

SECTION 13: WHEELS, HUBS & TIRES

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1. WHEELS AND TIRES

1.1 Description

Where the vehicle is provided with stud-mounted wheels, wheel studs and nuts on the left side of the vehicle have left-hand threads whereas those on the right side have right-hand threads. If equipped with hub-mounted wheels, all studs and nuts have right-hand threads. Either disc steel wheels or optional aluminum-polished wheels may be installed on the vehicle. Both are mounted with radial tubeless tires.

Aluminum wheel dimensions are 22.50 X 9 inches (571.5 X 228.6 mm) and steel wheel dimensions are 22.50 X 8.25 inches (571.5 X 209.6 mm) for 315/80 R 22.5 and 12 R 22.5 tires.

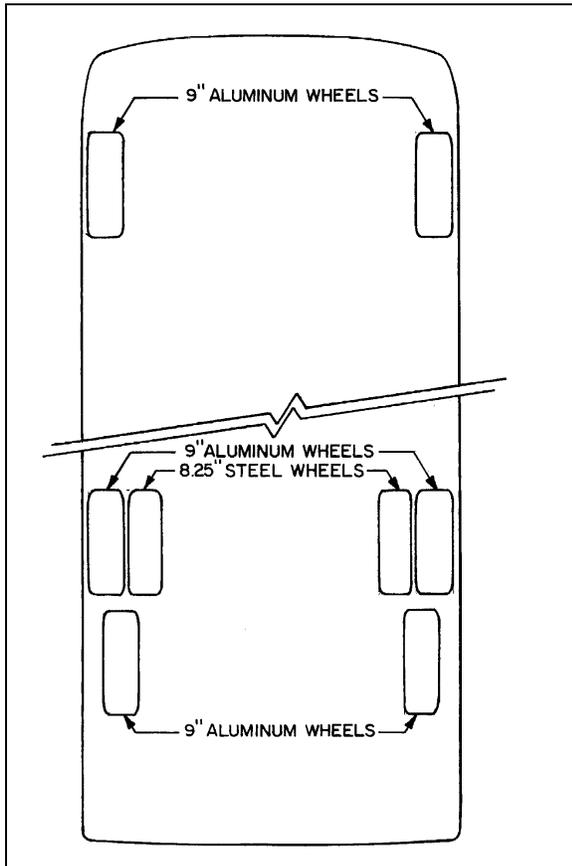


FIGURE 1: ALUM/STEEL WHEEL ARG'T 13001

2. WHEEL MAINTENANCE

Wheel maintenance consists of periodic inspections. Check all parts for damage and ensure that wheel nuts are tightened to the proper torque. In the case of a new vehicle, or after a wheel installation, stud nuts should be tightened every 100 miles (160 km) for the first 500 miles (800 km) to allow setting in of clamping surfaces.

Wheel studs and nuts must be kept free from grease and oil. No lubricant whatsoever should be used. Cleanliness of the wheel and its rotor or brake drum mating surfaces is important for proper wheel mounting.

It is also important that wheel stud nuts be tightened alternately on opposite sides of the wheel. Refer to Figure 2 for the suggested tightening sequence.

However, for hub mounted wheels, it is recommended to add some rust protection lubricant on the pilot diameter of the hub (to facilitate future removal).

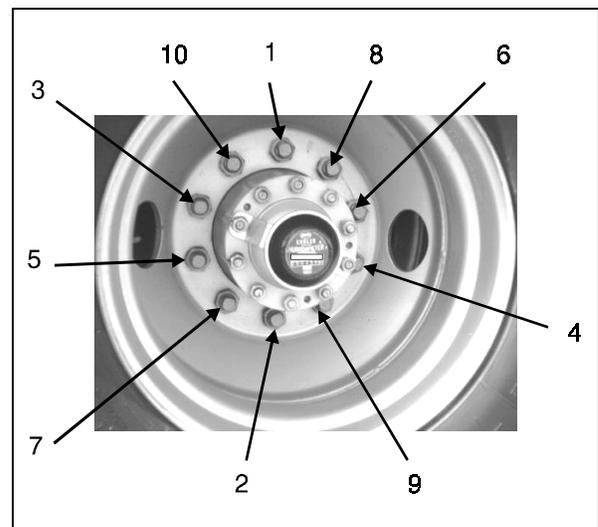


FIGURE 2: TIGHTENING SEQUENCE 13006

3. SINGLE WHEEL

3.1 Removal

1. Stop engine and apply parking brake.
2. Loosen wheel nuts about one turn (do not remove the nuts). (This is not necessary if equipped with hydraulic gun.)

