4.0.0 GENERAL OPERATIONS.

4.1.0 SERVICING TYRES AND RIMS.

Servicing performance tyre customers' expectations is just as important as recommending the right tyre and rim. They make major investments in custom rims and high-performance tyres that require special attention.

Improperly mounting, balancing, or installing a performance tyre can, in effect, deletes the unique capabilities that are built into it. That's why the key to making tyre reach its promised potential - and, therefore, the key to customer satisfaction - is knowing how to service it properly.

The following sections will review the proper steps to servicing a set of new performance tyres through mounting, match mounting, balancing and installation.

4.2.0 MOUNTING INSTRUCTIONS.

Tyre mounting is a skilled task that should be performed only by properly trained and informed people.

Professional tyre installation.

1. Only specially trained persons should mount tyres. Improper tyre mounting and inflation procedures may cause tyre beads to break with explosive force during installation of the tyre on the rim causing serious personal injury, death and property damage.
2. Before you begin to mount the tyre and rim, verify that they are the same diameter.
3. Clean steel rims of corrosion, burrs, and dried lubricant, using a steel brush or clothes. Do not use sandpaper, steel wool or a wire brush on custom wheels. Use only non-abrasive cleaning pads or cleaners. Be sure to follow the rim manufacturer's recommended cleaning procedures.
4. Avoid scratching the rim. Remember that performance customers make a heavy investment in custom wheels.
5. Properly lubricate both the top and bottom beads of the tyre. This will help uniform and easier seating of the beads, after a smoother mounting operation.
6. To seat the beads, inflate the tyre to 40 psi. If the beads do not seat at 40 psi, relieve the air pressure, break down the assembly and start again. Never inflate the tyre with more than 40 psi to seat the beads. When the bead is seated, bleed the tyre to 0 psi and re-inflate it to the recommended pressure.

Never inflate over 40 psi (280 kPa) to seat beads. Mount radial ply tyres only on rims designed by wheel manufacturer as suitable for radial tyres. Mismatched tyres and rims can explode during inflation. Also, mismatched tyres and rims can result in dangerous tyre failure on the road. If a tyre is mounted in error on the wrong-sized rim, do not remount it on the proper rim - scrap it. It may be damaged internally (which is not externally visible) by being dangerously stretched and distorted and could fail on the highway. ONLY SPECIALLY TRAINED PERSONS SHOULD MOUNT TYRES. Never allow unsupervised children to mount or inflate tyres.

7. Ensure complete seating of the beads. Make a final check of the bead register for concentric fit.

Note: Directional Tyres have directional arrows on their sidewalls and should be observed in mounting the tyre.

4.3.0 RIM PREPARATION.

- Confirm that the size of rim and the size of tyre to be mounted are compatible (diameter and width).
- Remove any balance weights and thoroughly clean and inspect the rim before mounting the tyre.
- An acceptable rim must be free from rust, foreign matter, cracks and distortion.
- Bead seats and flanges must be absolutely clean.
- Rust should be wire-brushed, and sharp edges and burred areas of the rim flanges should be filed smooth.
- Rims that show signs of impact damage or distortion should be discarded.
- Excessive rim runout (out-of-round) cannot be absorbed entirely by the tyre and might impair the ride quality of the vehicle in the 50 to 80 mph range. Rims with excessive runout must be replaced.

4.4.0 VALVES.

Old valves could leak. When new tyres are mounted, have new valves installed.

Also the seal of a sensor/valve combination has to be changed.

4.5.0 TYRE PREPARATION.

Inspect and clean the interior of the tyre, removing any residue.

Warning! Serious or fatal injury may result from improper mounting, under-inflation, overloading or the tyre damage due to abusive use. The tyre and rim size must match when mounting the tyre on the wheel. Never exceed 40 psi to seat beads. For proper operation, consult the vehicle's tyre information placard.

Many tyre problems, including vibration or shake, result from improper mounting. Problems of this nature can be avoided by adopting the following procedures for installing passenger tyres.

