PNEUMATIC TIRES AND TUBES

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1. GENERAL

1.01 This section covers basic inspection, care, and storage requirements that are necessary if maximum, safe mileage is to be obtained from pneumatic truck and passenger car tires and tubes. Detailed instructions for repairing tires and tubes and for correcting mechanical irregularities that lead to abnormal tire wear are not included in this section. For specific information on mechanical repairs, tire and tube repairs, types and sizes of tires, etc, refer to the car or truck manufacturers' manuals or to the various publications issued by tire manufacturers.

1.02 This section is reissued to update the existing information and to include information about radial tires. Since this constitutes a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 There are several causes that singularly or in combination can contribute to making a tire unsafe or short lived. Most of the causes can be eliminated or their significance reduced by giving proper attention to the following:

(a) Inflate tires to proper pressure.

(b) Do not subject tires to overloaded conditions.

(c) Drive at moderate speeds.

(d) Perform regular and frequent inspections.

(e) Avoid fast stops and starts.

(f) Make necessary repairs promptly.

(g) Correct mechanical maladjustments as soon as detected.

(h) Do not drive over curbs, chuck holes, or other obstructions.

(i) Avoid riding the pavement edge.

(j) Avoid fast driving on rough roads and around curves.

1.04 In the text of this section, the term "conventional" as applied to tires refers to all tube-type or tubeless bias-angle ply tires and is used only to differentiate between bias-angle ply tires and radial-ply belted tires.

2. DESCRIPTION

2.01 The pneumatic tire is constructed of rubber, steel wire, and textile cord materials that make up the tire components: tread, sidewall, carcass plies, liner, and beads. Each of these components performs a specific function in the overall design of the tire, but fundamentally they form an airtight container which is capable of supporting a specified load. The carcass plies provide container strength, the steel wires in the beads form anchors for the cords in the plies, the sidewall and tread rubber protect the plies, and

the tread provides the wear surface that contacts the road. The air in the tire provides support and cushioning, and enables the tire to roll uniformly.

2.02 Tires for truck and passenger car use may be generally classified as either conventional or radial. Both are available as tube-type or tubeless. The tube-type tires use an innertube as the airtight container while the tubeless tires contain the air by having an airtight liner and by forming an airtight seal between the tire bead and the rim.

CONVENTIONAL TIRES

2.03 The carcass plies of the conventional tire (Fig. 1) consist of a series of cords laid from bead to bead at an angle of approximately 35° with respect to a centerline around the tire tread. The cords are secured to the steel wires that form the tire beads and are laid so the cords in any one ply are at an angle to the cords in any adjacent ply.

RADIAL-PLY TIRES

2.04 The radial-ply tire (Fig. 2) consists of two distinct members: the radial plies, which are laid from bead to bead at an angle of approximately 90° with respect to a centerline around the tread of the tire, and the low-angle breakers or belts that are laid around the outer circumference of the tire under the tread area.

2.05 The outward appearance of the radial-ply tire differs only very slightly from the conventional tire, except that with greater sidewall flexibility, the radial-ply tire may appear to be under-inflated when it is actually properly inflated. However, cornering, braking, and steering characteristics do differ. Therefore, ***radial ply tires and conventional tires cannot be mixed*** on a vehicle.

