"WE DELIVER DREAMS"

Thank you purchasing a Magic Tilt trailer. Since 1953, Magic Tilt has been building quality boat trailers. During that time, we have learned that a little preventative maintenance can extend your trailer's life several years. This booklet explains some of the necessary maintenance.

If you have any questions regarding these procedures, the safe operation of your trailer or if you need Magic Tilt parts, see your authorized Magic Tilt dealer – they are the local expert.

For a complete listing of Magic Tilt dealers and service centers, please visit our web site at www.magictilt.com

TOP TEN MAINTENANCE ITEMS

We are often asked for a condensed version of maintenance tips that every trailer owner should know. This is our list:

1. **Wash your trailer** after dipping in saltwater. Saltwater is incredibly corrosive. Rinsing off the trailer will greatly prolong your trailer's useful life.
2. **Check your tire pressure**. Trailer tires are different from car tires – check the tire sidewall for correct tire pressure (often 50-65 psi – much higher than your tow vehicle).
3. **Check your tire tread**. Use the "penny test" – insert a penny into the tread. The tread should touch the top of Abe Lincoln's head.
4. **Check the lights**. Have someone depress the brake pedal and use the turn signal while you stand behind the vehicle and ensure the correct lights illuminate.
5. **Use tie down straps**. These inexpensive straps help secure your boat to the trailer. Every boat should be secured with several tie-down straps. Your winch strap is not a tie down strap.
6. **Check** to make sure all of your **fasteners are tight**.
7. If you are storing your boat – **block and cover your trailer tires**. Remember rubber degrades when exposed to sunlight and also rots when exposed to the ground. You may wish to shade your tires. Moving your trailer periodically or jacking your trailer off the ground will help reduce dry rotting of your tires.
8. **Use safety chains correctly**. Chris-cross the chains below the tongue.
9. **Do not put too much weight on your trailer**. Gear can add a lot of weight – even if your boat can handle all of the gear, look at the weight rating on your trailer and do not exceed the maximum weight.
10. **Grease your bearings**. You can learn more about this procedure in this manual – but remember if you do not have good grease in your hubs, your trailer cannot roll.

As you do with your car, we strongly encourage trailer owners to carry some equipment in the event of an emergency. We always recommend that you carry a trailer kit. Contents can include a spare wheel and tire, lug wrench, wheel chocks, bearing grease, extra hub assembly, extra line (for the winch and tie-down straps), replacement light bulbs, wheel bearings and road flares (or road markers).

SCHEDULED MAINTENANCE

The following chart serves as a basic guideline for scheduling your trailer maintenance. Your maintenance may be different based on your local conditions, type of trailer and frequency of trailer use. Your dealer is the best reference concerning any unique maintenance needs you may have.

	Periodic Maintenance				Initial Maintenance			Special Maintenance	
	Before Each Use	After Each Use	Quarterly	Annually	First 50 miles	300 miles	600 miles	Before Storage	After Storage
Overall									
Freshwater wash		✓						✓	
Coupler									
Ensure proper fit	✓								
Lubricate mechanism				✓				✓	✓
Tongue jack									
Grease jack				✓				✓	
Winch assembly									
Oil gears				✓				✓	✓
Inspect cable, rope or strap			✓						
Wheels and Hubs									
Check lug nuts	✓				✓			✓	✓
Grease bearings			✓						✓
Repack bearings				✓ (x2)				✓	
Tires									
Check tire pressure	✓							✓	✓
Visual Inspection	✓							✓	✓
Tread life check			✓					✓	✓
Brakes									
Check brake fluid	✓							✓	✓
Check line connections	✓								✓
Freshwater flush – drum only		✓							
Verify Actuator Travel			✓						
Adjust brakes - drum				✓	✓	✓	✓		
Check pads, rotors, master cylinder				✓					
Electrical									
Check tail lights	✓								✓
Check brake Lights	✓								✓
Check ground	✓								✓

(x2): Semi-annual (every 6 months) check. See detailed procedure (page 9 – repacking bearings).

BEFORE YOU TOW YOUR BOAT

Please contact your authorized dealer for service, parts or maintenance needs.

> **CAUTION**. Failure to follow proper maintenance procedures or use of the trailer for purposes other than originally intended will void your warranty.

GENERAL CHECKLIST.

Never tow before you check the following:

- ✓ Coupler securely engages your hitch. The coupler and hitch ball must be rated for the same size – the size should be imprinted on both the ball and the hitch.
- ✓ Safety Chains are safely secured to trailer and tow vehicle in a chris-cross fashion under the tongue.
- ✓ Jack is fully cranked up (and parallel to tongue if swivel jack).
- ✓ All fasteners / bolts are properly tightened. Pay particular attention to the lug nuts (tightened to 85 ft-lbs).
- ✓ Boat is securely tied down with tie-down straps. Your winch strap is not a tie-down strap. A winch controls your boat in a horizontal direction. Tie-downs control your boat in the vertical direction. You must have bow-eye and transom tie down straps securely attached whenever the trailer is in use.
- ✓ Tires are properly inflated – read the tire sidewall to determine the correct tire pressure required. This rating will be different than your tow vehicle. Also check for tire wear, cracks, bubbles or foreign objects imbedded in the tire. Bias ply trailers are not designed for speeds in excess of 65 mph.
- ✓ Brake lights and other trailer lights are working.
- ✓ If the trailer is equipped with brakes, make sure they are functioning by lightly testing before getting on a major road.

> **CAUTION**. Do not exceed the maximum weight rating on your trailer. Exceeding the maximum rating voids the manufacturer's warranty and may lead to premature failure of the trailer causing damage to the boat and creating an unsafe towing condition.

COUPLER.

There are generally two types of couplers. One, the lever type is currently being used in production. It has a lever on top of the coupler that engages the pawl – securing the trailer to the hitch ball. The second type of coupler is a hand-wheel type. On the top of this coupler is a small hand-wheel that is turned to engage / disengage the trailer from the hitch ball.

1. Visually inspect hitch, ball and coupler for signs of wear or damage. Replace any parts that are worn or damaged before towing.
2. Be sure the coupler is secured to the hitch ball and the lock lever or hand wheel is down and tight and locked. *Clamp hand wheel couplers hand tight only*. When properly engaged, the tongue jack will not be able to lift the trailer off of the hitch ball.
3. Verify that the ball is properly inside the coupler and the coupler is not sitting on top of the ball.

> **CAUTION**. Use only the ball diameter indicated on your coupler - any other ball diameter will create an extremely dangerous condition that may result in separation from the coupler or ball failure.

4. Secure the safety chains. Chris-cross the safety chains under the tongue and then securely attach the S-hooks to the tow vehicle.
5. Recheck tightness after initial 50 miles.

> **NOTE.** When attached, your boat and tow vehicle should be parallel to the road surface. It you have questions concerning the load, see your dealer.

TONGUE JACK.

1. Before each use, check jack for grease. Grease as necessary with wheel bearing grease.
2. Ensure that the jack is completely raised before towing. If your trailer is equipped with a swivel jack, make sure that the swivel jack is in the folded position – jack parallel to the trailer tongue.

> **CAUTION**. When placing a swivel jack in the down position (positioned to support the weight of the tongue) ensure the swivel pin is engaged BEFORE adding weight to the jack or removing the trailer from the tow vehicle. Not verifying that the swivel jack pin is engaged could cause the jack to collapse under the weight of the tongue.

WINCH ASSEMBLY.

