

# Owner's Manual

## GAS

Part No. L90-0010-32  
Customer Service: 1.800.322.8216



America's favorite motorhomes.

# 2017 Fleetwood Owner's Manual

## Fleetwood RV Class C

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**IMPORTANT - PLEASE READ:** Product information, photography and illustrations included in this manual were as accurate as possible at the time of publication. Materials, design, and specifications are subject to change without notice. American Coach has designed its recreational vehicles for a variety of customer uses. Each vehicle features optimal seating, sleeping, storage, and fluid capacities. The user is responsible for selecting the proper combination of loads (i.e. occupants, equipment, fluids, cargo, etc.) to ensure that the vehicle's weight capacities are not exceeded.

Manufacturing brands of REV Recreation Group, Inc. include: American Coach, Fleetwood RV, Holiday Rambler & Monaco

The information contained in this document is intended to reflect standard and optional equipment included in a typically equipped model at the time of delivery to the initial retail owner. Your actual unit may vary from this document as a result of optional equipment that is not generally offered on this model. In the case that you are not the initial retail owner of the unit, this document will not reflect modifications that may have been performed by previous owners.

Product information and specifications are shown herein as of the time of printing. The motorhome manufacturer reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligation.

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# General Information

## Section 1

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### **CALIFORNIA PROPOSITION 65 WARNING:**

Most vehicles, including this one, contain and/or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Engine exhaust and a wide variety of vehicle fluids, components, and parts—including building materials used in the interior furnishings in this vehicle—contain and/or emit these chemicals, including formaldehyde. In addition, battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling. Consult with your doctor or other health professional for further advice concerning exposure from this vehicle to chemicals known to the State of California to cause cancer and reproductive harm.



## WARRANTY INFORMATION FILE

In addition to this Owner's Manual, a Warranty Information File Box can be found in the motorhome. This box contains valuable documents about the motorhome's systems and equipment. Many of the component manufacturer warranty registration cards can be found in the box. They will need to be filled out and mailed. Carefully reading and understanding of all the information in this box will help in the safe operation, maintenance and troubleshooting of the systems and equipment.

## REPORTING SAFETY DEFECTS

If you believe that your motorhome has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying REV Recreation Group Inc. at: 1-800-322-8216.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall or remedy campaign.

However, NHTSA cannot become involved in individual problems between you, your dealer or REV Recreation Group Inc.

To contact NHTSA, you may call the Vehicle Safety Hot line toll-free at 1-888-327-4236 (TTY: 1-800-424-9153); go to <http://www.safercar.gov>; or write to: Administrator, NHTSA, 1200 New Jersey Avenue, SE, Washington, DC, 20590. You can also obtain other information about motor vehicle safety from <http://www.safercar.gov>.

### **Canadian Consumers:**

If you believe that your vehicle has a defect that could cause a crash, injury, or death, you should immediately inform Allied Recreation Group at: 1-800-322-8216 or you may call Transport Canada toll-free at: 1-800-333-0510.

## SAFETY TERMS

Many of the safety terms are personal safety instructions. Definitions for the terms are listed below. It is important to thoroughly read and understand the safety instructions displayed throughout the manual. Failure to comply with specific instructions may result in personal injury or death. Many instructions are required by National Safety Associations.

### **CAUTION:**

Cautions pertain to potential damage to the motorhome and/or its components.

### **POISON:**

A warning or caution pertaining to safety and/or use of a poisonous substance or harmful chemical.

### **NOTE:**

Information and reminders concerning proper operation of the motorhome and/or its components.

### **WARNING:**

Warnings contain information regarding personal safety and/or pertaining to potential extensive or permanent damage to the motorhome or its components by means of hazards or improper use.

### **INSPECTION:**

Inspection of the motorhome and/or its components is required. Additional instruction may follow.

### **LUBE:**

Lubrication, or addition of a lubricant product, to the motorhome and/or a specified component or part is required. Additional instruction may follow.

### **ASSEMBLE or REPAIR:**

Assembly, disassembly or installation of a component or part, and/or repair to the motorhome may be required. Assistance of Technical Support or Technician may be necessary.

### **INFORMATION:**

References to additional information regarding operation of the motorhome and/or its components found in additional sources, other than the Owner's Manual. Also refers to the Warranty Information File, found within the Warranty Information Box in the motorhome.

**TIP:**

Tips contain information, helpful hints and/or suggestion for ease of operation of the motorhome or its components.

**GLOSSARY OF TERMS**

**AC Electricity** - Alternating current also known as household power.

**Air Compressor** - Pumps air to and builds air pressure in an air system.

**Air Dryer** - Cools, filters and dries the air delivered by an air compressor.

**Air Governor** - Controls the operation of the air compressor by constantly monitoring air pressure in the supply tank of the air system. The air governor initiates the unload cycle when the cut-out pressure is reached.

**Alternating Current (AC)** - A current that oscillates at a specified frequency typically 60 times a second (60 Hz) in the United States and Canada. Also referred to as shore power, utility power, inverter power (if equipped), generator power, or house power.

**Ampere (Amp)** - The measure of electron flow rate (current) through a circuit.

**Ampere-hour (Amp-hr. AH)** - A unit of measure for a battery electrical storage capacity, obtained by multiplying the current in amperes by the time in hours of discharge. *Example:* A battery which delivers 5 amperes for 20 hours, delivers 5 amperes times 20 hours, or 100 Amp-Hr. of capacity.

**ANSI** - American National Standards Institute.

**ASTM** - American Society for Testing and Materials.

**Black Water** - Term associated with the sewage holding tank. The toilet drains directly into this tank.

**CCA** - Cold Cranking Amperage is the amount of current a battery can deliver for 30 seconds at 0° F without dropping below a specified voltage, usually 10.5 Volts DC.

**Chassis Battery** - Battery used to power the 12 Volt accessories and start the engine.

**Circuit** - An electric circuit is the path of an electric current. A closed circuit has a complete path. An open circuit has a broken or disconnected path.

**City Water** - A term associated with the water supply at campgrounds. It is called city water because water is pulled from a central source (like in a city) and not the fresh water tank.

**Compressor Load Cycle** - The time during which the air compressor is building air pressure in an air system.

**Compressor Unload Cycle** - The time during which the air compressor is idling and is not building air pressure in an air system.

**Curbside** - This refers to the side of the motorhome that faces the curb when it is parked. Often called the door side or the passenger side.

**Current** - The rate of flow of electricity or the movement rate of electrons along a conductor. It is comparable to the flow of a stream of water. The unit of measure for current is the ampere.

**Cut-In Pressure** - The pressure level in the air system supply tank that triggers the compressor load cycle.

**Cut-Out Pressure** - The pressure level in the air system supply tank which triggers the compressor unload cycle.

**Cycle** - A battery discharge and subsequent recharge equals one cycle.

**Desiccant** - A granular substance that has a high affinity for water and is used to retain moisture from the air stream flowing through the air dryer cartridge.

**DC Electricity** - Direct current also known as battery power.

**Direct Current (DC)** - Type of current that travels in one direction. This type of current can be stored in a battery bank.

**Drain Trap** - This is a curve that is in all drains. Water is trapped in the curve and this creates a barrier so tank odors cannot escape through the drain. Also called a "P-Trap."

**Dry Camping** - Camping in the motorhome when there is no city water hook-up or shore power. In other words, using only the water and power that is in the motorhome and not from another source.

**Drying Cycle** - The time during which the air dryer cools, filters and removes moisture from the air delivered by the air compressor. The drying cycle begins and ends the same as the compressor load cycle.

**Dump Station** - A site where the waste (grey) and sewage (black) tanks can be drained. In most states it is illegal to drain waste tanks anywhere other than at a dump station.

**Dump Valve** - Another name for the T-handle valve used to drain the sewage (black) and waste (grey) tanks.

**Escape (Egress) Window** - The formal name for the emergency exit window located in the motorhome. Egress windows are identified by their red handles.

**Full Hook-Up Site** - A campground that has city water, shore power and sewer hook-ups or connections available.

**Grey Water** - Term associated with the waste water holding tank. Water from the sink drains, the shower and the washer-dryer (if equipped) go into this tank.

**House Battery** - Powers 12 Volt DC lights and accessories inside motorhome.

**HVAC** - Heating, Ventilation and Air Conditioning.

**LED (Light Emitting Diode)** - Indicator light.

**Liquid Lead Acid Battery (LLA)** - A type of battery that uses liquid as an electrolyte. This type of battery requires periodic maintenance such as cleaning the connections and checking the electrolyte level.

**Low Point Drain** - The lowest point in the plumbing. Drains are placed here so water will drain out of the lower end of the motorhome. Drains must be closed when the water tank is filled.

**OEM** - Term for Original Equipment Manufacturer.

**OHM** - A unit for measuring electrical resistances.

**Ohm's Law** - Expresses the relationship between Volt (E), amperes (I) in an electrical circuit with resistance (R). It can be expressed as follows:  $I = V/R$  or  $V = I \cdot R$ . If any two of the three values are known, the third value can be calculated by using the above formula.

**Potable Water** - Water that is safe for human consumption.

**Potentiometer** - A device for measuring an unknown potential difference or electromotive force.

**Pounds Per Square Inch Gauge (psig)** - Pressure measured with respect to that of the atmosphere. This is a pressure gauge reading in which the gauge is adjusted to read zero at the surrounding atmospheric pressure. It is commonly called gauge pressure.

**Purge** - The initial blast of air (decompression) from the air dryer purge valve at the beginning of the air compressor.

**Purge Cycle** - The time during which the air dryer is undergoing purge and regeneration. This cycle starts at the beginning of the compressor unload cycle and normally ends well before the beginning of the compressor load cycle.

**Regeneration** - The reverse flow of air through the air dryer and out the purge valve that begins immediately after the purge and lasts normally 10 to 15 seconds. This reverse flow of air, from the air system and through the air dryer, removes moisture from the desiccant cartridge and prepares the air dryer for the next compressor load cycle.

**Roadside** - The side of the motorhome that faces the road while parked. Often called the off-door side or the driver side.

**SCA** - Term for Supplemental Coolant Additive. Chemical added to coolant for diesel engines to help prevent cylinder liner pitting and internal corrosion.

**Shore Cord** - The electrical cord that connects the motorhome to AC electrical supply.

**Stinger** - An arm attachment on a tow truck that is used to lift the motorhome slightly for towing.

**Volt** - The unit of measure for electric potential.

**Watt** - The unit for measuring electrical power, i.e. the rate of doing work, in moving electrons by or against an electric potential.

**Wet Cell Battery** - A type of battery that uses liquid as an electrolyte. This type of battery requires periodic maintenance to clean the connections and check the electrolyte level.

## Fleetwood RV Class C

# Limited One-Year Warranty

## Section 2

For Motor Homes Manufactured By REV Recreation Group, Inc., sold in the United States and Canada

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## COVERAGE PROVIDED

Your new motor home is warranted under normal use to be free from manufacturing defects in

material or workmanship when first sold by an authorized Fleetwood Dealership. For purposes of this warranty, “defect” means a failure of the material or workmanship to conform to the manufacturer’s specifications and tolerances.

The warranty covers the first retail purchaser and all authorized transferees during the warranty. The warranty begins on the date of original retail delivery or the date the motor home is first placed into service as a rental, commercial or demonstrator unit (whichever occurs first) “Start Date” and extends for the following periods:

1. For non-structural defects, one (1) year from the Start Date or until the motor home reaches 15,000 total miles as determined by the mile age shown on the odometer, whichever occurs first.

2. For structural defects, three (3) years from the Start Date or until the motor home reaches 45,000 total miles as determined by the mileage shown on the odometer, whichever occurs first. Structural defects are defined only as the motor home’s roof structure, sub-floor structure, and Vacubond® walls.

## WHAT IS NOT COVERED BY THIS WARRANTY

### **This warranty does not cover:**

1. The automotive chassis system (including the chassis and drive train), tires and batteries, all of which are covered by the separate warranties of the respective manufacturers of these components.

2. Components or items expressly warranted by their respective manufacturer.

3. Defects or performance failures caused by or related to:

- a. Abuse, misuse, negligence or accident;
- b. Failure to comply with instructions contained in the Owner’s Information Package;
- c. Alteration or modification of the motor home;
- d. Environmental conditions (salt, hail, chemicals in the atmosphere, etc.);
- e. Normal deterioration due to wear or exposure, such as sealants, fading of exterior surfaces, fabrics, drapes, and carpet wear, etc.;
- f. Motor homes on which the odometer reading have been altered;
- g. Normal maintenance and service items, such as light bulbs, fuses, sealants, lubricants, etc.;

h. Appearance imperfections, or damage to paint, graphics, exterior materials, or upholstery that may have occurred prior to delivery and are normally corrected during the delivery inspection process at the manufacturing plant or at the dealership;

i. Transportation to and from dealer location;

j. FLEETWOOD RV SHALL NOT BE LIABLE FOR ANY (1) INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO ANY CLAIMS FOR PROPERTY DAMAGE, LOSS OF USE, LOSS OF VALUE, LOSS OF INCOME, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, BUS FARES, VEHICLE RENTAL, INCIDENTAL CHARGES SUCH AS TELEPHONE CALLS OR HOTEL BILLS, (2) ANY OTHER PROPERTY DAMAGE CAUSED OR ALLEGED TO BE CAUSED BY MOLD, MILDEW, FUNGUS, DRY ROT OR ANY MICROBIAL MATTER, OR (3) LEGAL FEES OR EXPENSES;

k. Pre-mature deterioration and accelerated wear and tear on Motor homes used for full-time living accommodations;

l. Motor homes used for commercial or business purposes;

m. Motor Homes that are not originally sold by an authorized Fleetwood RV dealership, i.e., sold at auction, repossession, salvaged or sold in an otherwise distressed condition.

n. Residential refrigerators, which are covered by separate warranties of the respective manufacturers of these components.

**Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.**

## LIMITATIONS

ANY IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE DURATION OF THIS WRITTEN WARRANTY.

Some states do not allow restrictions on how long an implied warranty lasts, so this limitation may not apply to you.



The manufacturer is not responsible for any undertaking, representation or warranty made by any dealer or other person beyond those expressly set forth in this warranty. There is no warranty of any kind made by Fleetwood RV beyond the limited warranty contained in this document.

## **YOUR RIGHTS UNDER STATE LAW**

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

## **LEGAL REMEDIES**

Any claim or controversy arising out of or relating to this limited warranty, or breach thereof, shall be settled by arbitration administered by the American Arbitration Association in Milwaukee, Wisconsin in accordance with the Commercial Arbitration Rules of the American Arbitration Association. The laws of the State of Indiana shall be applied in any arbitration proceedings, without regard to principles of conflict of law. Each party shall bear its own costs, fees and expenses of arbitration. The arbitrator(s) determination and the basis for that determination shall be in writing and shall include an explanation of the basis for the determination. The determination of the arbitrator(s) shall be final and binding and judgment upon such determination may be entered in any court having jurisdiction. The arbitration proceedings and arbitration award shall be maintained by the parties as strictly confidential, except as otherwise required by court order or as is necessary to confirm, vacate, or enforce the award and for disclosure in confidence to the parties' respective attorneys, tax advisors, or senior management personnel. Furthermore, any action for breach of warranty must be commenced within three months following the expiration of the warranty period.

## **DEALER'S OBLIGATIONS**

By agreement with the manufacturer, the dealer is obligated to maintain the motor home prior to retail sale, to perform a detailed pre-delivery inspection and to repair or replace any parts necessary to correct defects in material or workmanship.

## **OWNER'S OBLIGATIONS**

The owner is responsible for normal maintenance as described in the Owner's Information Package; however, minor adjustments (such as adjustments to the interior or exterior doors, cabinet latches, TV antenna control, etc.) will be performed by the dealer during the first 90 days after delivery.

Thereafter, such adjustments are the responsibility of the owner as normal maintenance unless required as a direct result of repair or replacement of a defective part under this warranty.

If a problem occurs which the owner believes is covered by this warranty, then the owner shall contact the selling dealer, or other authorized dealer, giving sufficient information to resolve the matter.

Written notice of defects must be given to the selling dealer or manufacturer within thirty

(30) days of discovery by owner but no later than ten (10) days after the expiration of the warranty period. The owner shall deliver the motor home to the dealer or an authorized Fleetwood RV dealer location for warranty service. See "Warranty Service," page 2-3, for additional details. To the extent allowed or not prohibited by applicable law, the manufacturer requires that the owner first provide it with direct written notification of any alleged unrepaired defect, or any other dissatisfaction experienced with the motor home so the manufacturer has the opportunity to cure the problem or dissatisfaction itself.

Giving the manufacturer this direct notice and opportunity to cure enables the manufacturer to supplement prior efforts by its authorized dealers so any ongoing problem or dissatisfaction can be resolved or addressed by the manufacturer.

The manufacturer's written notice should be mailed to:

**REV RV Group  
Owner Relations  
P.O. Box 1007  
Decatur, IN 46733**

## **MANUFACTURER'S OBLIGATIONS**

Upon receipt of notice of a claim, where the dealer was unable or unwilling to resolve the problem, a Fleetwood RV Service Center will repair or replace any parts necessary to correct defects in material or workmanship.

**For Customer Service Assistance, contact:**  
REV RV Group  
Owner Relations  
P.O. Box 1007  
Decatur, IN 46733  
1-800-322-8216



**For Chassis Customer Assistance, contact:**  
Ford Chassis Assistance:  
1-800-444-3311

## DISPUTE RESOLUTION

AS TO NON-STRUCTURAL DEFECTS, ANY ACTION TO ENFORCE THESE EXPRESS OR ANY IMPLIED WARRANTIES SHALL NOT BE COMMENCED MORE THAN NINETY (90) DAYS AFTER THE EXPIRATION OF THE ONE YEAR WARRANTY COVERAGE PERIOD DESIGNATED ABOVE. AS TO STRUCTURAL DEFECTS, ANY ACTION TO ENFORCE THESE EXPRESS OR IMPLIED WARRANTIES SHALL NOT BE COMMENCED MORE THAN NINETY (90) DAYS AFTER THE EXPIRATION OF THE THREE YEAR WARRANTY PERIOD DESIGNATED ABOVE.

Indiana law shall exclusively govern the interpretation and application of this limited warranty.

## WARRANTY SERVICE

If you need warranty service or warranty information, please see the booklets and other documents included in your Owner's Information Package. If you have any questions about the warranty or what it does or does not cover, please contact Fleetwood RV Owner Relations.

As a part of the pre-delivery inspection procedure, the dealer is responsible for road testing the motor home, noting and correcting any steering problems and setting correct tire pressures before delivery.

**Fleetwood RV will not be responsible for front end alignment after this pre-delivery inspection has been performed.**

For warranty service, you should return your motor home to the selling dealer. If this is not possible, you may contact any other authorized Fleetwood RV motor home dealer. The Fleetwood RV Owner Relations group can help you find a dealer in your area. If, for some reason, a problem is not handled to your satisfaction:

1. Discuss any warranty-related problems directly with the manager and/or owner of the dealership, giving them an opportunity to help the service department resolve the matter for you.
2. If a problem arises that has not been resolved to your satisfaction by your local dealer, contact Fleetwood RV Owner Relations.

3. We sincerely believe that your dealer and the factory representative will be able to solve any problem that might arise. If their combined efforts are not satisfactory, please send a letter describing the circumstances to:

**REV RV Group  
Owner Relations  
P.O. Box 1007  
Decatur, IN 46733**

Please include the brand name and **Unit Identification Number (U.I.N.)** of your motor home. The **U.I.N.** is located on the identification tag **underneath the driver's side window** on the exterior of your motor home.

4. If you wish to call for assistance, please use this toll-free telephone number.

**REV RV Group  
Owner Relations  
1-800-322-8216**

There may be times when your motor home will need repairs or parts while you are on the road. If your motor home is repaired by a nonauthorized repair facility (non-Fleetwood RV dealer), be sure to save receipts and especially any parts that are replaced. These parts will have to be returned to your dealer before you can be reimbursed for their cost.

Always make a written list of the motor home problems or the specific work you want done. If you've had work done that is not on your maintenance log, let the service advisor know.

If you have a long list of service items that need attention and you need your motor home very soon, discuss the situation with the service advisor, listing the items in order of priority. This will help the service department manage its time and will help get you going as quickly as possible. If required work is not covered under the warranty, your dealer's service department can help you with getting the correct service.

The materials in your Owner's Information Package contain warranty information and operating instructions on the various appliances and components in your motor home. If you do not have operating instructions for a particular appliance or component, contact your dealer. Warranty registration cards for these items should be filled out and mailed as soon as possible after you take delivery of your motor home.

When contacting any of the equipment manufacturers, always have the model and serial numbers available. Appliance identification numbers will be found on tags or plates attached to the appliance.

If you have a warranty or service concern about the chassis portion of your motor home, you may go directly to an authorized chassis dealer for service. This may save you time and effort as the chassis warranty is administered by the chassis manufacturer. Consult your area directory for an authorized claims dealer. If you are unsure if the issue is chassis related, please contact your Fleetwood RV dealer.

The motor home has been thoroughly inspected before shipment. Your dealer is responsible for performing a complete pre-delivery inspection of the motor home as specified in the Owner Care delivery checkout.

Please refer to the warranty in the front of this manual. It explains your rights and obligations, as well as the rights and obligations of the dealer and manufacturer. Please read this section carefully. You will be better informed in case you have a warranty-related problem, and your dealer will be better able to get you on the road again.

## REPORTING SAFETY DEFECTS

### UNITED STATES CONSUMERS:

If you believe that your vehicle has a defect that could cause a crash, injury, or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Fleetwood RV Owner Relations at 1-800-322-8216.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign.

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

**Administrator  
National Highway Traffic Safety Administration  
1200 New Jersey Avenue, SE  
Washington, DC 20590**

You can also obtain other information about motor vehicle safety from the Vehicle Safety Hot line.

## CANADIAN CONSUMERS

If you believe that your vehicle has a defect that could cause a crash, injury, or death, you should immediately inform Fleetwood RV at:

**1-800-800-322-8216**

Or, you may call Transport Canada toll-free at:

**1-800-333-0510.**

## Notes

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# Driving & Safety

## Section 3

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## DRIVING & SAFETY

Section Two contains information on driving tips, emergency situations, towing, safety devices, weighing the motorhome and tires.

### **NOTE:**

**The motorhome has electronic data recording devices that may record information about direction, road speed, engine speed, brake application, steering attitude or other vehicle operating data. Data recording devices can be present in engines, transmissions, ABS (Antilock Brake Systems) or other systems affiliated with operation of the vehicle. Information from data recording devices can be examined in case of an accident. Contact the component manufacturer to learn more about these devices.**

### ***Inspections***

Differences between a passenger automobile and a motorhome are significant. Be aware of these differences when traveling. The key to safely operating the motorhome is inspection and maintenance. Problems on the road can result in lost time and increased repair costs. Several states require a special driver's license endorsement and vehicle inspection prior to registration. Traffic laws do vary between states. Be aware of these varying state traffic laws.

Conduct a systematic detailed inspection prior to moving the motorhome. Examine the condition of the motorhome and the surrounding area. Look "high and low" when walking around the motorhome.

The location of the driver's seat is higher and farther to the left than most vehicles causing a different perspective of the roadway. Use the outside mirrors to gauge the center of the road and to check conditions behind the motorhome. The dashboard may include more gauges and controls than are normally found in passenger automobiles. Become familiar with these gauges and their indications before starting out.

## ***Mirror Adjust***

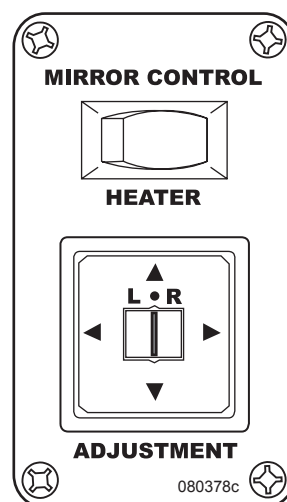
Adjust the mirrors prior to starting out. Have an assistant help to simplify the mirror adjustment process.

### **Mirror Adjusting:**

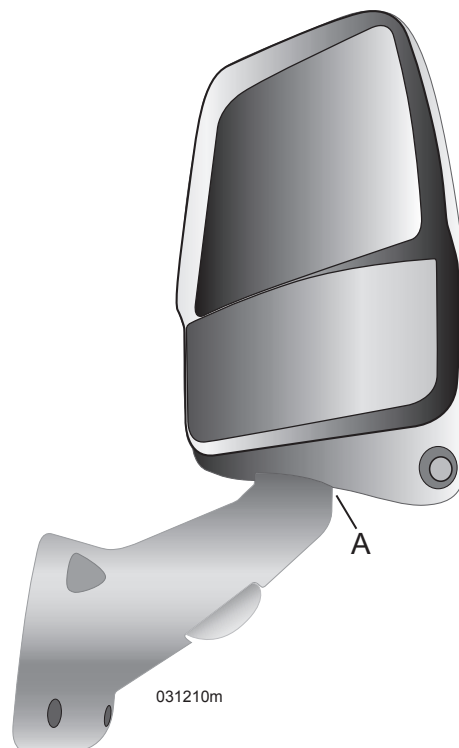
- Tools needed: Allen wrench.
- Adjust the driver seat to the travel position.
- To adjust the "head" of the mirror, loosen one of the Allen set screws located below the mirror head shown as point A. Adjust the head of the mirror to obtain best view.
- Manually adjust the bottom section of the mirror.
- Tighten set screw(s) once the proper view is obtained.
- Repeat procedure for passenger side mirror.

### **TIP:**

**Use the mirror adjust switch located on the driver's armrest to fine tune view of the top mirror.**



*Mirror switch*



## Safety Seat Belts

All occupants must be furnished with and use seat belts while the motorhome is moving. The driver's seat, and all other seats designed to carry passengers while the motorhome is in motion, are equipped with safety seat belts. Do not occupy beds or seats that are not equipped with a safety belt while the motorhome is in motion. The driver's seat must be locked in the forward facing position while motorhome is in motion. Seat belts are designed for individual use. Do not use a seat belt for more than one person.

To fasten the seat belt, pull the belt out of the retractors and insert the tab into the buckle; a click will sound when the tab locks into the buckle. Seat belt lengths automatically adjust to each occupants size and sitting position. Do not route belts over armrest or under the arm.

### **WARNING:**

**Safety belts are supplied at affixed seating positions. Do not occupy seats not equipped with safety belts while the motorhome is in motion. Seat belts must only be used on permanently mounted seats. Do not use a single seat belt on more than one person. Pilot and Co-pilot seats must be locked in a forward facing position with seat belts fastened while the motorhome is in motion. Do not rotate the seat while in transit.**

### **Child Passenger Safety:**

Child restraint requirements are determined by age and weight. According to NHTSA (National Highway Traffic Safety Administration), there are four stages to child restraint safety. Go to: <http://www.safercar.gov/parents/RightSeat.htm>

### **WARNING:**

**Refer to the manufacturer of the child seat for installation guidelines. Adhere to all instructions, cautions and warnings for proper securement of the child safety seat or booster seat.**

### ***Child Seat Tethers (If Equipped)***

Some child seat manufacturers recommend the use of a top anchorage (tether) strap in addition to the lap belt. Since a top anchorage (tether) strap can provide additional security to a child seat, we recommend using a tether whenever one is required or available.

The motorhome may be equipped with a child seat top anchorage (tether) strap anchorage point in the forward passenger seat location.

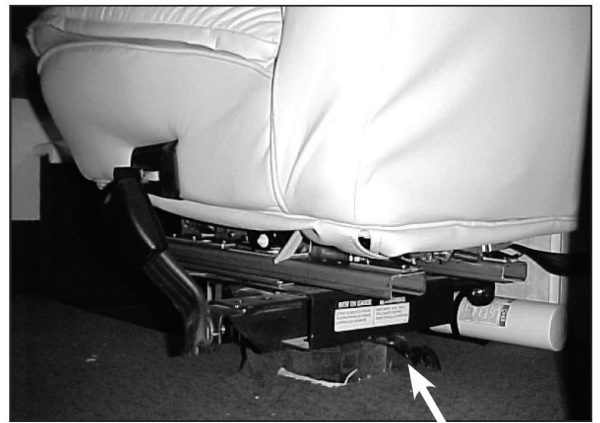


Illustration 1

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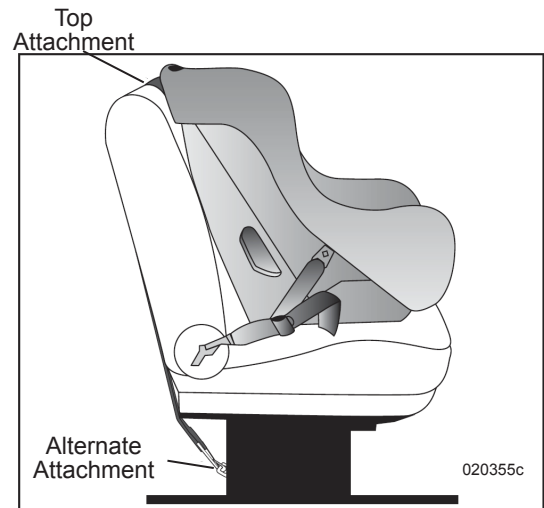


Illustration 2

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The anchorage hardware, if available, is located at the lower rear of the passenger or secondary seat. A small metal anchorage loop will be present which will allow the tether strap hook to engage (see Illustration 1).

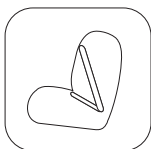
To use, with the seat in position, drape the tether strap over the seat back and down (see Illustration 2). Attach the tether strap hook to the tether anchorage point and tighten the strap according to the child seat manufacturer's instructions. Make sure the strap is not twisted and that the forward facing seat is always positioned upright and locked in the forward facing position when the motor home is in motion.





### Step 1:

For the best possible protection keep infants in the back seat, in rear-facing child safety seats, as long as possible up to the height or weight limit of the particular seat. At a minimum, keep infants rear-facing until a minimum of age 1 and at least 20 pounds.



### Step 2:

When children outgrow their rear-facing seats (at a minimum age 1 and at least 20 pounds) they should ride in forward-facing child safety seats, in the back seat, until they reach the upper weight or height limit of the particular seat (usually around age 4 and 40 pounds).



### Step 3:

Once children outgrow their forward-facing seats (usually around age 4 and 40 pounds), they should ride in booster seats, in the back seat, until the vehicle seat belts fit properly. Seat belts fit properly when the lap belt lays across the upper thighs and the shoulder belt fits across the chest (usually at age 8 or when they are 4', 9" tall)



### Step 4:

When children outgrow their booster seats, (usually at age 8 or when they are 4'9" tall) they can use the adult seat belt in the back seat, if it fits properly (lap belt lays across the upper thighs and the shoulder belt fits across the chest). All children under age 13 should ride in the back seat.



### NOTE:

The motorhome manufacturer is not the author of Child Passenger Safety. The information provided is reprinted from the National Highway Traffic Safety Administration's website. Visit NHTSA's website at [www.nhtsa.gov](http://www.nhtsa.gov) for the most recent and up to date information.

### Tips:

- Go to [www.nhtsa.gov](http://www.nhtsa.gov) and choose "Child Safety Seat Information" from the menu or click on the child passenger safety icon. The site includes child safety seat installation tips, product ratings, recalls and other useful information.
- For more information about child safety seats, booster seats, inspection/fitting stations in your area, seat belts, and other highway safety issues, call the DOT Vehicle Safety Hotline at: **1-888-327-4236**.
- A certified child passenger safety technician can check your installation and answer questions. To find a technician or an inspection station near you, go to [www.nhtsa.gov](http://www.nhtsa.gov), click on the child passenger safety icon, and then click on the Fitting/Inspection Station link, or go to [www.seatcheck.org](http://www.seatcheck.org).

The child safety seat can be positioned in two places: the front passenger (co-pilot) seat and forward facing permanently mounted booth dinette seat equipped with safety belts.

### WARNING:

Individual states and Canadian provinces may have laws that can exceed the requirements as described in this section. It is the responsibility of the owner to know and comply with the laws in the state or province in which the motorhome will travel.

### NOTE:

Use of a safety or booster seat in the front seat may be prohibited in some states and Canadian provinces.

### WARNING:

Do not transport children unrestrained. Infants must be placed in approved safety seats - small children must be restrained in child safety seats. Do not use a single seat belt on more than one child. Failure to comply with these rules can lead to injury or death.

## DRIVING TIPS

The motorhome is a complex vehicle that requires increased driving awareness because of its size and various components. Turning radius will be much wider than that of a standard automobile due to increased length. Pay close attention to the perimeter of the motorhome including front, sides, rear, roof and undercarriage. Ensure the surrounding area is clear of obstacles. Use the mirrors to observe traffic conditions as well as the exterior including tires, bay doors, blind spots, etc.

Use a push-pull method of steering, with both hands parallel on the steering wheel. The motorhome is considerably heavier than an automobile and has a higher center of gravity. These factors will necessitate advanced reaction time. Swerving and sharp cornering performed at high speeds could result in loss of control.



Keep size and weight of the motorhome in mind. Drive with increased caution to avoid situations that might require quick momentum changes. Increase reaction time by paying attention to traffic and road conditions 12 to 15 seconds ahead.

The motorhome will travel safely and comfortably at highway speed limits. However, it takes more time to reach highway speed. When passing another vehicle, allow extra time and space to complete the pass due to increased length.

Manually shift to a lower gear when descending a long hill. Begin the descent at a slow speed. Do not allow the motorhome to gain momentum before trying to slow down. Use the transmission and engine to help control downhill speed and can extend the service life of the brake lining. Distance required to stop the motorhome is greater than an automobile. Practice stopping away from traffic to get the feel of distance required to stop.

Note weight limits of bridges before crossing. Signs should be posted at bridge entrances. Check posted height of all overpasses and situations where overhead clearance is limited. Keep in mind road surfaces may be repaved or packed with snow; therefore, the actual posted clearance would be less in such conditions.

Use the pilot seat controls to comfortably position the seat. Stay seated and adjust the outside mirrors if necessary to gain a clear line of vision down both sides of the motorhome.

## Adjust to Driving Conditions

Adjusting to road, weather and terrain conditions is necessary to keep the motorhome under control. Pay attention to road signs that advise of local road hazards and driving conditions. Do not operate the motorhome when road, weather and terrain conditions seem unsafe.

The cockpit, dash area and windshield are larger than those found on passenger cars and trucks. Keep the windshield clear of humidity in the form of water or ice.

Start the motorhome and turn on the dash defrost to help remove moisture from inside the windshield. It may be necessary to use a clean cloth to wipe away moisture. Do not operate the motorhome if the windshield is not clear.

Keep windshield wipers in good working order at all times. Do not operate the motorhome when road, weather and terrain conditions are considered unsafe.

### Driving Cautions:

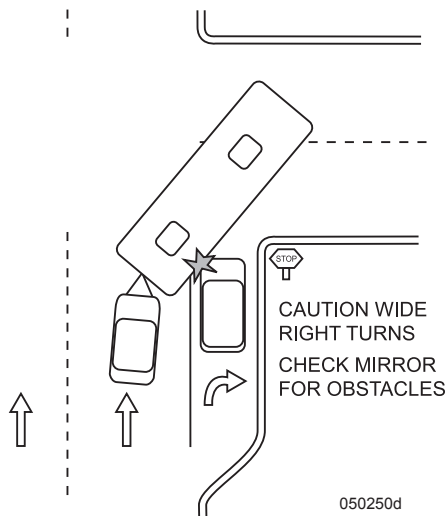
- Avoid getting too close to the shoulder of the road, which may be too soft to support the weight of the motorhome.
- Side spacing is best maintained by keeping the motorhome centered in the driving lane.
- Driving lanes in work zones can be uneven, congested and more narrow than usual.
- Be cautious of road debris that can damage the undercarriage of the motorhome or become lodged in the dual tires and cause damage to the tires, wheel rims or tow vehicle.
- On back roads and single divided roads, tree branches and shrubbery can protrude into the roadway. Watch for low hanging branches especially during inclement weather. Rain and snow will cause branches to hang lower than usual.
- Keep in mind that posted speed signs are usually passenger automobile rated. Be extra aware of driving conditions and use the appropriate speed for a motorhome when necessary, especially on corners and mountain roads.
- Downgrade speed should be at least 5 mph less than upgrade speed, or downgrade speed should be attainable within three seconds of a brake application.
- Use a four second rule when following other vehicles at speeds under 40 mph. Use a five second rule when following at speeds over 40 mph.



### Right Turns:

Negotiating a right hand turn in a motorhome can be difficult. Many drivers fear they cannot make the turn without entering into the other lane or jumping the curb. Here are a few tips to make a right hand turn easier:

- As the turn approaches, look into the mirror to ensure the lane to the left is clear, then move wide over to the left.
- When making the right turn, the left rear wheel should touch the center line of the road and the driver's hips should be parallel to the roadside curb of the corner being turned to aid in avoiding a premature turn.
- Make the turn slowly.



- Make the turn slowly.
- Check mirrors frequently. Stay aware of necessary clearance and space management of the motorhome while negotiating the turn.

### Left Turns:

- Do not proceed with the turn until the driver's seat is aligned with the center of the intersection. If two lanes are available, use the right hand lane. Vehicles or objects are more easily seen by the driver on the left hand side.

### Ascending a Grade:

When approaching a grade, assess the grade and length before ascending. Prepare early for a long ascent. To avoid overheating, downshift to a lower gear and use less throttle where engine temperature remains stable. Power output from the engine depends on the following circumstances:

- **RPM** - Every engine has a RPM range that produces the most efficient torque curve.
- **Fuel/Air Mixture** - There is a limit to how much air is drawn into the combustion chamber. Conversely there is a limit to how much fuel can be injected to produce the most efficient state of combustion.

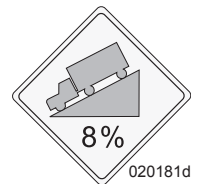
The drivetrain is more efficient when temperatures remain stable during long grades.

### IMPORTANT SAFETY TIP:

**Turn on the hazard lights if road speed decreases to the point where the motorhome is moving significantly under the posted speed. Use pullouts if traffic is accumulating. Once in a pullout, if there is sufficient clearance for safety, idle the engine for a while to allow the exhaust to cool. While these are cooling, the transmission will also cool. Continually monitor the gauges while waiting.**

### Descending a Grade:

Prepare to descend a grade at the crest of the hill. Observe any signs indicating grade angle and duration. The sign may suggest maximum downhill speed according to Gross Combined Weight (the combined weight of the motorhome and a trailer/tow car). At the crest of the hill, manually shift the transmission into a lower gear. Do not allow the motorhome to gain momentum before slowing down.



Use moderately heavy pressure on the brake pedal to reduce speed and manually downshift to maintain a safe, slow speed. Pumping and riding the brake pedal is not recommended when descending a grade. Brakes can overheat, resulting in loss of effectiveness.

### Night Driving:

- Be well rested and alert. If necessary, find a safe to stop and rest until ready to continue.
- Avoid using interior lights that create a glare on the windshield and decrease visibility.
- Dim dash lights to a comfortable level to reduce glare.

### Extreme Heat/Hot Weather Conditions:

- Frequently observe all gauges. Variations from normal conditions should be promptly evaluated.
- Check tire pressure before traveling in hot conditions. Tire air pressure increases with heat. Do not let air out of a hot tire. When the tires cool down they will return to the correct/previous tire pressure.

- Pay extra attention to hoses and belts that are more susceptible to fatigue in extreme heat.

### **Winter and Cold Climate:**

- The motorhome should be prepared for cold weather use.
- Keep speeds slow and steady. Make moves gradually and look further ahead to increase reaction distance.
- During cold weather tire air pressure can decrease. Check tires and ensure tires are at proper inflation pressure.
- If road or weather conditions are treacherous, find a safe place to stop until conditions improve.
- Avoid downshifting on wet or slippery surfaces that can cause the drive wheels to skid.
- Wiper blades should be in good condition. Fill the washer reservoir with antifreeze formula window washer fluid.
- Use mirror heat to keep mirrors clear.
- Remove any ice build-up from the entry step to avoid accidental slipping.

### **Wet Conditions:**

- Worn or improperly inflated tires can increase risk of hydroplaning.
- Heavy rain or deep standing water can cause brakes to apply unevenly or grab.

### **Refueling:**

- Truck stops are good refueling points.
- Check overhead clearance before pulling into the fuel island.
- Be aware of concrete/steel posts installed around fuel islands.
- Avoid running over the fuel hose as it can get hung up on the motorhome and cause body damage.
- To prevent grease and fuel deposits from being tracked into the motorhome when refueling, change shoes before entering. Store the extra pair of shoes near the entry door.
- Use of gloves is recommended for refueling. Store gloves in the outside compartment.

### **WARNING:**

**Propane and gasoline are highly flammable and can ignite, resulting in explosion, fire or death. Ensure all flames are extinguished and all propane appliances are turned off and the primary propane shut-off valve is turned off prior to refueling.**

### **Fuel Economy:**

Driving style, wind resistance, terrain, vehicle weight, and engine-driven accessories are some of the factors that affect fuel economy.

### **Guidelines to Help Increase Fuel Efficiency:**

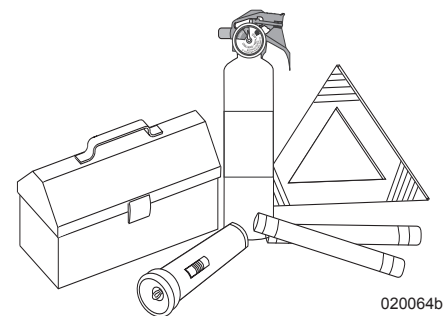
- When starting out, apply the throttle lightly and accelerate gradually. Avoid excess throttle and accelerating quickly.
- Check the tire pressure. A low tire is not only a safety hazard but also increases rolling resistance and fuel consumption. Keep the engine at a low to mid operating range of 1100 to 1500 RPM, which requires less fuel than operating at higher RPM.
- Avoid using full throttle when ascending a long hill. This wastes fuel and increases engine operating temperature from incomplete combustion. Manually shift to a lower gear and use less throttle. Fuel will burn more efficiently.
- Avoid extended idling to warm-up the engine. Start the engine and wait for normal oil pressure to register. The engine is now ready for travel. Whenever coolant temperature is below operating temperature (idling engine) incomplete combustion occurs, causing carbon build-up and raw fuel to wash lubricating oil from the cylinder walls and dilute the crankcase oil.
- Follow the maintenance schedule for the engine.

### ***Trip Preparation***

The following suggestions are general guidelines to follow when preparing for a trip:

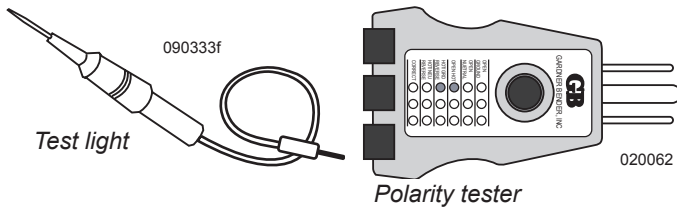
### **Items to Carry:**

- An emergency road kit containing a flashlight, road flares, warning signs and a fire extinguisher.



*Tool Box & Emergency Road Supplies*

- Local, State and National Maps, as well as a 'Motor Carrier' road atlas (for refueling station and truck repair facility locations).
- Hand tools, a 12 Volt DC test light, a 120 Volt AC polarity tester, battery hydrometer, an assortment of blade fuses, mini fuses and alternator belt.



- Potable and non-potable water hoses, a water pressure regulator and various termination connectors for sewage.

### **Inspection:**

- Ensure all exterior items are stowed or secured (i.e. TV antenna, ceiling vents and windows).
- Check belts, hoses, battery and engine fluid levels. Inspect the engine, transmission and generator per the OEM manuals.
- Evenly distribute and secure cargo. Store heavy items near the rear axle and lighter items toward the front to prevent uneven stress and abnormal handling.
- Check all tires for accurate inflation pressure and physical condition. Look around, above and under the motorhome for obstruction or leaks. Test all exterior lighting: headlamps, taillights, brake and clearance lights.
- Inside the motorhome, store and secure heavier objects in the lower cabinets to maintain a low center of gravity for sway reduction.
- Secure loose items to prevent weight shifts.
- Store lighter items in the overhead cabinets.
- Close and secure all cabinet doors and drawers, shower and pocket doors.
- Turn off interior lighting.
- Adjust exterior mirrors and check dash gauges for proper operation.
- Dash and Controls is located in Appendix A. Dash Board and Controls has been provided to assist with identification of switches and controls. Use this to familiarize yourself with their functions before traveling.

### **INFORMATION:**

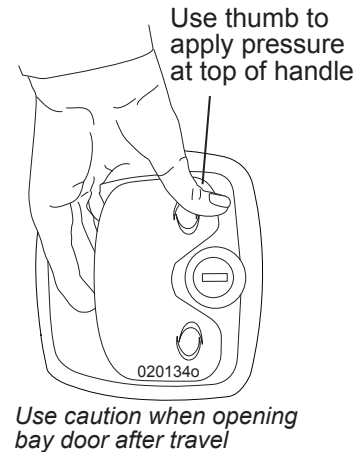
**Refer to the Chassis OEM manual for maintenance recommendations.**

### **CAUTION:**

**Open the bay doors slowly. Cargo may shift during travel.**

### **WARNING:**

**To avoid injury, never place hands or fingers near the edges of the bay door when opening or closing. Always use the latch handle. Apply pressure with the other hand just above the latch handle.**



### **TIPS:**

**Multi-purpose items, versatile clothing and periodic removal of unused cargo will streamline cargo storage.**

## **HITCH**

### ***Using the Hitch Receiver***

When using the hitch receiver, remember that the motorhome is intended for towing light loads and is primarily designed as a recreational vehicle. Safety and durability of the hitch receiver requires proper use. Avoid excessive towing loads or other misuse of the receiver. Towing will affect fuel economy.

When towing a trailer or car without use of an auxiliary braking device, the brakes on the motorhome must absorb the increased energy required to stop both the motorhome and the towed load. This is critical and extra awareness must be used especially on hills and mountainous terrain where sharp curves, steep grades and possibly irregular road surfaces may be encountered.

Check the motorhome Chassis Operator's/Owner's Guide/Manual for the maximum weight the motorhome can tow and stop. Extreme caution must be used especially as weight of a towed load increases.

While the motorhome has a Gross Combination Weight Rating (GCWR), stopping distances will increase if the towed load is not equipped with an auxiliary braking device.

When weighing the motorhome, add all passenger weight to the GCWR total. The motorhome must be weighed, in a fully loaded ready to travel condition which includes weight of fresh water, occupants, carry on items and any vehicle or trailer towed. Total weight must not exceed the GCWR.

#### **NOTE:**

**In most cases the GCWR of the chassis and the finished motorhome are the same. In some cases, due to the equipped hitch receiver, the GCWR may be reduced. Please refer to the Federal Certification Label posted in the motorhome for the GCWR.**

#### **WARNING:**

**Most states and Canadian provinces require trailers and/or towed vehicles to have adequate auxiliary brakes and safety chains. Failure to comply with these State and Canadian province requirements may result in fines and/or pose a safety hazard, that can result in an accident.**

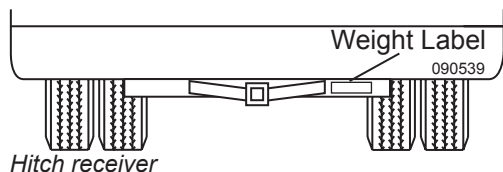
#### **WARNING:**




**Do not tow a trailer or vehicle that exceeds the rated capacity of the hitch receiver. Overloading the hitch receiver can cause unusual handling characteristics and overstress the hitch receiver and chassis. It could also void the warranty. If there are any questions, call customer support.**

### ***Towing Systems***

#### **Hitch Receiver:**

Tongue weight must not exceed 10% of the rated capacity when using the hitch receiver. The ratings associated with the particular hitch receiver supplied with the motorhome are noted on the federal certification weight label and on the weight label affixed to the hitch receiver.



WARNING				
DO NOT CUT, DRILL, WELD, OR MODIFY	DO NOT EXCEED LOWER OF TOWING VEHICLE MFR'S RATING OR			
	HITCH TYPE	MAX GROSS TRLR WT (LB)		MAX TONGUE WT (LB)
	*WEIGHT DISTRIBUTING	WARNING DO USE WITH SPRING BARS		
	*WEIGHT CARRYING	5,000	500	
	*DINGHY TOWING	5,000	500	
	*SEE OWNERS MANUAL FOR TOWING INSTRUCTIONS. SAE/V-5			
837 0117				

Example of weight label. Refer to actual label for weight ratings

100200m

The weight label on the hitch receiver provides the maximum trailer weight rating and the maximum tongue weight rating. It is important that these ratings not be exceeded.

It is important that towing devices attached to the hitch receiver are rated equal to or greater than the load of a towed trailer, automobile dolly, or other towed load.

Consult with your dealer or towing equipment/trailer supplier to determine the correct type of hitch head assembly, hitch ball and other towing equipment for a safe and correctly assembled towing system for the towed load.

Towing literature is also available from vehicle manufacturers, the National Highway traffic Safety Administration, towing equipment manufacturers, trade associations, and publications/books about how to tow.

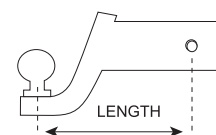
#### **Ball Mount:**

Ball mounts come in various configurations and weight limitations. There are three things to consider when selecting a ball mount: weight rating, pin to ball center length and rise/drop. The weight rating of the ball mount, tongue weight and tow weight must meet or exceed the total load weight.

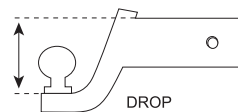
Pin to ball center should not exceed 8".

Ball mounts of longer length will significantly reduce the weight rating of the hitch receiver. Observe weight reduction percentages that may be listed on ball mounts longer than 8".

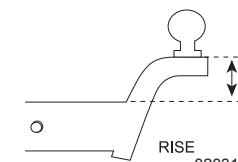
Selecting how much rise or drop a ball mount will need is relative to hitch receiver height and height of the towed load with respect to the type of towing equipment between the motorhome and towed load. When connected, the towed load or towing equipment should be level and parallel with the ball mount.



*Distance from the center of the hitch ball hole to the center of the pin hole.*



*Distance from the shank to the top of the hitch ball platform.*



*Distance from the top of the shank to the top of the hitch ball platform.*



### **Weight Distributing Hitches:**

A weight-distributing hitch (load-equalizing) uses spring bars attached to the trailer tongue A-frame assembly to transfer some of the trailer tongue weight to both motor home axles.