3. PRECAUTIONS

3.01 When preparing to demount a tire that is mounted on a rim equipped with a lock

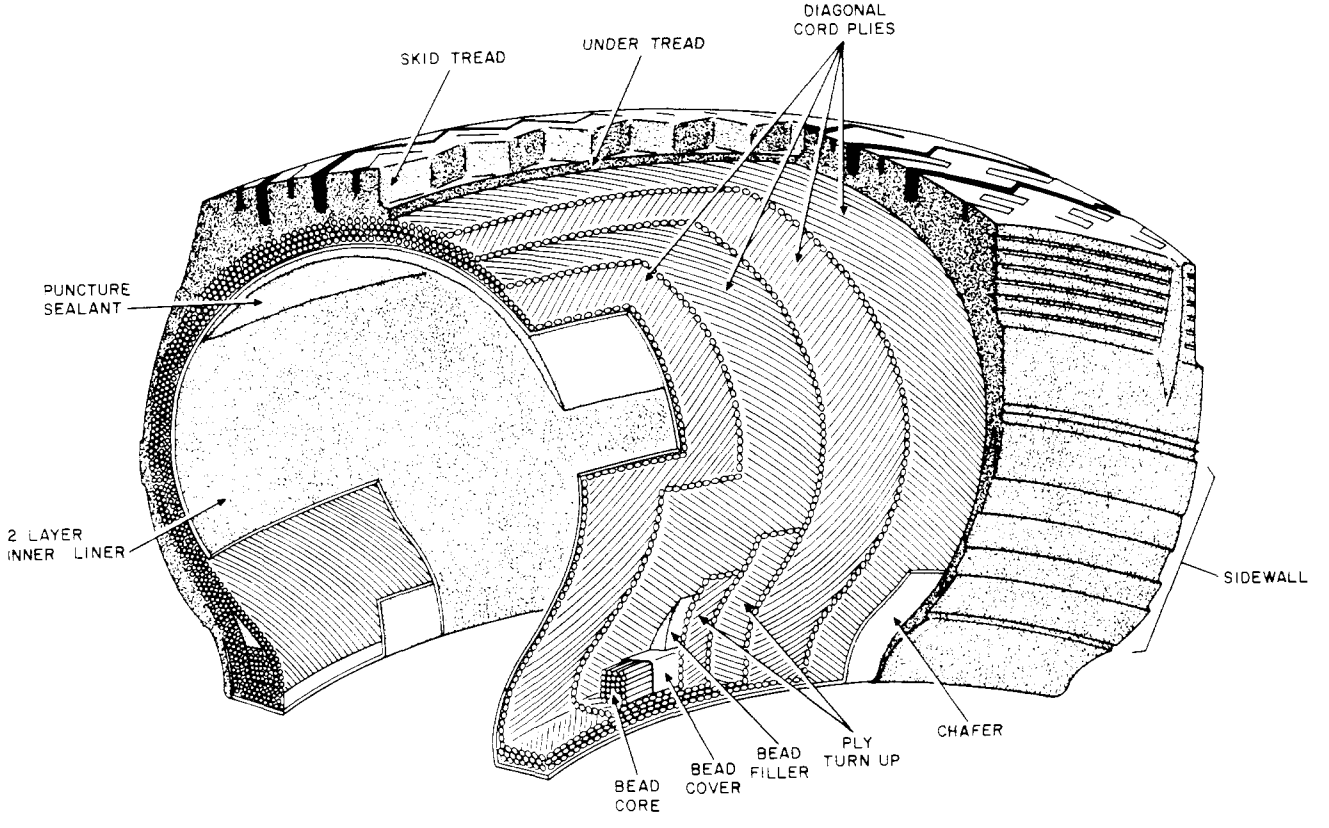


Fig. 1—Conventional Tire Construction

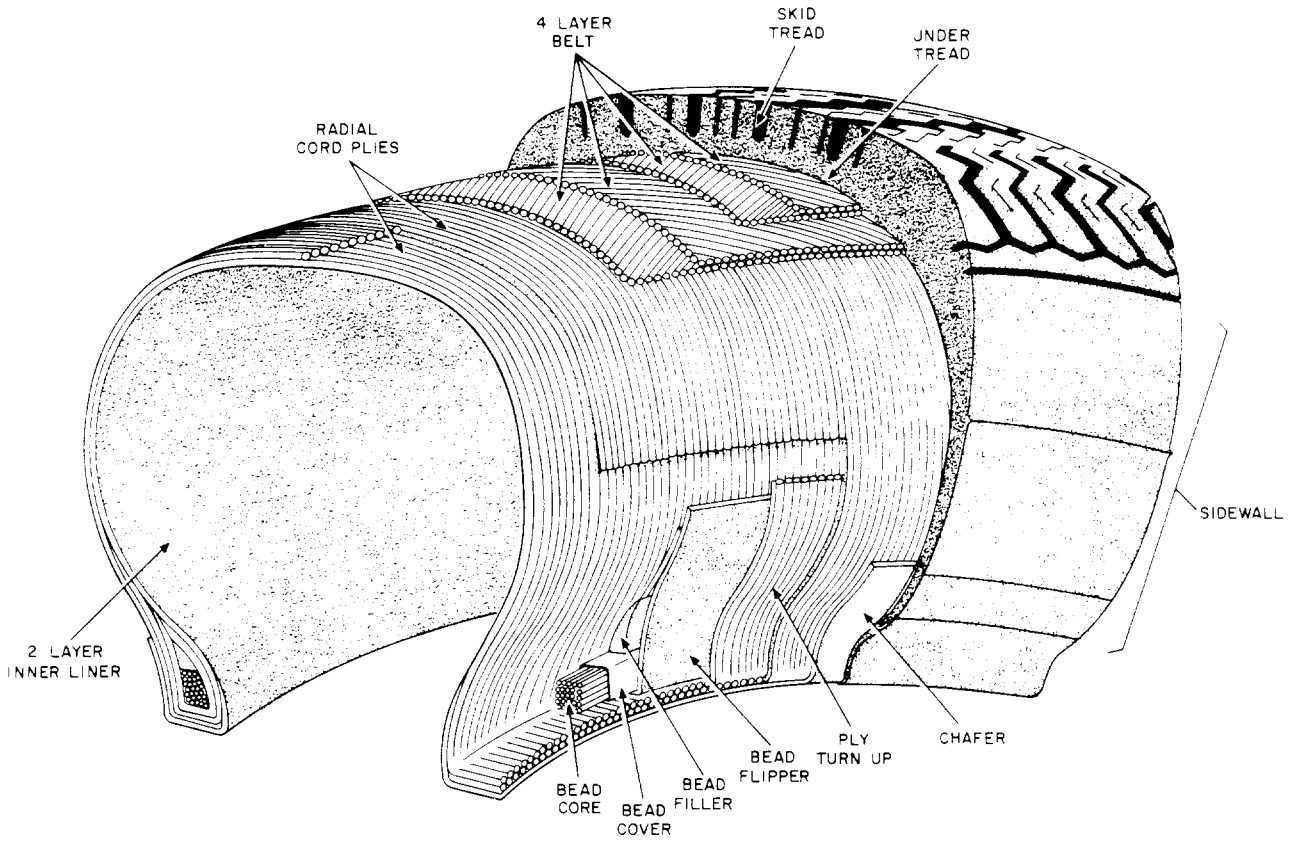


Fig. 2—Radial-Ply Tire Construction

ring, remove the valve core to make certain all of the air is out of the tire before unlocking the ring.

3.02 Inspect all rim parts for damage, rust, or distortion before mounting a tire and assembling the rim. Do not use rims, locking rings, or flanges that are distorted, rusted, or broken. Do not use a ring or rim parts of any different size, type, or manufacture than that of the rim.

3.03 When inflating a tire on a rim equipped with a lock ring, use a cage or guard that will restrain the lock ring if it should break away. If a cage or guard is not available, wrap a heavy chain around the tire and ring and place the tire with the ring side down while it is being inflated.

3.04 Stand away from the valve stem while inflating a tire. Avoid a position where the face or body is directly over the work being done on any tire in which there is pressure.

3.05 When changing tires, use only tools and equipment designed for that purpose. The use of pliers, screw drivers, or makeshift tools to force tires on or off of rims or wheels can be dangerous. Do not hammer lock rings or rims with a steel hammer. Use a rubber-covered steel-headed hammer. Use only a rubber mallet on passenger car tires.

3.06 Standard eye protection shall be worn while performing any tire maintenance, repair, or service operation.

3.07 Radial ply tires should not be mixed in any way with conventional tires on the same vehicle. Radial ply tires differ in such characteristics as flex action, cornering force, traction, torque response, and steering response. When radial and conventional tires are mixed on the front axle, steering pull can result, and when mixed on the rear axle undue stress can be placed on the

differential. Under no circumstances should radials be used on the same vehicle with bias tires.

4. INSPECTION AND MAINTENANCE

4.01 The general appearance of all tires on a vehicle should be observed each day before the vehicle is used. Check for cuts, snags, punctures, and abrasions and for signs of abnormal wear and underinflation. Any irregularities should be repaired or corrected as soon as possible in accordance with local routine.