Note: *For stud-mounted wheels, turn nuts counterclockwise for R.H. side and clockwise for the L.H. side. For hub-mounted wheels, turn nuts counterclockwise on both sides of the vehicle.*

3. Raise the vehicle by its jacking points on the body. See Section 18, "BODY", under heading "VEHICLE JACKING POINTS".
4. Unscrew wheel hex stud nuts and remove the wheel.

3.2 Installation

1. Mount the wheel over studs, being careful not to damage stud threads.
2. Screw in the hex stud nuts (refer to Figure 2 for sequence) so that wheel will position itself concentrically with hub. This is important, otherwise wheel may be eccentric with hub and will not run straight. In this initial step, slightly tighten the nuts to correctly position the wheel.
3. Tighten stud nuts progressively as shown in Figure 2. The final tightening should be done with a torque wrench. Tighten stud nuts to 450 - 500 lbf•ft (610 - 680 N•m) for aluminum as well as steel wheel.

Caution: *Insufficient mounting torque can result in damage to parts. Excessive mounting torque can cause studs to break and the wheel to crack in stud hole area.*

3.3 Inspection

Repeat "3.2 Installation", step 2.

4. DUAL WHEELS

4.1 Removal

4.1.1 Outer Wheel

Unscrew the hex stud nuts, using the "Single Wheel Removal" procedure described previously in step 3.1.

4.1.2 Inner Wheel

1. Unscrew inner cap nuts.
2. Remove inner wheel.

4.2 Installation

4.2.1 Inner Wheel

1. Mount the wheel over studs, being careful not to damage stud threads.
2. Screw in the inner cap nuts (Fig. 3) and refer to Figure 2 for sequence, so that wheel will position itself concentrically with hub.
3. Tighten inner cap nuts progressively according to sequence shown in Figure 1. The final tightening should be done with a torque wrench. Tighten inner cap nuts to 450 - 500 lbf•ft (610 - 680 N•m) for aluminum as well as steel wheel.

Caution: *Insufficient mounting torque can result in damage to parts. Excessive mounting torque can cause studs to break and the wheel to crack in stud hole area.*

4.2.2 Outer Wheel

Tighten the hex head nuts (Fig. 3) using the single wheel installation procedure described previously.

Note: *On dual wheel assemblies, position the wheels with the tire valves 180° apart in order to have access to both the inner and outer valves.*

4.3 Inspection

1. Loosen a hex stud nut three turns (Fig. 3).
2. Tighten the inner cap nut to (450 - 500 lbf•ft [610 - 680 N•m]).
3. Tighten the hex stud nut to (450 - 500 lbf•ft [610 - 680 N•m]).
4. Repeat the 3 previous steps for each of the 10 "hex stud nut - inner cap nut assemblies" according to the tightening sequence in Figure 2.

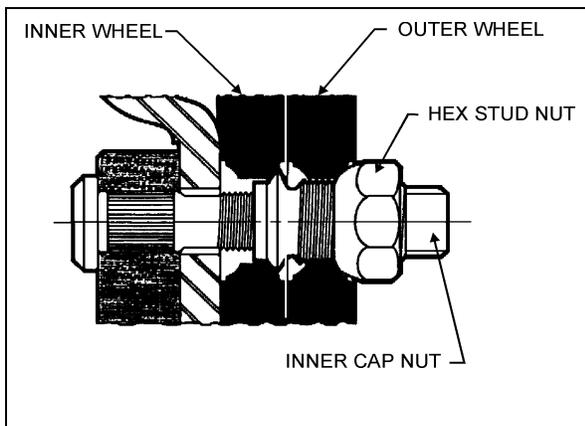


FIGURE 3: DUAL WHEEL INSTALLATION

13007

Caution: *Do not attempt to tighten an inner cap nut without having previously loosened the hex stud nut.*

