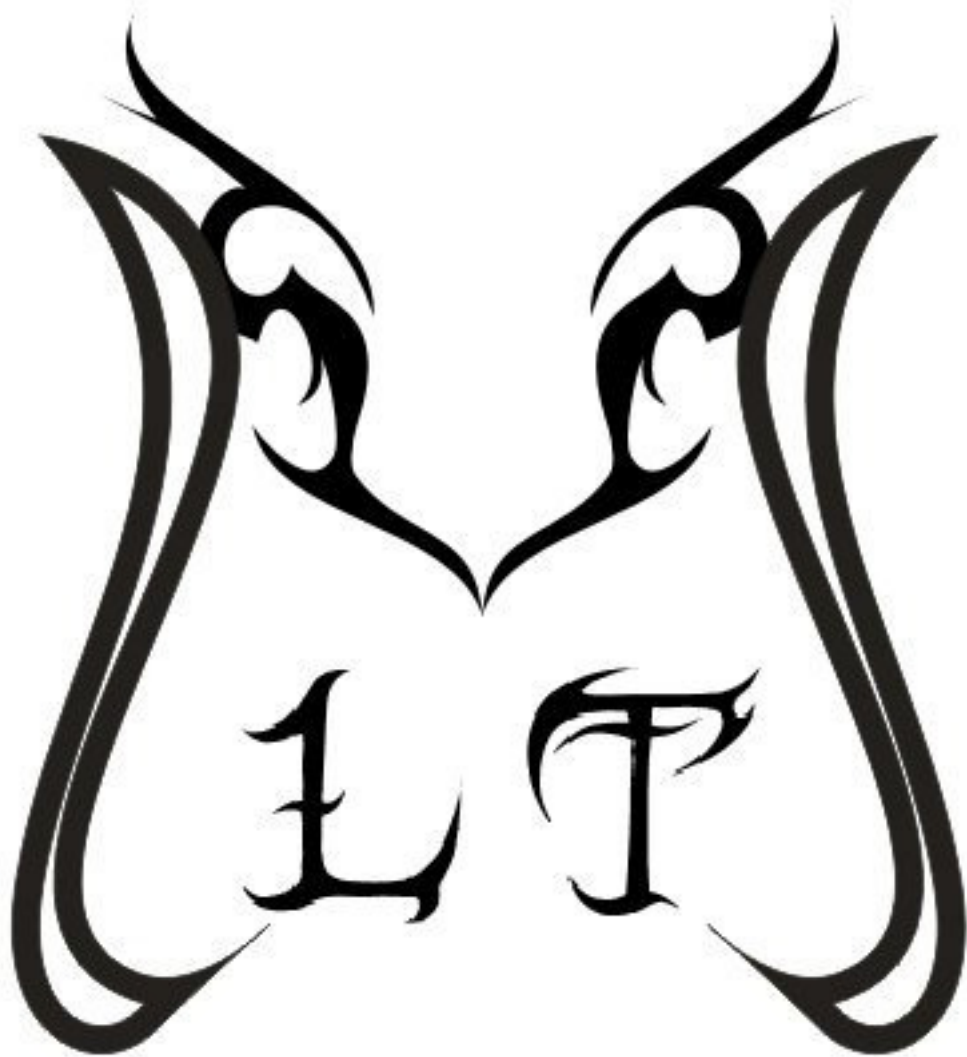


OWNER'S MANUAL



micro-lite trailer

Introduction






Micro-Lite Trailer Manufacturing, LLC
25745 Woodlawn Avenue
Phone / Fax: (574)-264-3067
www.microlitetrailer.com

Warranty

Micro-Lite Trailer Manufacturing, LLC has provided this manual solely for the purpose of providing instructions about the operation and maintenance of its trailers. Nothing in this manual creates any warranty, either express or implied. The only warranty offered by Micro-Lite Trailer Manufacturing, LLC is set forth in the limited warranty applicable to your trailer. The Limited Warranty and limited warranties issued by the component manufacturers require periodic service and maintenance, and the owner's failure to provide these services and / or maintenance may result in loss of warranty coverage for that item. The owner should review Micro-Lite Trailer's limited warranty and the warranties of all other manufacturers. Instructions included in this manual are for operating some components, which may be optional on your trailer. This manual is devoted to instructions on our trailers.

Danger, Warning, Caution and Note Boxes

We have provided many important safety messages in this manual. Always read and obey all safety messages.

	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	NOTICE is used to address practices not related to personal injury. This applies to hazardous situations involving property damage only.
	Important information regarding the maintenance of your recreational vehicle.

Terms and Symbols Used

This manual is based on the latest information available at the time of publication. Due to continuous product development and improvements, Micro-Lite Trailer Manufacturing, LLC reserves the right to make changes in product specifications and components without prior notice.

Important Safety Precautions

You'll find many safety recommendations throughout this section, and throughout this manual. The recommendations on these pages are the ones we consider to be the most important.

Do Not Allow Passengers to Ride in the Trailer During Travel

The transport of people puts their lives at risk and may be illegal. The trailer does not have seat belts; therefore, it is not designed to carry passengers.

Reducing Fishtailing or Sway

Sway or fishtailing is the sideways action of a trailer caused by external forces. Excessive sway of your travel trailer can lead to the rollover of the trailer and tow vehicle resulting in serious injury or death. Be sure to follow the instructions and warnings.

Mold

There are mold and mold spores throughout the indoor and outdoor environment. There is no practical way to eliminate all mold and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.

Towing and Weight Distribution

Weight distribution is an important factor when loading your travel trailer. A recreational vehicle with the cargo distributed properly will result in efficient, trouble-free towing.

Formaldehyde

Formaldehyde is an important chemical used widely in building materials and numerous household products. It is also a by-product of combustion and certain other natural processes. Thus, it may be present inside the trailer with some individuals being sensitive to it. Ventilation of the unit normally reduces the exposure to a comfortable level.

Generator Safety

Do not operate the generator in an enclosed building or in a partly enclosed area such as a garage. Nor should the generator be operated while sleeping. Be sure to follow instructions and warnings in this manual and the manual provided by the generator manufacturer.

Lug Nut Torquing

Being sure wheel mounting nuts (lug nuts) on trailer wheels are tight and properly torqued is an important responsibility that trailer owners and users need to be familiar with and practice. Inadequate and/or inappropriate wheel nut torque (tightness) is a major reason that lug nuts loosen in service. Loose lug nuts can rapidly lead to a wheel separation with potentially serious safety consequences.



Tow Vehicle Disclaimer

In connection with the use and operation of Micro-Lite trailers, Micro-Lite customers and owners of Micro-Lite trailers are solely responsible for the selection and proper use of tow vehicles. All customers should consult with a motor vehicle manufacturer or dealer concerning the purchase and use of suitable tow vehicles for Micro-Lite products, Micro-Lite Trailer further disclaims any liability with respect to damages which may be incurred by a customer or owner of Micro-Lite trailers as a result of the operation, use or misuse of a tow vehicle. NOTE: Micro-Lite Trailer's LIMITED WARRANTY DOES NOT COVER DAMAGE TO THE TRAILER OR THE TOW VEHICLE AS A RESULT OF THE OPERATION, USE OR MISUSE OF THE TOW VEHICLE.



Please note, your Micro-Lite Trailer Manufacturing, LLC Limited Warranty covers warrantable repairs that are performed by an authorized Micro-Lite Trailer Manufacturing, LLC dealer at their service center or facility only. It is important for the owner to know that if you are unable to bring your unit in for repairs, Micro-Lite Trailer Manufacturing, LLC is not responsible for any costs incurred for the service call charge, or time accrued to come out to your unit. Your unit is a recreational vehicle and not intended, nor manufactured, as residential or commercial structure, use as such will void your warranty.

Inspection

To assist you in avoiding problems, Micro-Lite Trailer Manufacturing, LLC requests that each dealer review the limited warranty and inspect the unit along with you. The dealer has been provided with a pre-delivery checklist. Review this checklist with the dealer. Do not sign the checklist until this review is complete and any questions about anything you do not understand have been answered.

Owner Registration

As a convenience to you, the owner registration form is completed at the dealership at the time of delivery. After an owner signs this form, the dealer will send the completed form or electronic submission to Micro-Lite Trailer Manufacturing, LLC within 30 days. Please make sure this form is completed and signed prior to leaving the dealership.

Obtaining Warranty Service

Micro-Lite Trailer Manufacturing, LLC recommends obtaining service from your dealer or the nearest authorized repair facility. Service must be obtained within a reasonable time after discovery of the defect and prior to the applicable warranty expiration period. If assistance is needed in locating an authorized repair center, please contact Micro-Lite Trailer Customer Service at 1-574-264-3067.

Get To Know Your Unit Before Heading Out

Throughout the manufacturing process, your recreational vehicle has been inspected by qualified inspectors and then again at the dealership. As the owners, however, you will be the first to camp and extensively use every system. Micro-Lite Trailer Manufacturing, LLC wants the first camping experience to be an enjoyable one and recommends a “Trial Camping Experience” before heading out. Plan a weekend in the yard or driveway and really camp in your unit. By camping for a couple of days, full-time in your unit, you will have the opportunity to use and become accustomed to the systems within your unit and find out what items are needed or not needed while camping. Note any questions that arise, difficulties encountered or problems that occur. After your trial, call your dealer and ask any questions that have arisen. Getting to know your unit before the first adventure can save a lot of frustration and leave more time for fun!

NOTE: PLEASE WEIGH UNIT FOLLOWING INSTRUCTIONS ON PAGE 16 TO ENSURE PROPER WEIGHT DISTRIBUTION. IT SHOULD BE LOADED PRIOR TO LEAVING FOR TRIPS TO ENSURE YOU ARE WITHIN THE RATINGS.

If You Need to Make an Appointment

Call Ahead

Give thought to an appointment time and call ahead. Mondays and Fridays are generally the busiest times at a dealer’s service center, as are right before seasonal holidays.

Be Prepared

If warranty work is to be done, please have a copy of your warranty paperwork available and provide the service center with any helpful information on past repairs that may pertain and help the technicians in diagnosing the problem.

Make a List

Have a list ready and be reasonable with repair expectations. Some repairs may require special order parts or parts shipped from a manufacturer. Explain what you would like to have done over the phone or stop by ahead of time so that you and the service manager or writer can discuss possible repair times.

While Waiting

Drop your unit off if possible. If you wait on your repair, do not be surprised if you cannot enter the repair area. Many insurance policies prohibit customers or non-personnel from entering into the work area for safety reasons.

Inspecting Your Repairs

Micro-Lite Trailer Manufacturing, LLC and your dealer want you to be satisfied with any repair. After a repair is performed, inspect thoroughly. Check off your list and go over the repairs with the service center representative. Once satisfied, sign the Micro-Lite Trailer Manufacturing, LLC Warranty Claim. In the event a problem should reoccur after you have left the dealership, contact the repair center or Micro-Lite Trailer Manufacturing, LLC as soon as possible, so that the situation can be resolved expediently.

Chapter 2: Effects of Prolonged Occupancy

Your recreational vehicle was designed primarily for recreational use and short-term occupancy. If you expect to occupy the coach for an extended period, be prepared to deal with indoor air quality issues that you may encounter. These issues include condensation and high humidity, concentrations of formaldehyde and other airborne irritants, and biological pollutants. This

chapter outlines some basic information about these air quality concerns and how you can minimize their effects on your RV lifestyle.

Condensation and Excessive Humidity

The relatively small volume and tight compact construction of modern RVs, means that the normal living activities of even a few occupants will lead to rapid moisture saturation of the air in the trailer and the appearance of visible moisture, especially in cold weather.

Just as the moisture collects on the outside of a glass of cold water during humid weather, moisture can condense on the inside surfaces of the trailer during cold weather when the relative humidity of the interior air is high. This condition is increased because the insulated walls of your trailer are much thinner than house walls. Estimates indicate that every day a family of four can vaporize up to three gallons of water through breathing, cooking, bathing and washing.

During cold weather and even in short term occupancy, condensation often forms on ceiling vents and may even accumulate to the point of dripping onto the surface below. This is sometimes thought to be a “leaking” roof vent, but is most often condensation.

Unless the water vapor is carried outside by ventilation or condensed by a dehumidifier, it will condense on the inside of the windows and walls as moisture or in very cold weather as frost or ice. It may also condense out of sight within the walls or the ceiling where it will manifest itself as warped or stained panels. Appearance of these conditions may indicate a serious condensation problem. When you see signs of excessive moisture and condensation in the trailer, you should take action to minimize their effects.

To Avoid Condensation Problems, Follow These Tips

- Allow excess moisture to escape to the outside when bathing, washing dishes, hair-drying, laundering and using appliances and non-vented gas burners. Open windows and use the vent fans.
- Maintain interior relative humidity at 60% or below. In cold climates, relative humidity may need to be 35% or less to avoid window condensation. You can monitor relative humidity with a hygrometer. Hygrometers are available at building supply or some electronics stores.
- Always use the vent hood when cooking.
- Keep the bathroom door closed and the vent or window open when bathing and for a period of time after you have finished.
- Do not hang wet clothes or wet shoes in the trailer.
- In hot weather, start the air conditioner early as it removes excess humidity from the air while lowering the temperature.
- Keep the temperature as reasonably cool during cold weather as possible. The warmer the interior of the trailer, the more cold exterior temperatures and warm interior temperatures will contribute to creating condensation on interior surfaces. Avoid nighttime thermostat settings at 10 or more degrees below your daytime settings. Drastic temperature reductions that reduce the indoor temperature quickly can increase the chance for moisture to condense on windows and other interior surfaces.
- Use a fan to keep air circulating inside the trailer so condensation and mildew cannot form in dead air spaces. Allow air to circulate inside closets and cabinets (leave doors partially open). Please keep in mind that a closed cabinet full of stored goods prevents circulation and allows the buildup of condensation.
- During cold weather, the natural tendency is to close up the trailer tightly. This will actually make the problem worse. You need to remove some of the warm air and allow some cool outside air to get inside the vehicle so the furnace will not recycle the humid interior air. Even when it's raining or snowing outside, the outside air will usually be dryer than the inside air.
- When cleaning floors and carpet, use the least amount of water necessary. Be sure to extract or dry any residual moisture thoroughly. If floors and carpet are cleaned before storing the trailer, be sure carpet is completely dry before closing up the trailer for an extended period.
- Keep the exterior shell of the trailer properly maintained. The shell includes the roof, side and end walls, windows, doors, compartments and exterior accessories, and under floor. Proper maintenance of sealants will help maintain a tight barrier against water intrusion. If you ever make modifications to your trailer, be sure any changes are done by a qualified service firm to minimize the possibility of moisture intrusion or accumulation problems later.
- Using your trailer in severe climates or weather conditions, such as extreme hot, humid or cold weather, will require extra care and maintenance to avoid moisture-related issues. In both extremely cold and hot/humid climates, you will need to pay more attention to controlling relative humidity inside the trailer. You may need to use a portable dehumidifier to manage the relative humidity within an acceptable range.

About Molds and Biological Contaminants

What are biological contaminants?

Biological contaminants include bacteria, molds, mildew, viruses, animal dander and saliva, house dust, mites, cockroaches, and pollen. There are many sources of these pollutants. Pollens originate from plants; viruses are transmitted by people and animals; bacteria are carried by people, animals, and soil and plant debris; and household pets are sources of saliva and animal dander. The protein in urine from rats and mice is a potent allergen. When it dries, it can become airborne.

Biological contaminants are, or are produced by, living things. Biological contaminants are often found in areas that provide food and moisture or water. For example, damp or wet areas such as cooling coils, humidifiers, condensate pans, or unvented bathrooms can be moldy. Draperies, bedding, carpet, and other areas where dust collects may accumulate biological contaminants. Contaminated air conditioning/heating systems can become breeding grounds for mold, mildew, and other sources of biological contaminants and can then distribute these contaminants throughout your RV. Many of these biological contaminants are small enough to be inhaled.

By controlling the relative humidity level in a recreational vehicle, the growth of some sources of biologicals can be minimized. A relative humidity of 30-50 percent is generally recommended. Standing water, water-damaged materials, or wet surfaces also serve as a breeding ground for molds, mildews, bacteria, and insects. House dust mites, the source of one of the most powerful biological allergens, grow in damp, warm environments.

Health Effects from Biological Contaminants

Some biological contaminants trigger allergic reactions, including hypersensitivity pneumonitis, allergic rhinitis, and some types of asthma. Infectious illnesses, such as influenza, measles, and chicken pox are transmitted through the air. Molds and mildews release disease-causing toxins. Symptoms of health problems caused by biological pollutants include sneezing, watery eyes, coughing, shortness of breath, dizziness, lethargy, fever, and digestive problems. Children, elderly people, and people with breathing problems, allergies, and lung diseases are particularly susceptible to disease-causing biological agents in the indoor air.

Allergic reactions occur only after repeated exposure to a specific biological allergen. However, that reaction may occur immediately upon re-exposure or after multiple exposures over time. As a result, people who have noticed only mild allergic reactions, or no reactions at all, may suddenly find themselves very sensitive to particular allergens.

Reducing Exposure to Biological Contaminants

- General good housekeeping, and maintenance of heating and air conditioning equipment, is very important. Adequate ventilation and good air distribution also help.
- Maintain the relative humidity between 30%-60% to help control mold, dust mites, and cockroaches.
- Use the recommendations in the section on **Condensation and Excessive Humidity** to keep the humidity level down.
- Humidifiers can become breeding grounds for biological contaminants. They have the potential for causing diseases such as hypersensitivity pneumonitis and "humidifier fever." Clean evaporation trays in air conditioners, dehumidifiers, and refrigerators frequently. Thoroughly clean and dry water damaged carpets and building materials (within 24 hours if possible). Water-damaged carpets and building materials can harbor mold and bacteria. It is very difficult to completely rid such materials of biological contaminants.
- Avoid drying wet clothes inside.
- Keep the RV clean. Dust mites, pollens, animal dander, and other allergy-causing agents can be reduced, although not eliminated, through regular cleaning.
- Take steps to minimize biological pollutants in storage compartment and indoor closets and cabinets.



Remember, your trailer is not designed, nor intended, for permanent housing. Use of this product for long-term or permanent occupancy may lead to premature deterioration of structure, interior finishes, fabrics, carpeting and drapes. Damage or deterioration due to long-term occupancy may not be considered normal and may, under the terms of the warranty, constitute misuse, abuse or neglect and may therefore reduce the warranty protection.

Specifically about Molds...

Molds are microscopic organisms that naturally occur in virtually every environment, indoors and out. Outdoors, mold growth is important in the decomposition of plants. Indoors, mold growth is unfavorable. Left unchecked, molds break down natural materials such as wood products and fabrics. Knowing the potential risks is important for any type of consumer to protect their investment.

What factors contribute to mold growth?

For mold growth to occur temperatures indoors or outdoors must be between 40 degrees and 100 degrees Fahrenheit and there must be a source of moisture such as humidity, standing water, damp materials, etc. Indoors, the most rapid growth occurs with warm and humid conditions.

How can mold growth be inhibited?

By controlling relative humidity, the growth of mold and mildew can be inhibited. In warm climates, use of the air conditioner will reduce the relative humidity. Vents are located in the bathing and cooking areas and constant use is advised during food preparation and bathing even during colder weather. Additionally, opening a window during these activities will assist in ventilation. In extremely humid conditions, using a dehumidifier can be helpful.

Further Information About Molds

Frequent use of your coach and maintaining its cleanliness are important preventive measures. Further, any spills should be wiped up quickly and dried as soon as possible. Avoid leaving damp items lying about. On safe surfaces, use mold or mildew-killing cleaning products. Check sealants regularly and reseal when necessary to avoid water leaks. Proper preventive maintenance to the trailer and its accessories, as described both in this manual and in accompanying literature, will help reduce the possibility of mold and mildew problems.



If using a dehumidifier, please read and follow all manufacturer instructions and recommendations for use and cleaning.

Dry any areas exposed to water leaks or spills as soon as possible and definitely within 24-48 hours. Quickly drying minimizes the chance for moisture damage and possible mold growth which can begin to form colonies in 48 hours. Since moisture is the key to mold issues, treat all signs of condensation and spills seriously and deal with them promptly. Failure to deal with a moisture issue promptly may cause more severe problems where there weren't any before, or may make a small problem much worse.

Learn to recognize the signs of mold. Don't paint over suspicious discolorations until you are sure it is not mold. The affected surface must first be cleaned and dried. Any residual stains can be painted over.

Be sure to understand and eliminate the source of moisture accumulation as a part of the clean up. Clean up small amounts of mold as soon as it appears. Use a detergent/soap solution or an appropriate household cleaner. The cleaned area should be thoroughly dried. Dispose of any sponges or rags used to clean mold.

Several drying methods can be used:

- Remove excess water with an extraction vacuum
- Use a dehumidifier to aid drying
- Use portable fans to move air across the wet surfaces

Chemical Sensitivity

After you first purchase your new RV and sometimes after it has been closed up for an extended period of time, you may notice some strong odors and feel some chemical sensitivity. *This is not a defect in your RV.* Many different products are used in the construction of your RV. Some of these materials such as carpet, linoleum, plywood, insulation, upholstery, may "off-gas" different chemicals, including formaldehyde. This off-gassing is especially noticeable when the materials are new or are exposed to high temperatures and/or humidity. Formaldehyde is also a by-product of combustion and numerous household products such as some paints, coatings and cosmetics. Since your RV is much smaller than your home, and because the air inside the RV is exchanged less often, the concentration of these chemicals in your RV is more noticeable.

Under some conditions, you may experience eye, nose, and throat irritation, and possibly headache, nausea, and a variety of asthma-like symptoms. Elderly persons and young children, as well as anyone with a history of asthma, allergies, or lung problems, may be more susceptible to the effects of off-gassing,

Formaldehyde

Formaldehyde is an important chemical used widely by industry to manufacture building materials and numerous household products. It is also a by-product of combustion and certain other natural processes. It is used to add permanent-press qualities to clothing and draperies, as a component of glues and adhesives, and as a preservative in some paints and coating products. Thus, it may be present in substantial concentrations both indoors and outdoors.

Sources of formaldehyde in your RV include pressed wood products such as particleboard used as sub-flooring and shelving and in cabinetry and furniture; hardwood plywood paneling used for decorative wall covering and used in cabinets and furniture; and medium density fiberboard (MDF) used for drawer fronts, cabinets, and furniture tops. Formaldehyde is also found in tobacco smoke, household products, and the use of un-vented, fuel-burning appliances.

The rate at which products like pressed wood or textiles release formaldehyde can change. Formaldehyde emissions will generally decrease as products age. When the products are new, high indoor temperatures or humidity can cause increased release of formaldehyde from these products.

Health Effects of Formaldehyde

Formaldehyde is a colorless, pungent-smelling gas that can cause watery eyes, burning sensations in the eyes and throat, nausea, wheezing and coughing, fatigue, skin rash and difficulty in breathing in some people, and severe allergic reactions. High concentrations may trigger attacks in people with asthma. It has also been shown to cause cancer in animals and may cause cancer in humans. If you have any questions or concerns about the health effects of formaldehyde, please consult your doctor or local health professionals.