4.02 Once each month on vehicles in service, all tires should be checked for correct air pressure. Check the tires when they are cool. Use an accurate gauge to determine the pressure, and inflate underinflated tires to the recommended pressure for the tire size, ply-rating, and load. Tires which show a decided drop in pressure should be checked for leaks and the leaks repaired. Be sure that valve caps are on every tire and that the caps are screwed on fingertight.

4.03 At regular intervals, a thorough tire inspection should be made. In addition to checking tire inflation pressure, tires should be inspected for tread wear, fabric breaks, cuts, snags, or other damage. Pieces of metal, glass, or small stones imbedded in the tread should be removed. If upon inspecting a tire any of the following conditions are found to exist, either replacement or immediate repair of the tire must be made.

(a) Cuts, snags, or cracks in the tread that are more than one inch long or deep enough to expose the ply cords.

(b) Bulges or bumps in the tire tread or sidewall.

(c) Cracks, scuffs, cuts, or snags in the sidewall that have exposed or damaged the ply cords.

(d) Tread wear to the extent that there is less than 1/16-inch of tread depth in any groove or there is ply cord exposed.

(e) Any tire that has gone flat while being driven should be removed from the wheel and examined for fabric breaks or loose cords inside the tire.

4.04 Tire punctures should always be repaired from the inside of the tire. Plug-type repairs made from the outside of the tire, pressure sealants, and blow-out patches are temporary repairs and should be used only until permanent, vulcanized repairs can be made. Do not use an inner tube in a tubeless tire in place of making a permanent repair.

4.05 As a part of the regular tire inspection, truck tires in a dual assembly should be checked to be sure they are properly matched. Duals should be of the same size, should be inflated to the same pressure, and should have approximately equal tread wear so there is little or no difference in the rolling circumference of the tires. If the rolling circumference of the tires differs by 3/4-inch for tire sizes up to 8.25 (9-22.5 tubeless) and 1-1/2 inches for sizes 9.00 (10-22.5 tubeless) and larger, one of the tires should be replaced. It is desirable for the tire with the smaller circumference to be mounted on the inside position on a dual assembly.

4.06 Wheels and rims should be maintained by observing the procedures in the following list.

(a) Keep mounting stud and rim bolt nuts properly torqued, and replace missing or defective bolts, nuts, or lugs.

(b) Inspect wheels and rims at regular intervals. Rims that are bent, loose, cracked, or otherwise damaged should be replaced.

(c) Keep wheels and rims clean and painted. Scale, rust, dirt, and other foreign material can conceal defects or accelerate corrosion.

(d) Do not attempt to repair rims or wheels by heating or welding unless it is first determined that this type of repair on any particular rim or wheel is in keeping with manufacturer's recommendations. Heat can change the physical characteristics of heat-treated metal and can make a wheel or rim unfit for further use.

(e) Dents in the rim flange area should be straightened with a rim straightening tool or hammer and the hammer marks smoothed with a file.

5. CAUSES OF TIRE DAMAGE AND ABNORMAL WEAR

OVERINFLATION

5.01 Overinflation can cause tire damage by reducing the ability of the tire to absorb road shock. Overinflation does not compensate for overloading, but it can lead to tire failures caused by tread cracking, rapid center tread wear by reducing tread contact with the road (Fig. 3), cord breaks, ply or tread separation, and strain on the rim and tire beads. An example of tire damage caused by overinflation is illustrated in Fig. 4.

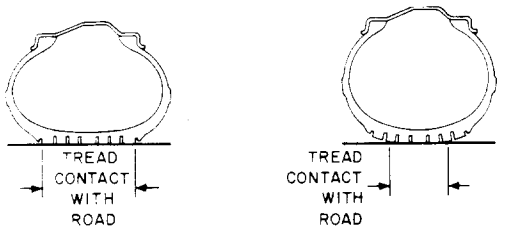


Fig. 3—Appearance of Overinflated Tire vs Properly Inflated Tire

5.02 To avoid overinflation, inflate to the correct air pressure when the tires are cool. If tires are continually carrying less than the maximum load, it may be desirable to adjust the air pressure downward to correspond to the actual load carried. It is normal for tires to build-up pressure after being run. ***Do not reduce (bleed) this pressure.*** Bleeding the pressure causes excessive flexing of the sidewalls and results in abnormally high internal tire temperatures. In addition, when the tires cool off they will be badly underinflated. If excessive pressure does build up, underinflation, overloading, speed, or a combination of these is the cause.