### **WARNING**

**Never weld or drill holes in the trailer hitch.  
Never weld or drill holes in the frame.**

A weight-carrying hitch (ball mount) assembly does not use spring bars. All of the tongue weight of the trailer bears down on the hitch assembly that loads the motorhome rear axle(s). For this reason, the maximum load is limited when using only a ball mount.

In addition to ball mounts and weight-distributing, the hitch may also have a tow car rating. This rating will apply should a motor vehicle be towed with all four wheels down.

A major weight distributing hitch manufacturer provides the following information in their installation and operation instructions:

“...Severe bumps and badly undulating road can damage your towing vehicle, hitch, and trailer, and should be negotiated at a slow steady speed.”

A weight-distributing hitch that has been properly adjusted for operation on relatively level road surfaces may cause the weight distribution hitch to produce enough force to bend the trailer “A” frame, hitch head assembly, hitch receiver, or motorhome frame when operated over severe bumps and badly undulating road surfaces. Contact the weight distributing hitch manufacturer for further information. Frame damage resulting from this type of operation may void portions of the warranty. Here are additional guidelines to follow:

- Do not use a load equalizing hitch if the hitch head receiver rating is below 10,000 lbs. capacity. It could cause structural damage to the motorhome frame components.

- Do not exceed Maximum Tongue Weight as listed on the Federal Certification label. Heavier tongue weights can change handling and response which can lead to an accident, and will restrict coverage under the Owner Care Warranty.
- Do not tow anything weighing more than the GTW listed on the Federal Certification label. Heavier towed loads can exceed the ability of the chassis to pull and stop the load and cause a vehicle crash, damage the motorhome structure or drive train, and restrict coverage under the Monaco RV or chassis manufacturer’s warranty. Changing the trailer hitch will not increase the tow capacity of the motor home.
- Consult the Chassis Operator’s/Owner’s Guide/ Manual, and U.S. state and Canadian provincial laws for towing weight limits and for guidelines for installing supplemental braking systems that operate with your motor home’s brakes.
- Towing equipment to consider includes a weight distribution system, a sway control system, a brake controller, and a supplemental brake control system. The weight of the towed load in comparison to the towing capacity of the motorhome should be evaluated during this consultation. Installation of tow equipment must be performed by a competent installer. Make sure the installation follow the tow equipment manufacturer’s instructions.

### **WARNING:**

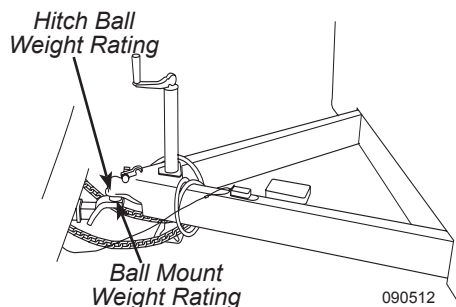
**Do not exceed the rated load of the motor home, or the rated load of any axle. Exceeding the GVWR, GAWR, GTW or GCWR of your motor home can cause handling problems, a vehicle crash, damage the motorhome and void the warranties.**

### **WARNING:**

**Failure to understand and follow these guidelines as presented in this section could result in damage to the motorhome frame or body, could cause unstable driving and handling characteristics, and will restrict warranty coverage.**

### **Hitch Ball:**

The three most common diameters of a hitch ball are: 1-7/8", 2" and 2-5/16". The larger the diameter of the hitch ball, the higher the weight rating. The diameter of the hitch ball shank also factors into weight rating. Match shank diameter with the hole in the ball mount or weight distributing head. Shank clearance should not exceed 1/16".



There should be at least two additional threads extending past the nut when the hitch ball is secure.

### Safety Chains:

Safety chains are required by law when towing any load. The chains and any fasteners used to attach the chains to the hitch receiver must be rated for the load being towed. Attach chains so they crisscross under the towing equipment. Allow just enough slack in the chains to make sharp corners.

Too much slack will allow the chains to drag on the road surface. If the towed load does uncouple from the hitch ball, the towing equipment will be cradled by the safety chains. Do not make a sudden stop and exacerbate the situation. Apply the brakes with gentle, steady pressure. Pull over to the side of road at a safe location.

### Tow Capacity and Class Ratings:

Several components may comprise a tow hitch system. The weight rating of individual components of the towing system must be greater than the gross weight of the load being towed.

Maximum tow capacity is limited to the component with the lowest weight rating in the tow hitch system. Example: a ball mount may have a weight rating of 5,000 lbs., but the hitch ball is rated 3,500 lbs. Maximum tow capacity is reduced to 3,500 lbs.

Towing components are classified into weight classes to define weight capacity of towing equipment. These groups are shown in chart:

	CLASS I	CLASS II	CLASS III	CLASS IV	CLASS V
Weight Carrying Hitch	TW - Up to 200 lbs.	WC TW - Up to 350 lbs.	TW - Up to 500 lbs.	TW - Up to 750 lbs.	TW - Up to 1,200 lbs.
	GTW - Up to 2,000 lbs.	WC GTW - Up to 3,500 lbs.	GTW - Up to 5,000 lbs.	GTW - Up to 7,500 lbs.	GTW - Up to 12,000 lbs.
Weight Distributing Hitch	---	---	---	TW - Up to 1,200 lbs.	TW - Up to 1,400 lbs.
	---	---	---	GTW - Up to 12,000 lbs.	GTW - Up to 14,000 lbs.

- **GTW** = Gross Trailer Weight. Weight of trailer fully loaded.
- **TW** = Tongue Weight. Weight pushing down on Tow Ball.
- **WC** = Weight Carrying. Weight carrying capacity of the Ball Mount.
- **WD** = Weight Distributing. Weight carrying capacity of a weight distributing hitch.

### **WARNING:**

Be sure the weight ratings of the ball mount, tow ball and safety chains are equal to or greater than the load. Use of an extension to the receiver or extended ball mount will significantly reduce hitch receiver weight ratings. Modifications to the hitch receiver, or use of the hitch receiver other than intended, can void the warranty of the hitch receiver, chassis or both.

### Calculating Tow Capacity:

Several variables must be considered and calculated to properly determine towing capacity. Limiting factors include GCWR (Gross Combination Weight Rating), GAWR (Gross Axle Weight Rating), hitch receiver weight rating and the weight rating of each piece of towing equipment. One or some of these variables will limit tow capacity.

### **WARNING:**

Never modify the hitch receiver or chassis frame. Never weld on the hitch receiver or chassis frame.

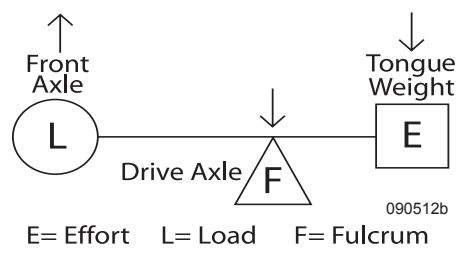
**Example:** The motorhome has a GCWR of 35,000 lbs. The motorhome in a fully loaded, ready for travel condition, weighs 29,500 lbs. The hitch receiver is rated at 700 lbs. tongue, 7000 lbs. tow. The load being towed weighs 4,200 lbs. with a tongue weight of 400 lbs. However, the hitch ball is rated at 3,500 lbs. In this case tow capacity is limited to 3,500 lbs. due to the rating of the hitch ball, even though the rest of the towing equipment, hitch receiver and vehicle GCWR are within specifications.

It is possible to be within the GCWR but exceed the GAWR. When tongue weight is applied, mechanical advantage increases with distance (lever) from the hitch ball to the tag axle or drive axle. That axle now becomes a pivot point (fulcrum).

Towing Weight Checklist				
<b>Towed Load</b>	(Tongue Weight) _____	(Overall) _____	Yes	No
<b>Towing Equipment</b>	(Ball Mount) _____	(Hitch Ball) _____	Yes	No
<b>Hitch Receiver</b>	(Tongue) _____	(Tow) _____	Yes	No
<b>GAWR</b>	(Rated) _____	(After Hitching) _____	Yes	No
<b>GCWR</b>	(Rated) _____	(After Hitching) _____	Yes	No

Insert Weight Ratings: Check Yes or No if within specifications.

As tongue weight increases (effort), weight on the drive axle also increases (fulcrum) while weight on the front axle (load) decreases as weight is displaced from the front axle.



It may be necessary to weigh both the tow vehicle and towed load as an assembly to ensure the GAWR has not been exceeded. It is also possible to be within the rating of the hitch receiver and yet exceed the GCWR.

Due to changes in weight, the motorhome must be weighed in a loaded, ready for travel condition that includes passengers, cargo and liquids. Subtract the weight of the motorhome in a loaded, ready to travel condition from the GCWR to determine tow capacity. Whether towing a vehicle or trailer, the load being towed must be weighed to ensure the towed weight, when added to the tow vehicle, will not exceed the GCWR and the weight ratings of each tow system component are equal to or greater than the load being towed.

**WARNING:**

**The motorhome and towed load must be weighed after they are loaded for travel to determine if actual weights are within towing specification. Each component of the towing system must be rated equal to or greater than the load being towed. Do not exceed the Gross Combination Weight Rating.**

***Towed Vehicle Requirements***

Vehicle manufacturers produce cars and trucks that are designed to be capable of being towed with all wheels down.

Use caution and note all limiting factors when

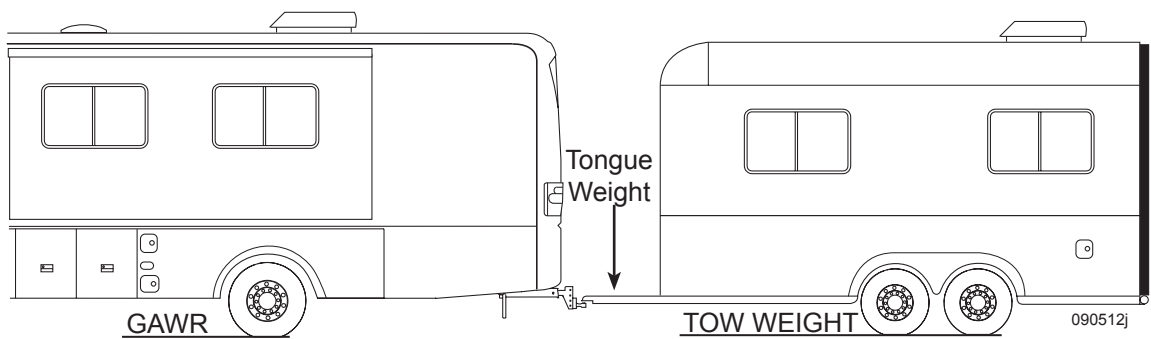
selecting a vehicle to tow (aka dingy). Things to consider are battery drain on the tow vehicle electrical system with the steering wheel unlocked, can the transmission of the towed vehicle be damaged with all wheels down and is the tow vehicle too heavy as well as other concerns.

Before selecting a tow vehicle, consult the tow vehicle manufacturer's instructions to ensure the vehicle is approved to be towed with all four wheels down. All aftermarket products that modify the vehicle for towing should also be approved by the vehicle manufacturer.

Make sure the tow vehicle weight and attaching hardware do not exceed the rating of the hitch receiver. Note the hitch receiver capacities (tongue and tow) listed on the weight tag located on the hitch receiver.

Do not exceed rated maximum capacities. Make sure the weight of the motorhome with the tow vehicle do not exceed the gross combination weight rating (GCWR) of the motorhome. Make sure that tow bars and hitch equipment is rated for the weight of the tow vehicle.

In addition, the tow vehicle must be equipped with its own independent auxiliary brake system that will activate when the brakes on the motorhome are applied. State/Province regulations may require additional lighting requirements. Check with the DMV of the State and/or States (and Provinces) you will be traveling for any additional requirements.



## Tow Plug Connection

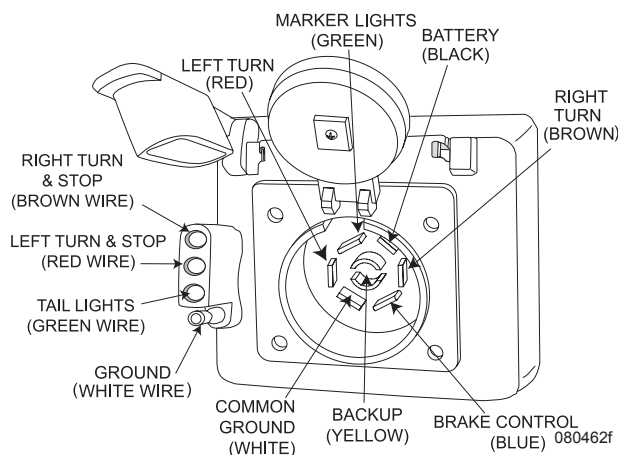
### Taillight Configuration:

Taillight wiring is classified either 2-wire or 3-wire configuration. A 2-wire configuration has all red lens. A 3-wire configuration usually has red and amber lens. Amber is used for turn signals only and red for taillight and brake light. These systems are electrically different. When connecting a towed load with a 2-wire system to a tow vehicle with a 3-wire system, or vice versa, a converter box must be installed for correct function of brake lights and turn signals. A taillight converter is available from auto and RV supply stores. Do not attempt to wire a tow plug connector if unfamiliar with these systems. A trained technician will install the proper converter so the brake lights and turn signals function correctly on the motorhome and towed vehicle or trailer.

The motorhome is pre-wired from the factory with an electrical connection for towing. The connection is located near or on the hitch receiver. Current draw should not exceed 10 Amps for each designated light circuit. Within the electrical connection is a positive terminal for use when towing a trailer equipped with a battery. The positive terminal maintains the charge of the trailer battery.

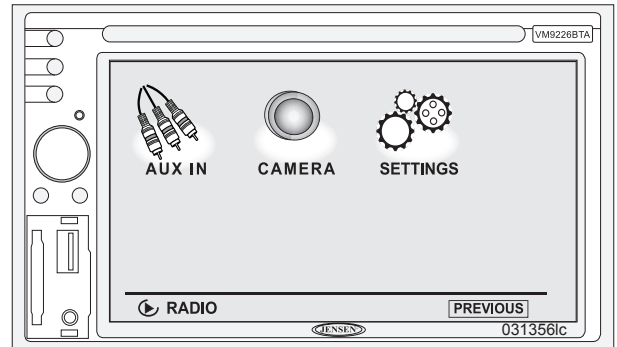
### To Tow a Car or Trailer:

- Connect a tow car or trailer to the motorhome with safety chains rated for the weight being towed.
- Make the electrical connection and perform a light check before starting a trip and at each rest stop.
- Check the tires frequently. A flat tire on a towed vehicle cannot be detected from the motorhome while driving. A flat tire is a safety hazard and may result in damage to the wheel, towed vehicle or other vehicles.

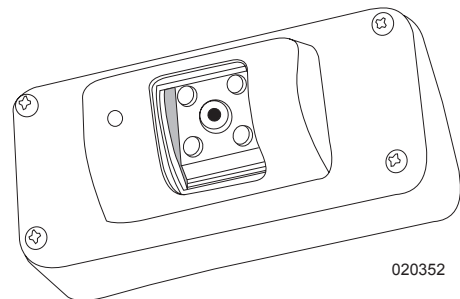


## REAR VISION SYSTEM (OPTIONAL)

The dash radio consists of a rear vision camera with microphone located at the rear of the motorhome. The camera is designed to provide the driver with a rear view when backing up. The system may be used while driving in forward, reverse or when parked. The monitor features a touch-screen display. The system must be powered on for use.



Jensen radio. Camera screen shown



Rear Camera

### INFORMATION:

**Refer to the OEM manual for detailed operating instructions.**

### NOTE:

**Refer to Section 5 Dash Radio for other system features.**

### Precautions:

- Do not expose the monitor to excessive heat or cold.
- The monitor is not waterproof.
- Do not use abrasive cleaning materials on monitor.
- Do not strike or drop objects on the monitor.

### To Use the System When Driving or Parked:

- Turn on the battery disconnect switch.
- Turn on the monitor.
- Press the Camera button from the touch-screen display.



**NOTE:**

**The rear vision system will automatically turn on when the gear selector is placed in reverse.**

**Features:**

- Remote Control Sensor: The remote control must be pointed at the infrared sensor for the system to operate.
- Power On/Off: The battery disconnect switch must be on to operate the monitor. The Power button on the monitor turns the system on or off. Momentarily press to turn the system on. Press and hold to turn off.

**BACKING UP A MOTORHOME**

Whether a long time owner of recreational vehicles or just starting out, backing up can be a challenge. Following some simple guidelines may help to reduce that challenge. When backing up, the driver (pilot) should be comfortable using the mirrors, the back-up camera and the co-pilot's directions (ground guide) for assistance.

Practice backing up with the co-pilot's guidance in a large unobstructed parking lot. Backing up is a team effort. The backing process should begin while the motorhome is in forward motion. Maneuver the motorhome to align with the chosen site. Aligning the motorhome with the site after the backing process begins may require more than one attempt. When the motorhome is properly aligned with the site, the parking area will be visible in both mirrors. Use road markings as reference points when possible.

When pull-through sites are not available, pick a solid, level site on the left side for a better field of vision using the roadside mirror. If the site is on the right, use the curbside mirror for backing up, but stay aware of blind spots. Get out and walk the area prior to backing in. Look for potential hazards or obstacles that may damage the motorhome.

If the site is satisfactory, prepare to back in carefully. Have the co-pilot provide guidance using the five hand signals. Use of walkie-talkies will also aid in guidance.

The backup monitor may have a one-way communication feature. Have the co-pilot or spotter "speak up" so directions can be given and followed.

The co-pilot will perform just as important a job as the driver. When guiding the driver, the co-pilot should be located safely at the left rear corner of the motorhome, facing forward, while remaining visible in the roadside mirror at all times.

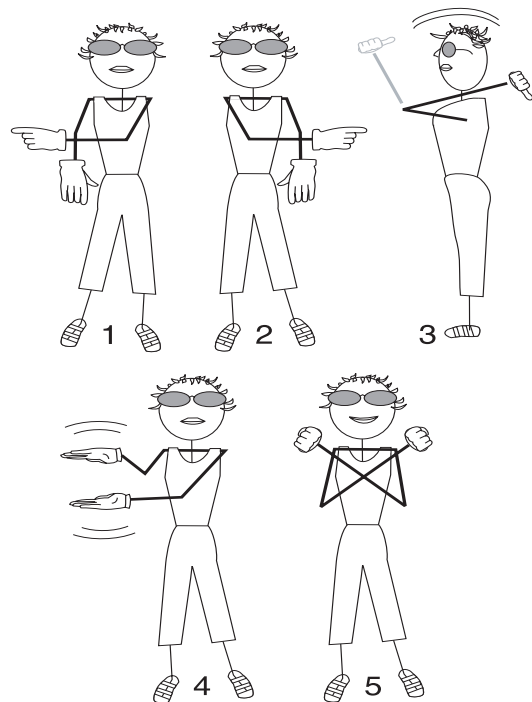
The co-pilot should make a conscious effort to maintain sight of the driver through the roadside mirror as the motorhome maneuvers. If the driver loses sight of the co-pilot, stop the backing up process until the co-pilot returns to view. To avoid mishaps, the co-pilot should be focused only on what the driver is doing, with brief observation moments.

If necessary, stop the backing up process to have co-pilot inspect other areas or angles of concern. The driver should receive directions only from the co-pilot. When the co-pilot is guiding the driver, five clearly defined signals should be used, with only one signal given at a time. Flailing arms with indecisive signals confuse the driver. Signals should be given with purpose and confidence. Directional signals are directing travel of the rear of the motorhome.

If the desired direction is left, the co-pilot points left. **For example:** The co-pilot will use his/her right arm and forefinger pointing distinctly left with arm and finger held on a horizontal plane, indicating desired direction of travel of the rear of the motorhome. The directional signal given should remain steady until the desired movement is complete.

**Five Directional Signals:**

1. Co-pilot uses left hand and arm held horizontal, with forefinger pointing right, to direct rear of motorhome to the right.
2. Co-pilot uses right hand and arm held horizontal, with forefinger pointing left, to direct rear of motorhome to the left.



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3. Co-pilot uses both arms and hands parallel with thumbs pointing up and to rear in a waving vertical motion. This signals driver to maintain a straight back direction.
4. Co-pilot holds arms horizontally, hands open with palms facing one another. Start with a wide separation, gradually closing distance of hands in a rate appropriate to vehicle speed to indicate amount of distance to the stop point.
5. Closed fists and crossed arms indicate **STOP**.

### Backing Up Trailers:

Towed vehicles using a tow bar or tow dolly have more than one pivot point and are not suitable for backing. Attempting to back up the motorhome while connected to a tow bar or tow dolly can jack-knife the towing device. Damage to towing device, tow car and motorhome can occur. If necessary, disconnect the tow vehicle to avoid a backing up situation.

Trailers have one pivot point and may be backed up. The same rules for backing a motorhome can be applied to backing a trailer.

When preparing to back the trailer into a space, maneuver the motorhome sweeping wide. Turn back to the opposite direction to maneuver the trailer into the space. Turn the bottom of the steering wheel in the desired direction of travel for the trailer.

**For example:** If the desired direction of the trailer is left, rotate the bottom of the steering wheel left. If the trailer moves in an undesired direction, pull forward just far enough to re-align the trailer with the space. The co-pilot should stand safely at the left rear corner of the trailer within view of the driver in the roadside mirror, using the five hand signals for guidance.

### CAUTION:

**Tow bars or car dollies are generally made to travel in a forward direction only. Most towing equipment of this type is not designed for backing. Never attempt short back up distances with a tow bar or tow dolly. Damage to the motorhome, vehicle or towing device will result.**

## SET-UP PROCEDURES

If the site for the motorhome provides full hook-ups, use this quick reference as a guide only. This information is an overview on hooking up the utilities and preparing appliances for use. Specific information on slide room, awning, leveling system, water system, entertainment and propane operations is discussed in detail in other sections.

### 1. Level the Motorhome:

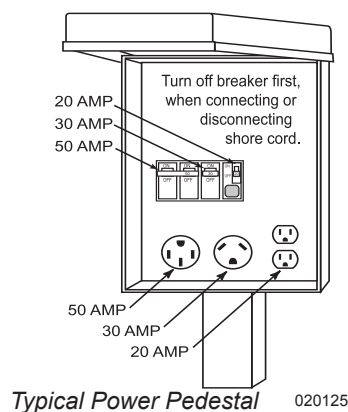
- Follow procedures and guidelines for extending the slideout rooms in section 5 **“Slideout Operation”** then **“Leveling the Motorhome”** in Section 5. When using the hydraulic jacks confirm that the parking surface will accommodate the weight placed on the jacks.

### 2. Hook up utilities and prepare appliances for use:

- Open the primary propane valve on the propane tank.
- Prepare the shore cord for connection. Uncoil and inspect the cord. Install proper electrical adapters if 50 Amp service is not available. Operate electrical appliances in sequence when hooked to limited shore power service. Turn shore power circuit breaker OFF prior to plugging in the shore cord.
- If hooked to less than 50 Amp service, operate appliances in sequence rather than at the same time to avoid shore power overload. Start the water heater and furnace (if needed).

### NOTE:

**If shore power is less than what is rated for the motorhome, electrical adapters will be required and power consumption must be reduced to avoid tripping the shore power breaker.**



### **CAUTION:**

Do not remove cover from the shore power supply to troubleshoot electricity to the motorhome. Serious personal injury or death may occur. If there is no power to the motorhome, inform the park manager. It is the park manager's responsibility to fix any problems with the power pedestal at the site.

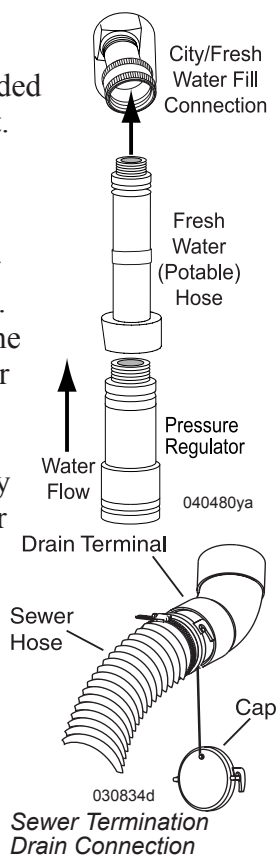
### **CAUTION:**

If shore power service is limited to 15 or 20 Amps, use of light duty extension cords and electrical adapters will create a voltage loss through the cord and at each electrical connection. Line voltage loss and the resistance at each electrical connection can be a hazardous combination. Damage to sensitive electronic equipment or an electrical fire may result.

### **NOTE:**

To avoid shore power overload when hooked to 30 Amp service, determine appliance current load prior to turning on appliances or using interior outlets.

- A phone connection port is provided in the water service compartment. Phone utility outlets are placed throughout the motorhome, including a phone line to be attached to a satellite receiver for Pay-Per-View movies and events.
- Hook the potable water hose to the city water connection in the water service center.
- Hook-up the sewer hose. Sewer drain pipe diameters are generally either three or four inches. Proper sewer hose adapters will ensure against leaks or spillage. With the sewer hose properly connected open the grey water valve (liquid waste drain). The black water valve (solid waste drain) remains closed until the tank is full or until time of departure.



## **DRY CAMPING**

Follow the suggestions below when staying at a location that does not have electrical, water or sewage hook ups. Plan ahead and conserve resources.

Before arriving at the site, ensure batteries are fully charged and properly maintained (see **Section 8 in Batteries - House under "Battery Maintenance"**), the fresh water tank and water heater are full and waste holding tanks are empty.

### **To conserve water and fuel:**

- Operate the refrigerator on propane (if applicable). Plan what is needed from the refrigerator prior to opening. Conserve propane by cooking over a campfire.
- Turn the water heater on about twenty minutes prior to use. Once heated, water will remain hot for several hours. Turn the water heater off when not in use.
- Set the thermostat temperature slightly lower than desired to prevent frequent cycling of the heating system.
- Know tank capacities and routinely check fuel levels, especially during cold weather.
- Open windows to reduce use of the roof air conditioner.
- Frequently monitor water consumption. Limit shower usage; turn water off when soaping down and back on to rinse. When water conservation is critical, take a sponge bath or use campground shower facilities if available. Do not fill the sink with water to wash only a few dishes.
- Evacuate waste holding tanks prior to filling fresh water tank.

### **To conserve battery power:**

- Do not allow batteries to fully discharge before operating the generator. If possible, run the generator twice a day, morning and afternoon, to charge the batteries.
- Turn off the inverter (if equipped) when not in use.
- Turn off interior 12 Volt DC power whenever possible. Refrigerator, battery charging and inverter (if equipped) function is not affected. Turn off small battery operated items i.e., porch, bay exterior step, generator and engine compartment lights, etc. Turn off the antenna boost when not watching TV. One light left on can quickly reduce battery reserves.

- Keep a working flashlight handy for night trips through the campsite and inside motorhome. When interior lighting is desired, use one light in a central location such as the vanity. Disconnect all but one or two bulbs.
- Turn on the water pump only when using water.
- Operate the generator when using convection microwave oven.

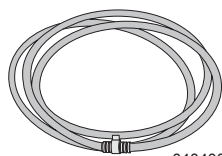
Typical DC Current Draw	
TV (when using inverter)	17 Amps
Rope Light (10 ft.)	1.3 Amps
Porch Light	2.0 Amps
Halogen Ceiling Light (1)	.09 Amps
LED Ceiling Light	.01 Amps

## BREAKING CAMP

Preparing the motorhome for travel will require several small tasks. Properly securing and storing items will help to prevent them from getting lost or damaged. Below is a checklist guide to reference when preparing to break camp.

### Outside Checklist:

- Disconnect the cable TV if available and connected.
- Disconnect and stow the telephone line if available and connected.
- Retract awnings and secure them for travel.
- Close the primary propane shut-off valve.
- Connect the sewer hose.
- Drain and flush holding tanks. Start by closing the grey water valve. Run enough cold water down sink and shower drains to fill the grey tank at least 50%. Use caution to avoid overfilling or flooding the grey tank. Open the black tank valve and allow adequate time for black tank to drain. If applicable, connect a non-potable water hose to the "Tank Flush" connection and flush the black tank system. Close black tank valve and open grey water valve. Water from the grey tank will help to flush the drain hose. Once evacuated, close grey water valve. Disconnect the sewer hose and flush with clean water from a non-potable hose. Store the hose. Replace the sewer cap.
- Fill the fresh water tank then disconnect fresh water hose from the source. If applicable, remove the water pressure regulator from the city water faucet and store.



*Screw the ends of the hose together to prevent leakage, dust and insects from entering the hose.*

- Turn shore power breaker off and disconnect shore line. Wind up and store shore cord. Secure door.
- Check all tire pressures.
- Inspect tires and wheels.
- Secure all compartment doors.
- Check for fluid leaks under and around the motorhome.

### Engine Checklist:

- Inspect the engine, transmission and the engine compartment for fluid leaks.
- Inspect the area under the motorhome for fluid leaks or puddles.
- Check all fluid levels: oil, coolant, transmission, hydraulic fluid and washer fluid.
- Inspect belts and hoses for wear.
- Inspect wiring for loose, frayed or corroded connections.
- Start engine and listen for unusual noise.
- Inspect gauges and controls for proper operation.

### Interior Checklist:

- Retract leveling jacks
- Start the engine to allow the air suspension to obtain proper ride height.
- Clear the slide room path, clean the floor and move the driver and passenger seats forward.
- Retract the slide room.

### CAUTION:

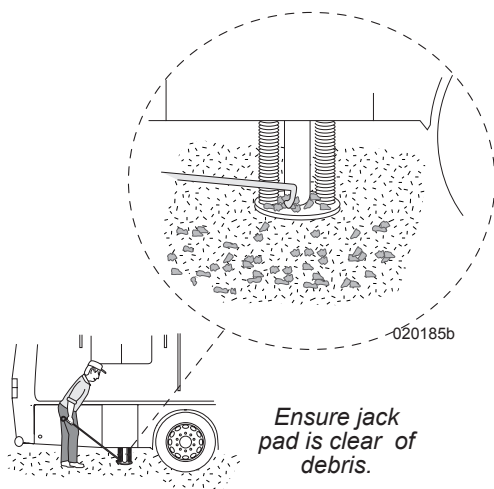
**To extend or retract the slideout room, the engine must be running and battery voltage at least 13.0 volts. Apply the park brake. Operate the slideout room when supported by hydraulic jacks. Damage to the slideout room, mechanism or seals can occur.**

- Secure and fasten all interior doors.
- Lock the shower door.
- Close roof vents and windows.
- Secure all loose, heavy or sharp objects in case of a sudden stop.
- Close all cabinet doors and drawers.
- Turn off interior lights.
- Turn off the water pump.
- Check fuel level and all other gauges for operation and correct level indications.
- Secure loose furniture.



## Departure Checklist:

- Check items in storage bays to ensure shifting or damage of items will not occur.
- Look around, above and under the motorhome for obstructions. Check for debris stuck between the rear dual tires.
- Outside compartment doors should be closed and locked.
- Check operation of all exterior lights, headlamp, taillamp, brake and clearance lights.
- Secure all awning and travel locks.
- Ensure jack pad is clear of debris when retracting hydraulic jacks. Loose rocks, gravel and debris can be thrown from the jack pad and can possibly damage the tow car.



- Secure and lock the entry door for travel.
- Pull forward out of the campsite. Inspect site for overlooked items.

## EMERGENCY ROADSIDE PROCEDURES

If an emergency situation occurs, use the appropriate braking technique and pull off the roadway a safe distance from traffic (if possible). Set the parking brake and turn on the hazard warning flashers, especially when parked alongside traffic lanes. In the event of an emergency stop due to a mechanical breakdown or other motorhome related problems, contact customer support or an emergency service provider.

EMERGENCY SERVICE PROVIDER		
Equipment	Provider	Emergency Number
Motorhome:	Customer Support	877-466-6226
Chassis:	Ford	800-444-3311
Towing	Owner's Advantage Program	877-211-8135
Tires:	Michelin	800-847-3435
Tires:	Goodyear	877-484-7376

Road flares or reflective warning signs should be displayed if the motorhome is on the side of the road for any length of time. Guidelines for placing warning triangles depend upon the road characteristics and visibility. For example: The standard placement is 10, 100 and 200 ft. from the rear of the motorhome when on a divided highway or one-way road.

On a two-way road, with traffic traveling both directions, the same placement is required at the front of the motorhome. Roads with curves and hills may require the placement of the last/furthest triangle to be 500 ft. behind the motorhome in order to safely warn approaching traffic.

## In Case of Flat Tire

In the event of a flat tire, it is recommended to call for roadside assistance. The size and weight of the motorhome and its tires require proper equipment to change the tire. A professional service technician will have the equipment and training needed to repair or replace the tire. In the case of sudden tire failure, avoid heavy braking. Hold the steering wheel firmly and gradually decrease speed. Slowly move to a safe off-road place which should be a firm level spot. Turn the ignition off and turn the hazard flashers on.



## **WARNING:**

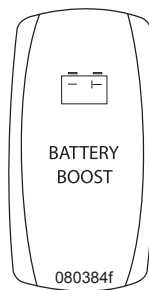
**DO NOT** crawl under the motorhome for any reason if a wheel has been removed. Any number of circumstances could cause the motorhome to suddenly fall, resulting in severe injury or death.

## Dead Chassis Battery

A discharged battery will not supply the amount of amperage necessary to crank and start the engine. If the engine fails to crank, or cranks slowly due to a discharged chassis battery, the Battery Boost switch will allow a temporary connection of the house battery to the chassis battery to increase amperage.

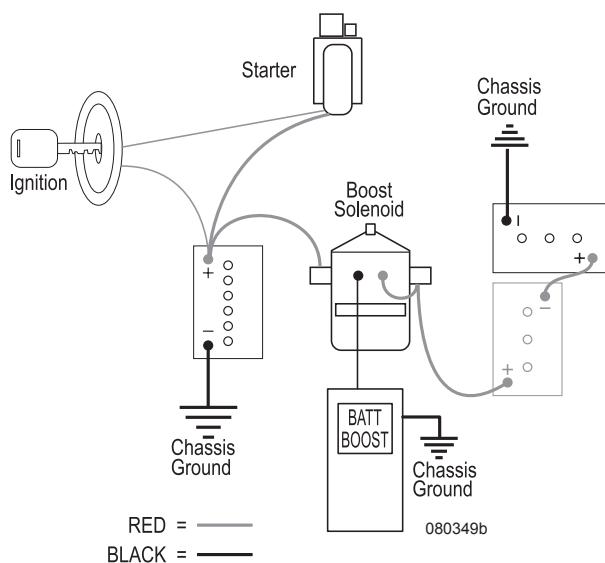
### Battery Boost Switch:

The Battery Boost switch engages a heavy-duty solenoid to electrically connect the house batteries to the engine battery in the event the engine will not crank or cranks slowly. The solenoid is designed for short-term high-current intermittent use. Engaging the boost solenoid for an extended period will damage the solenoid.



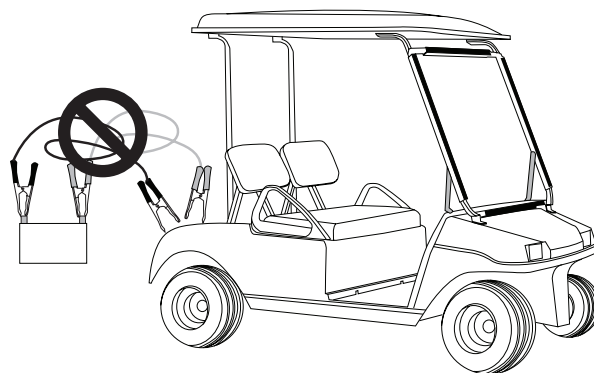
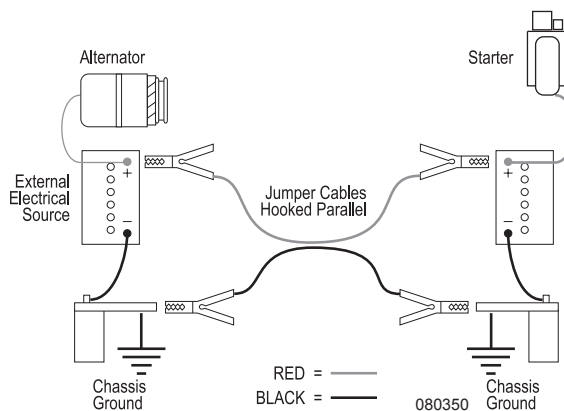
### Jump Starting Using Battery Boost Switch:

- With ignition key Off, press and hold the Battery Boost switch for ten seconds. After ten seconds, continue to hold the switch and attempt to crank the engine.
- If the engine fails to crank or does not crank fast enough, discontinue the attempt. Continued attempts will only diminish any remaining surface charge in the chassis battery and end future alternative attempts.
- Next, start the generator. This may require using the Battery Boost switch for the generator to start from the engine battery. Once the generator is operating, the electrical combination of the generator and the converter will charge the batteries.
- Allow the generator to run approximately ½ hour before attempting to crank the engine.
- Press the Battery Boost switch and attempt to crank the engine.
- If the engine fails to crank, or does not crank fast enough to start the engine, the chassis battery may be depleted and the motorhome will require a jump start or connect an external charger to the chassis battery.



### Jump Starting Using an External Source:

When using jumper cables to start the engine, the cables must connect in a parallel configuration. That is, positive (+) to positive and negative battery (-) to negative chassis (-). Always connect the positive (+) before connecting the negative (-). To prevent arcing when disconnecting the cables; disconnect the negative (-) before disconnecting the positive (+).



*Do not use incompatible voltage sources for jump starting*

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### **WARNING:**

**Always ventilate the battery compartment prior to any work or service to the batteries. Gas emitted by the batteries can explode when exposed to smoking material, flames, sparks or other sources of ignition, resulting in injury or vehicle damage. Batteries contain sulfuric acid that can burn skin, eyes and clothing. Do not connect the end of the second cable to the negative (-) terminal of the battery to be jumped. Connect only to the chassis, away from the battery.**

### **CAUTION:**

**Do not use the towed vehicle for jump starting. The charging system of the towed vehicle does not supply the amperage necessary to jump start the motorhome. Voltage sensitive equipment on the towed vehicle can be damaged and render the towed vehicle disabled.**

### **CAUTION:**

A large amount of electrical current is required to jump-start an engine. The sizes of the battery, alternator and jumper cables supplying the “jump” are current limiting factors. Wait a sufficient amount of time for a surface charge to build before attempting to start the engine. Voltage fluctuations that occur during a jump-start procedure can damage sensitive electronic equipment and charging systems. If a jump-start is necessary, it is recommended to call Roadside Assistance. They will have the equipment necessary to jump start the motorhome.

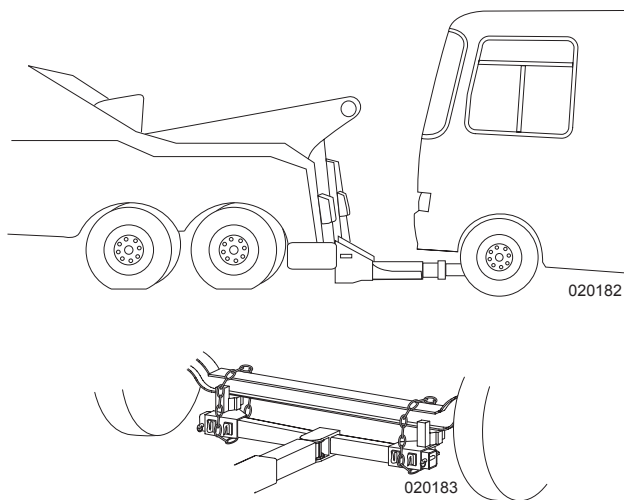
- When using an external electrical source to connect to the chassis battery, turn the chassis and house battery disconnect switches off prior to hooking up the jumper cables.
- Hook up the cables then wait several minutes to allow a surface charge to build in the chassis battery before attempting to start the engine.
- Turn on the chassis and house battery disconnect switches and attempt to start the engine. **Do not** crank the engine more than a few seconds.
- After the engine starts, disconnect the cables. Disconnect the negative (-) cables before disconnecting the positive (+) cables to prevent arcing.
- If the engine does not crank, or cranks slowly, **DO NOT** continue. Extensive damage, fire or injury can occur. Obtain help from a qualified technician.

## **TOWING PROCEDURES**

### **CAUTION:**

**Note the overall height of the motorhome being towed. 13'6" is the maximum allowable height. Damage to equipment or property may result if the maximum height is exceeded**

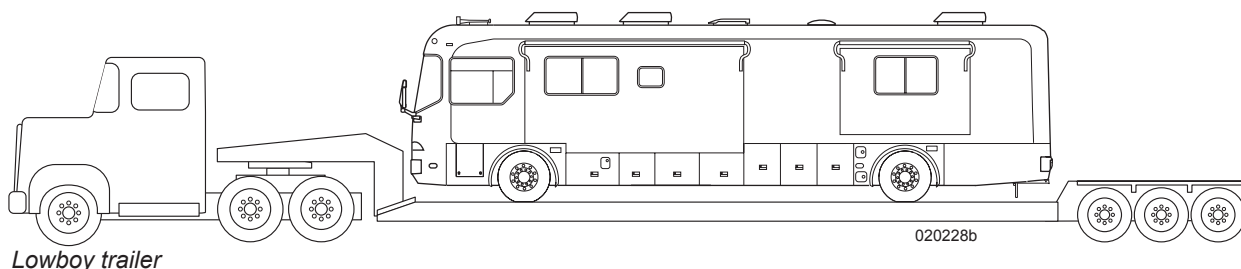
If calling a towing company for service, it is recommended to use a lowboy type of trailer. If a tow truck is used it needs to have a support arm that goes under the motorhome and secures to the front axle. Inform the tow company of the axle weights, overall height and total weight of the motorhome.



Other important information is the length of the motorhome, number of passengers and milepost location. Two tow trucks may be necessary to tow the motorhome and to tow a trailer or tow vehicle if it is not operational.

Generally, if the motorhome ever needs to be towed, use the following instructions. Secure any loose or protruding parts if the motorhome is damaged.

- Inspect the points of attachment on a disabled motorhome. If attachment points are damaged, select other attachment points at a substantial frame structural member.
- Never allow anyone under a motorhome while it is being lifted by towing equipment unless the disabled motorhome is adequately supported by safety stands.
- Do not tow the motorhome from the rear. Towing from the rear will severely overload the front tires and suspension, possibly resulting in tire and/or front suspension failure. Rear frame extensions are not designed to support weight loads imposed by lifting the motorhome from the rear.
- If the rear wheels are disabled, place the motorhome on a flat bed trailer, or use a heavy duty dolly under the rear wheels and tow the motorhome from the front.
- The drive shaft must be removed to prevent damage to the transmission. Secure end caps to prevent losing or contaminating the needle bearings.



Lowboy trailer

- The mud flap may need to be removed to prevent damage due to limited ground clearance.

**WARNING:**

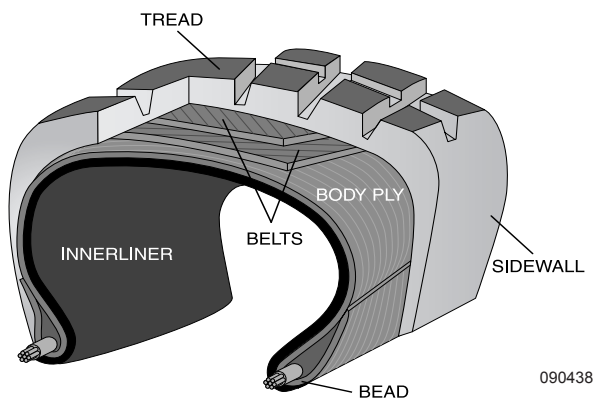
**In case the motorhome requires towing, ensure all precautions are followed. The drive shaft must be disconnected and the mud flap may need to be removed. The manufacturer will not cover damage to the motorhome caused by a towing company.**

## TIRES

Maintaining proper tire inflation pressure is important for proper tire load carrying capacity and wear. Improper pressure will lead to abnormal wear and/or sudden tire failure. Weigh the motorhome fully loaded for travel to determine proper tire inflation pressure. If one tire position on the axle is heavier than the other side, inflate both sides according to the heaviest side. This will provide correct tire inflation pressure across the axle and provide stability while cornering. To obtain the maximum wear and best service from tires, it is helpful to understand their components and functions.

**Tire Components:**

- **Tread:** Provides traction and cornering grip.
- **Belts:** Stabilize and strengthen the tread.
- **Sidewall:** Protects the side of the tire from road and curb damage.
- **Body Ply:** Provides tire strength and flexibility.
- **Bead:** Assures an air-tight fit with the wheel.
- **Inner Liner:** Keeps air inside the tire.



### Importance of Air Pressure

The most important factor in maximizing the life of the tires is maintaining proper inflation pressure. Driving with an underinflated or overinflated tire is dangerous and may cause premature wear, tire damage, sudden tire failure that can result in loss of control of the motorhome.

A tire that is underinflated will cause excess heat that can exceed operating limits of the tire and could result in sudden failure and fire. An underinflated tire will also cause poor handling, rapid and/or irregular tire wear and increases rolling resistance and decreases fuel economy.

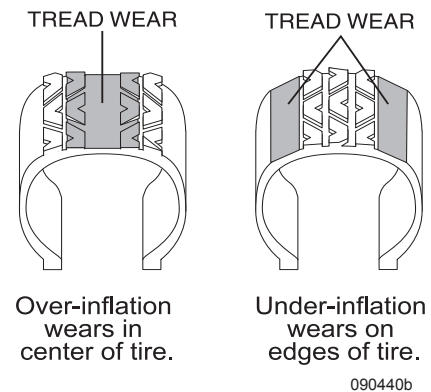
**WARNING:**

**Driving on a tire that is underinflated can exceed the design limits of the tire and may damage the sidewall. A damaged sidewall can suddenly burst upon inflation resulting in serious damage, injury or death. Aged tires are also susceptible to sidewall damage.**

A tire that is overinflated will reduce the footprint/contact patch with the road reducing traction, brake effectiveness and handling. Overinflation will also cause a harsh ride, uneven tire wear and make the tire susceptible to impact damage. Maintaining correct inflation pressure is of utmost importance for safety and reliability and should be a part of regular maintenance checks.

**Underinflation can cause:**

- Tire squeal on turns.
- Separations.
- Rapid and uneven wear on the edges of the tread.
- Circumferential breaks.
- Tire container may bruise or rupture.
- Higher risk of road hazard.
- Tire cord breakage.
- Loss of casing durability.
- Excessive tire temperature.
- High fuel consumption.
- Reduced handling quality.



**Overinflation can cause:**

- Hard ride.
- Tire bruising or carcass damage.
- Rapid tread wear in the center of the tire.



### Unequal Tire Pressures on the Same Axle Causes:

- Uneven braking.
- Swerve upon acceleration.
- Torque steer.
- Reduced handling quality.

### Load Inflation Table

Federal law requires the size of the tire, the tire's maximum inflation pressure and load capacity as well as load range be molded into the sidewall of the tire. Inflation pressure will vary dependent upon the weight of the motorhome when fully loaded ready for travel. The load inflation table indicates inflation pressure based on weight.

Always comply with the tire manufacturer's recommended inflation pressure. This requires the motorhome be weighed in a loaded, ready to travel condition, to determine actual weight carried by the tires. Actual weight of the motorhome can vary significantly depending on how it is loaded. For optimum tire wear, ride and optimum handling always comply with the manufacturer's suggested inflation pressure. From the factory, the tires are inflated to the maximum pressure.

When the motorhome is loaded ready for travel, check and adjust inflation pressure on each tire as indicated in the load inflation table.

#### **WARNING:**

**Do not overinflate or underinflate tires. Sudden tire failure can result.**

The Federal Certification Label, attached to the wall adjacent to the Pilot's seat, lists the Gross Axle Weight Ratings (GAWR). These ratings are the maximum allowable weights per axle position.

When the actual loaded weight of the motorhome and the weight on each axle is unknown, follow the recommended tire inflation pressure(s) listed on the federal certification label. Never exceed the Gross Vehicle Weight Rating (GVWR) or the Gross Axle Weight Rating (GAWR). Contact the tire manufacturer for further information concerning inflation pressure and other tire concerns.

#### **NOTE:**

**The motorhome manufacturer will not be responsible for substitution of an incorrect tire size or load range. Verify actual tire brand, size and load range before obtaining replacement tires.**

#### **WARNING:**

**Do not exceed the tire manufacturer's maximum speed rating.**

#### **Understanding the Load Inflation Table:**

The tire size is listed in the left margin of the table. Inflation pressure and weight rating will vary depending if the wheel position has a single tire indicated by S or a dual wheel position (drive axle) indicated by a D. Locate the corresponding psi at the top columns to obtain the correct inflation pressure based on weight.

All tires of the same axle must be inflated to the heaviest loaded position on the axle due to weight transfer that occurs when cornering.

#### **NOTE:**

**Tire construction determines Load Range which also determines minimum and maximum inflation pressure. Load range H has a greater weight carrying capacity than load range G. The load range is embossed into the sidewall of the tire.**

Tire Size	Max Speed Rating (MPH)	Single (S) Dual (D)	Inflation Pressure - PSI						
			80	85	90	95	100	105	110
<b>245/70R19.5</b> Load Range G	<b>75</b>								
		S	3640	3740	3890	4080	4190	4335	4540(G)
		D	6830	7030	7310	7720	7880	8150	8600(G)

Tire Size	Max Speed Rating (MPH)	Single (S) Dual (D)	Inflation Pressure - PSI								
			70	75	80	85	90	95	100	105	110
<b>235/80R22.5</b> Load Range G	<b>75</b>										
		S	3470	3645	3860	3975	4140	4300	4455	4610	4675(G)
		D	6320	6630	7050	7230	7530	7940	8110	8390	8820(G)

The motorhome manufacturer is not the author of this chart and makes no representation or warranty concerning the accuracy of the information disclosed by the chart.

**WARNING: Do not exceed the tire manufacturer's maximum speed rating.**

**NOTE:**

If weight of a wheel position is under the minimum weight rating, the tire(s) must be inflated to the minimum weight rating as listed in the table.