How to Reduce Exposure

To reduce or lessen your exposure to chemicals from off-gassing, you must ventilate your RV. Open windows, doors, and exhaust vents frequently after purchase and whenever the temperature and/or humidity is high. Operate ceiling and/or other fans, roof air conditioner (s) and the furnace. Use a fan to force the stale air out and bring fresh air in.

- Use air conditioning and dehumidifiers to maintain moderate temperature and reduce humidity levels. Use the recommendations in this chapter on controlling moisture and humidity.
- Increase ventilation, particularly during the first few months after purchasing your RV.
- Do not smoke inside your RV. In addition to causing damage to your RV, tobacco smoke releases formaldehyde and other toxic chemicals. If you use dehumidifiers to control humidity, be sure to drain and clean dehumidifier collection trays frequently so that they do not become a breeding ground for microorganisms. See the section on biological pollutants for more information.

ADDITIONAL INFORMATION ABOUT FORMALDEHYDE

• *An Update on Formaldehyde: 1997 Revision (CPSC document #725)*, U.S. Consumer Product Safety Commission

• **American Lung Association**

1740 Broadway

New York, NY 10019-4374 (local ALA offices also have information)

• For further information on formaldehyde and consumer products, call the **EPA Toxic Substance Control Act (TSCA) Assistance Line (202) 554-1404**.

Warranty Exclusion

CHEMICAL OFF-GASSING IS NOT A "DEFECT" IN YOUR RECREATIONAL VEHICLE AND IS NOT COVERED BY THE MIRCO-LITE TRAILER LIMITED ONE-YEAR WARRANTY. PLEASE FOLLOW THE RECOMMENDATION IN THIS SECTION TO ADDRESS THIS CONCERN.



Wheel separation can occur! Exceeding the GVWR and GAWR ratings for your unit could result in serious damage to the suspension, frame or other components.

Chapter 3: Towing and Leveling

Towing Guidelines

Weight distribution is an important factor when loading your trailer. A recreational vehicle with the cargo distributed properly will result in efficient, trouble-free towing. Loading the coach as evenly as possible and then weighing the loaded RV can accomplish proper weight distribution. Keep heavier items as low as possible and distribute evenly (front to back and side to side). Securing your possessions can prevent damage from shifting during towing and maintain the weight distribution balance achieved during preparation for travel.

You must not exceed the GVWR or GAWR of the unit (see definitions). To verify GVWR, total the loaded hitch and axle weights. If this total exceeds GVWR, you must remove items until the vehicle weight is within this limit. You can verify that the coach's axles are not overloaded by comparing the loaded axle weight with the GAWR. If the reading is above this limit, redistribute the item load.

Finally, make sure the hitch weight or pin weight of the loaded trailer falls within the limits of the tow vehicle.

Weight Ratings – Definitions

GVWR (Gross Vehicle Weight Rating)

The maximum permissible weight of this coach when fully loaded. It includes all weight at the unit's axle(s) and tongue or pin.

UVW (Unloaded Vehicle Weight)

The weight of this trailer as manufactured at the factory. It includes all weight at the coach's axle(s) and tongue or pin. If applicable, it also includes full generator fluids, fuel, engine oil and coolants.

CCC (Cargo Carrying Capacity)

The GVWR minus each of the following: UVW, full fresh (potable) water weight (including water heater) and full Propane weight.

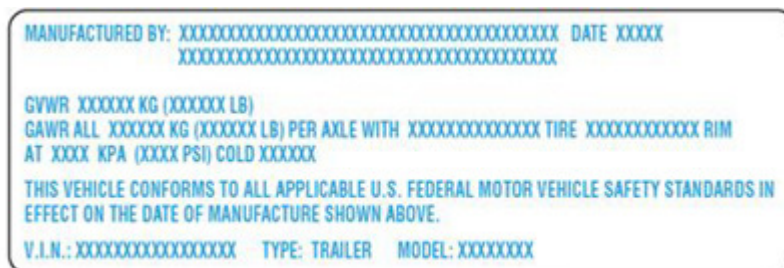
GAWR (Gross Axle Weight Rating)

The maximum allowable weight that an axle system is designed to carry.

Weight Ratings - Labels

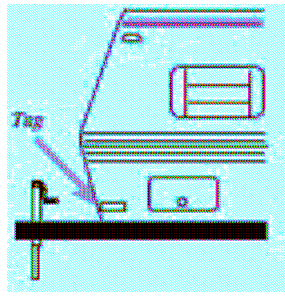
The information on the weight ratings is contained on two labels: The Federal Certification Tag and the RVIA Weight Label. Each label contains the Vehicle Identification Number (VIN) / Serial Number for the vehicle rated. These ratings are specific for each trailer manufactured. Use only the ratings found on these labels:

Federal Certification Label



Location

The Federal Certification Tag on your fifth-wheel or travel-trailer can be located on the road side (off-door side) near the front of the unit as seen in the diagrams below. This tag contains the GVWR, GAWR (front and rear) and tire pressure limits.



RVIA Weight Label

TRAILER WEIGHT INFORMATION

VIN: 47CPCRS24BXXXXXX MODEL: 31RL
 GVWR (GROSS VEHICLE WEIGHT RATING) IS THE MAXIMUM PERMISSIBLE WEIGHT OF THIS TRAILER WHEN FULLY LOADED. IT INCLUDES ALL WEIGHT AT THE TRAILER AXLES) AND TONGUE OR PIN. UVW (UNLOADED VEHICLE WEIGHT) IS THE WEIGHT OF THIS TRAILER AS MANUFACTURED AT THE FACTORY. IT INCLUDES ALL WEIGHT AT THE TRAILER AXLES) AND TONGUE OR PIN. IF APPLICABLE, IT ALSO INCLUDES FUEL, GENERATOR FLUIDS, INCLUDING FUEL, ENGINE OIL, AND COOLANTS. CCG (CARGO CARRYING CAPACITY) IS EQUAL TO GVWR MINUS EACH OF THE FOLLOWING: UVW, FULL FRESH (POTABLE) WATER WEIGHT (INCLUDING WATER HEATER), AND FULL PROPANE WEIGHT.

CARGO CARRYING CAPACITY (CCC) COMPUTATION	POUNDS	KILOGRAMS
GVWR:	12192	5530
MINUS UVW:	9960	4463
MINUS FRESH WATER: (86 GALLONS @ 8.3 LB/GAL)	466	211
MINUS PROPANE: (14 GALLONS @ 4.2 LB/GAL)	59	31
CCC FOR THIS TRAILER:	1927	875

DEALER INSTALLED EQUIPMENT WILL REDUCE CCC.
 CONSULT OWNER MANUAL(S) FOR SPECIFIC WEIGHING INSTRUCTIONS AND TOWING GUIDELINES. ALL WEIGHTS ARE APPROXIMATE.

Location

The RVIA Weight Label is located on the inside of the door jamb.

TREAD Tire and Wheel Certification Label

TIRE AND LOADING INFORMATION

The weight of cargo should never exceed
XXXX Kg or XXXX Lbs.

TIRE	SIZE	COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	
REAR	XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	
SPARE	XXXXXXXXXXXXXX	XXXXXXXXXXXXXX	

Location

The TREAD tire and WHEEL certification label is located in the lower left front corner on the exterior of the off door side wall. This tag contains the GVWR rating, the UVW (Unloaded Trailer Weight) and the computation for CCC (Cargo Carrying Capacity).

Weighing Your Unit

Travel-Trailer

- Drive the loaded trailer onto the scales as shown in the picture below, making sure that the hitch will be the only contact point with the scales after unhooking. Unhook and drive the tow vehicle off the scales. Level the trailer and record hitch weight.
- Hookup to the trailer and pull forward on the scales until only the trailer axles are on the scale. Level the trailer and record axle weight.
- To determine overall weight, add the hitch weight plus axles.

Hitches and Towing

Travel-Trailer

1. Crank the tongue of the trailer jack up until the hitch coupler is high enough to clear the tow vehicle.
2. Back the tow vehicle to the trailer until the hitch ball is directly under the coupler on the trailer.
3. Set the parking brakes, raise the locking latch on the coupler and crank it down on the ball.
4. Move the locking latch down to lock it on the ball.
5. Engage the lock and retainer clip.
6. Raise the tongue by cranking the jack down. (The tow vehicle will come up with it if the high coupler is properly latched.)
7. Connect the power cord between the tow vehicle and the trailer.
8. Connect the breakaway switch, assuring the breakaway cable is not attached to any part of the tow vehicle assembly.
9. Crank the jack all the way up.
10. Install and adjust side mirrors.
11. Check all lights on the trailer and tow vehicle.
12. Pull forward and check the operation of the trailer brakes with the hand control to assure proper operation. (Refer to manufacturer specifications on setting the brake control.)

Before Towing

- Ensure the TV antenna is down and in the correct position.
- Disconnect all park connections and are securely stored.
- Close and secure all doors, windows, awnings and roof vents
- Return the Entry step to the travel position.
- Refer to the “Pre-Travel Checklist” located in the Appendix

Towing

Towing a recreational vehicle can be enjoyable and worry-free if special attention toward safety is applied every time you hit the road and before heading out on our first camping trip, practice turning, stopping and backing in low traffic areas or large parking lots. In time, traveling with a recreational vehicle in tow will be as easy as driving the family car.



Disconnect the unit from the Bargman Seven-Way Tow Vehicle Cord prior to testing the breakaway switch. Failure to do so may cause damage to the brake controller.

SAFETY BREAK-AWAY SWITCH WILL NOT OPERATE unless connected to a power source equivalent to or greater than an automotive type 12 volt, 12 amp hour wet cell battery.



The breakaway switch is for emergency use only.



Check tires for proper inflation and wheel lug torque to meet manufacturer's specifications.

Before Heading Out

Weight Distribution

Proper weight and load distribution is absolutely essential to safe towing. It is necessary to maintain a certain percentage of gross vehicle weight on the tow vehicle. Common recommendations place approximately 10% - 15% of a loaded weight on a travel-trailer hitch and approximately 20-25% on a fifth-wheel pin weight, as the weight comes out of the tow vehicle payload capacity. Too much or too little weight upon the hitch leads to dangerous driving conditions such as sway and reduced tow vehicle control. In no circumstance should the loaded weight ever exceed the GVWR or the GAWRs.

Safety Chains

Always use safety chains when towing. They maintain the connection between the travel-trailer and tow vehicle in the event of separation of the ball and trailer coupling. Safety chains are included with every travel trailer and, in most states, are required when towing a travel-trailer. Hook them to the frame of the tow vehicle (not the hitch), crossing them under the trailer's tongue. Inspect the length of the chains once attached to the tow vehicle frame. They should be long enough to allow for turns, but short enough to avoid any drag.

Breakaway Switch

The breakaway switch is another safety device as it provides a means of automatically slowing and stopping your RV if it should become detached during traveling. The cable from the breakaway switch should be attached to the tow vehicle so that it remains connected in the event the trailer coupling detaches from the hitch ball. The breakaway switch is powered from the RV 12 Volt battery. If separation occurs the pin is pulled out of the switch and current from the RV battery is applied to the trailer brakes.

Tire Pressure Maintaining proper tire pressure is another key to safety. The Cold Inflation Pressure for each axle is located on the Federal Certification Label. Cold inflation pressure refers to the pressure in the tire prior to traveling. Always check your tire pressure before traveling. Under inflated tires will cause excessive sidewall flexing and produce extreme heat, leading to early tire failure and possible loss of control. Over inflated tires can cause uneven tire wear and can also lead to early failure. More information on tires and maintenance can be found in the Care and Maintenance section.

Level Towing

Having the tow vehicle and recreational vehicle level with each other will help improve tow ability as well as safe driving. A hitch that is too low can cause the front to drag. A hitch that is too high can cause the rear to hit those high spots in the road.

Lights

Check all electrical connections to ensure all lights on the tow vehicle and travel-trailer are functioning properly. The break lights, hazards and turn signals should be in synchronization with the tow vehicle.



Excessive sway or fishtailing of your travel trailer can lead to the rollover of the trailer and tow vehicle. Serious injury or death can occur. It is important that you read and understand the information in this section.

Equipment- When hitched together, the trailer and the tow vehicle must be level. The tires of both the trailer and tow vehicle should be in good condition and inflated to the pressure recommended as noted on the exterior of the trailer and in the owner's manuals of the trailer and tow vehicle.

Your trailer brakes should work in synchronization with your tow vehicle brakes. Never use your tow vehicle or trailer brakes alone to stop the combined load. Your brake controller must be set up according to the manufacturer's specifications to ensure proper synchronization between the tow vehicle and the trailer. Additionally, you may have to make small adjustments occasionally to accommodate changing loads and driving conditions.

Also, we recommend a friction sway damper or hitch with built-in sway control be provided for your unit. Please consult your dealer regarding this equipment, as the RV manufacturer does not provide sway control devices.

Tongue Weight - The tongue weight should be between 10% to 15% of the total travel trailer weight. See manual regarding the proper weight distribution of your recreation vehicle.

Driving - This is the most important component. The tendency for the vehicle to sway increases with speed. Obey all speed limits and reduce speed during inclement weather or windy conditions.

Corrective Measures- If sway occurs the following techniques should be used:

1. Slow down immediately, remove your foot from the accelerator. Avoid using the tow vehicle brakes unless there is a danger of collision. Reduce speed gradually whenever possible. If you can do safely, use the brake hand controller (independent of the tow vehicle brakes) to gently and progressively apply the trailer brakes. This will help to keep the vehicle aligned. Practice using the brake hand controller on a deserted parking lot. Don't wait until an emergency occurs before using it. Location of the brake hand controller is important and should be made easily accessible.

2. Steer as little as possible while maintaining control of the vehicle. Because of natural lag time, quick steering movements to counter trailer sway will actually cause increased sway and loss of control. Keep both hands on the wheel. Hold the wheel as straight as possible until stability is regained.
3. Do not jam on the brakes or attempt to press the accelerator to speed your way out of fishtailing. Both actions make the situation worse and could cause severe injury or death.
4. Once the swaying is under control, stop as soon as possible. Check tire pressures, cargo weight distribution and look for any signs of mechanical failure. Travel at reduced speeds that permit full control until the problem can be identified and corrected.

Sharply Winding and Narrow Roads

Keep well to the center of the lane, equally away from both the center line and pavement edge. This allows the trailer to clear the edge of the pavement without the likelihood of the wheels dropping onto the shoulder, causing potential dangerous sway. Do not overcrowd or cross the center line.

All sharp turns should be taken at low speeds. Professional drivers, when rounding turns, slow down well in advance of the turn, entering it at reduced speed, and then accelerate smoothly as they come out again into the straightaway.

Steep or Long Grades

Down shifting into a lower gear or range in advance assists braking on descents and adds power on the climb. Avoid situations that require excessive and prolonged use of the brakes. Apply and release brakes at short intervals to give them a chance to cool.

Slippery Pavement

On slippery and icy pavement, reduce speed and drive slowly. Hydroplaning can occur with little water on the pavement. If skidding begins, remove your foot from the throttle and gently apply the trailer brakes only.

Freeways and Highways

Try to pick the lane in which you want to move and stay in it, preferably keeping to the slower lane on the right.

Turning Corners

Here is where you find a first basic difference when towing. The trailer wheels do not follow the path of your tow vehicle's wheels. The trailer will make a closer turn than the tow vehicle. Compensate by pulling further into the intersection so that the trailer will clear the curb or clear any parked vehicles along the road. Left turns require a wider than normal swing into the new lane of traffic to keep the trailer from edging into the opposing lane. Use the turn signals early to communicate to traffic behind and slow down well in advance.

Mud and Sand

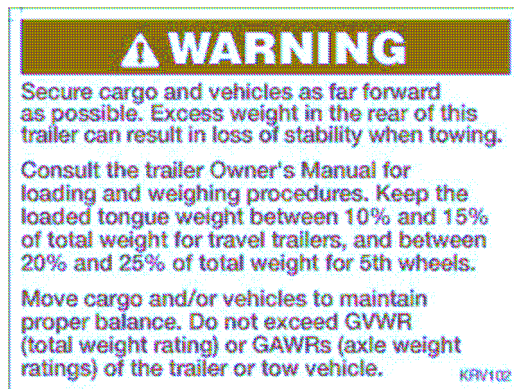
Let the momentum of the tow vehicle and trailer carry you through. Apply power gently and stay in the tracks of the previous vehicle. If stuck, tow the trailer and tow vehicle out together without unhitching.

Parking

Whenever possible avoid parking on a grade with a recreational vehicle in tow. If it is necessary, turn the front wheels of your tow vehicle into the curb and set the parking brake. For added safety, place wheel chocks under the trailer wheels on the down roadside.



Due to slower speeds, cars can become trapped behind you on a two-lane road. It is courteous and practical to signal and pull onto the shoulder when possible allowing them to pass. This reduces passing hazards and saves tempers.



Cargo Ramp Trailer Weight Distribution

All loaded trailers must remain within GVWR and GAWR limits. Proper load distribution is especially important for ramp/cargo trailers. These trailers are designed to carry a variety of cargo and/or vehicles in the cargo storage area. These cargo items are typically heavy and you must consider how they are loaded. Incorrectly loaded trailers can have too little weight resting on the hitch or pin and can become unstable when towing. Therefore, you must maintain a hitch weight percentage of 10-15% for travel trailers. Keep 60% of the cargo weight forward of the axle(s) center line.



Cargo/Ramp Trailer Loading

The rear cargo door/loading ramp gives you complete access to the trailer cargo area. When lowered, the loading ramp allows you to easily load rolling cargo, bicycles, small motorcycles and ATVs, and small vehicles. This section outlines the safety precautions you should take when loading and unloading cargo and vehicles, as well as loading/unloading procedures, techniques and tips.

Cargo/Ramp Trailer Loading Safety

The loading ramp/door area of your trailer can be a very hazardous part of your recreational activities. Many combinations of hazards and a large volume of activities occur in this area. Some of these hazards are:

- **ramps and inclines**
- **overhead obstructions**
- **dissimilar surfaces that are often wet and slippery**
- **poor lighting during night or early morning activities**
- **other vehicular traffic**
- **pedestrians**
- **restricted views**
- **awkward, heavy or unbalanced loads**
- **sheer drops**
- **trailer creep**
- **congested staging areas**
- **accumulations of empty containers and debris**

These are all hazards which can all be present at the same time within a very confined area. You need to be aware of these potential hazards when loading, unloading and rigging your cargo. Your continuous attention to safety measure will help prevent accidents and possibly serious injuries and property damage.

The biggest reason to put a priority on loading safety is not so much related to the frequency of accidents as it is to the potential severity of injuries that can occur in these types of accidents. These kinds of injuries sustained when a load tips over or falls from the ramp (s) or falls out of the trailer, or those that occur if the load shifts unexpectedly during travel tend to be very serious and sometimes fatal. You can prevent these types of accidents by paying attention to what you are doing and thinking through the consequences of poor loading.

Poor hazard assessment decisions are directly responsible for many accidents. You can help minimize these risks, avoid hazards, and enjoy your recreational activities safely by using an effective decision-making strategy:

Look around you and your situation. Get a good idea of what's going on around you before you act.

Identify hazards or specific problems in your path. Equipment, materials, debris, other vehicles, children, pets, or any number of other things may be in your way when you load or unload cargo or vehicles.

Predict what may happen and think of the consequences of your actions. If you are loading / unloading alone, are you physically capable of handling the load safely and keeping it under control? Ask yourself what would happen if your load falls over, slips off the ramp or falls out of the trailer. If you are unable to control your cargo, what will happen to it, you, and any other people, equipment, or materials if/when it becomes uncontrollable? If you tie down your load, what will happen if a tie down comes loose? What will happen if all tie downs come loose? What will you do if someone else does something dangerous during your loading/unloading?

Decide what to do based on your abilities and the capabilities of your equipment. Always use proper lifting techniques, and personal protection equipment as necessary such as gloves, helmets, kneepads and other protective clothing. Be sure your cargo does not exceed the capacity of your loading ramp and the trailer.



Secure cargo and vehicles as far forward as possible. Excess weight in the rear of trailers can result in loss of stability when towing.

Here are some general safety rules about loading and unloading your cargo trailer. Other safety items will be covered throughout this section.

Always consider the equipment you are loading. After use, it may be hot, wet, slippery, dirty, or in some other condition that may be potentially hazardous.

In all situations, follow the loading and weight guidelines in the "Loading and Weighing" chapter of this Owner's Guide. Never exceed the GAWR and GVWR ratings of either your trailer or your tow vehicle.

Connect to the tow vehicle and use wheel chocks in addition to the forward loading gear/jack of spotted trailers when loading and unloading to prevent potential forward or backward movement when loading or unloading.

Be sure the work/loading area is well lit. Avoid loading/unloading at night or in conditions of poor visibility.

Do not allow anyone who is not engaged in loading or unloading to be inside the trailer cargo area while loading/unloading.

Visually inspect the trailer before loading. A damaged spot in the floor can cause cargo to be unstable. Damaged or missing tie down rings will prevent you from securing your load properly.

Use caution tape, traffic cones or portable barricades to designate staging and loading areas in high activity situations where other vehicles and/or pedestrians are present.

Keep the loading area clean and free of clutter and debris. Clean up water and oil on the floor.

Designate areas at your campsite or activity area for storage of trash, tools, equipment, supplies and expendable containers such as food, beverage, oil and fuel containers.

Give special attention to large loads that may obstruct the view of the loading crew.

Wear boots that provide adequate ankle support and a slip resistant tread design, and hand protection when loading/unloading.

Always communicate with the person doing the loading. Know what the plan is and make sure you agree.

Maintain eye contact with other persons involved at all times during loading/unloading operations.

Slow down and pay attention; never hurry around loading/unloading operations.

Train everyone in your travel group on the hazards of loading and unloading.

Establish and enforce compliance to all safety procedures.

Your Loading Equipment

The loading equipment furnished with your trailer is the ramp door and the tie down attachment points in the cargo area floor. **The rated capacity of the ramp door is 1500 pounds. Each tie down D-ring attachment is rated at 800 pounds.** No tie down straps, cables, hooks, chains, wheel chocks, blocks, etc. are supplied with your trailer. Refer to your trailers cargo capacity rating to determine the maximum load capacity of the trailer.

Chocks and Blocks

Chocks and blocks prevent accidental or unintended movement of mobile equipment and cargo while you are loading, unloading, hitching, unhitching, or performing service or maintenance. Wheel *chocks* are wedge-shaped blocks placed in front of or behind the rear wheels of a trailer or tow vehicle to prevent the trailer from moving while the trailer is being loaded. "Trailer creep" occurs when the sideways and vertical forces exerted each time a load enters and exits the trailer cause the trailer to slowly move away from the loading area. The weight and speed of loading can affect trailer creep. The grade the trailer it parked on, the softness of the suspension, and whether the trailer has been dropped off or if it is still connected to the tow vehicle are also factors. Loading accidents can also occur when a driver prematurely pulls away while the trailer is still being loaded or unloaded.

Always hitch the trailer to the tow vehicle, and use wheel chocks or other vehicle-restraining devices when loading and unloading the trailer. Keep spare chocks on hand. They often get left behind or lost during outdoor activities. Chocking the wheels of a truck, trailer, or other piece of mobile equipment provides a physical stopper to the wheels to prevent runaways that can crush or injure people and damage equipment.