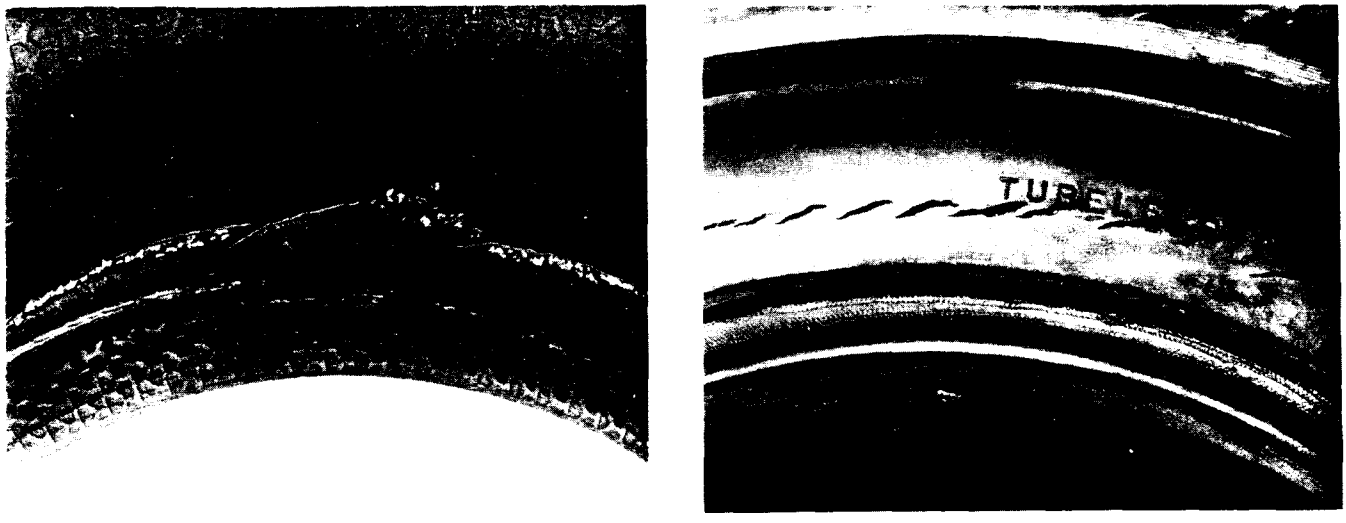
UNDERINFLATION

5.03 Underinflation can damage a tire by causing excessive flexing and heat build-up which leads to rapid tread wear, tread and ply separation, flex breaks (Fig. 5), rim chafing and loosened cords. Too little pressure also produces abnormal deflection (Fig. 6) which causes the shoulder area of the tread to wipe and scuff on the road.

OVERLOADING

5.04 Overloading can cause tire damage in much the same manner as underinflation. Overworking the cord body and abnormal flexing as a result of overloading can lead to cord body breaks in the

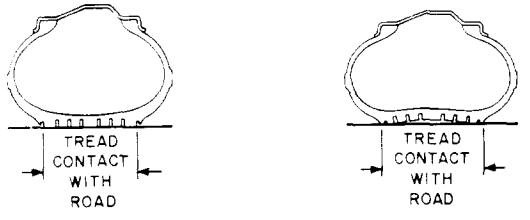
Fig. 4—Groove Cracking Caused by Overinflation



INSIDE VIEW

OUTSIDE VIEW

Fig. 5—Flex Break Caused by Underinflation or Overload



PROPER INFLATION UNDERINFLATION

Fig. 6—Appearance of Underinflated Tire vs Properly Inflated Tire

sidewall or shoulder area of the tire, severe flange chafing, and heat build-up due to the abnormal flexing.

HEAT BUILD-UP

5.05 Heat is generated in a tire by flexing of the tire body. Since the tire is cooled by surrounding air and by contact with the road and is heated by flexing, an increase in ambient temperature or an increase in flexing due to underinflation or overloading will cause the tire's operating temperature to increase. Tires are vulcanized or cured at the factory at a temperature of approximately 280 degrees, so the operating temperature of tire must remain well below this temperature. If the operating temperature reaches or exceeds the curing temperature, the component parts of the tire will be weakened or damaged and tire failure can result. To prevent overheating, avoid underinflation, overloading, and operation at sustained high speed.

MECHANICAL IRREGULARITIES

5.06 ***Toe-in (Fig. 7):*** Excessive toe-in causes the tire wear to show feathered edges on the inside edge of the tread design or possibly as excessive wear on the right front tire.

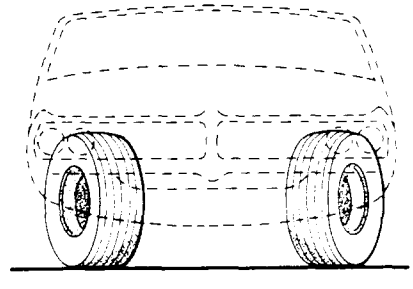


Fig. 7—Excessive Toe-in

5.07 ***Toe-out (Fig. 8):*** Toe-out causes the tire wear to show feathered edges on the outside edge of the tread design.

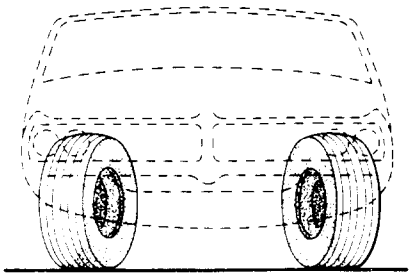


Fig. 8—Excessive Toe-out

5.08 ***Camber:*** Positive camber is having the wheels closer together at the point of road contact. Negative camber is having the wheels closer together at the top. Incorrect camber results in excessive and irregular wear on one side of the tread design.

5.09 ***Caster:*** Caster is the tilt of the front axle or inclination of the kingpin or ball joint toward the front or rear. Excessive caster can cause the wheels to weave or shimmy resulting in uneven or spotty tread wear.

5.10 ***Brakes:*** Brakes that are out of adjustment or brake drums that are out-of-round cause tire treads to wear rapidly by causing flat spots that lead to premature tire failure.

5.11 ***Wheels:*** Loose or worn wheel bearings, loose radius rods and U-bolts, unbalanced wheels, or wobbly wheels all result in rapid, uneven tread wear.

5.12 Mechanical irregularities either singularly or in combination can cause uneven wear patterns of the types illustrated in Fig. 9 and 10.

ROAD HAZARDS—ABUSES

5.13 Any tire may be accidentally injured, without external indication of the injury, by striking a chuck hole, curb, or other object with sufficient force. Impact or bruise injuries usually appear in the fabric on the inside of the tire and seldom cause a blowout or flat at the time the object is struck. The tire may be run for many miles before failing, because the constant flexing of the tire as it contacts the road increases the injury until failure occurs.

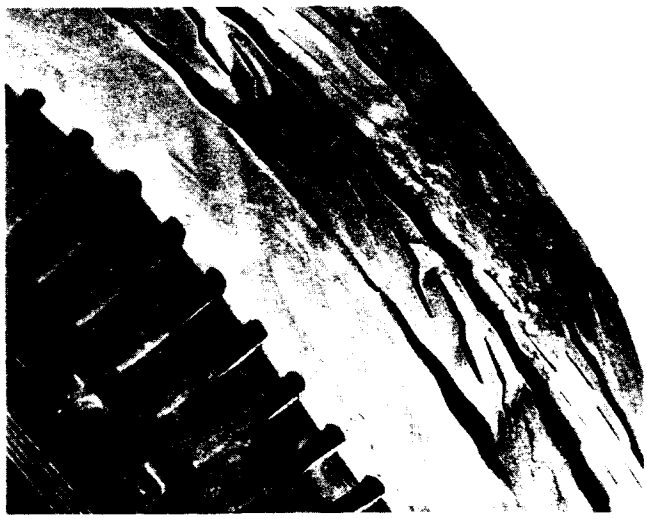


Fig. 9—Uneven Wear Caused by Mechanical Irregularities

5.14 The service delivered by tires is, to a great extent, controlled by driving habits. Avoiding such things as chuck holes, objects in the road, excessive speed for road conditions, fast starts, sudden stops, or spinning the wheels, and promptly reporting evidences of mechanical irregularities can do much toward obtaining maximum tire mileage. Tire injuries and possible causes are shown in Fig. 11 through 18.