***Inspecting & Pressure***

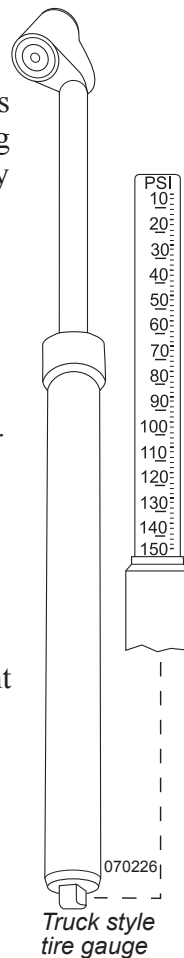
Inflation pressure is rated at a cold psi. Cold psi is defined as early in the morning before the day's ambient temperature, sun's radiant heat or heat generated while driving has caused inflation pressure to temporarily increase. Check tire inflation pressure every morning before driving. Use a high-quality truck tire gauge with an angle airhead to ensure access to the dual wheel positions of the drive axle.

Ensure the valve cap is replaced on the stem after the inflation pressure is checked. Use valve stem caps with a positive seal to prevent air from escaping through the valve stem.

If there are extension hoses on the valve stem, make sure they are high-quality reinforced stainless steel braid. Attach hoses securely to the outer wheel to prevent movement. The valve stem cap guarantees the valve core will remain free of dirt and foreign material. Material lodged between the valve core and internal stem can cause slow leaks resulting in tire failure.

Optimum tire performance is achieved at proper inflation pressure for the load carried. Do not mix tires of different tread patterns, size or construction on the same axle. The difference could result in damage to the drivetrain or handling issues.

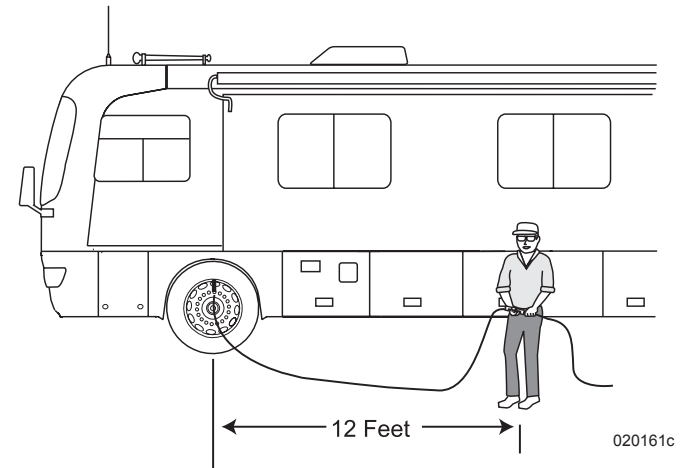
The motorhome may be equipped with an on-board "tire pressure monitoring" system. Individual tire pressures are displayed on the monitor when the feature is selected. The tire pressure monitoring system is to be used for **"Reference Only"**. To accurately determine individual tire pressure, a reliable and calibrated tire pressure gauge in good working condition should be used. The Federal Certification Label for proper tire inflation pressure. Follow the guidelines in this owner's manual for checking air tire pressure. Consult your monitor system's owner's manual for additional information.

**WARNING:**

A slow leak may go unnoticed on one of the dual tires. Damage to the other tire can occur from weight overload. Tires with damaged sidewalls can burst upon inflation. A flat or nearly flat tire can also generate enough heat from friction to ignite.

**WARNING:**

For safety purposes, clear the area of people and pets during tire inflation. Inflate tires using a remote inflation device.

***Air Pressure Checklist***

- When checking inflation pressure, confirm the tires are cool before increasing or decreasing inflation pressure. Tires in direct sunlight will increase inflation pressure. Driving a short distance will heat the tires and raise inflation pressure.

**NOTE:**

It is normal for tires to heat up and inflation pressure to increase during travel. If the motorhome must be driven to get air, check and record the tire pressure first then add the proportional amount of pressure so when the tires cool, inflation pressure will be correct.

- Remove the cap from the valve stem.
- Firmly press the tire gauge onto the valve stem and record reading.
- Add air to achieve recommended inflation pressure.
- If the tire is overinflated, release air by pushing on the metal stem in the center of the valve then recheck the pressure.
- Replace the valve stem cap.
- Repeat with each tire.
- Inspect all the tires for nails or other objects that could be embedded or puncture the tire and cause a leak.

- Check the sidewalls for gouges, cuts, bulges, or other irregularities.

**NOTE:**

**Air pressure in a tire increases (warm weather) or decreases (cold weather) one to two pounds for every 10° F. of temperature change.**

### ***Tire Vibration***

Sudden tire failure is often preceded by tire vibration. Symptoms that can cause tire failure are a bulge in the sidewall or swelling in the tire carcass. Striking an object or large hole in the road surface can damage a tire.

Inspect the tires periodically thereafter as rotational forces can continue to stress damaged areas and later manifest in tire failure. If an unusual vibration begins or a bulge is noticed in the sidewall, have the tires evaluated by a qualified professional as soon as possible.

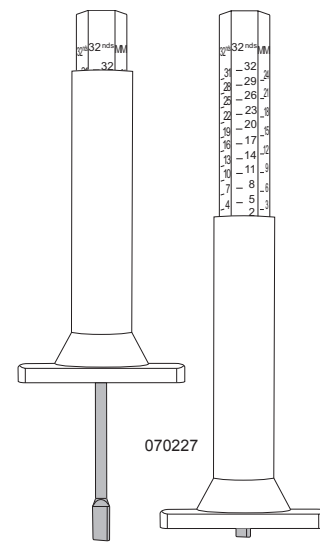
### ***Tire Rotation***

Tire rotation can increase the useful life of the tires by achieving uniform wear on all of the tires. Have the tire manufacturer determine the rotation pattern. The first tire rotation is the most important in determining which rotation pattern to use. Any unusual or unique wear patterns, or indications of uneven wear that may have developed, should be evaluated for possible tire rotation. Misalignment, imbalance or other mechanical problems may exist and will need to be corrected prior to rotation.

### ***Tire Replacement***

As represented within the tire manufacturer's published tire data guide, the size and rated load carrying capacity of the original equipment tires on your motorhome meet or exceed the motorhome's maximum axle weight/load ratings. Criteria used to determine when tire replacement is necessary are road hazard damage, wear, and age.

Tire replacement based on wear is determined by either measuring the tire's groove depth or a visual inspection of wear bars. Replace tires when the groove depth is 2/32" or less on rear tires and 4/32" or less on front tires.



*Tire groove depth gauge*

Wear bars are raised areas cast into the groove of the tire. Replace the tire when the wear bar in the groove is even (preferably before) with the road surface contact patch. A worn out tire cannot adequately channel water through the groove, which will result in hydroplaning. The tire manufacturer determines tire replacement based on age. While ozone inhibitors in the rubber help extend the life expectancy of a tire, exposure to the elements slowly breaks down the rubber, which can then suddenly fail when put to use. Tires that are five to seven years old (depending upon environment) are considered age worn and need to be replaced for safety even though the tire may not outwardly show age weathering and still has considerable tread.

Replacement tires on any axle, must be of the same manufacturer brand, model, size, and load range and must have a load rated carrying capacity equal to or greater than the original equipment tires.

Mixing tires on any axle of a different brand, model, size, load rating and load range can cause unusual handling and uneven braking due to different traction coefficient and could result in sudden tire failure or loss of control due to non-symmetrical handling.

**WARNING:**

**In many instances tire life is not determined by mileage or wear but by age. Tires are subject to weathering. Weathering cracks can appear in the sidewall and also run along the edge of the tire. Though the sidewall of the tire may look structurally sound, weathering can occur inside the groove of the tread. If any tire exhibits age weathering, replace all tires.**

### **WARNING:**

**Any and all replacement tires must have a rated load carrying capacity equal to or greater than the gross axle weight/load ratings as identified by the federal certification label located adjacent to the driver's seat.**

### **CAUTION:**

**Signs of irregular tread wear, exhibited by scalloping or unusually smooth areas on the tire surface, are cause for concern. Immediately have the tire manufacturer inspect the tires.**

## ***Storage of Tires - Long Term***

A cool, dry garage with a sealed cement floor is the preferred method of storage. Tires stored outside may prematurely age.

### **Prior to Storage:**

- Thoroughly clean the tires.
- Unload the motorhome to reduce weight on the tires.
- Ensure the surface is reasonably level, firm, clean and has good drainage.
- Inflate the tires to the maximum inflation pressure as indicated on the Federal Certification Label.

### **During Storage:**

- Cover the tires to block direct sunlight.
- Periodically ensure tires are at proper pressure.
- Move the motorhome every three months to prevent cracking in bulge areas, as well as flat spotting from prolonged sidewall strain and tread deflection.

### **Removal from Storage:**

Before removing the motorhome from long-term storage thoroughly inspect each tire's tread area and air pressure. If the tires have lost air during storage, inflate them to the correct pressure.

## **WHEEL MOUNTING**

### **Hub Piloted Mounting:**

For used flange nuts, apply two drops of oil between the flange and hex nut before assembly. This will allow the flange to rotate freely and provide proper clamping force when torqued. Use any common lubricant typically used for fasteners. Examples are motor oil and general purpose lubricating oils. Excessive lubricant is not desirable and will not improve torque.

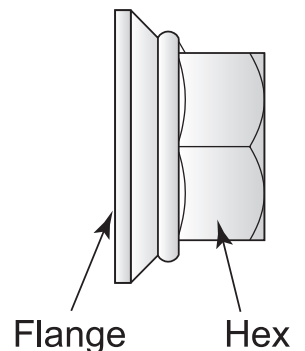
Excess lubricant makes the nuts hard to handle, attracts dirt, and may cause unsightly appearance to the wheel. Only used nuts require lubrication.

- Flange nuts generate higher clamping force. Always use grade eight studs with hub mount wheels.
- Before installing the wheels, lubricate the hub pilot pads with a drop of oil to prevent galling. Do not lubricate any other wheel or hub surface.
- For a hub with intermittent pilot pads, position a pad at the twelve o'clock position to center the wheel and reduce runout.

### **CAUTION:**

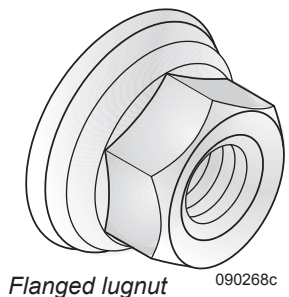
**See the Ford OEM chassis manual for proper tightening pattern. Loosen and tighten lug nuts in pattern indicated. Sequence tighten nuts to 50 ft. lbs, then tighten in pattern to manufacturer's recommended torque specification. Over-tightening can cause distortion.**

For used nuts add two drops of oil between flange and hex.



### **WARNING:**

**Never use wheels or lug nuts different than the original equipment as this could damage the wheel or the mounting system. Damage to the wheel or mounting system could cause a wheel to come off while the motorhome is in motion.**



### **Front Wheels:**

Slide the front wheel over the studs. Use caution to avoid damaging stud threads. Snug the nuts in correct pattern. Do not fully torque until all nuts have been seated.

### **Dual Rear Wheels:**

Slide the inner dual wheel over the studs. Use caution to avoid damaging threads. Align the hand-holds for valve stem access and slide the outer dual wheel over the studs again using caution to avoid damaging threads.

- Before installing the wheels, lubricate the hub pilot pads with a drop of oil to prevent galling. Do not lubricate any other wheel or hub surface.



- For a hub with intermittent pilot pads, position a pad at the twelve o'clock position to center the wheel and reduce runout.
- See the Chassis OEM Manual for lugnut torque specification.

Snug nuts in sequence but do not tighten them fully until all are seated. Tighten the nuts in the pattern indicated in the Chassis OEM manual. Hub mount wheels use two-piece flange cap nuts for both front and rear applications. No inner cap nuts are required.

### Torque the Nuts Properly:

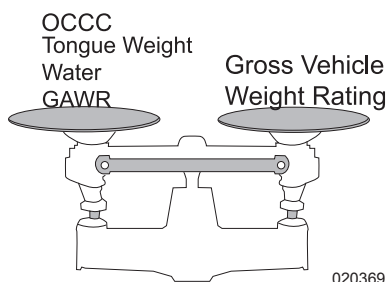
- Tighten the wheel nuts to the recommended lug nut torque. Do not over tighten.
- Maintain the nut torque at the recommended level through planned periodic checks or at 10,000 mile intervals, whichever comes first.
- If air wrenches are used, they must be periodically calibrated for the proper torque output. Use a torque wrench to check air wrench output and adjust line pressure for the correct torque.

### CAUTION:

**Dual wheels require tightening the lugnuts to the specified torque at 100 miles and again at 500 miles of initial operation. Perform same procedure any time a wheel has been removed.**

## WEIGHING THE MOTORHOME

Proper weight distribution, load management and operating within established limitations will aid in safe and enjoyable travel. The information in this section outlines guidelines and provides information on the proper techniques for weighing to accurately determine total weight, axle weights, balance and tire inflation pressure. According to the National Highway Traffic Safety Administration, most tire failures are a result of under-inflated tires.



Load management, weight distribution and properly inflated tires are the responsibility of the operator. The motorhome must be weighed in a loaded, ready to travel condition to correctly determine how much weight is placed on each wheel position, then added to determine the overall weight upon a single axle.


This may require one or more adjustments and the motorhome subsequently weighed again to verify proper and adequate adjustments. The first thing to determine is the maximum allowable weight of the motorhome. This information is found on the Federal Certification Label located adjacent to the driver seat under Gross Vehicle Weight Rating. This is the maximum allowable gross weight and cannot be exceeded.

### Federal Certification and Weight Labels:

There will be two Federal Certification build labels and as many as three Federal Weight label(s) affixed to the motorhome.

### Incomplete Vehicle Manufactured By:

This certification label lists the name of the chassis manufacturer, date of completion and location of construction. The gross vehicle weight rating and gross axle weight ratings. The tire size, load range and appropriate tire inflation pressure based on gross axle weight ratings when compared to the tire manufacturer load inflation table. Confirms the chassis conforms to U.S. Federal Motor Vehicle Safety Standards (FMVSS) under their respective guidelines. The Vehicle Identification Number (VIN) is located at the lower right.

INCOMPLETE VEHICLE MANUFACTURED BY																																																	
FORD MOTOR COMPANY																																																	
DATE: XX/XX		GVWR: XXXXXLB/XXXXKG																																															
FRONT GAWR: XXXXLB				REAR GAWR: 11000LB																																													
XXXXKG		WITH XXXXKG				WITH																																											
XXX/XXR XXX		TIRES XXX/XXR XXX				TIRES																																											
XXXXXX		RIMS XXXXXX				RIMS																																											
AT XX kPa/ xx PSI		COLD		AT XXX kPa/XX PSI		COLD																																											
VIN: XXXXXXXXXXXXXXXXX																																																	
																																																	
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Incomplete Vehicle Certificate

100230f

### Manufactured By (Federal Certification Label):

This certification label lists the body builder company and designate name, date of completion and location of construction and the name of the incomplete vehicle manufacturer.

FEDERAL CERTIFICATION LABEL			
MFD BY: ALLIED RECREATION GROUP		DATE: XX/XX	
INCOMPLETE VEHICLE MFD BY: FORD MOTOR COMPANY		DATE: XX/XX	
GVWR		XX,XXX KG XX,XXX LB)	
FRONT GAWR:		XXXX KG ( XX,XXX LB)	
XXXX/XX.X Tires AT:		WITH: XX.X X X.XX RIMS	
(		XXX KPA COLD SINGLE	
(		XXX PSI)	
INTERMEDIATE GAWR:		XXXX KG ( XX,XXX LB)	
XXXX/XX.X Tires AT:		WITH: XX.X X X.XX RIMS	
(		XXX KPA COLD DUAL	
(		XX PSI)	
REAR GAWR:		XXXX KG ( XX,XXX LB)	
XXXX/XX.X Tires AT:		WITH: XX.X X X.SS RIMS	
(		XXX KPA COLD SINGLE	
(		XXX PSI)	
GAWR COMBINED INTERMEDIATE AND REAR: XX,XXX KG ( XX,XXX LB)			
This vehicle has been completed in accordance with the prior manufactures IVD where applicable. This vehicle conforms to all applicable Federal Motor Vehicle Safety Standards. In effect in xx/xx			
V.I.N. XXXXXXXXXXXXXXXXXXXX			
TYPE VEHICLE: MULTI-PURPOSE PASSENGER VEHICLE			
The tires and wheels with sizes and ratings designated above have been equipped with this vehicle by Monaco RV. Any replacement tires installed must meet the same specifications and minimum load requirements.			
ALLIED RECREATION GROUP			
PRODUCT: 2015 VACATIONER			
FIN: XXXXXXXXXXXX		kilograms (pounds)	
GROSS VEHICLE WEIGHT RATING (GVWR)		XX,XXX (XX,XXX)	
FACTORY WEIGHT ON		XX,XXX (XX,XXX)	
OCCUPANT AND CARGO CARRYING CAPACITY		X,XXX (XX,XXX)	
FULL FRESH WATER TANK: XXX GAL @ 8.3lb/gal		XXX ( X,XXX)	
FULL WATER HEATER TANK: X GAL @ 8.3lb/gal		XX ( XX)	
FULL PROPANE TANK (USEABLE CAPACITY) gal@4.2lb/gal		XXX ( XXX)	
GROSS COMBINED WEIGHT RATING (GCWR)		XX,XXX (XX,XXX)	
MAX. GROSS TOWED WEIGHT		X,XXX (XX,XXX)	
MAX TONGUE WEIGHT		XXX (XX,XXX)	
MOTORHOME OCCUPANT AND CARGO CARRY CAPACITY			
VIN: XXXXXXXXXXXXXXXXXXXX			
THE COMBINED WEIGHT OF OCCUPANTS AND CARGO SHOULD NEVER EXCEED			
XXXX KG OR XXXX LBS			
Safety belt equipped seating capacity: 4			
CAUTION:			
A full load of water equals xxx kg or xxx lbs of cargo @ 1 kg/L (8.3lb/gal) and the tongue weight of a towed trailer counts as cargo			
CAUTION: LOAD CARRY CAPACITY REDUCED			
Modifications to this vehicle have reduced the original load carrying capacity by			
_____ KG OR		_____ LBS	
100230hb			

Federal Certification Label

The gross vehicle weight rating and gross axle weight ratings. The tire size, load range and appropriate tire inflation pressure based on gross axle weight ratings when compared to the tire manufacturer's load inflation table.

### Factory Installed Federal Weight Label –

This factory installed certification label attached on the screen door lists the vehicle identification number.

The maximum allowable combined weight in Occupants and Cargo Carrying Capacity (OCCC). The designated number of seating positions equipped with safety belts for travel and the total amount of weight of fresh water based on the capacity of the fresh water tank and water heater tank. A duplicate weight label is installed next to the Federal Certification labels adjacent to the driver seat.

### Dealer Installed Federal Weight Label –

If this certification label is attached next to the factory installed weight label on the screen door, the dealer has installed equipment and/or accessories after the motorhome left the factory and prior to retail sale. This dealer installed label will list the amount of weight in equipment and/or accessories installed by the dealer. The amount of weight listed on the dealer installed label will reduce the amount Occupant and Cargo Carrying Capacity as stated on the factory installed label by the amount stated on the dealer installed weight label.

### NOTE:

**Do not remove these Federal Certification labels. These certificates confirm the chassis and body conform to guidelines and build practices as specified by the respective governmental agencies. The information on these certificates is used by the vehicle owner and the Department of Motor Vehicles (DMV) to register ownership and license the vehicle for travel.**

### CAUTION:

**Most States limit the amount of weight carried by any single axle position. It is the responsibility of the operator to know the legal weight limit of the State in which they travel. Side roads, surface streets and bridges may further impose weight restrictions.**

MOTOR HOME OCCUPANT AND CARGO CARRYING CAPACITY		vin xxxxxxxxxxxxxxxx	
THE COMBINED WEIGHT OF OCCUPANTS AND CARGO SHOULD NEVER EXCEED xxx kg or xxx lbs			
Safety belt equipped seating capacity: x			
CAUTION: A full load of water equals xxx kg or xxx lbs @ 1 kg/l (8.3 lbs/gal) and the tongue weight of a towed trailer counts as cargo.			
Factory Installed Federal Weight Label			
100179i			

CAUTION: LOAD CARRYING CAPACITY REDUCED	
Modifications to this vehicle have reduced the original load carrying capacity by	
_____ kg or	_____ lbs
Dealer Installed Federal Weight Label	
100179j	



## Weight Terms

The following are definitions of terms used when weighing. It is important each weight term is understood.



- **Gross Vehicle Weight Rating (GVWR):** Maximum permissible weight of this motorhome. GVWR is equal to or greater than the sum of UVW plus OCCC.
- **Gross Combination Weight Rating (GCWR):** The sum of the maximum allowable loaded weight of this motorhome and any towed trailer or towed vehicle.
- **Gross Axle Weight Rating (GAWR):** Load-carrying capacity specified by manufacturer of a single axle system, as measured at tire ground interfaces.
- **Occupant and Cargo Carrying Capacity (OCCC):**  
Is the weight comprised of occupants, cargo, full fresh potable water weight including water heater and tongue weight of a towed load. Dealer installed equipment and/or accessories reduce OCCC.
- **LCCR (Load Carrying Capacity Reduced)** is the amount the OCCC is reduced due to vehicle weight added by the dealer between vehicle certification and first retail sale.
- **Unloaded Vehicle Weight (UVW):**  
Is the weight of this vehicle as built at the factory with full fuel, engine oil, coolants, propane. Factory UVW may be increased by the addition of dealer installed equipment and/or accessories. UVW does not include occupants, cargo, full fresh potable water weight, including water heater, and the tongue weight of a towed load.

## Weight Limits:

Numerous Federal, State and local governments mandate weight limits. Understanding the terminology and performing proper weighing procedures will help eliminate confusion. It is important to weigh the motorhome in a loaded, ready to travel condition to ensure the Occupant and Cargo Carrying Capacity (OCCC), GVWR or GAWR are not exceeded.

The total weight of the motorhome in a loaded, ready to travel condition must not exceed the Gross Vehicle Weight Rating (GVWR) or the GAWR for a single axle.

The GVWR is the maximum total weight for which the motorhome is rated including occupants, fluids and cargo and any dealer installed equipment or accessories. The GAWR is the maximum weight for which a single axle is rated. The GCWR is the combined total of the GVWR and any towed load. The tires, wheels, chassis frame and/or drivetrain component(s) may limit the GVWR, GAWR or GCWR or any combination thereof.

Every recreational vehicle, even of the same make and model, will vary in actual loaded axle weight due to different options, floor plans, occupants and cargo. The motorhome must be weighed in a loaded, ready to travel condition to determine actual weight carried by each wheel position and axle.

Each wheel position must be weighed to determine no wheel position is overloaded and to confirm no single axle is overloaded. It is possible be within the GVWR yet overloaded on one wheel position or axle. For this reason it is necessary to weigh each wheel position to determine the actual gross vehicle weight in a loaded, ready to travel condition and how that weight is distributed.

There are two important factors to consider when loading the motorhome: total weight and balance. When loading for travel, place heavy objects as low as possible, preferably on the floor or below in storage compartments. Load weight must be distributed as evenly as possible. Instructions and diagrams to properly weigh the motorhome are presented on the following pages. The heaviest wheel position on an axle will determine the tire inflation pressure for all tires on that axle. Reference the tire manufacturer load inflation table to determine the correct cold inflation pressure.

## **CAUTION:**

**State and Local authorities may impose weight restrictions to surface streets, bridges and parkways. These reductions can include maximum single axle weights or an overall maximum weight limitation based on the number of axles per vehicle.**

## ***Tire Pressure***

The motorhome may weigh slightly heavier on one side. The heaviest wheel position (if applicable) on a single axle will determine the inflation pressure for all tires on that axle due to weight transfer that occurs when cornering. Improperly inflated tires can result in sudden tire failure (blowout). Cargo not properly balanced on the suspension, can result in poor handling, over-stressed chassis components, overloaded wheel positions and/or tires.

How the motorhome is loaded will influence tire inflation pressure and load carried by each axle. This is why each wheel position must be weighed. When the actual loaded weight of the motorhome and the weight on each axle are unknown, follow the recommended tire inflation pressure(s) listed on the federal certification label.

**NOTE:**

**When adjusting tire inflation pressure, each tire on any axle must be inflated to the same pressure. The wheel position carrying the most weight will determine the tire inflation pressure for each tire of that particular axle.**

**WARNING:**

**Improperly inflated or overloaded tires can cause a blowout. An overloaded axle can cause a component failure of the suspension system. Tire blowouts or broken suspension components can lead to loss of vehicle control resulting in property damage, personal injury or death.**

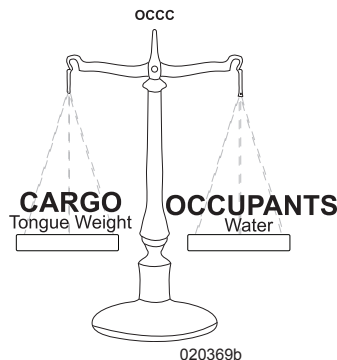
**NOTE:**

**Contact the tire manufacturer for further information concerning tire inflation pressure and other tire concerns.**

**Occupant & Cargo Carrying Capacity:**

Each motorhome, even of the same model year, floor plan and length, will weigh different due to options and accessories. The GVWR limits the weight of the entire load combination, regardless of the amount of weight of occupants, cargo, water, propane and tongue weight. Weighing will determine the GVWR is not exceeded as this is maximum allowable weight. However, Occupant & Cargo Carrying Capacity (OCCC) weight is comprised of variables in occupants, cargo, fresh water and tongue weight.

While the OCCC is a guide to the maximum allowable weight in combinations of occupants, cargo, water and tongue weight, the amount of weight in each of the categories (occupants, cargo, and water and tongue weight) can be adjusted so one can offset another or reduced entirely to gain advantage in GCWR.



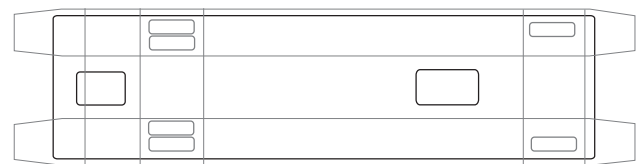
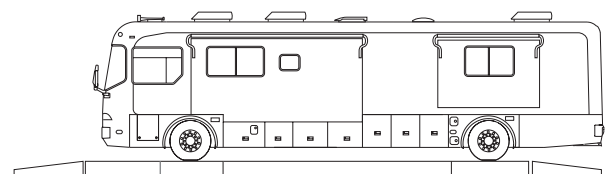
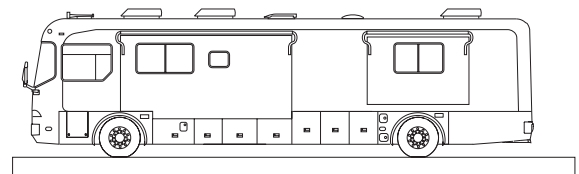
While maximum allowable weights are not to be exceeded, if one chooses to carry less water or no water, that can allow an increase in payload of cargo or tongue weight, offsetting one for another and still under maximum allowable weight of GVWR, GAWR, GCWR or OCCC.

***Scales***

Certified public scales are located in moving and storage lots, farm supplies with grain elevators, gravel pits, recycling companies and large commercial truck stops. To locate a nearby public scale, check the yellow pages under Scales-Public or Weighers. Expect to pay a small fee.

**Three basic types of scales:**

- A large platform scale will allow the entire motorhome to fit on the scale to read the gross vehicle weight in one scale recording.
- A segmented platform scale is designed to weigh one axle at a time.
- A segmented platform scale per wheel position reads each wheel position at a time.



Segmented Platform (Top View) per wheel position.

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## Four-Point Weighing

The motorhome must be weighed in a fully-loaded ready to travel condition. This includes passengers, food, clothing, fuel, water, supplies, etc. Any towed vehicle (car/pickup, boat or trailer) or item loaded on brackets on the back of the motorhome, such as bikes or motorcycles will also be included in the weighing. Each wheel position requires weighing to accurately determine the correct tire inflation pressure. When weighing, the scales and the motorhome must be level to obtain accurate scale readings. A definite lean in the motorhome will produce inaccurate scale readings.

### INFORMATION:

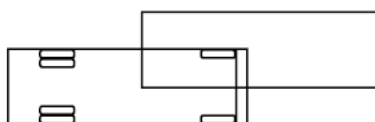
**The most accurate weighing method is to weigh each wheel position independently. Weighing the entire motorhome or a single axle will not reflect the actual weight carried by each wheel position. A segmented platform scale that reads a single axle may be used if a platform scale that will weigh each wheel position is unavailable. Divide the total axle reading by two for an approximation of what each wheel position may average. When weighing the dual wheel position on the drive axle, dividing that wheel position scale reading by two will determine the weight carried by each tire.**

The following steps are suggested and are illustrated:

1. Pull onto the scale so that only the front axle is on the platform (with the end of the scale midway between the front and rear axles), and record the scaled weight.
2. Pull forward until the full unit is on the scale, and record the scaled weight.
3. Pull forward so that only the rear axle is on the scale (again with the edge of the scale midway between the front and rear axles), and record the scaled weight.

To determine individual wheel position weights, it is necessary to repeat the first three steps, but this time, use only one side of the scale as shown.

To calculate the opposite side of the vehicle wheel position weight, subtract this side's weights from the weights recorded in steps 1, 2 and 3. If there is a towed vehicle, proceed to step 4 to obtain the "towed vehicle only" weight.

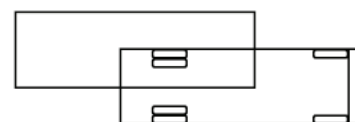


One Side Scale Weight \_\_\_\_\_ lbs.  
(Step 1S)

Calculate Other Side Weight \_\_\_\_\_ lbs.  
(Step 1 - 1S)

Tire Load (lbs.) \_\_\_\_\_ lbs.  
(See Note\*)

Inflation \_\_\_\_\_ psi.  
(See Note\*)



One Side Scale Weight \_\_\_\_\_ lbs.  
(Step 3S)

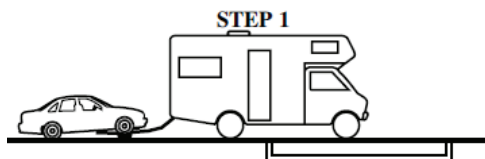
Calculate Other Side Weight \_\_\_\_\_ lbs.  
(Step 3 - 3S)

Tire Load (lbs.) \_\_\_\_\_ lbs.  
(See Note\*)

Inflation \_\_\_\_\_ psi.  
(See Note\*)

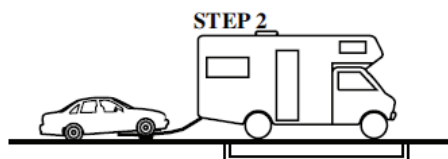
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Weighing individual wheel positions. Repeat procedure for other side.



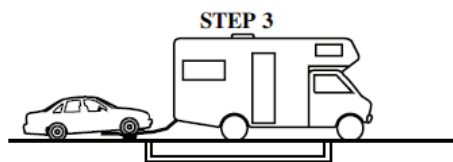
Scale Weight \_\_\_\_\_ lbs.  
(Step 1 = GAW)

From Fed. Cert. Tag \_\_\_\_\_ lbs.  
GAWR



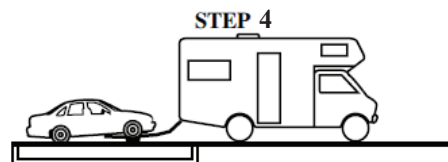
Scale Weight \_\_\_\_\_ lbs.  
(Step 2 = GVW)

From Fed. Cert. Tag \_\_\_\_\_ lbs.  
GVWR



Scale Weight \_\_\_\_\_ lbs.  
(Step 3 = GAW)

From Fed. Cert. Tag \_\_\_\_\_ lbs.  
GAWR



Scale Weight \_\_\_\_\_ lbs.  
(Step 4)

From Fed. Cert. Tag \_\_\_\_\_ lbs.  
Vehicle Weight  
(GCWR - GVW)

100237f

Four point weighing

### CAUTION:

**Refer to the tire load inflation table published by the tire manufacturer to determine the proper inflation pressures recommended for single and dual wheel positions. Always inflate each axle set to the tire with the higher of the side-to-side weight.**

4. If a boat, trailer or other vehicle is being towed, it should be weighed and combined with the towing vehicle's GVW (Gross Vehicle Weight) to ensure the total weight does not exceed the GCWR (Gross Combined Weight Rating).

**WARNING:**

**Improperly inflated or overloaded tires can cause a blowout. An overloaded axle can cause a component failure of the suspension system. Tire blowout or broken suspension components can lead to loss of vehicle control resulting in property damage, personal injury or death.**

**CAUTION:**

**Even though the weight of the total axle may be within the axle's rating, it may be overloaded on one side. This causes one wheel position to be overloaded; therefore, side-to-side weighing is required.**

**CAUTION:**

**If actual weight carried by any tire is below the load inflation table minimum pressure, inflate the tire(s) to the minimum inflation in the load inflation table. Setting tire pressure below the minimum inflation pressure can overheat and damage the tire casing leading to premature tire failure or blowout.**

The motorhome must remain as level as possible on the scale (even though an axle or side is not physically on the scale) to obtain accurate side-to-side scale readings. There must be enough space on either side of the scale to accommodate the width of the motorhome being partially off the scale. It may be necessary to use wheel ramps to get the required side to-side leveling.

If there is a difference in the weights on one side of the vehicle as compared to weights on the other side, components (tires, wheels, brakes, springs, etc.) on the heavier side could be overloaded, even though the total axle load is within the GAWR. It is important to redistribute the load to avoid component failure, as well as to improve the handling characteristics of the vehicle.

With these actual weights, it is now possible to compare them against the GAWR, GVWR, and tire capacities. These actual weights are also what will be used to determine proper tire inflation pressure. Options to help assist when weighing the motorhome include using "truck stop" scales. There is usually a small fee for this service.

Refer to the load inflation table published by the tire manufacturer to determine proper inflation pressure recommended for single and dual wheel positions. The heaviest wheel position (if applicable) on a single axle will determine the inflation pressure for all tires on that axle due to weight transfer that occurs when cornering.

***Dangers of Overloading***

Do not overload the motorhome. In addition to possible problems with tires, wheels, and air springs (air bags), there can be problems of brake failure, drivetrain failure, wheel bearing failure, etc. Moreover, an overloaded motorhome uses more fuel, is more difficult to drive, and can lead to driver fatigue. If any component should fail, it could result in vehicle damage and/or loss of control. In addition to the above dangers, there are some states that require certain motorhomes and RVs to utilize the Highway Patrol's weight scales to check for overloaded axle weights. Citations can be issued to violators.

The motor home can be loaded differently, depending on the type of trip, loading and weight patterns will change. Periodically reweigh the motor home and log the weights in this chapter. Refer to the Weight Record Sheet to help equate load distribution for future trips.

**Loading Tips:**

- Do not load heavy items on the bumpers.
- Secure and brace items so they won't move during travel. Generally, load heavier items lower.
- Make a diagram of your properly loaded motorhome and keep a log of the cargo. Then weigh the motorhome. The loading diagram, cargo log and the loaded motorhome weights will help to locate where specific items are stored, and will help speed the loading process.
- Fresh water and waste water weigh over eight pounds per gallon. Carry only as much water as needed for travel or to balance the load, and whenever practical, empty the holding tanks before traveling.
- Store emergency items in a readily accessible location. As a minimum include a fire extinguisher, tools, first aid kit, rain gear, flashlight, and highway warning devices, an electric cord with light and sturdy gloves.



**WARNING:**

**Modification of the motorhome by addition of racks not originally equipped by the manufacturer to carry additional equipment, vehicles or cargo will reduce your warranty coverage and may cause personal injury or property damage.**

**WARNING:**

**For safety, Do Not store or carry propane containers, gasoline, or other flammable liquids inside the motorhome.**

***Weight Record Sheet***

DATE: \_\_\_\_\_

PLACE: \_\_\_\_\_

FRONT: \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_  
             LEFT                      RIGHT                      TOTAL

REAR: \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_  
             LEFT                      RIGHT                      TOTAL

= \_\_\_\_\_  
             TOTAL GROSS  
             VEHICLE WEIGHT

DATE: \_\_\_\_\_

PLACE: \_\_\_\_\_

FRONT: \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_  
             LEFT                      RIGHT                      TOTAL

REAR: \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_  
             LEFT                      RIGHT                      TOTAL

= \_\_\_\_\_  
             TOTAL GROSS  
             VEHICLE WEIGHT

DATE: \_\_\_\_\_

PLACE: \_\_\_\_\_

FRONT: \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_  
             LEFT                      RIGHT                      TOTAL

REAR: \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_  
             LEFT                      RIGHT                      TOTAL

= \_\_\_\_\_  
             TOTAL GROSS  
             VEHICLE WEIGHT

**FRONT END ALIGNMENT**

The front suspension and steering system of the motorhome was accurately aligned at the factory before delivery to the dealership.

However, after the motorhome is fully loaded according to your personal needs, have the alignment checked and adjusted, if necessary. To help prevent uneven tire wear, check the front-end alignment periodically.

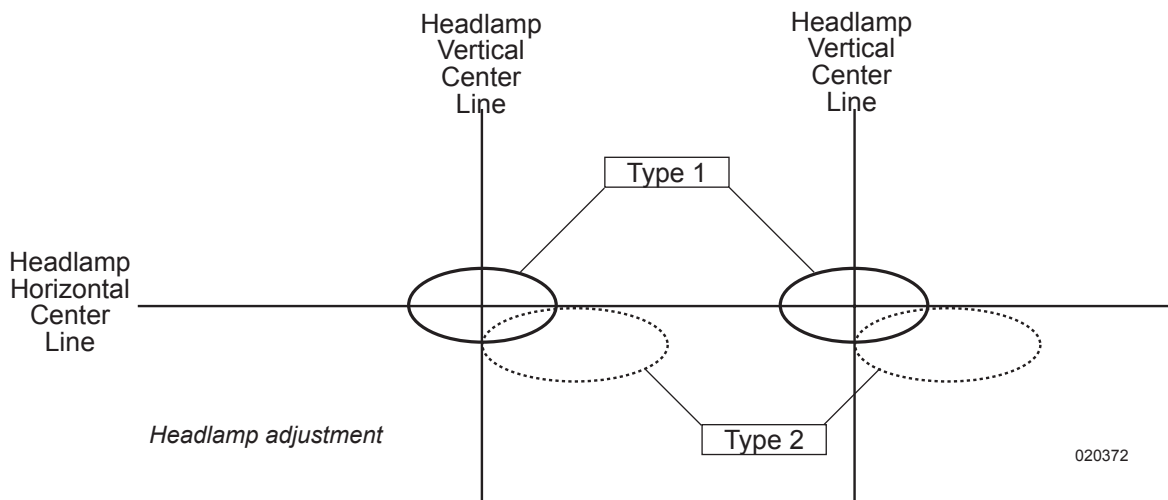
**NOTE:**

**Please note that front-end alignment after retail delivery is the owner's responsibility and is not covered under the warranty.**

**MANUAL HEADLAMP AIMING PROCEDURE****CAUTION:**

**The following procedure is not a substitute for having the headlamps professionally aligned by a certified headlamp alignment professional to the Society of Automobile Engineering standards. Improper headlamp alignment may result in poor visibility during reduced light conditions and may result in an accident.**

1. Ensure the vehicle is loaded to "travel and camping" conditions.
2. Remove all snow, ice, dirt and other debris that may affect the ride height of the vehicle.
3. Find a flat area at least the length of the motorhome plus 7.62 meters (25 ft) with a vertical flat surface that is at least 3.0 m (10 ft) by 3.0 (10 ft) at one end (a driveway and garage door can be used).
4. Measure 7.62 m (25 ft) and position the motorhome so the headlamps are 7.62 m from the vertical flat surface and secure by placing in park or neutral and setting the parking brakes.
5. Verify the headlamp system to determine if it is a "Type 1" or "Type 2" system. A Type 1 system has a separate HI and LOW beam and uses four lamps. A Type 2 system can be identified by locating the number "2" embossed on the lens of the lamp.



6. Measure the height from the ground to the center of the low beam filament of the driver's side headlamp. Project this height in an exact straight line to the vertical surface 7.62 m away from the motorhome. Mark the height of the filament and center line on the vertical surface. This will have set up a "coordinate system" for protecting the headlamp's beam on the vertical surface.

7. Repeat step 6 for the passenger's side headlamp.

8. Turn on the headlights. Using Figure 1 below, the projected beam on the vertical surface is to be located as follows.

**A - Type 1 Headlamps:** The projected beam should be centered vertically and horizontally on the vertical surface as marked in step 6 and 7.

**B - Type 2 Headlamps:** The top edge of the projected beam is to be even with a horizontal line parallel to a line formed by the two headlamp filament centers and to the right of the vertical center line of each headlamp.

9. If the headlamps do not meet the alignment criteria adjust the "Vertical" and/or "Horizontal" positioning as shown on the attached figure. Rotate the adjustment knobs and/or screws on the headlamp.

When turning the knobs and/or screws, watch the direction in which the projected beam moves to help understand which direction on the beam moves in relation to turning each.

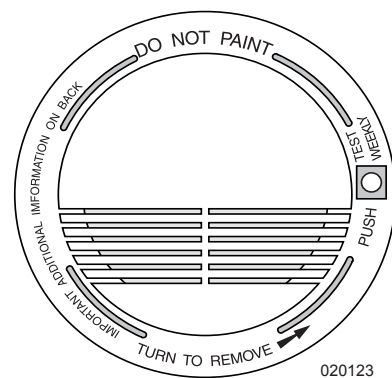
10. Remember, this procedure is only a guideline and is not a substitute for having headlamps professionally aligned.

## SMOKE DETECTOR

Statistics show that most fire casualties are not caused by direct flame, but by less visible smoke (products of combustion). The smoke detector automatically returns from alarm to normal state when the reason for activation, the presence of smoke, is completely removed. Reduce risk of fire by being safety conscious.

### WARNING:

**There is no way to ensure against injury or loss of life in a fire; however, the smoke detector is intended to help reduce the risk of tragedy. Additional smoke detectors may help to reduce the risk. Proper use and care of the smoke detector could save lives.**



Located on ceiling

### INFORMATION:

**Refer to the smoke detector OEM manual for detailed information and maintenance information.**



## Operation

When a 9 Volt DC battery is correctly connected the LED flashes every minute and a loud alarm will sound when a production of combustion is sensed.

### **NOTE:**

**The unit will not operate without a battery. A battery flag will pop up preventing the unit from being installed to the mounting bracket without a battery. Carbon Zinc batteries average a service life of one year. Alkaline batteries average a service life of one to two years.**

## Testing

Simply press the test button on the smoke alarm cover for approximately three seconds. The alarm will sound if all electronic circuitry, horn and battery are working properly. The smoke alarm should be tested at least once a week when the motorhome is in use, prior to each trip and when the motorhome has been in storage. When testing the smoke alarm it is advised to stand at arm's length or muffle the alarm.

### **CAUTION:**

**Never use an open flame to test the smoke alarm as this may ignite the alarm or surrounding area.**

### **⚠ WARNING**

TEST THIS ALARM'S  
OPERATION AFTER EACH  
STORAGE PERIOD, BEFORE  
EACH TRIP AND AT LEAST  
ONCE PER WEEK DURING  
USE. 020155e

## Maintenance

### **Maintenance for Proper Operation:**

- Test the smoke alarm once a week.
- Keep a supply of 9 Volt DC batteries on hand.
- Periodically vacuum the slots in the cover and sides with a soft brush attachment. Test the smoke alarm after the unit has been vacuumed.
- The smoke alarm will beep once a minute when battery power is low. Immediately replace the battery.

## Troubleshooting

If the alarm does not sound when the test button is pushed, or with a smoke test, try the following:

- Inspect alarm for obvious damage.
- Check for the recommended battery type.
- Check the battery for proper connection or replace the battery if needed.
- Gently vacuum as recommended.

If these procedures do not correct the problem, do not attempt repairs. Contact the manufacturer of the alarm if the smoke alarm is within the warranty period. Smoke detectors beyond the warranty period cannot be economically repaired.

## CARBON MONOXIDE DETECTOR

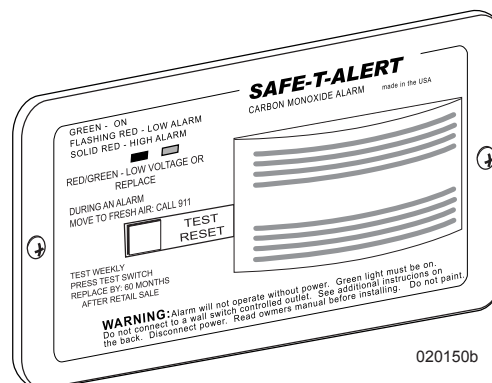
American National Standards Institute (ANSI) 119.2 - Fire & Life Safety 6.4.6 Carbon Monoxide Detectors states *"CO detectors used must be listed as suitable for use in RV's and installed in accordance within the terms of their listing. No specific mounting location is mandated for CO detectors; only that they be installed in accordance with their listing. The installation of the CO detector mounting bracket alone will be considered acceptable as long as the CO detector is provided."*

*A CO detector is required to be installed in any RV that either contains an internal combustion engine or is designed to have one installed. This would include all motorized RV's, regardless of whether the fuel source is gasoline, diesel, propane, or other alternate fuel. This would also include an RV equipped with a generator or designed to accommodate future installation of a generator (commonly called "generator prep" setups). This would not include RV's equipped to store or transport internal combustion engine vehicles.*

*Also, all truck campers must have a CO detector installed, since an internal combustion engine is ultimately present once the truck camper is mounted on a pickup truck."*

### **INFORMATION:**

**Refer to the CO detector OEM manual for detailed information and maintenance information.**



Located in bedroom

The motorhome is equipped with a Carbon Monoxide detector. Everyone is at risk with Carbon Monoxide poisoning. Carbon Monoxide (CO) is a colorless, odorless and tasteless gas that binds with hemoglobin reducing the body's ability to absorb and carry oxygen to vital organs. Even low levels of CO have been known to cause brain and other vital organ damage in unborn infants, with no effect on the mother.

When removed from exposure, the symptoms dissipate as Carbon Monoxide is expelled through the lungs. Level of contamination in the body reduces at half-life increments at approximately four-hour intervals. Treatment with Oxygen will quicken recovery time.

In cases of mild exposure, the symptoms may include: a slight headache, nausea, vomiting and fatigue. Some consider this a "Flu-like Symptom." Symptoms for medium exposure may include a severe throbbing headache, drowsiness, confusion and fast heart rate. Extreme exposure can result in unconsciousness, convulsions, cardiorespiratory failure and death.

Young children and household pets may be the first affected. Other highly sensitive people include the elderly and those with lung or heart disease or anemia. The CO detector is designed to detect the toxic CO Gas resulting from incomplete combustion of any fuel. This can be gasoline, propane, natural gas, oil, charcoal or wood. Anything that burns fuel such as engines, generators, furnaces, gas stoves or water heaters, produce CO Gas. Consequently, it is uncommon for household smoke from cigarettes or normal cooking to cause the alarm to sound.

#### **CAUTION:**

**Activation of this device indicates the presence of Carbon Monoxide (CO), which can be fatal. A concentration of above 100 PPM will cause a warning condition. Individuals with medical problems may consider using detection devices with lower Carbon Monoxide alarming capabilities. Prolonged exposure to the horn at a close distance may be harmful to hearing.**

#### **WARNING:**

**Constant beeping and a flashing red light means CO gas has been detected. Shut off all sources of CO such as propane appliances, the engine, generator etc. Open vents and windows to ventilate the motorhome. Evacuate the motorhome until conditions are safe to re-enter. Determine the source of the alarm and have the problems corrected before resuming operation.**

The CO detector is wired to the house batteries. This allows reliable protection by alerting the build up of potentially dangerous levels of Carbon Monoxide. Once powered, the detector will run through a brief warm-up and self check prior to monitoring for CO gas.

#### ***Operation***

The detector is equipped with a self-cleaning CO sensor and requires a ten minute initial warm-up period to clean the sensor element and achieve stabilization. During the warm-up period, the green power light will flash On and Off. The green power light should be lit when the power is on. If the light is not lit, turn off the power and check all wire connections. If the power is on and the connections are correct, but the indicator still does not light, the detector should be returned for service. Do not attempt to fix the detector. The indicator light displays a specific color to monitor along with a matching sound pattern.

#### **Indicator Lights and Sound Patterns:**

- On or normal condition is indicated by green. The CO detector has power and is sensing air for the presence of CO Gas. The alarm will not sound.
- Flashing red indicates low CO alarm condition along with four beeps then off for five seconds. The alarm will sound and can be reset by the Test/Reset button. The CO detector has detected the presence of 60 ppm.

- Steady red indicates a CO alarm condition. The detector has sensed the presence of levels over 100 ppm of Carbon Monoxide. The alarm will sound continuously until the Reset switch is reset.
- Alternating red and green indicates a malfunctioning alarm.

## Alarm

If the alarm sounds, have the detector and the motorhome checked by an authorized service technician as soon as possible. Never disconnect a CO detector to silence an annoying alarm. Evacuate the motorhome immediately when the red light is lit and the alarm sounds. Do a head count to check that all persons are accounted for. Call the nearest fire department and ask them to determine the source of the Carbon Monoxide. Do not re-enter the motorhome until it has been aired out and the problem corrected.

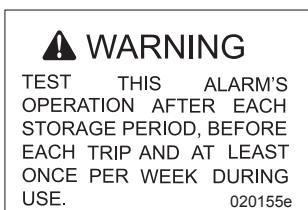
### Potential Sources of CO in the motorhome:

- Engine Exhaust
- Portable Grills
- Portable Space Heaters
- Camp Fires
- Gas Stoves and Ovens
- Generator Exhaust
- Portable Generators
- Nearby Motorhomes
- Defective Engine Exhaust System

## Testing

### Test Procedures:

Test the Carbon Monoxide detector operation after the motorhome has been in storage, before each trip and at least once a week during use. Test by holding the Test/Reset button in until the alarm sounds four beeps and the indicator lamp is steady red. Six seconds later the alarm will again beep four times and the indicator light goes steady green.



### Peak Level Memory:

The CO detector has the capability to remember the level of Carbon Monoxide that activated the alarm.

Press the Test/Reset button for less than one second and observe the visual and audible signals.

- One beep and one green flash indicate memory is clear.
- Two beeps and two red flashes indicate less than 100 ppm.
- Three beeps and three red flashes indicate less than 200 ppm.
- Four beeps and four red flashes indicate greater than 200 ppm.