1. Visually check the strap, rope, or cable and hook before each use. Never use any strap, rope or cable that is worn, damaged, frayed or kinked. Replace with parts from your authorized Magic Tilt parts dealer.
2. Make sure the winch strap is securely attached to the boat's bow eye.

NOTE. The winch / winch strap is not designed to be the only line securing a boat to a trailer while towing. Tie-down straps (bow – eye and transom) must be used to properly secure your boat while towing.

CAUTION. Failure to properly secure your boat with tie down straps can cause damage to your boat trailer, boat and boat contents. In addition, an improperly secured boat can create a dangerous road condition. In many states, towing a boat without tie down straps is illegal. See your dealer to get the proper tie down straps and learn their correct use.

WHEELS AND HUBS.

Lug nuts.

1. Check for loose or missing lug nuts – tighten all lug nuts to 85 foot-pounds. Replace any damaged or missing lug nuts. Use the correct size wrench when tightening lug nuts.
2. When on a trip, visually check the wheel hubs each time you stop.

CAUTION. The following are signs of bearing failure or other wheel problems:

a) Bearing grease splattered on the rim. This could be a sign of rear seal failure, bearing lock-up or loss of grease in the bearing.
b) Smoke from a wheel. This could indicate a dragging tire (possible brake lock-up).

If you experience any of these problems, stop your vehicle in a safe, secure area. *You should immediately contact your dealer, a local trailer repair facility or the nearest automotive repair facility*. Continuing to operate your trailer can cause damage to your trailer and your boat and creates an unsafe driving condition.

WARNING. Maintain proper torque on lug nuts. Failure to do so may cause serious injury or damage.

Hubs.

1. Perform visual inspection of hub, bearing buddy (optional) and bearing protector or grease cap. If any parts are damaged or missing replace before towing your trailer.
2. If equipped with buddy bearings or posi-lube spindles, apply grease if needed (see procedure in Maintenance Procedures).

WARNING. Keep wheel bearings properly lubricated and in good condition. Failure to do so may cause bearing failure and possible wheel loss resulting in serious injury and / or property damage.

TIRES.

1. Always check tire pressure prior to each use (when tire is cold). The proper tire pressure is listed on the tire sidewall. Please realize that trailer tires often require a higher tire pressure than the tow vehicle.

WARNING. Keep tires properly inflated. Failure to maintain correct pressure may result in tire wear, tire failure and loss of control resulting in serious injury or property damage.

2. Ensure that tire treads are visible and there are no slick surfaces on the tires. The penny test can be used to verify remaining tread. Insert a penny into the tread, if Abe Lincoln's head is not touched by the top of the tread, there is not enough tread life on the tires – replace the tires before towing your trailer.

WARNING. If your tires have bubbles, deep cracks, insufficient tread or show signs of tread separation – DO NOT OPERATE YOUR TRAILER until replacing all defective tires.

TIRE SAFETY INFORMATION

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

Section 1.1 contains "Steps for Determining Correct Load Limit - Trailer".

Section 1.2 contains "Steps for Determining Correct Load Limit – Tow Vehicle".

Section 1.3 contains a Glossary of Tire Terminology, including "cold inflation pressure", "maximum inflation pressure", "recommended inflation pressure", and other non-technical terms.

Section 1.4 contains information from the NHTSA brochure entitled "Tire Safety – Everything Rides On It".
This brochure, as well as the 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:

A. Cold inflation pressure.
B. Vehicle Placard and location on the vehicle.
C. Adverse safety consequences of under inflation (including tire failure).
D. 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:

A. Locating and understanding the load limit information, total load capacity, and cargo capacity.
B. 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.
C. Determining compatibility of tire and vehicle load capabilities.
D. Adverse safety consequences of overloading on handling and stopping on tires.

1.1. 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 a particular axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

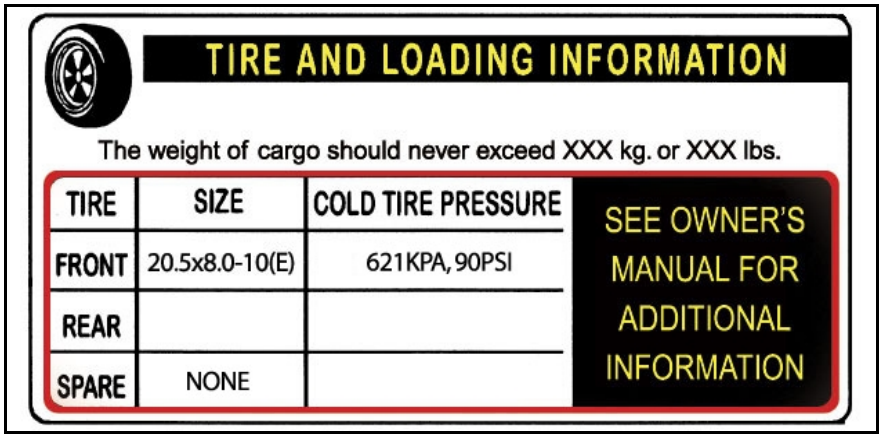
If your trailer has a GVWR of 10,000 pounds or less, there is a vehicle placard located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity. Cargo can be added 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 can not exceed the stated GVWR.

For trailers with living quarters installed, the weight of water and propane also need to be considered. The weight of fully filled propane containers is considered part of the weight of the trailer before it is loaded with cargo, and is not considered part of the disposable cargo load. Water however, is a disposable cargo weight and is treated as such. If there is a fresh water storage tank of 100 gallons, this tank when filled would weigh about 800 pounds. If more cargo is being transported, water can be off-loaded to keep the total amount of cargo added to the vehicle within the limits of the GVWR so as not to overload the vehicle. Understanding this flexibility will allow you, the owner, to make choices that fit your travel needs.

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 underinflation 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.

1.1.1. TRAILERS 10,000 POUNDS GVWR OR LESS



Tire and Loading Information Placard – Figure 1-1

1. Locate the statement, "The weight of cargo should never exceed XXX kg or XXX lbs.," on your vehicle's placard. See figure 1-1.
2. This figure equals the available amount of cargo and luggage load capacity.
3. 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.

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.

1.1.2. TRAILERS OVER 10,000 POUNDS GVWR (NOTE: THESE TRAILERS ARE NOT REQUIRED TO HAVE A TIRE INFORMATION PLACARD ON THE VEHICLE)

1. Determine the empty weight of your trailer by weighing the trailer using a public scale or other means. This step does not have to be repeated.
2. Locate the GVWR (Gross Vehicle Weight Rating) of the trailer on your trailer's VIN (Certification) label.
3. Subtract the empty weight of your trailer from the GVWR stated on the VIN label. That weight is the maximum available cargo capacity of the trailer and may not be safely exceeded.

1.2. 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 Step # 4.
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.

1.3. GLOSSARY OF TIRE TERMINOLOGY

Accessory weight
The combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio and heater, to the extent that these items are available as factory-installed equipment (whether installed or not).

Bead
The part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

Bead separation
This is the breakdown of the bond between components in the bead.

Bias ply tire
A pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

Carcass
The tire structure, except tread and sidewall rubber which, when inflated, bears the load.

Chunking
The breaking away of pieces of the tread or sidewall.

Cold inflation pressure
The pressure in the tire before you drive.
Cord
The strands forming the plies in the tire.

Cord separation
The parting of cords from adjacent rubber compounds.

Cracking
Any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

CT
A pneumatic tire with an inverted flange tire and rim system in which the rim is designed with rim flanges pointed radially inward and the tire is designed to fit on the underside of the rim in a manner that encloses the rim flanges inside the air cavity of the tire.

