

VOYAGER INDUSTRIES

TRAILER OWNER'S MANUAL

This manual details safety information and maintenance recommendations related to the use of the basic trailer for Voyager Industries product lines.



WARNING

This owners manual contains safety information and instructions for your trailer. You must read this manual before loading or towing your trailer. You must follow all safety precautions and instructions.

voyager
INDUSTRIES™

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1.0 INTRODUCTION

Congratulations on the purchase of your **[VOYAGER INDUSTRIES, Inc.]** product. We believe you will be happy and completely satisfied with your purchase. Our goal is to provide a valued customer a quality trailer at a reasonable price.

For your safety, read and understand this manual before operating your **[VOYAGER INDUSTRIES, Inc.]** product. If there are any questions about information in this manual, please consult your dealer.

When calling about your trailer, please have the VIN number available for the dealer. The VIN number is typically found on the front left side of the trailer.

For future reference, please write your VIN number in the space below:

Purchase Date: _____ **Model:** _____

VIN#: _____

This manual covers the trailer portion of your **[VOYAGER INDUSTRIES, Inc.]** product. You must read, understand and follow the instructions given by the trailer manufacturer, tow vehicle and trailer hitch manufacturers. Always keep all manuals provided with your trailer in a safe place.

Inserts providing information on axles and tire warranty are provided with this manual. Please keep these inserts for future reference.

2.0 SAFETY

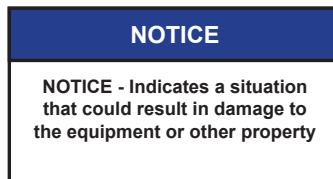
2.1 Safety Alert Symbols And Signal Words

An Owner's Manual that provides general trailer information cannot cover all of the specific details necessary for the proper combination of every trailer, tow vehicle and hitch. You must read, understand and follow the instructions given by the tow vehicle and trailer hitch manufacturers, as well as the instructions in this manual.

Our trailers are built with components produced by various manufacturers. Some of these items have separate instruction manuals. Where this manual indicates that you should read another manual, and you do not have that manual, contact your dealer for assistance.

The safety information in this manual is denoted by the safety alert symbol: 

The level of risk is indicated by the following signal words.



2.2 Major Hazards

Loss of control of the trailer or trailer/tow vehicle combination can result in death or serious injury. The most common causes for loss of control of the trailer are:

- Improper sizing for the tow vehicle, or vice versa.
- Excessive Speed: Driving too fast for the conditions.
- Improper braking and steering under sway conditions.
- Overloading and/or improper weight distribution.
- Not keeping lug nuts tight
- Not maintaining proper tire pressure.
- Improper or mis-coupling of the trailer to the hitch.

2.2.1 Improper Sizing of Trailer Tow Vehicle

Trailers that weigh too much for the tow vehicle can cause stability problems, which can lead to death or serious injury. The additional strain put on the engine and drive-train may lead to serious tow vehicle maintenance problems.

Do not exceed the maximum towing capacity of your tow vehicle. The towing capacity of your tow vehicle, in terms of maximum Gross Trailer Weight (GTW) and maximum Gross Combined Weight Rating (GCWR) can be found in the tow vehicle Owner's Manual.



DANGER

- *Use of an under-rate hitch, ball or vehicle can result in loss of control leading to death or serious injury*
- *Make certain your hitch and tow vehicle are rated for your trailer*

2.2.2 Driving Too Fast

With ideal road conditions, the maximum recommended speed for safely towing a trailer is 55 mph. Driving too fast can cause the trailer to sway, thus increasing the possibility for loss of control. Also, your tires may overheat, increasing the possibility of a blowout.



WARNING

Driving too fast for conditions can result in loss of control and cause death or serious injury.

Adjust speed down when towing a trailer.

2.2.3 Adjust Driving When Towing Trailer

When towing a trailer, you will have decreased acceleration, increased stopping distance, and increased turning radius.

The trailer will change the handling characteristics of the tow vehicle, making it more sensitive to steering inputs and more likely to be pushed around in windy conditions or when being passed by large vehicles. In addition, you will need a longer distance to pass, due to slower acceleration and increased length. With this in mind:

- When encountering trailer sway, take your foot off the accelerator, and steer as little as possible to stay on the road. Use small "trim-like" steering adjustments. Do not attempt to steer out of the sway; you'll only make it worse. Also, do not apply the tow vehicle brakes to correct trailer swaying. On the other hand, application of the trailer brakes alone will tend to straighten out the combination, especially when going downhill.
- Check rearview mirrors frequently to observe your trailer and traffic.
- Be aware of trailer height, especially when approaching bridges, roofed areas and trees.
- Be alert for slippery conditions. You are more likely to be affected by slippery road

surfaces when driving a tow vehicle with a trailer, than driving a tow vehicle without a trailer.

- Anticipate the trailer “swaying.” Swaying can be caused by excessive steering, wind gusts, roadway edges, or by the trailer reaction to the pressure wave created by passing trucks and busses.
- Use lower gear when driving down steep or long grades. Use the engine and transmission as a brake. Do not ride the brakes, as they can overheat and become ineffective.

2.2.4 Trailer Not Properly Coupled To Hitch

It is critical that the trailer be securely coupled to the hitch, and that the safety chains and emergency breakaway brake lanyard are correctly attached. Uncoupling may result in death or serious injury to you and to others.

WARNING

- *Proper selection and condition of the couple and hitch are essential to safely towing a trailer.*
- *A loss of coupling may result in death or serious injury.*
- *Hitch size must match coupler size.*
- *Be sure hitch load rating is equal to or greater than load rating of the coupler.*
- *Be Sure hitch components are tight before coupling the trailer to the tow vehicle.*
- *Observe hitch for wear, corrosion and cracks before coupling.*
- *Replace worn, corroded or cracked hitch components before coupling trailer to tow vehicle.*

An improper coupled trailer can result in death or serious injury. Do not move the trailer until:

- *Coupler is secured and lock to hitch.*
- *Safety chains are secured and locked to hitch.*
- *Trailer jack(s) are fully retracted.*
- *Trailer brakes are checked.*
- *Tires and wheels are checked.*
- *Breakaway switch is connected to tow vehicle;*
- *The trailer lights are connected and checked.*
- *Load is secured to trailer.*

2.2.5 Proper Use Of Safety Chains

Safety chains are provided so that control of the trailer can be maintained if your trailer comes loose from the hitch.

WARNING

- *Improper reeking of the safety chains can result in loss of control of the trailer and tow vehicle leading to death or serious injury, if the trailer uncouples from the tow vehicle.*
- *Cross chains underneath hitch and Coupler with enough slack to permit turning and to hold tongue up if the trailer comes loose.*
- *Fasten chains to frame of Tow vehicle.*
- *Do not test him chains to any part of the hitch unless the hitch has holes or loops specifically for that purpose.*

2.2.6 Proper Connection of Breakaway Brake

If equipped with brakes, your trailer will be equipped with a breakaway brake system that can apply the brakes on your trailer if your trailer comes loose from the hitch. You may have a separate set of instructions for the breakaway brake if the trailer is so equipped. The breakaway brake system, including battery, must be in good condition and properly rigged to be effective.

2.2.7 Matching Trailer And Hitch



DANGER

- *Be sure hitch and tow vehicle are rated for Gross Vehicle Weight Rating (GVWR) of your trailer.*
- *Use of a hitch with a load rating less than the load rating of the trailer can result in loss of control and may lead to death or serious injury*
- *Use of tow vehicle with towing capacity less than the load rating of the trailer can result in loss of control and may lead to death or serious injury*

2.2.8 Worn Tires, Loose Wheels And Lug Nuts

Inspect all trailer tires before each tow. If a tire has a bald spot, bulge, cut, cracks, or is showing any cords, replace the tire before towing.

If a tire has uneven tread wear, take the trailer to a trailer service center for diagnosis. Uneven tread wear can be caused by tire imbalance, axle misalignment or incorrect inflation.

Tires with too little tread will not provide adequate frictional forces on wet roadways and can result in loss of control, leading to death or serious injury.

Improper tire pressure causes increased tire wear and may reduce trailer stability, which can result in a tire blowout or possible loss of control. Therefore, before each tow you must also check the tire pressure.

The proper tire pressure is listed on the Certification / VIN label, normally mounted on the front left side of the trailer and should be checked when tires are cold. Allow 3 hours cool-down after driving as much as 1 mile at 40 mph before checking tire pressure.



WARNING

- *Inflate tires to pressure stated on the certification /VIN label*
- *Improper tire pressure may cause unstable trailer. Blowout and loss of control may occur. Death or serious injury can result.*
- *Make sure of proper tire pressure before towing trailer.*

The tightness of the wheel nuts or bolts is very important in keeping the wheels properly seated to the hub. Before each tow, check to make sure they are tight.