5. CORROSION PROTECTION OF ALUMINUM WHEELS

1. Clean wheels often by means of a high pressure water jet. Cleaning may be accelerated with mild soap. Do not use concentrated alkaline cleaning products.
2. When tire is removed, clean and inspect wheel thoroughly. Remove dirt and corrosion on rim by means of a wire brush. Do not use a wire brush on the outer surface of the wheel.
3. The following measures should be taken to maintain original appearance of the aluminum wheels:
 - Use a sponge, a soft cloth, or a soft fiber brush, with a mild soap and warm water solution to wash the outer wheel surfaces.
 - Rinse thoroughly with clean water.
 - Wipe and dry thoroughly to prevent water stains.
 - Wax surface with "Simonize Body Guard", "Dupont 7 New Car Wax", or an equivalent product.
 - Clean aluminum wheels as required to maintain original look.

Warning: *Wheel surfaces may have sharp or cutting edges which may cause injury to the hands. To prevent contact with sharp edges, it is strongly recommended to wear rubber gloves when washing or polishing wheels.*

6. WHEEL STRAIGHTNESS TEST

1. Slightly raise axle to be checked and place a safety support underneath.
2. Check wheel lateral runout. Install a dial gauge as shown in Figure 4, then rotate the wheel by hand one full turn. As the wheel turns, note any variation on the dial gauge.

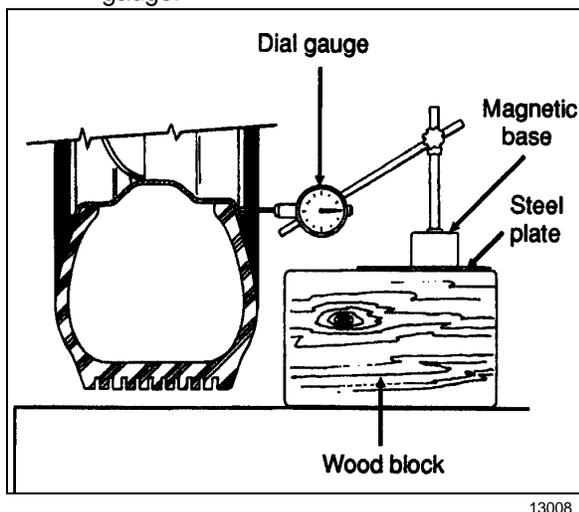


FIGURE 4: SUGGESTED DIAL GAUGE INSTALLATION

Caution: *Damage to the dial gauge could occur if it strikes a wheel balancing weight.*

3. If the variation in lateral runout exceeds 0.125 inch (3,2 mm), the wheel must be replaced.
4. If doubt exists whether wheel or hub is distorted, hub may be checked as follows:
 - Replace the existing wheel with a wheel known to be correct.
 - Check wheel lateral runout as outlined in step 2.
 - If, within specifications, the hub is correct but the suspected wheel must be replaced.

Caution: *NEVER STRAIGHTEN ALUMINUM WHEELS. Never heat aluminum wheels for the purpose of repairing damages incurred after hitting a curb or resulting from other causes. The special alloy in wheels has been heat treated, and any uncontrolled heating could alter the wheel structure. Furthermore, never weld aluminum-forged wheels for any reason whatsoever.*

7. WHEEL STUDS

Stripped threads may be the result of excessive torquing, or may have been damaged during wheel installation, when placing the wheel over the studs. A stud having damaged threads must be replaced. Broken studs are a direct result of operating with loose stud nuts or improperly seated wheels. When a broken stud is replaced, the adjacent studs, on each side of the broken one must also be replaced, since they could have been subjected to excessive strain and may be fatigued.

When installing wheel studs to hubs, check nuts retaining the wheel stud to wheel hub and if they are deformed, damaged or severely corroded, install new parts. Install nut (and washer where applicable) to new stud and torque to 110 - 130 lbf•ft (150 - 177 N•m) for studs mounted on front and tag axle wheel hubs and torque to 450 - 500 lbf•ft (610 - 680 N•m) for those mounted on drive axle wheel hubs.

7.1 Drive Axle

Wheel can be mounted on the drive axle with studs (3/4"-16 thread) or hub mounted (7/8"-14 thread) and with the inner cap nut (1-1/8"-16 thread).