Curb weight
The weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine.

Extra load tire
A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

Groove
The space between two adjacent tread ribs.

Gross Axle Weight Rating
The maximum weight that any axle can support, as published on the Certification / VIN label on the front left side of the trailer. Actual weight determined by weighing each axle on a public scale, with the trailer attached to the towing vehicle.

Gross Vehicle Weight Rating
The maximum weight of the fully loaded trailer, as published on the Certification / VIN label. Actual weight determined by weighing trailer on a public scale, without being attached to the towing vehicle.

Hitch Weight
The downward force exerted on the hitch ball by the trailer coupler.

Innerliner
The layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

Innerliner separation
The parting of the innerliner from cord material in the carcass.

Intended outboard sidewall
The sidewall that contains a white-wall, bears white lettering or bears manufacturer, brand, and/or model name molding that is higher or deeper than the same molding on the other sidewall of the tire or the outward facing sidewall of an asymmetrical tire that has a particular side that must always face outward when mounted on a vehicle.

Light truck (LT) tire
A tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

Load rating
The maximum load that a tire is rated to carry for a given inflation pressure.

Maximum load rating
The load rating for a tire at the maximum permissible inflation pressure for that tire.

Maximum permissible inflation pressure
The maximum cold inflation pressure to which a tire may be inflated.

Maximum loaded vehicle weight
The sum of curb weight, accessory weight, vehicle capacity weight, and production options weight.

Measuring rim

The rim on which a tire is fitted for physical dimension requirements.

Pin Weight
The downward force applied to the 5th wheel or gooseneck ball, by the trailer kingpin or gooseneck coupler.

Non-pneumatic rim
A mechanical device which, when a non-pneumatic tire assembly incorporates a wheel, supports the tire, and attaches, either integrally or separably, to the wheel center member and upon which the tire is attached.

Non-pneumatic spare tire assembly
A non-pneumatic tire assembly intended for temporary use in place of one of the pneumatic tires and rims that are fitted to a passenger car in compliance with the requirements of this standard.

Non-pneumatic tire
A mechanical device which transmits, either directly or through a wheel or wheel center member, the vertical load and tractive forces from the roadway to the vehicle, generates the tractive forces that provide the directional control of the vehicle and does not rely on the containment of any gas or fluid for providing those functions.

Non-pneumatic tire assembly
A non-pneumatic tire, alone or in combination with a wheel or wheel center member, which can be mounted on a vehicle.

Normal occupant weight
This means 68 kilograms (150 lbs.) times the number of occupants specified in the second column of Table I of 49 CFR 571.110.

Occupant distribution
The distribution of occupants in a vehicle as specified in the third column of Table I of 49 CFR 571.110.

Open splice
Any parting at any junction of tread, sidewall, or innerliner that extends to cord material.

Outer diameter
The overall diameter of an inflated new tire.

Overall width
The linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

Ply
A layer of rubber-coated parallel cords.

Ply separation
A parting of rubber compound between adjacent plies.

Pneumatic tire
A mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

Production options weight
The combined weight of those installed regular production options weighing over 2.3 kilograms (5 lbs.) in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim.

Radial ply tire
A pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

Recommended inflation pressure
This is the inflation pressure provided by the vehicle manufacturer on the Tire Information label and on the Certification / VIN tag.

Reinforced tire
A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

Rim
A metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

Rim diameter
This means the nominal diameter of the bead seat.

Rim size designation
This means the rim diameter and width.

Rim type designation
This means the industry of manufacturer's designation for a rim by style or code.

Rim width
This means the nominal distance between rim flanges.

Section width
The linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.
Sidewall
That portion of a tire between the tread and bead.

Sidewall separation
The parting of the rubber compound from the cord material in the sidewall.

Special Trailer (ST) tire
The "ST" is an indication the tire is for trailer use only.

Test rim
The rim on which a tire is fitted for testing, and may be any rim listed as appropriate for use with that tire.

Tread
That portion of a tire that comes into contact with the road.

Tread rib
A tread section running circumferentially around a tire.

Tread separation
Pulling away of the tread from the tire carcass.

Treadwear indicators (TWI)
The projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

Vehicle capacity weight
The rated cargo and luggage load plus 68 kilograms (150 lbs.) times the vehicle's designated seating capacity.

Vehicle maximum load on the tire
The load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

Vehicle normal load on the tire
The load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table I of CRF 49 571.110) and dividing by 2.

Weather side
The surface area of the rim not covered by the inflated tire.

Wheel center member
In the case of a non-pneumatic tire assembly incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic rim and provides the connection between the non-pneumatic rim and the vehicle; or, in the case of a non-pneumatic tire assembly not incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic tire and provides the connection between tire and the vehicle.

Wheel-holding fixture
The fixture used to hold the wheel and tire assembly securely during testing.

1.4. 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/ridesonit/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 others 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.

1.5. 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.

1.5.1. 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.

1.5.2. 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.

1.5.3. CHECKING TIRE PRESSURE

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 underinflation 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.

1.5.4. STEPS FOR MAINTAINING PROPER TIRE PRESSURE

Step 1: Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual.

Step 2: Record the tire pressure of all tires.

Step 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.

Step 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 will need to add.

Step 5: At a service station, add the missing pounds of air pressure to each tire that is underinflated.

Step 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 underinflated, 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 underinflated 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 underinflated 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.

1.5.5. 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.

1.5.6. 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 1/16 of an inch. Tires have built-in treadwear 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.

1.5.7. TIRE BALANCE AND WHEEL ALIGNMENT

To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the vehicle's frame. This adjustment maximizes the life of your tires. These adjustments require special equipment and should be performed by a qualified technician.

1.5.8. TIRE REPAIR

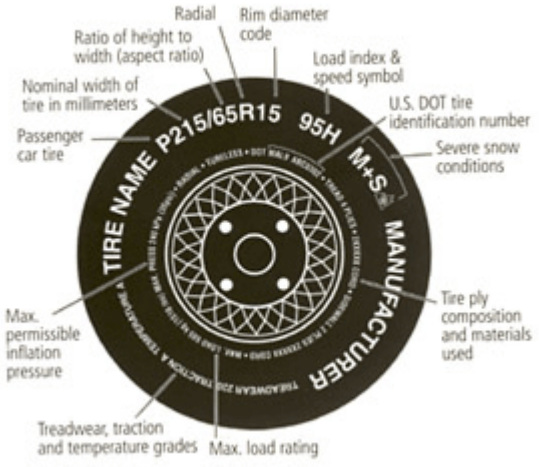
The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim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

1.5.9. 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 also provides a tire identification number for safety standard certification and in case of a recall.

1.5.9.1. Information on Passenger Vehicle Tires

Please refer to the diagram next page.



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

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. The ratings range from 99 miles per hour (mph) to 186 mph. These ratings are listed below. Note: You may not find this information on all tires because it is not required by law.

Letter Rating	Speed Rating
Q	99 mph
R	106 mph
S	112 mph
T	118 mph
U	124 mph
H	130 mph
V	149 mph
W	168* mph
Y	186* mph

* For tires with a maximum speed capability over 149 mph, tire manufacturers sometimes use the letters ZR. For those with a maximum speed capability over 186 mph, tire manufacturers always use the letters ZR.

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.