WARNING

- *Metal creep between the wheel rim and wheel nuts or bolts may cause rim to loosen.*
- *Death or injury can occur if wheel comes off.*
- *Tighten Lug Nuts or bolts before each tow.*

The proper tightness (torque) for wheel nuts or bolts and tightening sequence is listed in the Inspection, Service and Maintenance section of this manual. Use a torque wrench to tighten the lug nuts and use the criss cross star pattern sequence. Improper tightening of the lug nuts voids the axle warranty.

Wheel nuts or bolts are also prone to loosen after first being assembled. When driving a new trailer (or after wheels have been remounted), check to make sure they are tight after the first 10, 25 and 50 miles of driving and before each tow thereafter.

Failure to perform this check can result in a wheel separating from the trailer and a crash, leading to death or serious injury.



WARNING

- *Wheel nuts or bolts are prone to losing after being first assembled. Death or serious injury can result.*
- *Check wheel nuts or bolts for tightness on a new trailer, and after remounting a wheel at 10, 25 and 50 miles.*
- *Inadequate wheel nut or bolt torque can cause a wheel to separate from the trailer, leading to death or serious injury.*
- *Verify wheel nuts or bolts are tight and before each tow.*

2.2.9 Improper Loading

The total weight of the load you put on the trailer, plus the empty weight of the trailer itself, must not exceed the trailer's Gross Vehicle Weight Rating (GVWR).

If you do not know the empty weight of the trailer plus the cargo weight, you must weigh the loaded trailer at a commercial scale. In addition, you must distribute the load in the trailer such that the load on any axle does not exceed the Gross Axle Weight Rating (GAWR).

If your trailer is equipped with a Tire & Loading Information Placard, mounted next to the Certification/VIN label, the cargo capacity weight stated on that placard is only a close estimate. The GVWR and GAWR are listed on the Certification / VIN label normally located on the front left side of the trailer



WARNING

- *An overloaded trailer can result in failure or loss of control of trailer, leading to death or serious injury.*
- *Never load a trailer so that the weight on any tire exceeds its rating.*
- *Never exceed the trailer Gross Vehicle Weight Rating (GVWR) or Axle Weight Rating (GAWR).*

2.2.10 Unsafe Load Distribution

Improper front / rear load distribution can lead to an unstable trailer or poor tow vehicle handling. Poor trailer stability results from tongue weights that are too low, and poor tow vehicle stability results from tongue weights that are too high.

Refer to the “Loading and Unloading” section for more information.

In the following table, the second column shows the rule of thumb for percentage of total weight of the trailer plus its cargo (Gross Trailer Weight, or “GTW”) that should appear on the tongue of the trailer. For example, a large trailer with a loaded weight of 6,000 pounds, should have 10-15% of 6,000 pounds (600-900 lbs.) on the hitch.

Tongue Weight as a Percentage of Loaded Trailer Weight	
Type of Hitch	Percentage
Ball Hitch or	10-15% for Large Trailers

The numbers quoted are for example purposes only and should be tailored to the specific trailer.

For questions regarding the actual percent of tongue weight for the trailer, check with the manufacturer for specifics.

After loading, be sure to check that none of the axles are overloaded.

Uneven left / right load distribution can cause tire, wheel, axle or structural failure.

Be sure your trailer is evenly loaded left / right. Towing stability also depends on keeping the center of gravity as low as possible.



WARNING

- *Improper tongue weight load distribution can result in loss of control of trailer, leading to death or serious injury.*
- *Make certain that tongue weight is within allowable range*

Be sure to:

- *Distribute the load evenly, right and left and the center of gravity low.*
- *Distribute the load front to rear to provide proper tongue weight (seat chart)*

2.2.11 Shifting Cargo

Since the trailer “ride” can be bumpy and rough, you must secure the cargo so that it does not shift while the trailer is being towed.



WARNING

- *He's shifting load can result in failure, or loss of control of trailer, and lead to death or serious injury.*
- *You must tie down all loads with proper size fasteners, chains, straps etc. to prevent the load from shifting while towing.*

2.2.12 Inappropriate Cargo

The trailer may be designed for specific cargo. If your trailer is designed for specific cargo, only carry that cargo in the trailer. A trailer must not be used to carry certain items, such as people, containers of hazardous substances or containers of flammable substances.



WARNING

Do not transport people on your trailer. Besides putting their lives at risk, the transportation of people on trailers is illegal.



WARNING

Do not transport flammable, explosive, poisonous or other dangerous materials on your trailer.
The exemption is fuel in the tank of a vehicle or equipment being hauled.

2.2.13 Inoperable Brakes Or Lights

If your trailer has electric brakes, your tow vehicle will have an electric brake controller that sends power to the trailer brakes.

Be sure that the electric brakes and all the lights on your trailer are functioning properly before towing the trailer. Electric brakes and lights on a trailer are controlled via a connection to the tow vehicle, generally a multi-pin electrical connector.



WARNING

Improper electrical connection between the tow vehicle in the trailer will result in inoperable lights and electric brakes and can lead to collision.

Before each tow:

- Check that the electric brakes work by operating the brake controller inside the tow vehicle.*
- Check that all lights and turn signals work.*

You must provide mirrors that allow you to safely observe approaching traffic. Standard mirrors usually do not provide adequate visibility for viewing traffic to the sides and rear a towed trailer.

2.2.14 Trailer Modifications

Modification of the trailer structure or alteration of your trailer can make the trailer unsafe and will void all warranty options. Before making any alteration to the trailer, contact your dealer or the manufacturer and describe the alteration you are contemplating.

2.2.15 Trailer Towing Guide

Driving a vehicle with a trailer in tow is vastly different from driving the same vehicle without a trailer in tow. Acceleration, maneuverability and braking are all diminished with a trailer in tow. It takes longer to get up to speed; you need more room to turn and pass, and more distance to stop when towing a trailer.

You will need to spend time adjusting to the different feel and maneuverability of the tow vehicle with a loaded trailer. Because of the significant differences in all aspects of

maneuverability when towing a trailer, the hazards and risks of injury are also much greater than when driving without a trailer.

You are responsible for keeping your vehicle and trailer in control, and for all the damage that is caused if you lose control of your vehicle and trailer.

Find an open area with little or no traffic for your first practice. Before you start towing the trailer, you must follow all the instructions for inspection, testing, loading and coupling. Also, before you start towing, adjust the mirrors so you can see the trailer as well as the area to the rear of it.

Drive slowly at first, 5 mph or so, and turn the wheel to get the feel of how the tow vehicle and trailer combination responds. Next, make some right and left-hand turns. Watch in your side mirrors to see how the trailer follows the tow vehicle. Turning with a trailer attached requires more room.

Stop the rig a few times from speeds no greater than 10 mph. If your trailer is equipped with brakes, try using different combinations of trailer/electric brake and tow vehicle brake. Note the effect that the trailer brakes have when they are the only brakes used. When properly adjusted, the trailer brakes will come on just before the tow vehicle brakes.

It will take practice to learn how to back up a tow vehicle with a trailer attached. Take it slow. Before backing up, get out of the tow vehicle and look behind the trailer to make sure that there are no obstacles.

Some drivers place their hands at the bottom of the steering wheel, and while the tow vehicle is in reverse, “think” of the hands as being on the top of the wheel. When the hands move to the right (counter-clockwise, as you would do to turn the tow vehicle to the left when moving forward), the rear of the trailer moves to the right.

Conversely, rotating the steering wheel clockwise with your hands at the bottom of the wheel will move the rear of the trailer to the left, while backing up. Be careful not to allow the trailer to turn too much, because it will hit the rear of the tow vehicle. To straighten the rig, either pull forward, or turn the steering wheel in the opposite direction.

2.2.16 Safe Trailer Towing Guidelines

- Before towing, check coupling, safety chain, brakes, tires, wheels and lights.
- Check the lug nuts or bolts for tightness. Recheck the load tie downs to make sure the load will not shift during towing.
- Check coupler tightness after towing 50 miles.
- Use your mirrors to verify that you have room to change lanes or pull into traffic.
- Use your turn signals well in advance.
- Allow plenty of stopping space for your trailer and tow vehicle.
- Use lower gears for climbing and descending grades.
- Do not ride the brakes while descending grades; they may get so hot that they stop working. Then you will potentially have a runaway tow vehicle and trailer.
- Do not apply the tow vehicle brakes to correct extreme trailer swaying. Instead, lightly apply the trailer brakes with the hand controller.

Make regular stops, about once each hour. Confirm that:

- The coupler is secure to the hitch and is locked.
- Electrical connectors are made.
- There is appropriate slack in safety chains.
- There is appropriate slack in breakaway lanyard
- The tires are not visibly low on pressure.
- The cargo is secure and in good condition. Slow down for bumps in the road.

Do not brake while in a curve unless necessary. Instead, slow down before you enter the curve.