When chocking, use wheel chocks of the appropriate size and material to securely hold the vehicle. Don't use lumber, cinder blocks, rocks, or other make-shift items to chock. Make it easy to find and use the correct chocking equipment; store chocks inside the trailer or tow vehicle. Keep chocks available at places where you typically load and unload.

Use extra caution when loading from the ramp. If the trailer rolls away, you and the equipment you are loading can fall with severe injuries or death. Never load equipment from the ramp into the trailer until you ensure that the wheels are properly chocked. Ensure that the trailer floor is in good condition and that it can support the weight of the equipment you are loading.

Blocking stabilizes loaded cargo to prevent shifting and trailer overturns. If the load shifts while in motion, the sudden shift in position and center of gravity may cause towing instability possibly causing the trailer to overturn. Securely block all cargo, not just wheeled equipment and round or oddly shaped items. Block items separately and on all four sides using wood blocks thick enough to prevent cargo movement. Use tie downs and D-rings / carabiners strong enough to secure the load. Avoid using other cargo as a block.

Cargo Placement and Restraint

Cargo that is likely to roll (vehicles, tool chests, barrels, etc.) should be restrained by chocks, clocks, wedges, a cradle or other equivalent means to prevent rolling. Whatever you use to prevent rolling should not be able to be accidentally unfastened or loosened while the trailer is in motion.

Proper Use of Tie-downs

Avoid using tie-downs and securing devices with knots. Be sure to attach and secure each tie-down so that it can't come loose, unfastened, opened or released while the trailer is in motion. Also, use edge protection whenever a tie-down could be damaged or cut at the point where it touches an article of cargo.

Tie-down Minimum Working Load Limit

The working load limit of a tie-down, associated connector, or attachment mechanism is the lowest working load limit of any of its components (including any tensioner device), or the working load limit of the anchor points to which it is attached, whichever is less. When you choose tie-down hardware, choose items that are strong enough to hold the load you are

securing. The load limit of each tie-down used should be at least one-half the working load limit of each tie-down that goes from an anchor point on the trailer to an attachment point on an article of cargo. Check the tie-down manufacturer's specifications to determine working load limits.

NOTE: Tie-down hardware is not supplied with your trailer.

When an article of cargo is not blocked or positioned to prevent movement in the forward direction, the number of tie-downs needed depends on the length and weight of the articles. In all cases, use enough tie-downs to secure the cargo from moving in any direction. Heavy tool chests or cabinets may require tie-downs around the bottom, middle and top to secure them. Be sure to lock or secure drawers in these chests or cabinets so they can't open while traveling. Keep handle bars, mirrors, etc. away from the trailer interior walls. The walls can be damaged by contact with hard, sharp objects.

Cargo Loading Procedure



**The rear cargo door weighs approximately 100 pounds. It is designed for two-person operation.
The maximum cargo capacity of the rear cargo door/ramp is 1500 pounds.
The maximum capacity for each tie-down point in the cargo area is 800 pounds.**

Rear Door/ Loading Ramp Operation

1. Hitch the trailer to a tow vehicle before loading and unloading the rear cargo area.

Select a parking site where the edge of the rear door/loading ramp will rest entirely on a flat, level surface and the corners of the door will be supported. Avoid soft sand or mud surfaces. When the trailer is loaded, the added cargo weight may cause the trailer and/or tow vehicle to become struck.

2. Level and stabilize the trailer.
3. Unlock the rear door/landing ramp and carefully lower it to the ground.
4. If equipped with a power bunk, raise both bunks fully.
5. Move things out of the way of your cargo, whether you are loading, or unloading. Have an idea where your cargo will be positioned after your load/unload activities.
6. Use caution and proper lifting techniques when loading and unloading items from the cargo area.
7. Use extreme caution when loading/unloading ATVs, motorcycles, or other vehicles ("motorized cargo" or "vehicle (s)"). These machines are generally heavy, and may be hot from operation and/or covered with dirt, oil, or other substances that may make them slippery.
8. Make certain that the door seals and hinge area are free of any debris, such as sand or snow before closing the rear door/loading ramp.
9. Inspect the hinges, assist springs, and latch mechanism before each trip for signs of wear or damage, and make any needed repairs for safe operation and towing.

Loading and Unloading Motorized Cargo



Any motorized vehicle or any motorized equipment powered with flammable liquid can cause fire explosion, or asphyxiation if stored or transported within the recreational vehicle. To reduce the risk of fire, explosion, or asphyxiation:

- **Passengers shall not ride in the vehicle storage area at any time**
- **Occupants shall not sleep in the vehicle storage area while vehicles are present**
- **Doors and windows in walls of separation (if installed) shall be closed while the vehicles are present.**
- **Fuel shall be run out of engines of stored vehicles after shutting off fuel at the tank.**

- Motor fuel shall not be stored or transported inside this vehicle.
- The vehicle storage area shall be ventilated.
- Gas appliances, pilot lights, or electrical equipment shall not be operated when motorized vehicles or motorized equipment are inside vehicle.
- **FAILURE TO COMPLY COULD RESULT IN AN INCREASED RISK OF FIRE, EXPLOSION, ASPHYXIATION, DEATH OR SERIOUS INJURY.**



It is not safe for persons or pets to occupy the vehicle storage area while vehicles are present. Failure to follow these important precautions may result in serious injury or death.

Many recreation ATV or motorcycle accidents and injuries happen while loading or unloading. Steep inclines, unstable ramps, power and a short stopping area are what make loading motorized cargo difficult and unsafe. There is no absolute safe way to drive your motorized cargo into the trailer. Take the following steps to aid in reducing the risks associated with transporting, storing, or occupying the trailer. Take the following steps to reducing the risks associated with transporting, storing, or occupying the trailer with motorized equipment and vehicles:

- **Wear personal protective equipment while loading and unloading vehicles to/from the trailer. This includes but is not limited to, an approved motor vehicle helmet, leather boots, appropriate gloves, and eye protection.**
- **Never stand in the path of equipment when loading/unloading with the ramp, and keep bystanders away from the ramps.**
- **Keep body parts completely clear of the ramp door hinge pinch area at all times.**
- **Check parking brakes on the vehicle (s) you are loading/unloading, and on the tow vehicles.**
- **Inspect ramp and trailer floor/loading area for cracks, damage, oil or other debris that may cause slippage.**
- **Do not allow persons or pets to ride inside the vehicle storage area at any time.**
- **Close doors and windows in separation walls while the vehicles are present.**
- **Close tank fuel valves and operate the engine (s) to run fuel out of engine (s) of stored vehicles.**
- **Do not store or transport motor fuel anywhere inside the trailer.**
- **Ventilate the interior of the trailer to reduce the risk of fire, explosion, or asphyxiation.**
- **Do not operate gas appliances, pilot lights, or electrical equipment when motorized vehicles or motorized equipment are inside the trailer. FAILURE TO COMPLY COULD RESULT IN AN INCREASED RISK OF FIRE, EXPLOSION OR ASPHYXIATION.**
- **Load and store your equipment and motorized vehicles according to the “Loading and Weighing” chapter in this Owner’s Guide.**
- **During transit, secure motorized vehicles and motorized equipment so that items do not move while in transit.**
- **Remove carpet from section where fueled vehicles or motorized equipment will be stored.**



There is a hazard of serious personal injury when using a loading ramp. Never ride motorized cargo up a loading ramp.

Loading Technique – Ramp Positioning

The ramp angle from the trailer floor to the ground affects the risk when loading/unloading cargo. If the ramp angle is reduced, and all other conditions remain the same, risk is reduced. Always try to reduce the loading ramp angle – the shallower the ramp angle, the easier cargo loading will be. Position the trailer to take advantage of any terrain features that will help reduce the ramp angle. In all cases, be sure the ends of the ramp door can be fully supported.

Always position the loading ramp so the ends in contact with the ground are level or at the same height. An uneven ramp may cause the cargo to tip over sideways during loading/unloading.



Do not load motorized cargo (motorcycles, ATVs, etc.) by riding them up the ramp door. Loss of control could cause serious personal injury. Micro-Lite does not recommend loading motorized cargo under power.

Loading Under Power

Motorized cargo should be walked up the ramp. When preparing to load the vehicle into the trailer, the operator's hands should be positioned on the controls so as to keep the vehicle in control during loading.

1. Shift into lowest gear before ascending ramps.
2. Align wheels with ramps both loading and unloading.
3. Approach straight on, not on an angle. If you are off to one side and the ground is uneven where the ramp touches the ground, an unbalanced situation can occur.
4. The operator should apply throttle smoothly and climb the ramp at low speed. Too much or sudden increases in throttle will cause the vehicle to be harder to control and may cause the vehicle to impact the front of the trailer cargo area or overturn.
5. Stop when fully in the trailer. Keep handle bars, mirrors, etc. away from the trailer interior walls. The walls can be damaged by contact with hard, sharp objects.
6. After loading, close the fuel valve and run the engine until it stops (motorcycle and ATVs). Turn the ignition key off and remove it. Set the parking brake. For manual clutch machines, leave the machine in gear.
7. Secure the vehicle with tie downs. The attachment points you select on your equipment must be strong enough to support the weight of the equipment. Usually attachment points that are low and centered on the equipment frame will be good. An attachment to a decorative piece of chrome or plastic will usually not be a good tie-down point. Consider any leverage action that may occur. An attachment point past the center of the equipment could cause the equipment to either swing around or flip over, causing damage to the equipment, or personal injury. If you have any doubt about the attachment point you have selected, stop and find a better attachment point.



If the motorized cargo loses traction and spins sideways, it may slip sideways off the ramp, tipping sideways, and possibly falling on the rider causing injury.

Secure the Load

Install blocking devices in the front, back, and on both sides of the wheels to keep it from rolling. This block is strictly an additional safety precaution and does not reduce the need for strapping the vehicle in securely.

Use a minimum of three tie-downs to secure the vehicle to the trailer. Use one tie-down to secure the front of the vehicle to the trailer. Use two tie-downs to secure the rear of the vehicle to the trailer. Four tie-downs (one at each corner) are preferred.

Attach tie-down hooks to the vehicle's frame, not to an accessory such as a mirror, handle bar, pedal, etc. Hooks on the other end must be attached to vehicle cargo anchors installed in the trailer.

For transport, motorized cargo with manual transmissions should be left in first gear. Vehicles with automatic transmissions should be in the Park position. The vehicle's ignition key should be turned off and removed, the parking brake set, the run/stop switch in the stop (or off) position and the fuel lever turned to the off position.



Failure to properly secure cargo could cause property damage, injury, and/or death.

The Safest Way to Unload Your Motorized Cargo

The safest method of unloading is to push the vehicle down the ramp, carefully braking to ensure control of the vehicle. If you loaded your vehicle forward (front in) that means you will unload it in reverse. Driving a motorized vehicle backwards down a hill (the ramp) is not recommended. A slight turn of the handle or slip of a wheel can cause your vehicle to fall, tip or roll sideways. If you are on or in the vehicle you can be injured or killed. Unload the vehicle safely as follows:

1. Be sure the back tires of the vehicle are aligned with the ramp, and there are no people, pets or obstructions in the unloading area at the end of the ramp. Assure that the ground surface will support the vehicle, and that the vehicle cannot roll away uncontrolled.
2. Stand at the front of the vehicle.
3. Push the vehicle backward in line with the ramp.
4. As the rear tires start down the ramp let go of the vehicle and let it roll backwards (don't try and slow or control the vehicle as this can cause injury).



Portable fuel-burning equipment, including wood and charcoal grills and stoves, must not be used inside the recreational vehicle. The use of this equipment inside the recreational vehicle may cause fires or asphyxiation.



Do not store or use gasoline or other flammable vapors and liquids in the vicinity of any appliance.



Any motorized equipment powered with flammable liquid can cause fire and explosion or asphyxiation if stored or transported inside the trailer. To reduce the risk of fire, explosion or asphyxiation:

1. Do not allow passengers to ride inside the storage area at any time.
2. Prior to storing vehicles in the trailer, run fuel out of the engine after shutting off fuel at the vehicle fuel tank.
3. Do not store or transport any motor fuel inside the trailer.
4. Ventilate the interior of the trailer to reduce the risk of fire, explosion or asphyxiation. Open the ventilation panels on either side of the cargo area.
5. Do not operate propane appliances, pilot lights, or electrical equipment when motorized vehicles or motorized equipment are inside the trailer. Set the cargo electrical disconnect switch to OFF.



When refueling the tow vehicle, shut off all Propane appliances. Most Propane appliances are vented to the outside. Gasoline fumes could enter the appliance and ignite from the burner flame, causing an explosion or fire.

Travel-Trailer Leveling Procedures

1. Choose a site that is level as possible (Some sites are equipped with a prepared surface such as concrete or asphalt.) Ensure the ground is not soft and will support the weight of the trailer on the stabilizing jacks or other support devices.
2. Before uncoupling, level the trailer from side to side with suitable lengths of 2" x 6" wood blocks under the trailer wheels. Place the wood blocks on the ground forward of the wheels, and tow the trailer onto the blocks. Block the wheels to be sure the trailer cannot roll.
3. Put the foot pad on the hitch jack post, uncouple the trailer from the tow vehicle and level the trailer front to rear. It may be necessary to place a sturdy 2" x 6" wood block under the jack post foot pad to support the jack post on soft ground surfaces.
4. Check the level of the trailer with a carpenter's level both crosswise and lengthwise on the trailer floor.

5. After stabilizing the trailer, be sure the trailer frame is not twisted, buckled, or stressed. Check that all doors and windows operate freely and do not bind.
6. Before resuming travel, be sure all stabilizers are removed or fully retracted.

Stabilizing jacks are designed to level and stabilize your coach. Do not attempt to lift the unit to change a tire or for any other purpose.

Stabilizing Jacks

Although stabilizer jacks come in different types and sizes, all perform the same function: To stabilize the front and rear of all recreational vehicles while parked for camping. Always park the recreational vehicle on level ground and use tire chocks. It is extremely important to level the trailer front and rear using the tongue jack (travel-trailers) or landing gear (fifth-wheels). Using the crank for the particular stabilizer jack, lower the jack(s) on the lowest side of the trailer first and check the level. Adjust if necessary and then lower the other jack(s) to finish stabilizing the trailer.



After-market stabilizer stands must be placed only under chassis frame rails. Stabilizer jacks should not be placed at extreme corners of the frame. Locating stabilizers in these locations can cause slide-room damage if leveling blocks were to shift or settle. Do not attempt to level, raise or otherwise place all of the weight of the unit on the stabilizer jacks. Do not use stabilizer jacks for tire-changing.



When the trailer is unhooked from the tow vehicle, lower and check the stabilizing jacks before using the loading ramp. Failure to do so could cause the trailer to tip back as the load is shifted to the rear of the cargo area causing property damage, personal injury, and/or death. Hitch the trailer to a tow vehicle before loading and unloading the rear cargo area.

Chapter 4: Appliances and Equipment



IF YOU SMELL GAS

1. Extinguish the open flames, pilot lights and all smoking materials.
 2. Do not touch electrical switches.
 3. Shut off the gas supply at the container valve(s) or gas supply connection.
 4. Open doors and other ventilating openings.
 5. Leave the area until odor clears.
 6. Have the gas system checked and leakage source corrected before using again.
- FAILURE TO COMPLY COULD RESULT IN EXPLOSION RESULTING IN DEATH OR SERIOUS INJURY.**

What to do if you smell gas

Do not try to light any appliance.
Extinguish any open flames including cigarettes.
Do Not Touch Any Electric Switch.
Open windows and doors.
Exit trailer.
Shut off the gas supply at the gas container (bottle or source).
Immediately call a service center or gas supplier from an outside phone and follow their instructions.
Do not turn on the gas supply until the gas leaks have been repaired.

Refer to the individual manufacturer's owner's manual for operating instructions on the following equipment.



Never run the A/C without the filter. This could plug the unit evaporator cell, substantially effecting performance.

Air Conditioner (Optional)

Air conditioners are operated by an 110V AC power source through a separate circuit breaker. Keep in mind that typically RV electrical systems are designed to handle 30 amps and that the air conditioner takes a sizable portion of that when the compressor starts. Reduce other loads as much as possible when using air conditioning to reduce the chance of overload and possibly tripping the main breaker.

Capability vs. Environment

The capability of the air conditioner to maintain the desired inside temperature is directly effected by the heat gain of the RV. During extreme high outdoor temperatures, the heat gain of the vehicle may be reduced by:

1. Parking in a shaded area
2. Keeping blinds down or drapes shut
3. Keeping windows and doors shut and minimize usage
4. Operation on High Fan/Cooling mode will provide the maximum efficiency in high humidity or high temperatures
5. Using awnings to block direct sunlight exposure on the unit
6. Avoiding use of heat producing appliances
7. Giving the A/C a "head start" by turning the air conditioner on early in the morning

Care and Maintenance

Periodically remove the return air filter and wash with hot soapy water. During extended use situations, cleaning is recommended after two weeks of daily usage.

Antenna (TV)

The television antenna installed is designed for either color or black-and white television. If reception is poor, make sure the power supply switch is on and connections are tight. If the reception remains poor, check with your authorized dealer.

To Raise Antenna

1. Check location to ensure no obstacles will be encountered while raising the antenna.
2. Turn elevating crank (clockwise) in an "UP" direction about 13 turns or until resistance is felt.
3. Turn Power Supply switch to "ON" (If cable is being used the power supply switch needs to be set to "OFF".)



Do not raise TV antenna near overhead electrical wires as contact may cause injury or death.

Rotate for Best Picture

1. Make sure antenna is fully raised.
2. Pull down on lower ceiling plate with both hands until it disengages and will turn.
3. Slowly rotate clockwise or counterclockwise for best picture and sound.

To Lower Antenna

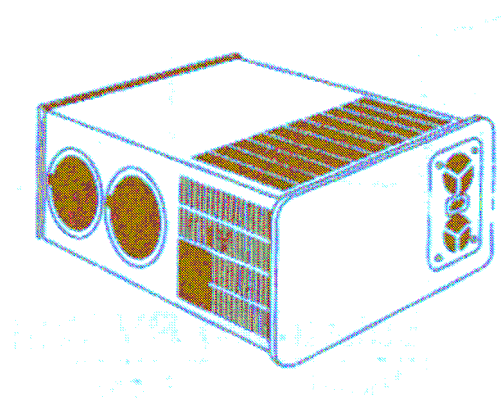
1. Rotate antenna until pointer on directional handle aligns with pointer on ceiling plate.
2. Turn elevating crank (counterclockwise) in "DOWN" direction about 13 turns or until resistance is felt. Antenna is now locked in travel position.

Furnace

The furnace installed is a Propane appliance. Carefully read the manufacturer's manual for complete operational and safety instructions, provided in the unit packet, prior to using the appliance.



Failure to read the furnace user's information manual and follow instructions could cause a fire or explosion, causing property damage, serious injuries or loss of life.



The furnace utilizes a sealed combustion system, which means the combustion chamber is completely sealed from the inner atmosphere of your vehicle. Combustion air is drawn from the outside and combustion products are expelled outside through a vent.

New furnaces sometimes emit smoke and an odor during the first 5 – 10 minutes of initial use due to paint burning off the heating chamber. Do not mistake this for a malfunctioning furnace. Opening the windows and door prior to first lighting will help vent any smoke or odor.

Operation - Heat Only Thermostat

To turn "ON": Set temperature to desired level.

To turn "OFF" set thermostat to lowest setting and follow instructions for furnace operation in the manufacturer's user's guide.

Microwave

Installed microwaves operate on 120V AC power only and are a popular for quick and convenient heating and cooking. Due to differing models used it is recommended that the Owner's Guide in the Unit Packet be read to for use on special features and operations.

Care and Maintenance

To clean exterior surface and the oven interior, use only mild, nonabrasive soaps or detergents applied with a soft sponge or cloth. Never operate the microwave when oven is empty.

Range / Cook-Top

Operation – Top Burners (Range or Cook-top)

Prior to Lighting

Assure the gas supply to the trailer is turned "on".

Open a window and / or vent for ventilation purposes.

Check for any hazards (flammable liquids, fabrics, objects near burners).

If gas smell is present, Do Not Light. -See "What to do if you smell gas"

Depress knob corresponding to burner to be lit and turn to "Lite" position.

Immediately Light Burner

Match-Light Models: Hold a long match or a hand held igniter, near the burner port. Make sure the hand held igniter is the type designed for open flame burners.

Piezo Ignition Models: Rotate the Piezo knob clockwise rapidly. This will produce a spark to ignite the gas.

After lighting adjust burner flame to needed level. If flame on burner goes out after initial lighting or during cooking, turn burner knob to off and wait 5 minutes before attempting to relight. Before attempting to relight check to make sure gas smell has disappeared. If odor still present after 5 minutes, DO NOT relight burners. See “What to do if you smell gas”.

To turn burner(s) off: turn the knob(s) to the “OFF” position.

The Range or Cook-top installed is a Propane appliance. Carefully read the manufacturer’s manual for complete operational and safety instructions, provided in the unit packet, prior to using the appliance.



All pilot lights, appliances and their igniters (see operating instructions) must be turned off before refueling of motor fuel tank and/or propane containers. Failure to comply could result in death or serious injury.



To ensure a supply of fresh air to occupants, open ventilators when fuel burning range, fuel burning carry-on appliance, and/or fuel burning lights are in operation. Cooking appliances should not be used for space heating purposes.

Care and Maintenance

Before cleaning make sure all knobs are in the “OFF” position and wait until all surfaces, including burners, are cool. Use warm soapy water only. Do not use oven cleaners, bleach or rust removers on the range/cook top surface. Wipe up any spills as soon as possible to avoid possible discoloration or pitting on the surface. Check burner ports when cleaning. If the ports or the orifice is clogged, carefully clean with a toothpick.



Never use wire brushes or any metallic item for cleaning range ports or orifice, as wire brushes or metallic items may shed, leading to a fire or explosion.



Never use the range or oven for extra comfort heating. Cooking appliances are not directly vented to the outside as are the furnace / air conditioning systems.

Refrigerator

The refrigerator installed is a LP gas appliance. Carefully read the manufacturer’s manual for complete operational and safety instructions, provided in the unit packed, prior to using the appliance.

Operation

The refrigerator operates on either 120V AC or LP Gas and has a gravity based cooling system. This system requires that the recreational vehicle be level for efficient operation. The cooling coils are sloped to allow continuous movement of the liquid chemicals and if the unit is not level for extended periods, the flow of these chemicals will slow and pool inside the tubing, resulting in a loss of cooling.

During towing, the leveling is not as crucial as the movement of the trailer will prevent the liquid inside the tubing from pooling. If needing to park for several hours, the trailer should be leveled if operating the refrigerator or the refrigerator needs to be turned off.

Placing a small bubble level inside of refrigerator will assist in determining if level for operational efficiency.

When starting the refrigerator for the first time or after extended storage, allow up to four hours for the cooling cycle to become fully operational.