1.5.9.2. UTQGS Information

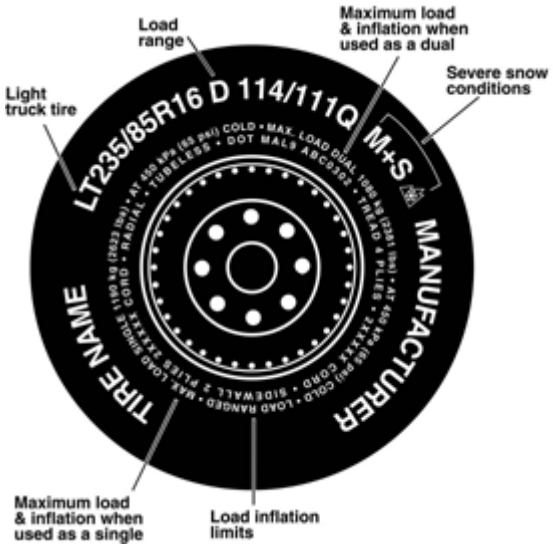
Treadwear Number
This number indicates the tire's wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

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, underinflation 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".

1.5.9.3. Additional Information on Light Truck Tires

Please refer to the following diagram.



Tires for light trucks have other markings besides those found on the sidewalls of passenger tires.

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.

Max. Load Dual kg (lbs) at kPa (psi) Cold
This information indicates the maximum load and tire pressure when the tire is used as a dual, that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).

Max. Load Single kg (lbs) at kPa (psi) Cold
This information indicates the maximum load and tire pressure when the tire is used as a single.

Load Range
This information identifies the tire's load-carrying capabilities and its inflation limits.

1.6. 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. Check the Tire Information and Loading Placard or User's Manual for the maximum recommended load for the vehicle.

BRAKES.

Brake System (general).

1. Before each use check brake fluid in reservoir on brake actuator. Refill as necessary using DOT 3 heavy-duty brake fluid to 3/8 inch below the top of the reservoir.
2. If your trailer is equipped with disc brakes, ensure that the solenoid wire is securely attached to the tow vehicle's brake wire. The trailer's solenoid wire is a separate wire at the front of the trailer (near the actuator). You need to attach this wire to a wire from the tow vehicle. The wire from the tow vehicle operates off of the tow vehicle's reverse lights. When you put the tow vehicle in reverse, the power that illuminates the tow vehicle's reverse lights also applies power to the solenoid (releasing the brakes). Improperly (or not) engaging the reverse solenoid will result in brakes locking while backing-up the trailer and could cause damage to your trailer and your tow vehicle.
3. Immediately after hook-up, always test and confirm that trailer brakes are operating properly before attaining normal road speed.

NOTE. To prolong the life of your brakes – after you back up your trailer to park the trailer -- ease forward approximately two inches. This will pull the actuator forward, relieving the pressure on the brake components

ELECTRICAL.

Lights.

1. Ensure both the wire harness connector from the tow vehicle and from the trailer are free of debris and water.
2. Verify that the white ground wire on the trailer is securely attached to the trailer frame.
3. If your trailer lights have an independent grounding circuit, verify the grounds from the trailer lights are securely attached to the trailer frame.
4. Properly secure the wire harness from the trailer to the wire harness connection from the tow vehicle.
5. Check to ensure the brake and turn signal lights correctly illuminate.
6. Check for burned out or broken bulbs, cracked or broken lenses, etc. Replace any non-working or damaged parts through your Magic Tilt dealer. A small amount of electrical socket grease on plug contacts and light bulb bases can be used to prevent rust and corrosion.

NOTE. Disconnecting the wire harness connections prior to submerging the trailer may reduce the risk of light bulb failure, fuse failure or other electrical problems.

WARNING. Operating a trailer without working lights is both dangerous and illegal. Always ensure your lights are working before taking your trailer on the road.

GENERAL MAINTENANCE PROCEDURES

REFER TO THE SCHEDULE (ON PAGE 2) FOR FREQUENCY.
(Ask your dealer if you should deviate from this proposed schedule.)

OVERALL - GENERAL APPEARANCE / GENERAL CARE.

Freshwater wash.

Your trailer will look better and last longer if you wash it off with fresh water several times a year. If you boat in salt water, rinse the trailer thoroughly after each use.

Aluminum trailers can be waxed with an auto wax to keep them bright and clean.
Galvanized trailers have a durable surface that can be scrubbed with soap and water.

COUPLER.

Ensuring a proper fit.

1. When engaged the coupler should not rattle against the hitch ball.
2. Adjusting the fit
   - Hand-wheel type couplers are adjusted by turning the hand-wheel.
   - Lever-type couplers should never need adjustment – provided that you are using the correct hitch ball. *Only a dealer should attempt to adjust a lever-type coupler*.

Lubricating mechanism.

1. Prior to using your trailer, apply a light coating of bearing grease to hitch ball.
2. Engage the hitch ball and the coupler.
3. Tow your trailer to ensure grease adheres to all surfaces

NOTE. When parking or storing your trailer, keep the coupler off the ground so debris will not build up in the ball socket.

WARNING. When jacking up the trailer, ensure that all wheels are blocked in both the forward and reverse directions. Failure to block the wheels can result in personal and property damage.

TONGUE JACK.

Grease jack.

Some tongue jacks have a small ZERK fitting. ZERK fittings allow you to easily use a grease gun to lubricate the part. If your tongue jack has a ZERK fitting:

1. Ensure your grease gun has wheel bearing grease (or equivalent).
2. Secure grease gun to ZERK fitting.
3. Pump grease until grease comes out of the jack – usually excess will come out of the bottom of the jack.
4. Crank jack between completely up and completely down several times to allow grease to adhere to all surfaces.

If your jack does not have a ZERK fitting:

1. Remove the black plastic cap on top of the jack. The cap is usually secured by a small set screw on the side of the jack.
2. Push grease into opening on top of tongue jack. Reapply cap and secure with set screw.
3. Crank jack between completely up and completely down several times to allow grease to adhere to all surfaces.

With swivel jacks.

In addition to the procedure for applying grease to the jack, you should lubricate the swivel surfaces.

1. Apply a light coating of penetrating oil (such as WD-40) on and around the swivel surface.

WARNING. Special care must always be exercised when engaging or disengaging a swivel jack. When removing your trailer from the tow vehicle always check that the swivel jack is engaged before allowing the jack to support the weight of the trailer.

WINCH ASSEMBLY.

Oil gears.

1. Verify the winch assembly is free of dirt and debris.
2. Apply a light coating of household oil (e.g. 3-in-1 oil) on the gears only.
3. Operate the winch to ensure proper adhesion of oil onto all gear surfaces.

Inspect strap, cable, rope.

You should inspect your winch strap, cable or rope every time you launch and recover your boat. Stowing your winch strap, cable or rope evenly and neatly will also extend its useful life.

1. Verify the bow eye hook is secure to the strap, rope or cable. If necessary, re-tie bow eye hook to the rope.
2. Completely extend the rope, cable or nylon strap.
3. Check the entire length of winch strap, cable or rope for cuts, burrs, rust, tears or any other damage that would degrade the performance of the securing strap. Replace as necessary.
4. Ensure the end of the strap is secure to the winch assembly.
5. Rewind the winch.

WHEELS AND HUBS.

Check lug nuts.

1. Before each use, check torque on all lug nuts. With trailer wheels blocked to eliminate the chance for accidental movement, tighten each lug nut to inflation recommendations below.

Wheel Size	TQ MIN	TQ MAX
12" wheels	50 ft. lbs.	75 ft. lbs.
13" wheels	50 ft. lbs.	75 ft. lbs.
14" wheels	90 ft. lbs.	120 ft. lbs.
15" wheels	90 ft. lbs.	120 ft. lbs.
16" wheels	90 ft. lbs.	120 ft. lbs.