6. CAUSES OF PREMATURE TUBE FAILURES

6.01 Premature tube failures can result from several causes. The most common are improper mounting, improper inflation procedures, and use of the wrong size tube or a stretched tube which can lead to tube failure, and in turn can cause severe damage to the tire.

6.02 When a tire, through normal wear, reaches the point of being unsafe, the tube used in the tire generally is in the same condition and should not be reused. Flaps used in tube-type truck tires may be reused, but only if they are in good condition, and are remounted in the same size tire and on the same size rim from which they were removed.

6.03 Mounting a new tube of a larger size than the inside of the casing or mounting an old tube in a new casing can cause the tube to crease or wrinkle. If the crease occurs in the flexing area of the tire, a hinging action will occur that

EXAMPLES OF UNEVEN WEAR CAUSED BY :

1 - UNDERINFLATION OR FAST CORNERING

2 - OVERINFLATION AND FAST CORNERING

3 - EXCESSIVE CAMBER

4 - EXCESSIVE TOE-IN OR TOE-OUT

5 - MECHANICAL IRREGULARITY AND UNDERINFLATION

Fig. 10—Uneven Wear Caused by Mechanical or Operating Irregularities

can cut the tube and possibly damage the tire fabric.

6.04 Mounting a tube that is smaller than the inside of the casing stretches the tube excessively which can cause:

(a) Rapid deterioration of the tube

(b) Decreased resistance to chafing, tears, and punctures

(c) Abnormal strain at the valve base

(d) Poor air retaining qualities.

6.05 When inflating a tube for inspection, do not inflate the tube to the point that it balloons. Ballooning thins and stretches the tube, making the stretched area too large for the casing. When mounted, the stretched area is likely to crease or wrinkle and cause the tube to fail.

7. MOUNTING AND DEMOUNTING

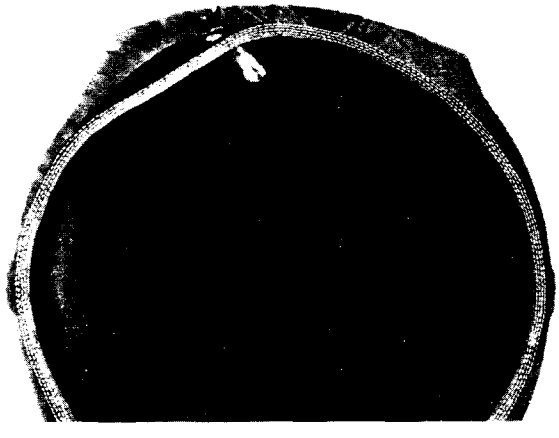
7.01 Prior to mounting tube-type or tubeless tires, clean the rim thoroughly to remove rust and dirt. Do not mount a tire on a wheel that has a bent rim flange.

MOUNTING INNER TUBES

7.02 Be sure the tube and the inside of the tire are clean and free of all foreign matter. Insert the inner tube in the tire and inflate the tube until it is nearly rounded out. Insert the flap, if required, making sure it is properly centered between the beads and is not twisted, creased, or folded over at the edges.

TREAD SEPARATION CAN BE THE RESULT OF MPROPER REPAIRS OR HEAT DUE TO OVERLOADS, UNDER- NFLATION, OR EXCESSIVE SPEED

Fig. 11—Tread Separation

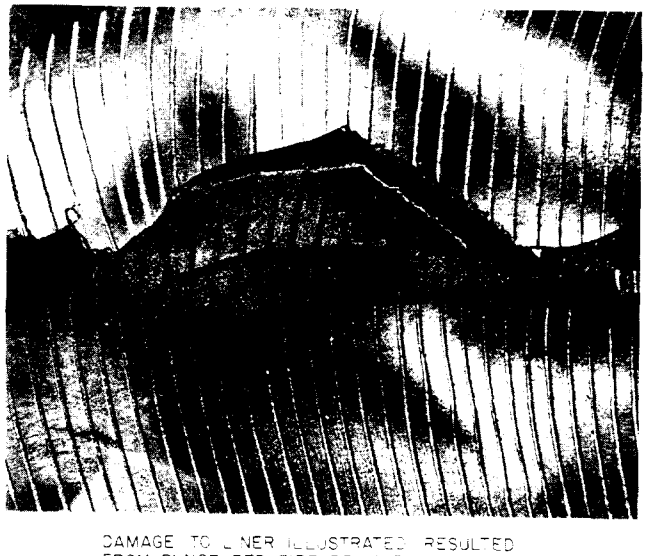


TREAD SEPARATION ILLUSTRATED WAS CAUSED BY MPROPER PUNCTURE REPAIR TREAD OR PLY SEPARATION CAN ALSO BE CAUSED BY EXCESSIVE HEAT

Fig. 12—Tread or Ply Separation

DAMAGE TO BEAD CAN BE CAUSED BY MPROPER MOUNTING OR DEMOUNTING OR BY BENT RIM

Fig. 13—Bead Core Separation



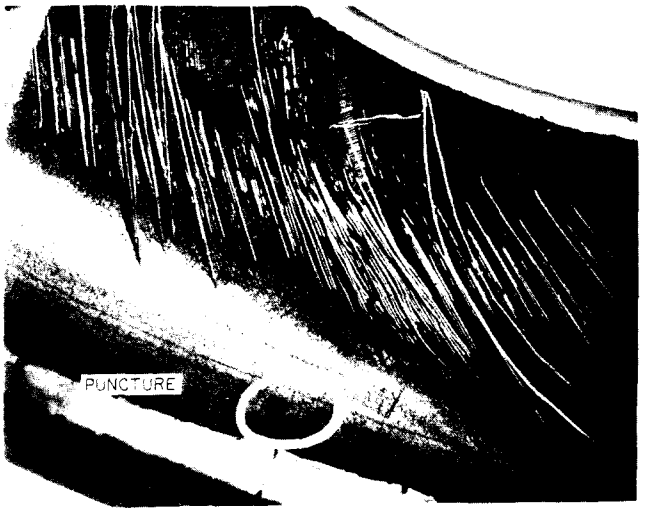
DAMAGE TO L NER ILLUSTRATED RESULTED FROM PUNCTURED TIRE BEING RUN FLAT

Fig. 14—Liner Damage (Tubeless)

Fig. 19. Do not allow the lubricant to run into the tire.