Care and Maintenance

Exterior: Ventilation of the refrigerator is essential. Make sure the vents are clear of any obstructions such as bird/insect nests, spider webs, or any other debris. Periodically clean the coils on the back of the refrigerator with a soft bristled brush. At no time should any combustible materials, such as gasoline, flammable liquids or vapors be stored near the refrigerator.

Interior: When cleaning the interior lining of the refrigerator, use a weak solution of soda and warm water. Use only warm water, however, when cleaning the finned evaporator, ice trays and shelves. Never use harsh chemicals or abrasive cleaners to clean these parts or their protective coatings will be damaged.

Defrosting: When defrosting the refrigerator, shut off the power by turning the main power button to the off position. Remove any food and leave the drip tray under the finned evaporator. Remove light bulb or cover switch with a piece of tape. Leave the door(s) open and empty drip pan when necessary. Dry with a soft cloth when done.

ANY SERVICE TO THE REFRIDGERATOR MUST BE PERFORMED BY A QUALIFIED REPAIR TECHNICIAN.

Roof Vents

Manual and / or power roof vents are installed. Operate the roof vents when showering, bathing, washing dishes, or anytime hot water is used, as it allows moisture to escape. Ventilation is extremely important in reducing condensation formation.

Safety

Fire safety is important whether at home or in a recreational vehicle. The best way to limit fire risk is by prevention. Follow the manufacturers' instructions on the use of all appliances and observe all safety warnings and instructions included.

Before camping, make certain the locations of all safety equipment inside the coach and all emergency exit windows as well as doors. An escape plan for emergencies whether at home or camping is always a good idea.

Egress Windows

Egress or "Emergency Exit" Windows are labeled from the factory with the word EXIT. All Egress windows can be distinguished by red operational handles or levers. Dependent upon the window type, an egress window may be a large section or an entire window. Review the locations and operational instructions posted upon the window with all passengers.

Fire Extinguisher

Each recreational vehicle includes a fire extinguisher, which is located near the main entry door. The fire extinguishers are rated for Class B (gasoline, grease, and flammable liquids) and Class C (electrical) fires. Test and operate according to manufacturer instructions.

LP Detector

See the LP section of this manual.

Smoke Detector



Test smoke alarm operation after vehicle has been in storage, before each trip, and at least once per week during use. Failure to comply may result in serious injury.

For safety a smoke detector is installed in the living/ cooking area. Smoke detectors should be tested prior and during each camping trip, or weekly during the season. Most detectors are powered by a 9-Volt battery. Keeping fresh extra batteries on hand is a good idea.

Carbon Monoxide Detector



If the alarm sounds, provide ventilation by opening windows and doors. The CO build-up may dissipate before help arrives, but may be only temporarily solved. It is crucial that the source of the CO is determined and repaired.

A carbon monoxide (CO) detector is installed in your coach. For specific information regarding the specific operation or functions of the particular detector in your unit, consult the individual manufacturer's owner's manual.

Common sources of CO are malfunctioning or misuse of gas appliances, vehicle engines, generators, and many other fuel burning products.



Carbon monoxide can be fatal! When the device detects carbon monoxide in the air it will sound. Consult the individual detector's user manual for specific instructions and / or audible warning meanings.

Indications of CO poisoning are (but not limited to):

Mild Exposure

- Symptoms of the flu (minus a fever)
- Slight Headache
- Dizziness
- Fatigue

Medium Exposure

- Sever Throbbing Headache
- Drowsiness
- Confusion
- Fast Heart Rate

Extreme Exposure

- Unconsciousness
- Convulsions
- Cardio respiratory Failure
- Death



The CO alarm can only warn you in the presence of CO. It does not prevent CO from occurring nor can it solve an existing CO problem.

For your safety and to keep your carbon monoxide alarm in good working order, follow the steps below.

- Verify the unit alarm, lights and battery operation by pushing the "Test" button weekly
- Vacuum the CO alarm cover with a soft brush attachment once a month to remove accumulated dust
- Instruct children never to play with the CO alarm. Warn children of the dangers of carbon monoxide poisoning
- Never use detergents or solvents to clean the carbon monoxide alarm
- Avoid spraying paint, hair spray, air fresheners or other aerosols near the CO detector
- Do Not paint the CO detector. Paint will seal the vents and interfere with the sensor ability to detect CO
- Do not place near a diaper pail
- Test the alarm operation after your coach has been in storage, before each trip and at least once a week during the camping season



CARBON MONOXIDE GAS CAN KILL YOU. Fuel-burning devices such as ATVs or motorcycles that burn gasoline, diesel, or other fuels produce carbon monoxide when they are operating. Carbon monoxide gas is invisible, odorless, and colorless. Dangerous levels of carbon monoxide gas can accumulate in a trailer which cannot be detected by sight, smell, or taste. Even small quantities of carbon monoxide can cause carbon monoxide poisoning and suffocation, which will cause death, serious injury, or permanent disability. Exposure to high concentrations of carbon monoxide for even a few minutes will also cause death, serious injury, or permanent disability **DO NOT** start ATVs, motorcycles, or other fuel burning devices while they are located in your trailer.

Chapter 5: Electrical System

The trailer 12-volt system includes components that operate an electrical power from the tow vehicle engine alternator, a converter/charger, or the trailer battery (s). “House” electrical components such as the lights and water pump are supplied by the house battery bank. The house battery bank may consist of only one battery or several batteries connected together. The converter/charger charges the batteries when the trailer is connected to 120-volt (“shore”) power or when the generator (if equipped) is running. The tow vehicle engine alternator also charges the trailer battery while the tow vehicle engine is running. The tow vehicle engine alternator also charges the trailer battery while the tow vehicle engine is running and the 7-way cord is connected.

Power for the trailer exterior 12-volt DC system is provided by the tow vehicle through the 7-way power cord. This system powers the trailer running lights, brake lights, turn signals, backup lights (if equipped), and brakes. The 7-way power cord also provides a common ground and a 12-volt charge line from the tow vehicle alternator to charge the trailer batteries.

The trailer interior 12-volt DC system operates 12-volt motors, pumps, 12-volt appliances, interior lighting, landing gear, furnace, slide-outs, etc. The batteries also provide power to the breakaway switch to apply the trailer brakes in the trailer ever becomes uncoupled from the tow vehicle.

Power from the batteries, tow vehicle alternator and/or converter is routed to the main fuse panel. From the main fuse panel, power is supplied to the various circuits in the trailer. The circuits are listed on a label attached to the distribution panel door usually located below the refrigerator.



The 12-volt battery is not supplied with the trailer. You must purchase the battery separately.

Batteries

The batteries and charging system are the heart of the 12-volt DC system. When the trailer is not connected to shore power, or if the generator (if equipped) is not running, most power needs are supplied by the batteries. If the batteries are low, all sorts of problems can occur. It is very important to maintain the batteries in a full state of charge or monitor their charge state. The converter/charger system will help you manage your electrical requirements and charging needs. When the trailer is not connected to shore power or you are not running the generator (if equipped), be energy efficient. Turn off lights and appliances when they are not being used. Later in this chapter we'll discuss power management and give you some worksheets and charts to help you manage your 12-volt power needs.

Under low voltage, fuses and circuit breakers can blow without a short circuit condition. The refrigerator control system requires at least 10.5 volts and will shut down even with propane supplied, potentially ruining food in the refrigerator.

Never completely discharge the batteries, and maintain the electrolyte level in each battery cell at the proper level. Permanent damage may occur from using or charging a battery with a low electrolyte level. Add only *distilled water* to the proper level.

Low battery charge or bad batteries are the most common cause of poor performance of slide-out rooms, appliances and other components connected to the 12-volt DC electrical system. Low voltage can also cause the furnace fan to run too slowly to operate an internal switch controlling the furnace gas valve. This will shut the furnace down. Learn to conserve your battery

power. The power use chart at the end of this chapter can help you determine your power needs. To help insure that you don't have a battery failure, have your batteries checked and serviced regularly.

Avoid running down the batteries completely. The breakaway braking system depends on the 12-volt power from the trailer battery bank.

If the batteries become discharged quickly (high current use over a short period of time), a high amperage charge rate can be used to quickly recharge them. Disconnect batteries before high-amperage charging.



Make sure the area around the battery is well ventilated. Have someone within range of your voice or close enough to come to your aid when you work near a lead acid battery. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flood it with running cold water for at least twenty minutes and get immediate medical attention.

Battery Installation

The way that batteries are installed in your coach is critical. Improperly installed batteries create the potential for serious injury. Although Micro-Lite Trailer does not provide batteries, here are guidelines for their proper installation:

- Batteries should be installed in a protective “battery box” or tray. This reduces the possibility of accidental contact with the battery terminals and contains any leakage of battery acid.
- You can operate your trailer with either single or dual batteries. In either case, we recommend deep cycle batteries, typically **Group 24 or better**.
- Always install multiple 12-volt batteries in parallel or 6-volt in series/ parallel. Route cables carefully to avoid pinching the cables after installation. Pinching the cables may damage the cable insulation and lead to a short.
- Remove the batteries from the trailer before recharging them with an accessory battery charger.

Battery Monitor

The monitor panel provides an effective way to keep an eye on your battery bank. To check the battery charge, press the **CHARGE or BATTERY LEVEL** button. Indicators show the charge level in the batteries. Disconnect the shore power source when check the battery condition. If the batteries become drained over an extended period of time, a low charge rate over a long period of time works best to recharge them. The converter/charger will automatically charge the batteries at the proper rate when you are connected to shore power or running the generator (if equipped).



Do not install fuses with amperage ratings greater than that specified on the fuse panel or fuse holder label.

BATTERY HOOKUP

(+) POSITIVE TO BLACK WIRE

(-) NEGATIVE TO WHITE WIRE

Battery Disconnect

Some accessories or equipment in the trailer may draw small amounts of current even when turned OFF. A battery disconnect (or “load disconnect”) system allows you to disconnect the house batteries. Disconnecting the batteries will help reduce the possibility of battery discharge over long storage periods. The battery disconnect switch (optional on some models) may be either a rotary or push-pull type. Push-pull types will be located near the 12-volt fuse panel/converter, or near the battery in an exterior compartment. The rotary type will be mounted near the battery. If you expect to store the trailer for more than 10 days, turn the knob to **OPEN** or pull the switch knob out. Remember to close it when you take the trailer out of storage.

Battery Inspection and Care

Check the condition of the batteries at least monthly. Check the cracks in the cover and case. Check vent plugs and replace them if they are cracked or broken. Make sure the hold-down hardware is tight to prevent the batteries from shaking. Make sure the battery tray or compartment is clean and free of corrosion. Do not store anything in the compartment or tray which could cause a short circuit across the terminals of the batteries.

To clean the batteries:

1. Be sure the vent caps are installed and tight.
2. Wash the batteries with a diluted solution of baking soda and water to neutralize and acid present. Gently rinse the batteries with clean water.

NOTE: Foaming around the terminals or on top of the batteries is normal acid neutralization. Avoid getting the solution in the battery.

3. Dry the cables and terminals before reinstalling them
4. Clean the terminals and the cable ends with a brush
5. Reinstall the cables and use a plastic ignition protective spray to protect the terminals. Do not use grease on the terminal or cable bare metal. Grease is an insulator.

Batteries and Battery Charging

Most of the time you will use your trailer under three different conditions: dry camping, driving, or connected to shore power.

Dry Camping

You will be using power from the batteries to operate lights, fans and other DC components as listed on the power use charts. You will be discharging the batteries.



Keep the batteries fully charged at all times. Storing a discharged battery will shorten the life of the battery.



Never replace circuit breakers or fuses of higher current rating than those originally installed. This could overheat the wiring and start a fire.

While Driving

If your tow vehicle has been wired accordingly it will, under driving conditions, or with the tow vehicle's engine running, charge your trailer's battery.

Connected to Shore Power

When you are connected to shore power or when the generator (if equipped) is running, all batteries will be charged automatically by the converter/charger.

The 120-volt AC is the power input source to the converter/charger. The converter/charger changes the 120-volt AC power to 12-volt DC to operate the DC appliances and accessories in the trailer.

It is very important to understand that **the difference between a fully charged battery and a fully discharged one is only about 1 volt.** A fully charged battery at rest, in which no discharging or recharging has occurred for 24 hours, has a voltage of 12.63 volts (at 77 degrees F.). A completely discharged battery has a voltage of 11.82 volts. Don't be fooled by voltage readings -- **a battery that measures 12 volts is already 75% discharged.**

If you experience dead batteries:

1. Plug in to shore power if available, or start and run the generator (if equipped).
2. Reduce the loads on the batteries by turning off any lights, fans, or other 12-volt DC powered equipment that is not absolutely necessary. Avoid turning off the refrigerator. You must reduce loads as much as possible for charging to take place. Run the generator while monitoring the battery charge status indicator on the monitor panel. Running the generator will supply AC current to the converter/charger system, thus charging the batteries.
3. Connect the 7-way cord to your tow vehicle and run the engine at high idle to increase charging current and reduce charging time. Keep loads reduced until batteries are fully charged. If your tow vehicle battery is dead or discharged, and the generator will not start, an external jumper battery or battery charger must be used to either start your tow vehicle engine or the generator. You may also connect to available shore power to operate the converter/charger system to charge the batteries.

Tips for Dead Batteries:

Dead batteries raise a lot of questions, and in most cases, are the result of owners misunderstanding their use, maintenance and capabilities.

- *Compartment, patio and bathroom lights left on are common causes of battery drain. If you are going to park the trailer for a period of time, plug in to shore power to insure the batteries are topped up prior to your next use. Check the batteries while the trailer is plugged in to make sure they are not overcharged or the electrolyte has not evaporated out. Battery failures caused by lack of water are not covered under the battery warranty.*
- *In most refrigerators there is a “humidity control” switch, usually just inside the door. Be sure it is off when you leave your trailer as this one function can draw down your battery quickly.*
- *Furnace and vent fans are one of the most common and significant power draws in your trailer. If you leave a furnace or vent fan on all night, your battery will be nearly completely drained by morning.*



Disconnect all electrical power, both 120-volt AC and 12-volt DC systems, before working on the electrical systems. Make sure all accessories are off so you don't cause a spark.

When checking or filling the electrolyte level in the batteries, do not allow battery electrolyte to contact skin, eyes, fabrics or painted surfaces. The electrolyte is a sulfuric acid solution, which could cause serious personal injury or damage to the trailer. Wear complete eye protection when working with batteries. Avoid touching your eyes while working near batteries.

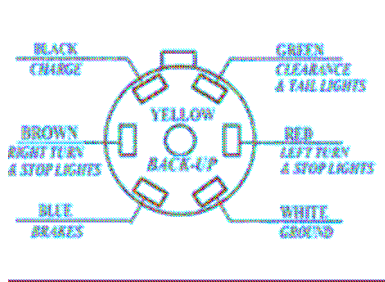
Do not smoke, have an open flame, or generate sparks near batteries that are being charged or that have recently been charged. Gases from the battery could explode.

When working around a battery, remove rings, metal watchbands, and other metal jewelry. Be careful when using tools. A short circuit across the battery terminals could cause injury, explosion or fire. Lead-acid batteries produce a short circuit high enough to weld metal to skin, causing a severe burn.

7-Way Power Cord

The power cord circuits are protected by automotive type auto-reset circuit breakers mounted on a panel either in a forward compartment or under the front of the trailer on the chassis frame rail.

Be careful to prevent damage to the 7-way cord. When hitching and unhitching, make sure the cord is out of the way and cannot be damaged by the hitch and/or pin box. Do not allow the cord to drag on the ground. When not in use, cover the cord connector to prevent moisture from entering the connector. Clean the contacts in the cord with a contact cleaner every six months.



Power Worksheets

The following chart illustrates various combinations of power service and converters. The maximum available power to your RV depends on both the electrical service you connect to and the output capability of the converter installed in your trailer.

NOTE: You do not have the total output current (amps) available when operating on 120-volt AC service. The service input current is also “converting” to DC and therefore not all current is available for the trailer AC circuits.

To find out how much power capacity your trailer has, select the type of service (30-amp or 50-amp) then locate the type of power converter and then match the system voltage. The amperage shown is the total amount of amps that you can use at a single time.

120-Volt Electrical System

The 120-volt AC system in your trailer is similar to that in your home. The system also charges the batteries through the converter/charger. 120-volt AC power is supplied to the load center from either the generator (if equipped) when “dry camping” or through the shore power cord when plugged into campground power.



The power cord prongs should always be clean and solid. Clean with a contact cleaner, emery cloth and or a nail file. Electrical connections work better when clean.



Exceeding the amperage rating of an adapter can cause low voltage which may cause damage to the appliances or other components. It may also cause the adapter or the shore cord to melt leading to fire which could cause property damage, personal injury or death!



Exceeding the amperage rating of an extension cord can cause low voltage which may damage appliances or other components. It may also cause the extension cord to melt leading to fire which could cause property damage, personal injury or death!

Load Center Circuit Breaker

Circuit breakers for the 120-volt system are usually located under the refrigerator either combined in the converter/charger or on a separate panel. The location may vary depending on model and floor plan.

AC current from the power source or the generator is routed to the main circuit breakers in the distribution panel. The current is then distributed to the other circuits through individual circuit breakers. The circuit breakers open the circuits if the rated current is exceeded. Never substitute a circuit breaker with a higher value than the original breaker installed.

Main Converter/Charger

Your trailer is supplied with a converter. The converter converts 120- volt AC current to 12-volt DC. It provides DC power to operate the DC electrical system and charge the batteries.

Power is supplied whenever the trailer is connected to shore power or the generator is running. Some converters include a cooling fan that will come on when certain temperatures are reached. You may occasionally hear this fan running if outdoor temperatures are high or the DC load is high

Ground Fault Circuit Interrupter (GFCI)

The receptacles in the bathroom, galley and exterior are protected by the GFCI. This device provides ground fault protection from the potential electrical shock hazards of line to ground electric faults and electrical leakage shocks possible when using appliances in damp areas. The GFCI disconnects the circuit (and other outlets on the same circuit) whenever a ground fault is detected, limiting your exposure time to the shock hazard caused by current leakage to ground. The GFCI device does not prevent electric shock, nor does it protect a person who comes into contact with both “hot” and neutral sides of the circuit. It does not protect against electrical circuit overloads.

Test the GFCI breaker each month while operating on 120-volt AC power.

To test the GFCI:

1. Press the **TEST** button on the GFCI outlet. The **RESET** button should pop out indicating that the protected circuit has been disconnected.

2. If the **RESET** button does not pop out when the **TEST** button is pressed, ground fault protection on the protected circuit has been lost. Do not use the outlet or other outlets on the same circuit. Have the trailer electrical system checked by your dealer or a qualified electrician. Do not use the system until the problem has been corrected.
3. Press the **RESET** button to reset the GFCI and restore power to the protected circuit.

NOTICE

Always run off the main circuit breakers before plugging into the site receptacle. If the power conductors (“hot” legs) make contact before the neutral, unbalanced voltage can damage electronic devices connected to the electrical system.

Power “Shore” Cord

Your trailer is equipped with a heavy duty power cord to connect to an external 120-volt 30- or 50-amp (depending on model) rated AC service. The cord and plug are a molded, weatherproof assembly. The cord provides a correct ground connection to the site service. Do not alter or cut the cord in any way. Do not remove the ground pin from the plug, or defeat the ground circuit in the trailer. If you have to use an adapter to plug into an electrical service, make sure the ground is maintained through the adapter. Never use a two-conductor extension cord, or any cord that does not assure correct and adequate ground continuity. Never plug the 120-volt cord into an ungrounded receptacle.

Depending on model, the power cord is either wired permanently to the trailer electrical system, or is removable. Removable cords attach to the trailer inlet with a twist lock connector and locking ring. When attaching the cord to the trailer, be sure to align the pins correctly before locking the cord in place. The locking ring provides extra strain relief and a weather resistant seal. When connecting the cord to the service, push the plug straight into the receptacle until it seats completely.

Electrical Hookup

Before connecting to the electrical supply, check the supply rating. Be sure it is 110-volt to 125-volt single phase AC for 30 amp service or 2-phase 220 to 240-volt AC (two 110 to 120-volt legs) for 50-amp service.



Before plugging in the RV shore cord, turn off all electrical appliances so as not to start under a” load”, which could cause a breaker to open. Reverse this process before unplugging.

Connecting to Shore Power

Be sure the site power source breakers are OFF (both legs on 50-amp service).

1. If the site power source breakers are not accessible, turn OFF the main breakers inside the trailer.
2. Insert the plug of the cord into the site source receptacle, seating the connector squarely and completely.
3. Turn site source breakers ON.
4. Turn trailer main breakers ON.

To disconnect:

1. Turn trailer main breakers OFF.

OR

Turn site source breakers OFF.

2. Pull the plug end of the cord straight out of the source receptacle.
3. Coil and stow the shore power cord

Generator (If Equipped)

The generator will provide 120-volt AC power when shore power is not available. It can be controlled both at the generator and from the remote START/STOP controls located inside the trailer. **IMPORTANT: BE SURE TO READ AND UNDERSTAND THE GENERATOR OPERATOR’S MANUAL BEFORE OPERATING THE GENERATOR.** Observe all operating instructions and warnings as well as all recommended maintenance schedules and procedures.

Depending on model, the output of the generator is connected to the trailer AC electrical system either automatically through a transfer switch in the converter when the generator is started, or by plugging the shore cord into the generator outlet. In either case, power is routed through the load center main breakers.

Chapter 6: Propane System

Propane gas is used to operate the range, oven, furnace, water heater, and the refrigerator (when 120-volt AC power is unavailable). The gas is stored in portable DOT cylinders.

In its natural state, propane is colorless and odorless. An odorant is added to the gas at the refinery to give it a very distinct odor - similar to onions or garlic. You may smell this odor occasionally, especially after filling the tank. The filling process requires venting a small amount of gas, and sometimes high outdoor temperatures can cause expansion of the gas in the cylinder, and venting of the excess pressure through the safety valve. Another reason, and probably the most common, is that the odorant tends to settle near the bottom of the cylinder and as the cylinder get closer to empty, the concentrated odorant becomes more obvious.

Any time you smell gas, you should investigate the cause. It is possible that you may not be sensitive to the odorant used, and therefore would not notice the smell of gas. That is why it is very important that you pay attention to the propane leak detector installed in your trailer. **If the leak detector sounds, or if you smell gas:**

1. **Extinguish any open flames, pilot lights, and all smoking materials.**
2. **Do not touch electrical switches.**
3. **Shut off the gas supply at the cylinder valves.**
4. **Open doors and other ventilation openings.**
5. **Evacuate the trailer of all occupants.**
6. **Have the gas system checked at the leak source corrected before using the system again.**

Propane Safety Precautions

Propane is highly flammable and is potentially explosive if not handled properly. It is not poisonous, but can cause drowsiness and may result in suffocation. If you maintain the system properly, you can expect nearly trouble-free operation. Always observe the following when handling and using propane:



Shut off gas supply before disconnecting appliance.



If a leak is detected, do not continue to use the propane system until the leak is repaired.