2. If replacement nut/nuts are required, ensure you replace with the correct size and type.

Grease bearings.

There are three widely available types of bearing covers. Some trailers have a cap (painted or galvanized) on the end of the hub that protects the bearings. To add grease to this hub assembly, you must disassemble the hub. With this system, a semi-annual inspection and repacking the bearings is recommended.

The second type of bearing system is a Posi-Lube spindle. On the end of the spindle is a small ZERK fitting which allows grease to enter the spindle and get routed to the bearing surfaces. To lubricate this bearing, perform the following steps:

1. Remove the dust cap from the hub exposing the ZERK fitting.
2. Using bearing grease, secure the grease gun to the posi-lube ZERK fitting.
3. Gently add grease.
4. When grease comes out around the outer edge of the bearing, stop pumping grease.
5. Reapply the dust cover.

The third type uses Bearing Buddies to easy lubrication of the bearing assembly. Bearing Buddies keep a positive pressure of grease on the bearings limiting the potential intrusion of water and debris into the bearing assembly. To correctly lubricate a bearing equipped with Bearing Buddies, complete the following steps:

1. Remove the protective bearing cover from the hub exposing the Bearing Buddy.
2. Attach a grease gun (with bearing grease) to the ZERK fitting at the center of the Bearing Buddy.
3. Gently add grease.
4. When the center plate of the Bearing Buddy starts traveling forward, stop adding grease. With experience, you will be able to feel the additional pressure against the grease gun when the Bearing Buddies are close to being filled.

NOTE. If your trailer is not equipped with Bearing Buddies, you can purchase these components at your dealer. Never apply Bearing Buddies over Posi - Lube Spindles. *The two systems are not compatible when used together*.

CAUTION. Never use a pneumatic grease gun. The force of the grease gun can damage or destroy the rear seal. If your rear seal is damaged you must get it repaired before using the trailer. Even without a pneumatic grease gun, too much pressure could damage the rear seal.

WARNING. If you destroy the back seal of the hub assembly and have drum brakes. The grease can enter the brakes and erode the performance of your brakes.

Repacking bearings.

At least once a year when equipped with Buddy Bearings or Posi-Lube spindles – and semi-annually when these lubrication systems are not installed – your trailer should have the bearings repacked by your dealer. Your dealer will perform the following

1. Remove the tire.
2. Remove the dust cover or cap from the hub.
3. If present, remove the Buddy Bearing.
4. Remove the cotter pin from the spindle.
5. If equipped with a tang washer (some torsion axles and posi-lube spindles), bend the ears of the washer and remove.

CAUTION. Never re - use a tang washer. Never use anything but an actual tang washer. Reusing the tang washer or using a part other than a tang washer can cause the wheel to become separated from your trailer. This could cause serious property and personal damage.

6. Back off the axle nut – the large nut on the threaded spindle.
7. Remove the hub assembly from the axle.
8. Disassemble the seals and bearings in the hub assembly.
9. Carefully clean the bearings and hub with mineral spirits (or other parts cleaning liquid).
10. Clean the spindle – where the hub is seated on the axle.
11. Perform a careful visual inspection of the spindle face, bearings, hub compartment. If you notice any cracks, scoring or voids, replace the damage part. If metal shavings are evident in the grease, replace all bearings and seals. Magic Tilt strongly recommends replacement of bearings at this same time.
12. Replace (do not reuse) grease seal.
13. Reassemble hub assembly with repacked bearings. Grease should be applied liberally to all surfaces.
14. Place hub on spindle and secure with axle nut. While making sure that the bearings properly seat, never over-tighten axle nut.
15. Insert new cotter pin or new tang washer. Do not reuse either cotter keys or tang washers. Bend securing device to lock axle nut.

WARNING. By failing to use or improperly using an axle nut securing device (cotter pin or tang washer) you jeopardize your property, your safety and the safety of others. Always ensure that cotter pins or tang washers have been properly applied.

15. Re-apply Bearing Buddy and protective bearing cover.
16. Secure tire to wheel (with 85 ft-lbs of torque per lug nut). Tire should spin but not wobble when bearings have been properly packed.

This procedure may have to be slightly modified if the trailer is equipped with brakes.

TIRES.

WARNING. Keep tires properly inflated. Failure to maintain correct pressure will result in tire wear, potential tire failure and possible loss of control of your trailer. Improperly maintaining tire pressure will void your warranty but more importantly creates a very dangerous road condition.

NOTE. The most common cause of tire wear and tire problems is under inflation. Verify the tire manufacturer's requirements by reading the tire sidewall. Even tires of the same size can have different recommended tire pressures. Always check tire pressure prior to each use (when tires are cold).

For tire maintenance remember the acronym **PART**:

- **Pressure** – Under inflation is a tire's #1 enemy. It results in unnecessary tire stress, irregular wear, loss of control and accidents. A tire can lose up to half of its air pressure and not appear to be flat. Tires do allow for some leakage of air to occur – especially when stored for extended periods of time.
- **Alignment** – is your vehicle pulling to one side or shaking? A bad jolt from hitting a curb or pothole can put your vehicle out of alignment and damage your tires. Check your alignment periodically to ensure your vehicle is properly aligned.
- **Rotation** – promotes uniform tire wear – only required on very large trailers.
- **Tread** – measure it and inspect it. Advanced and unusual wear can reduce the ability of tread to grip the road in adverse conditions. Visually check your tires for uneven wear, looking for high and low areas or unusually smooth areas. For most trailer tires, Magic Tilt recommends replacement at least every five years.

CAUTION. Driving your vehicle in an overloaded condition is dangerous. This can cause excessive heat to build up in your tires. This can lead to sudden tire failure and/or serious personal injury.

BRAKES.

Checking brake fluid.

1. Remove the brake fluid reservoir cap on top of the actuator.
2. Refill as necessary using DOT 3 heavy-duty brake fluid to 3/8 inch below the top of the reservoir.
3. Reapply cap.

CAUTION. Brakes directly affect the safety of your vehicle and everyone else on the road. No one should attempt brake adjustment, replacement or repair of brake components if they have not been trained in the repair and maintenance of braking systems.

WARNING. Allowing your brake system to run low of brake fluid – or using fluids other than brake fluid - could degrade the brake performance and possibly lead to a dangerous road condition.

Check line connections.

1. With your boat removed from your trailer, trace your brake line from the actuator to all brake clusters.
2. Verify that the brake line does not have cracks, abrasions or holes. Replace components as necessary.
3. Verify all brake line connectors are secure and not leaking. Replace as necessary.
4. If you have had to replace line and / or connections, you must have your dealer refill the brake fluid and properly bleed your brakes.

WARNING. Improperly bleeding brakes could cause air to be trapped inside the brake line. This air could significantly erode brake performance – or even render your brakes inoperative.

Freshwater flush (Drum Brakes Only).

Freshwater flush is only for trailers with drum brakes installed with a flush kit. Drum brakes without a flush kit cannot use this procedure.

1. Secure the male adapter from a standard garden hose to the female adapter located on the trailer frame.
2. Gently apply freshwater. You should only apply a very gentle stream of water – more vigorous washing will not aid in removing the salt and debris from the braking system. Too much water pressure can cause the flush kit connectors to separate and render the flushing system inoperative.

Verify actuator travel.

Your actuator operates like a piston. When fully extended it does not apply pressure to the brake fluid. When your vehicle slows, the actuator is pressed in (toward the rear of the trailer) and applies pressure to the brake fluid. The fluid in turn causes the brakes to engage. Any item or debris that hinders the travel of the actuator diminishes the effectiveness of your brakes.