### NOTE:

**Memory is erased when power is disconnected for 15 seconds.**

## Cleaning & Maintenance

Use a vacuum cleaner to remove dust or any other buildup on the detector. **Do not** wash. Wipe the detector with a damp cloth and dry with a towel. Do not open the detector for cleaning. Do not paint the detector. It is recommend that the Carbon Monoxide detector be replaced every five years.

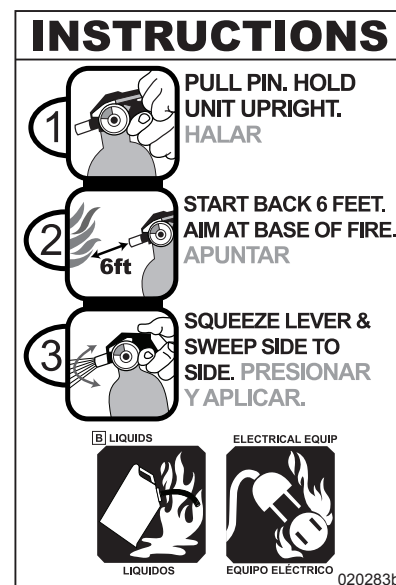
The CO detector has no user service parts. If there is a problem with the detector refer to an authorized service center. Do not remove power.

### INSPECTION:

**Test the CO detector weekly and at the beginning and end of each trip.**

## FIRE EXTINGUISHER

A fire extinguisher is located near the entry door. Please read the operating instructions printed on the fire extinguisher.



### Use the **PASS** method:

**P**ull the pin. Hold extinguisher upright.

**A**im at the base (bottom) of the fire and stand six feet away.

**S**queeze the lever to discharge the agent.

**S**weep the spray side to side until fire is totally extinguished.

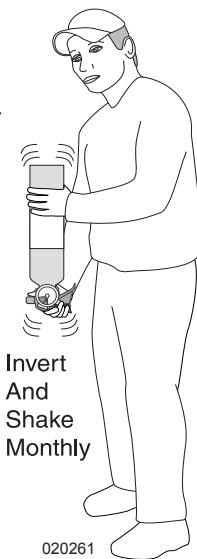
If there is any doubt on how to operate the fire extinguisher practice using it. Replace or recharge the extinguisher immediately after use.

### Maintenance

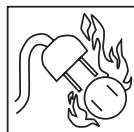
Inspect the fire extinguisher at least once a month. Inspect more frequently if the extinguisher is exposed to weather or possible tampering. Do not test the extinguisher by partially discharging. Internal pressure will escape and the fire extinguisher will need to be replaced.

#### **WARNING:**

**Road vibration will cause extinguisher powder to compact and may cause extinguisher malfunction. Invert and shake extinguisher monthly.**



Three classes of fire can occur in a motorhome. Any fire can fall into more than one class; a fire that involves both burning paper and kitchen grease is a Class AB fire.



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### Classes of Fire:

**A** - Fires that are fueled by materials that leave a residue when they burn: paper, wood, cloth, rubber, and certain plastics.

**B** - Fires that involve flammable liquids and gases: gasoline, paint thinner, kitchen grease, propane and acetylene.

**C** - Fires that involve energized electrical wiring or equipment. If electricity to the equipment is turned off, a class C fire becomes one of the other two class fires.

### ESCAPE (EGRESS) WINDOW

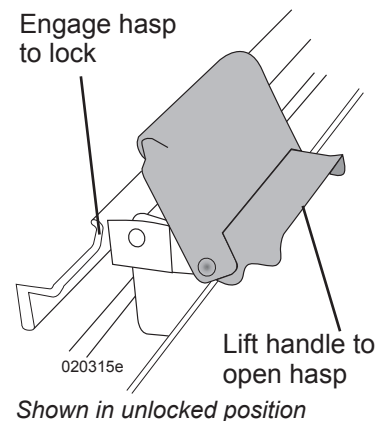
The Egress window, designated for use as an emergency exit, is identified by a red locking handle and Exit label.



### To Operate Style A:

- To open, lift handles and push window outward.
- To lock, pull window closed.
- Engage hasp with window trim.
- Lower lock handle.

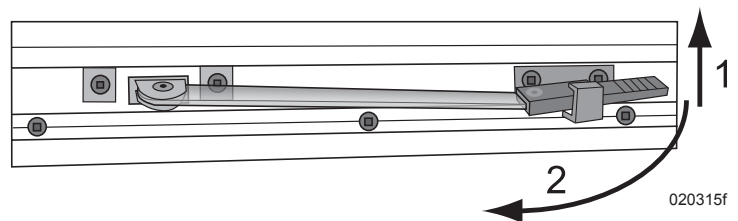
#### Style A



### To Operate Style B:

1. Unhook handle from latch
2. Swing handle open then push window outward guiding handle through handle access hole.

#### Style B



Hinges along the outside window top identify the Egress window on the motorhome exterior. The glass slider in the Egress window operates the same as all other windows in the motorhome.

### Maintenance:

- Occasionally open and close the Egress window to prevent the rubber seal from sticking.

## Notes

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



# Interior and Exterior Care

## Section 4

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### **INFORMATION:**

**This section is on general cleaning and maintenance. Some of the articles within “Exterior & Interior Care - Section 3” may not apply to all models. Improper or inadequate maintenance may affect your warranty coverage. Please review this section carefully. For more information, see the terms and conditions of the Limited Warranty in the front of this Manual.**

## **EXTERIOR CARE**

### ***Corrosion***

The most common cause of corrosion to the motorhome exterior is accumulation of road salt, grime and dirt. These elements, combined with moisture, may possibly cause early component failure. The undercarriage, around wheel openings and the radiator charge air cooler package require periodic cleaning to prevent component failure caused from corrosive materials collected on roadways.

If the motorhome is stored or driven in areas where road salts are used or near the ocean, it should be washed at least once a week, including the undercarriage. Otherwise, it is recommended to hose off the undercarriage area at least once a month to help slow the process of corrosion.

High-pressure washers or steam cleaners are the most effective way of cleaning the undercarriage and inside wheel openings. However, these devices can cause damage if used improperly. Avoid spraying directly at the painted surface with a high-pressure washer of any type. Also avoid spraying electrical wiring, connectors or electro-mechanical components with high pressure.

### **CAUTION:**

**It is up to the motorhome owner to properly wash and protect the motorhome and its components from corrosion. Sources of corrosion can come from road surfaces treated with de-icing agents or atmospheric conditions such as coastal regions.**

### **CAUTION:**

**Exercise caution when cleaning the radiator charge air cooler package. Damage to the fins can result when using a high-pressure washer or steam cleaner. The nozzle discharge pressure of these devices can exceed 1800 psi. Also avoid using high-pressure/high-temperature steam cleaners on the exterior paint surfaces. Remove all spattered washing debris from the exterior paint surfaces as soon as possible.**

## ***Winter Drive Protection***

Various substances and chemicals are applied to roadways to reduce hazardous winter driving conditions. These substances can include rock salt, sand, gravel or chemical applications such as Liquid Magnesium Chloride (LMC).

Road salts are known for their corrosive properties to steel and other metals. Road salt can also damage other vehicle components and materials. Vehicles located in or traveling through areas where road salt is used are subject to rapid corrosion. LMC is a moisture activated chemical applied directly to the road surface for the purpose of lowering the freeze point of water. According to published information, LMC is a suitable replacement for road salt or sanding.

The consequence of using LMC is that it is highly corrosive to all metals, plastics and can even destroy rebar embedded in concrete. After application, road traffic will cause LMC to become an airborne vapor traveling as much as 2000 feet from the point of origin. Vehicles located within that distance, even when stored outside, are exposed to the same corrosive affects as vehicles traveling over a road treated with LMC. LMC lowers the freeze point allowing moisture to further penetrate surfaces, and remains active down to 27% humidity. Foot traffic will also track road salt and LMC into living spaces.

While most sand, road salt and LMC accumulation can be washed away through use of a high-pressure washer, road salt and LMC is still bonded to all exposed surfaces including paint. Only chemical washing can neutralize road salts or LMC. However, chemical washing can only neutralize open surfaces. LMC and road salt remains trapped between mating surfaces and will corrode wiring as well.

Local or state governments determine what to apply to the road surface during winter months and substances can change by location. It is possible to encounter one or all of these substances while driving. Only regular weekly washing of the exterior and undercarriage can slow corrosion during the winter months. No single treatment can be used to eliminate and neutralize the affects of these corrosive substances.

Diligent washing and awareness of what substances applied to the road surface will dictate if a neutralizing agent must be applied to help slow the process of corrosion to exterior surfaces including the paint finish.

Therefore; it is up to the motorhome owner to perform regular washing maintenance and neutralize any corrosive agent applied to the roadway by local or state governments.

## ***Washing***

The recreational vehicle is painted with a “base coat, clear coat system.” Clear coat is a polyurethane-based material that brings out the shine and luster to the base coat paint. Periodic cleaning will help to preserve the finish. Care should be used when washing the recreational vehicle. Use only mild soap or (preferred) specifically designed automotive shampoo. Do not use abrasive cleansers or laundry detergents as these will scratch the clear coat and leave a soap film. Use a soft cotton cloth or specially designed microfiber and/or wool washing mitt when washing the paint finish. Do not use a brush as it can scratch the surface and damage the clear coat. Remove most of the accumulated dirt and road wash behind wheel openings and the rear of the recreational vehicle before washing. If build up is excessive, run water over a soft cotton cloth while gently wiping the surface in a downward direction. This will help float away the build up from the clear coat. Avoid using back and forth or circular motions when washing away build up as this can trap particulates and scratch the clear coat leaving a haze and swirl marks that will require a professional to repair.

After removing the heavy build up then wash the recreational vehicle. Start washing at the top working towards the bottom. If possible, wash the recreational vehicle in a shaded area when the exterior is not hot to the touch.

If necessary, turn the recreational vehicle around to keep the area being washed in the shade. Keep the surface wet and try not to allow the washing solution to dry before rinsing. Use plenty of water when rinsing the surface to remove all washing residue.

## ***Drying***

Chamois cloths come in natural and synthetic materials. Either type is acceptable as long as the surface is clean. Soak the chamois in clean water, then wring it dry. Remove the water from the surface, starting at the top and working towards the bottom, using a downward “S” pattern. Wring out the chamois as needed. Using a chamois cloth to remove the rinse water is not necessary, but the effort can be worthwhile.

## ***Waxing***

It is recommended to wax the motorhome twice a year: spring and fall. Many types of protective barriers are available today that may be applied to the clear coat: glazes, waxes, polishes, rubbing compounds or combinations of these products.

## **NOTE:**

**Use a grease and wax remover before applying another coat of wax. Chemicals can become trapped between layers of wax, possibly damaging the paint finish.**

## **INFORMATION:**

**When selecting a product, follow the product manufacturer’s recommended application instructions.**

### **Types of Products:**

**Glazes** - Glazes are generally used to fill very fine scratches in the clear coat. They are applied either by hand or by using a polisher with a special pad.

**Waxes** - Waxes come in many types of chemical make-up. Most contain cleaning agents, lubricants and wax. Cleaning agents remove oxidation and leave a high gloss. Wax leaves a clear film that protects the finish

**Polishes** - Polishes combine wax based substances with abrasives to clean and polish at the same time. These products can be too abrasive for clear coats and are not recommended for use.

**Rubbing Compounds** - These types of products are generally applied by using a buffer. The use of rubbing compounds should be left to professionals as undesired results can quickly occur. These types of products are generally used to correct or flatten a surface by removing high spots or small amounts of material.

When selecting a product, the container should be marked, “safe for clear coats” or “clear coat safe.” Carefully follow the application instructions when using a product. Upon first use of a product, try it on a small test spot in an inconspicuous area in case an undesired reaction occurs.

Observe the test area from different angles to check for hazing or swirl marks. If an abnormal reaction to the finish occurs, discontinue product use and consult the product manufacturer. If the product is a paste, do not allow dried paste to be baked on by the sun. Remove paste shortly after drying. Clean, dry, 100% cotton cloths are best suited for the removal of dried paste. Turn the cloth often. Use a separate clean cloth to buff. The surface should feel slick when rubbing the cloth lightly over it.

Avoid repeated wax applications which can cause build up. Some very fine scratches or swirl marks may be removed by application of a glaze. These types of glazes fill the scratches or swirl marks.

The motorhome has a large surface area. Washing and waxing may not be completed in one afternoon. Select sections to wax until the motorhome is complete. If the task seems overwhelming, have a professional detailer perform the task.

### **Paint Codes**

The motorhome color scheme is comprised of specific paint colors, each assigned a code used to achieve a desired color of paint. "Touch-up" paint may be used to repair a small scratch or imperfection in the paint surface. To paint a larger area, it is necessary to obtain the paint code to get the correct color match.

#### **To Obtain the Paint Code:**

- ◆ Contact **Parts and Service** at:  
**1-877-466-6226**.
- ◆ Specify the year, model, serial number and exterior color scheme name (if known).

#### **NOTE:**

**All special paint schemes require contacting the manufacturer directly for paint codes.**

### **Tire Care**

Proper care and methods in cleaning must be used to obtain the maximum service years out of the tires. Use a soft brush and a mild detergent to clean the tires. If a dressing product is used to "protect" the tires from aging, use extra care and caution. Tire dressings that contain petroleum products or alcohol may cause deterioration or cracking.

In many cases it is not the dressing that causes a problem but the chemical reaction that subsequently occurs. When these same dressing products are used on a passenger car tire that is replaced every three to four years, it is rare to see a major problem. However, in most cases motorhome tires may last longer due to limited annual mileage and exposure.

### **Bright Metal**

All chrome and stainless steel should be washed and cleaned each time the motorhome is washed. Use only automotive approved non-abrasive cleaners and polishes on exterior bright work. Do not use rubbing compounds. Do not use abrasive cleaners or compounds to clean the mirrors.

#### **NOTE:**

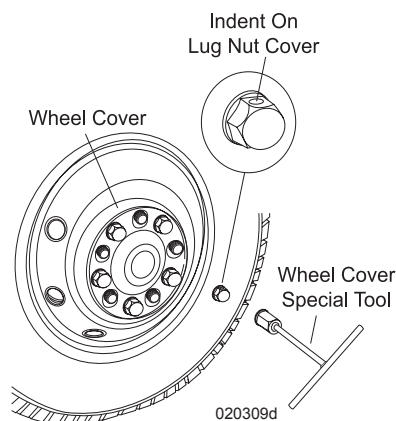
**When applying chemicals to remove road tar, use only automotive products that are recommended for painted surfaces and fiberglass. Observe the warning recommendations and directions printed on the container.**

### **Wheel Covers**

Clean the wheel covers frequently with high pressure water from a hose using a mild detergent. Do not use harsh alkalis, alcohol or acidic cleansers. A secondary hand washing with a soft cloth may be required to remove stubborn road grime. To remove the wheel covers from the wheel for a thorough cleaning use the special tool that was included with the motorhome. Each wheel cover is secured by lug covers identified by indent or notch markings. When the wheel covers are removed tires and rims can be cleaned and inspected.

Remove dirt, corrosion or any foreign material from the tire side of the rim using a wire brush. Do not use a wire brush or other abrasive substances to remove dirt and corrosion from the wheel covers. To maintain the original appearance of the wheel covers the following procedures are recommended:

- ◆ After reinstalling wheel covers (prior to operating the motorhome) use a sponge, cloth or soft fiber brush to wash the exposed wheel surfaces with a mild detergent/warm water solution.
- ◆ Rinse thoroughly with clean water.
- ◆ Wipe dry to avoid water spots.
- ◆ Use a high quality, non-abrasive polish to remove stubborn road tars, insects or hard to remove deposits.
- ◆ To protect the surface appearance on wheel covers, wax the cleaned surface with a high quality car wax.
- ◆ Clean the wheel covers frequently to maintain appearance.



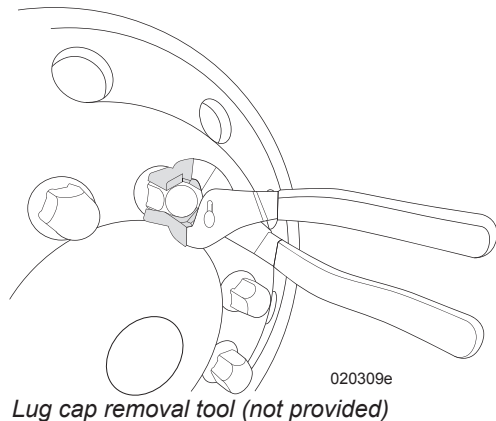


## Wheels - Polished Aluminum

### Outside:

The outward side of the aluminum wheel is a polished finish and should be treated the same as the paint finish on the motorhome. Road soils, grime and brake dust trap moisture which can cause corrosion over a period of time.

1. Frequently clean using high-pressure water.
2. Wash with a 100% cotton cloth and a mild soap solution (dish soap or car wash soap is recommended).



3. Rinse all remaining soap residue with high-pressure water and wipe the surface dry using a 100% cotton cloth to avoid water spots.
4. A secondary hand washing may be required to remove some stubborn road films.
5. Carnauba wax can be applied to help protect the finish.

### CAUTION:

**Rinse aluminum wheels using high-pressure water to remove debris from the surface before washing. Do not scrub. Rubbing debris against the surface of the wheel can result in scratches. Do not allow soap solution to dry on the finish of the wheel as spotting will occur.**

### NOTE:

**Allow heated wheels that are extremely hot to cool before spraying with cold water.**

Do not use the following items on polished aluminum wheels:

- ◆ Synthetic cleaning pads, wire or abrasive brushes, steel wool or scouring pads (these can mar or scratch the finish).
- ◆ Strong detergents, alkaline or acidic cleaners, acids or lye-based chemical products or solvents.

### Inside:

If the tires are removed, inspect and clean the entire rim. Air used to fill the tire may contain moisture and can cause the areas of the wheel under the tire to severely corrode.

Use a soft brush to remove foreign material from the tire side of the rim. Lubricate the rim and tire bead with a non-water-based lubricant before mounting the tire and ensure the inside of tire is dry before installing.

### WARNING:

**Do not use a flammable solution to coat the inside of the rim. This can lead to an explosion during tire inflation or in subsequent operation of the motorhome.**

## EXTERIOR MAINTENANCE

The motorhome is exposed to extreme temperatures, humidity, ultraviolet rays, rain and other environmental conditions. While in operation the motorhome is subject to twisting and flexing caused by rough roads, potholes and winding mountain roads. Maintenance is necessary not only to keep the exterior looking nice but also to keep it in proper working order.

### Fiberglass

Inspect the fiberglass exterior. Periodic inspection may reveal that flexing of the fiberglass exterior has created imperfections in the surface commonly known as “spider” or “hairline” cracks. A crack that has opened up to reveal the cloth weave threatens the integrity of the fiberglass. If the exterior exhibits signs of damage, prevent moisture penetration, particularly in freezing climates. Cover the area using plastic sheeting and/or tape, and have the damaged fiberglass repaired as soon as possible.

### Roof Care & Seal Inspections

Wherever there is something affixed to the motorhome, such as the “beltline” or vent attached on the roof, there is a seal preventing water intrusion.

There are many types of sealants and each has a specific use. While the beltline uses a silicone or urethane base sealant to prevent water intrusion, roof openings uses self-leveling sealant. Moisture intrusion can occur at any time for a number of reasons. Therefore, regular sealant inspection and maintenance will greatly reduce the likelihood of moisture intrusion and costly repairs.



The motorhome is sealed at the factory. However, extreme weather conditions can shorten the life of the sealant. Harsh road conditions can compromise sealant integrity. Maintaining sealant is part of regular motorhome maintenance. Inspect all joints, seams and openings at least once every six months. While sealant integrity may appear fine, a small void under the right conditions can quickly cause major damage.

Make a full interior inspection for signs of moisture intrusion every two weeks if the motorhome is in storage.

#### **CAUTION:**

**Inspect exterior seals, seams and joints for sealant integrity at least twice a year. Make a full interior inspection for water leaks every two weeks while the motorhome is in storage.**

#### **INSPECTION:**

**Surface must be clean and dry. Inspect seal for voids, cracks, bubbling, peeling or pulling away. Sealant that looks fine without imperfections is acceptable for continued service. Sealant that is old, cracking, flaking or bubbling will allow moisture intrusion and must be repaired.**

#### **WARNING:**

**Inspecting sealant will require use of a ladder or scaffold assembly. Roof access is also required. Follow proper safety measures accordingly. Exercise extreme care whenever using a ladder/scaffold assembly. Avoid getting on the roof if it is icy or moisture laden as the surface can be very slick. Use judgment if inspection is considered dangerous. Have the motorhome inspected or sealed (if necessary) by a qualified service technician.**

#### **Sealant Replacement:**

Carefully remove sealant that is cracking, flaking, bubbling, peeling or pulling away from the surface. The area under the removed sealant will need to be clean and dry before applying new sealant. Applying new sealant over a dirty or moisture laden surface will not allow proper adhesion.

Sealant application may require simple hand tools and paper towels or rags for cleanup. Some sealants may be labeled hazardous or require chemicals for cleanup. Follow all of the manufacturer's warnings and precautions when dealing with these substances.

#### **WARNING:**

**Some sealants may be labeled hazardous or require use of petroleum distillates for cleanup. Use proper precautions as suggested by the sealant or chemical manufacturer. Use of protective eye wear, gloves, respirator or open ventilation may be required. Use judgment when working with chemicals. If health limits exposure to chemicals or inhibits skills or abilities, employ a qualified service technician to perform the tasks.**

#### **Sealant Types**

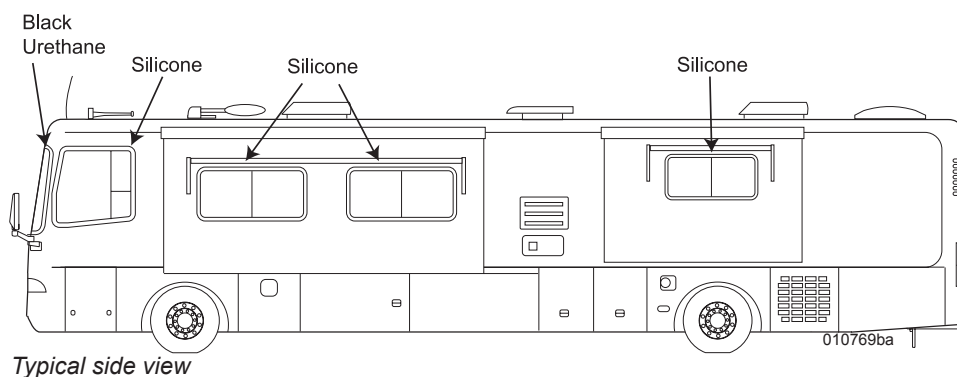
##### **Roof:**

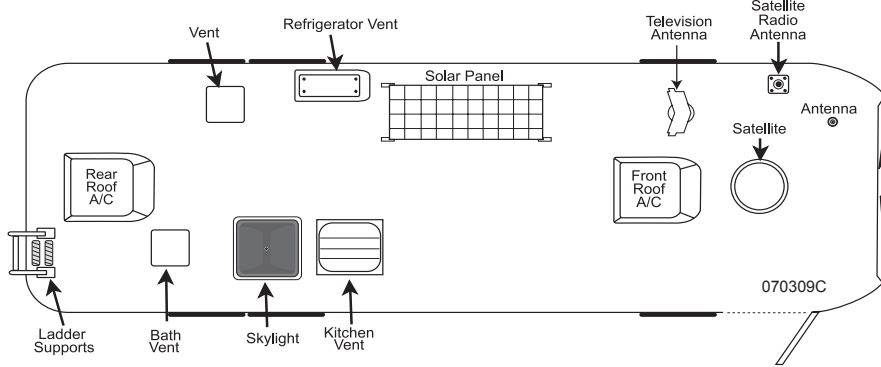
Dicor 502 is a self-leveling sealant designed for use on TPO (Thermoplastic Olefin) roof systems. This product is used on all roof openings such as vents, skylights, roof-mounted antennas and ladder roof mounts. Do not coat entire roof. Remove old sealant that is not adhered. Sealant that is secured need not be removed. Thoroughly clean and dry surface areas before applying new sealant.

Lay masking tape around the area to be sealed to limit sealant from spreading beyond the desired area. Using a caulking gun, apply new sealant working the caulking gun in a manner that causes the sealant to fully adhere. Allow adequate cure time before exposure to rains.

##### **Roof Air Conditioner:**

Roof air conditioners use a closed cell foam base gasket. No sealants are required. The roof air conditioners should be checked for tightness by the four mounting bolts located in each interior corner of the air conditioner roof opening. Torque specification is 40 to 50 in/lbs. The base gasket should be compressed to about 1/2".





#### **Typical Roof Layout:**

Inspect each item for sealant integrity. Acryl-R is used as a roof sealant.

### **Exterior Attachments: Sikaflex 221, 51 and Locktite 5510**

Primarily used on the sidewalls around windows, doors, handles, beltline molding, latches and bases of surface mounted items such as clearance lights. Old peeling sealant should be removed with nylon sticks or equivalent. Avoid using metal utensils that can scratch the painted surface. Use nylon sticks or equivalent. Avoid lacquer thinners or ketone based solvents as these chemicals can damage painted surfaces. Confirm that surface is clean and dry before a new application. Cut the tube at an angle with the smallest usable opening. Avoid a heavy bead as a little goes a long way. Use a finger at a 45° angle on the beaded surface to smooth out product. Do not moisten finger, use a disposable latex glove.

Keep rags or paper towels handy for clean up. Use care when applying silicone and plan ahead before starting a bead. Look for obstacles that may impede application.

### **Undercarriage: Expanding Spray Foam**

This product is used as a sealant where a hole has been made for items such as water lines or wires that are coming through a floor or bulkhead opening. Consult manufacturer data for application and safety instructions.

### **Windshield: Black Polyurethane**

Used for sealing the windshields not to fill holes or other imperfections. Product comes in a tube and applies much the same way as silicone. Clean up using solvents such as paint thinner. Gloves are required as product is considered hazardous.

Installing the windshield is a 3-step process using the following materials:

- ◆ Sika Primer 206
- ◆ Sika Aktivator
- ◆ Sika Adhesive 255FC

### **WARNING:**

**Avoid eye and skin contact and breathing of vapors. Consult manufacturer data for application and safety instructions.**

### **Painted Surface: Acrylic Sealants**

Used where items are sealed under a painted surface such as the metal corners of slideout rooms and roof mounted awning brackets. The material is specially formulated to allow paint adhesion. Consult manufacturer data for application and safety instructions.

## **INTERIOR CARE**

### **Cockpit**

The dashboard is a molded assembly that is vinyl wrapped. The instrument panel is comprised of various gauges and switches. The dashboard and instrument panel have different cleaning requirements. Clean the vinyl wrapped dashboard following the instructions under **“Vinyl”** in this section. If a blemish or small cut occurs in the vinyl, contact a professional upholstery repair service.

Clean plastic or Plexiglas® instrument panels with a cloth dampened with a mild soap and water solution. Dry using a separate cotton cloth. Plastic polish products that can help brighten the appearance of plastic or Plexiglas instrument panels are *Novus Plastic Care®*, a three-part system; *Meguires®* and *Johnson Paste Wax®*. These products will require buffing and rubbing. Only glass lens gauges can be cleaned using glass cleaner. Spray cleaner on the cloth, not directly onto the lens to prevent overspray or runoff.

### **CAUTION:**

**Do not use glass cleaner on plastic or Plexiglass surfaces. Most glass cleaners will haze plastic finishes and cause brittleness.**

### **TIP:**

**To determine if a lens is glass or plastic, tap the lens with a fingernail. Plastic lens will have a dull hollow sound whereas glass will have a clear ping sound.**

## FABRICS

### General Care & Cleaning

Use care when the motorhome is exposed to high-humidity climates for an extended period. Protect fabrics from prolonged exposure to moisture to prevent mold. Cover all upholstery and make sure window coverings are down to protect fabrics from sun damage. Frequently used items require more attention than those items not regularly used.

If a spill occurs, blot the moisture as quickly as possible. Do not use soap and hot water as this may set a stain. Clean the spot as soon as possible.

#### Cleaning Upholstery Fabrics:

- ◆ Water-based cleaners are not recommended.
- ◆ If a spill does occur, blot the soiled area, do not rub it.
- ◆ Some solvents may have an adverse reaction on the backing of the upholstery fabric and is not recommended.
- ◆ To prevent overall soiling, frequently vacuum or lightly brush to remove dust and grime.
- ◆ Clean spots using a mild water-free solvent or dry cleaning product.
- ◆ Clean only in a well ventilated area and avoid any product containing carbon tetrachloride or other toxic materials.
- ◆ Use a professional furniture cleaning service for overall cleaning.

## Vinyl

Several areas of the motorhome, such as the dash, ceiling and items of furniture, may be covered in vinyl. The care and cleaning of these areas are as follows:

#### Normal Cleaning:

Most common stains can be cleaned using warm soapy water and a clear water (distilled water preferred) rinse. Moderate scrubbing with a medium bristle brush will help to loosen soil from the depression of embossed surfaces.

For stubborn stains use the following commercially available mild detergents in accordance with the manufacturer's instructions: *Mr. Clean* or *Fantastik*®.

Full strength rubbing alcohol or mineral spirits may be tried cautiously as a last resort on very stubborn stains if the previous suggestions do not work. Indiscriminate use of any solvent or solvent containing cleaner can severely damage or discolor the vinyl. Stains may become permanent if not immediately removed.

## NOTE:

Detergents should never be used on a regular or repeated basis for normal cleaning.

## CAUTION:

**Powdered cleaners containing abrasives, steel wool and industrial strength cleaners are not recommended for vinyl.**

#### Bird Excreta & Vomit Stains:

Sponge the area with a soapy water and diluted bleach solution until stain is removed. Rinse thoroughly with clean water.

#### Urine Stains:

Sponge with soapy water containing a small amount of household ammonia. Rinse thoroughly with clean water.

#### Surface Mildew:

Wash with diluted bleach and use a soft brush for stubborn growth. Rinse repeatedly with clear, cold water.

#### Ballpoint Ink:

Wipe the stain immediately with rubbing alcohol in a well ventilated area.

## WARNING:

**If flammable solvents such as alcohol, turpentine or varsol are used for cleaning, use only small quantities in well-ventilated areas. Exercise proper caution by notifying any persons in the area. Keep away from any ignition source. Always wear protective gloves.**

#### Latex Paint:

Wipe fresh paint off with a damp cloth. Hot soapy water will normally remove dried latex.

#### Oil-Base Paint:

Use turpentine in a well ventilated area to remove any fresh paint. Dried paint must be moistened using a semi-solid, gel-type stripper. The softened paint can be gently scraped away. Rinse with soap and water.

## CAUTION:

**Lacquer solvent will cause immediate irreparable damage to the vinyl. Do not use wax on vinyl upholstery as it will cause premature embrittlement and cracking. Dilute chlorine bleach before using. Never use full strength bleach. Paint strippers will remove the print pattern and damage the vinyl if it comes in direct contact.**

**Tar or Asphalt:**

Remove immediately. Prolonged contact will result in a permanent stain. Use a cloth lightly dampened with mineral spirits and rub the stain gently, working from the outer edge of the stain toward the center to prevent spreading. Rinse with soap and water.

**Crayon, Mustard or Ketchup:**

Sponge with mild soap and water. For stubborn stains that have set, use a cloth soaked in diluted mild detergent with gentle rubbing. Any remaining stain should be washed with diluted bleach. Rinse repeatedly with cold water.

**Candy, Ice Cream, Coffee, Tea, Fruit Stains, Liquor, Wine, Tanning Lotion or Soft Drinks:**

Loose material should be gently scraped with a dull knife. Use lukewarm water and sponge repeatedly. Any soiled area that remains after drying should be gently rubbed with a cloth or dampened with a mild detergent solution. Rinse thoroughly with clean water.

**Chewing Gum:**

Scrape off as much gum as possible using a dull knife. Rub the gum with an ice cube to harden and for easier removal. In a well ventilated area, use a cloth saturated with mineral spirits and gently rub the remaining gum. Rinse thoroughly with clean water.

**Lipstick, Grease, Oil, Make-Up or Shoe Polish:**

Apply a small amount of mineral spirits with a cloth. Rub gently. Be careful not to spread the stain by smearing beyond the original source. Remove shoe polish immediately as it contains a dye that will cause permanent staining. Rinse thoroughly with clean water.

**Blood or Plant Residue:**

Rub out spots using a clean cloth soaked in cool water. For stubborn spots, use household ammonia and rinse repeatedly with a clean, wet cloth. **Do not** use hot water or soap suds as this will set the stain.

**NOTE:**

**Tears or holes in the vinyl can be temporarily covered with clear tape to prevent further damage. Repairs should be made by a professional upholstery shop. Commercial repair products may contain lacquers and cause the vinyl to become brittle and more difficult to repair.**

**TIP:**

**Vinyl requires periodic cleaning to maintain its appearance and to prevent the buildup of dirt and contaminants that may permanently stain or reduce the life of the vinyl if left untreated. Frequency of cleaning and procedures used depend upon the amount of use and the environmental conditions in which the vinyl is subjected.**

***Optima Leather & "O" Vinyl*****Cleaning Suggestions:**

Follow cleaning steps in sequence. Each subsequent step is to be used if the previous step was not successful. Clean area with warm water after each process.

**For General Cleaning:**

Wipe the soiled area with warm water, a mild detergent soap, and a soft cotton cloth.

**For Oil-based Stains:**

Spray soiled area with household cleaner, such as 409® or Fantastik®, and wipe with warm water using a soft cotton cloth.

**For Marker-type Stains:**

Dab stained area with solution of 50% Isopropyl Alcohol and 50% warm water using a soft cotton cloth.

**WARNING:**

**Avoid open flames or hot lighting when using an alcohol solution.**

**CAUTION:**

**Do not use any abrasive cleaner with this material.**

**NOTE:**

**A five parts water to one part bleach solution is recommended for disinfecting.**

***Ultra-Leather*****Care Instructions:**

- ◆ Spot clean with mild soap and water.
- ◆ Air dry or dry quickly with warm setting of a hair dryer.
- ◆ For stubborn stains, use mild solvent.
- ◆ For tougher stains, try Fantastik® brand spray cleaner. Disinfect with a 5:1 non-chlorinated (only) bleach solution.
- ◆ Dry clean using commercial dry cleaning solvents only.



- ◆ Use a mild detergent for:
  - Red Wine, Liquor, Coffee, Tea, Cola, Milk
  - Ketchup, Mustard, Mayonnaise, Steak Sauce, Soy Sauce
  - Butter, Salad Oil, Chocolate, Lipstick, Make-up, Face Cream
  - Suntan Oil, Machine Oil, Urine, Blood

### **Removing ballpoint pen stains:**

Wipe the stain off with ethanol (ethyl alcohol).

Follow all manufacturer safety instructions when using chemicals.

### **Use the following procedure if stain the remains:**

- ◆ Dilute household bleach (sodium hypochlorite) with the same amount of water. (One part to one part solution.)
- ◆ Apply the bleach/water solution to a piece of tissue (do not apply too much). Place the tissue on the stained surface and cover it with polyethylene film to prevent the solution from drying.
- ◆ Periodically remove the tissues to check on the condition of the stain. When the stain is almost gone, remove the tissues completely. Do not leave on for more than one hour.
- ◆ Wash the stain with sufficient amount of clean water.

### **CAUTION:**

**If bleach residue remains, the polyurethane resin and back cloth will yellow and deteriorate.**

### **To Neutralize Bleach:**

- ◆ Place a piece of tissue, as in Step 2, and apply hydrogen peroxide solution (15%).
- ◆ Leave the solution on for approximately 30 minutes then remove the tissue.
- ◆ Completely remove the residue of hydrogen peroxide on the Ultra-leather with water.

Bleach is the only chemical that will remove ballpoint pen stains. However, this may cause polyurethane to yellow or the back cloth to deteriorate. It is recommended to remove ballpoint pen stains as early as possible with ethanol.

## **FLOORS**

### ***Carpet Cleaning***

#### **Spot Removal Procedures:**

- ◆ Act quickly when anything is dropped or spilled. Remove spots before they dry.
- ◆ Blot liquids with a clean, white absorbent cloth or paper towel.
- ◆ For semi-solids, scoop up with a rounded spoon.
- ◆ For solids, break up and vacuum out as much as possible.
- ◆ Pre-test the spot removal agent in an inconspicuous area to make certain it will not damage the carpet dyes.
- ◆ Apply a small amount of the cleaning solution recommended for the particular spot. Do not scrub. Work from the edges of the spot to the center. Blot thoroughly. Repeat until spot is removed.
- ◆ Follow steps on the Carpet Spot Removal Guide.
- ◆ After each application, absorb as much as possible before proceeding to the next step.
- ◆ Absorb remaining moisture with layers of white paper towels, weighted down with a non-staining glass or ceramic object.
- ◆ When completely dry, vacuum or brush the pile to restore texture.
- ◆ If the spot is not completely removed, contact a professional carpet cleaner.

#### **Cleaning Solutions:**

- A. Dry Cleaning Fluid:** A non-flammable spot removal liquid, available in grocery and hardware stores.
- B. Nail Polish Remover:** Any acetate, that often has a banana fragrance. Do not use if it contains acetone.
- C. Detergent Solution:** Mix two cups of cold water and 1/8 teaspoon mild liquid detergent (no lanolin, non-bleach).
- D. Warm Water:** Lukewarm tap water.
- E. Vinegar Solution:** One cup white vinegar to one cup water.
- F. Ammonia Solution:** One tablespoon household ammonia to one cup water.



	A	B	C	D	E	F	G	H	I
Use the solution specified in order from 1-8 until stain is removed.	DRY CLEANING FLUID	NAIL POLISH REMOVER	DETERGENT SOLUTION	WARM WATER	VINEGAR SOLUTION	AMMONIA SOLUTION	STAIN REMOVAL KIT	CALL PROFESSIONAL	PERMANENT CHANGE
<b>SPOTS</b>									
Acid				2		1		3	*
Acne Medication		1		2	5	4	3	6	*
Alcoholic Beverage			1	4	3	2			*
Ammonia				2	1				*
Bleach		1	2					3	*
Blood		1	3		2	4			
Candle Wax	1					2			
Cement & Glue	2	1	3		5	4	6		*
Chalk		1	2						
Charcoal		1	2						
Chewing Gum	1								
Coffee			1	3	2		4	5	*
Cosmetics		2	1	3	6	5	4	7	*
Crayon	1		2	3					
Drain/Toilet Cleaner			2	1	3			4	*
Dye	1		2		4	3	5	6	*
Food			1	4	3	2	5	6	*
Fungicides, Insecticides, Pesticides	1		2	5	4	3	6	*	
Furniture Polish (Water Based)			1	4	3	2	5	6	*
Furniture Polish (Solvent Based)	2	1	3	6	5	4	7	8	*
Furniture Stain	2	1	3	6	5	4	7	8	*
Graphite		1	2						
Grease	1	2	3				4	5	*
Ink	2	1	3	6	5	4	7	8	*
Iodine	1		2	5	4	3	6	7	*
Lipstick	2	1	3	6	5	4	7	8	*
Medicine	2	1	3	6	5	4	7	8	*
Merthiolate			1	4	3	2	5	6	*
Nail Polish	2	1	3				4	5	*
Oil	1		2	4		3		5	*
Paint	2	1	3				4	5	*
Plant Food			1	4	3	2	5	6	*
Rust			2	3	1		4	5	*
Shoe Polish	2	1	3	5		4	6	7	*
Soft Drinks			1	4	3	2	5	6	*
Soot	1		2	3				4	*
Tar	1						2	3	*
Toothpaste			1						
Urine			1		2		3	4	*
Vomit			1	4	3	2	5	6	*

\* While recommended cleaning agents are effective, some stains may become permanent.

**G. Stain Removal Kit:** Available from retail carpet stores or professional cleaners.

**H. Call Professional:** Additional suggestions, special cleaning chemicals or the ability to patch the area may be available.

**I. Permanent Change:** Due to the nature of the stain, there may be color loss. The carpet has been permanently dyed or the carpet yarns have been permanently damaged.

#### **NOTE:**

**While the recommended cleaning agents have proven to be effective, some stains may become permanent.**

## ***Laminate Floor***

Laminate flooring used in the motorhome provides style, durability and ease of maintenance.

Laminate flooring is constructed of three main material components. The surface, similar to many countertops, contains aluminum oxide particles to form an extremely hard, durable outer layer. The carrier (core layer) is constructed from high-density fiberboard. A tongue and groove design provides a tighter bond. The backer (bottom layer) is also made of laminate for strength.

### **Cleaning and Maintenance:**

For everyday cleaning, vacuum the floor to remove dirt and debris. It is recommended to occasionally mop the floor using a cotton string mop and a minimal amount of water. Use a mixture of soap-free household cleaner (either vinegar or ammonia work well) and water for a more thorough cleaning.

### ***Tile Floor (If Equipped)***

Tile floors vary in porosity and surface irregularities. Regular maintenance is important to keep the tile in the motorhome looking new. Once the slideout has been extended, keep the tile floor clean to prevent dirt from scratching tiles prior to retracting the slideout.

#### **NOTE:**

**Tile is ceramic and will chip or break. Avoid dropping heavy or sharp objects on the tile.**

#### **NOTE:**

**Before using any solution to clean the tile, check the manufacturer's warning label to ensure safety of the product. If there is any doubt, apply a small amount of solution in an inconspicuous area to determine product suitability.**

These recommendations have been included as recommendations only - consult a tile installation professional in the event additional information is needed or the process is not applicable. Cementitious grout is porous and will absorb moisture and stain. To reduce staining of the grout, many owners choose to seal the grout. Quality grout sealers provide better stain protection. If epoxy grout is used, it is virtually as stain proof as the tile.

Removing stains from cementitious grout is similar to removing stains from clothing. The same cleaners used on clothes to get out a stain should also work on grout.

Keep in mind grout is based primarily of cement and sand. Sand, like glass, is unaffected chemically by most cleaners. Cement is not; rather it is alkaline based and is dissolved by acids. As baking soda and vinegar react, so do grout and vinegar.

Accordingly, it is better to clean grout with an alkaline cleaner (Spic N' Span, Mr. Clean, etc.) than an acid based cleaner. There are also specially designed tile and grout cleaners available at most tile retailers.

There are also cleaners with enzymes that attack stains similar to enzyme pre-soaks for laundry. The same cleaner that works on the grout generally will work well on the tile. In fact, since the tile is usually easy to clean, the tile can often be cleaned with water.

Grout can absorb soap as well as a stains. Do not clean with oil or wax based cleaners such as Murphy's Oil soap, Pine Sol, etc. These products will leave a waxy or oily film in the grout.

Even good alkaline cleaners, if not properly rinsed, will leave a sticky soap film. A sticky soap film attracts dirt.

Properly clean ceramic tile (without any sticky soap film) will stay clean longer as tile does not tend to hold an electrostatic charge which can attract some kinds of dirt.

The best way to clean grout is to apply the cleaner then use a wet/dry vacuum (shop vac) to pick up the solution. This lifts the dirt out of the joint. Apply rinse water and vacuum the rinse water. Vacuuming helps remove remaining soap film.

As a last resort for tough stains, tile professionals may attempt to remove very stubborn stains with an acid such as straight vinegar or a stronger acid. This will dissolve the top layer of grout so the stain is no longer attached to anything. Acid washing is not recommended by grout manufacturers as this can destroy the grout to the point the area will need to be re-grouted. Also, extreme care should be used when handling any acids.

If unable to get the grout clean through conventional methods, try steam. Some stains that do not respond to conventional cleaners will come clean when subjected to pressurized steam.

If the stain remains after treatment, a tile professional may elect to cut out the stained grout and regrout. This is possible although care must be taken to not damage or loosen the tile. Generally, it is not possible to grout directly over the old grout without cutting the old grout out. The same contaminants that made the old grout dirty may prevent new grout from adhering properly.

## SHOWER

Showers are susceptible to soap build-up. To control mildew growth, spray the shower with household chlorine bleach. Allow it to stand for five minutes, then rinse with clear water. Clean the glass shower doors with window cleaner on a weekly basis to maintain shine. If water spots cannot be removed from glass, rub lightly with the flat edge of a razor blade to remove deposits.

To prevent excessive moisture and a continual growth of mildew, use the shower only with adequate ventilation. The sealant in a regularly used shower should be replaced once a year. To replace sealant, remove the old sealant using a sharp non-metallic instrument. Apply new sealant that can be obtained at most hardware stores.

## CEILING

### Hardwood, Vinyl and Decorated Paneling:

Certain cleaning agents will affect the surface on both printed and non-printed vinyl. Use only a mild, non-abrasive detergent and warm water with a soft cloth or sponge to clean. Do not use bleach, alcohol, oil-based spray cleaners or cleaning agents that contain solvents, citrus oil or harsh chemicals.

## WALL COVERINGS

Immediately remove solvent based or pigmented substances from wall coverings. Do not use abrasive cleaners containing chlorine bleach or solvents. *Fidelity* and *Jolie* brands are recommended. Always begin with a mild detergent or soap and warm water. To remove normal dirt, clean with a soft sponge. Rinse and wipe dry.

Before applying a cleaner, test the cleaning agent on a small, inconspicuous portion of the wall covering to ensure the cleaner does not affect the color or gloss of the wall covering.

### Care for the Tower Wall Covering:

Remove ordinary stains with mild soap and warm water. Sponge on. Rinse well and dry with a soft cloth. To remove ball point pen, blood, lipstick, etc., use a sponge or soft bristle brush and *Formula 409*®, *Fantastik*® or a similar product. Rinse well and dry. Finish cleaning by applying full strength isopropyl alcohol with a sponge or soft brush. Rinse well and dry.

### Care for the Satinesque Wall Covering:

Remove stain quickly to minimize the reaction on the wall covering, especially if the stain is solvent-based or pigmented. **Examples:** nail polish, oil, shampoo, lacquer, enamel, paint, ink and lipstick.

Begin cleaning the stain with a mild soap-based detergent; and if necessary, move to a stronger cleaner such as household bleach, liquid household cleaners or rubbing alcohol. Before applying a stronger cleaner, test the cleaning agent on a small inconspicuous portion of the wall covering to ensure the cleaner does not affect the color or gloss of the wall covering.

### Specific Stain Type Removal Procedures:

#### Normal Dirt:

Remove normal dirt using a mild soap or detergent and warm water. Allow it to soak for a few minutes then rub briskly with a cloth or sponge.

#### Nail Polish, Shellac or Lacquer:

Remove liquid using a dry cloth. Use care not to spread the stain. Quickly clean the remaining stain with rubbing alcohol. Rinse with clean water.

#### Ink:

Remove immediately by wiping with a cloth dampened in rubbing alcohol. Rinse with clean water.

#### Chewing Gum:

Rub with an ice cube to cool and harden. Gently pull off the bulk of the gum. Remove remaining gum with rubbing alcohol.

#### Pencil:

Erase as much of pencil mark as possible. Wipe remaining marks with rubbing alcohol.

#### Blood, Feces or Urine:

Remove these staining substances as quickly as possible. Wash the stained area with a strong soap. If the stain does not disappear, rinse the soapy area thoroughly with clean water. Mix a solution of 50% water and 50% household bleach. Clean the stained area with the bleach solution. Rinse with clean water.

## WOOD CARE

For general cleaning, regularly wipe wood surfaces using a soft cloth lightly dampened with clear warm water. Thoroughly dry to prevent streaking. For stubborn stains, use a clean cloth dampened with a solution of mild non-alkaline soap (dish washing liquid) and water and rinse.

Dry thoroughly, buffing in the direction of the wood grain. Never use abrasive cleaners, scouring pads or powdered cleansers. Polishing products used on the solid wood surface depends on individual preference. Always follow product instructions.

Excessive dampness, dryness, heat, or cold can damage solid wood finishes. Sunlight can change the color or age the wood. Never allow moisture or spills to stand, always blot dry immediately. Solvents, alcohol, nail polish and polish removers, as well as harsh cleaners, should not be used on finished wood surfaces.

Minor damage to solid wood surfaces can be repaired quickly and effectively with a bit of hard work, some careful attention to details, and most importantly, the right materials. However, any wood repair or finishing job is best left for a professionally trained individual.

### **NOTE:**

**It is important to inform the service technician of any products used for the care and cleaning in the event of wood repairs.**

### Sanding and Sandpaper:

The following table is a general guide and may vary with wood type. The key to sanding is using the right sandpaper for the repair that is needed. Always sand with the grain.

GRIT	GRADE	USE
80-120	Medium	Smoothing the surface, removing small marks.
150-180	Fine	Final sanding prior to finishing.
220-240	Very Fine	Sanding between coats of sealing.
280-320	Extra Fine	Removing dust spots or marks between finish coats.
360-600	Super Fine	Removing luster or surface blemishes.

### Steel Wool:

Abrasive material composed of long steel fibers. Coarser grades are used to remove paint and other finishes; finer grades for polishing or smoothing a finished surface.

### **Nail Holes and Small Cracks:**

Fill nail holes and small cracks with wood putty or dough for unstained woods prior to any sanding. Stained finishes require filling holes and cracks after the stain has been applied. Putty should match the stain closely in color.

### **TIP:**

**A little sawdust and wood glue can be used to make putty for end grains.**

### **Scratches and Nicks:**

“Quick and simple” rarely describes repairs to stained wood finishes; however, a few tricks used by professional woodworkers can be tried to repair nicks and scratches.

### **Fixing Scratches in Stained Woodwork:**

Light scratches will often disappear when carefully rubbed with furniture polish or paste wax. When scratches appear lighter than the surrounding dark-stained woodwork, it usually means either the scratch goes through the stain into the wood or that the varnish is flaking off. Deeper scratches can be hidden by carefully rubbing with a piece of oily nut meat such as Brazil nut, black walnut or pecan. Be careful to rub the nut meat directly into the scratch to avoid darkening of the surrounding wood. Color the scratch with brown coloring crayon or liquid shoe dye (especially good on walnut). Always test a procedure on an inconspicuous area on the wood to ensure no damage to the finish occurs.

### **Staining a Scratch with Iodine:**

**Mahogany** - Use new iodine.

**Brown or Cherry Mahogany** - Use iodine that has turned dark brown.

**Maple** - Dilute one part iodine with one part denatured alcohol.

Commercial scratch removers, or stick wax to match the wood finish, can also be used. After the scratch has been hidden, polish or wax the entire area. Deep scratches should be repaired and finished by a professional.