Do not drive so fast that the trailer begins to sway due to speed. Generally, never drive faster than 55 m.p.h.

Allow plenty of room for passing. A rule of thumb is that the passing distance with a trailer is 4 times the passing distance without a trailer.

2.2.17 Safety Warning Labels On Your Trailer

Before towing, review all Safety Warning Labels, If they are damaged or cannot be read please contact your dealer for replacement.

2.2.18 Reporting Safety Defects

If you believe that your vehicle has a defect that could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying

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If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or

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To contact NHTSA, you may call the Vehicle Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424- 9153); or go to <http://www.safercar.gov>; or write to:

Administrator, NHTSA, 1200 New Jersey SE, Washington, DC 20590.

You can also obtain other information about motor vehicle safety from <http://www.safercar.gov>.

3. TIRE SAFETY INFORMATION

This portion of the User's Manual contains tire safety information as required by 49 CFR 575.6.

- Section 3.1 contains "Trailer Tire Information".
- Section 3.2 contains "Steps for Determining Correct Load Limit - Trailer".
- Section 3.3 contains "Steps for Determining Correct Load Limit – Tow Vehicle".
- Section 3.4 contains information from the NHTSA brochure entitled "Tire Safety – Everything Rides On It".

This brochure, as well as preceding subsections, describes the following items;

- Tire labeling, including a description and explanation of each marking on the tires, and information about the DOT Tire Identification Number (TIN).
- Recommended tire inflation pressure, including a description and explanation of:
- Cold inflation pressure.
- Vehicle Placard and location on the vehicle.
- Adverse safety consequences of under inflation (including tire failure).
- Measuring and adjusting air pressure for proper inflation.
- Tire Care, including maintenance and safety practices

Vehicle load limits, including a description and explanation of the following items:

- Locating and understanding the load limit information, total load capacity, and cargo capacity.
- Calculating total and cargo capacities with varying seating configurations including quantitative examples showing/illustrating how the vehicles cargo and luggage capacity decreases as combined number and size of occupants' increases.

- This item is also discussed in Section 3.
- Determining compatibility of tire and vehicle load capabilities.
- Adverse safety consequences of overloading on handling and stopping on tires.

3.1 Trailer Tire Information

Trailer tires may be worn out even though they still have plenty of tread left. This is because trailer tires must carry a lot of weight all the time, even when not in use.

It is better for the tire to be rolling down the road than to be idle. During use, the tire releases lubricants that are beneficial to tire life. Using the trailer tires often also helps prevent flat spots from developing.

The main cause of tire failure is improper inflation. Check the cold tire inflation pressures at least once a week for proper inflation levels. "Cold" means that the tires are at the same temperature as the surrounding air, such as when the vehicle has been parked overnight. Wheel and tire manufacturers recommend adjusting the air pressure to the trailer manufacturer's recommended cold inflation pressure, in pounds per square inch (PSI) stated on the vehicle's Federal Certification Label or Tire Placard when the trailer is loaded to its gross vehicle weight rating (GVWR).

If the tires are inflated to less than the recommended inflation level or the GVWR of the trailer is exceeded, the load carrying capacity of the tire could be dramatically affected. If the tires are inflated more than the recommended inflation level, handling characteristics of the tow vehicle/trailer combination could be affected. Refer to the owner's manual or talk to your dealer or vehicle manufacturer if you have any questions regarding proper inflation practices. Tires can lose air over a period. In fact, tires can lose 1 to 3 PSI per month. This is because molecules of air, under pressure, weave their way from the inside of the tire, through the rubber, to the outside. A drop-in tire pressure could cause the tire to become overloaded, leading to excessive heat buildup. If a trailer tire is under-inflated, even for a short period of time, the tire could suffer internal damage.

High speed towing in hot conditions degrades trailer tires significantly. As heat builds up during driving, the tire's internal structure starts to break down, compromising the strength of the tire. It is recommended to drive at moderate speeds.

Statistics indicate the average life of a trailer tire is about five years under normal use and maintenance conditions. After three years, replacing the trailer tires with new ones should be considered, even if the tires have adequate tread depth. Some experts claim that after five years, trailer tires are considered worn out and should be replaced, even if they have had minimal or no use. This is such a general statement that it may not apply in all cases. It is best to have your tires inspected by a tire supplier to determine if your tires need to be replaced.

If you are storing your trailer for an extended period, make sure the tires are fully inflated to the maximum rated pressure and that you store them in a cool, dry place, such as a garage. Use tire covers to protect the trailer tires from the harsh effects of the sun.

3.2 Steps For Determining Correct Load LIMIT – Trailer

Determining the load limits of a trailer includes more than understanding the load limits of the tires alone. On all trailers there is a Federal Certification / VIN label that is located on the forward half of the left (road) side of the unit. This certification/VIN label will indicate the trailer's Gross Vehicle Weight Rating (GVWR). This is the most weight the fully loaded trailer can weigh. It will also provide the Gross Axle Weight Rating (GAWR). This is the most an axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

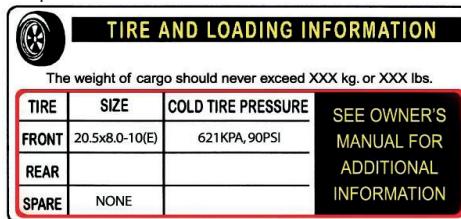
If your trailer has a GVWR of 10,000 pounds or less, there is a vehicle placard located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity.

Cargo can be added to the trailer, up to the maximum weight specified on the placard. The combined weight of the cargo is provided as a single number. In any case, remember: the total weight of a fully loaded trailer cannot exceed the stated GVWR.

When loading your cargo, be sure it is distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions

as reasonable. Too many items on one side may overload a tire. The best way to know the actual weight of the vehicle is to weigh it at a public scale. Talk to your dealer to discuss the weighing methods needed to capture the various weights related to the trailer. This would include the weight empty or unloaded, weights per axle, wheel, hitch or king-pin, and total weight.

Excessive loads and/or under inflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure. It is the air pressure that enables a tire to support the load, so proper inflation is critical. The proper air pressure may be found on the Certification / VIN label and/or on the Tire Placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.



1. Locate the statement, "The weight of cargo should never exceed XXX kg or XXX lbs.," on your vehicle's placard.
2. This figure equals the available amount of cargo and luggage load capacity. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity.
3. The trailer's placard refers to the Tire Information Placard attached adjacent to or near the trailer's VIN (Certification) label at the left front of the trailer.

3.3 Steps for Determining Correct Load LIMIT – Tow Vehicle

1. Locate the statement, "The combined weight of occupants and cargo should never exceed XXX lbs.," on your vehicle's placard.
2. Determine the combined weight of the driver and passengers who will be riding in your vehicle.
3. Subtract the combined weight of the driver and passengers from XXX kilograms or XXX pounds.
4. The resulting figure equals the available amount of cargo and luggage capacity. For example, if the "XXX" amount equals 1400 lbs. and there will be five 150 lb. passengers in your vehicle, the amount of available cargo and luggage capacity is 650 lbs. (1400-750 (5 x 150) = 650 lbs.).
5. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage capacity calculated in the previous step.
6. If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the tow vehicle's manual to determine how this weight transfer reduces the available cargo and luggage capacity of your vehicle.

3.4 Tire Safety – Everything Rides On It

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site:

http://www.nhtsa.dot.gov/cars/rules/TireSafety/rides_nit/tires_index.html

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires.

These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling
- Help protect you and other from avoidable breakdowns and accidents
- Improve fuel economy
- Increase the life of your tires

This booklet presents a comprehensive overview of tire safety, including information on the following topics:

- Basic tire maintenance
- Uniform Tire Quality Grading System
- Fundamental characteristics of tires
- Tire safety tips

Use this information to make tire safety a regular part of your vehicle maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

3.4.1 Safety First – Basic Tire Maintenance

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect your tires.

3.4.2 Finding Your Vehicle's Recommended Tire Pressure And Load Limits

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size
- Recommended tire inflation pressure
- Vehicle capacity weight (VCW—the maximum occupant and cargo weight a vehicle is designed to carry)
- Front and rear gross axle weight ratings (GAWR—the maximum weight the axle systems are designed to carry)
- Both placards and certification labels are permanently attached to the trailer near the left front

3.4.3 Understanding Tire Pressure And Load Limits

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure—measured in pounds per square inch (psi)—a tire requires to be properly inflated. (You will also find this number on the vehicle information placard expressed in kilopascals (kPa), which is the metric measure used internationally.)

Manufacturers of passenger vehicles and light trucks determine this number based on the vehicle's design load limit, that is, the greatest amount of weight a vehicle can safely carry and the vehicle's tire size. The proper tire pressure for your vehicle is referred to as the “recommended cold inflation pressure.” (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.)

Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the “maximum permissible inflation pressure” on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

3.4.4 Safety First – Basic Tire Maintenance

It is important to check your vehicle's tire pressure at least once a month for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking
- With radial tires, it is usually not possible to determine under inflation by visual inspection

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets. The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

3.4.5 Steps For Maintaining Proper Tire Pressure

1. Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual.
2. Record the tire pressure of all tires.
3. If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.
4. If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you add.
5. At a service station, add the missing pounds of air pressure to each tire that is under inflated.
6. Check all the tires to make sure they have the same air pressure except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is under inflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly under inflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly under inflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

3.4.6 Tire Size

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with the tire dealer.

3.4.7 Tire Tread

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 2/32 of an inch. Tires have built-in tread wear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires.

Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

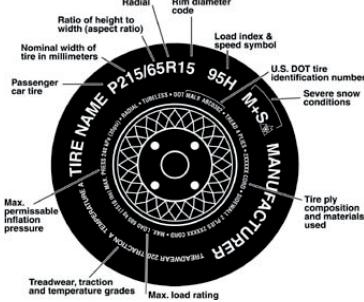
3.4.8 Tire Repair

The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

3.4.9 Tire Fundamentals

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and provides a tire identification number for safety standard certification and in case of a recall.

3.4.10 Information on Tires



P: The "P" indicates the tire is for passenger vehicles.

LT: The "LT" indicates the tire is for light trucks or trailers

ST: An "ST" is an indication the tire is for trailer use only.

Next number: This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

Next number: This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

R: The "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.

Next number: This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

Next number: This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. You may find this information in your owner's manual. If not, contact a local tire dealer. Note: You may not find this information on all tires because it is not required by law.

M+S: The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

Speed Rating: The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time.

Note: You may not find this information on all tires because it is not required by law.

U.S. DOT Tire Identification Number: This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall.

Tire Ply Composition and Materials Used: The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

Maximum Load Rating: This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

Maximum Permissible Inflation Pressure: This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

3.4.11 UTQGS Information

Treadwear Number: This number indicates the tire's wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

Traction Letter: This letter indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

Temperature Letter: This letter indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, under inflation or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

3.4.12 Tire Safety Tips

Preventing Tire Damage

Slow down if you have to go over a pothole or other object in the road

Do not run over curbs or other foreign objects in the roadway and try not to strike the curb when parking

Tire Safety Checklist

Check tire pressure regularly (at least once a month), including the spare

Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma.

Remove bits of glass and foreign objects wedged in the tread

Make sure your tire valves have valve caps

Check tire pressure before going on a long trip

Do not overload your vehicle

4. COUPLING TO TOW VEHICLE

Follow all the safety precautions and instructions in this manual to ensure safety of persons, cargo, and satisfactory life of the trailer.

4.1 Tow Vehicle And Hitch

If the vehicle and hitch are not properly selected and matched to the Gross Vehicle Weight Rating (GVWR) of your trailer, you can cause an accident that could lead to death or serious injury. If you already have a tow vehicle, know your vehicle tow rating and make certain the trailer's rated capacity is less than or equal to the tow vehicle's rated towing capacity.

DANGER

- *Use of a tow vehicle with a towing capacity less than the load rating of the trailer can result in loss of control and may lead to death or serious injury.*
- *Use of hitch with load rating less than load rating of the trailer can result in loss of control and may lead to death or serious injury.*
- *Verify hitch and tow vehicles are rated for the Gross Vehicle Weight Rating (GVWR) of your trailer.*

4.1.1 Trailer Information

The Certification / Vehicle Identification Number (VIN) tag is located on the front left side of the trailer.

The trailer Certification / VIN tag contains the following critical safety information for the use of your trailer:

MANUFACTURER: Name of trailer manufacturer.

DATE OF MANUFACTURE: Month and year the trailer was manufactured.

GVWR: The Gross Vehicle Weight Rating is the maximum allowable gross weight of the trailer and its contents. The gross weight of the trailer includes the weight of the trailer and all the items within it (such as cargo and other supplies).

GAWR: The Gross Axle Weight Rating is the maximum gross weight that an axle can support. It is the lowest of the axle, wheel, or tire rating. Sometimes the tire or wheel rating is lower than the axle manufacturers rating, and will then determine GAWR.

The sum total of the GAWR for all trailer axles may be less than the GVWR for the trailer, because some of the trailer load is carried by the tow vehicle, rather than by the trailer axle(s). The total weight of the cargo and trailer must not exceed the GVWR, and the load on an axle must not exceed its GAWR.

TIRE SIZE: The tire size and load range for your trailer.

RIM SIZE: The rim size and load range for your trailer.

PSI: The tire air pressure (kPa / PSI) measured with tires cold.

VIN: The Vehicle Identification Number.

VEHICLE TYPE: Model or style of trailer.

CERTIFICATION STATEMENT: "This trailer meets all the Federal Motor Vehicle Safety Standards in effect on the date of manufacture shown above".

4.1.2 Tow Vehicle

When equipping a new vehicle or an older vehicle to tow a trailer, ask the vehicle dealer for advice on how to outfit the tow vehicle.

Vehicle manufacturers will provide you with the maximum towing capacities of their various models, as well as the GCWR. No amount of reinforcement will give a 100 horsepower, 2,500-pound truck the towing capacity that a 300 horsepower, 5,000-pound truck has.

4.2 Coupling And Uncoupling The Trailer

A secure coupling (or fastening) of the trailer to the tow vehicle is essential. A loss of coupling may result in death or serious injury. Therefore, you must understand and follow all the instructions for coupling.

The following parts are involved in making a secure coupling between the trailer and tow vehicle:

Coupling: The trailer connecting mechanism by which the connection is made to the trailer hitch. This does not include any structural member, extension of the trailer frame, or brake controller.

Hitch: The connecting mechanism including the ball support platform and ball and those components that extend and are attached to the towing vehicle, including bumpers intended to serve as hitches.

Safety chains: Chains permanently attached to the trailer such that if the coupler connection comes loose, the safety chains can keep the trailer attached to the tow vehicle. With properly rigged safety chains, it is possible to keep the tongue of the trailer from digging into the road pavement, even if the coupler-to-hitch connection comes apart.

Trailer lighting (and braking) connector: A device that connects electrical power from the tow vehicle to the trailer. In addition, if your trailer has a separate braking system, the electrical connector will also supply power to the trailer brakes from the tow vehicle.

Breakaway switch: If the trailer becomes uncoupled from the tow vehicle, the breakaway switch lanyard, attached independently to the tow vehicle hitch, will pull a pin in the emergency electrical breakaway switch on the trailer. The breakaway switch is activated by a battery on the trailer to energize the trailer brakes independently of the towing vehicle.

It is important to check the state of charge of the emergency breakaway battery before each trip. Simply pull the pin out of the switch by hand and then try to pull the trailer. If you feel a significant drag force the brakes are activated. Be sure to re-insert the pin in the breakaway switch. Also be sure to allow enough slack in the breakaway brake lanyard such that the switch will only activate (pin pulls out) if the coupler connection comes loose.

Jack: A device on the trailer that is used to raise and lower the trailer tongue.



WARNING

Improperly coupled trailer can result in death or serious injury.

Do not move the trailer until:

- ***Coupler is secured and locked to hitch.***
- ***Safety chains are secured to tow vehicle.***
- ***Trailer jacks are fully retracted.***
- ***Trailer brakes are checked.***
- ***Tires and wheels are checked.***
- ***Breakaway switch is connected to tow vehicle:***
- ***The trailer lights are connected and checked.***
- ***Load is secured to the trailer.***

4.3 Coupler Trailer To Tow Vehicle

The trailer is equipped with a ball hitch coupler.

4.3.1 Ball Hitch Coupler

A ball hitch coupler connects to a ball that is located on or under the rear bumper of the tow vehicle.

We have utilized a ball hitch coupler that is suitable for the size and weight of the trailer. The load rating of the coupler and the necessary ball size are listed on the trailer tongue.

You must provide a hitch and ball for your tow vehicle that meets or exceeds the GVWR of the trailer.

The ball size must be the same as the coupler size. If the hitch ball is too small, too large, is underrated, is loose or is worn, the trailer can come loose from the tow vehicle, and may cause death or serious injury.

The tow vehicle, hitch and ball must have a rated towing capacity equal to or greater than the trailer gross vehicle weight rating (GVWR).

It is essential that the hitch ball be the same size as the coupler.

The ball size and load rating (capacity) are marked on the ball; hitch capacity is marked on the hitch.

4.3.2 Before Coupling Trailer To Tow Vehicle

1. Be sure the size and rating of the hitch ball match the size and rating of the coupler. Hitch balls and couplers are marked with their size and rating.