1. Annually have your dealer verify the distance over which your actuator travels between fully extended and fully engaged.
2. Your dealer will compare this travel distance to information in your brake owner's manual or published brake system operating characteristics.
3. Your dealer may also apply a lightweight oil to inhibit rust from accumulating on the actuator.

Adjust brakes (Drum Brakes).

Brake adjustments should only be done by a qualified mechanic. Magic Tilt strongly encourages you to return to the dealer where you purchased your boat, trailer and engine. Only this dealer understands the unique nature of your boating equipment as well as the local road conditions.

WARNING. Failure to complete brake adjustments correctly can result in diminished or loss of braking. Brakes adjusted too tightly can cause premature failure of the brakes. Any maladjustment can lead to property and / or personal damage.

Correct the adjustment of your drum brakes after the first 50 miles of operation, again after another 300 miles and then every 600 miles. Regardless of the amount of miles you put on your trailer, Magic Tilt recommends a drum brake adjustment at least annually.

Adjust each wheel brake assembly separately. To perform this maintenance, the mechanic will have to safely jack up your trailer. When scheduling your service appointment, you may wish to ask the mechanic whether they can remove your boat from the trailer or if you will have to make arrangements to have the boat taken off the trailer.

To complete this adjustment, the mechanic will do the following:

1. Locate the brake adjustor - behind slot at bottom of the back side of each backing plate.
2. Tighten adjustor with brake adjustment tool until you cannot rotate the wheel by hand.
3. **Caution, only rotate the drum forward**.
4. Back off the adjustment ten notches (or ten clicks).

Adjust brakes (Disc Brakes).

1. There is not an adjustment procedure for disc brakes**. If you suspect brake problems, take your trailer to your dealer immediately.**

Checking pads, rotors, master cylinder.

Annually, you should ask a mechanic to complete a visual inspection of your brakes. They will complete many of the same steps used to adjust your brakes, plus:

1. Visually inspect all components – looking for uneven wearing, cracking, warping or corrosion.
2. With brake pads, your dealer will recommend replacing the pads when they are approximately 1/8" thick or less (new pads are usually 3/8" thick).
3. If your dealer discovers bent rotors, inoperable master cylinders or other defective parts, the dealer will replace those parts.
4. At the conclusion of the inspection, the dealer will reassemble the brake system, fill the system with approved brake fluid, verify there are no leaks and bleed the braking system.

ELECTRICAL.

Check tail lights / brake lights / verifying ground.

1. Before attaching the wire harness from the trailer to the wire harness from the tow vehicle, trace the wiring system from the tow vehicle to the trailer and back. Look for bare wires, cracked or chafed insulation and corroded or rusted terminals.
2. While tracing the system, verify the white ground wire is connected to the trailer frame. Your tail lights may have an independent grounding system (evident from a short white wire from the tail light assembly). Verify that this wire is also securely attached to the trailer frame.
3. Replace any wires, wire harnesses or securing screws that are damaged, worn or missing.
4. Attach the wiring harness from the tow vehicle to the trailer. If equipped with disc brakes, also attach the single wire for the reverse lock-out solenoid.
5. Have another person depress the brake pedal and the turn signals while you remain behind the trailer and verify that the correct lights illuminate on both the trailer and the tow vehicle.
6. On trailers equipped with disc brakes - to verify the reverse solenoid works correctly, gently back the trailer.

NOTE. It is a good practice to activate your tow vehicles emergency flashers whenever backing your trailer. This will cause your rear lights on your trailer to illuminate.

7. Replace cracked, damaged or poorly illuminating bulbs. Replace crack, work or defective light shields and light covers. Some tail lights have a removable insert that can be removed through the bottom of the tail light. With these tail lights, you do not have to remove the lense cover to gain access to the tail light bulbs or their sockets.
8. A small amount of electrical socket grease on plug contacts and light bulb bases will help prevent rust and corrosion.

WINTERIZATION PROCEDURES

STORING YOUR TRAILER.

1. Park in a protected area such as garage, carport, etc. If you cannot park in a protected area, cover your trailer with a boat cover or tarp.
2. Repack wheel bearings to remove any lingering water or debris.

> **NOTE**. If water stands on bearing surfaces for as short a time as several weeks without the wheel being turned, rust and bearing damage will begin. Before storing the trailer for prolonged periods, bearings should be re-packed.

3. Lubricate moving parts such as rollers, winches and other rolling parts with lightweight household oil.
4. Tighten loose nuts and bolts.
5. Block the wheels – or better jack up the trailer so the tires do not come in contact with the ground. If your boat and trailer are not protected in a car port, garage or with a boat cover, you should still cover the tires to protect against ultra-violet rays.
6. Block the tongue and crank the tongue jack to the completely closed position.

REMOVING YOUR TRAILER FROM STORAGE.

1. Apply lightweight oil to winch gears.
2. Verify tightness of lug nuts.
3. Check air pressure in tires.
4. Check tread and general appearance of tires.
5. Verify brake fluid levels.
6. Check brake line for signs of rot or damage – replace as necessary.
7. Complete a full electrical check (as defined previously).
8. If equipped with Buddy Bearings or Posi-Lube spindles, apply additional grease.

TROUBLESHOOTING GUIDE

TRAILER.

Boat loading - boat is difficult to load.

1. Verify that your trailer is partially submerged. You should not be using your winch to forcefully pull your boat onto your trailer.
2. Check for obstructions on your boat (hull or equipment).
3. Check for obstructions on your trailer.
4. See your dealer – they may be able to adjust your trailer for your unique boating needs.

Boat unloading - boat is difficult to unload.

1. Verify that your trailer is partially submerged – your boat should partially float off your trailer.
2. Verify you have unhooked winch strap and tie-down straps.
3. Verify your motor is not impacting the ramp and / or ground.
4. See your dealer – they may be able to adjust your trailer for your unique boating needs.

Overweight - trailer is overloaded

> **NOTE**. Please pay careful attention to the selection of your boat motor and auxiliary equipment. Today's larger horsepower motors have greatly increased the weight placed on the boat's transom. In addition, larger fuel and water tanks, trolling motors, extra batteries and tee tops add considerable weight.

1. Remove excess gear while towing your boat.
2. Verify that the hull is structurally sound – this may be the first sign that the water has entered into the hull lining or is trapped in one of the holds.
3. Contact your dealer. Your dealer will work with Magic Tilt to determine if you trailer can be modified (with larger axles, different tires) to accommodate your unique needs.

COUPLER.

Improper coupler fit.

1. Verify the hitch ball and coupler are the same size.
2. Verify the coupler is free from debris.
3. Verify that the hitch ball is securely fastened to the tow vehicle.
4. For hand-wheel coupler only, verify operation of hand-wheel and attached pawl.
5. **See your dealer – You should not attempt additional adjustments to the hitch.**

WINCH.

Fails to operate.

1. Verify handle is securely fasten to winch and engaged.
2. Extend cable, rope or strap completely and verify that it is securely fastened to the winch barrel.
3. Visually inspect gears for signs of wear – replace gears as necessary.

WHEELS / HUBS.

Excessive heat.

Note. You should never attempt to touch any vehicles hubs – all hubs get warm during operation. Only test with an appropriate tester (e.g. temple stick).

After the hub has cooled:

1. Try adding grease via Posi-Lube or Buddy Bearing.
2. Verify brake fluid levels.
3. Verify reverse solenoid (if equipped with disc brakes) is properly secured.
4. Have your dealer inspect and repack your bearings.
5. Have your dealer verify your brake adjustment.