7.2 Front and Tag Axles

Wheel can be mounted on tag axle with studs (1-1/8"-16 thread) or hub mounted (7/8"-14 thread).

Note: *Wheel studs and nuts must be kept free from grease and oil. No lubricant whatsoever should be used.*

8. SPARE WHEEL AND TIRE (if applicable)

Tire failure is a rare event these days, if tires are properly cared for. In case of a flat tire, move vehicle a safe distance away from traffic and apply the parking brake. Remember to switch "ON" the hazard flashers and according to the highway code regulations, set up the triangular reflectors (see "Emergency Warning Reflectors" in the Operator's Manual) at an adequate distance, to warn incoming motorists.

Spare wheel and tire are stored in the spare wheel and tire compartment and are accessible by lowering the reclining front bumper. Use the wheel nut wrench to unscrew the two (2) bumper retaining bolts.

Note: *There is no spare wheel in the case of a converted vehicle. An air shutter is located behind the reclining front bumper. Access is obtained by pressing a latch located in the middle and upper part of the bumper air inlet.*

Warning: *It is recommended that two people perform this operation, since bumper weighs 100 lbs (45 kg).*

Warning: *This compartment has not been designed for storage. Never leave loose objects in this area since it may interfere with steering linkage mechanism. Make sure bumper is safely bolted in place after closing the compartment.*

The condition and pressure of the tires can greatly affect both useful tire life and road safety.

Note: *The recommended tire inflation pressures are given in "SPECIFICATIONS" at the end of this section. Also, cold tire inflation pressures are listed on the Department of Transport's certification plate, affixed below L.H. side control panel in driver's area. Tire pressure must be adjusted according to vehicle loading - see table in "Coach Final Record" (NOT NECESSARILY THE V.I.N. PLATE).*

At regular intervals, verify the tire pressures. Use an accurate tire pressure gauge when checking inflation pressures. Never exceed the maximum tire inflation pressure specified on each tire.

Cold tire inflation pressure means: When a vehicle has not been driven for at least 3 hours or less than 1 mile (1.6 km).

Warning: *Incorrect tire pressures cause increased tire wear and adversely affect road holding of the vehicle, leading to loss of vehicle control.*

Note: *Always include the spare tire during a pressure verification.*

9. REMOVING SPARE WHEEL AND TIRE FROM COMPARTMENT

To pull out spare wheel and tire, open reclining bumper according to the previous instructions, unscrew the wing nut retaining the support and rail extension assembly (stored on R.H. side of wheel), then take out the assembly. Install assembly by matching its two (2) holes to the corresponding mounting pins located in front center of spare tire compartment. Unscrew the retaining brackets T-handle to release the wheel and dolly assembly and pull out bracket. Pull out wheel using strap then remove tire covering. Separate wheel and tire from dolly by unscrewing the two (2) mounting nuts.

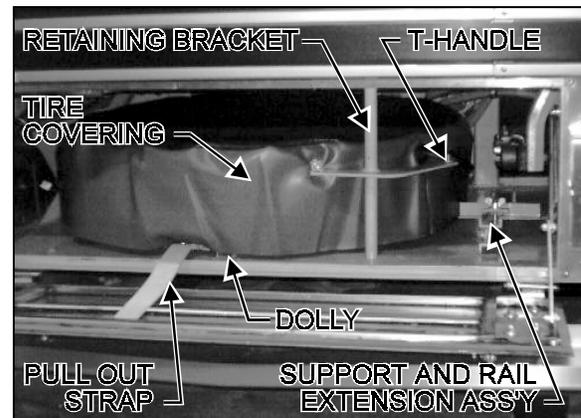


FIGURE 5: SPARE WHEEL & TIRE COMPARTMENT 13005

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Caution: After reclining bumper has been secured, the two (2) retaining bolts should be checked to make sure that they are tightly fastened.

Note: Reinstall support and rail extension assembly, then secure tire with retaining bracket before moving vehicle.

Jack and wheel nut wrench are stored at right in forward R.H. side baggage compartment.