WARNING

- *Coupler-to-hitch mismatch can result in uncoupling, leading to death or serious injury.*
- *Be sure the LOAD RATING of the hitch ball is equal or greater than the load rating of the coupler.*
- *Be sure the SIZE of the hitch ball matches the size of the coupler.*

2. Wipe the hitch ball clean and inspect it visually and by feel for flat spots, cracks and pits.

WARNING

- *A warrant cracked or corroded hitch ball can fail while towing, and may result in death or serious injury.*
- *Before a coupling trailer, inspect the hitch ball for wear, corrosion and cracks.*
- *Replace worn or damaged hitch ball.*

3. Rock the ball to make sure it is tight to the hitch, and visually check that the hitch ball nut is solid against the lock washer and hitch frame.
4. Wipe the inside and outside of the coupler clean and inspect it visually for cracks and deformations; feel the inside of the coupler for worn spots and pits.
5. Be sure the coupler is tight to the tongue of the trailer. All coupler fasteners must be visibly solid against the trailer frame.

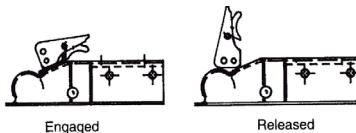
WARNING

- *A loose hitch ball nut can result in on coupling, leading to death or serious injury.*
- *Make sure the hitch ball is tight to the hitch before coupling the trailer.*

6. Raise the bottom surface of the coupler to be above the top of the hitch ball.

4.3.3 Prepare Coupler And Hitch

1. Lubricate hitch ball and inside of the coupler with a thin layer of automotive bearing grease.
2. Remove safety latch pin and open coupler locking mechanism. In the open position, the coupler can drop fully onto the hitch ball. See the coupler instructions for details of placing the coupler in the “open” position.
3. Slowly back up the tow vehicle so that the hitch ball is near or aligned under coupler.



Your trailer may be equipped with a different style coupler. If so, see the coupler manufacturers operating instructions.

4.3.4 Couple Trailer To Tow Vehicle

1. Lower the trailer tongue until the coupler fully engages the hitch ball. If the coupler does not line up with the hitch ball, adjust the position of the tow vehicle.
2. Close latch and engage the coupler locking mechanism. In the engaged position, the locking mechanism securely holds the coupler to the hitch ball.
3. Insert the safety lock pin through the hole in the locking mechanism.
4. Be sure the coupler is all the way on the hitch ball and the locking mechanism is engaged.
5. A properly engaged locking mechanism will allow the coupler to raise the rear of the tow vehicle. Using the trailer jack, test to see that you can raise the rear of the tow vehicle by 1 inch, after the coupler is locked to the hitch.

NOTICE

The tongue jack can be damaged by overloading. Do not use the tongue jack to raise the tow vehicle more than 1 inch.

If the coupler cannot be secured to the hitch ball, do not tow the trailer. Contact your dealer for assistance.

Lower the trailer so that its entire tongue weight is held by the hitch and continue retracting the jack to its fully retracted position

Full Retract jack drop leg if equipped.

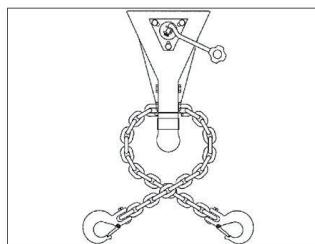
CAUTION

- *Drop leg jacks may be spring loaded and may rapidly return to raised position when released.*
- *Keep clear when releasing drop legs.*

4.3.5 Connect Safety Chains

1. Visually inspect the safety chains and hooks for wear or damage. Replace worn or damaged safety chains and hooks before towing.
2. Safety chains must crisscross under the coupler so if the trailer uncouples, the safety chains can hold the tongue up above the road. Loop around a frame member of the tow vehicle or to holes provided in the hitch system, but do not attach them to an interchangeable part of the hitch assembly. Attach hooks up from underneath the hole. Do not just drop into hole.

Provide enough slack in chains to permit tight turns, but not be close to the road surface to drag.



4.3.6 Connect Electrical Cable

Connect the trailer lights to the tow vehicle's electrical system using trailer electrical cable. Check all lights for proper operation. Repair or replace non-working lights before towing the trailer.

WARNING

- *Improper electrical connection between tow vehicle and the trailer will result in inoperable lights and electric brakes, and can lead to collision.*

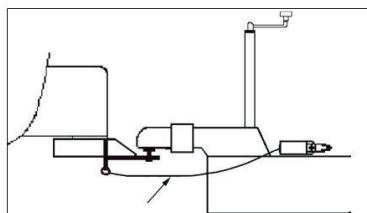
Before each tow:

- *Check that the electrical brakes work by operating the brake controller inside the tow vehicle.*
- *Check that all lights and turn signals work.*

4.3.7 Attach Breakaway Brake Lanyard (If your trailer has electric brakes)

If the coupler or hitch fails, a properly connected and working breakaway brake system will apply the trailer brakes. The safety chains will keep the tow vehicle attached and as the trailer brakes are applied, the trailer/tow vehicle combination will come to a controlled stop.

Connect the lanyard to the tow vehicle so that the electric brake pull pin will be pulled out before all of the slack in the safety chains is taken up. Do not connect the lanyard to a safety chain, hitch ball or hitch ball assembly. This would keep the breakaway brake system from operating when it is needed.



4.3.8 Test Electric Brakes (If your trailer has electric brakes)

If your trailer has electric brakes, your tow vehicle will have an electric brake controller that sends power to the trailer brakes. Before towing the trailer on the road, you must operate the brake controller while trying to pull the trailer in order to confirm that the electric brakes operate.

While towing the trailer at less than 5 mph, manually operate the electric brake controller in the tow vehicle. You should feel the operation of the trailer brakes. If the trailer brakes are not functioning, the brake system MUST be evaluated to determine the cause of the problem and corrective action MUST be taken before the trailer is used. Take the unit to your dealer or a qualified brake specialist.

Use this procedure each time you tow the trailer to check brake system operation.

4.3.9 Test Electric Breakaway Brakes (If your trailer has electric brakes)

The breakaway brake system includes a battery, a switch with a pull pin and lanyard, and a breakaway brake controller. Read and follow the instructions here as well as the instructions that have been prepared by the breakaway brake manufacturer. If you do not have these instructions, contact your dealer for assistance.

Hydraulic tilt trailers may use the hoist battery to provide power to the breakaway brakes. If your trailer is not set up this way, there will be a small breakaway battery mounted near the breakaway switch.

Most trailers are set up to charge the battery from the tow vehicle. If the electric system on our tow vehicle does not provide power to the battery, you must periodically charge the battery with a commercial battery charger to keep the battery charged

Do not tow the trailer if the battery requires recharging. A discharged brake battery will not activate the brakes if the trailer uncouples from the tow vehicle. The battery must be fully charged before towing the trailer.

To test the breakaway brake battery, remove the pull pin from the switch and attempt to pull the trailer forward. You should feel the trailer resisting being towed, but the wheels will not necessarily be locked. If the brakes do not function, do not tow the trailer until brakes, or battery, are repaired.

Immediately replace the pull pin. The breakaway brake battery discharges rapidly when the pull pin is removed.



CAUTION

- *Extreme cold weather can degrade battery performance in cars brakes not to operate properly.*
- *Check battery charge level before towing.*



WARNING

- *An ineffective breakaway brake system can result in a runaway trailer, leading to death or serious injury if coupler fails.*
- *Test the function of the breakaway brake system before towing trailer. Do not tow trailer if breakaway brake system is not working; have it serviced or repaired.*

Do not tow the trailer with the breakaway brake system ON because the brakes will overheat which can result in permanent brake failure.

WARNING

Failure to replace the pool pan can result in ineffective breaks, leading to loss of control, serious injury or death.

If you do not use your trailer for three or more months, or during winter months:

- Store the battery indoors; and
- Charge the battery every three months.

Replace the breakaway brake battery according to the intervals specified by the battery manufacturer.

4.4 Uncouple Trailer

Follow these steps to uncouple trailer form the tow vehicle:

- Park the trailer on a firm level surface and block trailer tires
- Disconnect electrical connection
- Disconnect breakaway brake switch lanyard
- Disconnect safety chains from tow vehicle
- Unlock the coupler and open it
- Before extending jack, make certain the ground surface below the jack pad will support the tongue load
- Rotate jack handle to extend the jack and transfer the weight of the trailer tongue to the jack
- Raise the trailer coupler above the tow vehicle hitch
- Drive tow vehicle forward

4.5 Tongue Weight

It is critical to have a portion of the trailer load carried by the tow vehicle. That is, the trailer tongue must exert a downward force on the hitch. This is necessary for two reasons. First, the proper amount of tongue weight is necessary for the tow vehicle to be able to maintain control of the tow vehicle/trailer system. If, for example, the tongue exerts an upward pull on the hitch, instead of pushing down on it (because the trailer is overloaded behind its axle(s)), the rear wheel of the tow vehicle can lose traction or grip and cause loss of control. Also, even if there is some weight on the tongue, but not enough weight on the tongue, the trailer can become unstable at high speeds. Remember, the faster you go the more likely the trailer is to sway.