- **Do not obstruct access to the cylinders. Access to the cylinders is critical in an emergency.**
- **Inspect the entire propane system for leaks or damaged parts before each trip and before filling the cylinders.**
- **Never check for leaks with an open flame. Use an approved leak detection solution or a non-ammoniated, non chlorinated soap solution only. If the leak cannot be located, take the trailer to a propane service facility.**
- **Do not attempt to fill the propane cylinders yourself. Filling should be done only by qualified personnel using the required special tools and fittings.**
- **When filling the propane cylinders, use extreme caution and make sure others do also. Keep any flame, spark or anything that might produce a spark at least 25 feet from the filling operation. DO NOT SMOKE.**
- **Observe the warning label located near the propane cylinders. The label reads "DO NOT FILL CONTAINER (S) TO MORE THAN 80 PERCENT OF CAPACITY."**
- **Alterations, even as simple as mounting a plaque, can cause an unseen propane, water or electrical line to be damaged. Any nailing, screwing, drilling, or similar operation on or in the trailer could be hazardous. Always be careful when drilling holes or fastening objects to the trailer.**
- **Turn off the main propane valve, pilot lights, appliances, and their igniters when filling the propane cylinders and/or tow vehicle fuel tank.**
- **Burning propane consumes oxygen in your trailer. Keep you trailer properly ventilated at all times, especially when the oven or stove is in use.**

- Do not place or store propane tanks or cylinders, gasoline or other flammable liquids inside the trailer (Standard models only. Carrying these items in cargo hauler models is permitted.)
- Do not use any other propane container other than the ones furnished with your trailer without being sure that all connecting components are compatible, and that it meets all applicable regulations and codes.
- Do not use cooking appliances for comfort heating.
- Before opening the main propane valve, be sure that all inside valves and burners are closed.
- Make sure all appliances, plumbing and outside vents are open and free from obstructions such as ice and snow. Make sure the breather vent on the propane regulator is clean and clear of obstructions.
- Make sure the regulator vent is facing downward.
- Portable fuel-burning equipment, including wood and charcoal grills and stoves, should not be used inside the trailer. The use of this equipment inside the trailer may cause fires or asphyxiation.
- Do not use a wrench or pliers to close the main shut-off valve. This valve is designed to be closed leak tight by hand. If a tool is required to stop a leak, the valve probably needs repair or replacement.
- If you do not have the special tools and training necessary, do not attempt to repair or modify propane system components.
- Annual maintenance on the propane system, appliances, and equipment should be done only by an authorized dealer or repair facility.
- Insects can build nests in the burners of the various appliances and equipment. The burners and orifices of the propane gas appliances and equipment should be cleaned out by an authorized dealer or repair facility whenever necessary, but no less frequently than each year.
- Always think safety.



This system is designed for use with propane only. Do not connect natural gas to this system.

Before turning on propane:

(A) Be certain appliances are certified for propane and are equipped with correct burner orifices. (B) Make certain all propane connections are tight by testing with soapy water, all appliance valves are turned off, and any unconnected outlets are capped.

After turning on propane:

(A) Light all pilots. (B) All connections, including those at the appliances, regulators, and cylinders, should be leak tested periodically with soapy water by the occupant. Never use a lighted match or other flame when checking for leaks. (C) Do not leave system turned on or containers connected until the system has been proven to be free of any leaks. (D) Cooking appliances should not be used for space heating. (E) When the containers are disconnected, the propane supply line should be capped or plugged.

Propane System Components

The propane system consists of the propane cylinders with overfill protection devices (OPD), the automatic change over regulator, hoses, and associated pipe and tubing. All components meet UL or CSA requirements. The system has been tested and approved for use in your trailer, and has been performance tested at both the factory and the dealership. You should check the system for leaks periodically. Twice a year, or after a long storage period, the system should be checked by a qualified propane service facility. Check hoses for signs of deterioration every time you have the propane cylinders filled or serviced. Be sure any replacements meet original performance specifications. See the “*Care and Maintenance*” chapter for details on leak testing and system service. A gas leak detector is installed in your trailer that will detect the presence of propane and sound an alarm. The regulator reduces the pressure of the gas from the cylinders to a safe, even level for use by the appliances. The regulator is adjusted for the proper pressure and is rechecked by your dealer. Do not adjust the regulator. If necessary, have the regulator checked and adjusted by an authorized propane service facility.

The automatic changeover features allows an uninterrupted flow of gas to the system as long as both cylinders’ main valves are open. The arrow on the changeover lever points to the supply cylinder. When the supply cylinder becomes empty, the control will automatically begin to draw gas from the reserve cylinder. An indicator on the changeover will show red. By turning the arrow on the changeover lever to the reserve cylinder, the red indicator will disappear as long as there is gas in the reserve cylinder.

Filling the Propane Tanks

Your trailer is equipped with one propane cylinder.

The propane system is equipped with a Type I cylinder connector. This connector makes them easy to connect and disconnect.

The Type I connection system uses the excess flow pigtail hose, distinguished by the large nylon swivel nut. The swivel nut attaches to the outside of the cylinder valve with right hand threads.

Tighten the swivel nut by hand. DO NOT use tools.

The safety features of this system prevent gas from flowing unless the connection is tight and will limit excessive gas flow. In cases of extreme heat, 240 degrees to 300 degrees Fahrenheit, at the connection, the connection to the cylinder will be shut down.

1. Before removing an empty cylinder for refilling, close the main valve on the empty cylinder - hand tighten only. Rotate the changeover lever on the regulator so that it points to the full cylinder.
2. Loosen the hand nut attaching the flexible hose to the cylinder.
3. Loosen the wing nut holding the retaining bracket for each cylinder. Remove the empty cylinder. Install the plastic plug in the cylinder port.
4. Have the empty cylinder filled at a safe distance from the trailer.

Caution the fill station attendant not to overfill the cylinder. All DOT propane cylinders have over fill protection devices (OPD) which will prevent overfilling.



Do not fill LP-Gas container(s) to more than 80 percent of capacity. Failure to comply could result in a fire or personal injury.



This gas piping system is designed for use with LP-Gas only. Do not connect natural gas to this system. Secure cap inlet when connected for use. After turning on gas, except after normal cylinder replacement, test has piping connections to appliances for leakage with soapy water or bubble solution. Do not use products that contain ammonia or chlorine.

Follow the instructions and warnings noted in the appliance and equipment owner's manuals as well as the ones listed here.



DO NOT attempt to adjust or repair regulator. Adjustments and repairs require specialized training and tools. Contact a qualified LP Service Technician. Failure to follow these instructions could result in a fire, explosion and / or injuries, including loss of life.

5. Place the refilled cylinder back on the trailer. Secure the cylinder with the retaining bracket and wing nut.
6. Remove the plastic plug and connect the flexible hose to the cylinder. Tighten the hand nut securely but not over tight.
7. Slowly open the main valve on the cylinder. Do not "snap" open the valve. The sudden pressure surge can damage the regulator diaphragm components. Test the connection for leaks with propane leak detector solution or a soapy solution that *does not contain ammonia or chlorine.*



The supply cylinder is not completely empty until the red indicator is fully visible in the indicator window. There will still be pressure in the empty cylinder.



With a cylinder removed, the hose from the regulator must be capped. Gas will escape to the atmosphere through the open connection if pressure in the supply cylinder drops to 5 psig (red indicator flag visible). If the changeover lever is turned to the disconnected side gas will escape.

Take empty propane cylinder to a propane gas supplier or service station which sells propane. Do not attempt to fill the cylinders yourself. The cylinders can legally be filled to 80% of each cylinder's total capacity. Filling a cylinder to 80% allows for 20% vapor and expansion space. A built-in safety feature indicates when the cylinder has been filled to the 80% level. Overfilling propane cylinders can result in uncontrolled gas flow which can cause fire or explosion. A properly filled cylinder will contain 80% of its volume as liquid propane.



The propane gas system in your trailer is designed for propane gas only. Do not connect natural gas to this system.

A simple way to determine the level of liquid in a propane cylinder is to slowly pour a pot of hot water down the side of the cylinder, warming a path from top to bottom. Wait 10 seconds. Now run your hand down the path warmed by the water until you feel a cold line - this indicates the liquid level. Be sure to wipe the cylinder dry to prevent rust spots. If the cylinder is to be put in storage for a length of time or is empty, close the main valve on the cylinder and install the plug in the cylinder port. This will minimize entry of moisture in the regulator or cylinder. Moisture can cause freezing damage in the regulator.



The propane regulator must always be installed with the diaphragm vent facing downward. Regulators that are not in compartments have been equipped with a protective cover. Make sure that the regulator vent faces downward and that the cover is kept in place to minimize vent blockage, which could result in excessive gas pressure causing fire and explosion. Open the tank main valve slowly. Opening the tank main valve quickly can be hard on the regulator diaphragm and result in leaks.

Using Propane In Low Temperatures

If you expect to use the system in cold temperatures, be sure to use a gas mixture that will not freeze up. Your local propane gas service facility can advise you on the best mixture of gas for your anticipated traveling needs. As long as the system components are kept above the vapor point of the gas, the system will function in low temperatures. Different gas blends are available, and you should contact your gas supplier for information on blends appropriate for your needs and the areas where you will be traveling.

Propane systems can freeze up during extremely cold weather. Although properly blended gas does not freeze, moisture or water vapor in the system or absorbed by the gas can freeze and partially or totally block the flow of gas. You can help prevent propane system freeze up:

1. If you are unsure whether a cylinder is completely moisture-free, have your propane supplier inject a special, approved antifreeze or deicer into the cylinder.
2. Use the proper blend of gas for your traveling area. With the proper blend, freeze up is unlikely. If you do experience freeze up, have your propane service facility service the cylinders and regulator as required. **NEVER TRY TO RESTORE GAS FLOW WITH ANY OPEN FLAME DEVICE.**



When refueling the tow vehicle, shut off all Propane appliances. Most Propane appliances are vented to the outside. Gasoline fumes could enter the appliance and ignite from the burner flame, causing an explosion or fire.



Propane containers shall not be placed or stored inside the vehicle. Propane containers are equipped with safety devices that relieve excess pressure by discharging gas to the atmosphere.



Propane may be present in other areas before it can reach the detector's location. The detector only indicates the presence of Propane at the sensor. Never check for leaks with open flame. Use only a mild soap and water solution.



LP-powered appliances produce carbon monoxide. Carbon monoxide can be fatal! When the device detects carbon monoxide in the air it will sound. Consult the individual detector's user manual for specific instructions and / or audible warning meanings.

Chapter 7: Plumbing System

Your trailer's fresh water system is a vital part of your traveling life while on the road.

Your trailer is equipped with a dual fresh water system. The demand fresh water system operates from the trailer's own self contained supply tank and water pump. A monitor panel indicates the water level in the fresh water tank. The "city water" hookup allows you to connect to a pressurized external system at a campground.

Fresh water for self-contained use is stored in a plastic tank located below the floor of the trailer. The tank is vented to allow proper and complete filling. This vent must remain open. The monitor panel level sensors are mounted in the tank, and a drain valve allows you to drain the tank. Always drain the tank before storing the trailer for long periods. When the trailer is in use, drain and clean the tank every month or so. The entire fresh water system should be sanitized before the first use, after a period of nonuse, or if the system becomes contaminated. Sanitation and routine tank maintenance are covered later in this manual.

The easiest way to keep the tank full of clean water is to start with a dedicated clean water hose and an inline filter system. These two items are not included with your trailer.

Non-toxic, FDA-approved drinking water hoses are inexpensive and yield no taste or no odor to the water. They are usually white in color with a light blue stripe. This helps identify the hose and reminds you to keep it separate from other hoses, especially any hose, fittings or other hardware you use for waste drainage. You should consider using a special FDA approved hose because many common garden hoses are made of reground rubber or other materials. As they age and the compounds break down, they can impart taste, odor and impurities to your fresh water supply.

TIP! If you screw the two ends of the fresh water hose together following each use, you will minimize the possibility that impurities will get into the hose while it is in a storage compartment.

These are two things to remember about your fresh water hose: *Never use it for anything except filling the freshwater tank or connecting to city water, and always store it away from all other assorted hoses and plumbing supplies. Second, if possible, nothing should go through that hose unless it goes through an inline filter first.*

NOTE: Before filling the water tank, be sure the water supply is "potable" that is, drinking quality. Not all water supplies may be drinking quality. Water quality and contamination issues are discussed later in this chapter. *The gravity water tank fill inlet is not designed or intended for fast tank filling under pressure.* The volume of air in the tank must be allowed to escape at the same rate the water is entering the tank. Sometimes filling too fast causes a back flow of water through the fill tube because the air in the system can't escape as fast as the water is coming in.

If you fill the tank too quickly, air can be trapped in the tank. This can cause the tank to bulge beyond its limits and possibly rupture. The excessive bulging can damage the trailer floor, surrounding cabinets, and chassis structure.

Fill the tank slowly, allowing the air inside to escape through the inlet vent. It takes a little more time, but slow filling will reduce the possibility of damaged tanks, damaged floors, and gushing water. **Structural damage from overfilling tanks is not covered under warranty. It is considered operator error.**

To fill the fresh water tank:

1. Remove the cap from the tank fill on the side of the trailer. (The tank fill may be behind a lockable door on some models.)
2. Connect one end of a potable water transfer hose to a water supply, turn on the supply and let the water run until it is clean and clear. Turn off the supply. Place the other end into the water inlet on the side of the trailer. Turn on the water supply and fill the tank until water flows out the tank vent on the side of the trailer.
3. Remove and store the hose.

Do NOT leave hose unattended during filling of potable water. Turn water OFF immediately when tank is full. Damage may result from either overfilling or leaving hose unattended. Rapid filling of the fresh water tank may cause inadequate venting or water to escape the tank when full. Excessive pressure in the tank may cause damage to the tank.

Connecting to City Water

The city water system is connected through a potable water hose to a hookup on the exterior wall of the trailer. Since campground water systems have varying pressures, a pressure regulator should be used to reduce the city water pressure to the trailer (see below).

To connect to the city water system:

1. Set the water pump switch to OFF.
2. Pull out the fresh water hose
3. Turn on the site water supply and allow clean water to flow for a few seconds or until the water is clean and clear. Turn off the site supply valve and connect the fresh water hose to the supply.
4. Turn on the site supply valve.

Pressure Regulators and Check Valves

Water pressure will frequently vary from location to location and too much pressure can damage your plumbing system and components. Always keep a water pressure regulator in the freshwater storage box and use it whenever you hook up to city/campground water. A number of reasonably priced, inline regulators are available. The majority of these regulators are set to limit the pressure to the RV to 45 psi. Adjustable regulators are also available that allow you to adjust the pressure and flow for your specific needs. A check valve built into the water pump prevents city water from flowing into the fresh water tank. A check valve is also located at the city water inlet to prevent water pressurized by the water pump flowing from the city water inlet.

Water Pump

The water pump is a demand type pump that runs when a pressure drop in the water lines is detected, such as when a faucet is closed and the pressure is restored. It is self-priming and can pump a constant rate of approximately 2.8 gallons per minute at approximately 40-45 psi. A switch for the water pump is located on the monitor panel, and an indicator light on the panel shows that the pump is operational. A transparent water strainer is installed on the supply side of the water pump. This strainer helps to filter out large particles, such as leaves, sand, etc., that might be in the fresh water supply. **It does not filter out bacteria or chemical pollutants in the water.** The strainer requires periodic cleaning.

To help speed priming after the fresh water tank has been emptied:

1. Fill the fresh water tank.
2. Turn on the water pump switch. Open all faucets, both hot and cold. Allow time for the water heater to fill. Turn off each faucet as the water flow becomes steady and free of air.
3. When the water heater tank is full and all air is expelled from the system, close all faucets. The water pump should stop running. The system is now ready for use.

Sanitizing the Fresh Water Tank and System

For RVers who consume water from their RV tanks, the most important fact to remember is that potable water doesn't stay potable for long. Even though you may be completely confident in your water supply, by the time city water reaches the tap, the chlorine level is already reduced. Air, heat and the sloshing of the water will quickly dissipate the remaining chlorine. Any micro-organisms that the chlorine had inhibited but not killed will not become active. This new growth of micro-organisms will render the water unpalatable and perhaps unpotable, producing slime and algae in the tank and lines.

To prevent this problem, you as an RV owner must maintain a safe system, treat the water that is stored in your holding tank and consider installing a water purification system.

How to Maintain Your System

There are two sanitation procedures that you need to learn and use. One can be considered a “shock” treatment for serious contamination and before you use the system for the first time, and the other is for routine maintenance to keep the system fresh during your normal travels. We’ll cover the “shock” treatment in the *Care and Maintenance* chapter. The Environmental Protection Agency (EPA) advocates a method called “super-chlorination/de-chlorination” to prevent bacterial growth while traveling. This method adds chlorine to the water in increased amounts to provide a minimum chlorine residual of 3.0ppm (parts per million) for a contact period of five minutes. Your tank will be full of water with a high concentration of chlorine. A granular activated carbon (GAC) filter can be used to remove the chlorine taste.

To super-chlorinate:

1. Connect your hose to your RV
2. Pour 1 teaspoon of chlorine bleach for every ten gallons of tank capacity into the opposite end of the hose, prior to connecting it to the filling source.
3. Connect the hose to your water supply and fill normally

Use chlorine every time you fill up with fresh water. This will also keep the filler hose sanitary and protect it from becoming contaminated. Use a chlorine test kit regularly to determine the residual chlorine level (3.0ppm recommended). Testing should not be done immediately after filling, wait until the water has been “standing” for at least six hours.

Between trips or every few months you should do routine tank sanitation to keep the tank and system fresh and odor-free.

NOTICE

Whenever you leave the trailer for a period of time, turn off the water pump and/or shut off the city water supply. A sudden leak in the water system will allow the water system to run and flood the trailer.

Turn off the water pump while traveling. A faucet may come open while traveling and all your fresh water could be pumped out. If you leave a sink drain plugged, the sink will overflow causing the interior of the trailer to be flooded.



Never let the water pump run while the fresh water tank is empty. Damage to the pump and / or a blown circuit may occur.

Routine tank sanitation:

1. Drain the water tank completely, then refill halfway with clean, fresh water.
2. Mix 1/6-cup of regular chlorine bleach (not fragrant) for every 15 gallons of tank capacity into a container filled with a gallon or two of clean water.
3. Pour this mixture into the water tank.
4. Top off the water tank with fresh water. Drive the trailer around the block a couple of times to mix the solution.
5. Pump about a quart of water through each faucet so that all the lines are filled with the water/bleach mixture from the tank.
6. Because the hot water tank holds around 6 gallons of water, run the hot water faucets until this much of the water/bleach solution has passed to ensure that the old water has been purged from the tank and replaced by the new solution.
7. Let the water stand in the system for three to six hours.
8. Drain the entire water system, hot water tank included.
9. To remove the bleach odor, mix a cup of baking soda with a gallon of water and pour into the fresh water tank.
10. Fill the tank completely and pump this solution through the water heater and the rest of the water lines as in step 5. Let this solution sit in the system for a few days to neutralize the odor.
11. Drain the entire system and refill with fresh, clean water.

Fresh Water Filter Systems

Many water filters are designed to remove sediment and particles from the water. Removing sediment and particles can help reduce the cloudiness of the water. You can also purchase filters that will help remove odors and improve the taste of the

water. Over time these filters will eventually become clogged with filtered sediment and must be replaced. When you notice reduced flow and decreased water pressure, it is time to replace the filter.

There are also filters that will reduce chemicals, bacteria, viruses, and various other organic impurities that can cause sickness. These filters are usually installed at the galley faucets or at a special filtered water faucet for drinking/cooking water only. If you will be traveling in places where the water supply is questionable, you might consider a filter system with these capabilities. Your dealer can advise you on specific filter systems for your needs.

Dealing with Water Contamination

Water contamination creates a challenge for RVers. Not only must RVers draw water from unfamiliar sources, they must deal with what can happen to the water once it's inside the holding tank and plumbing. You can reduce health risks by following a few common-sense precautions. You might also consider using water purification equipment.

At the Campground

Always connect to a water supply of known quality. If water is being delivered as potable, it has probably been tested. Many campgrounds operate from their own wells which should be tested and labeled as approved. Since you may not be able to determine when the water was last tested and since contamination can show up at any time, always be on guard.

In the Great Outdoors

Drinking from *any* non-treated source such as a lake, pond or cool mountain stream is risky. Although mountain water rushes over rocks, gravel and sand, most harmful contaminants are still in the water. There is also the possibility that you are downstream from a dead animal or even human waste.

Micro-organisms

The most formidable villains while on the road are microbes and cysts which includes bacteria, viruses, protozoa and fungi. Not all microbes are harmful to humans, but those that are can be serious. Among these are the viruses that cause infectious hepatitis and the protozoan or amoebic dysentery.

All of these contaminants can be present in any water supply that has been polluted by sewage. *This is the major reason why you should keep your fresh water hose and fittings away from any hardware or supplies you use for waste system chores.*

Giardiasis is caused by *giardia lamblia*. It infects the small intestines and causes symptoms that may include severe diarrhea, cramps, nausea, vomiting and fatigue. It has been considered the most common disease-causing intestinal parasite in the United States. It resists typical chlorination and filtration procedures, and thrives in a wide range of temperatures. Giardiasis hits hardest those water systems that draw their water from mountain streams.

Chemical Contaminants

The vast majority of chemical contaminants has no taste or smell and leaves the water appearing clear and clean. Even well water can't always be trusted. A common belief once was that if water came from the ground, it had to be safe.

Water contamination is a serious and complex problem. By taking a few precautionary measures, you can travel and enjoy the outdoors without risking illness. As said in the beginning, the simplest first line of defense is to **use only water you are reasonably certain is potable.**

Waste System

The waste water system in your trailer is made up of sinks, tub, shower, toilet, plumbing drain and vent lines. Waste water from the sinks and shower is contained in a "gray water" holding tank. Toilet waste is contained in a separate "black water" holding tank. The holding tanks make the system completely self-contained allowing you to dispose of waste at your convenience. In addition, there is a dump valve for each holding tank, the toilet, "P" traps at each sink and shower drain, and an indicator on the monitor panel for each tank. Each holding tank is vented through the roof to reduce the buildup of interior odors. A flexible sewer hose and several fittings are required to connect the holding tank outlet to the inlet of an approved waste water dump station or sewer system. The drain and waste plumbing is very similar to that used in your home. The plumbing is made of plastic, is durable and resistant to most chemicals.

Toilet

Your trailer is equipped with a marine/RV-type toilet. It operates from water supplied either by the fresh water tank or from an exterior water supply connected at the city water hook-up. (The water pump must be turned on when utilizing the water from the fresh water tank.) The toilet flushes directly into the black water tank. Most models have pedals or hand-operated levers that operate independently. One opens a water valve to fill the bowl; the other operates the valve in the bottom of the

bowl, permitting the contents to be flushed into the black holding tank. Complete instructions and care for the model installed are located in the separate component manual.

OPERATION

Depress the pedal about half-way to fill the toilet bowl prior to use. Depress the pedal completely to flush the contents into the holding tank. Refill the bowl about half-way after flushing, if desired. When flushing the toilet, make sure all contents are flushed out. If toilet tissue gets caught between the seal and the valve, the toilet may allow odors from the holding tank into the interior of the trailer.