Free spinning / cross-threaded / damaged lugs.

1. Have your dealer replace damaged lugs and lug nuts.

TIRES.

Tire wear. Uneven tire wear:

1. Check tire pressure
2. Check to see if an object (such as the fender) is rubbing against the tire when the boat is on the trailer.
3. Check to see that the hubs do not have excessive wobble – could indicate improperly packed hubs or wear on hub components.
4. Check trailer capacity versus towing load
5. Check trailer alignment

BRAKES

WARNING. Brake maintenance should only be accomplished by a trained mechanic. Improper adjustment repair or maintenance voids the manufacturer's warranty and may cause serious personal and property damage.

Lock-up.

- See your dealer immediately. Your dealer will investigate whether the problem has been caused by:
  a. low fluid and air in the system – replace fluid and bleed system.
  b. actuator malfunction – repair or replace actuator.
  c. cylinder malfunction – replace defective cylinders.
  d. individual component damage – repair or replace as needed.
  e. inadvertent backing without the reverse lockout solenoid hooked up – repair or replace as needed.

Poor brake performance.

- See your dealer immediately. Your dealer will investigate whether the problem has been caused by:
  a. brakes out of adjustment – adjust brakes.
  b. foreign material in brake line – flush and clean thoroughly, re-bleed system.
  c. low fluid level – fill and bleed brakes to eliminate any trapped air.
  d. broken or pinched brake lines – replace or repair as required.
  e. actuator malfunction – repair or replace actuator.
  f. residual pressure in brake line – the older hydraulic drum brake systems required that 10-12 psi residual pressure be maintained in order to keep the wheel cylinder piston seals seated. To accomplish this, many surge brake actuators have a small diaphragm type check valve installed just inside of master cylinder output port.

Unable to back-up (disc brakes). Reverse solenoid valve is inoperative.

1. Check connection to tow vehicle back-up light circuit. Connection should be free from dirt, water and debris.
2. Check trailer ground connection (do not depend on hitch ball connection to provide ground). Trailer should have dedicated ground wire (white) connected to grounding screw.
3. Check tow vehicle back-up light circuit. You should be able to hear a 'click' when 12 v. DC is applied to lead wire.

ELECTRICAL.

Lights don't work.

1. Verify wire harnesses are free of dirt, debris and water and are properly attached. Verify that the two harnesses properly mate - are the same type.
2. Check vehicle, that towing vehicle lights work
3. Check ground on trailer – and ground on tail lights (if equipped with separate tail light ground circuit).
4. Look for any pinched, frays or cut wires – replace as necessary. Before replacing, disconnect the trailer from the tow vehicle and verify that there is no charge in the trailer circuitry.
5. Check bulbs – replace as necessary. Many trailers are equipped with snap-out inserts. These inserts allow you to easily access the bulbs by removing the insert.

For more maintenance and operating ideas, please visit our website *www.magictilt.com*

MAINTENANCE LOG

Please keep track of your maintenance with the following.

As you complete required maintenance, circle the corresponding entry. After 5 years, make additional copies to maintain record keeping. Please review the rest of this manual for complete maintenance schedules

		1st Year				2nd Year		3rd Year		4th Year	
		First 50 miles	300 miles	600 miles	Quarterly	Annually	Quarterly	Annually	Quarterly	Annually
Coupler	Lubricate			C		C		C		C
Jack	Grease jack			C		C		C		C
Winch	Oil gears			C		C		C		C
	Inspect strap				1 2 3 4		1 2 3 4		1 2 3 4	
Wheels & Hubs	Grease bearings				1 2 3 4		1 2 3 4		1 2 3 4	
	Repack bearings					C		C		C
Tires	Tread life check				1 2 3 4		1 2 3 4		1 2 3 4	
Brakes	Actuator Travel				1 2 3 4		1 2 3 4		1 2 3 4	
	Adjust brakes	C	C	C		C		C		C
	Dealer Inspection					C		C		C

C: Complete
1 2 3 4: Quarterly checks – circle each time the maintenance is completed

MAGIC Tilt Trailers Inc
Limited Boat Trailer Warranty

I. Duration

This warranty is extended to the original boat manufacturer, boat dealer, and retail boat/trailer consumer only. This warranty shall be effective five years from the date of manufacture or two years from the date of retail sale in accordance with coverage described in section II of this document. The warranty provided herein is in lieu of all other express warranties and implied warranties, including any implied warranties of merchantability or fitness for intended use which are limited in duration to the periods defined above and below.

As a condition precedent to this Warranty, the Original Retail Purchaser must notify Magic Tilt Trailers Inc., at 2161 Lions Club Road, Clearwater, FL 33764 (on the card provided at the time of purchase by the dealer or through an electronic submission), within thirty (30) days from the date of purchase. Failure to comply with this notification, within the time provided, will relieve Magic Tilt Trailers Inc. from any responsibility under this Warranty.

II. Coverage

For five (5) years from the date of manufacture Magic Tilt Trailers Inc. warrants the following parts and components to be free from defects in material and workmanship when used under normal conditions for the manufactured (and designed) purpose, and provided they receive proper care: frame assembly, winch stand assembly, tongue assembly, roller bracket assemblies, bunk support brackets, and axle weldment.

For two (2) years from the date of original retail purchase or three (3) years from the date of manufacture, whichever comes first, the Magic Tilt Warranty covers every Magic Tilt supplied part on your trailers except the following: tires (covered by a separate warranty included in your Owner's Packet), actuators and other brake system components, alignment, galvanizing and/or other finish and incidents from normal wear and tear. For excluded items Magic Tilt when possible, will as part of our customer service provide assistance in replacement of excluded items.

III. Exclusions

Your Magic Tilt Limited Warranties do not cover the costs of damage caused by normal wear and tear or caused by environmental factors. "Environmental factors include, such things as; chemicals, salt, "salt spray", contact with hazardous materials. "Acts of Nature" include such things as hurricanes, tornadoes, lightning, or flooding. The warranty does not apply to damage caused by abuse, negligence, (including improperly tightening lug nuts and bolts, or improperly adjusted trailer coupling), lack of maintenance, vandalism, corrosion, improper storage accidents, overloading, or unauthorized repairs. The warranty does not apply to any statements, representations, or warranties given by dealer or other third party persons other than those provided herein. The Magic Tilt Warranty does not cover "incidental or consequential" damages connected with the failure of your trailer under warranty. Such damages include: lost time, any unit that is part of a rental fleet, the cost of a rental trailer, gasoline, travel or lodging, the loss of personal or commercial property, or the loss of revenue. The Magic Tilt Warranty will not apply to any altered or modified trailer. The Magic Tilt Warranty does not apply to the use of the manufacture's product in a commercial application without the express written approval of Magic Trailers Inc. Your Magic Tilt Warranty limited warranties do not cover alterations to your trailer once it has been delivered to you, even if parts, components, or modifications occur as a production change on a model trailer after your trailer was built.

IV. Warranty Claim Procedures

Upon discovery of a defect, the owner is to contact a Magic Tilt Trailer's Dealer within fifteen (15) days after discovery, and said dealer will effect any corrective action required under this Warranty after prior written authorization from Magic Tilt Trailers Inc. If there is no Magic Tilt dealer within the practical vicinity, the owner must contact Magic Tilt Trailers Inc., 2161 Lions Club Road, Clearwater, FL 33764, telephone number (727) 535-5561, to obtain prior written authorization for any corrective action required under this Warranty.