If there is too much tongue weight, the tow vehicle is prone to jack-knife. The front wheels of the tow vehicle can be too lightly loaded and cause loss of steering control and traction, if the front wheels are driving.

In addition to tow vehicle control, tongue weight is necessary to ensure that the trailer axle(s) do not exceed their Gross Axle Weight Rating (GAWR).

In the following table, the second column shows the rule of thumb percentage of total weight of the trailer plus its cargo (Gross Trailer Weight, or "GTW") that should appear on the tongue of the trailer.

For example, a large trailer with a loaded weight of 6,000 pounds, should have 10-15% of 6,000 pounds (600-900 lbs.) on the hitch.

Tongue Weight as a Percentage of Loaded Trailer Weight	
Type of Hitch	Percentage
Ball Hitch	10-15% for Large Trailers

The numbers quoted are for example purposes only and should be tailored to the specific trailer.

For questions regarding the actual percent of tongue weight for the trailer, check with the manufacturer for specifics.

WARNING

- *Improper tongue weight load distribution can result in loss of control of trailer, leading to death or serious injury.*
- *Make certain that tongue weight is within the allowable range.*

Be sure to:

- *Distribute the load evenly, right and left*
- *Keep the center of gravity low*
- *Distribute the load front to rear to provide proper tongue weight (see chart)*

4.5.1 Checking Tongue Weight

To check the tongue weight, the tow vehicle and trailer must be on level ground, as they will be when the trailer is being towed.

Take the trailer to a truck stop or grain elevator where there is a “certified” scale. Place the tow vehicle only onto the scale and get the weight. This weight must be less than your tow vehicle’s GVWR.

Pull the trailer onto the scale and uncouple it from the tow vehicle, leaving just the trailer on the scale. Get a ticket which lists the total trailer weight. Reconnect the trailer to your tow vehicle and drive the tow vehicle wheels off the scale, just leaving the trailer axles on the scale. Get a “ticket”, which lists the trailer’s axle weight. Simply subtract the axle weight from the total weight to determine the hitch weight.

While you are at the scale, you should weigh the entire combination vehicle. This result should be less than the Gross Combined Weight Rating (GCWR) for your towing vehicle. Some scales allow you to get individual axle weights also. If this is possible, get the tow vehicle’s front and rear axle weights to make sure they are in the same proportion as the tow vehicle alone, and that the rear axle is not overloaded.

Tongue Weight as a Percentage of Loaded Trailer Weight	
Type of Hitch	Percentage
Ball Hitch	10% – 15% for large trailers

4.6 Adjusting Hitch Height (If Equipped)

The height of the hitch on the trailer must be adjusted so that the trailer, when loaded to rated capacity, is level while connected to the tow vehicle. A level trailer allows equal weight distribution on the axles.

Your dealer or a trailer service center can perform this adjustment, or you can use the following steps to adjust the hitch height yourself.
If the trailer is not equipped with an adjustable hitch, an offset ball mount may be available from your hitch manufacturer.

WARNING

- *Improper hitch height adjustment can result in overloaded tires, blowout or loss of control, leading to death or serious injury*
- *Adjust the hitch height so that the loaded trailer is level.*

1. Connect trailer to tow vehicle and load the trailer to rated capacity. See Loading And Unloading.
2. Park the tow vehicle and trailer on a firm level surface.
3. Stand away from the trailer and visually verify if the trailer is level front-to-rear. If the front of the trailer is higher than the rear, the hitch must be raised. If the front of the trailer is lower than the rear, the hitch must be lowered.
4. Uncouple trailer from tow vehicle. See Coupling and Uncoupling.
5. Remove the lock nuts and bolts (1) on the hitch. Discard lock nuts. Inspect bolts for damage and replace if necessary. Contact your dealer for the correct size and grade of bolts.

WARNING

Used lock nuts are prone to loosening, resulting in the hitch separating from trailer, which can lead to death or serious injury.

NEVER re-use a lock nut.

- *Use a new lock nut each time the hitch height is adjusted.*
- *Contact your dealer for the proper grade and size of lock nut*

6. Raise or lower the hitch as necessary.
7. Install bolts and new lock nuts.
8. Tighten lock nuts to torque specified by your dealer.
9. Couple the trailer to the tow vehicle and verify that the trailer is level front to rear.
Adjust if necessary.
10. Unload trailer. See Loading and Unloading.

5. LOADING AND UNLOADING

Improper trailer loading causes many accidents and deaths. To safely load a trailer, you must consider:

- Overall load weight
- Load weight distribution
- Proper tongue weight
- Securing the load properly

To determine that you have loaded the trailer within its rating, you must consider the distribution of weight, as well as the total weight of the trailer and its contents. The trailer axles carry most of the total weight of the trailer and its contents (Gross Vehicle Weight, or "GVW"). The remainder of the total weight is carried by the tow vehicle hitch.

It is essential for safe towing that the trailer tongue and tow vehicle hitch carry the proper amount of the loaded trailer weight, otherwise the trailer can develop an undesirable sway at towing speeds, or the rear of the towing vehicle can be overloaded. Read the "Tongue Weight" information in Section 4.

The load distribution must be such that no component part of the trailer is loaded beyond its rating. You must consider the rating of the tires, wheels and axles. For tandem and triple axle trailers, you must make sure that the front-to-rear load distribution does not result in overloading any axle.

Towing stability also depends on keeping the center of gravity as low as possible. Load heavy items on the floor and over the axles. When loading additional items, be sure to maintain even side-to-side weight distribution and proper tongue weight. The total weight of the trailer and its contents must never exceed the total weight rating of the trailer (Gross Vehicle Weight Rating, or "GVWR").

Do not transport people, containers of hazardous substances, or flammable liquids. The exception is fuel in the tank of vehicles or equipment being hauled.

WARNING

- *Do not transport flammable, explosive, poisonous or other dangerous materials on your trailer.*
- *The exception is fuel in the tank of a vehicle or equipment being hauled.*

WARNING

- *Do not transport people on your trailer. Besides putting their lives at risk, the transportation of people on trailers is illegal.*

5.1 Loading Trailer

5.1.1 Preparing Trailer for Loading

1. Inspect the floor of the trailer.
2. Inspect the tie down rings and track system for damage, looseness or signs of bending before loading the trailer.

WARNING

- *Damaged or loose tiedown rings or track can break, allowing cargo to become loose.*
- *Louis cargo can shift the center of gravity, and result in loss of control of trailer.*
- *Inspect and test tiedowns and track before loading cargo.*
- *Do not use a damaged or lose tiedown or track to secure cargo.*

Park the tow vehicle and trailer on a firm and level surface.

Clear the area around the trailer.

5.1.2 Loading A Rigid Deck Trailer

1. Couple the trailer to the tow vehicle.

WARNING

- *Trailer must be couple to tow vehicle before loading trailer.*

2. Lower rear stabilizers (if equipped) or place blocking under the rear of the trailer so the weight of the cargo does not raise the front of the trailer during loading.

CAUTION

- *Use a safe lifting procedure to avoid injury when handling ramps.*

3. Remove ramps (if equipped) from the secured position and attach to the trailer. Adjust ramp position to align with equipment tires or tracks

WARNING

- *Load can suddenly move or topple, which can result in death or serious injury.*
- *Do not load or unload trailer unless couple to tow vehicle and is on firm and level surface.*

NOTICE

- *Ramps are not rated for load bearing capacity. They will NOT support the load bearing capacity of the trailer.*
- *Do not overload ramps.*

4. Load the cargo on the trailer with approximately 60% of the cargo in the front half of the trailer.
5. Secure the load to the trailer using appropriate straps, chains and tensioning devices. Refer to www.fmcsa.dot.gov for regulations regarding cargo securement rules.
6. Remove ramps and return them to their secured upright or horizontal (flat) position.
7. Secure ramps to trailer.
8. Raise rear stabilizers (if equipped) or remove blocking under the rear of the trailer.

5.1.3 Loading A Tilt Deck Trailer (trailer may be equipped with a manual or hydraulic tilt deck)

1. Couple the trailer to the tow vehicle.

 **WARNING**

- *Trailer must be couple to tow vehicle before unloading trailer.*

2. Release deck latch or pin to pivot trailer deck for loading

 **WARNING**

- *Loading a pivoting-deck trailer before retracting the deck latch or pin may crack or damage them, which can cause loss of cargo or loss of control of trailer. Death or serious injury may result.*
- *Before loading the trailer release the deck latch or Pin.*
- *If the deck latch or pin become bent or damaged, do not straighten them. Replace components before towing the load.*

3. Load the cargo on the trailer with approximately 60% of the cargo in the front half of the trailer. Deck will pivot down into the driving position as the cargo is moved forward on the deck

4. Install the deck latch or pin into position to lock the deck into the driving position. Verify the deck latch or pin are engaged properly securing the deck.