### **Dents:**

Small dents may be repaired by using steam. To raise a small dent, place a damp cloth over the area and hold a medium-hot iron on it. The steam causes the wood fibers to swell back into place. It may be necessary to repeat this process until the dented area is level with the surface. Allow the area to dry.

### **Restoring the Clear Finish:**

The finished surface on the wood is a clear lacquer coating. The lacquer finish can be repaired should the finish become dulled or scratched. Scratches extending into the wood will require wood repair by filling the damaged area. If there is light damage, the wood can be steamed to bring the wood surface level.

Lacquer finish sheen can be restored by carefully using 0000 steel wool or equivalent. Sand damaged lacquer with fine sandpaper. Once the scratched surface is smooth, apply a clear lacquer coating using an aerosol. Lacquer can be applied by cloth or brush, but best results are obtained from an aerosol. If necessary, use 0000 steel wool or equivalent to bring out the luster and smooth overspray.

### **CAUTION:**

**Use top coats and finishes in accordance with the manufacturer's safety instructions. Use only in well ventilated areas with proper respiratory filters and masks.**

### **Re-staining the Wood:**

If bare wood is visible at the bottom of the scratch, the wood will need to be re-stained. To remove damaged varnish, lightly roughen a small area around the scratch with sandpaper, steel wool or synthetic steel wool. Find a stain that is a shade lighter than the wood finish. Stain the bare wood with a very small amount of stain on a rag, brush or cotton swab. If the color is too light, apply additional coats. Rub away excess stain with a dry rag. If the wood becomes too dark, use a rag moistened in mineral spirits to lighten the wood. Select a lighter color stain and continue. Several companies have simplified this repair process by designing oil-based wood stain into marker-like containers to rub on the scratch. Torn and scratched wood fibers will absorb stain and darken quickly. Start with a stain color that is lighter than the original finish.

A second coat can always be applied if the color of the first coat is too light. Once the color is blended, patch the clear finish as described above and apply a wipe-on finish.

## **COUNTERTOPS** ***Solid Surface***

### **Routine Care:**

The solid surface countertops have a matte/satin finish. Soapy water or ammonia-based cleaners will remove most dirt and stains from all tops and bowls. Individual techniques may be used to remove different stains. Follow the recommendations below.



**NOTE:**

**Do not cut directly on the solid surface.**

**Cleaning the Countertops:**

**Most dirt and stains:** Use soapy water or ammonia-based cleaner.

**Water marks:** Wipe with damp cloth and towel dry.

**Difficult stains:** Use Soft Scrub® and a gray Scotchbrite® pad. If Scotchbrite is used, buffing may be necessary to restore finish.

**Disinfecting:** Occasionally wipe surface with diluted household bleach (one part water and one part bleach).

***Repairing Cuts and Scratches***

Solid surface countertops are renewable. Use the following instructions to repair minor cuts and scratches:

- ◆ If scratch or imperfection is deep, sand area with highest grit sandpaper to remove the blemish. Never sand in one small area. Feather out lightly at each increase in sandpaper grit to blend restoration.
- ◆ Switch from sandpaper to 3M™ # 35 Trizact™ micro-abrasive disc. Apply water while using Trizact discs to prevent clogging.
- ◆ Work downward to #10 Trizact micro-abrasive disc until blemish is gone.
- ◆ Buff surface with wool pad and 3M Imperial Compound and Finish Material.

**Preventing Heat Damage:**

Hot pans and heat-generating appliances, such as frying pans or crock pots, can damage the surface. To prevent heat damage, always use a hot pad or a trivet with rubber feet to protect the surface.

**Other Important Tips:**

Avoid exposing the solid surface to chemicals such as paint removers or oven cleaners. If these chemicals come in contact with the solid surface, quickly wash with water. Avoid contact with nail polish or nail polish remover. If contact is made, quickly wash with water.

***Laminate***

Clean laminate countertops with a damp cloth or sponge. Use a spray cleaner to remove stubborn stains. Avoid harsh abrasives, scouring powders, peroxides or bleaches. These products may dull or damage the surface. Avoid contact with dyes, bleaches and indelible inks used on food packages. Do not use laminated countertops as a cutting board. Laminated countertops are resistant to minor heat; however, hot pans, irons and lit cigarettes damage the surface. Use hot pads under pans taken directly from the stovetop.

**CAUTION:**

**Do not cut directly on the laminate surface.**

**STAINLESS STEEL SURFACES**

Stainless steel can be easily damaged by improper cleaners. For example: many liquid cleansers designed to be gentle on smooth surfaces will damage stainless steel. Only use the methods outlined below, and always follow the directions that come with the cleaner (usually located on the bottle).

**General Cleaning:**

- ◆ Use warm, soapy water and dry with a soft, clean cloth.

**For Heavy Soiling:**

- ◆ Only use a stainless steel cleaner designed specifically for appliances.
- ◆ Follow all directions from the manufacturer of the cleaner.

**Do not use:**

- ◆ Abrasive powders or cleaners
- ◆ Acidic citrus or vinegar based cleaners
- ◆ Ammonia
- ◆ Steel wool pads
- ◆ Abrasive cloths
- ◆ Oven cleaners

**CAUTION:**

**Citric acid permanently discolors stainless steel. Immediately remove mustard, tomato juice, marinara or citrus-based sauces or products from stainless steel surfaces.**

**CAUTION:**

**Do not cut directly on the stainless steel surface.**



## WINDOWS

### Water Spots:

Glass will develop water spots when not properly cleaned. Water spots are magnified on a reflective finish. Use a squeegee immediately after washing to reduce water spotting. To remove stubborn water stains from reflective glass use *Cerium Oxide Polishing Compound*, made by C.R. Lawrence, available at most glass shops.

### Condensation

Condensation develops when water vapor is present in the air. More vapor is added by breathing, bathing, cooking, etc. and collects wherever air space is available. When the temperature reaches dew point, water vapors in the air condense and change to liquid form.

### Controlling Moisture Condensation:

Reduce or eliminate interior moisture condensation during cold weather by using the following steps:

- ◆ Partially open roof vents and windows to allow outside air to circulate into the interior. Increase ventilation when a large number of people are in the motorhome. Even in damp weather conditions, the air outside will be far drier than the interior air.
- ◆ Install a dehumidifier. Continuous use of a dehumidifier is effective in removing excess moisture from interior air. Use of a dehumidifier is not a cure-all, however, it will reduce the amount of outside air needed for ventilation.
- ◆ Run the range vent fan when cooking and the bath vent fan (or open the bath vent) when bathing, to reduce water vapor. Avoid excessive boiling or use of steam producing hot water.
- ◆ Do not heat the motorhome interior with the range or oven. This increases the risk of toxic fumes and depletes oxygen. Open flames also add moisture to the interior air and increase condensation.
- ◆ In very cold weather, leave cabinet and closet doors partially open. Air flow will warm and ventilate the interior storage compartments and exterior walls to reduce or eliminate condensation and prevent the possibility of ice formations.

## WINDOW TREATMENTS

### Mini-Blinds

#### Dusting:

Regular dusting will maintain the appearance of the mini-blinds. Keep blinds looking their best by periodically wiping with a soft cloth or a dusting mitt. By tilting the slats down, not quite closed, most of the top surface of each slat can be cleaned. Blinds may be cleaned while hanging in place using this method.

#### Vacuuming:

For deeper cleaning, vacuum gently with the soft brush attachment of a vacuum cleaner.

#### Compressed Air or Hair Dryer (non-heat setting):

Blow dust off each slat. Dust is air-borne using this method. Ventilate the motorhome.

#### Spot-Cleaning:

Spot-clean shades and blinds using a soft cloth or a moistened sponge with lukewarm water. Add mild detergent, if needed. Blot gently to avoid creasing. In a dusty environment, the blinds may need to be cleaned regularly using a sponge or dampened soft cloth. Use warm (not hot) water and a mild detergent that does not contain abrasives. Rinse the blinds using a clean cloth and water to prevent water spots. Place a towel directly under the blinds to absorb water that may drip.

#### Ultrasonic cleaning:

Professional ultrasonic cleaning may be preferred.

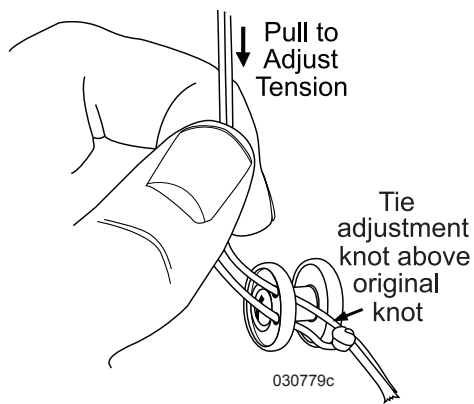
### Day/Night Shades

Leave Day/Night shades in the up position when not in use to help the shades hold their shape.

#### Tension Adjustment:

Tension should be adjusted if the shades are loose or there is excessive vibration. A button is located on the bottom of the shade at each end. Two lines on each side of the shade are threaded through the button and tied off.

- ◆ Pull the tied-off lines through the button to increase tension. Leave some slack so the shades are not too tight.
- ◆ Tie the lines off at the new position. Adjust each side equally.



- ◆ Operate the shades to ensure tension is set correctly and equally on both sides.
- ◆ Trim excess line from both sides if desired.

#### **Dusting:**

Vacuum with a brush attachment or use a dusting tool on a regular basis.

#### **Cleaning:**

A dry foam cleaner may be used for soil and dirt removal. Follow all directions on the container, or use a cleaning solution of ¼ oz. clear liquid soap to 8 oz. water.

#### **NOTE:**

**Do not use colored liquid soap as a stain may appear when fabric dries.**

## **MOLD & MILDEW**

### **What is Mold?**

Mold is a type of fungus that occurs naturally in the environment and can leave a musty odor, discolor fabrics, stain surfaces and cause considerable damage to the motorhome.

### **What Does Mold Need to Grow?**

Mold requires a food source, such as grease or soil. Synthetic fabrics, such as acetate, polyester, acrylic and nylon are mildew resistant, but soil on the surface of these fabrics are susceptible to mold.

Temperate climate and moisture also help to cultivate mold growth. Moisture in the motorhome can result from unattended spills, leaks, overflows and condensation. Moisture allowed to remain on a growth medium can develop mold within 24 to 48 hours. Minimizing moisture inside of the motorhome can reduce or eliminate favorable mold growth conditions. Good housekeeping and regular maintenance are essential in the effort to prevent or eliminate mold growth.

### **Consequences of Mold:**

All mold is not necessarily harmful, but certain strains of mold have been shown to cause, in susceptible persons, allergic reactions, including skin irritation, watery eyes, runny nose, coughing, sneezing, congestion, sore throat and headache. Individuals with suppressed immune systems may risk infection. Some experts contend that mold causes serious symptoms and disease which may even be life threatening.

However, experts disagree about the level of mold exposure that may cause health problems and about the exact nature and extent of the health problems that may be caused by mold. Moreover, the Center for Disease Control states that a casual link between the presence of toxic mold and serious health conditions has not been proven.

Standards or threshold limit values for concentration of mold or mold spores have not been set. Currently, there are no EPA regulations or standards for airborne mold contaminants. There is simply no practical way to eliminate all mold and mold spores in the indoor environment. For example, studies have shown that ozone cleaners are not effective at killing airborne mold or surface mold contamination.

### **Controlling Mold Growth:**

The motorhome owner should eliminate mold growth in the motorhome. Take the following steps to eliminate mold growth in the motorhome:

- ◆ Carefully examine items for signs of mold before loading them in the motorhome. Potted plants (roots and soil), furnishings, clothing and linens, as well as many other household items, may contain mold.
- ◆ Regular vacuuming and cleaning will help reduce mold levels. Mild bleach solutions and most tile cleaners are effective in eliminating or preventing mold growth.
- ◆ Indoor humidity can be reduced by 30 to 60% when venting clothes dryers to the outdoors. Ventilate the kitchen and bathroom by opening windows, using exhaust fans or a combination of both. Operating the air conditioning will remove excess moisture in the air and help facilitate evaporation of water from wet surfaces.
- ◆ Promptly clean up spills, condensation and other sources of moisture. Thoroughly dry any wet surfaces or material. Do not let water pool or stand in the motorhome. Promptly replace materials that cannot be thoroughly dried.

- ◆ Inspect for leaks on a regular basis. Look for discolorations or wet spots. Repair leaks promptly. Inspect condensation pans (refrigerators and air conditioners) for mold growth. Take notice of musty odors and any visible signs of mold.
- ◆ Should mold develop, thoroughly clean the affected area with a mild solution of bleach. First, test to see if the affected material or surface is color safe. If mold growth is severe, call on the services of a qualified professional cleaner.
- ◆ If mold cannot be removed, throw the item away.

Whether or not a motorhome owner experiences mold growth depends largely on how the motorhome is managed and maintained. As a manufacturer, our responsibility is limited to things that we can control. As explained in the written warranty, we will repair or replace defects in the construction (defects defined as a failure to comply with reasonable standards of motorhome construction) for the Limited Warranty coverage period provided.

**THE MANUFACTURER WILL NOT BE RESPONSIBLE FOR DAMAGE CAUSED BY MOLD THAT MAY BE THE CONSEQUENCE OF OR ASSOCIATED WITH DEFECTS IN THE CONSTRUCTION.**

## **PEST CONTROL**

Regardless of the area one lives in or travels to, it is safe in stating there will be pests waiting. These pests are not only annoying; they can pose a health risk and create serious damage to the motorhome.

- ◆ Common pests include insects such as ants, cockroaches, termites, flies, pantry pests and wasps as well as wildlife such as rodents, raccoons, bats, birds and snakes. It is important to remember that pests are searching for food, water and a place to live. Eliminating any one of those elements will help control the pest infestation. Take immediate steps to remove pests as soon as their presence is detected.

## **Steps to help control pests:**

- ◆ Reduce clutter inside the motorhome and storage bays. All storage items, particularly food (including pet food), should be kept in tightly sealed containers. Seal all cracks and holes, and ensure that window, door and vent screens are securely in place.
- ◆ Routinely clean the motorhome, including storage bays. Wipe down the water bay. Promptly remove all crumbs from areas where food is regularly prepared and eaten. Garbage should be placed in a sealed container and removed to an outside receptacle daily. Only put out pet food that will be immediately eaten.
- ◆ Keep foods such as flour, cereal, spaghetti and pet food in resealable containers with tight lids.
- ◆ Sweep and vacuum often (especially in eating areas) to help eliminate a food source for pests.
- ◆ Pests seek indoor shelter with food and water. Limit their access to water or moisture sources by sealing cracks and leaks in pipes and faucets. Reduce moisture in the motorhome by controlling condensation, immediately wiping up spills and promptly repairing leaks. Be extra alert around areas that attract rodents and insects, including the sewer hose, fresh water hose, bay doors and items that may be leaning against the outside of the motorhome, such as fishing poles and golf clubs.
- ◆ When the motorhome is stored outdoors, clear the surrounding area of all rodent friendly hiding places: shrubs, trees and clutter. Completely seal the underside of the motorhome. Wire mesh will work well to prevent points of entry, but beware of blocking necessary air vents. Prior to operating the motorhome after storage, remove all insect and animal nests that may have developed around vents, engine compartments, the exhaust pipe and in the wheel wells.
- ◆ Seal cracks, crevices, and gaps around doors and windows.

## **Rodents:**

Rodents may chew through wires or build nests in components of the motorhome. Signs of rodent infestation include droppings, shredded material or chewed furniture fabrics and vinyl. Rodents like to build nests with wire insulation and are commonly attracted to the outside coating of 120 Volt AC wiring more than 12 Volt DC wiring.

**NOTE:**

**Although the back cap of the motorhome is well sealed, rodents are capable of chewing through the foam insulation and that area should be routinely inspected.**

If signs of rodent infestation exist around the motorhome, place traps or poisons in suspected areas. Keep traps and poisons safely away from pets and children. Cheese is not the best bait for a rodent trap. Use peanut butter or chocolate in small amounts.

Place the bait on the trigger of the trap to induce the rodent to climb onto the trigger to reach the bait. Rodents do not limit invasion to unused vehicles.

**Insects:**

Eliminate insects when signs of infestation appear. If the type of insect cannot be identified, purchase sticky traps from the hardware store and place the tape where the insects have been seen. Once a sample is caught, seek assistance in identifying the insect to determine what will be required to remove the infestation.

Regularly inspect the exterior of the motorhome for signs of a budding wasp nest, and promptly destroy small nests before they become too large.

Spiders can be in any structure. Immediately remove spider webs. Some types of spiders like to nest on top of the diesel tank and around the diesel hoses. Dispense of spiders using a vacuum. Use care to capture the spider and egg sacs. Throw the vacuum bag away in a sealed bag.

Fruit flies invade the motorhome by attaching to fresh fruits and vegetables. Determine what food items are generating the flies and discard that item in an outdoor trash receptacle. Fruit flies can be eliminated with a homemade trap. Pour a few ounces of vinegar into a cup and cover the cup with plastic wrap. Secure the wrap with tape or a rubber band and poke a ¼" hole in the plastic. Place the trap in the area where fruit flies are present.

Ants live in colonies. Only a fraction of the ant colony will leave to seek food. Spraying pesticides will only kill the ants that are away from the colony. The colony must be destroyed to eliminate all ants. Keep ants away from the sewer hose by spraying the hose ends with a soap and water solution.

Fleas can be removed by properly treating pets with a veterinarian approved treatment and by thoroughly cleaning the motorhome. Vacuum vinyl areas and tile floors to remove dust, flea larva and flea eggs. Follow by thoroughly washing those areas with soap and water.

Carpets must be vacuumed and treated with a residual flea control product labeled safe for indoor carpet and furniture use. Perform the cleaning treatment daily for three days to ensure that all fleas have encountered the treatment.

Flying outdoor insects are attracted to bright light. Yellow porch light covers on the motorhome work to discourage insect invasion. During nighttime hours insects will be attracted to docking lights or other bright exterior lighting.

If the presence of moths is detected inside the motorhome, usually by holes appearing in material, clean the affected clothing and all other items stored in the same area. Follow by completely cleaning the closet, dresser or storage area. Seal cracks and treat the area with a product labeled safe for indoor pest control.

**Birds:**

Even birds can be considered pests, particularly when the motorhome is parked in the flight path of a flock. Bird droppings are hard to remove and will leave stains. Prevent permanent staining to the motorhome roof by regularly cleaning the surface to remove all bird droppings.

**Damage from Pests:**

Lizards have been known to crawl into the inverter and short out the circuit board. Lizards can be captured using glue traps. To remove the lizard from the trap, dissolve the glue with vegetable oil and release it outside and well away from the motorhome. A scorpion will glow blue-green in UV light. Be extra careful as scorpions stings can be poisonous.

**Best sources of information about common household pests:**

The Internet is a great place to find information about common pests. The National Pest Management Association web site can be a useful resource for common pests. Another good source of information is colleges and universities with entomology (study of insects) departments.

Electronic pest control devices can be costly and most likely will not work on all types of rodents and insects. When calling on the services of a professional to combat pest infestation, call a reputable business that is licensed in handling pesticides. Check references.



Explain that you are seeking assistance for a motorhome, as treatments may differ from standard household jobs. If a pest problem is suspected in the motorhome, consider professional pest control help. The following guidelines can be used for selecting a pest control service:

- ◆ Seek referrals from those who have used pest control services. Inquire about the type of pest problem encountered and if they were satisfied with the service.
- ◆ Membership in the national, state or local pest control associations is a good indicator that the company has access to modern technical information and is committed to further education.
- ◆ Reach a complete understanding with the company before work starts; find out what the pest is, how the problem will be treated, how long the period of treatment will be, and what results can be expected.
- ◆ Be sure to understand what is guaranteed and what is not.

## **STORAGE**

### ***Short Term***

Short term storage is defined as storing the motorhome for a period of thirty days or less. Properly preparing the motorhome during periods of short term storage will make bringing the motorhome out of storage a much easier process. Winterize the plumbing system if the motorhome is stored in winter months, or if stored when temperatures are below 32° F.

#### **Checklist - Short Term Storage:**

- ◆ Retract slide rooms. Do not store the motorhome with slideout rooms extended.
- ◆ Shut off all appliances.
- ◆ Remove all articles from refrigerator/freezer and clean thoroughly. Prop doors open to prevent mildew.
- ◆ Drain the holding tanks. Winterize the fresh water system using FDA RV antifreeze or air pressure to evacuate the plumbing system.
- ◆ Retract and secure all awnings.
- ◆ Store house and chassis batteries fully charged. Batteries stored in a discharged state will readily freeze and damage the battery.
- ◆ If possible, position the motorhome so the house and chassis batteries are accessible for charging or changing without having to move the motorhome.

- ◆ If AC power is not available, turn both the house and chassis battery disconnect switches off.
- ◆ If available, leave the motorhome hooked to shore power. Leave both the house and chassis battery disconnect switches on.
- ◆ Careful placement of a small heat source in the interior will help control moisture. Desiccate filter systems will help remove interior moisture.
- ◆ If possible, store the motorhome inside a storage building.
- ◆ If stored outside, inspect all seams and seals twice a month for possible leakage.
- ◆ Store the motorhome with a full tank of fuel to minimize moisture condensing at top of fuel tank.
- ◆ Close vents and windows to prevent entrance of wind driven rain.
- ◆ Store tires at maximum inflation pressure.
- ◆ Leave open cabinet doors and drawers to facilitate air movement behind those areas.
- ◆ Perform a full interior inspection for water leaks twice a month. Be sure to check behind all cabinet doors.

### ***Long Term***

Long term storage of the motorhome can be defined as leaving a motorhome unattended for a period of thirty days or more. A motorhome requires protection from the elements just as a house or a car would. When left out in the environment without proper storage or maintenance, a motorhome is vulnerable to the moisture and oxidation processes inherent in the environment.

#### **NOTE:**

**The natural process of condensation will occur with temperature changes of 30° Fahrenheit or more in one day. Humidity readings of 60% or greater will allow the accumulated moisture to remain for extended periods of time.**

#### **If AC power is not available in storage area:**

- ◆ Retract slide rooms. Do not store the motorhome with slideout rooms extended.
- ◆ Shut off all appliances.
- ◆ If possible, situate the motorhome so the house and chassis batteries remain accessible. This allows a battery to be charged or replaced without moving the motorhome.
- ◆ Charge house and chassis batteries to a full state of charge.
- ◆ Turn both the house and chassis battery disconnect switches off.



- ◆ Check battery voltage while the motorhome is in storage if stored outside.
- ◆ Preventive measures should be used if the voltage readings are low. It will make it easier to remove the motorhome from storage or move the motorhome in an emergency situation.

**NOTE:**

**Batteries in a low state of charge will readily freeze and damage the battery.**

**If AC power is available:**

The house and chassis battery disconnect switches should remain on. The inverter will charge both the house and chassis battery banks. 30 Amp shore power service will be more than adequate.

**CAUTION:**

**A 20 Amp service using light duty extension cords and the required adapters create serious voltage losses. Line voltage loss and the resistance at each electrical connection is a hazardous combination and should be avoided. Damage to sensitive electronic equipment may result.**

**Surfaces to park/store the motorhome on:**

- ◆ Avoid parking the motorhome on a grass or gravel surface to prevent moisture accumulation.
- ◆ Concrete pads seal the surface and allow better ventilation under the motorhome.
- ◆ Storage buildings with concrete floors, or heated storage facilities, greatly reduce the amount of moisture accumulation and protects the motorhome from moisture damage.

**Outdoor Storage Area:**

- ◆ The interior should be heated to help prevent mold and mildew growth. Moisture removing desiccate filter systems are available from hardware and RV supply stores. Place the filter system inside the motorhome to reduce interior moisture condensation or humidity.
- ◆ Proper winterization of the fresh water system will prevent potential damage in extreme cold.
- ◆ Ultraviolet radiation affects soft goods and rubber products such as privacy curtains, window shades and tires. These items should be protected. Store Day/Night Shades in the Up position.
- ◆ Cardboard templates can be made for the windows to protect the interior from exposure to direct sunlight.

- ◆ Tire covers are available to protect the sidewall of the tires from cracking. Make sure tires in storage contain the correct inflation pressure to prevent damaged caused by underinflation.
- ◆ Regularly wash the exterior to help control moss accumulation. Waxing the motorhome twice a year will augment these substances.

**Inspect the motorhome:**

- ◆ Perform a full interior inspection for water leaks every two weeks while the motorhome is in storage. Check inside all cabinets for signs of dampness or leaks. Inspect the ceiling areas around roof vents or other roof openings.
- ◆ Leave cabinet doors and drawers open to facilitate air movement behind those areas.
- ◆ Inspect and clean the roof and sidewall seams at least twice a year. **Inspect** for exterior sealant gaps of all roof seams, vents, skylights, roof air conditioners and windows.

**Fuel:**

Storing the motorhome with a full tank of fuel will minimize moisture condensing at the top of the tank. Diesel fuel is an organic material that can develop microbial growth (black algae). Fuel stabilizers may be added to control microbe growth and degradation of the fuel. Consult the engine manufacturer's owner's manual or a distributor for further detailed information on fuel stabilizers and additives.

**Brakes:**

Brakes suffer from non-use during periods of storage. The bare metal machined surfaces of brake drums or rotors have only a light coating of dust from the brake lining friction material. The brake dust is the only thing protecting the bare metal surfaces from rusting. Only regular brake applications dry the moisture preventing rust on brake drum or rotor surfaces. During periods of non-use, oxygen and moisture oxidize the machined surfaces. Only occasional use keeps these surfaces from oxidizing. Rusty brake drum or rotor surfaces permeate the brake lining upon the first few applications, reducing the friction action of the linings.

**Engine:**

Internal combustion engines need to be "exercised" on a regular basis to ensure an adequate supply of lubricating oil coats the cylinder walls and piston rings. Valve and valve seat surfaces also suffer from non-use. Some valves will remain open depending at which part of the combustion cycle the engine has stopped.

The heat and cold of the day allows moisture to accumulate through the exhaust system. Start all engines, including the generator, at least twice a month.

### **Electric Motors:**

Electric motors in the motorhome should be occasionally operated to help lubricate and keep surfaces freely rotating. These items include the roof air conditioners, dash fans, dash blower motor, furnace and powered roof vents.

### **Winter Storage Checklist**

- ◆ **Plumbing Lines** - Drain and protect. (*See Winterizing - Section 6.*)
- ◆ **Fresh Water Tank** - Drain.
- ◆ **Body** - Clean and wax. Reseal the roof as needed.
- ◆ **Countertop and Cabinets** - Wash with mild soap and water.
- ◆ **Curtains** - Remove and clean according to care specifications.
- ◆ **Windows** - To protect interior fabric from fading, cover windows by pulling blinds. For Day/Night shades cover with a separate cover such as a sheet or a cut out template. Day/Night shades hold their shape better if stored in the up position.
- ◆ **Holding Tank** - Drain and rinse. Close valves.

### **LUBE:**

**Add a small amount of RV antifreeze to waste holding tanks to keep valves and gaskets lubricated.**

- ◆ **Drain Traps** - Pour RV antifreeze down all drains.
- ◆ **Refrigerator** - Clean and leave both doors propped open. Cover exterior panels and roof vents. If equipped with an icemaker, drain icemaker and icemaker tray. See the refrigerator OEM manual for more detail.
- ◆ **Batteries** - Add distilled water and recharge if needed. If necessary, disconnect the cables, remove the batteries and store them in a cool dry place. Check and recharge as needed.
- ◆ **Air Conditioner** - Remove the air filters. Clean or replace.
- ◆ **Roof** - Keep clear of snow accumulation or damage may occur.

- ◆ **Interior/Exterior** - Storing under cover or indoors helps extend interior and exterior life.
- ◆ **Fuel Tank** - Diesel fuel tank should be full of fuel.

### **Removal from Storage**

Extensive freeze damage or other serious deterioration can occur if the motorhome is not properly winterized. If the motorhome is properly and carefully prepared for storage, removal from storage will not be difficult. The following checklist pertains to items or areas that should be inspected when it is time to take the motorhome out of storage and put back into operation. If there are any questions regarding storage or winterization, consult a qualified service technician.

- ◆ Thoroughly inspect the outside of motorhome. Look for animal nests in the wheel wells or in other out of the way places.
- ◆ Remove ceiling vent covers and air conditioning covers. Clear the refrigerator openings of debris, insect nests, webs, etc.
- ◆ Open all doors and compartments. Check for animal or insect intrusion, water damage or other types of damage which may have occurred.
- ◆ Check the state of charge of the batteries. If necessary, fill battery cells with distilled water only. Charge as necessary. Inspect the cable ends and terminals. They should be secure and free of corrosion.
- ◆ Check all the chassis fluid levels: engine oil, engine coolant, hydraulic fluid reservoir, transmission oil and rear axle oil.
- ◆ Start the engine, allowing it to reach operating temperature. Ensure gauge readings indicate a proper range.
- ◆ While the engine is running, check the headlights, taillights, turn signals, back-up lights, license plate light and emergency flasher. Operate the dash air conditioner. If the air conditioner does not work or the compressor makes unusual noises, have the system checked by a qualified air conditioner technician.
- ◆ Shut the engine off. Adjust or add fluids as necessary. Inspect around the engine and under the motorhome for fluid leaks.
- ◆ Drain, sanitize and flush the fresh water system as outlined in the **Water Systems - Section 6**. Inspect the sewer drain hose and connections for leaks. Replace if necessary.

- ◆ Operate all faucets and fixtures in the fresh water system. Run a sufficient amount of fresh water through all the water lines and faucets to thoroughly purge any potable antifreeze from the fresh water system.

**NOTE:**

**Discard at least the first two trays of ice from the icemaker to ensure the ice does not contain traces of antifreeze or other contaminants.**

- ◆ Open cabinet doors and drawers. Inspect for water leaks at fittings. Repair as necessary.
- ◆ Operate all 12 Volt DC lights and accessories. If something does not work there may be a bad 12 Volt DC circuit breaker or blown fuse.
- ◆ Install new batteries in battery operated safety detectors or devices. Test the carbon monoxide, and smoke detectors for proper operation.
- ◆ Check that the monitor panel is properly functioning.
- ◆ Inspect the 120 Volt AC electrical system which includes the power cord, inverter, all outlets and exposed wiring.

**NOTE:**

**Prepare the generator for operation following the instructions in the generator OEM manual.**

- ◆ Start and run the generator.
- ◆ Confirm that the batteries are charging. Operate the 120 Volt AC appliances and air conditioners. If an electrical item or appliance is not properly functioning, contact the dealer or an authorized service center to have it evaluated.
- ◆ Inspect and clean the interior.
- ◆ Check the sealant around all roof and body seams and windows. Reseal if necessary.
- ◆ Lubricate exterior locks with a graphite lubricant.
- ◆ Check condition of the windshield wiper blades. Check the wiper/washer operation.
- ◆ Wash and wax the exterior. Check the body for scratches or other damage; touch up or repair as necessary. Flush the underside thoroughly.
- ◆ Run through the operational checks for steering, brakes, engine and transmission. Operate the motorhome slowly during these checks to allow sufficient circulation of fluids and resetting of the components.
- ◆ If desired, have the dealer or repair center double-check preparation to make necessary adjustments and/or correct defects.

**NOTE:**

**Road vibration can cause fittings and fasteners to loosen. Perform periodic inspection of fasteners and fittings.**

## Notes

[illegible]

# Appliances

## Section 5

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## APPLIANCES - INTRODUCTION

This section covers operation and care of various appliances found in the motorhome: refrigerator, cooktop, microwave, roof air conditioner and optional appliances. These appliances operate on AC or DC current, propane or a combination of the three.

### **NOTE:**

Appliance features and options vary with floorplans.

### **INFORMATION:**

Detailed information with **CAUTION** or **WARNING** instructions for the various appliances, other than what is found in this section, can be found in the OEM manuals.

### **WARNING:**

Before entering any type of refueling station, turn off all propane operated appliances. Most propane appliances are vented to the outside. When parked close to a gasoline pump it is possible for fuel vapors to enter this type of appliance and ignite, resulting in an explosion or fire.

### **WARNING:**

Carbon Monoxide gas may cause nausea, fainting or death. Operating a propane appliance with inadequate ventilation or partial blockage of the flue can result in Carbon Monoxide poisoning. Do not store flammable liquids such as lighter fluid, gasoline or propane in the outside refrigerator compartment.

## REFRIGERATOR

Follow the specific guidelines in the refrigerator OEM manual for detailed operating and maintenance instructions. The refrigerator requires annual service. Keep a record of this service for any future warranty concerns. Annual service will help ensure longevity and proper operation of the refrigerator. With proper care and maintenance, the refrigerator should provide years of trouble-free service.

### **INFORMATION:**

Refrigerators equipped with an icemaker will require special winterization procedures. Refer to the refrigerator OEM manual for winterization instructions.

### **TIP:**

Reduce the possibility of food spoilage by keeping refrigerator temperature at or below 40° F. Lower temperature can also lead to increased frost build-up.

## Operation Specifics

- The refrigerator operates from propane or 120 Volts AC electric.
- DC Voltage for operation should be between 9.5-15 Volts DC.

## Leveling

The refrigerator must be relatively level during operation when parked. The margin of level for safe operation is within “comfortable living conditions”.

The refrigerator can be damaged if operated when parked on noticeable slope such as a driveway. Leveling the refrigerator is not required during travel.

### **CAUTION:**

Operating the refrigerator off-level when parked separates chemicals, causing them to crystallize and block the circulation action of the cooling unit. Damage is cumulative and irreversible.

### **WARNING:**

Do not use the refrigerator if there is an ammonia smell inside or outside of the refrigerator, or if a yellowish substance appears inside or at the outside access compartment. This can be an indication of a refrigerant leak. Contact an authorized repair facility.

### **Refrigerator Operation:**

- House batteries must be charged.
- The primary propane valve must be open.
- **Figure A:** The refrigerator 120 Volt AC cord(s) must be plugged in (located outside behind refrigerator access door).

## Control Panel 2 Door

### **On/Off Button:**

Turns the refrigerator on or off.

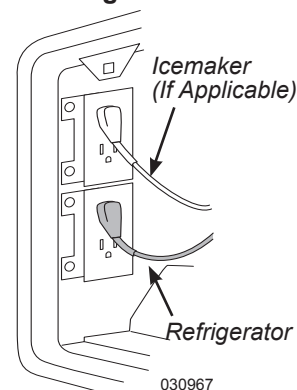
- Push the On/Off button to turn on the refrigerator.

### **Gas Button:**

Sets mode of operation.

- Automatic operation (Gas button not selected) sets mode of operation to 120 Volt AC as the primary energy source. If 120 Volt AC is not available, the refrigerator will automatically switch to Gas (propane) operation.

Figure A





Domestic 2 door control panel

- Press the Gas button to select Gas (propane) only operation.

### Operation:

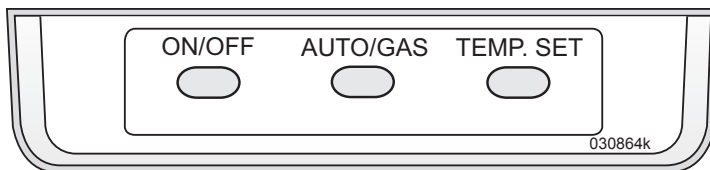
Auto feature selects 120 Volt AC as the primary energy source. If AC discontinues or is unavailable, the refrigerator will automatically switch to propane operation.

- Leave the Gas button in the out position for automatic energy selection.
- Press the Gas button to switch to propane operation only.
- Temperature is present and not adjustable.

### Control Panel 4 Door

#### On/Off Button:

- Turns the refrigerator on or off.



Domestic 4 door control panel

#### Auto/Gas Button:

Controls mode of operation.

- Selects between Automatic mode or Gas (propane) only operation.

#### Temp Set Button:

Adjusts the temperature.

- To adjust, press and release the Temp Set button until the desired setting is obtained.
- Number "5" is the coldest setting.

#### Automatic Mode:

Automatic mode selects AC over propane operation. If AC discontinues or is unavailable, the refrigerator will automatically switch to gas (propane) operation. Once AC becomes available, the refrigerator will automatically switch to AC operation. Press the Auto/Gas button until the light displays below Auto in the LED display.

#### Gas Mode:

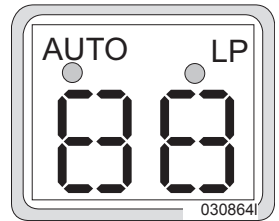
Gas only mode (propane operation) is selected by pressing the Auto/Gas button until the light displays next to LP in the LED display.

### Temp Set:

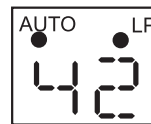
Press and release the Temp Set button until the desired setting of 1-5 is selected. The LED display will temporarily indicated the temperature setting then switch to actual temperature inside the refrigerator.

### LED Display - 4 Door

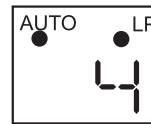
The LED display indicates mode of operation, temperature settings, actual temperature inside the refrigerator and fault codes. See LED Panel Legend for details.



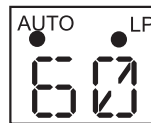
Domestic 4-door LED display



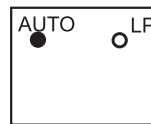
Actual Temperature



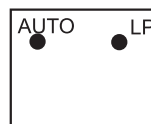
Temperature Set Point



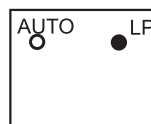
Temperature out of Range



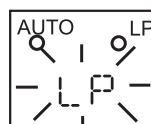
Auto Mode in AC Electric



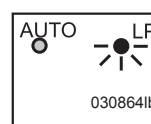
Auto Mode in Propane



Gas Mode



LP Flashing Indicates Propane Lockout.  
Ensure Propane Supply is On.  
Reset by Turning Off then On.

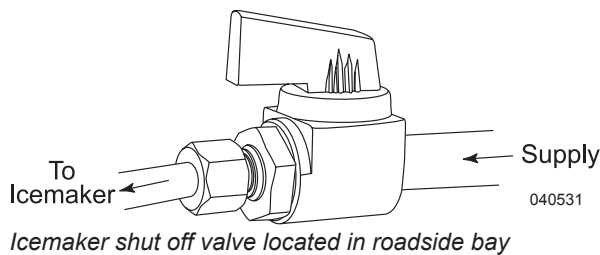


Auto Mode w/ LP Flashing  
AC not Available.  
Propane Mode not Working.  
Check AC and Propane Supplies.

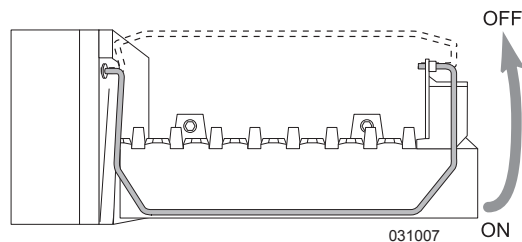
Legend

## Icemaker - 4 door

The icemaker requires 120 Volts AC to operate. Only after the freezer reaches freezing temperature will the icemaker function. City water or the water pump must be on and the water valve for the water supply line to the icemaker must be on.



- Pull the metal arm (bail) down to turn the icemaker on.
- Push the arm up to turn the icemaker off.



- Depending upon water pressure, the water refill rate for the ice tray may need to be adjusted to produce proper size cubes. See the OEM manual for refill adjusting instructions.

### Important:

- Do not operate icemaker while the motorhome is in transit. Water may spill out during travel.
- Do not use the first one or two trays of ice following storage.
- Do not operate the icemaker without water pressure supplied to the refrigerator. Damage to the icemaker assembly could occur.

## Doors

The refrigerator doors use a positive latch that secures the door with a “click” to prevent the door from opening during travel.

### Storage Procedures

When the refrigerator will not be used or when placing the motorhome in storage, it is recommended remove all items from the refrigerator and thoroughly clean the interior and doors using mild soap and water only.

The doors should be positioned partially open to allow airflow to help prevent mold and mildew growth. The refrigerator doors use a storage lock device to hold the doors in a partially open position.

### To use the refrigerator storage position:

- Completely empty the refrigerator.
- Thoroughly clean the interior using mild soap and water. Use a 100% cotton cloth to dry.
- Insert door storage tool into door(s) and position doors in the partially open position.

### **CAUTION:**

**Do not use a heating gun or hair dryer to remove frost. Permanent damage could result to plastic parts.**

### **CAUTION:**

**Do not use a knife, ice pick or any other sharp instrument to remove ice from the freezer as these can puncture and damage the interior or cooling unit.**

## Service

The refrigerator will require an annual service at an authorized Dometic repair center. The technician will perform a series of required checks as well as service the propane burner and flue. A record of annual service, such as the receipt, is required as proof of service should the refrigerator need repair during the warranty period.

### **NOTE:**

**Retain a record of annual service in case repair is required during the warranty period. See OEM manual for annual service record and details.**

Over time, the BTU output of the burner can change affecting the refrigerator’s performance when operating on propane. The annual service will entail a thorough cleaning of the burner, orifice (jet) and flue. Ambient temperature, high humidity and altitude above 5,500 ft. can affect performance and function. If possible, switch mode operation to AC while at a higher altitude.

### Tips

- Cool items first, if possible, before putting them into the refrigerator.
- Keep the doors shut. Think about desired contents before opening the doors.
- Allow the refrigerator 24 hours of operation before actual use to get a head start on the refrigerator process.

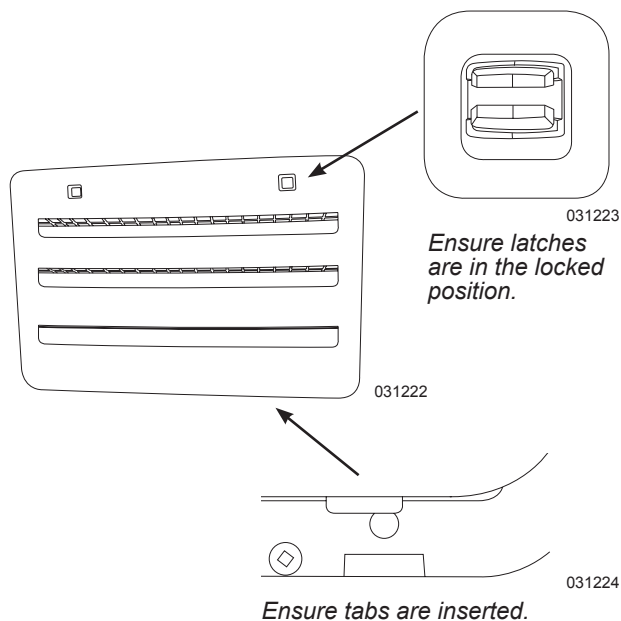
- A box of open baking soda will help absorb food odors.

### **Exterior Refrigerator Access Panel**

After opening the refrigerator access panel, the panel must be properly closed and secured.

#### **CAUTION:**

**Ensure the exterior refrigerator access panel is properly replaced after removal. Failure to do so may result in the panel jarring loose during travel.**



### **Air in Propane Supply Lines**

For safety reasons, the refrigerator will attempt to ignite on propane within a specified amount of time. When starting the refrigerator for the first time after storage or after servicing the propane supply system, propane supply lines may contain air. Due to air in the supply lines the refrigerator may not ignite on propane within the specified amount of time. Follow the procedure on how to remove air from the propane supply lines.

#### **To remove air from the propane supply lines:**

- Ensure the primary propane shut-off valve is open.
- Light cooktop burners first to quickly purge air from the main distribution line.
- Push the On/Off button to turn the refrigerator on.

- Press the Mode button until the refrigerator indicates LP. The refrigerator will begin the ignition cycle during which the propane safety valve opens and the igniter sparks.
- If the refrigerator fails to light, turn off the refrigerator to reset the ignition cycle then turn the refrigerator back on. If after several attempts the refrigerator fails to light, stop and consult an authorized Dometic service center.

### **REFRIGERATOR - RESIDENTIAL**

The refrigerator operates from shore power, the generator or from the inverter. The freezer door is equipped with water and ice cube dispensers. Ice can be dispensed as crushed or cubed.

#### **NOTE:**

**The refrigerator operates on 120 Volts AC, not from propane.**

#### **INFORMATION:**

**See the refrigerator OEM manual for detailed information and instructions.**

#### **Refrigerator Operation from Inverter While Traveling:**

Turn the inverter and refrigerator on. The electrical combination of the alternator on the engine and the inverter will supply the power necessary to operate the refrigerator on 120 Volts AC while traveling.

#### **NOTE:**

**Be sure to turn the inverter off after travel. Hook to shore power to continue refrigerator operation.**

#### **Refrigerator Operation while Dry Camping:**

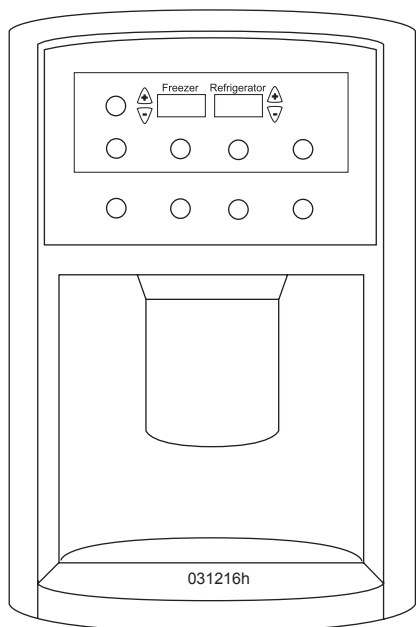
Start the generator or turn the inverter on to power the refrigerator. If using the inverter, enable the Automatic Generator Start feature (through inverter remote) to avoid dead house batteries and the possibility of food spoilage. The AGS feature will start the generator based on parameters set in the inverter remote. See ***“Inverter”*** in Section 8 for information on programming AGS.

## Control Panel

Features include temperature adjustment for the refrigerator and freezer. A water filter for the water and ice dispenser.

### On/Off Button:

Press and hold On/Off for three seconds to turn the refrigerator on or off. This will not disconnect power to the interior light.



Ice & water dispenser

### NOTE:

Turning off the refrigerator does not disable refrigerator power consumption. The refrigerator must be unplugged to remove power for lighting and control panel operation.

### Temperature Controls:

Press the up or down arrow to display temperature. The current set temperature momentarily displays before reverting to current temperature. The current temperature display is for reference only. Place a separate thermometers in the freezer and fresh food compartments for accurate temperature indications.

### CAUTION:

Keep the fresh food compartment temperature at or below 40° F. to reduce the possibility of food spoilage. Place a separate thermometer inside the freezer or fresh food compartment to accurately monitor temperature.

Allow the refrigerator to operate for at least 8 to 12 hours before storing food inside to ensure safe food storage. Adjust temperature gradually allowing time for the new preset temperature to stabilize.

### Water:

Press this button to select water from the dispenser.

### Cube:

Press this button to select cubed ice from the dispenser. Press the drinking glass against the dispenser paddle as far up as possible to catch all ice.

### Crush:

Selects crushed ice from the dispenser. Press the drinking glass against the dispenser paddle as far up as possible to catch all ice.

### Light:

Turns dispenser light on and off. The light will automatically turn on and off with water and ice dispenser use.

### Lock:

The ice and water dispenser can be locked to prevent unwanted use. Press and hold the Lock button until the red LED illuminates to lock the dispenser; press and hold until the red LED turns off to release dispenser.

### To Dispense Water:

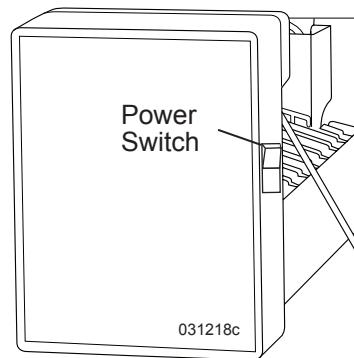
Press a drinking glass against the water dispenser arm. Release dispenser arm to stop water flow. Water is not chilled; add ice for cold water. Do not pour water or ice in the dip tray as there is no drain.

### NOTE:

Use only cotton cloth and mild soap to wash refrigerator components. Harsh detergents such as window cleaner or bleach or use of scouring pads can damage the finish.

## Icemaker

The icemaker requires 120 Volt AC power to operate. The icemaker will begin producing ice within 24 hours after the refrigerator is properly cooled.



Ice maker

### Operation:

- Hook to city water or turn on the water pump.
- Lower the bail arm to turn the icemaker on.  
Raise the bail arm to turn the icemaker off.



### To Dispense Ice:

Select crushed or cubed ice by pressing the corresponding button on the control panel. Press a drinking glass against the ice dispenser arm. Keep the glass as high as possible to catch all ice.

- Turn the icemaker off before travel to prevent water from spilling during transit.

### **NOTE:**

**Discard the first batch of ice as it may contain impurities.**

### **Water Filter**

The refrigerator is equipped with a water filter for the ice and water dispensers. The filter housing is located at the top right of the refrigerator compartment. A Bypass Cap is installed at the factory and will need to be removed to install the filter element before using ice or water dispensing functions.

A filter monitoring system on the control panel alerts when the filter nears end of use and should be replaced.

### **CAUTION:**

**Do not operate the water or ice dispenser with bypass cap removed or when filter is not installed. Water spillage will occur.**

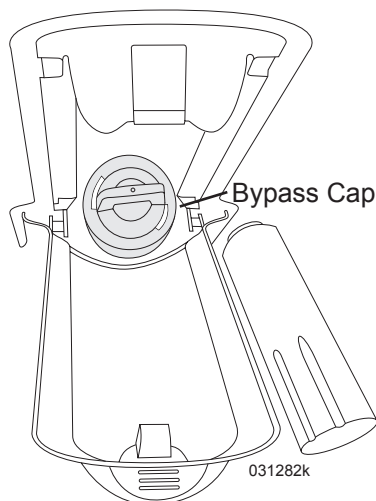
**Good:** Filter is operating within specified life cycle.

**Order Filter:** Filter has approximately 10% remaining.

**Replace Water Filter:** Filter is completely used. Replace as soon as possible. Also replace the water filter after extended periods of non-use.

### **Bypass Cap/Filter Removal:**

- Open filter housing.
- Rotate filter counterclockwise.
- A small amount of water may leak from the filter cartridge.
- Install filter (or bypass cap) then rotate clockwise.



*Water filter and bypass cap*

### **Priming the Water System:**

Prime the water system after changing the water filter and whenever the water source is changed. Ensure the water supply valve is open. The valve is located on the water manifold.