4.6.0 LUBRICATION.

- Lubricate both beads of the tyre. Also lubricate the inside surfaces of the rim flanges and bead ledge areas of the rim width approved lubricant.
- Proper lubrication will prevent tearing and damage to the tyre beads during the mounting process. With proper lubrication, tyre beads will seat on the rim easily in the correct position. This will ensure a true tyre profile and eliminate the possibility of stretched or

distorted beads.

- Tyres not seated properly on the wheel can produce an out-of-round condition that could cause difficulty in balancing. Moreover, improper bead seating ultimately results in a vibration/shake problem that degrades riding qualities.
- The basic requirements for a good lubricant are that it is developed from ingredients that will not react with rubber, reasonably slippery and, fast drying. Low-cost substitutes or over-dilution of the lubricant should be avoided.

Under no circumstances should the following liquids be used as a tyre lubricant:

- gasoline, etc;
- kerosene;
- water;
- spirits, such as paint thinner, mineral spirits, etc;
- lubricant should also be used when demounting tyres.

4.7.0 INFLATION.

Proper inflation pressure is essential for achieving maximum performance and mileage. Improper inflation pressure may result in rapid and/or irregular wear.

Tyres loose air. They will loose approximately 1PSI a month. Using nitrogen this rate goes down.

Vehicle manufacturers list recommended tyre pressures for original vehicles tyres in the owners manual and on a placard on the end of the driver's side or on the glove box.

For continuous high speed driving, tyre pressures should be increased (x) bar or psi above the normal cold inflation recommended (check car manufacturer).

Also respect recommended front to rear pressure differential.

The criteria that car manufacturers use to determine inflation recommendations are: ride comfort, load capacity, traction, wear, and fuel economy/rolling resistance

After adequate lubrication, mount the tyre on the rim. Inflate the tyre using the following sequence:

1. Remove the valve core and inflate the tyre to a maximum of 40 psi. (Use an in-line pressure gauge with a flexible extension and clamp-on nozzle).
2. Deflate the tyre completely. Then install the valve core and inflate the tyre slowly to the recommended pressure. Check the valve for perfect sealing and install a metal or hard plastic valve cap with sealing washer.

3 Visually inspect the tyre to make sure the beads are properly seated. Check the guide rib to see if it is equally spaced around the tyre. If not, the tyre must be broken down and reseated.

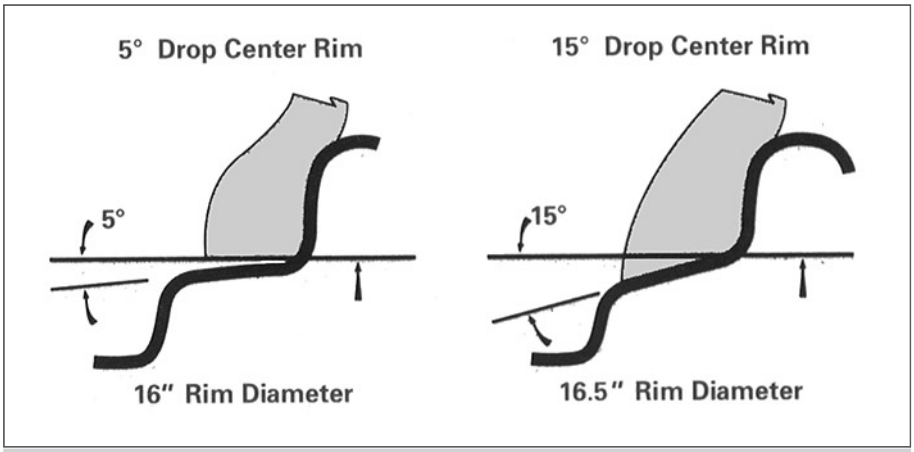
Never mount a tyre of one diameter on a rim of a different diameter. Attempts to mount a tyre of one diameter on a rim of another diameter can lead to failure causing property damage, serious injury or even death.

For example, while it is possible to pass a 16" diameter tyre over the lip or flange of a 16.5" diameter rim, the tyre cannot be inflated enough to position its beads against the rim flange. If an attempt is made to seat the tyre bead by over-inflating, the bead will break with explosive force possibly resulting in serious or fatal injury.

