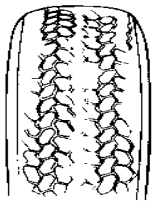
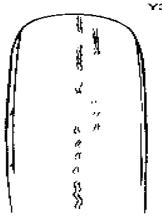
- Over-inflation gets better fuel mileage
- Under-inflation gets slightly better ride and better off-road traction
- Check when cold

Tire wear examples



Flat spot

Reading Your Tire for Problems

WHEEL AND TYRE DIAGNOSIS				
CENTER OF TREAD WORN		BOTH SIDES OF TREAD WORN	CHUNKING OF TYRE	ONE SIDE OF TYRE WORN
Y354-05 	Y354-06 	Y354-02 	Y354-04 	Y354-01 
*Over-Inflation	*Center-tread down to fabric due to excessive over-Inflation	*Under-Inflation *Bulge at the shoulder *Wear rapidly	*When a patch of tread has loosened, it torn off the tyre by centrifugal force at high speed	*Incorrect camber angle
FLAT SPOT	FEATHERING	BAD PLUGGING	UNEVEN TYRE WEAR	TOTALLY UNSAFE TYRE
Y354-03 	Y354-07 	Y354-08 	Y354-09 	Y354-10 
*Caused by heavy braking which makes the wheels lock and scrubs the tyres along the road surface	*Excessive TOE-IN TOE-OUT	*Using more than one plug distort the tread, resulting in carcass failure	*Bad wheel balance, fault in suspension, steering gear or bearing	*Tread worn below the limit

Rotate your tires

Make sure the tires are to the proper inflation

WHEELS

- Supports the tire while withstanding loads from acceleration, braking, and cornering.
- Made of steel, aluminum, or magnesium.

Parts of the Wheel

- Rim- outer lip that contacts the tire bead.
- Spider- center section that bolts to hub to secure wheel to car.
- Pilot bore- aids in installation and removal by locating proper mounting area.

Types of Wheels

- Drop center wheel- commonly used on passenger cars because it allows easy installation and removal of tires on the wheel.
- Safety rim- has small ridges that hold the tire bead on the wheel in the

Valve stems and Cores

- Pressed into a hole of the wheel to allow inflation and deflation of a tubeless tire.
- Made of rubber with a threaded metal tube formed in the end of the stem.
- Valve core- spring loaded air check valve that is threaded into the stem. Only allows air in or out when core is depressed by air chuck or other tools.
- Valve stem cap- small cap that threads over stem to protect core from dirt, moisture, and debris.

Lug Nuts, Studs, and Bolts

- Lug nuts hold the wheel and tire assembly on the vehicle- lug nuts are tapered to center wheel on hub- ALWAYS PUT TAPER TOWARD THE WHEEL
- Lug studs are special studs that accept lug nuts. Are usually pressed into hub.
- Lug bolts are used on a few cars instead of lug nuts/studs.

Wheel Weights

- Small lead weights that are attached to the wheel to balance wheel/tire assembly, preventing vibrations
- Offset heavy area of wheel assembly
- Stick on weights also available for visibility purposes. They are mounted on the inside of the wheel