7.03 Apply a solution of approved lubricant (soapstone for tube type—liquid solution for tubeless) to the tube and tire (the flap also, if used) in the tire bead and rim area as shown in

7.04 Mount the tire on the rim. Center the valve, pull it through the hole, and hold it in place while inflating the tube to seat the tire beads.

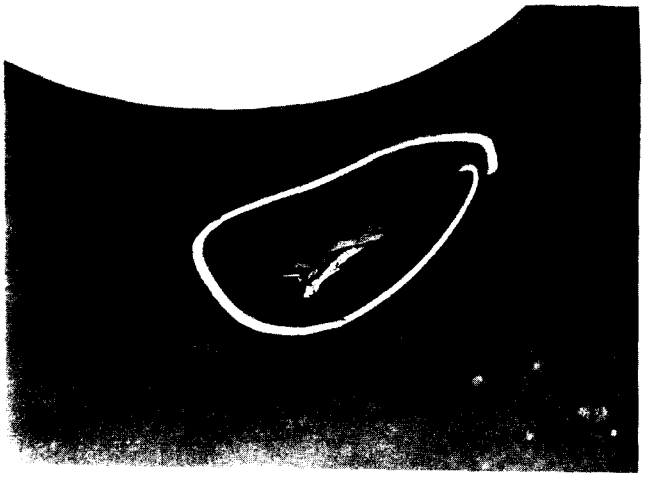


CORD BREAKDOWN ILLUSTRATED RESULTED FROM PUNCTURED TIRE BEING RUN FLAT

Fig. 15—Cord Breakdown (Tube-Type)

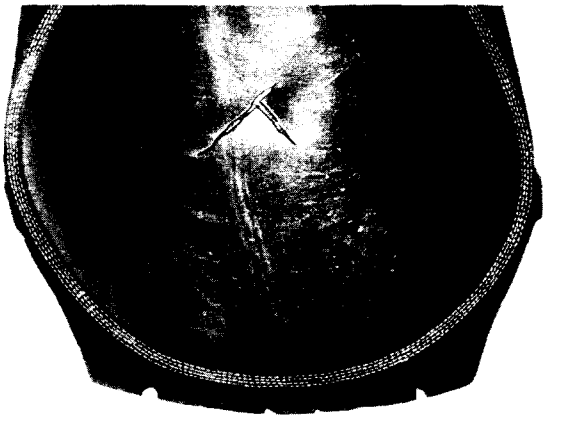
BROKEN CORDS IN SHOULDER AREA WERE CAUSED BY A SEVERE IMPACT

Fig. 17—Shoulder Bruise Break



BREAK ILLUSTRATED WAS CAUSED BY THE TIRE SIDEWALL BEING CRUSHED BETWEEN A CURB AND THE RIM.

Fig. 16—Rim Bruise Break



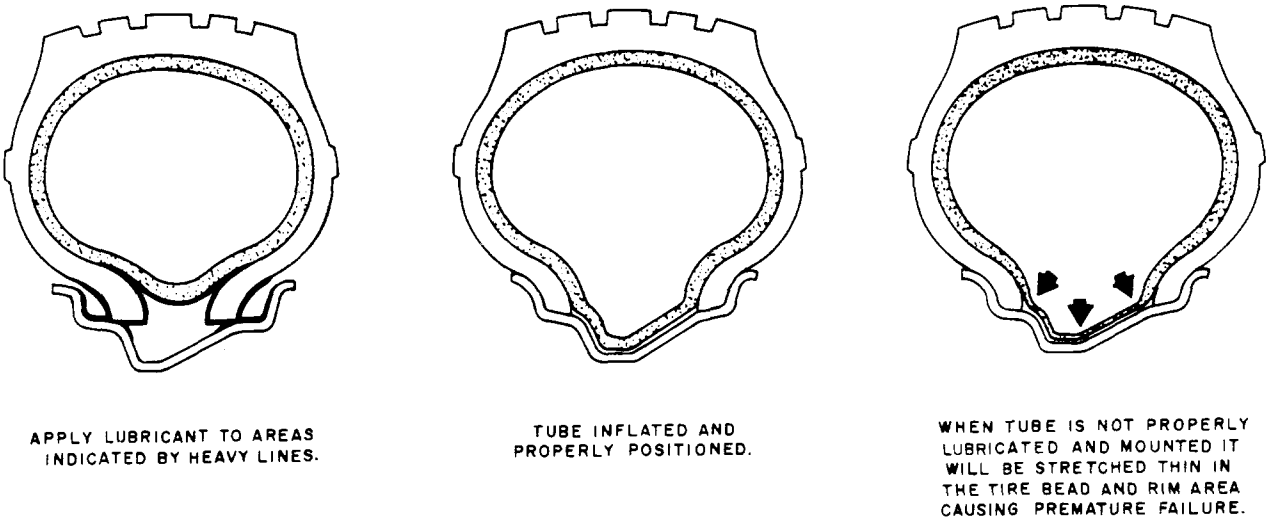
CORD BREAK IN TREAD AREA CAUSED BY A SEVERE IMPACT. OVERINFLATION CAN CONTRIBUTE TO THIS TYPE OF INJURY

Fig. 18—Tread Bruise Break

7.05 Completely deflate the tire by removing the valve core. Replace the valve core and reinflate to the recommended pressure. Apply the valve cap fingertight.