Further, in the USA, following diameters can be found rather frequently, used mainly on off-road vehicles, pick-ups, Lt's, T's and Lpt's:

R14 - R14,5 - R15 - R15,5 - R16 - R16,5 - R17 - R17,5 - R18 - R19,5 - R20 - R22,5 - R24,5.

So, extra attention is required.

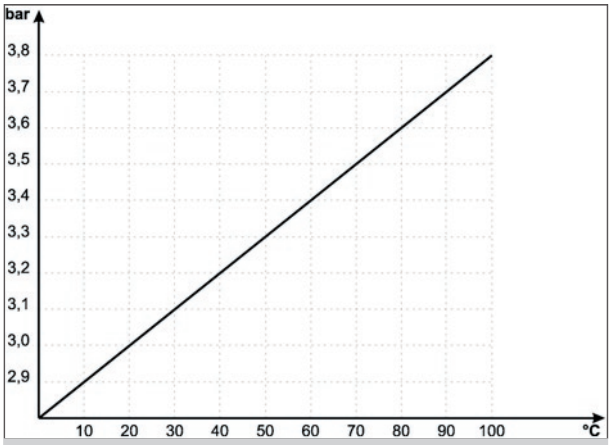


Pict. 54.

Note: Tyres with beads of one taper must be mounted on rims of the same taper. The taper diagram above shows the difference between the two types of tapers.

4.8.0 AIR PRESSURE.

Customers should be advised that the air pressure in tyres, including the spare, should be checked at least monthly and always before extended driving. Tyres should be checked when they are cold (at least three hours after the vehicle has been stopped and before it is driven more than one mile or two kilometres). Do not reduce pressure when tyres are hot; use an accurate air pressure gauge to check pressure and maintain it at the level recommended

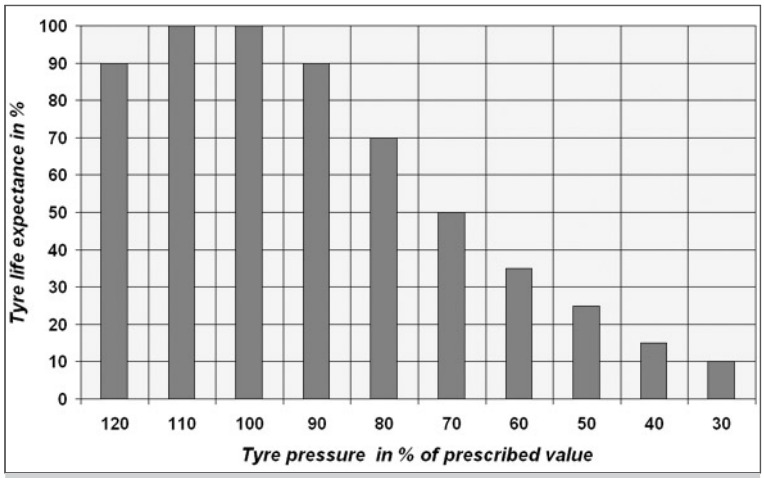


Pict. 55: Example of how temperature affects tyre pressure

on the vehicle tyre placard or in the Owner's Manual.

Underinflation produces extreme flexing of sidewalls and builds up heat to the point that tyre failure may occur. Overinflation can cause the tyre to be more susceptible to impact damage. Over/underinflation may also adversely affect vehicle handling. Cold tyre pressure should never be higher than the limit moulded on the sidewall.

Most tyre damage is caused by under inflation. It negatively affects the life expectancy of the tyre as should in the graphics below:



Pict.56.

Further underinflation causes a higher rolling resistance with higher fuels consumption as end result.

Never exceed the load-carrying limits moulded into the sidewall of the tyres or the maximum vehicle load limit as shown on the vehicle tyre placard, whichever is less. Overloading builds up excessive heat in the tyre and could lead to failure.