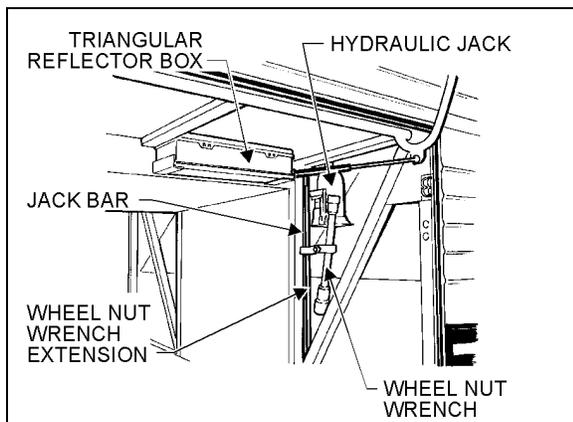


FIGURE 6: FORWARD R.H. SIDE COMPARTMENT 23012

Check the spare tires inflation pressure periodically to keep it ready for use. Inflate spare tire to the pressure of the tire which has the highest pressure on the vehicle.

Also, make sure that retaining bracket is securely fastened in order to prevent it from moving around inside compartment.

9.1 Procedure for Changing Wheel

1. Stop engine, apply parking brake, take out jack and wrench, then remove spare wheel and tire from their compartment.
2. Remove hub cap (with appropriate wrench) or cover from wheel.

3. With supplied wrench, loosen all wheel nuts to about one (1) full turn.

Note: For stud-mounted wheels, turn nuts counterclockwise on R.H. side of vehicle and clockwise on L.H. side. For hub-mounted wheels, turn nuts counterclockwise on both sides of vehicle.

4. Use the hydraulic jack to raise the vehicle. Raise vehicle to the height required to remove wheel.

Note: For hydraulic jack placement, refer to Section 18 "BODY", under heading "VEHICLE JACKING POINTS".

Warning: Place jack on stable and level ground; if necessary, place a board under the jack.

Do not raise the vehicle until you are sure the jack is securely engaged.

Warning: To prevent personal injury and/or equipment damage, use only the recommended jacking points.

Passengers must not remain inside vehicle while wheel is being replaced.

5. Fully unscrew the wheel nuts, then remove nuts and wheel. Install spare wheel with existing nuts, then slightly tighten nuts in a crisscross pattern before lowering the vehicle.
6. Lower vehicle (until tire touches ground) by slowly unscrewing the jack's hydraulic valve.
7. Torque all nuts, in a crisscross pattern, to 450-500 ft•lbs (610-680 N•m).
8. Completely lower the coach and remove jack. Adjust tire pressure according to the cold tire inflation pressures.
9. Store damaged wheel in spare tire compartment. Repair and balance the flat tire as soon as possible.

10. SPARE WHEEL AND TIRE MAINTENANCE

Maintenance of the spare wheel and tire consists in ensuring that tire inflation pressure is the same as the tire on the coach which has the highest inflation pressure (refer to "Recommended Tire Inflation Pressure (Cold)" in this section). Inspect rim to ensure that there is no important corrosion, check if spare wheel cover is in good condition and check that spare tire is securely fastened in compartment.

Caution: *If the spare wheel and tire must be installed, deflate the tire in accordance with recommended pressure.*

11. FRONT AND TAG AXLE WHEEL HUBS

Two types of wheel hubs are available. One is lubricated with grease and the other is lubricated with oil.

11.1 Grease Lubricated Wheel Hubs

Front and tag axle wheel hubs and hub bearings need to be cleaned and greased every 50,000 miles (80 000 km) or once a year, whichever comes first.

11.1.1 Recommended Lubricants

A good quality lithium-base grease NLGI No. 1 or 2 are recommended.

11.1.2 Hub Bearing Inspection

1. An inspection should be made after the first 3,000 miles (4 800 km) and then at intervals of 25,000 miles (40 000 km). When the wheels are raised, they should revolve quite freely without roughness.
2. Hub bearings should have a slight end movement with the limits 0.0005/0.002"

(0.0127/0.0508 mm) when rocked forward and backwards on axle stub. See "To Remove/Assemble Hub Unit" next in this section.

11.1.3 To Remove/Assemble Hub Unit

Refer to "ROCKWELL - MAINTENANCE MANUAL NO. 2)", annexed to Section 10, "FRONT AXLE".