Solid Build-Up

The most common problem associated with the waste system is solid build up. Use plenty of water when flushing the toilet, and keep the tank valves closed until ready to flush the system to reduce the risk of build up. Should you ever have a build up of solids, close the valves fill the tanks about 3/4-full with fresh water, drive a distance to agitate the solids and drain the tanks.

Use a holding tank deodorizing product is also highly recommended. Many deodorizing products are available from RV dealers or wherever camping supplies are sold.

Holding Tanks

The holding tanks provide maximum flexibility and convenience for complete self-contained operation. The tanks terminate at a three-inch drain fitting under the trailer. Each holding tank has a separate dump valve. The dump valve is a quick opening, knife-type, slide valve. Each waste tank is made of seamless molded plastic, and will not corrode. To insure proper operation of the toilet, dump valves, monitor, and holding tanks, *never* flush the following items down the toilet. See the “*Care & Maintenance*” chapter for more information on toilet and holding tank cleaning.

Facial and/or wet strength tissues, paper towels, sanitary products (including those labeled “flushable”)

Colored toilet paper. Use the inexpensive white toilet tissue as it dissolves easily. Biodegradable tissue is recommended and available at RV supply stores.

Detergents, bleach, lye, petroleum products or ammonia

Automotive antifreeze, alcohols, or acetones.

Grease or oil from cooking, table scraps or other solids that may cause clogging.

The water in the “P” traps also prevents odors from passing through the trailer interior. Evaporation, particularly in a little used shower can make the “P” trap ineffective and allow odors to back up into the trailer interior. Make sure there is water in the traps

NOTE: Do not open the holding tank dump valves unless properly connected to a sewer receptacle.

Use only potable antifreeze products, which are approved by the toilet and tank manufacturers, when winterizing the trailer. Whenever the waste system is not connected to a sewer receptacle, the dust cap should be kept on the drain connection to prevent dust and/or dirt from entering the connection and damaging the dump valves.

Dumping the Holding Tanks

During self-containment, the sewer line is securely capped to prevent leakage of waste material onto the ground or pavement. Do not pull the holding tank knife valves open when the protective cap is installed on the pipe. Always drain the tank into an acceptable sewer inlet or dump station.

Drain the holding tanks only when they are at least 3/4-full. If necessary, fill the tanks with water to 3/4-full. This provides sufficient liquid to allow complete flushing of waste material into the sewer line.

Whenever possible, drain the tanks before traveling. Waste water and sewage in the holding tanks reduce the carrying capacity of the trailer, and there’s no sense driving around with it.

During extended hookups, waste materials will build up in the tank and cause serious plugging if the tank valves are left open. Keep the valves closed until the tanks are 3/4- full, and then dump into the sewage system. When not connected to a sewage system, keep the protective cap in place on the drain line fitting.

To dump the holding tanks:

1. Turn the outlet cap counterclockwise to remove it.
2. Attach the sewer hose to the holding tank outlet by turning counterclockwise, locking the end levers over the termination end.
3. Place the other end of the sewer hose into an approved dump station inlet. Push it far enough into the opening to be secure. Adapters may be required between the line and the inlet. Arrange the hose so it slopes evenly to the sewer inlet. Avoid sharp bends.
4. Open the blank tank termination valve (the larger one) and drain. Grasp the valve handle firmly and slide the valve open with a quick, steady pull. Allow enough time for the tank to drain completely. Rinse and flush the tank through the toilet. When the tank is empty, push the valve handle back in to close the valve. Run enough water (up to five gallons) into the tank to cover the bottom. This will help to break up solids and reduce “pyramiding” of solid wastes.
5. To drain the gray water tank, open the gray tank termination valve (the smaller one) and drain. Drain the gray tank last to aid in flushing the outlets and hose. When the tank is empty, push the valve handle back into close the valve.
6. Disconnect sewer hose, reinstall termination cap on the outlet
7. Rinse out the sewer hose with fresh water and remove the sewer hose from the dump station.
8. Replace the sewer or dump station covers, and store the sewer hose and fittings.



Potable water only. Sanitize, flush and drain before using. See instruction manual. Failure to comply could result in death or serious injury.

NOTE: Prime the waste holding tank with an odor control chemical and one or two gallons of water at the start of each trip. Vehicle movement helps to liquefy solids for easier dumping.



DO NOT USE Automotive Anti- Freeze. Automotive Anti-Freeze is poisonous and not for use in potable water systems.



Please... Practice good housekeeping when draining wastes at a campsite or disposal station. Be a good RV citizen and leave the site in good order. Leave it the way you would like to find it. Above all, do not pollute.



Local or State regulations may prohibit highway travel unless the holding tank outlet is securely capped.



Holding tanks are enclosed sewer systems and as such must be drained into an approved dump station. Both black and gray water holding tanks must be drained and thoroughly rinsed regularly to prevent accumulation of harmful or toxic materials.



Do not use the fresh water hose you use for filling the fresh water tank or connecting to city water to rinse the sewer hose. Harmful or toxic materials could come into contact with the fresh water hose and could contaminate the fresh water supply, tank and plumbing system. Always use a separate hose for rinsing the sewer system components.

Holding Tank Care

The holding tanks are virtually trouble-free. The most common problem is also an unpleasant one --clogging. You can reduce the chance of clogging by remembering the following:

- Keep the black water tank knife valve closed. Fill the tank to at least 3/4- full before draining. Be sure to cover the tank bottom with water after draining.
- Use only toilet tissue formulated for use in septic tank or RV sewer systems.
- Use only cleaners that are approved for use in septic tank or RV sewer systems.
- Use a special holding tank deodorizer chemical approved for use in RV sewer systems. These chemicals aid the breakdown of solid wastes and make the system more pleasant to use.
- Do not put facial tissue, paper, automotive anti-freeze, household toilet cleaner or sanitary napkins in the holding tanks.
- Do not put anything solid in either tank that could scratch or puncture the tank.
- Keep both knife valves closed and locked, and the drain cap tightly in place when on the road.

If the drain system does get clogged:

- Use a hand-operated probe to loosen stubborn accumulations.
- Seriously clogged P-traps may require disassembly. Be careful not to over tighten when assembling.
- Do not use harsh household drain cleaners.
- Do not use motorized drain augers
- Sometimes the holding tank valve will get clogged. In this case, a hand-operated auger may be necessary. Be ready to close the valve quickly once the clog is cleared.

Chapter 9: Care and Maintenance

The instructions and recommendations located within this manual and the accompanying manufacturer's component literature should be read, as failure to perform necessary or preventative maintenance may limit or void all or part of a specific warranty.

Care and maintenance of the recreational vehicle is an important step in maintaining the safety, dependability and the appearance, both interior and exterior, of the unit. Keep good records of all maintenance performed as these may be necessary for warranty information or may assist in possible repairs needed.

Operational usage and climates may affect the frequency of maintenance needed on certain components. Preventative maintenance is important to the life and enjoyment of any recreational vehicle as many problems can be caught before they occur. Please do not hesitate to call your dealer with a question on the maintenance or care of any item.

The care and maintenance of appliances are discussed within the appliance chapter. Always refer to the manufacturers recommendations located within the separate component manuals provided with your trailer.

Exterior

Fiberglass / Gel Coat Finish

Care of the fiberglass finish is similar to caring for a new car. Any finish will deteriorate over time. Exposure to extreme sunlight, pollutants, and excessive moisture can cause dulling, fading and yellowing. Regular washing and periodic waxing will help maintain the glossy new look.

When washing, use a mild, automotive or RV wash solution, available at your dealer, being sure to rinse off any loose debris first. Avoid spraying water directly into the furnace and refrigerator vents. Waxing the Filon™ areas twice a year is

recommended. Wax with an automotive wax or polish developed for boats. Follow all directions by the wax manufacturer carefully and remember to wash and wax out of direct sunlight and when surfaces are cool.

Metal

The aluminum exterior has a baked on enamel finish. Washing frequently with an automotive or RV wash solution will help avoid staining from debris and soil build up. Always rinse unit with clear water prior to washing to remove any loose dirt. Waxing two to three times a year with a good automotive paste wax will help preserve the finish

DO'S and DON'TS

- Do Use Automotive / Marine grade non-abrasive waxes.
- Do Use Soft cloths to clean and wax
- Do be careful around graphics. Wax and wash with the graphic, not against it.
- Do not use products containing ammonia or caustic harsh cleaners as they may cause discoloration to the fiberglass surface. Do not use high-pressure washers, rotating brushes, such as in car washes, and power buffers. Use of these products can damage graphics and/ or paint finishes.
- Do not dry wipe surfaces
- Do not use rubbing compounds

ABS Plastic / Molded Parts

Some components of our products are constructed of strong ABS molded plastic. A mild solution of soap and water should be used when cleaning. When using any product, make sure the product is recommended for use on plastics. Avoid harsh abrasive cleaners, ammonia or citric-based products as discoloration may result. Carefully read the component manufacturer's manual for complete instructions and any applicable safety instructions, provided in the unit packet, prior to performing any maintenance.

Seals and Adhesives

The seals and adhesives used perform an important job, keeping out an RV enemy – water. Close inspection and routine maintenance are crucial to the longevity of the trailer. While many types are used, none have a pre-set lifetime, as exposure to the elements and regional variances of climate can accelerate any sealants deterioration. Therefore, every 90 days or change of season, inspection of all seals is recommended and a quick inspection prior to every trip will help reduce potential problems down the road.

When inspecting, check for cracks, voids, shrinkage, or any sign of deterioration. If any of these signs are noticed, have your dealer inspect and replace the sealant if necessary. It is important to use the same kind of sealant that was previously used.

Windows (Exterior)

As with seals, check the sealant around the windows at least once every 90 days or change of season. If any interior leaks are noticed, contact an authorized dealer immediately. To ensure window operation, adjust and lubricate latches and any moving parts annually. A light oil or powdered graphite can be used for lubrication. Periodically use a vacuum attachment to clean any debris out of the window weep holes, which are necessary to drain any condensation or moisture from hard driving rains that may collect.

Frame and Chassis

Frame and Bumper Over time, weather and climate such as rain, snow, salt, etc lead to corrosion. Rinse the undercarriage, wheel wells, hitch and bumper when needed to remove dirt, oil, tar, salt and other debris. Periodically inspect for rust. Near coastal regions, inspect more frequently. If needed, lightly sand and repaint with rustproof enamel.

Hitch Couplers

Inspect prior to each trip. The ball socket and clamp should be cleaned and lubricated monthly with wheel bearing grease. If coupler or coupler components appear damaged or worn, contact your dealer upon notice of the problem.

Safety Chains

Safety chains should be inspected monthly. If chains are damaged or weakened, replace immediately. Never tow without use of the safety chains. Carefully read the component manufacturer's manual and any safety instructions, prior to performing any maintenance

Jacks

• Tongue Jacks, Manual

Whenever preparing to travel, inspect the jack for any damage and test operation. If jack is difficult to operate, clean and oil lightly. If jack is still difficult to operate or freezes, call your dealer. Service on any jack should be performed by qualified service personnel only.

Prior to traveling, inspect the jack for any damage and test operation. Check connections at battery and keep contacts clean and secure. If the power jack malfunctions at any time, call a local dealer. Service on all power jacks should be performed by trained service personnel.

Tires and Wheels

The tires should be checked before starting out on any trip (See chapter 10: Tire Safety). Check them regularly and keep inflated to recommended pressures. The recommended tire pressure is on the side of the tire. A tire gauge is a very inexpensive and valuable tool for checking tire inflation. Rotate the tires at least once every 5,000 miles. You may want to have a spare tire with you in case of an emergency.



Do not tow the trailer with missing lug nuts or faulty lug bolts.



It is critical that the wheels be properly torqued every 50 miles during the first 200 miles of road operation. Although the wheels have been properly torqued before leaving the manufacturing plant, settling and wearing in of components during the first few miles of operation may cause some loosening of the wheel nuts. This occurs after the check for proper torque at 10, 25, and 50 miles, and wheel replacement.



Installation of wheels which are not compatible with the manufacturer installed axle assembly could result in wheel separation, which can lead to property damage, serious injuries or loss of life.



Loose wheel nuts can damage the stud and/or wheel. If driven in this condition for any extended period, severe wheel damage could occur affecting the handling of your trailer.



Do not attempt to repair or modify a damaged wheel. Even minor modifications can cause a dangerous failure of the wheel and result in personal injury or death.

All travel-trailers and fifth-wheels are equipped with tubeless tires. The average standard trailer tire is designed for 65 mph speeds, and is rated to carry the weight of the trailer plus your family's personal needs for an extended vacation. If you should require an adjustment on a fault or defective tire, secure the name of the nearest tire dealer or distributor and request an adjustment according to the conditions and terms of the tire warranty.

Tire Changing Basics

1. Position a hydraulic jack on the frame under the lip of the axle. (Never attempt to use a stabilizer jack to lift the unit)
2. Block the wheels on the opposite side from the tire you wish to change to prevent accidental movement.
3. Use emergency flares when near a road or highway
4. Place a hydraulic jack on a level surface under the lower lip of the axle.
5. Loosen the lug nuts
6. Raise the trailer until the tire clears the ground.
7. Remove the Lug Nuts and remove the tire.
8. Install the spare tire and install the lug nuts until the wheel is tight against the hub.
9. Lower the trailer.
10. Torque the lug nuts following the Wheel Nut Torque Procedure in this manual.
11. Recheck the torque every 10, 25, and 50 miles.

Wheel Nut Torque Requirements & Maintenance

Tools Required

Dial indicator or adjustable dial torque wrench

- 3/4" or 13/16" socket

DO NOT USE a 4-way socket or any other type of wrench, which does not measure the actual pressure applied to the wheel nut.

Please refer to the torque wrench manufacturer's instructions for information on correct use, storage and maintenance of your torque wrench.

Remember:

Check wheel nut torque before every trip.

Manufacturers recommend this maintenance procedure to ensure proper torque has been applied to wheel nuts before heading out on the road.

Always follow the appropriate tightening sequence ("star pattern") as indicated in these instructions or in your axle manufacturers' owner's manual to assure proper torque.

Torque wheel nuts in the correct stages and follow-up intervals after any wheel reinstallation. For further information on these steps, you may want to refer to the axle manufacturer's owner's manual provided with your trailer. Proper torque of wheel nuts can only be achieved by using a torque wrench and a socket.

Setting Torque Value on a Dial Indicator Wrench:

1. Make sure your indicator needle is set to "0".
2. As you apply clockwise pressure to the wheel nut, both needles will show the current amount of torque being applied.
3. When you reach your desired torque value, stop applying pressure and your indicator needle will stay at the highest torque value reached.

Setting Torque Value of Adjustable Dial Wrench:

1. Unlock the handle and set the dial to your desired torque value.
2. Lock the handle back in place.
3. As you apply clockwise pressure to the lug nut, you will hear and audible "click" when the desired torque wrench value is reached.

Do not apply further pressure once you hear the "click".

4. Torque lug nuts in the correct stages and follow-up intervals after any wheel reinstallation



WHEEL SEPARATION CAN OCCUR On first trip, torque wheel nuts at 10, 25 and 50 miles and every 50 miles during the first 200 miles thereafter, and before each trip. After winter storage, check wheel nut torque before beginning a trip. After excessive braking, check wheel nut torque.



Installation of wheels which are not compatible with the manufacturer installed axle assembly could result in wheel separation, which can lead to property damage, serious injuries or loss of life.



Some procedures require the use of special tools for safe and correct maintenance. Do not attempt to service, repair or work on any axle, brake, or wheel system unless you have appropriate skills and knowledge. Lack of proper training, failure to follow procedures or use special tools and safety equipment could result in property damage, serious injury or loss of life.

Torquing After Wheel Reinstallation

After removing a wheel from your RV for any reason, you must carefully follow a 2-step process:

1. Wheel Reinstallation
2. Follow-up

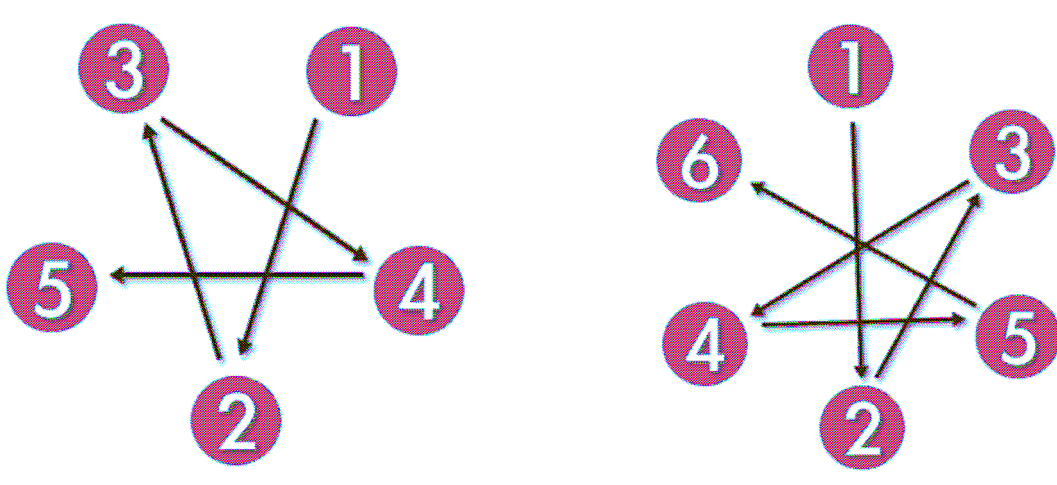
Wheel Reinstallation

When you reinstall a wheel, the wheel nut torque must be applied in 3 stages. This will ensure the wheel studs are centered in the wheel holes, and will help the wheel nuts maintain proper torque.

1. Start all wheel nuts by hand
2. Stage 1

Set your torque wrench to the 1st stage value³ on the **Wheel Nut Torque Table**.

Begin with the appropriate bolt for your wheel (12 o'clock position for 8 and 6 hole wheels and 2 o'clock position for 5 hole wheels) and apply torque to all wheel nuts following the star pattern as shown in the **Wheel Nut Torquing Sequence** illustration.



3. Stage 2

Increase your torque wrench setting to the 2nd Stage value on the **Wheel Nut Torque Table**.

Begin with the appropriate bolt for your wheel and apply torque to all wheel nuts following the star pattern. Following stage 2, the wheel can support the weight of the trailer and can be lowered off of the jack stands.

4. Stage 3

Increase your torque wrench setting to Final Torque value on the **Wheel Nut Torque Table**.

Begin with the appropriate bolt for your wheel and apply torque to all wheel nuts following the star pattern.

Step 2) Follow-Up: Re-torque after 10, 25, and 50 miles

1. After the first 10 miles of your trip, pull your recreation vehicle off the road into a safe work area.
2. Set your torque wrench to the Final Torque value on the Wheel Nut Torque Table for your wheels.
3. Begin with the appropriate bolt for your wheels and apply torque to all lug nuts following the star pattern.
4. Reapply torque (at the Final Torque value for your wheels) and repeat steps 1, 2, & 3 again at 25 miles and at 50 miles of your first trip.

5. The follow up process is complete and you should refer to the general lug nut torque maintenance process described in “Pre-Trip Torquing Procedure”.

TORQUE TO: 110-120 FT LBS.

Wheel Nut Torque Table

	Steel Wheel	Chrome-Plated Steel Wheel	Aluminum Wheel
1 st Stage	20-30 ft./lb	20-30 ft./lb.	35-40 ft./lb.
2 nd Stage	55-60 ft./lb.	55-60 ft./lb.	75-80 ft./lb.
3 rd Stage	90-95 ft./lb.	90-95 ft./lb	120 ft./lb



Never use the stabilizer jacks to raise the trailer.

Replacement Wheel Requirements

RV Manufacturers install axle systems with hubs and drums that are compatible with many wheels used in the recreational travel trailer industry that have similar or matching bolt patterns. If the original manufacturer-installed equipment must be replaced, contact the replacement wheel manufacturer to ensure compatibility prior to replacement and use.

Customers replacing original equipment must ensure the replacements are compatible with the hub and drum assembly installed.

This compatibility includes, but is not limited to:

- Diameter of the hub-mounting surface
- Stud length and diameter
- Location and number of studs - Many bolt circle dimensions are available. Some vary by so little that it might be possible to attach an improper wheel that does not match the axle hub. Be sure to match your wheel to the axle hub.
- Center hole diameter for the wheel
- Wheel mounting offset from the rim center
- Rated capacity of the wheel - Make sure that the wheels have enough load carrying capacity and pressure rating to match the rated load of the tire (s).
- Offset - This is the relationship of the center line of the tire to the hub face of the axle. Take care to match any replacement wheel with the same offset wheel as originally equipped. Failure to match offset can result in reducing the load carrying capacity of your axle.
- Wheel fastener torque
- Wheel nut size and shape (including cone angle)
- The effects of any added wheel accessories that could affect proper seating of the wheel to hub surface

Wheel Bearing Lubrication

Wheel bearings should be repacked every 6000 miles or every 6 months. Every time the wheel hub is removed, the wheel bearings must be adjusted. Turn the hub slowly to seat the bearings while tightening the spindle nut torque to 50 ft lbs. Loosen the spindle nut so it may be turned by hand. Tighten nut finger tight then loosen to first hub slot allowing alignment. Install cotter pin.

The spindle nut and hub should be free to move with the cotter pin being the only restraint.

Prepare bearings by cleaning with solvent to remove the old grease. Repack by pressing fresh bearing grease into bearing roller area. Repack bearings more often if subject to extremely wet conditions. If trailer has not been used for more than 2 months, the wheel bearings should be inspected and repacked if necessary.

Repack bearings using a high temperature, automotive type wheel bearing grease produced by a reputable manufacturer. The soap type should be polyurea, lithium complex or equivalent. Use a NLGI Grade 2 product with a minimum dropping point of 440F.



Some wheel assemblies require an extension. **DO NOT USE** a flexible extension. Also, **DO NOT USE** a 4-way socket or any other type of wrench, which does not measure the actual pressure applied to the lug nut.



If uncertain or unfamiliar with any procedure, please call your local dealer.



Do not mismatch wheels and tires.



WHEEL SEPARATION CAN OCCUR On the first trip, check for the proper torque every 10, 25 and 50 miles traveled in your coach. This procedure should also be repeated every time a wheel is replaced.



Always torque wheel nuts to the wheel manufacturer's specifications. Over or under-torqued wheel nuts can cause the wheel to separate from the wheel mounting surface during operation, causing property damage, personal injury or loss of life.



Do not paint or apply anti-seize or anti-rust materials to the hub mating surface of wheels. These materials prevent a secure metal-to-metal contact with the hub surface. Use of these materials may cause loosening of the wheel or wheel nuts, causing wheel the wheel to separate from the axle, and may lead to property damage, serious injury or death.

ULTRULUBE®

If the Recreational Vehicle is equipped with Ultrulube, there is no need to lift the RV prior to greasing axles. To grease follow these simple steps:

1. Remove the rubber plug from the grease cap
2. Insert grease gun on the grease zerk
3. Pump until new grease begins to appear
4. Replace rubber plug

Hubs and components still need to be inspected and maintained per the manufacturer's guidelines.

Carefully read the component manufacturer's manual and any safety instructions prior to performing any maintenance.