4.9.0 PROPER INFLATION PROCEDURES.

Inflation pressure affects the tread profile shape and the contact pressure across the tread surface. Changing the inflation pressure alters how the tyre will function on the customer's vehicle. When asked by a customer for the correct inflation pressure for his/her tyres, there isn't one universal answer you can give him/her. Tyre size and vehicle type as well as driver habits and preferences determine inflation pressure. You must ask specific questions to determine what is best for each customer.

Higher than minimum pressure increases the crown radius of the tyre, reducing the contact pressure at the shoulder and giving a slightly smaller footprint. In general, performance improvements of higher inflation pressure include steering response, fuel economy, hydroplaning resistance and treadwear (less shoulder wear).

OVERINFLATION.

Causes tires to run hard and makes them more vulnerable to impact and other road hazard damage. It also causes irregular wear.

Lower than maximum inflation pressure decreases (flattens) the crown radius of the tyre, increasing the contact pressure at the shoulder. In general, performance improvements of lower inflation pressure include smoother ride, snow traction, bruise resistance and less strain to suspension system components.

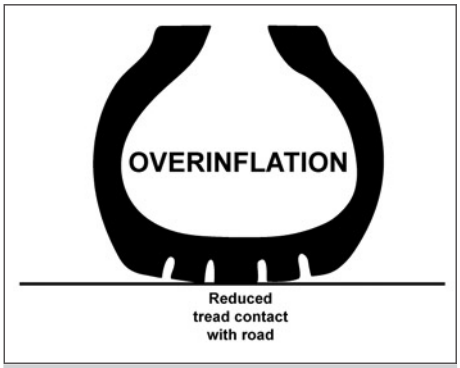
UNDERINFLATION

Causes abnormal tire deflection, which builds up excessive heat, risking failure. It also causes irregular wear.

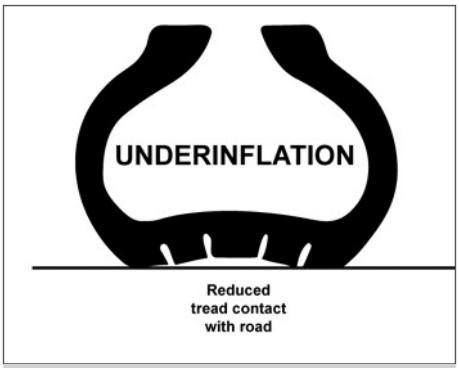
Proper inflation pressures provide optimal ride, handling, rolling resistance and treadwear performance, and are usually satisfied with the vehicle manufacturer's specification on the vehicle's placard.

Never exceed the maximum inflation pressure branded on the sidewall of the tyre.

Tyre pressure should never be below the minimum on the vehicle placard not above the maximum branded on the sidewall for a specific tyre in normal driving conditions. Keep in mind that when the inflation pressure is reduced, so is the load-carrying capacity of the tyre.



Pict. 57.



Pict. 58.

On radial tyres it is normal when a slight indentation appears during and, after inflation in case bulges appear, deflate the tyre completely and demount it for inspection by the tyre manufacturer or its representative.

4.10.0 TYRE EXPLOSIONS.

Any motor vehicle tyre, when inflated to recommended pressures, represents a tremendous amount of potential energy. If improperly treated, a tyre can literally explode, suddenly releasing this stored-up energy with sometimes-disastrous results.

Explosions occur infrequently, but have occurred for the following reasons:

1. Flammable vapours pumped into a tyre can explode from static electricity. Flammable vapours may inadvertently be pumped into a tire along with the air from the compressor when the tire is inflated. These vapours can originate from several sources.
   - Using alcohol, methanol, dry gas, or any other flammable material in the compressor tanks to prevent freezing on condensation.
   - Storing flammable solvents or rubber cements near the air in take of the compressor.
   - Cleaning of the air screen on the compressor in take with flammable solvents such as gasoline or varsol.

- Locating a battery charger near the air compressor in take can result in hydrogen gasses being drawn into the compressor.

2. Tyre defects.
3. Excessive tyre spinning as on snow, ice or mud and sand, can cause a tyre to tear apart and explode (some vehicles are able to bring a tyre to its centrifugal force failing point in 3 to 5 seconds).
4. Defective or damaged rims can fly apart during bead seating.
5. Extreme over inflation.
6. Improper mounting/demounting/bead breaking.