MOUNTING AND DEMOUNTING TUBELESS PASSENGER CAR TIRES

7.06 The types of rims used with tubeless tires differ in appearance from those used with tube-type tires. Rims of the 13-, 14-, and 15-inch size for passenger car and station wagon use will generally be one of the three types shown in Fig. 20. The standard rim for use with commercial or light-duty tubeless truck tires and the rims for use with the larger tubeless truck tires are shown in Fig. 21. Commercial or light-duty tubeless truck tires may be mounted on conventional rims and, accordingly, these tires have the same size designations as the equivalent tube-type tires. The



APPLY LUBRICANT TO AREAS INDICATED BY HEAVY LINES.

TUBE INFLATED AND PROPERLY POSITIONED.

WHEN TUBE IS NOT PROPERLY LUBRICATED AND MOUNTED IT WILL BE STRETCHED THIN IN THE TIRE BEAD AND RIM AREA CAUSING PREMATURE FAILURE.

Fig. 19—Areas Requiring Lubrication When Mounting Tube-Type Tire

larger tubeless truck tires cannot be mounted on conventional rims, and the size designations of these tires differ from the tube-type so the tubeless truck tires can be readily identified.

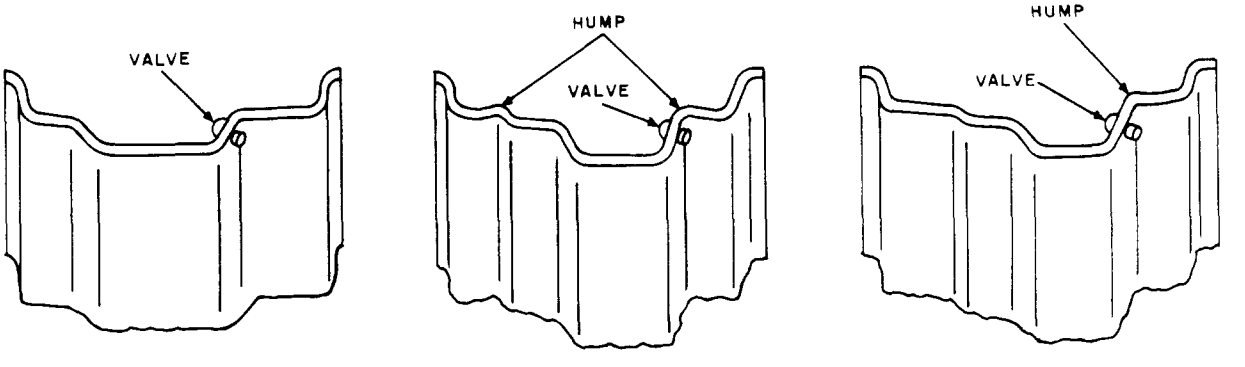
7.07 ***To demount passenger car or light truck tires:***

(1) Remove the tire and rim assembly from the vehicle.

(2) Place the tire and rim assembly on a mounting machine or on the floor with the ***narrow bead ledge of the rim up.*** Remove the valve core to completely deflate the tire.

(3) Apply a liberal amount of lubricant to the tire bead and loosen the bead with foot pressure or with a bead breaker tool. Do not use a hammer or tire irons to loosen the beads.

(4) Follow normal procedures to remove the tire from the rim taking care not to damage the bead area.



RIMS WITH NO HUMP AND WITH VALVE HOLE ON WIDE LEDGE SIDE, MOUNT AND DEMOUNT TIRES WITH VALVE HOLE DOWN.

RIMS WITH HUMP ON EACH SIDE AND VALVE HOLE ON NARROW LEDGE SIDE, MOUNT AND DEMOUNT TIRES WITH VALVE HOLE UP.

RIMS WITH HUMP AND VALVE HOLE ON NARROW LEDGE SIDE AND SIMILAR RIMS WITH NO HUMP, MOUNT AND DEMOUNT TIRES WITH VALVE HOLE UP.

Fig. 20—Types of 13-, 14-, and 15-inch Size Rims for Use With Passenger Car Tubeless Tires

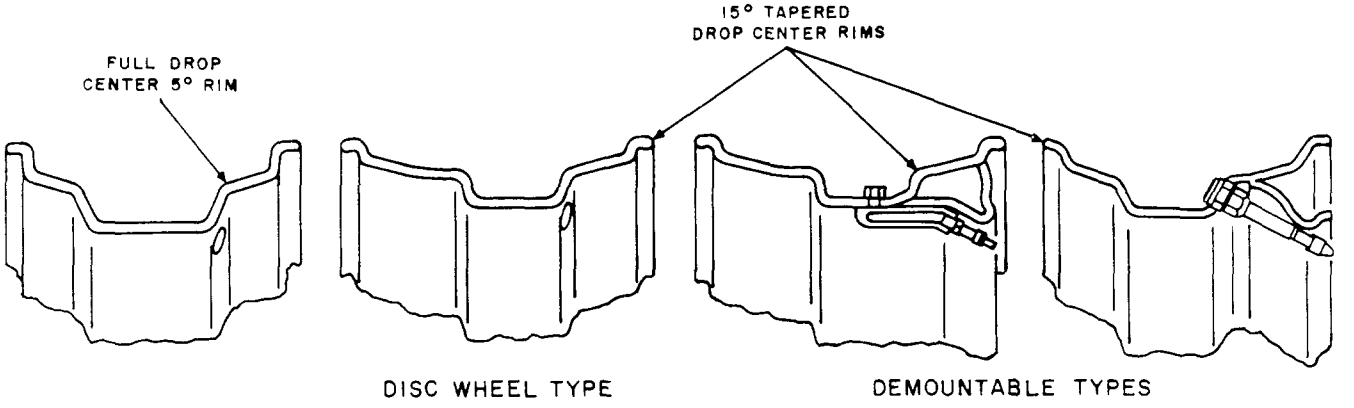


Fig. 21—Types of Rims for Use With Tubeless Truck Tires

7.08 ***To mount passenger car or light truck tires:***

(1) Inspect the rim and valve. Worn or damaged valves or valve stems should be replaced.