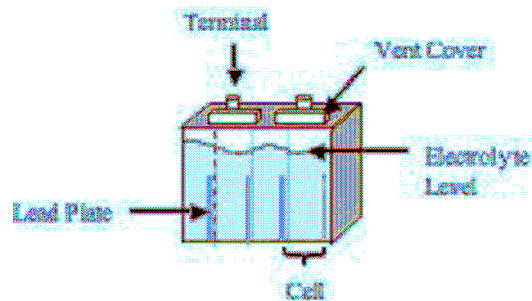
Brake Adjustment

The electric brakes are of the drum and two-shoe type and adjust the same as most automotive brakes. Adjust brakes after the first 200 miles.

Every 3 months or 3000 miles, test the brake drag and adjust if required. Full procedures are outlined in the component manufacturer's guide. Never adjust just one brake. When adjusting brakes on any vehicle, either replace or adjust all brakes at the same time, or at least both brakes on the same axle.

Battery

Before performing any maintenance on the battery, always disconnect the negative cable. To inspect the electrolyte level, remove the vent covers and visually ascertain the electrolyte level in each cell, using a small flashlight may help. (If a maintenance free battery has been purchased – no way exists to check these levels.) If the level needs to be replenished in any or all cells, carefully pour in distilled water only. Never use acid or tap water. Tap water contains minerals and chemical impurities that will permanently damage the battery. Besides maintaining the electrolyte level, visually inspect the battery for loose terminals, corrosion, or any damage to the vent covers or case. Tighten any loose clamps on the terminals of the battery and clean any corrosion off the terminals. An inexpensive device for cleaning these terminals can be purchased at automotive stores.



When working with batteries, be extremely careful. The acid in batteries is highly corrosive and flammable. Batteries produce a flammable hydrogen gas that will explode if ignited. Never place batteries in any compartment or near anything that could spark, even a 12 Volt switch. Never smoke or use open flames anywhere near the battery. Secure batteries in a battery box or in a compartment specially designed for battery storage. Wear safety glasses and appropriate clothing when performing any maintenance on a battery. In case of a spill or splash, immediately flush the affected area with cold water for 15 minutes and call the poison control center for further instructions.



When storing a battery, do not place the battery directly on concrete, as the battery will discharge more rapidly.



The acid in batteries is highly corrosive and hydrogen gas is produced which is extremely flammable. Avoid placing near a possible ignition source such as open flame or potential spark producing wiring.



Before performing any maintenance on the battery, always disconnect the battery, removing the negative (-) cable first and then disconnecting the positive (+).



Always disconnect the negative (-) cable prior to working near batteries to reduce risk of arcing and igniting.

Ceilings and Walls

Clean only with a mild detergent in warm water, using a damp cloth to clean the ceiling. Never use strong chemicals or excessive water / moisture, as either can damage the ceiling or walls.

Countertops

Most countertops are made of high-pressure plastic laminates and are highly resistant to normal spills and scuffs. Soap and lukewarm water or a mild, non-abrasive cleaner are recommended. Avoid use of abrasive pads and scouring powders, which can dull the surface and make it more stain-prone. Always use a chopping block or cutting board when using knives. Pots and pans straight from the burner or oven should be placed on lined hot pads and not directly on the counter surface.

Faucets and Fixtures

To protect the finishes on your kitchen and bath faucets and fixtures, use only a damp soft cloth or sponge. Do not use abrasive cleaners or materials as they can damage the finish.

Fabric and Upholstery

Do not laundry upholstery fabrics. Blot up stains promptly and use an upholstery cleaner or mild solvent, depending on the stain. Never soak the fabric and use as little water as possible. Blot rather than rub. Towel dry or have professionally cleaned. Upholstery can be vacuumed regularly using a soft brush attachment.

Sinks, Tubs and Toilets

Many of these products are made of stainless steel, acrylics, plastics or composite materials and use of non-abrasive cleaners is recommended to protect the finish. Use of harsh cleaning products can cause premature deterioration and/or yellowing of the surface finish.

Chapter 10: Tire Safety Information

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

Section 1, based in part on the National Highway Traffic Safety Administration's Brochure entitled "Tire Safety-Everything Rides on It," contains 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:

1. Cold inflation pressure
2. Vehicle Placard and location on the vehicle
3. Adverse safety consequences of under inflation (including tire failure)
4. 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:

1. Locating and understanding the load limit information, total load capacity, and cargo capacity.
2. 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.
3. Determining compatibility of tire and vehicle load capabilities.
4. Adverse safety consequences of overloading on handling and stopping on tires.

Section 2 contains "Steps for Determining Correct Load Limit"

Section 3 contains a Glossary of Tire Terminology, including "cold inflation pressure", "maximum inflation pressure", "recommended inflation pressure" and other non-technical terms.

SECTION I

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.

Safety First – Basic Tire Maintenance

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Under inflated tires and overloaded vehicles are major causes 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.

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).

[For TT] Both placards and certification labels are permanently attached to the trailer on the forward half of the left side, and are easily readable from outside the vehicle without moving any part of the vehicle. You can also find the recommended tire pressure and load limit for your vehicle in the vehicle owner's manual.



Keep the date and mileage when you check the wheel nut torque. Note any wheel nut that has lost torque. Investigate the reason (s) if the wheel nut torque is not maintained after more than one re-torquing. This indicates there is something wrong with the wheel nuts, nut studs, wheel and/or hubs and should be corrected.

If you ever experience a wheel separation incident, notify Micro-Lite Trailer and your dealer. Seek prompt professional assistance in assessing the trailer and its gear. Keep, but don't re-use the wheels, wheel nuts and studs involved. Don't repair or service the trailer yourself.

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.) Vehicle manufacturers 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.

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 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.

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 will need to 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).



Tire load ratings are dependent on tire inflation pressures. Under inflated tires can be damaged and result in a loss of inflation pressure.



There is a danger of serious injury or death if a tire of one bead diameter is installed on a rim or wheel of a different rim diameter. ALWAYS replace a tire with another tire of exactly the same bead diameter designation and suffix letters.



All tires on your trailer should be the same type, size, construction and load rating -- do not mix bias-belted and radial tires.

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.

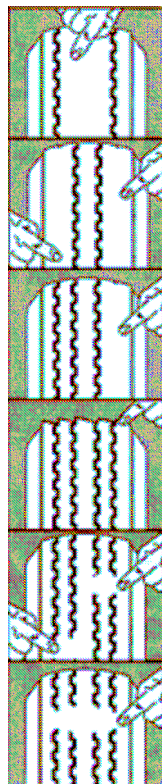
Tire Size

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.

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 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.



Even Center Wear	Over-Inflation	Check and Adjust Pressure When Cold
Inside and Outside Wear	Under-Inflation	Check and Adjust Pressure When Cold
Smooth Outside Wear 1 Side	Loss Of Camber or Overloading	Unload or Have Alignment Checked
Feathering Across The Face	Axle Not Square to Frame	Square Axles or Have Alignment Checked
Cupping	Loose Bearings or Wheel Balance	Check Bearings or Wheel Balance
Flat Spots	Wheel Lock Up	Adjust Brakes



Check tire pressure before traveling. Always check tire pressure when tires are cold. Do not exceed the maximum recommended pressure.



The air pressure recommended on the tire information placard is for the original standard equipment tires only. Your trailer may be equipped with optional-sized tires. Always follow the pressure recommendations stamped in the tire sidewall for any replacement tire.



Keep tires properly inflated. A tire that is run long distances or at high speeds while seriously under-inflated will overheat to the point where the tire may lose air suddenly and/or catch fire, possibly resulting in damage to the vehicle and its contents and/or personal injury.

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.

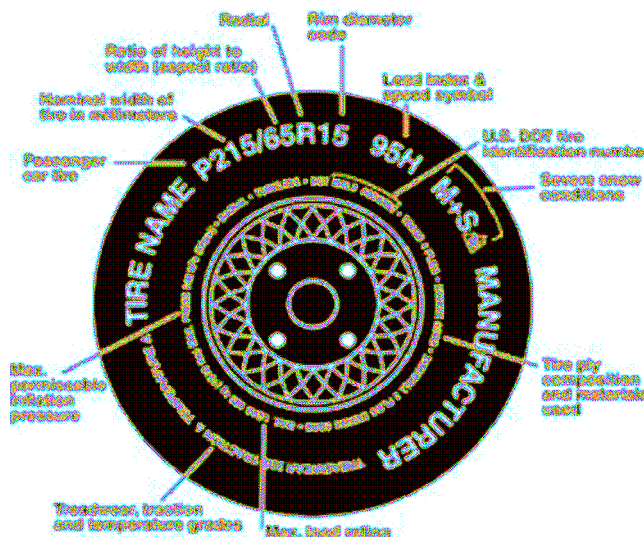
Tire Repair

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.

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.

Information on Passenger Vehicle Tires



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

NOTE: Passenger car tires are not recommended for use on trailers, because the capacity ratings are not marked on the side walls of these tires. In the event a passenger car tire is used, the capacity must be de-rated by 10%.

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.

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.

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.

Additional Information on Light Truck Tires

a 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 and camping needs.

[For TT] 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 RV dealer to discuss the weighing methods needed to capture the various weights related to the RV. This would include weights for the following: axles, wheels, hitch or pin (in the case of a trailer) and total weight.

How Overloading Affects Your RV and Tires

The results of overloading can have serious consequences for passenger safety. Too much weight on your vehicle's suspension system can cause spring, shock absorber, or brake failure, handling or steering problems, irregular tire wear, tire failure or other damage. An overloaded vehicle is hard to drive and hard to stop. In cases of serious overloading, brakes can fail completely, particularly on steep hills. The load a tire will carry safely is a combination of the size of tire, its load range, and corresponding inflation pressure. 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. Since RVs can be configured and loaded in many ways, air pressures must be determined from actual loads (determined by weighing) and taken from the load and inflation tables provided by the tire manufacturer. These air pressures may differ from those found on the certification label. However, they should never exceed the tire limitation for load or air pressure. If you discover that your tires cannot support the actual weights, the load will need to be lightened.

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.

SECTION 2

STEPS FOR DETERMINING CORRECT LOAD LIMIT

1. Locate the statement "The combined weight of occupants and cargo should never exceed XXX lbs" on your vehicles placard.
2. Determine the combined weight of the driver and passengers that 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. $(1400 - 750 (5 \times 150) = 650 \text{ lbs.})$
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 this manual to determine how this reduces the available cargo and luggage capacity of your vehicle.

For further information about wheel and tire safety and contacting the National Highway Traffic Administration (NHTSA), see Chapter 12, Contacting The National Highway Traffic Administration.

NOTICE

CHECK WHEEL LUGS

- 1. On the first trip, tighten wheel lugs at start and every 50 miles for first 200 miles. Correct torque is 90-95 foot-pounds.**
- 2. Thereafter, check wheel lugs before each lug.**
- 3. Following winter storage, check before beginning a trip**
- 4. Following excessive braking, inspect wheel lugs.**

Appendix

For assistance with this manual, warranty information or information on Micro-Lite Trailer Products please visit us on the web or contact Micro-Lite Trailer Mfg, LLC

Address:

Micro-Lite Trailer Mfg, LLC
25745 Woodlawn Avenue
Elkhart, IN 46514
Phone: 574-264-3067

Exterior Pre-Travel Checklist

- Fill the LP bottles
- Empty the holding tanks
- Connect the trailer to the tow vehicle and test all of the exterior lights
- Inspect the awning and ensure that it is properly retracted and secured for travel. It is recommended that a tie wrap be used on the awning arms preventing the possibility of the awning deploying while in travel.
- Inspect all exterior baggage doors and hatches ensuring they are locked
- Inspect the tires and check the pressures. Refer to Chapter 9
- Loosen and Torque the lug nuts. Refer to Chapter 9
- Connect the breakaway switch and test the brakes on the trailer. Adjust the tow vehicle brake controller in accordance with the manufacturer's recommendations
- Secure the rear leveling jacks in the "up" position
- Position the battery disconnect to the on position. This is required to engage the trailer's brakes in the event of an emergency
- Ensure the steps are retracted

Interior Pre-Travel Checklist

- Close all vents and windows
- Place the television antenna "down" position
- Retract the slide rooms
- Inspect the interior of the unit ensuring that all cabinet, interior, and the shower doors are closed and secured
- Secure all loose items in storage compartments
- Ensure that the travel latch is closed on the refrigerator
- Test the smoke, carbon monoxide and LP alarms.

Battery

- Check the electrolyte levels in the battery cells. Refer to Chapter 5
- Clean the battery terminals and ensure they are securely tightened. Refer to Chapter 5

Exterior

- Wash and wax the exterior of the coach at least monthly. Pay particular attention to the graphics when washing and waxing. Power buffers and high pressure washers can remove or damage the graphics. This type of damage is not covered under the warranty. Refer to Chapter 9
- Inspect the seals around the windows, doors and appliance vents. Clean and reseal as required. Refer to Chapter 9
- Remove debris from the window weep holes. Refer to Chapter 9

Frame and Chassis

- Inspect the frame for signs of corrosion. Clean and lightly sand any corroded areas and touch them up with good quality paint. Refer to Chapter 9

- Inspect the steps for corrosion. Clean and touch up any corroded areas. Lubricate the pivot points on the steps. Refer to Chapter 9
- Check the tire pressure. Refer to Chapter 9
- Generator - Review the preventative maintenance requirements in the manufacturer's owner manual. Refer to Chapter 4

Plumbing

- Flush the waste water system and sanitize. Refer to Chapter 7
- Flush the water heater tank. Refer to Chapter 7
- Replenish the water tank air pocket. Refer to Chapter 7
- Winterize your coach prior to the onset of freezing temperatures.

During extreme freezing temperatures it is recommended that the unit be winterized. Damage to the plumbing system due to freezing is not covered under the warranty.

Roof

- Remove all debris from the roof and thoroughly clean using a mild detergent. Refer to Chapter 9.
- Inspect the roof seals for signs of deterioration. Reseal areas as required. Refer to Chapter 9

Storage & Winterization

The checklists and procedures in this section will help you take a systematic approach to preparing your trailer for storage in cold-weather conditions. These checklists do not include every detail required, any you may want to expand them to suit your needs, or perform the tasks in an order that suits your situation and work style. The sections are not necessarily presented in the order that you should do them. Other manuals included with your trailer may contain more detailed procedures for some of the items on these checklists. Contact your dealer or Micro-Lite Trailer for additional suggestions suitable to your climate and storage conditions.

Chassis

- If possible, select a storage area that is dry, well-ventilated and protected from wind and sunlight. A garage would be ideal, but a protected outdoor area will be fine.
- Lubricate all grease fittings on the axle hubs,
- Check all tires for damage and set tire pressure to the maximum as indicated on the tire sidewall. Clean the tires and wheels with your regular soap/car wash solution. It is not necessary or desirable to treat the tires with any commercial tire dressing.
- Wash the trailer underside. Hose off any accumulations of mud and/or road salts on frame, axles, and other chassis components. This is also a good time to inspect the underside of the trailer. Look for obvious damage, and for small cracks, separations, or openings in storage compartments. Check for any damaged components or wear.
- Park the trailer as level as possible front to rear and side to side. Use blocks or ramps under the wheels, if necessary.
- Be sure the breakaway switch activating pin is secure in the switch. Coil and stow the 7-way power cord.
- Grease the hitch king pin (5th-wheels) to prevent rust and corrosion.
- Block the tires front and rear. Cover tires with cloth, plywood, or aftermarket tire covers to protect them from ultraviolet exposure from the sun (if stored outdoors).

Body/Exterior

- Close all vents and windows, and thoroughly wash the exterior, including roof, sidewalls and front and rear caps. Be sure to remove all debris, road grime, bugs, tree sap, bird droppings, etc.
- While washing, make note of any maintenance that may be needed. Closely inspect the sealants around roof accessories (vents, antennas, racks, etc.) and windows and doors. Reseal as necessary before winter rains or snows accumulate.
- Cover all exterior appliance vents (water heater, refrigerator, range hood) to prevent insects, small birds or other creatures from getting in.
- Extend the awnings (if equipped). Sweep or vacuum away branches, leaves, and any other debris. Wash both the tops and bottoms of the awnings with a mild, natural soap. This will help reduce the growth of mildew on the awnings. Allow them to dry completely before retracting them. After they are dry and still extended, spray a light coat of silicone-based lubricant on all metal moving parts.
- Extend the slide-outs (if equipped) and prepare them for storage:
 1. Wipe down all exposed mechanical slide components: gears, rails, shafts, etc. Look for any damage, or caked accumulation of grease and dirt. Remove any of this accumulation.
 2. Check the exterior rubber slideout seals. Look carefully for any tears or splits in the seals. This would be a good time to have repairs made. Clean the seals with soap and water. After cleaning, apply a coating of **303 Protectant** to the seals. Use clean cloths to spread the protectant evenly over the surface of the seal. Allow to air dry.
 3. Leave the slideouts extended for now. Retract them after your interior preparation is completed.

- Check inside all exterior compartments. Remove anything that you don't intend to store. Vacuum out the compartments and carefully wipe down components inside. Look over any exposed wiring. Check for loose connections or damaged wires. Make any repairs now. Wipe down the rubber seals around the doors and apply **303 Protectant**. Lock all exterior compartments (except propane compartment).
- Lubricate locks, hinges and latch mechanisms with silicone-based lubricant.
- If the trailer is parked outdoors, remove any high grass and weed accumulation under and around the trailer, as necessary.

Propane System

- Turn off all propane appliances: refrigerator, range/oven, water heater, and furnace.
- Close the main outlet valves on the propane cylinders. Cover the regulator and cylinders to keep moisture out.
- Remove all food from the refrigerator and freezer. Wash down the interior walls with a mild soap solution. An open box of baking soda or other absorbent inside will help reduce odors. Block the doors open slightly to allow air to circulate.
- Turn off the range and oven burners. Clean the top and over interior. Turn off any pilot valves.

Plumbing Systems

Proper preparation and winterization of the fresh water and waste water systems is vital to the continued safe and effective operation of these systems. Freezing water expands and can rupture tubing, fittings, tanks, and fixtures. Damage from freezing could be extensive and very expensive to fix. Since you will be running water and antifreeze solution through the drain piping into the gray and black water holding tanks, we'll winterize the fresh water system first, and finish the job with the waste water system. Be sure to dump the holding tanks before starting winterization.

- Turn off the water heater and let it cool. Turn off the water heater electrical circuit breaker to prevent accidental operation with a dry tank. To drain the water heater, remove the plug at the bottom of the heater and open the pressure relief valve near the top of the heater. When all water is drained from the heater, close the pressure relief valve and replace the drain plug. Set the bypass valve to prevent filling the water heater with antifreeze.
- Open the tank drain valve to drain the fresh water tank. If you have a full or nearly full tank, be prepared for the full capacity of the tank to drain. Close the valve when the tank is completely drained.
- Open all faucets, both hot and cold, in the galley, bathroom and shower. Open the shower head valve. This will allow the water in the lines to flow to the low point drains.
- Open the system low point drain valves. These are the lowest points in the water system. The low point drains are located under the trailer. Drain out all water. Close the low point valves when ALL water is drained.
- Press the toilet flush pedal to completely drain the water from the toilet.
- Remove the water filter cartridge, if equipped. If you are draining for storage, do not reinstall the filter cartridge. Store the cartridge in a safe place. Turn off the supply valve to the filter.
- Disconnect the outside shower hose (if equipped) and drain the hose. After all water is drained from the hose, reconnect hose.

For Storage in Freezing Conditions:

- Add potable RV antifreeze to the system. Micro-Lite Trailer recommends disconnecting the water pump inlet tube and pumping antifreeze from a container into the system.
 1. Close the fresh water tank drain valve and the low point drain valves. Close the faucets, and be sure the water purifier (if installed) supply valve under the galley is closed.
 2. Disconnect water pump inlet line. Attach a 3' or 4' length of hose to the pump inlet port, and put the other end of the hose into at least a one-gallon container of RV water system antifreeze. Do not use automotive coolant system antifreeze.
 3. Be sure the trailer 12-volt electrical system is activated. Turn the water pump **ON** to pressurize the cold side of the fresh water system. Pump about a gallon of antifreeze into the system. Put the free end of the hose into another container of antifreeze. Open each faucet- lavatory, shower, galley, exterior shower and wash-up faucets- until the antifreeze solution flows freely. Close each faucet when you see the antifreeze. Open the toilet water inlet valve and activate the toilet flush valve so antifreeze gets into the toilet. With the system pressurized, press the check valve in the city water inlet until antifreeze flows out.
 4. Open the low point drain valves until you see antifreeze flowing out, and then close the valve.
 5. Turn off the water pump, disconnect the temporary hose, reconnect the inlet tubing and open all faucets.
 - Winterize the refrigerator ice maker (if equipped).
 1. Push the ice maker arm up to the OFF position.
 2. Remove the vent from the exterior side of the trailer.
 3. Close the water shutoff valve for the ice maker.
 4. Place a shallow pan under the water solenoid valve.
 5. Disconnect the water supply line from the water solenoid valve.
- Drain the water from the supply line.

6. Unscrew the plastic nut and disconnect the water line from the outlet side of the water solenoid valve. Drain the water from the ice maker line.
7. Reconnect both lines to the water solenoid valve in their original locations. Leave the water shutoff valve closed.
8. Dry out the ice maker mold assembly with a soft cloth.
9. Remove the white ice maker AC power cord from the outlet.
 - Be sure water pump and water heater switches are OFF.
 - Clean up around the dump valves and fittings. Be sure the dump hose is clean and dry. Pull off the termination caps, clean around the sealing rings and reattach them. Cycle the dump valves a couple of times. Spray a silicone-based lubricant on the actuating shafts and mechanisms.
 - Pour one or two cups of RV antifreeze down each lavatory, galley, and shower drain. Pour a couple of cups into the toilet, and operate the flush valve.
 - Cap the holding tank drain, city water inlet, and fresh water fill inlet. Coil and store the fresh water hose, waste hose and flushing hose.

Preparing the Electrical Systems for Storage

Preparing the electrical systems for storage mainly involves the batteries and the generator (if equipped). Properly storing the batteries will ensure that they will be able to power up your systems when you take the trailer out of storage, and that you get the maximum life from the batteries.

- If possible, remove all batteries and store them in a clean, dry location. Arrange them in a way that allows you to get to them for periodic charging during the storage period.
- If you can't remove the batteries, disconnect the cables and clean the terminals. Remove any dirt and/or acid buildup. Clean the tops of the batteries and dry thoroughly. Reattach the cable, and apply a battery terminal protectant.
- **Check the charge in each battery with a hydrometer.** Be sure the specific gravity in each cell is no less than 1.260. Recharge as necessary. A fully charged battery will not freeze until 50 to 60 degrees below zero, but a partially discharged one may freeze at only 20 degrees below zero. A frozen battery is a ruined battery. Checking the voltage is not a good way to determine battery charge. A battery that measure 12 volts is already 75% discharged. A fully charged battery will measure about 12.63 volts at 77 degrees F. The hydrometer/specific gravity method is the best way to determine battery charge level.
- Check the charge in the batteries every 30 days. Recharge to specific gravity of at least 1.260.
- Change the oil and oil filter in the generator (if equipped).
- Turn off any unnecessary DC and AC loads. Turn devices off, open the main battery disconnect switch.
- Unplug all 120-volt AC appliances. Turn off all AC breakers, including the main breakers at the main panel. You may want to do this after all interior preparations have been completed, leaving it as the last things you do.
- Clean and re-coil the shore power cord. Check the plug end of the shore power cord. Clean the prongs with electrical contact cleaner or a ScotchBrite pad.