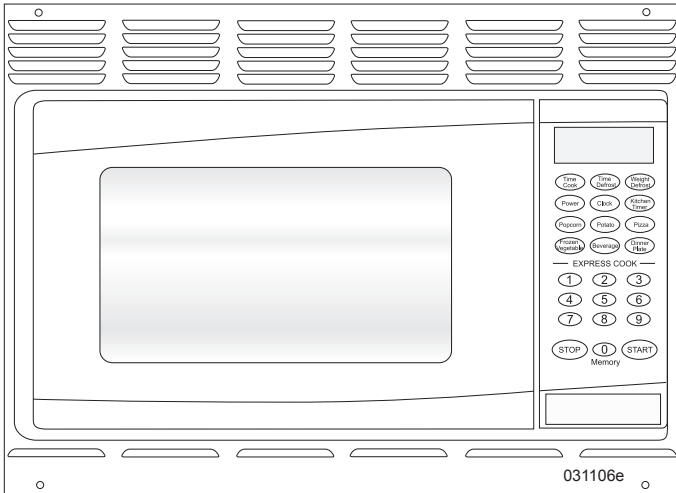
- Press and hold a drinking glass against the water dispenser paddle until water flows. Sputtering is normal as air is purged.
- Allow water to flow for few seconds then release for a few seconds.
- Repeat until no air pockets are present.

### **Tips:**

- If the temperature display flashes, the control system has detected a fault. Call Whirlpool customer service at 1-800-253-1301. A qualified service technician can interpret the flashing message.
- If possible, cool items first before putting them into the refrigerator.
- Keep the doors shut. Plan ahead what is needed before opening the doors.
- Do not block cold air vents with food items.
- Allow the refrigerator 24 hours of operation before actual use to help it get a head start with the refrigeration process.
- A box of open baking soda will help absorb food odors.
- To prevent dead batteries when dry camping, use the Automatic Generator Start feature and inverter to supply AC power to the refrigerator.

## CONVECTION MICROWAVE OVEN

The oven is operated from 120 Volt AC supplied by shore power.



High Pointe microwave

### **INFORMATION:**

**For more detailed information and operating instructions, refer to the OEM manual. Be sure to register the microwave/convection oven with the manufacturer.**

### **CAUTION**

**Microwave ovens have been known to electrically interfere with pacemakers and other electrical medical devices. Persons with electronic medical devices should exercise care when in the general vicinity when operating these devices. Consult the appliance manual for further information.**

### **Operating Tips:**

- To prevent damage to the operating parts inside the oven do not allow water to seep into the ventilation openings.
- The glass tray and roller guide must always be in place during cooking.
- Ensure the door is firmly closed before use.
- Confirm the cookware is microwave safe.
- Cover food with microwave safe paper towel or upside-down plate to reduce spattering.
- Clean up all spills or spatters before they dry.
- Some food wrappers may be foil lined. Check food wrapping carefully before cooling or heating.
- If the oven screen is not lit, plug another electrical appliance into the same outlet as the oven to verify AC power is preset. If test item works, contact an appliance repairman to check the oven.
- Never use the oven as a storage area.

The oven has safety interlocks to prevent use with the door open, and screens to prevent oven leakage. These safety features should be kept in good condition.

Never attempt to bypass the safety interlocks or allow residue to accumulate on the door or oven face. If the oven is damaged, Do not attempt to use it. The oven should be repaired by an appliance repairman.

### **CAUTION:**

**The oven is for food preparation only. Do not use the oven to dry clothes, paper or other items.**

### ***Clock Set***

- Press the Clock pad.
- Use number buttons to enter clock time.
- Press the Clock pad to set.

### ***Cooking***

- Use number pads to set amount of cooking time.
- Place food or beverage into microwave.
- Touch Start.

### **Adjusting Power Level:**

- Touch Power level pad.
- Use number pads to select between 9 (high) and 1 (low).
- Use number pads to set amount of cooking time.
- Place food or beverage into microwave.
- Touch Start.

### **Quick Cook Buttons:**

There are several preset cook time buttons. Refer to the OEM manual for further information.

- Select a quick cook button or if cooking multiple similar items, press the cook button again.
- Place food or beverage into microwave.
- Touch Start.

### ***Care & Cleaning***

The exterior of the oven is plastic and metal. The interior is metal. Do not clean with scouring pads, harsh or abrasive cleaners, chemical cleaners or petroleum based thinners that can damage the finish.

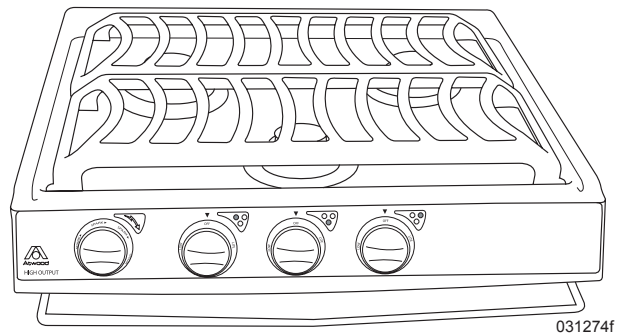
Use mild soap and water with a damp cloth or paper towel to remove stains or spills. When cleaning the touch pad, open the door to prevent accidental operation. Use mild soap and water with a soft cloth. Avoid using excess amounts of water on the touch pad. The turntable plate and oven racks are dishwasher safe.

- It is occasionally necessary to remove the glass tray for cleaning. Wash the tray in warm sudsy water or in a dishwasher.
- If the control panel becomes wet, clean with a soft, dry cloth. Do not use harsh detergents.
- The roller guide and oven cavity floor should be regularly cleaned to avoid excessive noise. Wipe the bottom surface of the oven with mild detergent water or window cleaner and then dry. The roller guide may be washed in mild sudsy water.
- Food odors may linger inside oven. To help eliminate odors, combine the juice and the peel from one lemon, several whole cloves and 8 oz. of water into a two cup bowl. Place in oven on high power, bring to a boil for several minutes. Let cool in the oven for several minutes.
- It is occasionally necessary to remove the glass tray for cleaning. Wash the tray in warm, sudsy water or in a dishwasher.
- The roller guide and oven cavity floor should be regularly cleaned to avoid excessive noise. Wipe the bottom surface of the oven with mild detergent water or window cleaner and then dry. The roller guide may be washed in mild sudsy water.
- If the control panel becomes wet, clean with a soft, dry cloth. Do not use harsh detergents or abrasive when cleaning the control panel.
- Food odors may linger inside oven. To help eliminate odors, combine the juice and the peel from one lemon, several whole cloves and 8 oz. of water into a two cup bowl. Place in oven on high power; bring to a boil for several minutes. Let cool in the oven for several minutes.
- Clean the outside oven surface with soap and water. Wipe away any residue using a damp cloth. Dry with a soft cloth. To prevent damage to the operating parts inside the oven, do not allow water to seep into the ventilation openings.

## COOKTOP

The cooktop uses propane as a fuel source. The burners are ignited with piezo ignition. The cooktop is intended for cooking purposes only. It is not designed as a heating source. The flame should have a blue appearance with a lighter blue defined flame at the burner head.

A yellow flame or yellow tips indicate a rich fuel mixture that can leave carbon on the bottom of cooking utensils.



### **INFORMATION:**

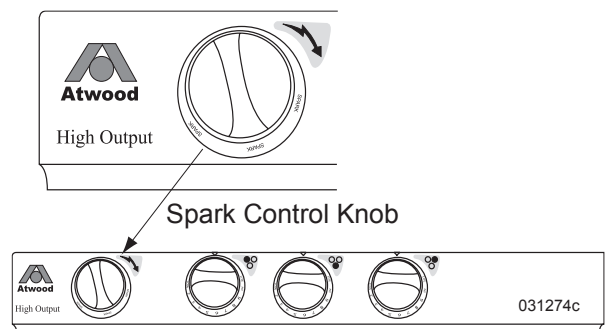
**For detailed cooktop information, operating instructions and safety refer the OEM manual.**

### **To Use the Cooktop:**

- Open the primary valve on the propane tank.
- Battery cutout switch is on.
- House batteries are charged.

### ***Lighting the Burners***

- Place cookware on burner grate over the desired burner.
- Push in and turn the appropriate burner knob to Lite. Do not attempt to light more than one burner at a time.
- Rotate Spark Control Knob clockwise until the burner lights.
- When the burner lights, rotate knob to the desired flame setting.



⚠
**WARNING**

IT IS NOT SAFE TO USE COOKING APPLIANCES FOR COMFORT HEATING.

Cooking appliances need fresh air for safe operation.  
Before operation:

1. Open overhead vent or turn on exhaust fan.
2. Open window.

FAILURE TO COMPLY COULD RESULT IN DEATH OR SERIOUS INJURY.

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### **WARNING:**

**Do not leave burners unattended during cooking. Do not leave burner valve(s) open while burner(s) are not lit. Propane is heavier than air and will settle on the floor and “hide” in corners. If a propane smell exits, extinguish all open flames. Open all windows and doors. Do not touch any electrical switches. They may cause a spark that can ignite. Evacuate the motorhome and shut off the primary propane valve. Liquid propane is highly volatile, highly explosive and extremely dangerous. Explosion, fire, property damage, injury or death can result. Contact a qualified service center to have the problem correctly diagnosed and repaired before resuming operation.**

### **Operation Tips:**

- A yellow flame is an indication of incorrect fuel/air ratio. Lowered BTU output and carbon build-up can occur.
- When cooking at an altitude above 5,000 ft., the flame may change appearance and the flame BTU output will be lowered. Allow extra cooking time.
- Do not allow the tips of the flame to extend beyond pan or pot edge. When this occurs heat is wasted and possibility of injury increases.
- Cooking time can be reduced if the least amount of liquid is used.
- Cookware type and style can make a big difference in heat distribution.

### **Safety**

- Do not leave children alone or unattended in the galley area when the cooktop is in use.
- Never allow anyone to sit, stand or climb on any part of the range cooktop. Serious injury or burns could occur.
- Do not store items that children may want above the cooktop. Children can be burned or injured.
- Do not wear loose or hanging garments when using the cooktop.

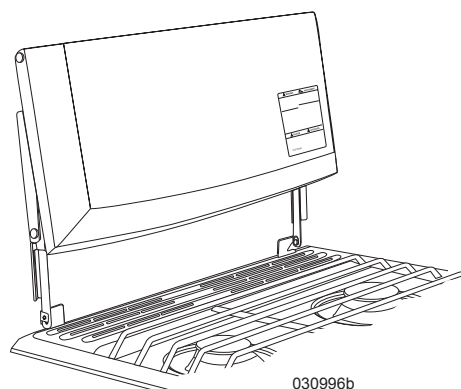
- Use only dry pot holders. Damp pot holders on hot surfaces may result in burns from steam. Do not let potholder touch an open flame.
- Do not heat unopened containers. Containers could explode.

### **CAUTION:**

**Never leave the cooktop unattended.**

### ***Cooktop Cover***

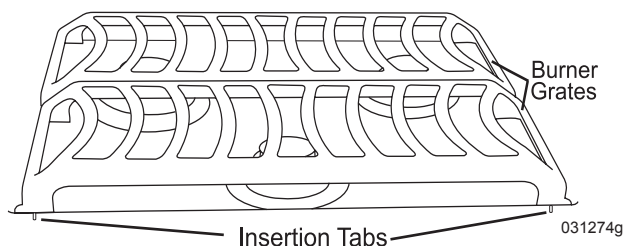
The cover must be open before using the cooktop.



- Do not lower the cover on the cooktop while burners are lit.
- Do not use the cover as a griddle.
- Lift up on hinges then fold cover closed while the motorhome is in transit.

### ***Burner Grate***

The burner grates are attached to the cooktop by four insertion tabs and can be removed for cleaning. Place a cloth down to protect the countertop. To remove a burner grate, pull up on the grate. To re-install a burner grate, align the insertion tabs with the grommets and push down.



### ***Care & Cleaning***

Regularly clean the cooktop with a soft cloth and a warm soapy solution. Do not use abrasive or harsh cleaners such as steel wool, bleach, ammonia or oven cleaner as these can damage the finish.

Use a dry paper towel or cotton cloth to wipe up spatters or spills while the cooktop surface is still slightly warm. To avoid accidental burns, do not clean the cooktop when it is hot to touch. Do not allow food to bake on. Clean the surface burner grate and caps using the same guidelines as the cooktop surface.

To avoid dulling the finish, wipe up the spill before it is baked on. Steel wool and coarse, gritty cleanser will scratch or mar the surface. Use gentle kitchen cleanser powder or grease cleaner. Hopes “*Perfect Cooktop*” can be used to maintain the finish.

Hopes: 800-325-4026.

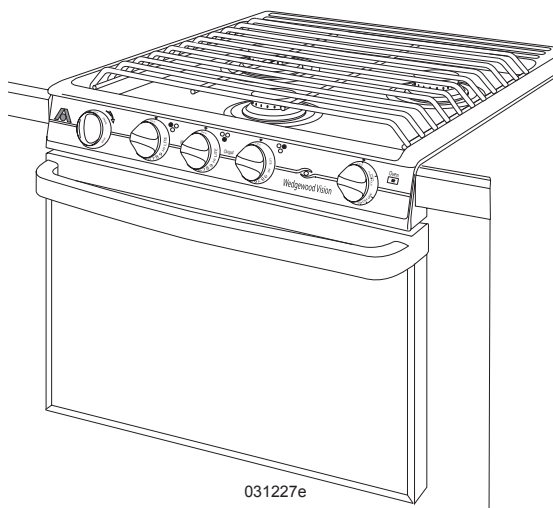
### Porcelain Enamel:

Porcelain enamel, a type of glass fused on steel at a very high temperature, is not extremely delicate but must be treated as glass. Sharp blows, radical surface temperature changes, etc., will cause enamel to chip or crack. Some foods, such as vinegar, lemon juice, tomatoes and milk, contain acids which can dull the finish of the enamel. To avoid dulling the finish, wipe up the spill before it is baked on. The surface is glass and must be given consideration when cleaning. Steel wool and coarse, gritty cleanser will scratch or mar the surface. Any gentle kitchen cleanser powder or grease cleaner will be suitable. Hopes “*Perfect Cooktop*” can be used to maintain the finish.

Hopes: 800-325-4026.

## COOKTOP WITH OVEN

The cooktop and oven use propane as a fuel source. The cooktop burners are ignited with piezo ignition. The oven pilot is lit with a match. The cooktop is intended for cooking purposes only. It is not designed as a heating source. The flame should be blue with a lighter blue defined tips at the burner head. A yellow flame or yellow tips indicate a rich fuel mixture that can leave carbon on the bottom of cooking utensils.



## INFORMATION:

For detailed information, operating instructions and safety refer to OEM manual.

### ⚠ WARNING

IT IS NOT SAFE TO USE COOKING APPLIANCES FOR COMFORT HEATING.

Cooking appliances need fresh air for safe operation.

Before operation:

1. Open overhead vent or turn on exhaust fan.
2. Open window.

FAILURE TO COMPLY COULD RESULT IN DEATH OR SERIOUS INJURY.

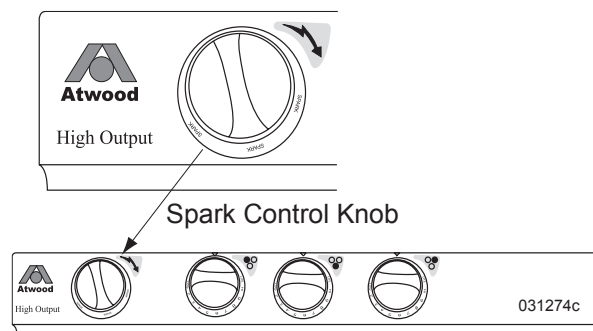
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### To Use the Cooktop:

1. The primary propane valve is open.
2. The battery cut-off switch is on.
3. House batteries are charged.

### Lighting the Cooktop Burners

- Place cookware on burner grate over the desired burner.
- Push in and turn the appropriate burner knob to Lite. Do not attempt to light more than one burner at a time.
- Rotate Spark Control Knob clockwise until the burner lights.
- When the burner lights, rotate knob to the desired flame setting.



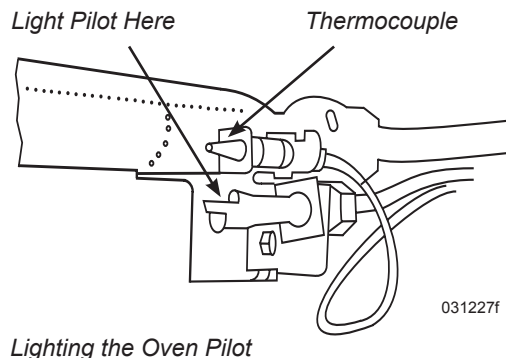
### Using the Oven

#### Lighting Oven Pilot:

- Light a cooktop burner to purge air from system then shut off the burner.
- Push in oven control knob and rotate to Pilot On.
- Push and hold knob inward and light pilot under broiler shelf.



- Once pilot is lit, hold in control knob for several seconds then release. Ensure oven pilot remains lit.
- Rotate control knob to desired temperature.
- To extinguish pilot, push in the oven control knob and rotate to Off.



### **WARNING:**

Extinguish oven pilot when refueling or traveling. Do not block vents in oven with any objects.

### **CAUTION:**

It is recommended to open the cooktop cover when using the oven.

### **WARNING:**

If a propane smell exists, extinguish all open flames and turn off the main gas supply. Liquid propane is highly volatile, highly explosive and extremely dangerous. Explosion, fire, property damage, injury or death can result. Propane is a “heavy” gas and will lay on the floor and “hide” in corners. Open all windows and doors. Do not touch any electrical switches. They may cause a spark which can ignite. Contact a qualified service center to have the problem correctly diagnosed and repaired before resuming operation.

## **Safety**

- Do not leave children alone or unattended in the galley area when the cooktop is in use.
- Never allow anyone to sit, stand or climb on any part of the range cooktop. Serious injury or burns could occur.
- Do not store items that children may want above the cooktop. Children can be burned or injured.
- Do not wear loose or hanging garments when using the cooktop.
- Use only dry pot holders. Damp pot holders on hot surfaces may result in burns from steam. Do not let potholder touch an open flame.

- Do not heat unopened containers. Containers could explode.

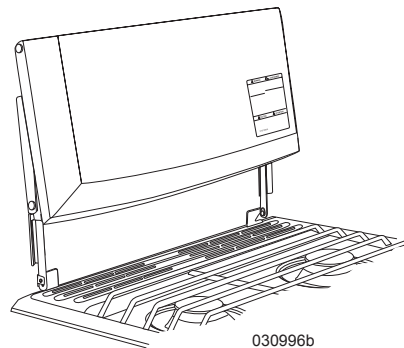
### **CAUTION:**

Never leave the cooktop unattended.

## **Cooktop Cover**

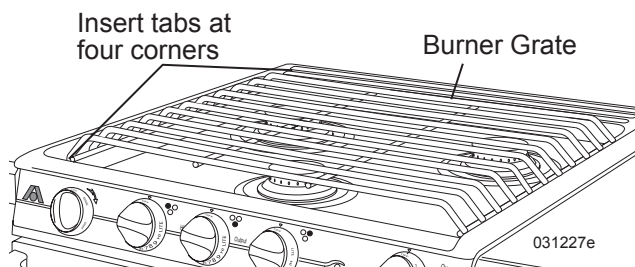
The cover must be open before using the cooktop.

- Do not lower the cover on the cooktop while burners are lit.
- Do not use the cover as a griddle.
- Lift up on hinges then fold cover closed while the motorhome is in transit.



## **Burner Grate**

The burner grates are attached to the cooktop by insertion tabs and can be removed for cleaning purposes. Place a cloth down to protect the countertop. To remove a burner grate, pull up on the grate. To re-install a burner grate, align the insertion tabs with the grommets and push down.



### **Operation Tips:**

- A yellow flame is an indication of incorrect fuel/air ratio. Lowered BTU output and carbon build up can occur.
- When cooking at an altitude above 5,000 ft., the flame may change appearance and the flame BTU output will be lowered. Allow extra time cooking time.
- Do not allow the tips of the flame to extend beyond pan or pot edge. When this occurs heat is wasted and possibility of injury increases.
- Cooking time can be reduced if the least amount of liquid is used.

- Cookware type and style can make a big difference in heat distribution.
- Pre-heat the oven for 10 minutes prior to use.

### Cleaning Tips:

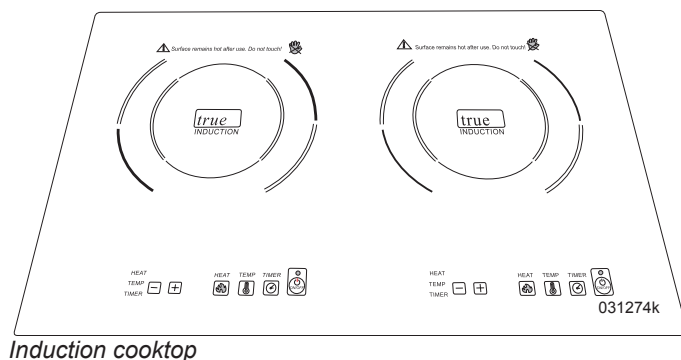
- Clean all surfaces as soon as possible after boil overs or spill overs.
- Use warm soapy water to clean the burner grates, cooktops, painted surfaces, porcelain surfaces, stainless steel surfaces and plastic items on the range or cooktop. Grit or acid-type cleaners may ruin the surface. Glass cleaner should only be applied to the cooktop surface using a paper towel. Do not spray directly on the cooktop surface.
- Use only non-abrasive plastic scrubbing pads.
- Do not allow foods containing acids (such as lemon or tomato juice, or vinegar) to remain on porcelain or painted surfaces. Acids may remove the glossy finish. Wipe up egg spills when cooktop is cool.
- Allow porcelain surfaces to cool before cleaning. Burns from the heated surface may occur or the porcelain can crack.

Regular cleaning with a soft cloth and a warm mild soap solution is recommended. Wash, rinse and dry with a soft cotton cloth. Thoroughly clean the cooktop when cool. Use a dry cloth or paper towel while the surface is warm to the touch to clean splatters or spills. Cleaning will be more difficult if spills bake on to the surface.

Do not spray glass cleaner directly on the surface. Do not use abrasive cleaners or steel wool. Harsh cleansers like bleach, ammonia and oven cleaner should never be used.

### COOKTOP - ELECTRIC (IF EQUIPPED)

The electric cooktop operates from 120 Volts AC supplied from either shore power or the generator. The cooktop operates through induction of a magnetic field to the cookware. Cookware of iron, stainless steel and copper are acceptable. Aluminum cookware is not recommended but cookware with an aluminum-clad bottom to stainless can work but with reduced results compared to iron cookware.



Glass cookware will not work. A test of acceptable cookware is if a magnet will adhere to the cookware. Heating of cookware is relatively fast with temperature changes occurring quickly similar to gas (propane) cooktops.

While the cooktop has two elements, power level 10 is the maximum amount of power available to operate one or both elements. If both elements are active, the maximum power level is shared to a multiple of 10. One element can be set to 6 while maximum power available for the other element would be 4 as an example.

### **WARNING:**

**Use only cookware that is magnetic. Place only cookware on the cooktop. Avoid placing flatware or other magnetic items on the cooktop as these can become immediately hot resulting a burn.**

### **CAUTION:**

**Inductive cooktops have been known to electrically interfere with pacemakers and other electrical medical devices. Persons with electronic medical devices should exercise care when in the general vicinity when operating these devices. Consult the appliance manual for further information.**

### **NOTE:**

**Refer to the OEM cooktop manual for further information about cookware.**

### **To Operate the Cooktop:**

- Hook to shore power or start the generator.
- Place only cookware onto the area indicated on the cooktop.
- Turn on the cooktop. The default setting is 5.
- Adjust power to the desired level.
- Turn off the cooktop when finished.

Cooking temperature is selected by using either the Temp(erature) or Heat feature. The Timer feature can be set in 5 minute intervals up to 150 minutes.

For safety, the cooktop will automatically shut off a few minutes after cookware is removed from the cooktop or after 3 hours of continuous operation.

### **CAUTION:**

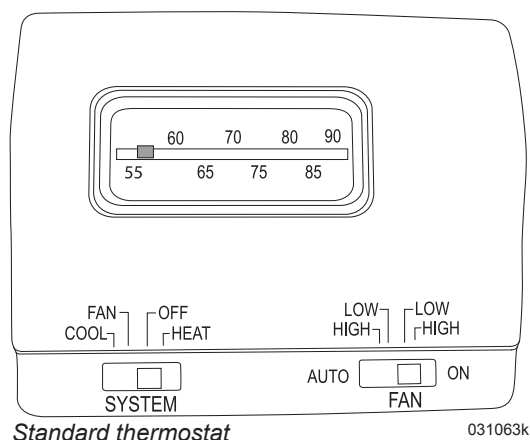
**While only cookware is heated during operation, the cooktop surface can be warm/hot to the touch due to heat transfer by the cookware to the cooktop. A burn can still occur.**

### ***Cleaning***

Use only water and soft cotton cloth or microfiber cloth. Mild dish soap can be used if needed. Excess water during cleaning is not recommended as water can enter and damage the cooktop.

### **ROOF A/C**

The roof air conditioner operates from 120 Volts AC. The thermostat controls roof A/C functions and the furnace.



### **INFORMATION:**

**Refer to air conditioner OEM manual for detailed information and operating instructions.**

### ***Thermostat***

#### **System Switch:**

**Off** – Turns the thermostat off.

**Fan** - Operates the roof A/C fan only. The compressor will not engage in Fan mode.

**Cool** - The fan operates continuously for even cooling. The thermostat regulates compressor cycle according to temperature setting.

**Heat** – Sets the thermostat to operate the furnace. Fan speed of the furnace is not adjustable.

#### **Fan Switch:**

Auto Mode

Low Fan – The roof A/C fan operates continuously at low speed. Thermostat temperature setting will cause the fan to cycle on and off.

High Fan – The roof A/C fan operates continuously at low speed. Thermostat temperature setting will cause the fan to cycle on and off.

On Mode

Low Fan – The fan operates continuously at low speed.

High Fan – The fan operates continuously at high speed.

### **NOTE:**

**The temperature setting regulates the cycle of the compressor in Cool mode. The blower runs continuously in Cool mode to circulate air and maintain an even temperature.**

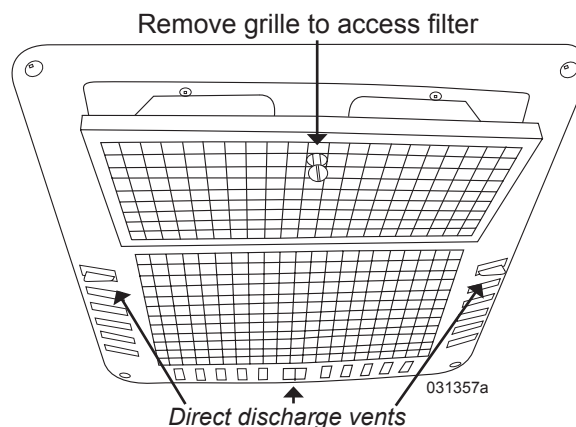
### **CAUTION:**

**Wait 2 minutes after the compressor cycles off before setting the thermostat to a cooler setting. This allows refrigerant pressure to equalize and compressor to easily restart.**

### ***Maintenance***

Periodically remove and clean return air filter. The filter is located above the removable panel. Avoid use without the filter in place.

Remove and clean filter and housing with mild soap and water. Do not use harsh cleaners, scouring powders or petroleum based cleaners as this can damage the filter and housing finish.



### **Energy Saving Tips:**

1. Select a temperature setting that suits comfort needs.
2. Regularly clean return air filters.
3. Park in a shaded area during extreme outdoor temperatures. Keep windows and doors closed. Keep blinds or shades closed. Avoid use of heat producing appliances.

## **FURNACE**

The furnace is 12 Volt DC operated and uses propane as the fuel source. Electronic circuitry (automatic ignition) ignites the burner. The furnace uses outside air for burner combustion. Exhaust is expelled through the outside vent. Inside air is drawn into the furnace and blown across the internal heat exchanger. Heated air is then discharged through ducted hoses to the heat registers.

### **Operation**

The furnace is controlled by either an analog thermostat used with standard roof A/C or electronic thermostat used with roof A/C with heat pump.

The air conditioner sends an electrical signal to the furnace to begin ignition cycle. There is a small time delay before the blower motor begins.

Once the blower motor attains a predetermined speed it will close the air prover or sail switch. The sail switch, which is now closed, sends the electrical signal through a high-temperature protection switch, then to the automatic ignition circuit board.

The automatic ignition circuit board will attempt to light the burner three times. If the burner does not light by the third attempt, the ignition board will go into "lock-out". The furnace blower motor will continue to run and the thermostat will have to be cycled off to reset the ignition cycle.

After the thermostat is satisfied the propane valve closes and extinguishes the burner. The blower motor will continue to operate for two or three minutes to cool the furnace.

### **INFORMATION:**

See the furnace OEM manual for complete operation information.

### **CAUTION:**

**Do not store any items or materials in the furnace area. Restricted air flow can hamper furnace operation leading to failure and/or fire hazard.**

### **CAUTION:**

**Avoid a direct stream of water into the outside furnace vents. This can damage the furnace.**

### **NOTE:**

**It is not advisable to use the furnace to heat the interior of the motorhome during transit.**

### **WARNING:**

**If a propane smell exists, extinguish all open flames and turn off the main propane supply. Propane is an extremely dangerous gas that can ignite and explode, resulting in property damage, injury or death. Propane is heavy and can float on the floor or hide in corners. Open all windows and doors. Do not touch electrical switches as they may spark. Keep open flame, spark producing devices and smoking material out of the area. Contact a qualified service center to have the problem correctly diagnosed and repaired before resuming operation.**

### **Operation Requirements:**

- Primary propane shutoff valve on the propane tank is open.
- House batteries are fully charged.
- Battery disconnect switch is on.

### ***Thermostat***

There is a short time delay before the blower motor begins once the thermostat is set.

#### **- Standard Roof A/C:**

- Set System switch to Heat.
- Set temperature to desired setting.

#### **Tips:**

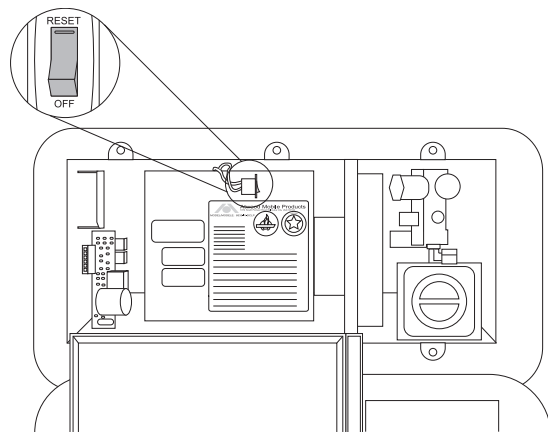
- A musty smell may occur during the first couple of heat cycles after the motorhome has been removed from storage.
- Operating the furnace at altitudes above 5,000 feet reduces the BTU output due to air/fuel ratio.
- Have the furnace periodically serviced by a qualified technician, especially if the system makes unusual noise or emits an unusual smell.

### ***Troubleshooting***

- Make sure the primary propane shut-off valve is open.
- The furnace will not light if the blower motor fails to spin at a specified speed. This may be due to a low house battery charge condition.
- Hookup to shore power, start the generator, or start the motorhome.



If the blower motor fails to operate after verifying the batteries are charged and the fuses are good, use a screwdriver or coin to open the furnace access panel to inspect the circuit breaker.



Reset switch located through exterior access

030943d

### To Reset the Circuit Breaker:

- Turn the circuit breaker to Off and then back to Reset.

## WATER HEATER

The water heater uses propane to heat water: The burner for propane operation is controlled by an automatic ignition circuit board powered by 12 Volt DC. Thermostat temperature is preset and is not adjustable. For ease of winterization, the water heater is equipped with a tank drain plug and bypass valves.

### INFORMATION:

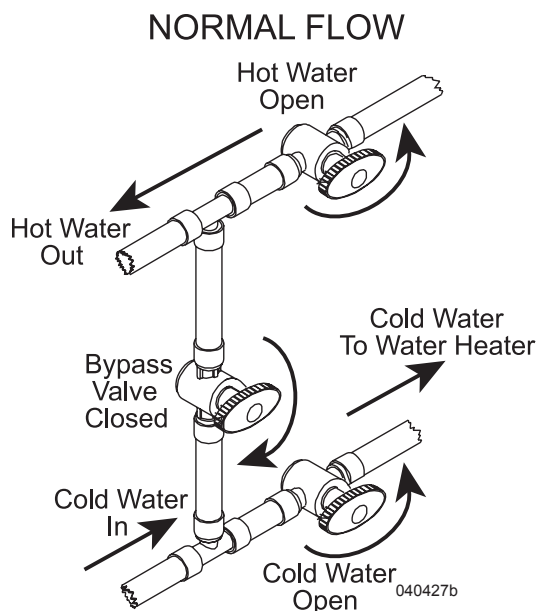
Refer to the Water Heater OEM manual for detailed information and operating instructions.

### Before Using the Water Heater:

Use water to purge air from the water system and water heater and if necessary, purge FDA approved RV antifreeze from the system.

### To Purge Air and Pressurize the System:

- Turn the water heater bypass valves (located on back of water heater) to Normal Flow by opening the Hot and Cold water valves and Closing the Bypass valve (as shown). If necessary, install the drain plug.
- Fill the fresh water tank or hook to city water.
- Turn on the water pump or city water.
- One at a time, open the hot and cold valves of all faucets until a steady stream of clear water flows with no bubbles or pockets of air.



Bypass valves located behind water heater

- Do not operate the water heater until the system is purged of air.
- Inspect the water heater and water system for leaks after the water system is purged of air.

### CAUTION:

After purging the water lines and water heater, small air pockets or hydrogen gas may be present. After the first heat cycle of the water heater, initially open hot water faucets slowly to minimize potential spattering of hot water.

### WARNING:

If a propane smell exists, extinguish all open flames and turn off the main propane supply. Propane is an extremely dangerous gas that can ignite and explode, resulting in property damage, injury or death. Propane is heavy and can float on the floor or hide in corners. Open all windows and doors. Do not touch electrical switches as they may spark. Keep open flame, spark producing devices and smoking material out of the area. Contact a qualified service center to have the problem correctly diagnosed and repaired before resuming operation.

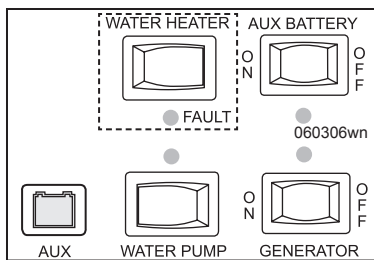
## Operation

The water heater uses propane and an automatic ignition system to light the main burner.

### Propane operation:

- Open the primary propane tank valve.
- Light burners on cooktop to help purge air from the propane system.
- Ensure battery is charged.
- Turn the water heater gas switch On.





Water heater propane switch located on systems monitor panel.

#### **NOTE:**

The water heater will attempt 3 ignition cycles after which ignition lockout will occur indicated by the red light. Turn switch off then back on.

#### **CAUTION:**

Do not operate the water heater without water. Damage to the thermostats and electric heating element can occur.

#### **WARNING:**

Before beginning any service or work on the water heater, make sure the propane is turned off and the 120 Volt AC and 12 Volt DC sources have been disconnected. Failure to do so can result in explosion, fire or injury.

#### **CAUTION:**

It is recommended not to operate the water heater on propane while the motorhome is in transit. The water heater must be off before refueling.

#### **High Temperature Thermostat:**

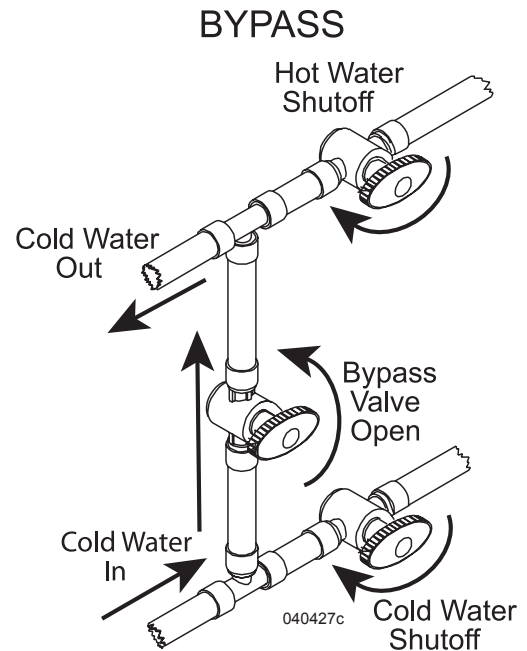
Separate thermostats are used for propane and AC electric. If a thermostat fails, a high-temperature safety limit switch will open.

#### **CAUTION:**

If the high-temperature safety limit should open, discontinue using the water heater. Have the water heater inspected by a qualified technician to determine the cause of the over temperature condition.

#### **Water Heater Bypass Valve:**

The bypass valve is located at the back of the water heater. Turn the valve to the Bypass position. This prevents water from entering the water heater. Turn the valve to the bypass position when winterizing. For normal operation, set the valve to Normal Flow.

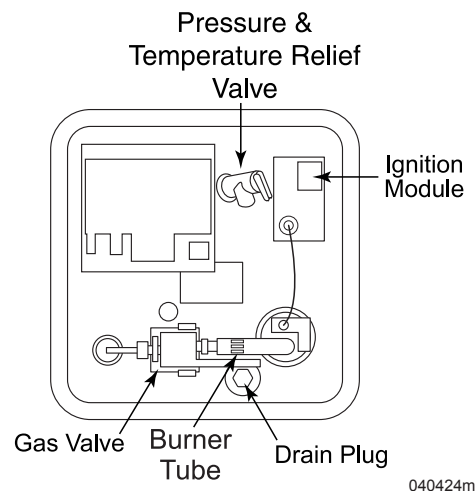


#### **Pressure & Temperature Relief Valve:**

The water heater is equipped with a Pressure & Temperature (P & T) relief safety valve. The P & T valve is designed to open if water temperature in the tank exceeds 210° F. (98.8° C.) or internal pressure exceeds 150 psi. If water begins to weep from the valve, it may be due to a loss of the air pocket in the tank and not a defective valve. See re-establishing the air pocket.

#### **Re-establishing the Air Pocket:**

Water may weep from the P & T valve under normal operation. This is not necessarily a faulty valve but more likely caused by lack of an air pocket and water expansion. The water heater tank is designed with an internal air pocket. Eventually, the cyclic expansion of water will absorb the air pocket.



If weeping from the valve occurs, the air pocket will need to be re-established utilizing the following procedure. If the valve continues to weep after establishing the air pocket, contact a qualified service center to evaluate the valve.

**CAUTION:**

**Ensure the water heater is cool prior to establishing the air pocket.**

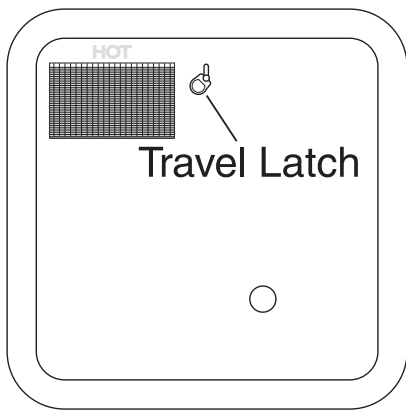
- Turn Off the water heater.
- Turn Off the incoming water supply.
- Open the hot water faucet closest to the water heater.
- Open the handle of the P & T valve.
- Allow excess water to drain from the water heater through the P & T valve. When draining is complete, close the P & T valve by allowing it to snap shut. Close the faucet and turn on the water supply.
- Turn on the water heater.

**Water Heater Compartment:**

Periodically inspect the water heater compartment and door screen for foreign material that can prevent the flow of combustion and ventilating air. The water heater drain plug and pressure relief valve are located inside.

**CAUTION:**

**Do not block any opening.**

***Tips***

- Conserve propane by turning off the water heater when not in use.
- Conserve energy and hot water by shutting off the shower water when not rinsing.

- Water may drip occasionally from the Pressure-Temperature relief valve until the pressure has dropped. Avoid opening the Pressure-Temperature valve manually as collected minerals may cause the valve to leak continually. The valves can be purchased from most hardware stores.

**Draining & Storage:**

Drain the water heater to prevent freeze damage if the motorhome is to be stored during the winter months.

- Turn off electrical power to the water heater.
- Turn off the primary propane shut-off valve.
- Open low point drains.
- Open both Hot and Cold on all faucets.
- Remove water heater drain plug.
- Turn the bypass valve to the bypass position.

**NOTE:**

**Be sure to refill the water heater with water before resuming operation.**

**Troubleshooting:**

- Insects may make nests in the burner tube. Check the burner tube for obstruction if the water heater fails to light. It is recommended to clean the burner tube with a brush and not compressed air. Compressed air may not fully remove obstructions.
- If the water heater still fails to operate, the high-temperature safety fuse may be blown. Have a qualified technician inspect the water heater.

# Equipment

## Section 6

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## EQUIPMENT - INTRODUCTION

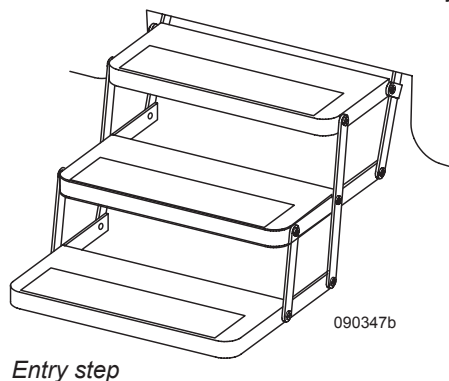
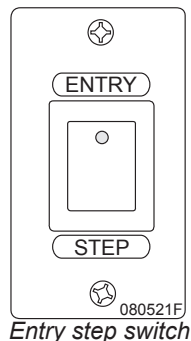
This section covers the basic operation and care of equipment found in the motorhome, most of which are provided for entertainment and comfort. More detailed information about specific equipment may be found in that particular OEM manual. Optional equipment will also be discussed in this section that may not apply to all motorhomes.

### **INFORMATION:**

**Detailed information with CAUTION or WARNING instructions for the various electronics, other than what is provided in this section, can be found in that specific OEM manual.**

### **ENTRY STEP Operation**

The exterior electric entry step will extend and retract with door opening and closing, automatic retraction with the ignition key in the run position and a “last out” feature. The entry switch illuminates when turned on.



### **WARNING!**

This vehicle is equipped with an automatic electric step. Turning the ignition switch to the "ON" position while the vehicle is parked will cause the step to retract. Visually confirm that the step is fully extended prior to exiting the vehicle.

**BE SAFE - LOOK BEFORE YOU LEAP!** 020325

### **NOTE:**

When dry camping, it is important to note that when the switch is illuminated all step circuits are active and drawing current from the chassis battery.

### **Entry Step Operation:**

With entry step switch on, the step will extend and retract when the entry door opens and closes.

### **Cancel Step Operation When Parked:**

Open door to extend step. Turn entry step switch off. Entry step will remain extended.

### **Last Out Feature:**

Turn the ignition off and open the door. The step will extend. This is the “last out” feature.

### **Ignition Override:**

When the ignition is on, the step will extend and retract with door movement with the entry step switch off. This ensures the step will not be extended during travel and will extend when the door is opened.

### **WARNING:**

The entry step will retract when the ignition switch is turned on. Always confirm the entry step is fully extended and locked in position prior to exiting the motorhome.

### **CAUTION:**

High curbs can impede step operation. Use care when parked on side streets.

### **If the entry step fails to operate:**

- Verify that the entry step switch is on.
- A magnetic door jam switch is used to control step operation. Use a separate magnet to apply a “trigger” to the door jam switch. Rotate test magnet to align polarity field.

### **WARNING:**

If the motorhome is driven with the step in the extended position, damage could occur to both the step and the motorhome.

### **CAUTION:**

Keep fingers, clothing and other hardware away from moving components.

### **WARNING:**

Step repairs should be performed by a qualified technician. Failure of the step to extend can result in serious injuries.

### **INSPECTION:**

Clean and inspect step more frequently in inclement weather. Mud, snow, road salts and sand could quickly break down lubricant and corrode painted surfaces.

## Maintenance

The steps are equipped with self-lubricating bushings in the drive assembly and step joints and require no maintenance. If in extreme weather conditions and lubrication is deemed necessary a silicon based grease or spray can be used on the bushings.

### GRAB HANDLE

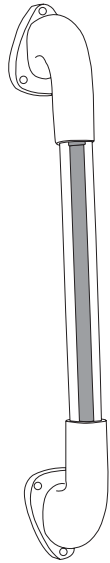
The grab handle is used to aid in entering and exiting the motorhome.

#### Cleaning the Handle:

- Clean the acrylic grab handle using mild Soap and Water only!

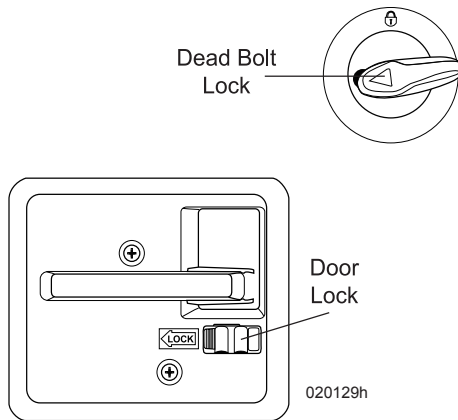
#### Do Not Use:

- Alcohol based glass cleaners or citrus based cleaners as these solutions adversely affect acrylic material causing stress cracks leading to eventual failure of the grab handle.



### ENTRY DOOR

The door uses two separate locks for safety and security. One locking system is the door lock and the other is a dead bolt. The door lock incorporates a primary and secondary latching system to ensure safety.



#### Adjusting the Entry Door Latch:

- Determine which bolt needs adjustment.
- Slowly close the entry door, observing the latch and strike bolt alignment. Do not attempt to latch if the alignment is off. If the alignment is correct, allow the latch to catch in the first (primary) position only.

- The latch should move to the second position with only slight pressure applied to the entry door. Upper and lower latches should be evenly timed. Press on the entry door to check for further movement.
- The entry handle should operate with little effort to open the entry door. Excess pressure indicates the bolts are set too far back.
- With a box wrench or socket, loosen the movable strike bolt. Adjust in small increments. Tighten the bolt firmly after making adjustments. Bolts should have slight up and down movement for vibration control in travel.
- Test the operation of the dead bolt lock to ensure proper functions.
- Spray silicone on a 1" sponge paint brush then brush door gasket to eliminate squeaks during travel.

#### CAUTION:

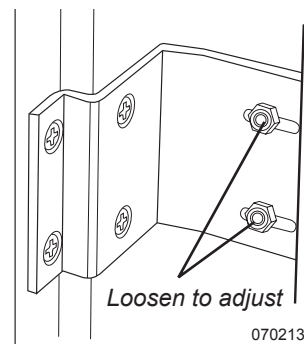
**When operating the entry door, ensure the dead bolt latch is fully unlocked prior to closing. Damage to the dead bolt and/or entry door can result.**

#### Changing Screen Door Glass:

- The screen slider is Tuffak®. The slider can be bowed for removal and replacement.
- Replace with new Tuffak and reverse the procedure.

#### Adjusting the Screen Door:

- The steel hinge has slots to allow movement.
- Loosen the fasteners on the hinge side of the screen door: two on the top and two on the bottom.
- The hinge should fit tightly to the trim of the door when the screen door is latched to the door and the door is open.





## SLIDEOUT OPERATION

Slideout room operation uses safety features to prevent mechanical damage or physical harm. Slideout room(s) will not operate until all safety requirements are met. To prevent damage to cabinet doors or the slide room, secure all cabinet doors in the closed position prior to room activation. Some interior doors may require being fully open or fully closed to provide adequate clearance for the slideout room.

### Slideout Operation Requirements:

- House batteries are charged.
- House battery disconnect switch is on.
- Ignition key is on.
- Engine is running.
- Park brake is applied.
- Hydraulic jacks extended and the motorhome is level.

### Extending & Retracting Slide Rooms

#### **CAUTION:**

**To extend or retract the slideout room, the ignition must be on, the engine running and battery voltage 13.0 volts. Apply the park brake. Operate the slideout room when supported by hydraulic jacks. Damage to the slideout room, mechanism or seals can occur.**

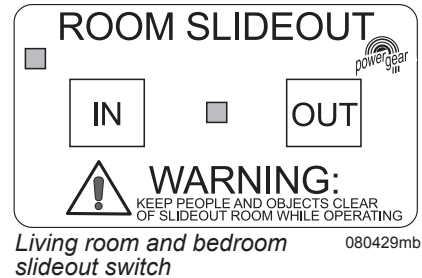
#### **To Extend or Retract Slide Rooms:**

- Clean the floor of dirt or grit that could result in damage during operation.
- Confirm there is enough clearance inside/outside the motorhome for the room to extend/retract.
- Allow at least five feet of clearance to extend the slideout.
- Move the driver and passenger seat forward to clear slideout room fascia.

MOVE CAB SEAT  
FORWARD BEFORE  
ACTIVATING  
SLIDE-OUT ROOM  
020329

- Apply the park brake.
- Start the engine.
- Level the motorhome using the hydraulic leveling jack system.
- Turn off the engine.
- Confirm the house batteries are fully charged and interior house power is on.
- Open a window or vent to equalize pressure during slideout operation.

- Ensure people, pets and objects are clear of the slideout room path.
- Firmly latch all cabinet doors and close drawers. Damage to the doors, drawers and fascia can occur.
- Locate the slideout room control switch. Press and hold the slideout room switch to the desired (In or Out) position.



- Release the switch to stop room movement at any time. The drive motor will not automatically stop at the end of room travel. The switch must be released. A change in motor sound indicates full extension/retraction.

#### **CAUTION:**

**Firmly latch all cabinet doors adjacent to the slideout before extending or retracting the rooms. Damage to doors or the fascia may occur.**

#### **CAUTION:**

**Do not leave the slide room extended during severe weather. Conditions such as high winds or heavy rain may cause damage. Rain water can pool on the slide room awning, adding weight and causing the awning to sag. Retract the room in small increments to allow water run off.**

#### **CAUTION:**

**Extensive damage could occur to the slide room and awning when extending the slideout room in snow, sleet, ice or freezing rain conditions. In such conditions, if the slide room is extended, clear the awning and ensure free movement prior to operating the slideout room.**

#### **CAUTION:**

**Clean the floor before retracting the slide room. Dirt and grit trapped under the slide room can scratch and damage the floor. Never move the motorhome with the slideout room extended.**

#### **CAUTION:**

**Continuous operation of the slideout room can drain the batteries and overheat the motor.**

**CAUTION:**

Do not use petroleum based products on the slide seal. Petroleum based products can damage the paint and will cause premature aging of the rubber seal.