11.2 Oil Lubricated Wheel Hubs

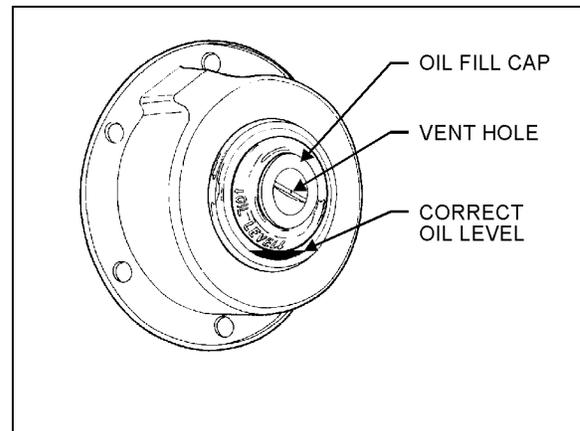


FIGURE 7: OIL FILL CAP

13003

11.2.1 Hub Bearing Maintenance

If applicable, the front and tag axle wheel hubs use oil lubrication which eliminates periodic grease repacking of the hubs. A sight glass is provided for convenient verification of oil level. Oil level should be checked daily and must be maintained to the level mark in the sight glass. If oil is not visible through the sight glass, general purpose gear lubricant SAE 90 (A.P.I. spec. GL5) must be added by removing the oil fill cap in center of hub to bring oil to the correct level. To check oil level after vehicle has been driven, wait at least 15 minutes to ensure that oil has settled.

Caution: *Hub oil fill cap is provided with a very small vent hole in its center. Occasionally insert a small tip (toothpick size) to avoid hole restriction, since it prevents overpressure in bearing housing.*

12. DRIVE AXLE WHEEL HUBS

12.1 Description

Drive wheels use a single oil-seal assembly and are lubricated from the oil supply in the differential housing. Bearings are tapered rollers, adjustable to compensate wear. Maintain differential oil level with general purpose gear lubricant (refer to Section 24 "LUBRICATION" for proper oil grade selection) to ensure adequate oil supply to wheel bearings at all times.

12.2 Bearing Adjustment

To adjust drive wheel bearings, raise vehicle until both dual wheels can be turned freely (approximately 6 inches from the ground). Position jack stands under drive axle, then lower vehicle approximately 2 inches in order to avoid entire weight of the axle being supported by the suspension air bellows and the shock absorber pins.

Remove axle shaft as indicated in "Rockwell - Maintenance Manual No. 5" under heading "Single Reduction Differential Carriers" annexed to "Section 11" of this manual. Remove gaskets. Unscrew lock nut and remove adjusting nut lock ring.

To adjust, tighten adjusting nut until the wheel binds, rotate the wheel while tightening so that all surfaces are in proper contact. Back off adjusting nut approximately 1/4 to 1/3 turn to assure 0.001/0.007" (0.0254/0.1778 mm) end play and to ensure that wheel turns freely. Replace lock ring, and adjust nut dowel pin in one of the holes. The ring may be turned over if necessary to allow more accurate adjustment of bearings.

Tighten lock nut and recheck bearing adjustment. Replace the axle shaft using a new gasket.

12.3 Disassembly and Repair

Jack vehicle as per "12.2 Bearing Adjustment" and remove axle shaft as indicated in "ROCKWELL - MAINTENANCE MANUAL NO. 5" entitled "Single Reduction Differential Carriers"

annexed to Section 11 of this manual. Remove wheels and tires.

Caution: Always mark position of the wheel on the axle prior to removal, to replace wheel at the same location, thus avoiding a new wheel balancing.

Remove lock nut, lock ring and adjusting nut from axle housing to prevent the outer bearing from falling out. Remove outer bearing cone and roller assembly.

Remove screws attaching inner oil seal retainer to hub, and remove inner oil seal assembly. Remove inner bearing cone and roller assembly. Bearing cups can be separated from the hub using a hammer and a long brass drift.

All parts should be thoroughly cleaned. Bearing cone and roller assemblies can be cleaned in a suitable cleaning solvent using a stiff brush to remove old lubricant.

If excessive wear, deterioration, cracking, or pitting are present on the bearing cups, rollers, or cones, the bearings should be replaced. Seals should be replaced each time they are removed from the hub. To install new oil seal, use a suitable adapter and drive the seal into the retainer bore until it bottoms.