 **WARNING**

- *An unlock everything that can result in loss of cargo or loss of control of trailer, which can result in death or serious injury.*

Before towing the trailer:

- *Lock the pivoting deck in the driving position.*
- *Verify the deck latch or Pin or engage properly securing the deck.*

5. Secure the load to the trailer using appropriate straps, chains and tensioning devices. Refer to www.fmcsa.dot.gov for regulations regarding cargo securement rules.

 **WARNING**

- *Shifting cargo can result in loss of control of trailer and can lead to death or serious injury.*
- *Tie down all loads with proper size fasteners, chains, straps etc.*

5.2 Unloading A Rigid Deck Trailer

Follow the same procedure and safety guidelines as per section 5.1.2

5.3 Unloading a Tilt Deck Trailer

1. Couple the trailer to the tow vehicle.

WARNING

- *Shipping cargo can result in loss of control of trailer and can lead to death or serious injury.*

2. Release deck latch or pin to pivot trailer deck for loading

WARNING

- *Loading a pivoting-deck trailer before retracting the deck latch or pin may crack or damage them, which can cause loss of cargo or loss of control of trailer. Death or serious injury may result.*
- *Before loading the trailer release the deck latch or pin.*
- *If the deck latch or pin become bent or damaged, do not straighten them. Replace components before towing the load.*

3. Park the tow vehicle and trailer on a firm and level surface.

4. Clear the area around the trailer.

5. Remove chains, straps and tensioning devices.

6. Release deck latch pin to pivot trailer deck for unloading.

7. Carefully move cargo toward the rear of the trailer. Deck will pivot down into the unload position as cargo is moved rearward.

WARNING

- *Unloading a pivot deck trailer before retracting the deck catch pan can crack the catch pan, which can cause loss of cargo or loss of control of trailer. Death or serious injury may result.*
- *Before unloading the trailer, retract the deck catch pin.*
- *If the deck catch pan becomes bent do not straighten it. Replace the deck catch pin before towing the load.*

8. Pivot deck back to the driving position and extend the deck catch pin to lock the deck. Verify the catch engages the hole in the pivoting deck.

WARNING

- *An unlocked pivoting that can result in loss of cargo or loss of control of trailer, which can result in death or serious injury.*

Before towing the trailer:

- *Lock pivot deck in driving position*
- *Verify that the catch engages the hole in the pivot deck.*

5.4 Hydraulic Components

Do not alter or substitute any hydraulic components on the trailer. The hydraulic system is designed with each component being compatible with the safe and reliable operation of the hydraulic system.

Under no circumstances should you alter the hydraulic pressure or flow rate in the hydraulic system.

DANGER

- *Crashing hazard.*
- *An altered or component substituted hydraulic system may malfunction, resulting in till the feeling without warning.*
- *NEVER alter or substitute any hydraulic system component.*

6. PRE – TOW CHECKLIST

6.1 Pre– Tow Checklist

Before towing, double-check all these items:

- Tires, wheels and lug nuts. See “Breaking in A New Trailer” section of this manual
- Tire Pressure. Inflate tires on trailer and tow vehicle to the pressure stated on the Certification / VIN label
- Coupler secured and locked. See “Coupling to Tow Vehicle” section of this manual
- Safety chains properly rigged to tow the vehicle, not to hitch or ball. See “Coupling to Tow Vehicle” section of this manual
- Test Tail, Stop, and Turn Lights
- Test trailer brakes
- Safety breakaway lanyard fastened to tow vehicle, not to safety chains. See “Coupling to Tow Vehicle” section of this manual
- Cargo properly loaded, balanced and tied down. See the appropriate “Loading and Unloading” section of this manual
- Tongue weight and weight distribution set-up
- Ramps secured for travel
- Fire extinguisher
- Flares and reflectors
- Trailer Ramp is secured in either upright or horizontal (flat) position

6.2 Make Regular Stops

After each 50 miles, or one hour of towing, stop and check the following items:

Coupler secured.

Safety chains are fastened and not dragging.

Cargo secured.

7. BREAKING IN A NEW TRAILER

7.1 Retighten Lugs At First 10; 25; & 50 Miles

Wheel lugs can shift and settle quickly after being first assembled, and must be checked after the first 10, 25 and 50 miles of driving. Failure to perform this check may result in a wheel coming loose from the trailer, causing a crash leading to death or serious injury. Improper tightening of the lug nuts or bolts voids the axle warranty.

Refer to the Inspection, Service and Maintenance section of this manual.

WARNING

- *Lug nuts or bolts are prone to losing after being first assembled. Death or serious injury can result.*
- *Check lug nuts or bolts for tightness on a new trailer, and after re-mounting a wheel at 10, 25 and 50 miles.*

7.2 Adjust Brake At First 200 Miles (If Equipped)

Brake shoes and drums experience a rapid initial wear. The brakes must be adjusted after the first 200 miles of use, and each 3,000 miles thereafter. Some axles are fitted with a mechanism that will automatically adjust the brake shoes.

Read your axle and brake manual to see if your brakes adjust automatically. If you do not have the axle and brake manual, contact your dealer for assistance.

If your trailer is not fitted with automatically adjusting brakes, the brakes will need to be manually adjusted.

7.3 Synchronizing Brake System (If Equipped)

Trailer brakes are designed to work in synchronization with the brakes on the tow vehicle. When the tow vehicle and trailer braking systems are synchronized, both braking systems contribute to slowing, and the tongue of the trailer will neither dive nor rise sharply.

WARNING

- *If trailer and tow vehicle brakes do not work properly together, death or serious injury can occur.*
- *Road test the brakes in a safe area at no more than 30 mph before each tow.*

8.0 INSPECTION, SERVICE AND MAINTENANCE

8.1 Inspection, Service And Maintenance Summary Charts

You must inspect, maintain and service your trailer regularly to insure safe and reliable operation. If you cannot or are unsure how to perform the items listed here, have your dealer do them.

Note: In addition to this manual, also check the relevant component manufacturer's manual.

INSPECTION AND SERVICE BEFORE EACH TOW		
Item	Inspection/Service	Manual Section Reference
Breakaway Brakes	Check operation.	Section 4
Breakaway Battery	Fully charged, connections clean.	Section 4 and 9.
Brakes	Check operation.	Section 4 and 9.
Shoes & Drums	Adjust	Section 9.
Safety Chains & Hooks	Check for wear, damage.	Section 4.
Coupler & Hitch Ball	Check for cracks, pits, and flats. Replace w/ ball and coupler having trailer GVW Rating. Grease. Check locking device & replace when worn.	Section 4 and 9. Section 4 and 9. Section 4 and 9.
Tires	Check tire pressure when cold. Inflate as needed. Check for damage.	Section 6 and 9 Section 6 and 9
Wheels - Lug Nuts Or Bolts & Hub [Voyager Industries, Inc.] recommends wheel nuts be torqued to 100 – 110 ft/lbs.	Check for tightness. Tighten. For new and remounted wheels, check torque after the first 10, 25 & 50 miles of driving and after any impact.	Section 6. Section 7 and 9.

INSPECTION AND SERVICE EVERY MONTH		
Item	Inspection / Service	Manual Section Reference
Lubrication	Lubricate tilt deck pivot points (if equipped).	Section 9.
	Lubricate hydraulic cylinder ends (if equipped)	Section 9.

INSPECTION AND SERVICE EVERY 6 MONTHS OR 6,000 MILES		
Item	Inspection/Service	Manual Section Reference
Brakes, electric Magnet	Check wear and current draw.	Section 9.
Controller (in tow vehicle)	Check power output (amperage) and modulation.	Section 9. Per Controller Mfr's Recommendation
Tires	Inspect tread and sidewalls thoroughly. Replace tires when treads are worn, when sidewall has a bulge, or sidewall is worn. Rotate every 5,000 Miles.	Section 9.
Brakes	Check Operation	Section 4
Brake Shoes & Drums	Adjust	Section 7 and 9.
Safety Chains & Hooks	Check for wear, damage.	Section 4.
Coupler & Hitch Ball	Check for cracks, pits, and flats. Replace w/ ball and coupler having trailer GVW Rating. Grease. Check the locking device and replace when worn.	Section 4. Section 4 and 9. Section 4 and 9.

INSPECTION AND SERVICE EVERY YEAR OR 12,000 MILES		
Item	Inspection/Service	Manual Section Reference
Brake Shoes & Drums	Check for scoring and wear. Replace	Section 9. See Brake Mfr's Recommendation
Jack, Drop-leg (if equipped)	Grease gears at top.	See Jack Mfr's Recommendation
Structure Frame Members	Inspect all frame members, bolts & rivets. Repair or replace damaged, worn or broken parts.	Section 9.
Welds	Inspect all welds. Repair as needed.	Section 9.
Axle Attachment Bolts	Check BY DEALER	Section 9.
Wheels Wheel Bearings	Disassemble / inspect / assemble and repack. Replace promptly if immersed in water.	Section 9 & See Axle Mfr's recommendations
Rims	Inspect for cracks & dents. Replace as needed.	