4.11.0 INSTALLING THE TYRE/WHEEL ASSEMBLY ON THE VEHICLE.

When installing the tyre and wheel assembly on a vehicle, verify that it will clear the vehicle's fender, moulding, callipers, springs and struts in full left and right turns. If the tyre and wheel have been up-sized for a vehicle that has an anti-lock brake system (ABS) also verify that the assembly will not interfere with the ABS.

Vehicle manufacturers have indicated that a change in a tyre/wheel diameter or axle ratio less than 15 percent will not normally affect the performance of the ABS. Changes in tyre/wheel diameter or axle ratio that are greater than 15 percent will affect the performance of the ABS and require recalibrating. Instructions for recalibration of the system to maintain speedometer accuracy and ABS performance are included in most vehicle service manuals

Some vehicles with ABS cannot be up- or downsized without affecting braking operation. Check vehicle operating manual, service manual or check with vehicle manufacturer.

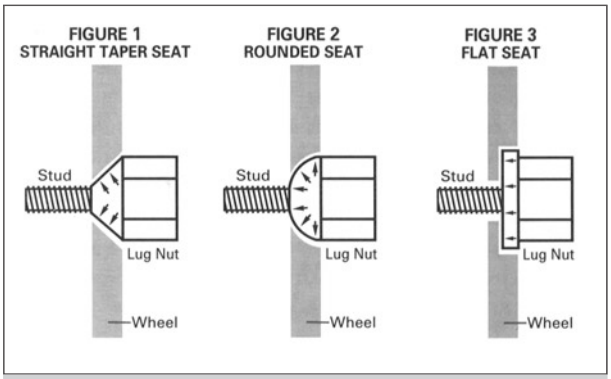
To avoid wheel distortion and to maintain a concentric assembly, snug the lug nuts gradually at first and tighten to the recommended torque setting using the criss-cross tightening sequence. The vehicle manufacturer sets lug nut torque specifications.

Excessive torque on the lug nuts can damage studs, distort wheel spiders or warp brake rotors on cars equipped with disc brakes. A warped brake rotor can cause high-speed vibration, or result in pulsating brake pedal action and reduced braking efficiency. It is recommended that lug nuts, on cars equipped with disc brakes, be tightened to exact specifications with a torque wrench.

4.12.0 TORQUING LUG NUTS.

Before you begin to install the assembly also check the lug nuts for proper fit on the studs. To ensure proper seating, we recommend that you use only the lug nuts that are supplied with wheels. If the nut features a rounded or ball style face while the wheel features a tapered seat pocket, one cannot create the proper interference fit. There are three types of lug nuts. The difference between each is the geometric shape of the lug nut that contacts

the wheel. There is straight taper seat, rounded seat and flat seat lug nut.

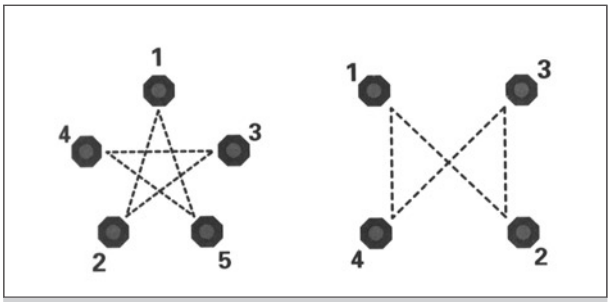


Pict. 59.

When the taper and round seat lug nuts are tightened, they become wedged into the bolthole. This creates pressure against the rim and locks the lug nut and wheel together. If any of these lug nuts are undertorqued, they could work loose. If over-torqued, these lug nuts can become fatigued, and the metal around the bolthole may deform. Either situation can cause the lug nut to work loose, damaging the rim in the process. The shape of the rounded seat lug nut diminishes the effects of overtorquing since the pressure is more evenly distributed than with the taper seat lug nut.