When installing wheel on spindle, center the wheel hub with spindle to avoid damaging the seal with the end of the spindle. Push wheel straight over the spindle until inside diameter of seal press fits on wiper ring. Prefill hub cavity with general purpose gear lubricant (refer to Section 24 "LUBRICATION" for proper oil grade selection). Lubricate, and then install outer bearing cone. Adjust bearing and lock. Assemble axle flange to axle using a new gasket. Apply sealant in stud area. After both wheels have been assembled according to above procedure, fill the differential with the recommended lubricant to the proper factory recommended level.

Note: During regular inspection, do not forget to check lubricant level in differential. Clean thoroughly or replace vent as required.

13. TIRE MAINTENANCE

The most critical factor in tire maintenance is proper inflation (Fig. 8). No tire is completely impervious to loss of air pressure. To avoid the hazards of underinflation, always maintain tires to the recommended pressure. Improper inflation decreases tire life.

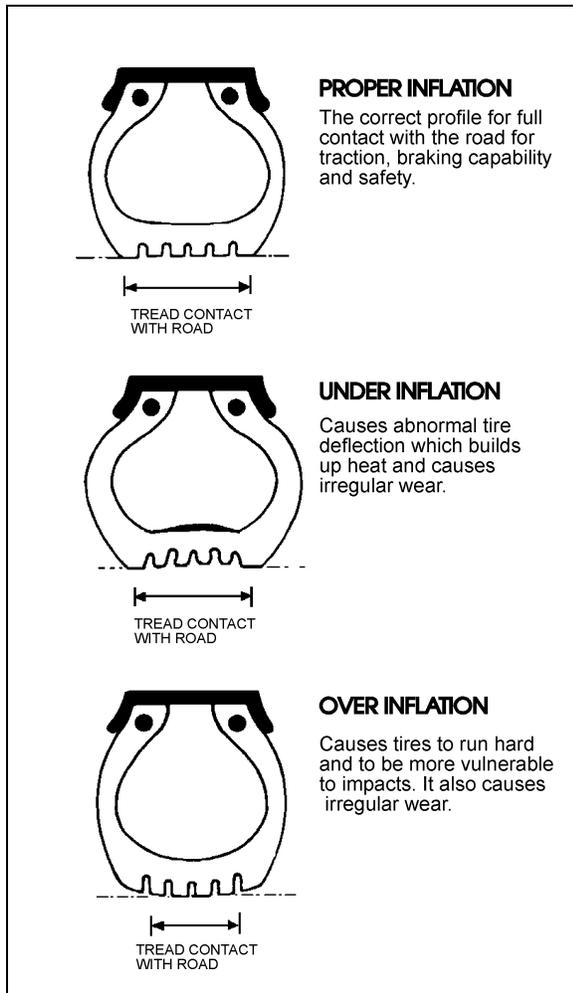


FIGURE 8: TIRE INFLATION

13009

An underinflated tire builds up heat that can cause sudden tire destruction, resulting in improper vehicle handling and possible loss of vehicle control. At least once a week, before driving (when tires are cold), check inflation pressure on all the tires, including the spare tire. This is especially important in cases where vehicle is operated by different drivers.

Warning: Failure to maintain correct tire inflation pressure may result in sudden tire destruction, improper vehicle handling, and will cause rapid and irregular tire wear. Therefore, inflation pressure should be checked weekly and always before long distance trips.

13.1 Recommended Tire Inflation Pressure (Cold)

Inflation pressure should be checked when tires are cold. Driving, even for a short distance, will cause the tire to warm up and the air pressure to increase. Check inflation pressure on all tires using an accurate tire gauge.

The maximum loading tire inflation pressure (cold) for 12 R 22.5 tires are as follows:

Front axle	115 psi (792 kPa)
Drive axle	90 psi (620 kPa)
Tag axle	95 psi (655 kPa)

Note: It is recommended that all tires on coach be of the same type.

Note: Tires are considered cold when the vehicle has not been driven for at least three hours, or driven less than 1 mile (1,6 km). Driving, even for a short distance, causes tires to heat up and air pressure to increase.