**WARNING:**

The outside area must be clear of obstruction that can restrict slide room operation. Ensure there are five or more feet of clear space outside the slide room prior to extending the room or damage to the slide, motorhome or property can occur. Ensure there is sufficient clearance inside the motorhome prior to retracting. Clear the area of people and pets.

**CAUTION:**

If a problem with the slideout occurs, contact a qualified technician.

***Troubleshooting***

If the slide room does not operate, a safety feature may be engaged to prevent room operation.

If slide room does not respond from switch, check the following safety requirements:

- Ignition key is off.
- Park brake is applied.
- House battery disconnect switch is on.
- House batteries are charged.
- The motorhome is level.

***Manual Override*****Living Room/Galley Slideout:**

While it is recommended to diagnose and repair the problem so the in-wall slideout system operates as intended, conditions may require the slideout room be retracted manually. The in-wall system uses a 12 Volt DC motor located at the top of each slideout assembly. Gears mesh with the upper and lower racks that are connected by a drive shaft.

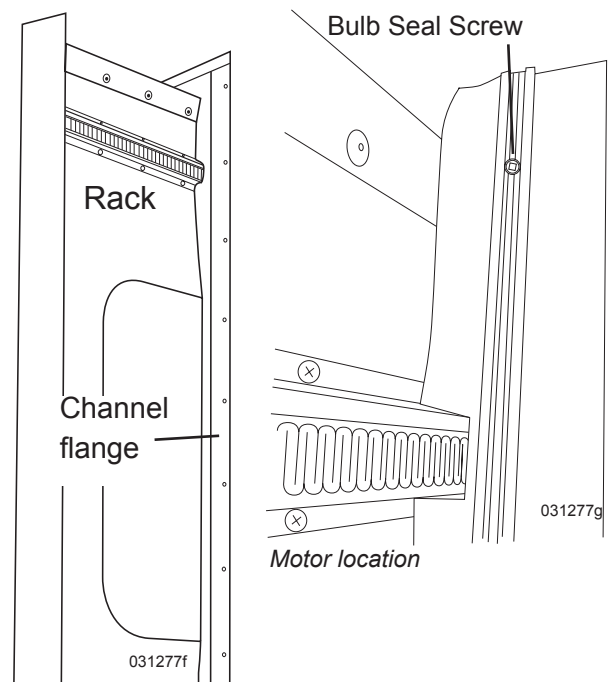
A control module monitors the revolution of each motor to ensure synchronous room movement. Unplugging each motor from the control module will allow the motors to rotate providing there is not mechanical interference or damage to the gears and racks.

**NOTE:**

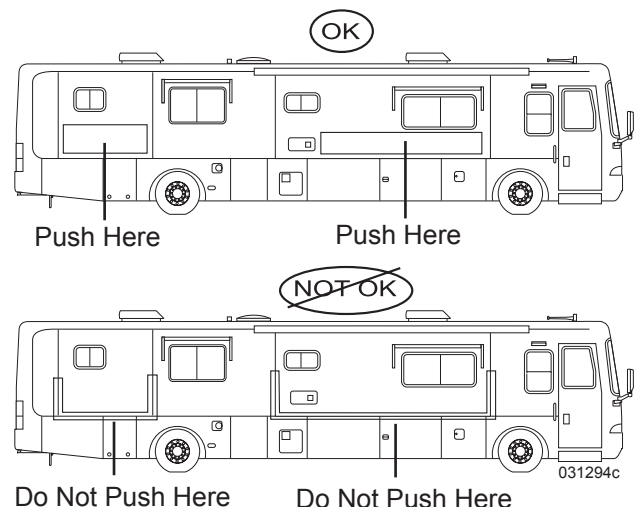
Several people may be required to push the slideout room to the retracted position.

**Manually Retract the Slideout Room:**

1. Access either the inside or outside (whichever is easier) the vertical channel assembly by removing trim and flange pieces around the slideout room.
2. If applicable, remove the top screw from the bulb seal at the top of the vertical.



3. Pull down on bulb seal and remove the motor cover.
4. Use a pick tool or equivalent to remove the retaining spring from the motor spring clip. If not equipped with a retaining spring, loosen the motor retaining screw.
5. Unplug the motor from the harness and remove the motor by lifting it up and out.
6. Repeat steps 1-4 for the other side.
7. Push the room into the retracted position.

**WARNING:**

To avoid injury do not place fingers near edges of the slideout room!

- Secure the room in place by either re-installing the motors ensuring both motors have fully engaged or use a wooden block such as a 2" x 4".

**CAUTION:**

**Do not drive the motorhome with the slideout room partially or fully extended. Structural damage to the slideout room and/or motorhome can occur.**

If the motor, gear or rack is damaged, the slideout mechanism and/or slideout room will need to be removed to gain access to the motor and hardware. The motor is located inside the channel flange at the top of the hardware. Support underside of slideout and unbolt channel flange to access motor.

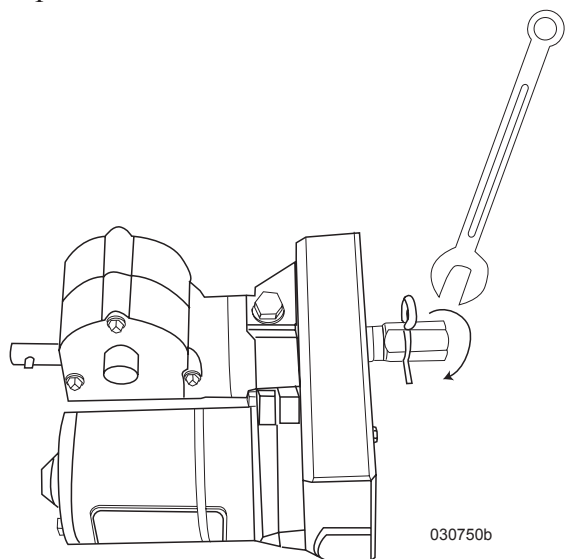
**Bedroom Slideout (If Applicable):**

If the bedroom slideout room will not operate after verifying 12 Volt DC power and safety features, it will be necessary to manually retract the slideout.

**WARNING:**

**Do not work on the slideout system unless power is disconnected.**

- Lift the mattress to gain access to the slideout motor inspection panel.
- Remove the panel screws to access the motor and mechanism.
- If the battery power to the slideout motor needs to be disconnected, mark the wire color and location.
- Use the appropriate sized wrench or socket on the drive shaft to retract the room.
- Take the motorhome to a service center for repair.



Bedroom slideout motor

## AWNINGS

### ***Slideout Cover***

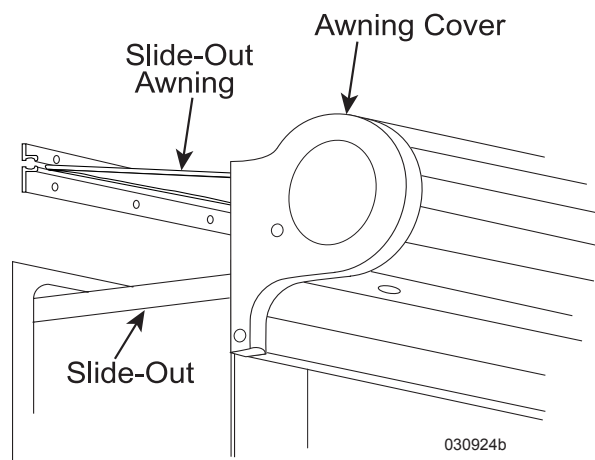
The slideout cover automatically reacts to slideout direction. A fixed edge of the slideout cover is installed into an awning rail, mounted just above the slideout. A spring-loaded roller with special brackets mounts to the slideout. In a hard rain the cover helps prevent water from penetrating the seal of the slideout. The slideout cover will automatically reach full extension when the slideout room is fully extended. The slideout cover automatically rolls up into the travel position when the slideout room is completely retracted.

**INSPECTION**

**When retracting the slideout, stop the room approximately halfway. Confirm that the fabric is properly rolling before fully retracting the slideout.**

**CAUTION**

**The slideout room and slideout awning should be retracted before heavy wind, rain or snow to prevent damage to the awning or motorhome. Wind can drive rain under the slideout awning and into the motorhome.**



**CAUTION**

**At least five feet of clearance is needed between the side of the motorhome and any objects, such as trees or fences, to allow the slideout room and slideout awning to fully extend.**

### ***Rain Water***

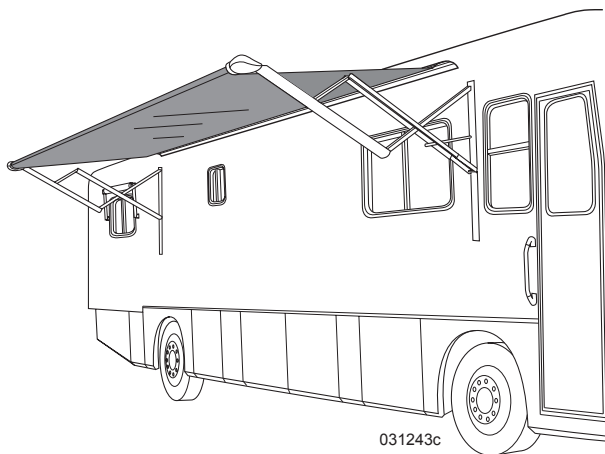
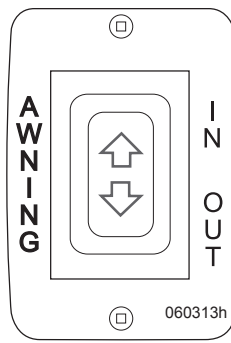
Rain water can pool on the slide-out awning. The added weight will cause the awning to sag. Upon retracting the room, material can become caught in between the top of slide room and the opening in the motorhome. It will be necessary to retract the room in small increments and allow the water time to run off.

## Patio Awning - Electric

The Travel'r awning operates on 12 Volt DC. The awning requires 10' of lateral side clearance.

### To Operate:

- Turn the ignition switch off.
- Check for sufficient clearance before extending the awning.
- Battery disconnect is on.
- Push and hold the awning switch to Out. Release the switch at any time to stop movement.
- Push and hold the awning switch to In to retract the awning. Release the switch at any time to stop movement.



### If the awning fails to operate:

- Ensure ignition is off.
- Check the 15 amp circuit breaker in the front distribution panel.

### INFORMATION:

See the awning OEM manual for detailed operation instructions.

## Awning Care & Cleaning

On a monthly basis, loosen hardened dirt and remove dust from the awning with a dry, medium bristle brush. Thoroughly rinse both the top and bottom with a garden hose. A high-quality fabric cleaner may be used to help maintain appearance. Carefully follow the instructions on cleaning products. Metal surfaces should be cleaned with soapy water and thoroughly rinsed.

Allow the awning to thoroughly air dry while extended. Awning maintenance products can be found at RV supply stores.

### Carefree Awning:

**Acrylic Awnings** - Wash both sides of the awning with a mild soap (i.e. dish soap) and lukewarm water. **Do not** use detergents. If necessary, reapply the solution to keep fabric saturated. Rinse the awning thoroughly. Repeat, if necessary, until most of the stains disappear. Contact *Carefree of Colorado* for removal of stubborn stains.

**Polyweave and Vinyl Awning** - Mildew will not form on the awning material itself, but may form on the dust accumulated on the canopy. A quality vinyl cleaner, such as *Carefree Awning Magic*, will help keep the awning looking new. A mild soap (i.e. dish soap) and lukewarm water solution can be used. **Do not** use detergents. Be sure to follow the instructions on the container.

### Leaks:

It is normal for slight leakage to occur through the fabric where water is allowed to accumulate. If water drips through the needle holes in the stitching, use a commercial seam sealer that is available in canvas and trailer supply stores. Paraffin wax may also be applied to the top of the seams. As the awning “weathers” these holes will normally seal themselves.

Soap or chemical residue can “wet” the fabric so that it appears unable to repel water. Rinse the fabric thoroughly and test to see if it is water repellent after it dries. If leakage continues after washing and thoroughly rinsing, please contact *Carefree of Colorado*.

### Storm Precautions

The warranty does not cover damage caused by acts of nature; therefore, steps should be taken to prevent damage from occurring due to wind, rain or storms. Retract the awning in inclement weather conditions or when leaving the motorhome unattended. Should the awning need to be retracted while the fabric is wet, extend as soon as possible to allow complete drying.

### INFORMATION:

**Water weighs 8.33 pounds per gallon. The awning was not designed to withstand the 500 to 700 pounds of water that could accumulate on the canvas. Damage to the hardware and awning tube can occur. Storm damage is not covered by the warranty.**



## LEVELING SYSTEM (POWERGEAR)

The leveling system is used to stabilize the motorhome when parked. A leveling control panel operates the leveling system. The leveling system hydraulic pump also operates the front roadside and curbside (if applicable) slideout rooms.

### **CAUTION:**

**Do not use a single jack to level the motorhome. Ensure all jacks are in contact with the surface when leveling. Using a single jack to level can apply excess torsion twist to the chassis frame. Damage to the motorhome and related components can result.**

### **CAUTION:**

**Do not use the leveling system to elevate any wheel position. Do not use the leveling system to change tires.**

### **WARNING:**

**Do not access the underside of the motorhome when the leveling system is turned on or operating. Serious personal injury or death can occur.**

### **Safety Features:**

The leveling system has safety features that prevent a jack from extending during travel. The control panel will not activate until these safety features are in place:

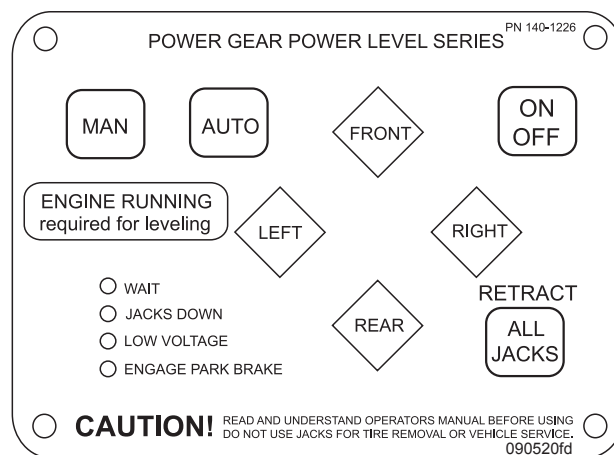
- The engine is running.
- Transmission is in neutral.
- Park brake is applied.

### **Warning Features:**

- Lights on the control panel will flash and alarm will sound if a jack is extended, the ignition is turned on and park brake released.
- Should the Jacks Down alarm activate momentarily when driving over rough roads and corners, this could indicate the fluid level in the reservoir is low.

### **Control Panel:**

The control panel includes an On/Off button, 4-position jack extend buttons, an Auto (automatic) button, a Man (manual) button, and an All Jacks retract button.



*Powergear hydraulic leveling system*

### **CAUTION:**

**Do not move the motorhome while jack(s) are extended or in contact with the ground. Damage to jacks and/or jack mounts can occur.**

### ***Prior to Leveling***

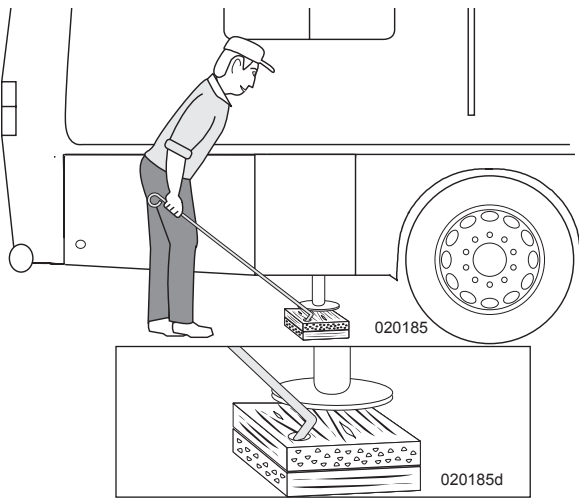
Before lowering the suspension, survey the area around and under the motorhome for obstructions that can damage the motorhome or undercarriage components. Damage to the mud flap can occur if located over a raised area.

- Clear all debris and obstructions of jack landing points. Landing points must be flat and stable enough to support the weight without giving way.
- Ensure people and pets are clear of the motorhome and surrounding area during leveling system operation.
- Do not expose hands or other parts of the body near hydraulic leaks. The hydraulic system operates at high pressure. Hydraulic leaks can cut and inject hydraulic fluid causing serious injury.

### **NOTE:**

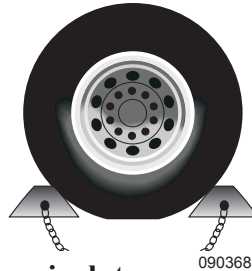
**If additional height or surface support is needed, construct a 1' x 1' wooden block made from two pieces of 3/4" plywood for a total thickness of 1 1/2". Drill a hole in corner and use the awning wand to slide the wooden block under the jack pad.**





### **CAUTION:**

Surfaces such as hot asphalt, gravel or dirt may not be stable enough to support the weight. Place thick plywood under the jack pads to help disperse weight. Place a wheel chock at the opposite corner to help prevent the motorhome from rolling if blocks are placed under a jack to gain additional height.



### ***Automatic Leveling***

- Extend slideout rooms only when the motorhome is supported by the leveling system. See “*Slideout Operation*” in this section.
- Park on a solid, reasonably level surface.
- Apply the park brake.
- Place transmission in neutral.
- The engine must be running for the leveling system to operate properly.
- Press the On/Off button to turn the system on. If the Excess Angle light illuminates, another site must be selected before the leveling system will operate.
- Be sure all people and pets are clear of the motorhome and surrounding area.
- Press and release the Auto button. The system will begin automatic leveling.

### **NOTE:**

The leveling system is sensitive to movement during automatic leveling. The system may determine an inaccurate state of level if movement is not restricted during the automatic leveling cycle.

- The logo will illuminate when the automatic leveling cycle is complete.
- Press the On/Off button to turn the system off.
- Shut off the engine.

### ***Manual Leveling***

- Extend slideout rooms only when the motorhome is supported by the leveling system. See “*Slideout Operation*” in this section.

### **WARNING:**

The Excess Slope feature is disabled in manual mode. Do not apply excess torsion twist when leveling. Damage to the motorhome and related components will result.

### **NOTE:**

When manually leveling, level front to rear first. After the motorhome is level front to rear, level the motorhome left to right.

- Park on a solid, reasonably level surface.
- Apply the park brake.
- Place transmission in neutral and shut the engine off.
- The engine must be running for the leveling system to operate properly.
- Press the On/Off button on control pad.
- Press and hold the Man (Manual) button for approximately five seconds.
- Press the Front jack button until front jack contacts the ground.
- Push the Rear button until rear jacks contact the ground.
- The right and left buttons are used to level the motorhome side to side. Pressing the Left button will extend the left rear jack. Pressing the Right button will extend right rear jack.
- Repeat steps as necessary to obtain level.
- Turn the control panel off when level is achieved.
- Shut off the engine.

### ***Jack Retract Procedure***

Retract the slideout rooms only when the motorhome is supported by the suspension. See “*Slideout Operation*” in this section.

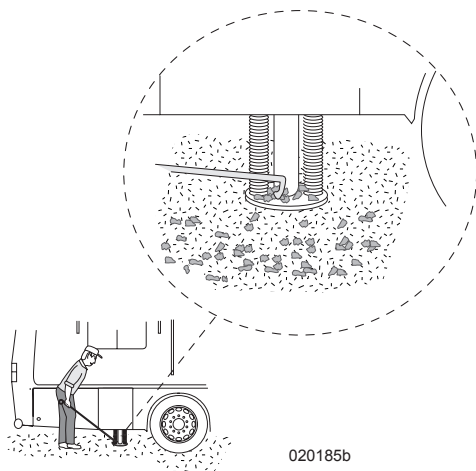
- Start the engine.
- Ensure the park brake is set.
- The transmission is in Neutral.
- Press the On/Off button turn the system on.
- Press the All Jacks retract button. The jacks will automatically return to fully retracted position.
- The Jacks Down light will go out when all jacks have retracted.
- Push the On/Off button to turn system off.

**NOTE:**

The All Jacks retract button must be pressed and held if the system is set to manual mode. With the system set to Auto mode, momentarily press All Jacks retract. The jacks will fully retract.

**WARNING:**

Visually ensure all jacks have fully retracted prior to moving the motorhome. Remove any debris that may be on the jack pad.

**Low Voltage Light:**

- If the Low Voltage light is flashing, leveling system voltage is low. Start the engine.
- If the Low Voltage light is solid, turn the ignition off then start the engine to reset the system.

***Jacks Fail to Extend or Retract***

- The engine is running.
- Ensure the park brake is set.
- The transmission is in neutral.
- If the control panel does not operate, check the 15 Amp in-line fuse located with the leveling system wiring approximately 16" from the hydraulic pump.

**NOTE:**

The hydraulic pump has an internal circuit breaker to protect against overheating. If the pump is used repeatedly in a short period, the breaker will trip and reset automatically in 5 to 30 minutes.

**Safety Shutoff:**

- The control panel will turn off automatically when the system has been inactive for four minutes.
- To reset the system, the ignition must be turned off then back on then press the On/Off button.

***Drive-Away Protection***

If the park brake is released while the engine is running and the jacks are extended, all control panel indicator lights will flash and the alarm will sound. The system will automatically begin retracting the jacks until all jacks are fully retracted or the parking brake is set.

***Maintenance***

- For protection, it is recommended to use silicone spray on exposed jack rods every seven days.
- If the motorhome is located in a salty environment, it is recommended to spray the rods every 2 to 3 days.
- Remove dirt and road debris from the jacks as needed.
- Do not use grease on the rod as this will attract dirt which can damage seals.

***Checking/Adding Hydraulic Fluid***

- The system uses Dexron/Mercon Type A automatic transmission fluid.



- Check the fluid level monthly. Fill reservoir within ½" of reservoir spout.
- Chock a wheel fore and aft for safety.
- Retract all jacks and slideout rooms. Filling the reservoir with jacks extended will cause the reservoir to overflow when jacks are retracted.
- Make sure breather cap is free of contamination before removing, replacing or installing. Do not allow any contamination into reservoir during fill process.
- Replace the breather cap.
- Change fluid in reservoir every 36 months. It is not necessary to empty the entire system of fluid. Change only the fluid in the reservoir.

**INFORMATION:**

In colder temperatures (less than 10° F.) the jacks may extend and retract slowly due to increased viscosity.

**Electrical Connections:**

- Inspect and clean all hydraulic pump electrical connections every 12 months. If corrosion is evident, spray with WD-40 or equivalent.

## Manual Override

Check the following items before attempting to manually retract the jacks.

- Engine is running.
- Transmission is in neutral.
- Park brake is applied.
- 15 Amp in line fuse next to hydraulic pump tests good.

If after verifying these conditions and the jacks will not retract, the jacks can be retracted manually. It will be necessary to access the hydraulic pump and control valves.

### **CAUTION:**

**Do not continue to run the hydraulic motor if the jacks do not retract. Damage to the motor can occur.**

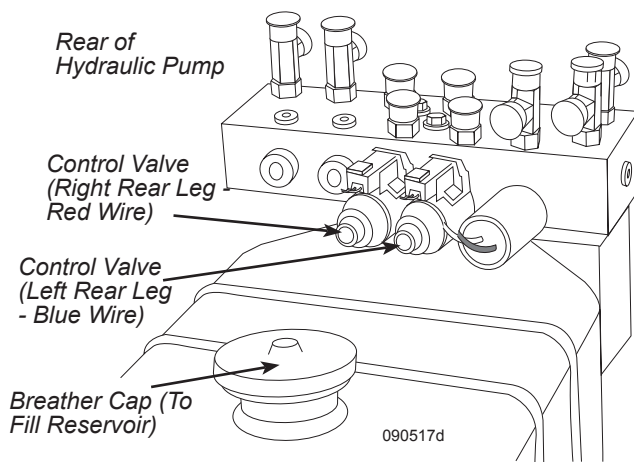
### **Control Valve Identification:**

Each control valve operates a designated jack identified by the color of wire to the control valve:

- Green wire is the front jack.
- Red wire is the right rear jack.
- Blue wire is the left rear jack.

### **NOTE:**

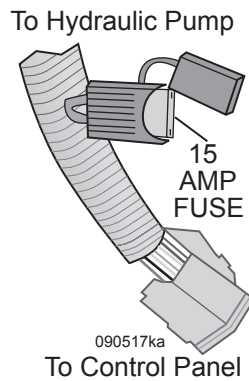
**Jack control valve location in the manifold will vary slightly depending on number of slideout rooms operated by the hydraulic system.**



*Representation of the hydraulic jack manifold*

### **Manually Retracting the Jacks:**

- Turn off disconnect switches to chassis and house batteries.
- Locate respective control valve per corresponding jack.
- Insert 1/8" Allen wrench into control valve and turn inwards (clockwise).



### **NOTE:**

**Some control valves have a knurled knob instead of an Allen socket.**

- Access manual drive coupler on motor located beneath label or plug.
- Attach a standard hex bit into an angle drill.
- Insert bit into drive motor coupler.
- Run drill counterclockwise to retract.
- When the jack is retracted, turn control valve(s) outward (counterclockwise) to lock jack in up position.
- Turn on both chassis and house disconnect switches.
- Take the motorhome to an authorized repair center.

## FANS

### **Power Roof Vent**

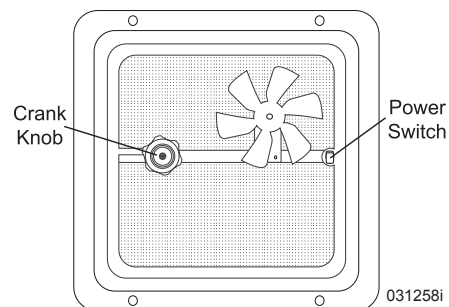
The vent is opened or closed by turning the crank knob in the desired direction. The vent is for ventilation only, it is not designed to cool the motorhome.

### **Fan Operation:**

- Battery disconnect switch must be on.
- Battery switch, by entry door, must be on.
- Fan is activated by pushing the vent power switch on.
- Vent must be opened before using the fan.

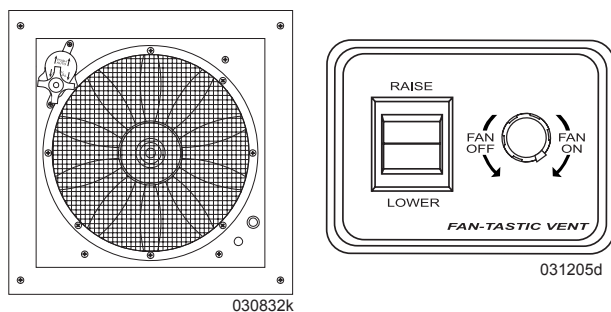
### **CAUTION:**

**Do not leave any vent cover open while the motorhome is in motion, stored or unattended for extended periods of time. High winds or other unusual conditions or obstructions may damage and prevent closing. Leakage could result, causing serious damage.**



## Automatic

A wall rheostat controls the automatic vent and power of the fan. The system operates from 12 Volt DC power.



### Fan Operation:

- House batteries must be on.
- Turn on the battery cut-off switch.
- Push the vent cover knob to the Automatic position.

#### **NOTE:**

**Push the knob in for automatic. Pull the knob out for manual.**

- Use the wall switch to raise the vent cover. The vent cover will open approximately 2" before the fan will run.
- Turn power knob clockwise to turn fan on. The power knob also adjusts fan speed.

#### **NOTE:**

**To override the automatic setting, pull the vent cover knob out to the manual position and close vent. The fan blade will stop spinning when the vent is closed.**

#### **WARNING:**

**Do not hold switch after the motor has stopped. This can damage to the automatic lift system.**

#### **NOTE:**

**The safety switch will not allow the fan motor to operate until the vent is open approximately 2" or more.**

### Tips:

- Operate the fans to reduce condensation. Condensation occurs naturally from fluctuations in interior and exterior temperatures, humidity and dew point changes. Steam from cooking and shower use are other sources of condensation.

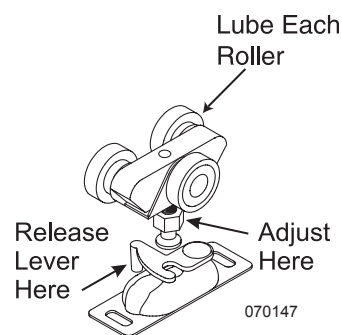
- If the fan fails to operate, check for a blown fuse either in the house distribution fuse panel or the 4 Amp fuse on the fan.
- Slightly open windows on the shaded side of the motorhome to create a draft. Maximum airflow is achieved between an open window and the vent.

#### **NOTE:**

**Do not leave the fan switch in the active mode while the motorhome is stored or unattended for extended periods. High winds, unusual conditions or obstructions may prevent the fan cover from fully closing, resulting in leakage and serious damage.**

## DOOR - SLIDING

The sliding pocket door utilizes two rollers at the top of each door. The sliding door may eventually require adjustment. Turn adjusting screw upward or downward as necessary to align door. To remove pocket door, rotate lever outward to release the latches.

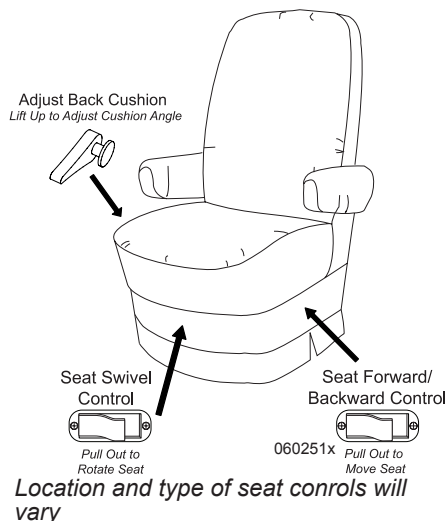


#### **LUBE:**

**The pocket door rollers should be lubed with just a small drop of oil once a year to help increase the life of the rollers and improve sliding.**

## SEAT CONTROLS

The driver and passenger seats are adjustable to provide maximum comfort. Seats must be locked in the forward facing direction while traveling.





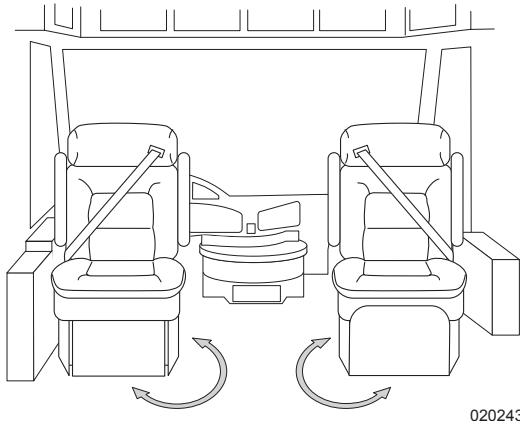
## SWIVEL SEATS

### Swivel Seat Operation:

- To swivel, pull out on the swivel control lever.
- When rotating the driver seat, put the steering wheel in the upright position.
- Move the seat forward, then pull the swivel lever out and rotate to the desired position.

### **WARNING:**

**Seats must be locked in the forward facing position while the motorhome in transit.**

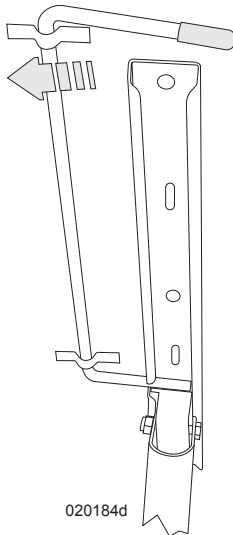


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## BOOTH DINETTE

The booth dinette converts quickly into a bed.

1. Tip seat base cushions up to make clearance for lower of table top.
2. Rotate lock mechanism located on bottom side of table to the unlock position.
3. Push downward on table top until it fully seated onto stops located on seat base.
4. Lay both seat cushions and back cushions together to form a mattress.



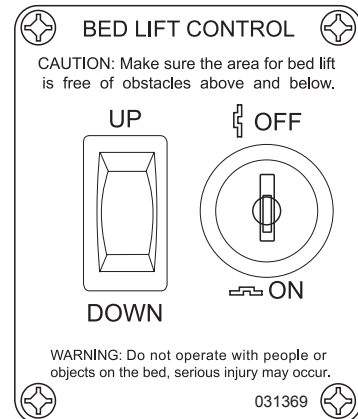
020184d  
*Shown in locked position*

## DROP DOWN BED

The drop down bed is operated by a 12 volt motor. House power must be on for the bed to operate. A mattress is supplied as is a ladder to access the bed. A security net attaches to hardware adjacent to the bed to reduce the possibility of falling. The bed stows out of the way for travel.

### **WARNING:**

**The bed must be in the up/stowed position while the motorhome is in motion. Do not attempt to drive the motorhome with the bed in the lowered/down position. This can result in a serious accident, injury or death.**



*Drop down bed control*

### Lowering the Bed:

- Turn off the engine.
- Turn on the battery cutoff switch.
- Clear all objects below the bed that may inhibit bed operation or be damaged. Keep fingers clear and loose clothing away from all moving parts.
- Turn the safety key to the on position.
- Press and hold the switch in the down position. Travel may be stopped at any time by releasing the switch. Release switch when the bed stops in the lowered/down position.
- Attach safety webbing to hardware provided to reduce likelihood of falling.
- Install ladder.

### Raising the Bed:

- Remove and store any extra items or heavy bedding from bed that could impede the bed from retracting to the travel/stowed position.
- Remove safety webbing from hardware.
- Stow ladder.
- Check for any objects that will inhibit proper operation.
- Press and hold the switch in the up position until the bed is fully raised. Travel may be stopped at any time by releasing the switch. Release switch when bed stops.

### **WARNING:**

**Do not place heavy objects or allow people or pets to be on the bed while raising or lowering the bed.**



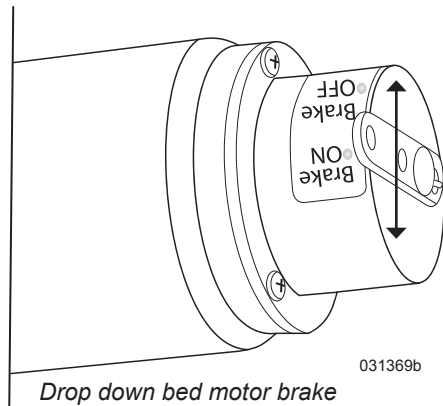
### **Bed Will Not Operate:**

- The engine is off.
- Check the battery disconnect switch is on.
- Check the safety key is in the on position.

### **Manual Retract**

If the bed will not retract or power cannot be restored to the motor, the bed can be manually raised to the stowed position.

- Move Brake lever to the Off position.
- At back of motor, use a ½" socket to manually crank the bed to the travel position.
- Engage Brake lever to the On position to prevent movement during travel.



### **CAUTION:**

**Do not overstress gas struts by rapidly opening or closing the bed access cover, as this action can damage the struts or mounts. In extreme cold, gas struts may not hold the mattress platform in the open position.**

### **LADDER - REAR**

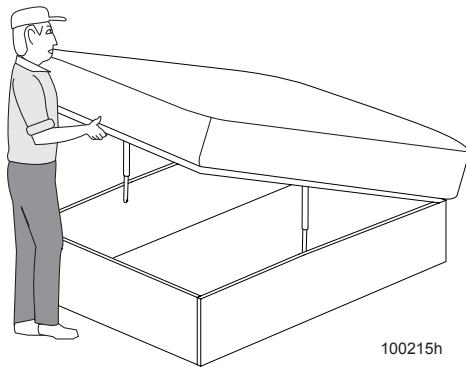
The rear ladder allows access to the roof. Use care when climbing the ladder. Access to the roof should be limited to cleaning and sealing purposes only.

### **NOTE:**

**Maximum weight capacity for the ladder is 300 lbs.**

### **STORAGE - UNDER BED**

To use the storage compartment located under the bed, lift up the bed by the front edge of the mattress platform. Gas struts hold the mattress and platform open.



*Automatic strut shown in locked position.*

### **CAUTION:**

**An automatic locking strut is used to hold the bed deck open. Do not attempt to force close as this can damage the device. Unlock strut before closing.**

## DASH RADIO

The dash radio includes an AM/FM tuner, CD/DVD player, Rear Camera, an iPod connection and is Sirius ready (subscription not included). A remote control is included (not shown). The system uses a touch-screen display. Each selected feature will bring up a new menu for the selected feature. Press the Home button to return to the main menu.

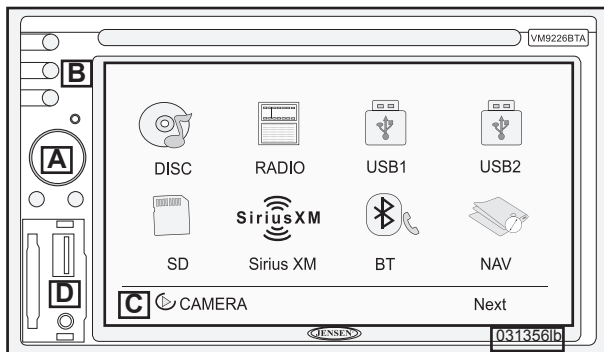
### Operation Requirements:

- Turn on the battery disconnect switch.
- Turn on the radio.

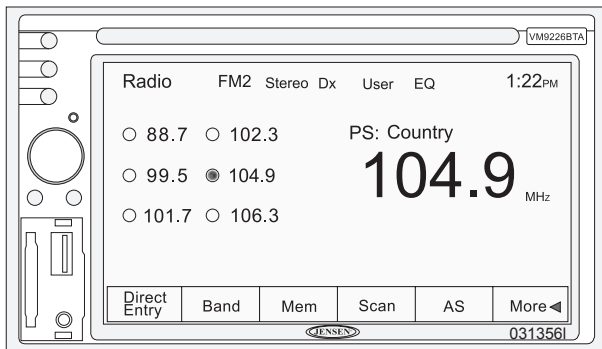
### INFORMATION:

**Only the most common connections and features are described. The system is comprehensive. It is recommended to refer to the dash radio OEM manual for detailed operating instructions and information. While the system has many features, function buttons with black text mean the source or function (such as Navigation) is not available.**

A: Volume On/Off  
B: Home  
C: Rear Camera  
D: iPod Connect



Jensen radio. Home screen shown



Radio screen

### To Set the Clock:

- Press the Settings button.
- Press the Time button.
- Use the arrows to set hour and minute. The clock can be set for 12 or 24 hour display by pressing the Time Format button.

### To Play the Radio:

- Press the Band button to select AM or FM.
- Right or Left buttons increase or decrease frequency.
- Press and hold one of the preset buttons to store the station in memory.
- Adjust Volume to desired level.

### To Play a CD or DVD:

- Insert a CD or DVD.
- The menu will change and the disc will load and play automatically.
- Adjust Volume to desired level.

### NOTE:

**DVD video is unavailable while the vehicle is in motion. Turn the ignition off and set the park brake to display video.**

### USB Port:

- Insert a USB device or connect an iPod (cable not provided) to the USB port.
- The radio will automatically switch modes.

### NOTE:

**Not all MP3 players may be compatible or require updates to the device. The radio will automatically switch modes when a USB device is connected. Depending on compatibility the source material, the radio may display track title and file type information.**

### SD Card Operation:

- Insert the Secure Digital (SD) flash memory card into the slot on the front panel.
- The unit will automatically switch to the SD Card mode and start playing.
- Depending on the source material, the radio may display track title and file type information.

### Aux In/iPod (Stereo Jack):

- Connect a cable with a 1/8" stereo plug (male) on both ends from an auxiliary device (such as an MP3 player headphone jack or a laptop computer speaker/headphone output) to the "Aux In" input. This will give audio reproduction through the dash stereo.

- Set the auxiliary device to a mid-range volume level and adjust volume at the dash stereo for best results.
- Source information may not display on the radio screen (such as song title, artist, etc.).

## TV ENTERTAINMENT COMPONENTS

The following paragraphs will discuss the operations and various components that make up the entertainment center.

### **INFORMATION:**

**It is recommended to become familiar with individual components. Refer to the respective component's OEM manual for detailed instructions.**

### **NOTE:**

**All components of the entertainment system require 120 Volts AC to operate. Hook to shore power or start the generator. Turn on the battery disconnect switch to supply power to the roof antenna.**

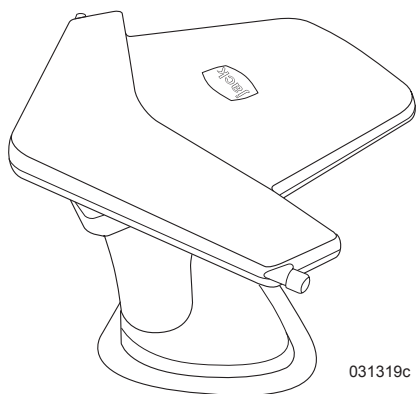
### ***Television (Front) Lockout Feature***

The ignition switch controls the outlet for the front TV, allowing the front TV to operate only when the ignition is off.

### ***TV Antenna***

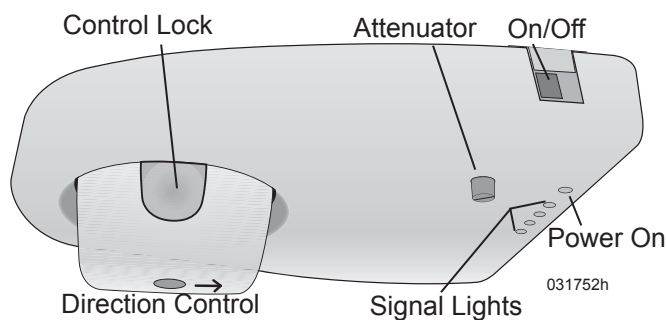
The television (TV) antenna with built-in electronics use 12 Volts DC to “boost” signal strength. Directional control, amplifier and attenuator are located on the antenna base.

Directional control and the attenuator provide the best possible picture for most situations depending on location. Certain reception conditions may occur where amplification can degrade picture quality.



### **To Use the Roof Antenna:**

- Rotate Attenuator fully clockwise.
- Press inwards on lock to directional control then rotate antenna until maximum number of signal strength lights illuminate.
- Rotate Attenuator counterclockwise until maximum number of signal strength lights illuminate.
- Rotate antenna until strongest signal indicator flickers then adjust attenuator counterclockwise until maximum number of signal strength lights illuminate.
- Antenna direction and attenuator is now set for the best possible reception.



### **NOTE:**

**Rotation control stops allow the antenna to rotate 360°.**

### **NOTE:**

**Rotate direction control knob with arrow pointing rearward for travel.**

### ***Video Selector Box***

The motorhome is equipped with a video selector box that directs the signals from either the DVD player, roof antenna or shore cable to the TV(s).



***Video selector box***

## Front TV Operation

### **NOTE:**

Due to options in entertainment equipment and floor plans, operation of entertainment components may vary.

### **NOTE:**

Only basic operating instructions are provided. Refer to the OEM entertainment components for further information.

### **NOTE:**

The TV(s) will require a channel search to obtain local over the air channels or cable channels. See OEM manual for procedure.

- Hook to shore power, start the generator or turn on the inverter.
- Ensure house batteries are fully charged.
- Use the battery cutoff switch to turn on interior house power.
- Ignition key must be in the off position.

### **To Watch TV from the Antenna:**

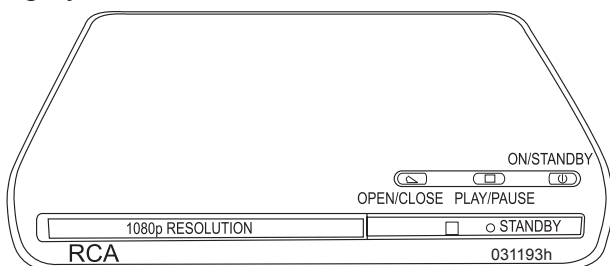
- Set selector box to ANT for Front TV.
- Turn on the TV. Select desired channel.
- Adjust volume on TV to desired sound level.

### **To Watch TV from Shore Cable:**

- Connect a cable from the park service to the Cable port.
- Set selector box to Cable for Front TV.
- Turn on the TV. Select desired channel.
- Adjust volume on TV to the desired level.

### **To Watch TV from the DVD Player:**

- Set selector box to DVD for Front TV.
- Press On/Standby to turn DVD player on.
- Press Open/Close to open DVD tray.
- Place DVD into tray. Close tray. DVD will load and play automatically.
- Select channel 4 (or channel 3) on the TV to display the DVD.



DVD player

## Bedroom TV Operation

### **TV Wall Mount Bracket:**

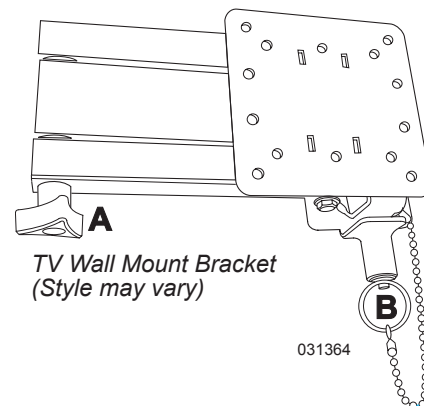
The bracket allows the TV to pivot to the viewing position when the bed is lowered.

### **To Use the Wall Mount:**

- Pull down on lock pin B to release from travel position.
- Pivot TV to best viewing angle.
- Tighten knob A to set position.

### **To Stow the Wall Mount:**

- Loosen knob A.
- Fold hardware to stow position.
- Pull down on lock pin B to place mount in travel position.
- Release lock pin.
- Ensure lock pin is properly engaged to prevent movement during travel.



### **To Watch TV from the Antenna:**

- Set selector box to ANT for Rear TV.
- Turn on the TV. Select desired channel.
- Adjust volume on TV to desired sound level.

### **To Watch TV from a Shore Cable:**

- Connect a cable from the park service to the Cable port.
- Set selector box to Cable for Rear TV.
- Turn on the TV. Select desired channel.
- Adjust volume on TV to the desired level.

### To Watch TV from the DVD Player:

- Set selector box to DVD for Rear TV.
- Press On/Standby to turn DVD player on.
- Press Open/Close to open DVD tray.
- Place DVD into tray. Close tray. DVD will load and play automatically.
- Select channel 4 (or channel 3) on the TV to display the DVD.

## EXTERIOR ENTERTAINMENT (OPTIONAL)

The exterior entertainment may include an exterior radio or TV depending on options selected.

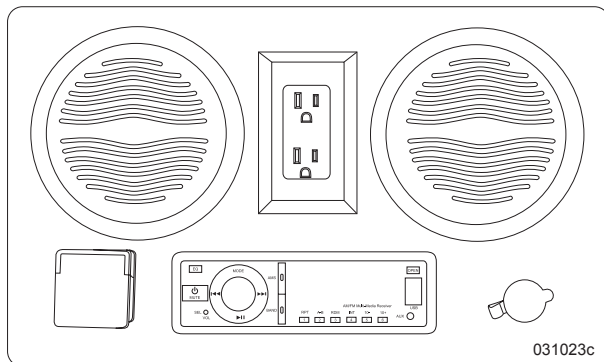
### To Operate Any Component:

The exterior radio requires 12 Volt DC. The exterior TV requires 120 Volt AC from shore power or the generator.

- Turn on the house battery disconnect switch.
- Ensure house batteries are charged.
- Battery cutoff switch must be on.

### To Watch TV from the Antenna:

- Set selector box to ANT for Ext TV.
- Turn on the TV. Select desired channel.
- Adjust volume on TV to desired sound level.



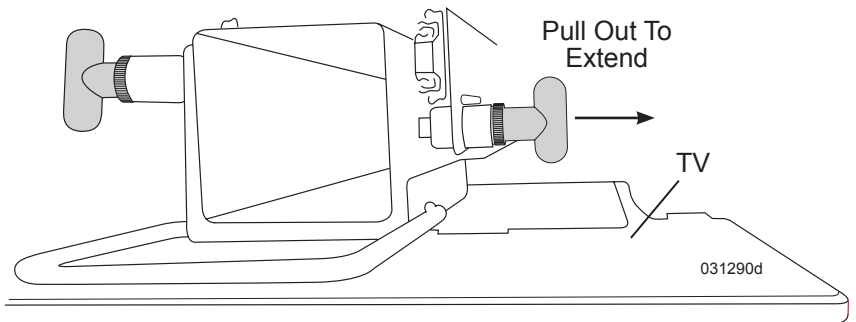
Exterior radio

### To Watch TV from a Shore Cable:

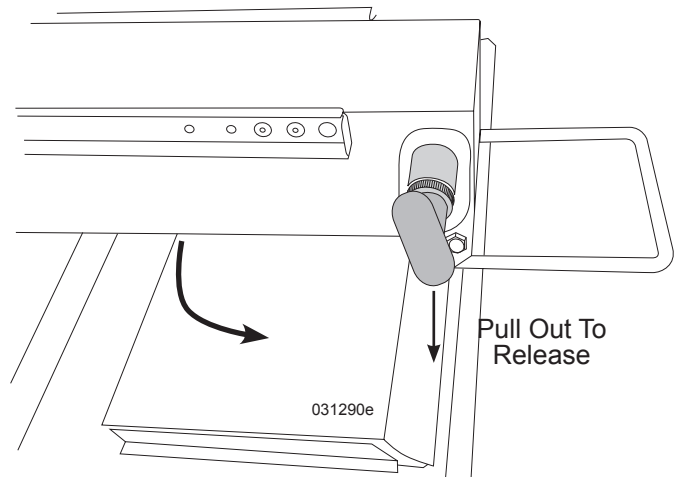
- Connect a cable from the park service to the Cable port.
- Set selector box to Cable for Ext TV.
- Turn on the TV. Select desired channel.
- Adjust volume on TV to the desired level.

### To Watch TV from the DVD Player:

- Set selector box to DVD for Ext TV.
- Press On/Standby to turn DVD player on.
- Press Open/Close to open DVD tray.
- Place DVD into tray. Close tray. DVD will load and play automatically.
- Select channel 4 (or channel 3) on the TV to display the DVD.