The flat seat lug nut is commonly used with washers. It is also used almost exclusively with aluminium rims because the aluminium is too soft to withstand the frictional forces created by the taper and round seat lug nuts. This brings up a critical point: because the frictional force of the flat surface of the washer and the wheel is the only pressure holding the wheel to the vehicle, it is crucial that a flat seat lug nut be tightened correctly.

Over-torching a flat seat lug nut can deform a wheel, causing the aluminium portion that comes into contact with the washer to extrude. The wheel can then loosen itself.



Pict. 60.

With these cautions in mind, centre the assembly on the vehicle and begin to tighten the lug nuts. Once again, remember that your high performance customer has made a substantial investment in their wheels. You should handle the lug nuts on custom wheels as carefully as the wheel itself.

Use a calibrated torque wrench with a plastic or Teflon cap to tighten the lug nuts in a cross pattern for 4-, 6- and 8-lug bolt circles. Tighten 5-lug circles with a star pattern. When you follow these patterns as shown on this page, you will:

- assure uniform pressure;
- prevent misalignment;
- help keep the wheel centred

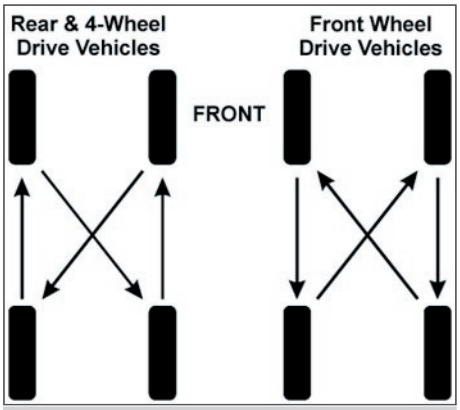
Be sure to follow wheel manufacturer's specifications for torching.

Make one last check to verify that each lug nut has been torqued.

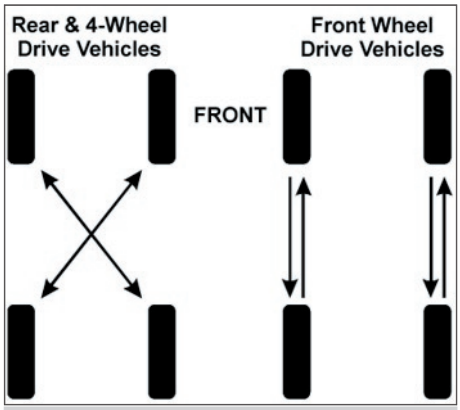
4.13.0 TYRE ROTATION.

Tyre rotation is essential to achieve even tread wear and long tread life. Rotation is necessary because of uneven wear characteristics of each wheel position on the vehicle (for certain tyres, rotation is necessary to maintain the warranty status).

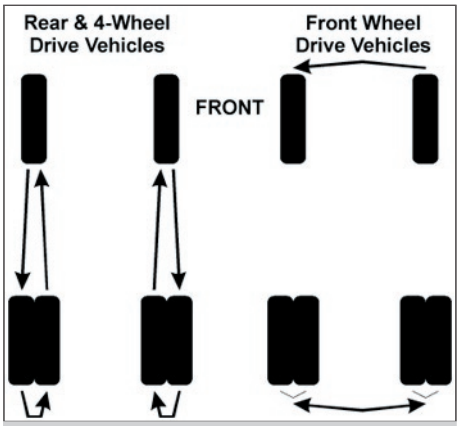
The "Cross rotation" pattern provides the best reults and can be done on any front or rear wheel drive vehicle equipped with 4 non unidirectional tyres.



Pict. 61: Preferred rotation pattern.



Pict. 62: Alternative rotation pattern.



Pict. 63: Rotation pattern for dual wheels.

NOTE:

1. Whenever only two tyres are replaced, the new tyres should be put on the rear axle.
2. Directional tyres are to be switched at the same side of the vehicle, never diagonally.
3. 5 tyre rotation (including the spare tyre): the normal four tyre rotation is used but the spare tyre comes into the rear right position. The tyre that should have gone in that position goes in the trunk as spare.