Interior

- Thoroughly clean the interior. Remove all traces of food, including pet food. Vacuum in and under cabinets. Remove all canned goods and personal items if they contain liquids that will freeze. A burst can or jar of food can be a real mess to clean up in the spring.
- Open closet doors, drawers, and cabinets so air can circulate through. This will help reduce the buildup of condensation and musty odors.
- Close and cover all vents to prevent entry of snow, etc.
- Close and lock all windows. Turn vent fan and range hood fan switches OFF.
- Turn off all radios, TVs, interior and exterior lights.
- Close curtains and/or mini-blinds, and pull shades. This will help reduce fabric fading from exposure to sunlight.
- Remove, clean or replace air conditioner filter.
- Remove batteries in clocks and other battery-operated devices such as smoke detectors. Leave the cover off the smoke detector to remind you to replace the battery when reactivating the trailer after storage.
- After all cleaning chores are complete, and you are ready to leave the trailer, do a walk-through to make sure you haven't forgotten something.
- When exiting the trailer, close and lock the entry door, and retract the entry step.
- Check the condition of the trailer weekly.
- During long-term storage, operate the air conditioning system (if equipped) periodically to lubricate the compressor seals. Operate the slideout(s) several times to keep seals from sticking, and to lubricate the mechanism. Reconnect batteries or connect to shore power.

Reactivating the Trailer after Extended Storage

If the trailer was properly and carefully prepared for storage, getting it ready for another travel season should not be difficult. The following checklist assumes that you stored the trailer with care. If damage from freezing or other serious deterioration

has occurred, please consult with your dealer or Micro-Lite Trailer for advice on how to get your trailer back to operating order. If you have added checklist items of your own, make sure those items are covered as you prepare your trailer for travel.

- Thoroughly inspect the outside of the trailer. Look for animal nests in wheel wells, in compartments, or in other out of the way places.
- Remove all appliance vent covers, roof vent covers, or other coverings. Be sure all furnace, water heater, and refrigerator openings are clean and free of debris.
- Open all doors and compartments. Check for animal or insect intrusion, water damage, or other deterioration.
- Check charge level in all batteries. Refill and recharge as necessary. Reinstall batteries, if necessary. Be sure cable ends and terminals are clean and free of corrosion. **Always install the positive (+) cable first.**
- Close the main battery disconnect switch.
- Check tire pressures. Re-inflate to specified cold pressure.
- Lube chassis.
- Check all exterior lights, and replace as necessary.
- Remove covering from inside windows for interior ventilation.
- Drain, flush and sanitize the fresh water system as outlined in the **Care and Maintenance** chapter. Inspect the drain hose for leaks. Replace the hose if necessary.
- Install a new fresh water filter cartridge (if equipped).
- Operate all faucets and fixtures in the fresh water system. Check for leaks at all joints and fittings. Repair any leaks.
- Check all 12-volt DC circuit fuses.
- Operate all 12-volt DC lights and equipment.
- Install new batteries in battery-operated devices. Check the operating guides for these devices for additional operating information.
- Test the carbon monoxide, propane and smoke detectors and alarms.
- Check the monitor panel operation.
- Open and operate vents and vent fans, including the range hood fan.
- Inspect the 120-volt AC electrical system. Check the shore power cord, converter, all outlets, and any exposed wiring. If defects are found, refer service to your dealer.
- Prepare the generator (if installed) for operation following instructions in the generator operating manual. Make sure the main circuit breakers are off.
- Start and run the generator (if equipped). Check the generator exhaust system for leaks or deterioration.
- Operate 120-volt appliances and trailer air conditioning system (if equipped).
- Inspect the propane system and check for leaks as described in the **Care and Maintenance** section. If the propane cylinder(s) appear rusted or corroded, have them inspected by a qualified propane service center.
- Operate each propane appliance. Observe all burner/pilot flames for proper color and size.
- Inspect and clean the interior.
- Check sealants around all roof and body seams and windows.
Reseal if necessary as outlined in the Care and Maintenance section.
- Wash and wax the exterior. Inspect the body for scratches or other damage. Touch up or repair as necessary. Flush the underside of the trailer thoroughly.

Severe Weather Use

Your RV was designed primarily for short-term use in moderate temperature and climate conditions. Generally, this means in temperatures between 0 degrees F and 110 degrees F. There may be situations when you may choose to use the RV outside of this range.

But you must be aware that the plumbing systems, heating and cooling appliances, and structural components of the RV are not appropriate for long term use in either the coldest or warmest climate conditions.

Before you consider using your RV in temperature extremes, please take time to read this section. We've provided some guidelines for operating various systems and appliances in either very cold or very hot weather.

We've also provided some lift-style tips if you intend on using your RV in temperature extremes. Please also be aware that although the components and appliances in your RV will perform very well within their design specifications, damage to components, appliances or RV structural materials while used in severe weather conditions may not be covered under the warranty. If you intend to store your RV during severe winter weather, please see the **"Storage and Winterization"** section of this chapter. Operating and living in your RV during the winter requires some preparation and additional equipment and materials. You will also need to learn to more closely manage your electrical and propane resources.

Successfully using your RV in extreme cold temperatures generally means doing three basic things: *1) keeping heat in, 2) keeping cold out, and 3) adding heat where it's needed.* This guide will give you a few tips on dealing with those three basics.

Plumbing Systems

Of all the systems in your RV, the fresh and waste water plumbing will require the most attention during extreme cold weather use. Freezing can cause extensive damage to the plumbing that can be very costly to repair, and will not be covered under warranty.

The fresh water and waste tanks, and most of the plumbing pipes and fixtures are *not* in heated compartments. The plumbing pipes run through the walls or under the floors. Some are exposed to the outdoors and can freeze.

Know where all of the plumbing on your RV is located. Take a close look around and find where your tanks, outdoor fixtures, indoor plumbing, drain valves, and water pump are located. Look under the RV, and in all the compartments. The plumbing components that are exposed to the outside are much more prone to freezing since they are directly exposed to outdoor air temperature.

• Keep the heat in

Look all around the outside underside of the trailer. Wherever you find plumbing fixtures, piping, etc. is a good place to stuff in insulation material such as fiberglass wool. Look especially for pipes where they enter through the floor or sidewalls. Those are good places to put extra insulation. And don't forget to keep the interior of the RV heated. If you're expecting extremely cold temperatures, open cabinet doors and drawers in the galley and bathroom. The plumbing fixtures are closer to the outside walls in these areas and will freeze faster. If you leave the doors and drawers open, the interior heat will have a chance to keep the plumbing above freezing.

• Keep the cold out

Exterior utility compartments are directly exposed to outside temperatures. The exterior compartment (if equipped on some models) can be stuffed with insulation if you don't have to get into it often. You can also cut out pieces of foam insulating material to fit inside the door to help keep out the cold.

If you are going to be situated for several weeks or months during severe cold weather, consider installing insulated under skirting all around the trailer. Small ceramic heaters and heat tape can be used under the trailer and around plumbing components. Try to seal up as many gaps as possible to keep cold winds and snow from getting under the trailer.

• Add heat where it is needed

The most effective way to protect the water tanks, water pump, fresh and waste water plumbing is to add heat in the areas where it is needed. Keep the compartment doors closed. Foam insulating material can be cut to fit inside the compartment doors and help keep the heat inside. Check inside occasionally to make sure everything is okay. If you have AC power available, wrap the fresh water inlet plumbing and waste lines with heat tape. Plug the heat tape into an extension cord. Be sure to follow all installation and use instruction provided by the heat tape manufacturer.

• A few more tips:

Thoroughly drain water from hoses before you store them. If you don't and you need to use a hose, it will probably be frozen. You can take hoses inside to thaw out if need be, or use a hair dryer. Drain holding tanks before they are completely full during cold weather camping. This will reduce the chance of freezing, resulting in damage to the holding tanks. Leave the water heater turned on whenever the water tank is full so there is no chance of it freezing. Depending on your travel situation, you might consider traveling with the water system winterized. Take bottled water along for drinking and other needs like cooking, washing up and brushing your teeth when the RV is winterized. Even with the fresh water system winterized, you can still use the bathroom facilities. Gallon jugs filled with water can be used in the toilet. If your holding tanks are not heated, you can put some RV antifreeze in the holding tanks to prevent the contents from freezing. Add the RV antifreeze through the toilet for the black water holding tank and down the shower or tub drain for the gray water tank. The antifreeze will also protect the shower or tub P-trap which is usually located below floor level. The amount of antifreeze required for the holding tanks will be based on the size of the tanks, and it will be necessary to add more RV antifreeze as waste water is added to the tanks to prevent the antifreeze from being diluted.

Electrical System

The batteries and generator (if equipped) will be your primary electrical system concerns. If you are connected to shore power, you will likely have all the power you need to operate appliances and the battery charger. You will also have necessary power if you have a generator *IF* you properly prepare it for extreme temperature operation. This will mean

making sure the correct weight of oil is installed, and the engine is in good tune. Preparing the generator for cold weather is relatively inexpensive. But if you can't get it started or if it fails during extremely cold weather, it is no better than not having a generator. Be sure it is well-prepared for the traveling conditions you expect.

If you expect to dry camp - that is without the benefit of shore power or a generator - ***the batteries are the most critical part of the electrical system since they will be your only source of electrical power. If the batteries are not kept fully charged, they will freeze.*** If they freeze, they will be destroyed. You must measure specific gravity with a hydrometer to determine battery state of charge. A voltage reading will not give you useful information. A battery that measures 12 volts is already 75% discharged. If the battery measures below 12 volts, the battery will freeze at a much higher temperature.

The batteries, fully charged, will not last more than about 10 hours in zero-degree weather depending on battery condition and 12-volt loads. In extreme temperatures, don't plan on relying on batteries for longer than this unless you have a means to charge them. If you expect to stay longer than overnight, you should expect to either have a 120-volt AC power nearby or run the generator (if equipped). Minimize your use of electric power if AC power is not available or you cannot run the generator. Without shore power or a generator to run the charger, you can charge batteries with your tow vehicle alternator through the 7-way connector charge line. If you do this, monitor battery charge with the monitor panel or measure specific gravity with a hydrometer.

Cold weather preparation for your RV batteries is the same as for your car or truck: keep them clean, keep the electrolyte level correct and keep the cables and terminals clean and dry. A battery terminal protectant spray or paste can help keep corrosion to a minimum.

Running Gear and Body

Prepare your RV chassis, running gear and body as you would your car or truck. A good coat of wax will help protect the exterior panels. Be sure tires, bearings, brakes and exterior lighting are all in good operational condition. Many locations use corrosive substances to de-ice roads.

Whenever you can, use fresh water to flush the undercarriage and rinse off accumulations of mud and road salts.

Before traveling in severe weather, do a thorough inspection of exterior sealants. Water that gets into walls or under the roof area can cause severe damage. Open seams or moldings can become filled with water and freeze causing even more damage from expanding ice.

Be sure roof vents, furnace, refrigerator and water heater exhaust vents and the generator exhaust system are not damaged and are functioning properly. Fault exhaust vents can allow the buildup of deadly carbon monoxide.

Interior

Outside of comfort heating, humidity and condensation will be your main concerns during cold weather. Moisture buildup on walls, the ceiling and even in closets can cause damage and lead to mold and mildew formation. This Owner's Guide has a detailed section on humidity and condensation control. Please see that chapter for more information as you plan your cold weather RVing activities.

Cold weather comfort involves the same three basics as keeping your plumbing systems working: ***1) keeping heat in; 2) keeping cold out; and 3) adding heat where it is needed.***

The best heat source is the RV's forced air furnace. It will consume more propane than any of the other propane-fired appliances. The propane tank or cylinders should be full before leaving on your trip. Monitor the propane supply carefully during your stay.

• Keep the heat in

Much of the heat inside your RV will escape through the windows. Cover the windows with curtains, drapes or almost anything to help hold some of the heat in. Foam or other insulation material cut to fit the windows can help cut down on heat leakage during the night. Several plastic films are available that can be applied to window frames with adhesive and then shrunk with a hair dryer that will act like storm windows to help keep the heat in and help reduce the formation of condensation on the window glass.

You can stuff insulation or heavy cloths into the slideout mechanisms and other openings that will help reduce drafts.

Use overhead and range vents to reduce the humidity inside the RV. A cross-flow of outside fresh air using the overhead vents will be better at conserving heat than opening windows or exterior doors. In very severe weather, you can cover or block the insides of roof vents with plastic or foam insulation.

Weather-strip doors and windows. Cold little drafts in your main residence are annoying; they are much more serious in a recreational vehicle. A few throw rugs over uncarpeted flooring can add another thermal layer. When you arrive at your destination, try to select a site that will be exposed to sun throughout the day, but also where there is some type of wind break available. Position the RV on the site so the front or rear rather than the side will be facing into the wind. And if possible, situate so that the site with the utility connections (water, sewer, electrical) is on the sunny side.

• **Keep the cold out**

The best way to keep the cold out is to avoid opening doors and windows. Avoid opening the entry door as much as possible. Block off sections of the RV you won't be using with blankets or sheets. The more heat where you are the better. That doesn't mean that you shouldn't heat parts of the RV; just keep most of the heat in the areas where you will be spending most of your time. Check all around doors, windows and other openings for drafts or cold air. Block these areas with blankets, carpet or other insulating materials to help keep the cold out.

• **Add heat where it is needed**

There may be times in exceptionally cold weather when you will have to add heat to the interior. If you are connected to shore power or can operate a generator, use low-wattage electric ceramic heaters for spot heating an area. ***Never use the range or oven for interior comfort heating.*** These appliances produce deadly carbon monoxide when they are operating. If you use electric heaters, be sure to follow all instructions.



Some upholstered components and mattresses, carpet, and insulation products are made of urethane foam. Urethane foam is flammable!

Urethane foams burn rapidly, releasing great heat and consuming oxygen very quickly. Lack of oxygen is a danger of suffocation hazard. Hazardous gases released by the burning foam can be incapacitating or fatal to human beings if inhaled in sufficient quantities.

Do not expose urethane foams to open flames or indirect high temperature sources of ignition such as burning operations, welding, burning cigarettes, space heaters, or unprotected electric light bulbs.

Do not place the heaters near upholstery, clothing or other flammable materials.

If you have 120-volt power at your site, turn on the tow vehicle engine block heater (if equipped) overnight to ensure the engine will be warm for a quicker start in the morning. If you don't have block heater, a trouble light placed under the engine oil pan or near the battery can help with cold-weather starting.

Personal Comfort and Safety

Extreme temperature and weather conditions require that you prepare yourself for the conditions you may encounter. Extreme cold weather is often experienced in places where the weather can change rapidly. Watch for sudden weather changes. Always carry a survival kit in your vehicle.

The kit should contain flashlights, batteries, rain ponchos, a portable weather radio, first aid kit, nonperishable packaged or canned food and a manual can opener, blankets, prescription and nonprescription drugs, pet supplies, bottled water and any special items for infants, elderly or disabled family members. What you put in this survival kit is up to you, but be sure to include everything you might need.

You must be prepared with appropriate clothing, fuel supplies and food. Adding these extra severe-use items may affect the load you carry in your RV and how you load it. Equip your tow vehicle with snow tires or have tire chains available when conditions warrant their use. Watch for ice on roads and trails. Always obey posted speed limits and proceed with caution.

No matter what extreme weather conditions you may encounter – whether extreme heat or extreme cold - remember that you may be isolated. You may be far away from food or fuel supplies, other RVers, and emergency help. If you have cell phone service, be sure your service is usable in the areas where you intend to travel. Always tell someone where you are going, how

long you plan to be gone, and how to contact you in case of emergency. An aftermarket GPS system can be a good emergency preparedness investment.

Weather Planning

Many RVers do not take into consideration the weather conditions at their travel destination. When you travel several hundred miles a day in your RV the weather conditions can change several times. The weather is often the last thing on your mind. Severe weather can occur without much warning, and if you are caught in it, it can be disastrous. RVers need to have an emergency plan in case of a severe storm.



Travel trailers are high-profile vehicles and are subject to the effects of wind.

Be aware of any wind advisories and warnings in the areas where you travel and/or camp.

Do not use your RV to take shelter during severe weather. Seek shelter when severe weather or tornado warnings are issued.

The National Oceanic Atmospheric Administration (NOAA) Weather Radio (NWR) is a nationwide network of radio stations that broadcast National Weather Service warnings, watches, forecasts and other hazard information 24 hours a day. Alerts inform people if they need to take some type of action in order to protect themselves.

Consider both a portable GPS unit and a weather radio receiver as part of your travel gear. Receivers are available in many price ranges depending on the quality of the receiver and its features. It is well worth the investment to be able to pinpoint your exact location to know what type of weather to expect when traveling or camping in your RV. For more information on the NOAA Weather Radio visit their website at www.nws.noaa.gov. It is a good idea to monitor the weather radio while traveling. Develop an emergency evacuation plan in case of severe weather. When you arrive at a campground, ask about emergency plans in case of a severe storm such as a tornado, or a thunderstorm with high winds. If the campground doesn't have a plan, you need to make your own. Locate a structure that is safer than your RV, like a bathhouse or the campground office. Always stay on the lowest level possible an away from doors and windows. Tell everyone who is with you about the emergency plan. Explain to children how to respond to different disasters and the dangers of severe weather, fires, and other emergencies. Instruct children on emergency exits. Instruct them on how and when to call 911 or other emergency phone numbers. Make sure everybody knows exactly what his or her job is in case of severe weather. Monitor the weather radio for emergency information. Emergency weather watches and warnings are posted for counties and towns, so always check a map for the county or town where you are staying.

Glossary of Common RV Terms

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).

AC ELECTRICITY: Alternating Current. Standard Household 110 Volt AC current.

ANODE ROD: Part of the water heater that attracts impurities in the water that cause corrosion.

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 center line of the tread.

BLACK TANK: The holding tank into which the toilet directly drains.

BLACK WATER: The term associated with sewage contained within the black tank.

BRAKE CONTROLLER: Device located under the dash of a towing vehicle that controls the braking system of the trailer.

BTU: The measurement of the amount of heat required to raise the temperature of one (1) pound of water, one (1) degree F.

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.

CITY WATER: Refers to exterior water source, not water from the fresh water tank that you hook up to at campgrounds. "City Water" refers to pulling water from a central source (like in a city).

CONDENSATION: The result of warm humid air coming in contact with cold glass also known as 'Sweat'.

CONVERTER: Device that converts 110V AC to 12V DC.

CURBSIDE: Term used to refer to the side of your coach, which faces the curb or shoulder when parked. Also called DOOR SIDE (the main entrance door) or OFFROAD SIDE.

DC ELECTRICITY: Direct Current. Also termed Battery Power. Used to run all 12 Volt powered systems or lighting.

DRY CAMPING: Refers to camping using only the resources within your unit and without amenities such as city water hook-ups, electrical hookups, etc., often provided at commercial campsites.

DSI IGNITION: Direct Spark Ignition – The method of lighting a main burner on a LP fired appliance.

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.

DUCTED AC: Air conditioning distributed through a ducting system.

DUCTED HEAT: Warm air distributed through a ducting system.

DUAL ELECTRICAL SYSTEM: Coach equipped with appliances and lights, which operate on 12V power when self-contained, and with a converter, on 110 AC when in campgrounds or run off of a generator.

DUMP STATION: Term used for locations to drain the waste holding tanks (gray and black tanks). In most states, it is illegal to dump your tanks anywhere except at dump stations.

DUMP VALVE: Another name for the T-Handle used to drain the black and gray tanks.

EGRESS WINDOW: Term for the emergency exit windows within recreational vehicles: Usually identified by a red handles or levers.

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.

FULL HOOK-UP SITE: A Campsite that offers full amenities: City water, sewer, and electrical hook ups – many have cable and phone available.

GALLEY TANK: A gray water holding tank used specifically for the kitchen waste water.

GENERATOR: Powered by Propane, generates 110 Volt power.

GRAY TANK: the waste holding tank into which water from the kitchen and bath sinks, shower and tub drains.

GRAY WATER: Water drained into the gray holding tank.

GROSS AXLE WEIGHT RATING (GAWR): Maximum amount of weight (in lbs.) that can be placed on the axle.

GROSS COMBINED WEIGHT RATING (GCWR): Maximum load weight (in lbs.) allowed for the coach and tow vehicle.

GROSS VEHICLE WEIGHT RATING (GVWR): Maximum load weight (in lbs.) allowed for the vehicle.

GROSS Fifth-Wheel WEIGHT (GTW): Weight of the fully loaded coach in its actual towing condition.

HITCH WEIGHT: Amount of a coach's weight that rests on the tow vehicle's hitch.

HOLDING TANKS: Refers to the tanks typically known as fresh water, gray and black, where the water is held.

HOOK-UPS: Where you connect to a campground's facilities.

INNERLINER SEPARATION: The parting of the inner liner from cord material in the carcass.

INTENDED OUTBOARD SIDEWALL: The sidewall that contains a whitewall, 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.

NET CARRYING CAPACITY (NCC): Maximum weight without exceeding the GVWR. Also referred to as 'Payload Capacity'

LOW POINT/LOW POINT DRAIN: Lowest point in the plumbing system. Drain valves are placed at these points for sewage dumping.

Propane: Liquefied Petroleum Gas – Used to fuel appliances.

MAXIMUM LOAD RATING: The load rating for a tire at the maximum permissible inflation pressure for that tire.

MAXIMUM PERMISSABLE 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.

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 inner liner 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.

PILOT: Small flame that is used to ignite the main burner of a LP-fired appliance.

PIN WEIGHT: The vertical trailer load supported by the king pin of a fifth wheel hitch.

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.

PRIMITIVE CAMPSITE: Campsite that offers limited connections. May have city water or electrical available but not both.

PULL-THROUGH SITES: Camp sites that you can pull your recreational vehicle through, eliminating the need to back in.

RADIAL PLY TIRE: A pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the center line of the tread.

RECOMMENDED TIRE 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 DESIGN: 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.

ROADSIDE: Refers to the side of the unit that faces the road when parked. Also commonly referred to as "Off DOOR SIDE."

RV: Short for Recreational Vehicle.

RVIA: Recreational Vehicle Industry Association

SECTION WIDTH: The linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.

SHORE LINE: The electrical cord that connects 110V from an exterior outlet (such as campgrounds) to the RV. Also called 'Power Cord'

SHORE POWER: The 110V outlet that connects to the Shore Line.

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.

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.

TREAD-WEAR INDICATORS (TWI) - The projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

UNLOADED VEHICLE WEIGHT (UVW): Weight of the unit without adding fuel, water, propane, supplies and passengers. Also referred to as 'Dry Weight'

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 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.

WET WEIGHT: Weight of the coach with fuel, fresh water and LP tanks full.

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.