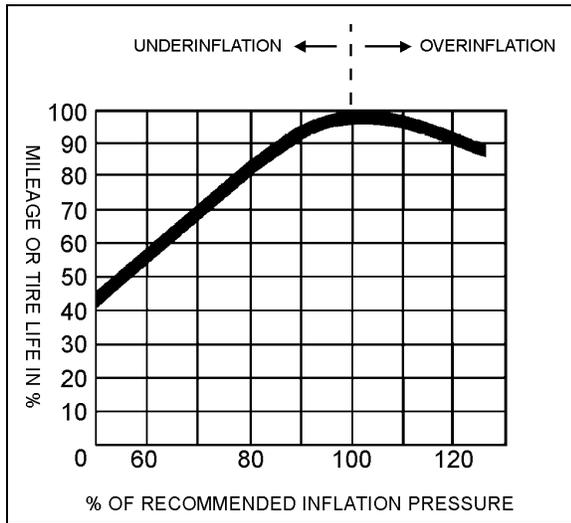
Note: Never bleed air from hot tires as tires will then be underinflated. Use an accurate tire gauge to check pressures. (Do not kick tires as an inflation check. This is an unreliable method).

Caution: In the case of a converted vehicle, weigh vehicle fully loaded and pressurize according to tire manufacturer's recommendations.

Caution: These tire pressures are established in accordance with the maximum allowable load on each axle. A lower pressure is recommended if the axle load is less than the above specifications. Weigh vehicle fully loaded and pressurize according to tire manufacturer's recommendations. For

other tire and wheel specifications, see *Prévost tire pressure tabulation in "Coach Final Record"*.

Warning: All tires on the same axle should always be inflated to the same pressure. There should not be a difference in pressure between right and left tires on the same axle. A 5 psi (35 kPa) underinflation in one front tire can not only destroy ease of steering, but creates steering hazards which can lead to a potential accident.



13010
FIGURE 9: EFFECTS OF INFLATION PRESSURE ON TIRE LIFE

13.2 Tire Matching

Unmatched tires on drive axle will cause tire wear and scuffing, as well as possible damage to the drive unit. Consequently, we recommend that tires be matched within 1/8" (3 mm) of the same rolling radius, and 3/4" (19 mm) of the same rolling circumference.

13.3 Wheel and Tire Balancing

Wheels and tires must be clean and free from all foreign matter. The tires should be in good condition and properly mounted. Unbalanced wheel and tire assembly can be due to a bent wheel or improper mounting. Before removing the wheel and tire assembly from the vehicle, check for swaying movement, and if necessary, check the wheel lateral runout as outlined under heading "*Wheel Straightness Check*".

Warning: When balancing wheel and tire assemblies, it is strongly recommended that instructions covering the operation of wheel balancer being used are closely followed.

Caution: A maximum of 16 oz (450 g) of balancing weight is recommended. If more weight is necessary, check and correct the cause.

13.4 Tire Rotation

Radial tires should be rotated only when necessary. If the tires are wearing evenly, there is no need to rotate. If irregular wear becomes apparent or if the wear rate on the tires is perceptively different (from axle to axle), then tires should be rotated in such a manner as to alleviate the condition.

Note: There is no restriction on criss-cross rotation.

14. SPECIFICATIONS

STEEL WHEELS (including inner drive axle)

Wheel size	8.25" X 22.5"
Wheel nut torque	450 - 500 lbf•ft (610 - 680 N•m)
Tire size	12 R 22.5 315/80 R 22.5

ALUMINUM WHEELS (except inner drive axle)

Wheel size	9" X 22.5"
Wheel nut torque	450 - 500 lbf•ft (610 - 680 N•m)
Tire size	12 R 22.5 315/80 R 22.5

RECOMMENDED TIRE INFLATION PRESSURE AT MAXIMUM LOAD (cold)

Tires 12R22.5

Front axle.....	115 psi (792 kPa)
Drive axle.....	90 psi (620 kPa)
tag axle	95 psi (655 kPa)
Spare tire (if applicable).....	115 psi (792 kPa)

Tires 315/80R22.5

Front axle.....	100 psi (689 kPa)
Drive axle.....	90 psi (620 kPa)
tag axle	80 psi (551 kPa)
Spare tire (if applicable).....	100 psi (689 kPa)

Caution: *In the case of a converted vehicle, weigh it fully loaded and pressurize according to tire manufacturer's recommendations.*