8.2 INSPECTION AND SERVICE INSTRUCTIONS

WARNING

- *Worn or broken suspension parts can cause loss of control and injury may result.*
- *Have trailer professionally inspected annually and after any impact.*

To perform many of the inspection and maintenance activities, you must jack up the trailer. When jacking and using jack stands, place them to clear wiring, brake lines, and suspension parts (springs, torsion bars). Place jacks and jack stands under the outer frame rail to which the axles are attached.

WARNING

Never go under trailer unless it is on firm and level ground and resting on properly placed and secured jack stands.

WARNING

- *Crushing hazard*
- *The tow vehicle and trailer could be inadvertently moved while a person is under the trailer.*
- *The tow vehicle engine must be off, ignition key removed, and parking brake set before entering the area under the trailer.*

8.2.1 Trailer Structure

Wash the trailer as needed with a power washer and a detergent solution.

8.2.2 Fasteners And Frame Members

Inspect all fasteners and structural frame members for bending and other damage, cracks, or failure. Repair or replace any damaged fastener and repair the frame member. If you have any questions about the condition or method of repair of fasteners or frame members, get the recommendation of, or have the repair done by your dealer.

WARNING

- *Broken or damage fasteners can cause injury or damage to trailer and contents.*
- *Inspect four and repair all damage parts at least once a year.*

8.2.3 Welds

All welds can crack or fail when subjected to heavy loads or movement of cargo that was not properly secured. Any time that you know or suspect that the trailer has been subjected to heavy loads or movement of cargo, immediately inspect the welds and fasteners for damage.

To prevent severe damage to your trailer, inspect all the welds for cracks or failure at least once a year. If a weld failure is detected, contact your dealer.

WARNING

- *Do not attempt to repair a cracked or broken weld unless you have the skills and equipment to make the repair.*
- *Improper weld repair will lead to early failure of trailer structure in serious injury or death.*
- *See your dealer for weld repairs*

WARNING

- *Broken or damaged welds can cause injury or damage to trailer and contents.*
- *Inspect for and repair all damage parts at least once a year.*

8.2.4 Coupler And Ball

Before each tow, coat the ball with a thin layer of automotive bearing grease to reduce wear and ensure proper operation; and check the locking device that secures the coupler to the ball for proper operation.

See the coupler manufacturer's manual for other inspection and maintenance procedures. If you do not have this manual, contact your dealer for assistance.

If you see or feel evidence of wear, such as flat spots, deformations, pitting or corrosion, on the ball or coupler, immediately have your dealer inspect them to determine the proper action to prevent possible failure of the ball and coupler system. All bent or broken coupler parts must be replaced before towing the trailer.

The coupler latch lever must be able to rotate freely and automatically snap into the latched position. Oil the pivot points, sliding surfaces, and spring ends with SAE 30W motor oil. Keep the ball pocket and latch mechanism clean. Dirt or contamination can prevent proper operation of the latching mechanism.

When replacing a ball, the load rating must match or exceed the GVWR of the trailer.

8.2.5 Landing Leg Or Jack

If a grease fitting is present, use a grease gun to lubricate the jack mechanism. Grease the gears in the top of hand-cranked jacks once a year, by removing the top of the jack and pumping or hand packing grease into the gears.

8.2.6 Lights And Signals

Before each tow, check all trailer lights for proper operation.

WARNING

To avoid risk of collision all lights must work.

8.2.7 Wheel Rims

If the trailer has been struck, or impacted, on or near the wheels, or if the trailer has struck a curb, inspect the rims for damage. Replace any damaged wheel. Inspect the wheels for damage every year, even if no obvious impact has occurred.

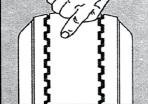
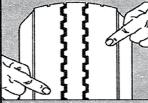
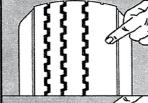
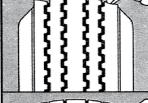
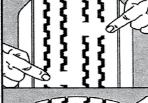
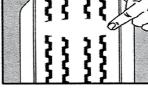
8.2.8 Tires

Before each tow, check the tire pressure to make sure it is at the level indicated on the tire sidewall or VIN label. Tire pressure must be checked while the tire is cold. Do not check tire pressure immediately after towing the trailer. Allow at least three hours for the tires to cool, if the trailer has been towed for as much as one mile. Tires can lose air over a period.

Replace the tire before towing the trailer if the tire treads have less than 2/32-inch depth or the telltale bands are visible.

A bubble, cut or bulge in a side wall can result in a tire blowout. Inspect both side walls of each tire for any bubble, cut or bulge; and replace a damaged tire before towing the trailer.

If you are storing your trailer for an extended period, make sure the tires are inflated to the maximum rated pressure indicated on the sidewall or VIN label and that you store them in a cool, dry place such as a garage. Use tire covers to protect the tires from the harsh effects of the sun.

	Condition	Possible Cause	Remedy
	Even Center Wear	Over Inflation	Check & Adjust Pressure When Cold
	Inside & Outside Wear	Under Inflation	Check & Adjust Pressure When Cold
	Smooth, Side Wear - One Side	Loss of Camber or Overloading	Check & Unload As Necessary Have Alignment Checked
	"Feathering" Across The Face	Axle Not Square To Frame or Incorrect Toe In	Square Axles Have Alignment Checked
	Cupping	Loose Bearings or Wheel Balance	Check Bearing Adjustment and Wheel & Tire Balance
	Flat Spots	Wheel Lockup	Adjust Brakes

WARNING

- *Warren, damage or under inflated tires can cause loss of control, injury and damage.*
- *Checked tires before each tow.*

8.2.9 Wheel Bearings

A loose, worn or damaged wheel bearing is the most common cause of brakes that grab.

To check your bearings, jack up the trailer and secure it on adequate capacity jack stands. Check wheels for side-to-side looseness.

If the wheels are loose, or spin with a wobble, the bearings must be serviced or replaced.

WARNING

Never go under a trailer unless it is on firm and level ground and resting on properly place and secure jacks.

If your axle(s) are equipped with a grease zerk on the ends of the axle(s), the bearings must be greased every 6 months or 6,000 miles to ensure reliable and safe operation of your trailer.

1. Remove the rubber plug from the axle end.
2. Place the grease gun on the zerk.
3. Pump grease until new grease begins to appear. Use a different color grease each time so you will know when the new grease begins to appear.
4. Install rubber plug and cap. Repeat for remaining wheel bearings.

If your trailer axle(s) are not equipped with grease zerk, refer to the axle manufacturer for service information

8.2.10 Lug Nuts Or Bolts

Lug nuts or bolts are prone to loosen right after a wheel is mounted to a hub. When driving on a remounted wheel, check to see if the lug nuts or bolts are tight after the first 10, 25 and 50 miles of driving, and before each tow thereafter.

WARNING

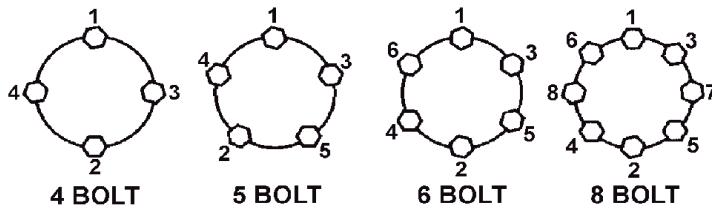
- *Lug nuts or bolts are prone to losing after being first assembled. Death or serious injury can result.*
- *Check lug nuts or bolts for tightness on a new trailer, and after re-mounting a wheel at 10, 25 and 50 miles.*

WARNING

- *Metal creep between the wheel and rim and lug nuts or bolts can cause rim to loosen.*
- *Death or serious injury can occur if wheel comes off.*
- *Tighten the lug nuts or bolts before each tow.*

Tighten the lug nuts or bolts in three stages to the final torque for the axle size on your trailer, to prevent wheels from coming loose. Tighten each lug nut or bolt in the order shown in the following figure.

Use a calibrated torque wrench to tighten the fasteners. Verify that wheel studs are free of contaminants such as paint or grease, which may result in inaccurate torque readings. Over-tightening will result in breaking the studs or permanently deforming the mounting stud holes in the wheels and will void the axle warranty.



[Voyager Industries, Inc.] recommends a wheel nut torque of 100 – 110 ft/lbs.

SERVICE NOTES:

VoyagerTM

INDUSTRIES



WARNING

This owners manual contains safety information and instructions for your trailer.

You must read this manual before loading or towing your trailer.

You must follow all safety precautions and instructions.

voyager
INDUSTRIESTM

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