V. Laws Governing

In addition to the provisions of this Warranty, the owner has available the legal remedies provided by the Magnuson-Moss Warranty Act, 15 U.S.C. 2301 et seq. This Warranty is designed and intended to fully comply with the requirements of the Magnuson-Moss Warranty Act. should any provision of this Warranty be held not to comply, however, the remaining provisions of this Warranty shall remain in full force and effect. Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitations of "incidental or consequential" damages, so the applicable limitations or exclusions herein may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

-Go to the Next Page to Register your Trailer-

TRAILER REGISTRATION

Please register your vehicle within 30 days of purchase.

You may print, fill out and mail the warranty form below, or register on line at www.magictilt.com.

For a printed copy of the Maintenance and Warranty Guidelines, check the box on the warranty form, or call us toll-free at 800-998-8458.

MAGIC TILT WARRANTY FORM

Date:
Owner Name:
Address:
City, State, Zip:
Dealer Name:
Address:
City, State, Zip:
Trailer Serial No.:

Mail To:
Magic Tilt Trailers
Warranty Department
2161 Lions Club Rd.
Clearwater, FL 33764

If There Is No KENDA/LOADSTAR Tire Dealer Available

1.) Purchase a tire of like quality and price.

2.) Return the LOADSTAR tire to the nearest distribution center, U.P.S. collect.

3.) IMPORTANT — You Must include the following:

A.) Invoice for replacement
B.) Original invoice
C.) Current information

Name: _____

Address: _____

Phone Number: _____

Date Tire Removed: _____

Reason Removed: _____

Trailer Make: Model: Year:

_____

4.) Fill out this information and tape securely to the tire along with a mailing label addressed to the distributor.

5.) When the LOADSTAR Distributor receives the tire he will examine it, adjust it under the terms of the LOADSTAR warranty and send you a complete explanation and check (if applicable).

Important Safety Information

Any tire, no matter how well constructed, may fail due to improper maintenance or service factors, creating a risk of property damage and serious or fatal injury. For your safety, comply with the following:

1.) Check air pressure monthly when tires are "cold". Use an accurate tire air pressure gauge. Do not reduce pressure when tires are hot.

Proper inflation is essential. Underinflation produces flexing of sidewalls and builds up heat to the point that premature tire failure may occur. Overinflation can cause the tire to be more susceptible to impact damage.

2.) Never overload your tires. The maximum load capacity and maximum inflation pressure are molded into the sidewall of your tire. Overloading builds up excessive heat and can lead to early tire failure.

3.) Avoid damaging objects (chuckholes, glass, rocks, curbs, etc.) which may cause internal tire damage. Continued use of a tire that has suffered internal damage, which may not be visible externally, can lead to dangerous tire failure. Determination of internal damage will require dismounting of the tire and examination by trained tire personnel.

4.) Property damage and serious or fatal injury can also result from the following causes:

• Improper tire mounting and inflation procedures may cause the tire beads to break with explosive force during installation of the tire on the rim. Tire and rim must match in size. Rim parts must match by manufacturer s design. Clean rim. Lubricate rim and beads. Do not exceed the maximum recommended pressure to seat the beads. ONLY SPECIALLY TRAINED PERSONS SHOULD MOUNT TIRES.

• Use of worn out tires (less than 2/32nd" remaining tread depth) increases the probability of tire failure.

• Excessive speed creates heat buildup in a tire, leading to possible tire failure.

THE KENDA/ LOADSTAR

WORRY FREE WARRANTY

FOR HIGH SPEED TRAILER TIRES

LOADSTAR

SAFETY INFORMATION ON BACK

Eligibility

You are eligible for the benefits of this policy if you are the owner and original consumer of new KENDA/LOADSTAR tires, bearing Dept. of Transportation prescribed tire identification numbers, only on the vehicle on which they were originally installed according to the vehicle manufacturer s or KENDA/LOADSTAR recommendations.

What Is Warranted And For How Long

Your tires are warranted against failures due to defective materials and workmanship.

(A) Tires are eligible for warranty if presented not more than two years past manufacturing date and has a minimum of 2/32 tread remaining.

(B) Free Replacement For (Bias or Bias/Belted) High Speed Trailer Tires. If a KENDA/LOADSTAR tire fails due to defective materials or workmanship during the first 10% of treadwear, or the first year, the tire will be replaced with a new comparable KENDA/LOADSTAR tire without charge.

(C) Treadwear Prorated Replacement. Tires not qualifying for free replacement will be replaced with a new, comparable tire based upon the percentage of tread that has been worn. The price you pay will equal the percentage of original, usable tread worn, multiplied by our then current "Predetermined Adjustment Price". Owner pays mounting charge.

Definition of Comparable Tire

A "comparable" new KENDA/LOADSTAR tire may either be the same line of tire, or, in the event the disabled tire is out of production or unavailable, the same basic or equal construction and quality with different sidewall or treadwear configuration. If a higher priced tire is accepted as replacement, the difference in price will be paid by the owner.

Computing Treadwear

Treadwear is computed as a percentage of the original, usable tread. The original, usable tread does not include the last 2/32nd inch of tread depth.

What Is Not Covered By The Warranty

• Failures due to fire, accident, malicious mischief, improper inflation, improper use, running flat, overloading or road hazards. Examples of road hazards include nails, glass and other foreign objects and natural and man-made defects or obstacles such as excavations, construction, potholes and chuckholes. Damages caused by road hazards include cuts, snags, punctures, scuffs, carcass bruises and impact breaks.

• Premature or irregular wear due to improper inflation or alignment or balance.

• Tires presented by other than the original consumer.

• Tires with weather cracking which were purchased more than (2) two years prior to presentation for adjustment. If you have no proof of purchase date, tires manufactured (2) two years prior to presentation are not covered.

• Loss of time, inconvenience, loss of use of the vehicle, costs of towing or transportation, or consequential damages of any type or nature.

• Any implied warranty, including merchantability or fitness, is limited to the duration of this written warranty or (2) two years, whichever is less.

• Balancing or mounting charges.

*NOTE: This limited warranty is the entire warranty given by KENDA/LOADSTAR and KENDA/LOADSTAR s complete obligation is as set forth herein. No one has authority to imply, suggest, agree, represent, warrant or promise contrary to the terms hereof.

Owner s Obligation

You must present the tire to any KENDA/LOADSTAR Tire Distributor or participating dealer in the U.S.A. To obtain no charge adjustment for tires, you must present proof of purchase date (such as trailer dealer or tire retailer invoice). You are responsible for payment of all taxes, as well as retailer charges for services that you request but are not covered by the warranty. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

NOTE:

Some states do not allow the exclusion or limitation of incidental or consequential damage or how long an implied warranty lasts, so the limitation or exclusion may not apply to you.

Adjustment Procedures

Unserviceable LOADSTAR tires adjustable under the terms of this policy should be returned to a LOADSTAR tire Distributor.

1.) Check National Distributor Directory for the nearest LOADSTAR Tire Distributor.

2.) Call 1-(800)-225-4714, 9AM-5PM weekdays for the nearest distributor.

REPORTING SAFETY DEFECTS

If you believe that your vehicle has a defect which could cause serious injury or death, you should immediately contact the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Magic Tilt Trailers Inc

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 any individual problems between you, your dealer or Magic Tilt Trailers Inc

To contact NHTSA you may call the Auto Safety Hotline toll-free within the United States on 1-888-327-4236 or (202) 366-0123 or write to:

NHTSA (NSA-11)
400 7th Street SW
Washington DC 20590