(2) Use a liberal amount of lubricant on the tire beads and rim flanges and mount the tire with the ***narrow rim ledge up.***

(3) After the tire is mounted on the rim, it may be necessary to use a bead expander on conventional tubeless tires to bring the beads in contact with the rim so the tire can be inflated. A special mounting band is available for use with tubeless radial tires. If the bead expander is used, inflate the tire to not more than 10 pounds, then remove the bead expander. Continue to inflate to fully seat the beads on the rim, ***but do not exceed 40 pounds pressure.*** If the beads do not seat at 40 pounds pressure, deflate, relubricate, center the tire, and reinflate. Check for leakage and adjust pressure.

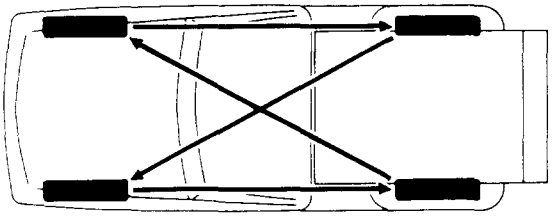
MOUNTING AND DEMOUNTING TRUCK TIRES

7.09 Mounting or demounting truck tires, either tube-type or tubeless, will require that different procedures be used depending on the type of rim on which the tire is to be mounted. For specific truck tire mounting procedures, consult the various publications available from tire manufacturers or from the Rubber Manufacturers Association.

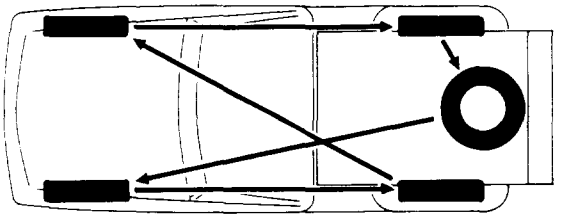
8. TIRE ROTATION

8.01 In order to obtain uniform tire wear on passenger cars or trucks with rear singles, the tires may be rotated as shown in Fig. 22 at intervals of approximately 5000 miles. At the time of rotation, a complete tire inspection should be made.

8.02 The tires on trucks with dual assemblies usually have different rates of wear. If the tires are not rotated, the dual mounted tires may become mismatched causing overloading of one tire in each dual pair. For best results in obtaining an even rate of wear and minimizing the chance of overloading one tire in a dual pair, truck tires should be rotated periodically, as shown in Fig. 23, if the front and rear tires are of the same size and ply rating. Under normal conditions, the front tires should be moved to the rear wheels after about one-third of the tread design is worn off. New tires should be mounted on the front wheels. Tires that are moved to the rear must be matched with other tires of the same rolling circumference in the dual assembly. At the time of rotation, a complete tire inspection should be made.



PROCEDURE FOR VEHICLES WITHOUT A SPARE TIRE



PROCEDURE FOR VEHICLES WITH A SPARE

Fig. 22—Tire Rotation Procedures for Passenger Cars and Light Trucks

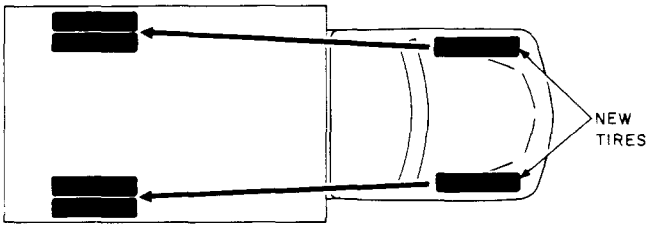


Fig. 23—Tire Rotation Procedure for Trucks With Dual Mounted Tires

9. LOAD AND INFLATION

9.01 In accordance with new standards adopted by tire manufacturers, the term ply rating will no longer be used. The ply rating will not be included as a part of the tire size designation. Instead, a code letter will be used to designate load range of the tire. Information on the conversion of ply rating to the load range designation for passenger car and truck tires is given in the following list.

LOAD RANGE	PLY RATING
A	2
B	4
C	6
D	8
E	10
F	12
G	14
H	16
J	18
L	20
M	22
N	24

9.02 The maximum recommended inflation pressures for passenger car tires designated load range B or D are 32 and 40 pounds, respectively, as gauged when tires are cool. The maximum inflation pressures for truck tires depend on tire size and load range. To determine proper inflation pressures for truck tires, consult truck manufacturers' manuals or various publications issued by tire manufacturers, or follow instructions issued locally. A clear, pressure-sensitive decal that indicates the correct inflation pressure when the tires are cool may be applied to the vehicle fenders. Operating with a tire either overloaded or overinflated can shorten the life of the tire.

10. RETREADED TIRES

10.01 Full retreaded automobile and truck tires can be serviceable, giving tire mileage equal to or better than new tires *if* the tire carcass is adequately inspected to ensure that it is in a safe condition prior to retreading and, if it is retreaded by an acceptable procedure with a quality rubber compound.

10.02 It is recommended that retreading be done by a reliable and reputable organization that will furnish their tire retreading specifications and guarantee material and workmanship. To avoid unsatisfactory tire service, do not retread tires that show signs of misuse. Do not retread:

(1) Any tire that has exposed cords, a fabric break, or has been repaired with a blowout patch, rubber plug, or boot.

(2) Any tire that has a section inserted.

(3) Any tire that has a bump, bulge, or knot related to sidewall or tread separation or has a partial failure of tire structure including the bead area.

(4) Any repaired tubeless tire that will require the use of an inner tube in the finished product.

10.03 It is recommended that only those tires removed from company vehicles be retreaded. Do not rely on the tire retreader to furnish retreadable tire casings. Retreaded tires may be used on:

(1) Trailers

(2) Construction trucks and equipment

(3) Repair and installation vehicles assigned to metropolitan areas

(4) Passenger cars assigned to metropolitan areas.

11. STORAGE OF TIRES AND TUBES

11.01 Tires and tubes should be stored in containers or with wrapping or covering that will protect them from exposure to light, dust, and circulating air.

11.02 Tires should be stored away from heat ducts or pipes and away from electrical equipment. The storage area should be clean, dry, and cool. The ideal storage area temperature is in the range of 40° to 60°F. Petroleum products, floor polish, cleaning products, etc, should not be allowed to contact the tires, tubes, or their containers. It is preferable to have a raised platform or a storage rack that is used for tire storage only.