Exterior TV in stowed position



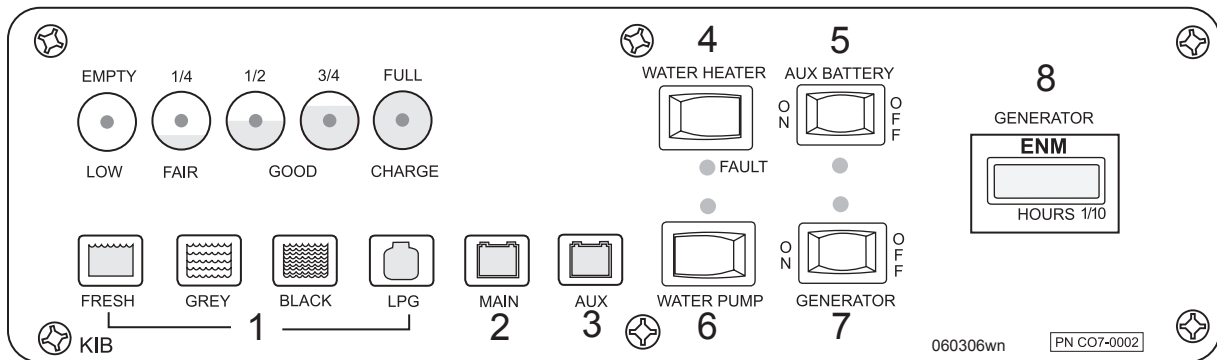
Exterior TV in extended position



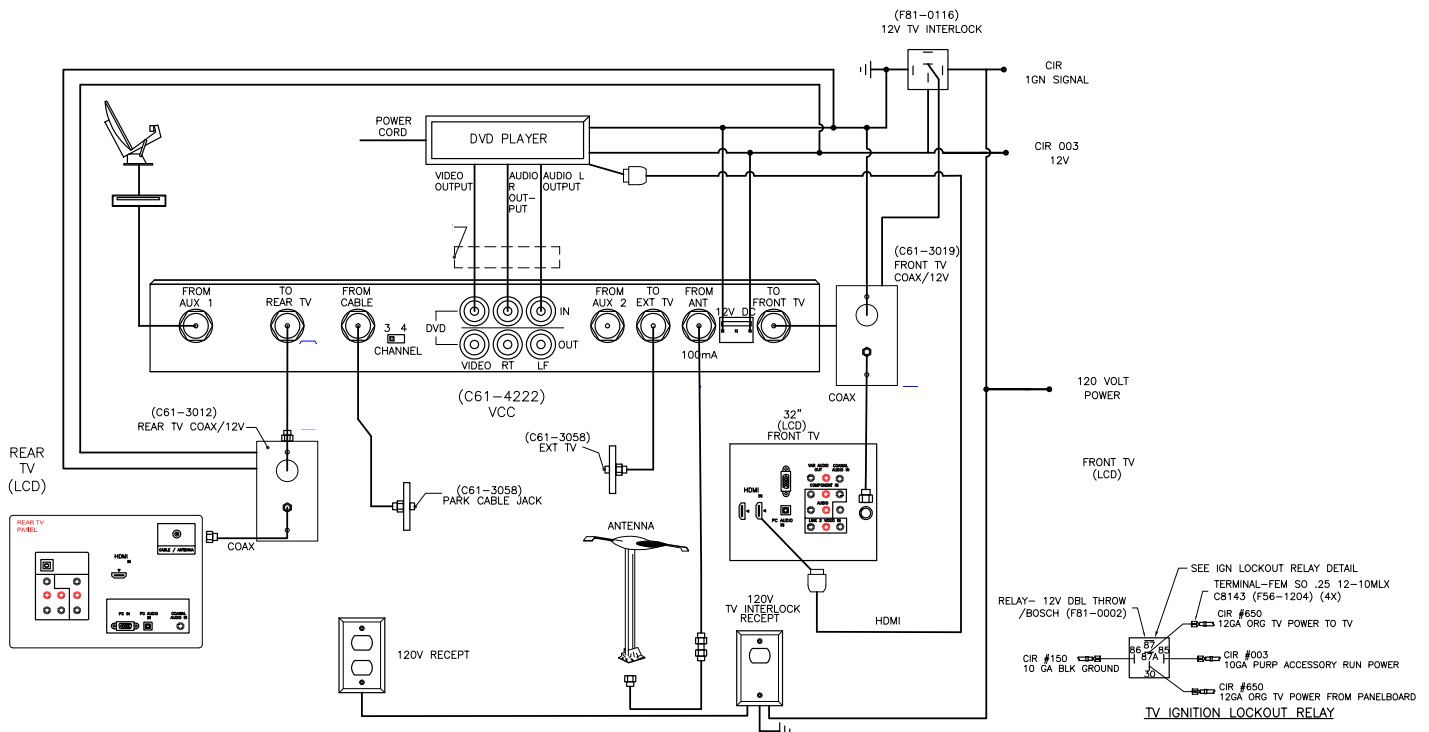
## SYSTEMS CONTROL CENTER

1. **Tank Monitor:** Pressing the individual buttons displays the status of the black and grey holding tanks, fresh water tank and propane tank. Also displays status of house and chassis batteries.
2. **Main:** Indicates chassis battery state of charge.
3. **Aux:** Indicates house battery state of charge.
4. **Water Heater:** Controls propane function for the water heater.

5. **Aux Battery:** Turns on house battery power to operate 12 Volt lights and appliances.
6. **Water Pump Switch:** Turns the water pump on and off.
7. **Generator:** Starts and stops the generator.
8. **Generator Hours:** Displays total number of hours of generator operation.



## ENTERTAINMENT WIRING



## Notes

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

# Water Systems

## Section 7

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## WATER SYSTEM - INTRODUCTION

This section contains information about the operation and care of various water system equipment. More detailed information with **CAUTION** or **WARNING** instructions for various equipment, other than what is found in this section, can be found in the OEM manuals in the owner information box.

If new to using a self-contained motorhome, use of water will need to be conserved otherwise water does not last long unless habits are modified.

For example, less water can be used for showering if the shower is turned off while soaping down, and turned back on to rinse. Plenty of water will be available to meet personal needs once habits are adjusted.

### **NOTE:**

**Illustration is a general depiction of water system Layout.**

The plumbing system is fully self contained (FSC); the entire fresh water system and waste water system can operate independently of shore services. The plumbing system includes holding tanks for fresh water (potable), grey water (sinks and shower) and black water (toilet). An onboard water pump will supply all faucets and toilets with water from the fresh tank. A monitor panel will indicate holding tank levels.

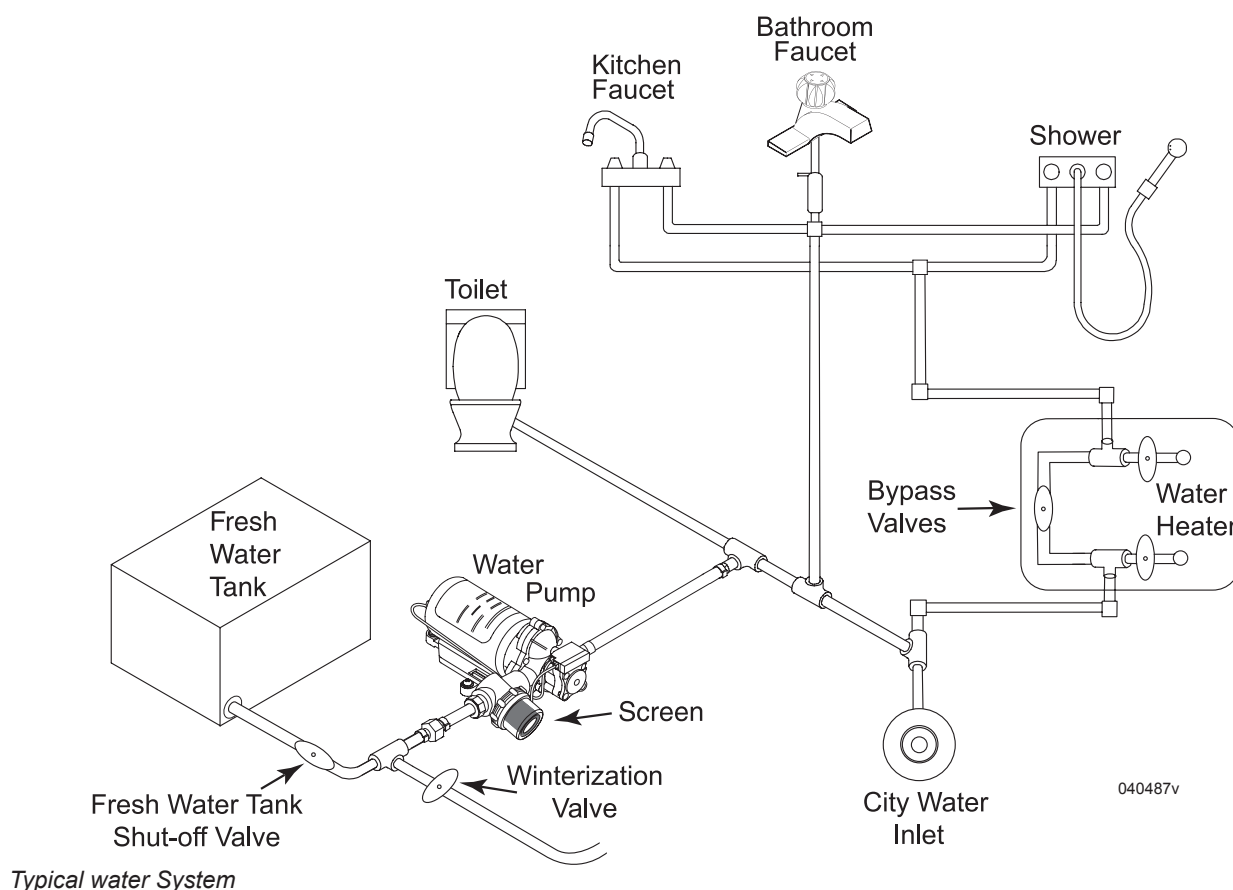
If shore services are available, city water is used to pressurize the water system so the onboard water pump can be left off. The grey and black holding tanks share a termination outlet. A sewer hose attaches between the termination outlet and shore sewer connection. Leave the black tank drain valve closed to prevent solids from clogging the hose. Leave the drain valve to the grey tank open. Drain and flush the grey and black tanks prior to departure.

### **Fresh Water System:**

The fresh water system consists of a fresh water tank, water pump and gravity fill inlet. Obtain a supply hose made for potable water use only. Proper care of the hose is necessary. After each use, drain the water hose and screw the ends together for sanitary purposes.

The onboard water pump uses water from the fresh water tank when a faucet is opened or the toilet is flushed. Use water sparingly when not hooked to shore service.

Improper winterizing, poor maintenance, road vibration and campsite water pressure variations are common culprits of water system problems or failure. Check all plumbing connections for leaks at least once a year.



Typical water System

## Waste Water System:

The sinks and shower drain into the grey water holding tank. The black water tank is dedicated for the toilet. Normally these tanks are proportionate in size to the fresh water tank. If a camping trip is started with a full fresh water tank, the waste holding tanks will be full or nearly full when all the water is used from the fresh water tank.

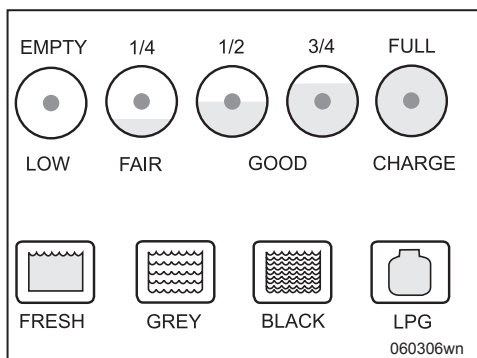
Prior to using the toilet, add several gallons of water to the black tank to help prevent accumulation of solids. Holding tank odor control chemicals are available at most RV supply outlets.

## TANK MONITOR

A monitor panel will aid in managing the storage tanks. The monitor panel is located on the panel located in the hallway area. Press the corresponding switch to test the level of a storage tank. The scale uses colored lights along with a corresponding scale reading.

### Tank Monitor:

- ◆ Press the Levels Test button to obtain a readout.



Tank level monitor

## WATER-POTABLE

The motorhome is equipped with a fresh water holding tank and an on-demand water pump. The water pump pressurizes the fresh water system. When city water is available, city water will pressurize the fresh water system and the water pump can be left off. A water pressure regulator must be installed to limit incoming city water pressure to the fresh water system to no more than 45 psi.

**There are two methods of supplying fresh water to the motorhome:**

- ◆ Use a potable water hose connected to a water source.
- ◆ Water is added directly to the fresh water tank via the gravity fill.

### **WARNING:**

**Water is electrically conductive. Do not use any electrically powered item or electrical outlet that may be exposed to a water source. Electrical shock can cause serious injury or death.**

### **CAUTION:**

**External water sources can deliver water pressure, particularly in mountainous regions. High water pressure is anything over 55 psi (pounds per square inch). Excessive water pressure can cause leaks in water lines, damage appliances and cause the potable water hose to swell and burst. Attach a pressure regulator at the city water faucet to limit water pressure to 45 psi.**

### City Water Hook-Up

Use a hose specifically manufactured and labeled for “potable water” to supply the motorhome with fresh water. It is required to install a water pressure regulator to limit pressure to no more than 45 PSI to prevent over-pressurization and possible damage to the fresh water plumbing system. Attaching the pressure regulator at the water source will also protect the potable hose from expanding and bursting due to excess pressure.

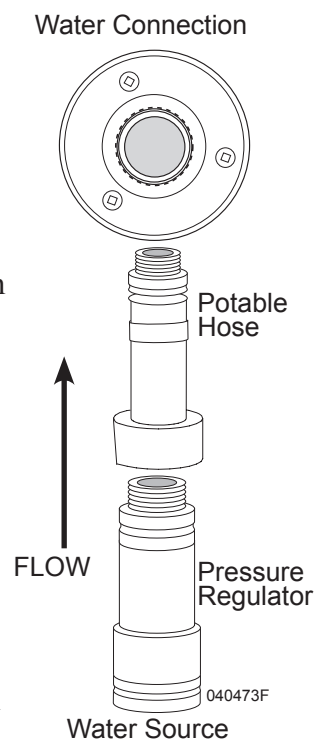
- ◆ Install a pressure regulator on potable water hose.
- ◆ Connect the potable water hose to the “City Water” connection.
- ◆ Turn on the city water supply.
- ◆ It may be necessary to open each faucet, one at a time, to get rid of trapped air inside the pipes.

### **CAUTION:**

**A water pressure regulator must be used.**

### **WARNING:**

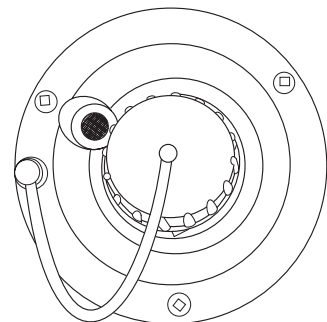
**Hose and hose fittings not manufactured for potable water can contain unsafe levels of lead. It is highly recommended to use only fresh water supply hoses and fittings manufactured for potable water use.**





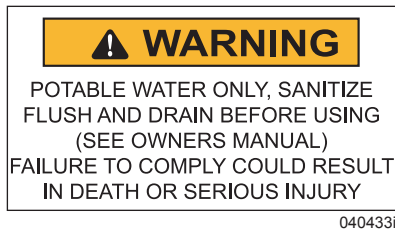
## Gravity Fill

The gravity fill inlet allows fluids to be added directly into the fresh water tank. Use only potable water sources, solutions and delivery systems when using the gravity fill inlet. Water can also be poured directly from a container into the fresh water tank. The gravity fill inlet can be used to pour disinfecting solution into the fresh water tank.



Gravity Fill Inlet

040483h



040433i

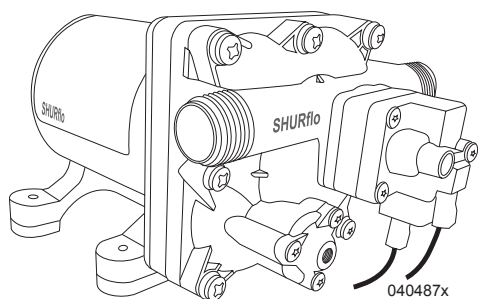
- ◆ Connect a potable water hose from a city water source.
- ◆ Leave the water pump off.
- ◆ Turn on the city water supply.
- ◆ Monitor the tank filling process at all times using the monitor panel.
- ◆ When the fresh water tank is  $\frac{3}{4}$  full, prepare to shut the water supply off when water begins to overflow from the gravity fill port.

### **CAUTION:**

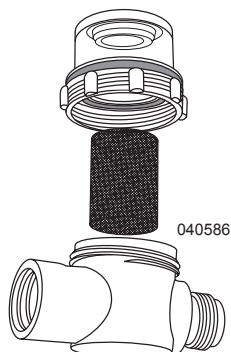
**Do not leave the hose unattended when filling the fresh water tank. Damage to the plumbing system, fresh water tank or flooding may occur.**

## Water pump

The water pump pressurizes the fresh water system when the motorhome is not connected to city water. The water pump is automatic and self-priming, operating on demand as water is used. Clean the inlet screen about every two months or when flow of water is reduced.



Water pump



Water pump inlet screen: Located on water pump. Clean every two months.

040586

040487x

## **WARNING**

**Before leaving the motorhome for an extended period of time (i.e. overnight or longer), be sure that the city water and water pump have been turned off. Damage from neglect will be the responsibility of the owner, not the manufacturer.**

The water pump is operated by the water pump switch located on the monitor panel. Do not allow the pump to run with an empty fresh water supply tank. Operation of the pump without water may damage the water pump.

## **CAUTION:**

**Do not continue water pump operation when the fresh water holding tank is empty. Damage to the water pump may result.**

### **To operate the pump:**

- ◆ Fill the fresh water tank.
- ◆ Turn on the water pump from the monitor panel.
- ◆ Open faucet valves to purge system of air.
- ◆ Close each faucet when it delivers a steady stream of water.
- ◆ It will take several gallons to fill the water heater tank.

## **Water Pump Troubleshooting**

Vibration induced by road conditions can cause the plumbing or pump hardware to loosen. Check the water pump system for components that are loose. Many symptoms can be resolved by tightening the hardware. Check the following items:

### **Water pump will not start or blows the fuse:**

- ◆ Check the electrical connections, fuse or breaker, main switch and ground connection.
- ◆ Is voltage present at the pressure switch on the pump? If voltage is present, the pressure switch may be faulty. As a test, temporarily bypass the pressure switch.
- ◆ Check the charging system for correct voltage and good ground.
- ◆ Check for an open or grounded circuit or motor.
- ◆ Check for a seized or locked diaphragm assembly (water frozen).

### **Water pump will not prime or sputters (No discharge/motor runs):**

- ◆ Is the pump inlet strainer clogged with debris?
- ◆ Is there water in the tank or has air collected in the water heater?

- ◆ Is the inlet tubing and plumbing sucking in air at plumbing connections (vacuum leak)?
- ◆ Check for proper voltage with the pump operating.
- ◆ Check the pump housing for cracks or loose drive assembly screws.

**Water pump will not shut-off or continues to run when the faucet is closed:**

- ◆ Check to see if the fresh water/tank fill valve is completely closed.
- ◆ Check the output (pressure) side plumbing for leaks and inspect for a leaky toilet or valves.
- ◆ Look for a loose drive assembly or pump head screws.

**Water pump is noisy or rough in operation:**

- ◆ Check for plumbing that may have vibrated loose.
- ◆ Does the mounting surface multiply noise (flexible)?
- ◆ Check for mounting feet that are loose or compressed too tight.
- ◆ Look for loose pump head to motor screws.

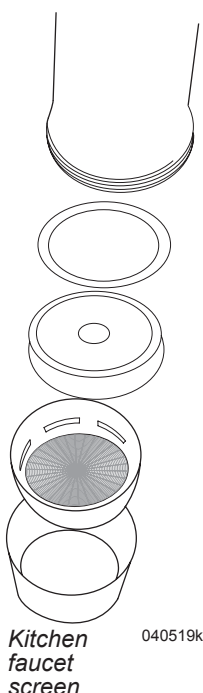
**Water pump is rapid cycling:**

- ◆ Look for restrictive water flow in the faucets or shower heads.

**Faucet Screens**

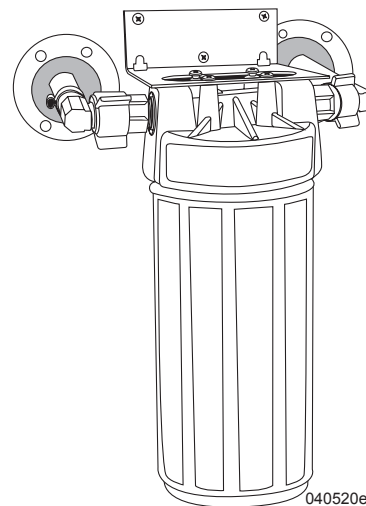
Quality of fresh water will vary by location. A build up of lime deposit or debris on the faucet screens may restrict or plug the flow of water coming from the faucets or shower heads. All faucet screens should be checked and once a month or as necessary when flow is reduced.

- ◆ Faucet screens are normally located on the outlet side of the faucet and held in place with a threaded collar.
- ◆ Remove screen from faucet.
- ◆ Clean screen using a small, soft brush and de-liming solution.
- ◆ Reinstall screen and check water flow.



**WATER FILTER**

A whole house water filter is located in an exterior luggage compartment. Change the water filter after 1,000 gallons of use or sooner if water flow is noticeably reduced.



**FORMATION:**

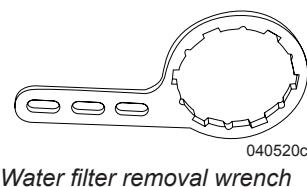
For specific water filter information, cautions and additional filter replacements consult the water filter OEM instructions.

**CAUTION:**

Protect filter from freezing or damage to the system could occur.

**Filter Removal:**

- ◆ Turn off the water supply and the water pump.
- ◆ Open faucets to bleed off pressure.
- ◆ Unscrew the filter bowl using the bowl wrench.



- ◆ Check O-ring for damage and lubricate if necessary. O-ring should be replaced every third cartridge change to ensure proper sealing.
- ◆ Remove the old cartridge and discard.
- ◆ Empty any remaining water in the bowl.

### Filter Installation:

- ◆ Insert new cartridge into filter bowl.
- ◆ Screw filter bowl back onto head and hand tighten securely.
- ◆ Turn on water pump or city water.
- ◆ Thoroughly flush and purge air from the system by opening faucets and running the water.
- ◆ Check for leaks.

### To Winterize:

- ◆ Winterize the motorhome.
- ◆ Unscrew the filter bowl using the bowl wrench.
- ◆ Remove the old cartridge and discard.
- ◆ Screw filter bowl back onto filter head and follow instructions in *“Winterization”*.

### To De-Winterize:

- ◆ Insert new cartridge into filter bowl.
- ◆ Screw filter bowl back onto head and hand-tighten securely.
- ◆ Turn on water pump or city water.
- ◆ Thoroughly purge air from the system by opening faucets and running the water.
- ◆ Check for leaks.

### CAUTION:

**O-ring must be properly seated in the groove of the bowl housing or a water leak could occur.**

## Disinfecting Fresh Water

Disinfecting the water system with chlorine bleach (superchlorination) protects the drinking water from bacterial or viral contamination that may come from any common water source.

### When to Disinfect the Water System:

- ◆ The motorhome is new.
- ◆ The motorhome has been in storage.
- ◆ Every three months during use.

### To Disinfect the Water System:

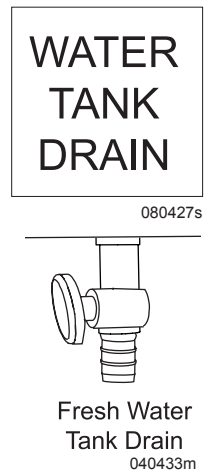
Prepare a disinfecting solution using one of the following methods:

- ◆ Combine one gallon of water and  $\frac{1}{4}$  cup of household bleach. Use one gallon of solution for every 15 gallons of tank capacity or multiply tank capacity (in gallons) by 0.13. The result is the amount (in ounces) of household bleach to add to the fresh water tank.

These methods yield a 50 PPM (parts per million) disinfecting solution in the water system that acts as a quick-kill dosage for harmful bacteria, viruses and slime-forming organisms. Concentrations higher than 50 PPM may damage the water lines and/or tanks.

Once the solution is prepared, the next step is to drain the water tank and water system of fresh water.

1. Locate the fresh water tank drain. Open the valve and allow the tank to drain then close the valve. The water tank drain valve is located generally in the water service center.
2. Place the water heater bypass valves to the Bypass position (See Water Heater Section 4). This ensures the disinfecting solution does not enter the water heater. Refer to the water heater OEM manual for instructions on flushing the water heater tank.
3. Located the hot and cold low point drains. These are generally located in the water service center. Red is hot and blue is cold. Remove both caps then open the kitchen faucet to release any vacuum. Close the kitchen faucet and replace caps when finished draining.
3. Carefully pour the solution into the fresh water tank using the gravity fill inlet. It will be necessary to use a funnel.
4. Turn on the water pump. Open each faucet in turn until a distinct bleach odor is present. Do not forget the hot water, tub and shower faucets.
5. Allow the system to stand for four hours.
6. Drain the system and flush with fresh water repeatedly until no chlorine bleach smell or taste is left in the water system.



## WASTE WATER SYSTEMS

### Proper Waste Disposal

Dumping raw sewage from the toilet holding tank, except at authorized dumping stations, is universally prohibited. Most National, State and private parks have either a central dump facility or campsite hook-up for sewage. Many modern rest areas along an interstate now have dump stations available.

Woodall's Campground Directory, Trailer Life's RV Campgrounds and Services Directory, Rand McNally's Campground and Trailer Park Guide, Good Sam Park Director (Good Sam Club) and other similar publications list dumping stations. Some major oil companies also offer dump facilities at select stations.

### ***Do Not Put in Waste Holding Tanks***

- ◆ Do not use strong or full strength detergents to deodorize and disinfect. Only use odor controlling chemicals specifically made for holding tanks.
- ◆ Do not use automotive antifreeze, ammonia, alcohol or acetone in holding tanks. These products will dissolve plastic.
- ◆ Do not use standard household tissue that remains in one piece. Paper designed specifically for holding tanks is available at most RV supply stores. Facial tissue is thicker, softer and stronger than rapidly dissolving tissue. White toilet paper dissolves faster than colored. To test how well the tissue dissolves, immerse one tissue square into a jar of water. Shake the jar five times to determine how the tissue disintegrates.
- ◆ Do not dispose of table scraps or cooking grease into the tanks. They can clog pipes or damage termination valve seals.

#### **CAUTION:**

**Do not dispose of sanitary supplies or other non-dissolving items into the system. Facial tissue, wet strength tissue, paper towels or an excessive amount of toilet tissue can create clogging in the holding tank system.**

#### **CAUTION:**

**Do not use any products that contain petroleum distillate or ammonia in place of RV odor controlling chemicals. Petroleum distillate or ammonia will damage the ABS plastic holding tanks and seals.**

### ***What to Put in Holding Tanks***

#### **Grey Water Tank:**

The grey water waste tank stores the sink, shower and clothes washer (if equipped) drain water. A reduced mixture of chemicals may help to control odor in the grey tank.

Ensure that there is enough liquid in the holding tanks prior to dumping the waste holding tanks to provide a smooth flow through the valve, termination drain and sewer hose. Empty the waste holding tanks weekly to prevent stagnation and overfilling.

#### **Black Water Tank:**

To help prevent buildup, pre-treat the sewage holding tank with a few gallons of water and an odor-control chemical (available at most RV supply stores). First, add approximately three gallons of water to the holding tank. Next, add the chemicals, in accordance with the manufacturer instructions. Pour mixture through toilet to the holding tank. Be careful not to spill the chemical on hands, clothing, toilet bowl or carpet. Hot weather conditions may require adjusting the amount of chemical used to control odor. Repeat the chemical pre-charge each time the black tank is cycled.

#### **WARNING:**

**Most chemical mixtures for holding tank odor control are poisonous. Follow the product manufacturer's directions and warnings when using holding tank additive. Do not use products that contain petroleum distillates or ammonia in place of RV odor controlling chemical. Petroleum distillates or ammonia will damage ABS plastic and termination seals.**

### ***Waste Drain Hose***

A flexible three-inch sewer hose attaches between the common termination drain and the shore sewer facility. Sewer hoses usually come in 10 and 20 foot lengths.

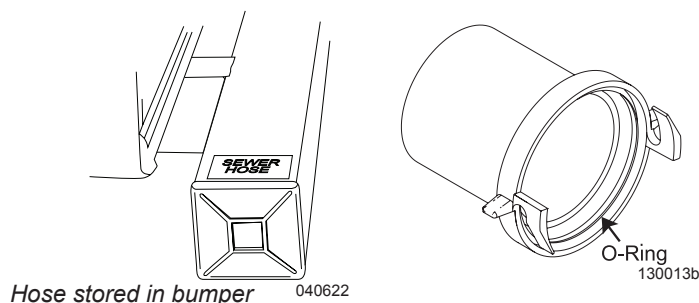
The shore fitting for the sewer hose may be a three or four-inch, male or female thread pipe; or a four-inch pipe with no threads, covered by a metal plate. Different style of adapters are available to fit most configurations. Hose ladders may also be purchased to support the hose.

It is important that the hose remains secure. Always tighten clamps and restraining devices before use. Lay the sewer hose in-line between the termination drain and the shore fitting. Restrain the hose to prevent movement during use. Wear protective and/or disposable gloves when handling the sewer hose.



## Sewer Hose Storage

The motorhome comes equipped with a sewer hose storage compartment in the rear bumper.

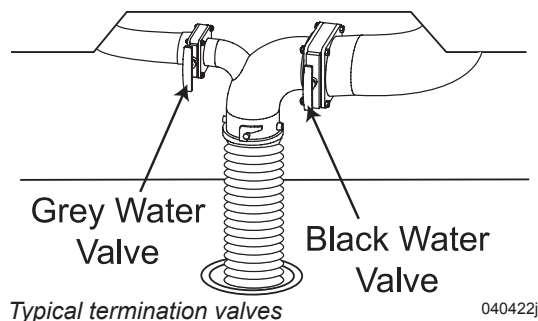


### **LUBE:**

**Periodically lubricate the O-ring on the sewer hose adapter with silicone spray.**

### **To Attach the Sewer Hose:**

- ◆ Remove sewer hose from storage.
- ◆ Remove termination cap. Align coupler tangs with termination tabs. Twist coupler clockwise 90° locking coupler to termination drain.



- ◆ Unscrew access port and feed the sewer hose through the opening.
- ◆ Attach other end of hose to shore sewer facility. Restrain hose to prevent movement during use.
- ◆ Open the liquid waste drain (grey water) valve.

The solid waste drain (black water) valve remains closed until the tank is full or until time of departure to help prevent clogging. Use the outside faucet or shower attachment for washing or rinsing the sewer hose after dumping the black tank.

### **NOTE:**

**Use care when connecting the sewer hose adapter to the termination drain in cold weather.**

### **NOTE:**

**Close the grey water valve 24 hours prior to departing to allow the tank to fill with liquid to help in the dumping process.**

## Draining the Tanks

The waste holding tanks should be full or nearly full prior to draining to help evacuate the tanks more efficiently.

### **To Drain the Tanks:**

1. Attach sewer hose to termination drain and shore facility.
2. Prepare to dump the solid waste (black) tank first. Close the liquid waste drain (grey) valve.
3. Fill the grey tank to at least 50% by running water in the shower or sinks. Use the tank monitor panel to observe tank fluid levels. When the grey tank is 50% full, stop filling the tank.
4. Secure the drain hose to prevent movement. Open the solid waste drain (black) valve. Allow the black tank to drain.
5. Flush the black tank using the Tank Flush fitting in the water service center. Flush the tank for approximately 2-3 minutes.
6. When complete, close the black water valve.
7. Open the grey water valve. The water in the grey tank will flush remaining solids from the sewer hose. With the grey water valve open, run two gallons of water down any drain to flush grey tank. The grey valve remains open until the next drain cycle, or time of departure.

### **Preparing for Travel:**

1. Close solid waste (black) and liquid waste (grey) valves.
2. Undo restraining devices from the sewer hose. Disconnect the sewer hose from the termination drain by rotating the fitting counterclockwise 90°.
3. Raise the sewer hose and using hand over hand method working the sewer hose towards the shore fitting.
4. Rinse the sewer hose with outside facility and repeat the hose drain process.
5. Remove the sewer hose from shore fitting.
6. Store the sewer hose.
7. Secure the termination cap to the termination drain (required by law in some states).
8. If desired, add chemicals to the tanks to control odor. Follow the directions given by the manufacturer of the chemical.



**NOTE:**  
**Dump the black tank and grey tank before driving.**

**NOTE:**  
**Always empty the tanks before traveling.**

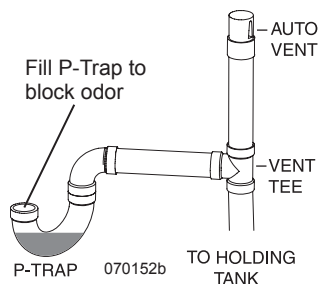
### ***Drain Traps & Auto Vents***

A “P-trap” and auto vent are located at each sink and shower drain to prevent holding tank odor from entering the motorhome. These P-traps are usually within 54” of a vent tee. These traps must have water in them to block odors.

During storage, water can evaporate and allow odor into motorhome. If odor is detected, run water into sinks, shower drain and washer (if equipped) traps.

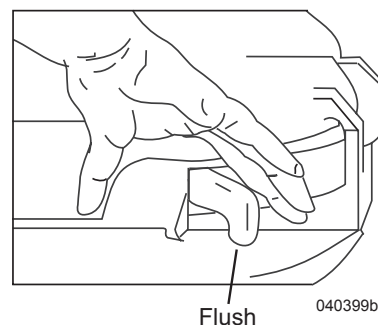
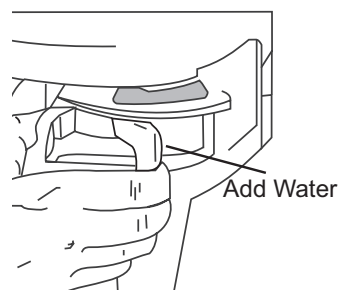
The auto vent is to assist in the flow of water in the drain lines by enabling a smooth flow of water in the drain without creating a vacuum. If the auto vent is stuck in the open position, grey tank odors may enter the motorhome. Auto vents double as clean outs in case the line has to be “snaked” out.

**NOTE:**  
**During cold weather antifreeze must be added to the drain traps.**



### ***Lever Flush***

- ◆ To add water to the toilet move the flush lever mid way to flush position until desired water level is reached. Generally, more water is required only when flushing solids.
- ◆ To flush the toilet, push the lever all the way to flush position until the sewage leaves the toilet. Water flow pressures vary at different locations; therefore, holding the flush lever down for five to eight seconds may be required.



### ***TOILET***

The toilet operates from either the fresh water tank or city water supply. The water pump must be turned on or the city water connected. The toilet flushes directly into a sewage holding tank (black water).

**NOTE:**  
**To prevent accumulation of solids below toilet, add several gallons of water to the holding tank before use.**

**NOTE:**  
**Holding flush lever down longer than necessary results in excessive water usage.**

**NOTE:**  
**Do not dispose of sanitary supplies or other non-dissolving items into the toilet.**

### ***Pedal Flush***

- ◆ To add water to the toilet before using, press and hold the pedal halfway until the desired water level is reached. Generally, more water is required only when flushing solids.
- ◆ To flush the toilet, push the lever all the way down until the sewage leaves the toilet.

### ***Troubleshooting - Leaks:***

- ◆ Bowl will not hold water: Check for foreign material in valve blade groove.
- ◆ Leaks between closet flange and toilet: Check screws for tightness. If leak continues, remove toilet and replace the flange seal.
- ◆ Difficult hand lever operation: Apply a light film of silicone spray on the blade.
- ◆ Poor flush: Check water pressure and flow to toilet. Remove the water supply line and check flow rate. The flow rate should be at least 2.5 gallons per minute.

- ♦ To find leaks: Use four or five sheets of toilet tissue and wipe all the seams and water line connections. Start at the top of the unit and work downward. When the tissue comes in contact with moisture, it will immediately change texture.

#### **LUBE:**

**If the motorhome is in storage for six months, spray silicone on the toilet valve and work it back and forth. Perform this maintenance monthly. A hydrocarbon based spray will damage the seal and other surfaces in the toilet. Petroleum Based lubricants must also be avoided as they cause the seals to swell and deteriorate faster.**

### ***Cleaning***

The toilet should be cleaned regularly for sanitation and operational efficiency. Clean the toilet bowl with a mild bathroom cleaner. Do not use chlorine or caustic chemicals, such as drain opening types, as they will damage the seals.

Clean out the system by flushing with several gallons of fresh water and one cup of dry laundry detergent. Add holding tank odor control in the accordance with the product manufacturer's instructions.

### **COLD WEATHER USE**

A motorhome is not designed for extended use in below freezing (32° F./0° C.) weather. Interior water lines, fixtures, water storage tanks and pumps are normally protected from moderate freezing temperatures as long as the furnace is operating. Exposed drains may freeze quickly. If in doubt about what temperatures the motorhome will tolerate, winterize the motorhome.

#### **CAUTION:**

**The plumbing system and related appliances can be severely damaged if subjected to freezing. Freeze damage is not covered under warranty.**

### **WINTERIZATION**

There are two acceptable methods of winterizing the motorhome.

1. The plumbing system can be blown out with compressed air to remove water.
2. The plumbing system can be filled with FDA approved RV antifreeze to protect the plumbing system from freezing.

Which method to use to winterize the plumbing and holding tank systems is up to the owner. The preferred method is to use compressed air. Regardless which method is used, the plumbing and holding tank systems must be winterized to prevent freeze damage.

#### **CAUTION:**

**Freeze damage is not covered under warranty.**

It is recommended to winterize whenever the motorhome is placed in storage or below freezing weather is expected. When the plumbing system is purged with compressed air, antifreeze is not necessary except a small amount to protect P-traps and termination valves from freezing. If using FDA approved antifreeze to winterize the plumbing system, several gallons may be required to fill the water lines.

#### **POISON:**

**Use only non-toxic FDA approved RV antifreeze to winterize the fresh water system. Automotive antifreeze, if ingested, can cause blindness, deafness or death.**

#### **INFORMATION:**

**Some items require special winterizing procedures which can be found in their respective OEM manuals.**

#### **WARNING:**

**It is recommended that a qualified RV service technician familiar with motorhomes, such as an authorized dealer, perform the winterizing procedure. Freeze damage is not covered under warranty.**

### ***Using Air Pressure***

Access to an air compressor and an adapter is needed to connect the air line to city water connection. Adapters can be purchased from most RV supply stores. Air pressure must not exceed 40 psi. Higher pressure can damage the plumbing system.

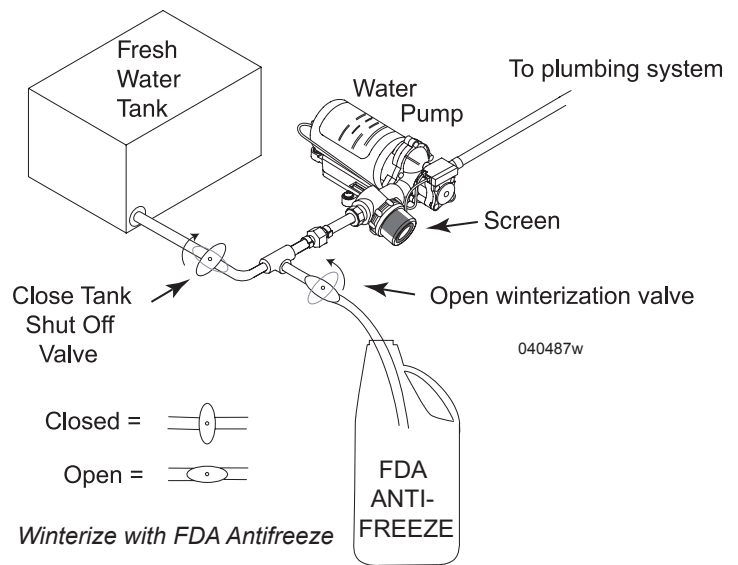
**WARNING:**

**Turn off power to the water heater and allow it to cool. Hot water can result in burn injuries.**

1. Empty and flush holding tanks.
2. Drain the fresh water tank.
3. Remove low point drain caps.
4. Turn on the water pump and allow it to run for 30 seconds to one minute to clear all water out of the water pump.
5. When cool, remove the water heater drain plug and open the pressure-temperature relief valve. Both are located behind the outside water heater compartment door.
6. After draining the water heater, close the pressure-temperature relief valve. Do not install drain plug.
7. Hook an air hose to the city water connection. Do not exceed 40 psi. Turn on compressed until all water has finished being purged from water heater and low point drains then turn off the compressed air.
8. Place water heater bypass valves in the Bypass position. Install the water heater drain plug.
9. Install low point drain caps.
10. Turn on compressed air. Open all the faucets, including the inside and outside shower, one at a time.
11. Flush the toilet until the water stops running.
12. After all water has been purged from the faucets etc, turn off compressed air and disconnect air hose.
13. Pour 1 pint FDA approved antifreeze into kitchen and shower drain. Pour 2 pints into bath sink drain with some of the antifreeze going into the grey tank to protect the drain valve. While holding toilet flush handle open, pour 3½ pints into the toilet, letting the antifreeze run into the black tank to protect the valve. Pour 1 pint of antifreeze into the toilet after the toilet bowl valve has been closed. Use a soft cloth to wipe out sinks and showers after pouring in antifreeze to protect surfaces from stains.

***Using Nontoxic Antifreeze***

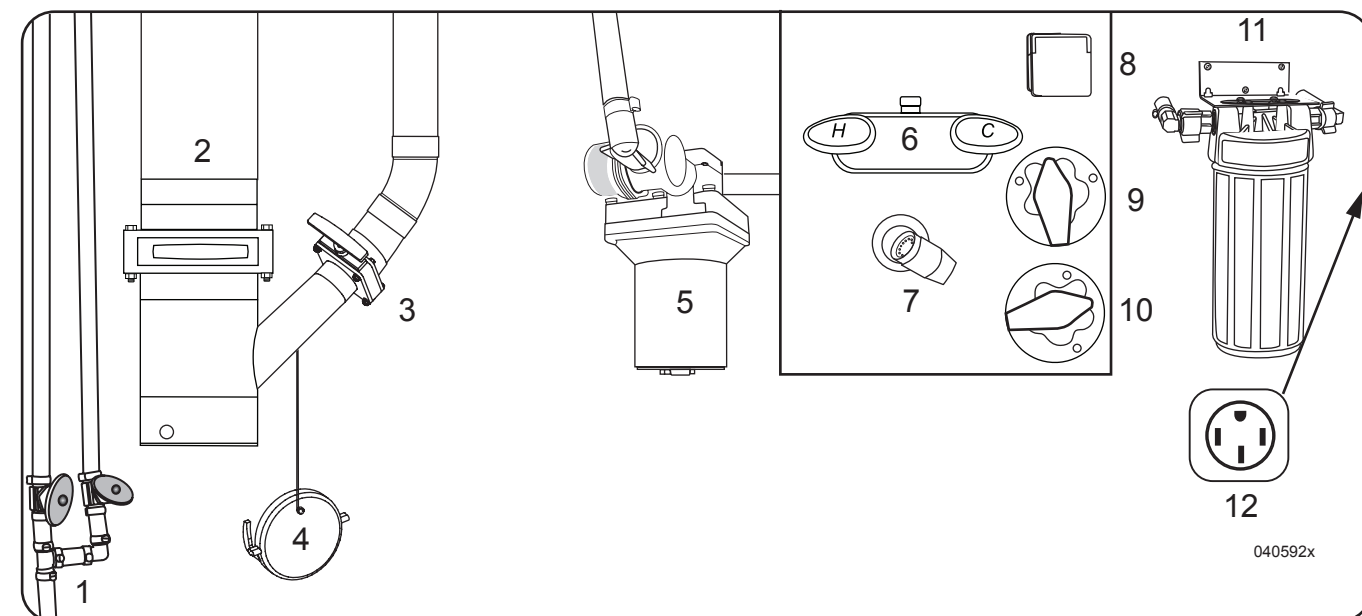
Approximately five gallons of FDA approved RV antifreeze is needed to fill water lines with antifreeze. Do not add antifreeze to the fresh water tank.

**WARNING:**

**Turn off power to the water heater and allow it to cool. Hot water can result in burn injuries.**

1. Empty and flush holding tanks.
2. Drain the fresh water tank.
3. Remove low point drain caps.
4. Turn on the water pump and allow it to run for 30 seconds to one minute so that all water is cleared out of the pump.
5. When cool, remove the water heater drain plug and open the pressure-temperature release valve. After draining, close the pressure-temperature relief valve. Do not install drain plug.
6. Place water heater bypass valves in the Bypass position.
7. Close all faucets, drain valves and low point drains.
8. Place one end of the winterization hose into antifreeze container.
9. Turn on the water pump.
10. Open each faucet, hot then cold, one at a time, until a small amount of antifreeze is present then turn off the faucet. Allow a small amount of antifreeze to run into drains to protect P-traps and holding tank termination valves.
11. Turn the water pump off.
12. Use a soft cloth to wipe out the sinks and shower to protect surfaces from antifreeze stains.
13. Close the winterization valve.

## WATER SERVICE CENTER



*Typical water center*

1. Hot and Cold Water Drains
2. Black Tank Drain Valve
3. Grey Tank Drain Valve
4. Termination Cap
5. Water Pump
6. Exterior Water Faucet
7. Exterior Spray Hose
8. Park Cable Connection
9. City Water Connection
10. Black Tank Flush
11. Water Filter
12. Generator Power Outlet

### **NOTE:**

**Layout of the water service center and location of components will vary.**

# Propane Systems

## Section 8

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## PROPANE SYSTEMS

This section contains safety information and operating instructions of the propane gas system and related equipment. More detailed information with CAUTION or WARNING instructions for various equipment, other than items within this section, can be found in the OEM manuals in the owner's information box.

### **NOTE:**

**Some appliance displays and appliance manuals may refer to LP-Gas as a fuel source; however, the actual fuel source used and required for these appliances is propane. The phrase "LP-Gas" is synonymous with not only propane, but butane and propane/butane mixtures. Since propane is the actual fuel required, the term "Propane" will be used throughout this manual except for references to third party appliances (such as the refrigerator) that include the term "LP-Gas" on their displays or other literature.**

### **Propane Overview:**

The propane tank contains liquid propane under high pressure. As fuel is used, the liquid vaporizes to a gas and passes through the primary tank valve to a regulator that reduces pressure. Low-pressure gas is then distributed to components through a manifold system.



When removed from storage, propane appliances may have trouble igniting or staying lit. Ignition problems upon storage removal are commonly caused by air in the manifold system or incorrect gas pressure. **DO NOT** attempt to adjust the propane regulator. Adjustments must be made by a dealer or authorized service personnel with the proper equipment. In higher elevations or extreme cold weather (10° F./-12° C or lower) a shortage of propane may be experienced. If propane is going to be used in higher elevations or cold climates for a long period of time, have an authorized service person adjust the propane regulator for these conditions.

## ***Propane System Tests***

Have the propane system tested by an authorized dealer or service center at least once a year and before every extended trip. The test will include checking the pressure regulator for functionality and the propane system checked for leaks. Although the manufacturer and the dealer test the system carefully for leakage, vibrations during travel can loosen fittings.

### **WARNING:**

**When storing portable propane tanks that are not connected to a propane system, install an approved plug in the tank outlet hole to prevent leaks. Do not store or transport empty propane tanks, portable tanks, gasoline or other flammable liquids in the interior area of the motorhome. Keep open flame and spark producing materials away from the propane area. Shut off all appliances and the primary propane tank valve when the motorhome is in storage. If this warning is ignored, a fire or explosion could result.**

### ***Propane Leaks***

Leaks, identified by the odor of rotten eggs or smell of sulfur, can be found by applying a propane leak detecting solution on all connections. **Do not** use a match, open flame or use any spark producing device or appliance to test for leaks. Leaks can usually be repaired by tightening the fittings. If not, turn off the primary gas valve at the tank. Hand-tighten the primary valve only. Do not use a wrench or pliers as over-tightening can damage the valve seat. If a leak is suspected, for safety, it is highly recommended to have the leak repaired at an authorized dealer or qualified service center.

### **WARNING:**

**Propane is highly volatile and extremely explosive. Do not use matches or open flame to test for leaks. Use only approved propane leak testing solution for leak detection. Unapproved solutions can damage copper tubing and brass fittings. All fittings tested should be thoroughly rinsed and dried after testing. For continued operational safety and integrity of the propane system, only qualified service personnel should perform maintenance or repairs to the propane system.**

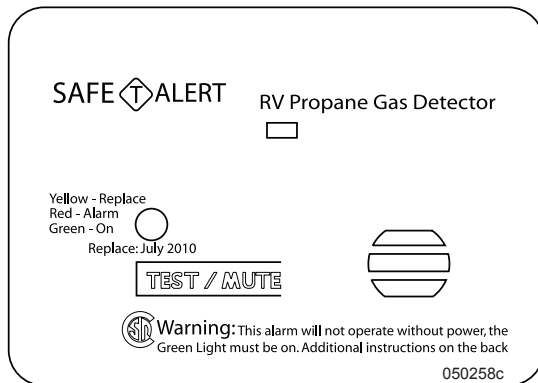
### **NOTE:**

**It may be illegal to travel in some States and Canadian provinces with the primary propane valve open. Failure to comply with these State and Canadian province requirements may result in fines and/or pose a safety hazard.**

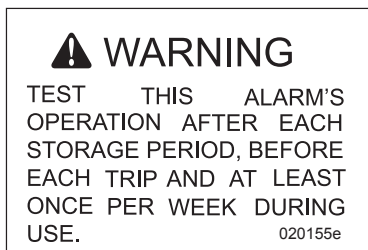
## PROPANE DETECTOR

The propane detector is required safety equipment in RVs. American National Standards Institute (ANSI) 1192 - **Fire & Life Safety, 6.4.8, Propane Detectors states:** “All recreational vehicles equipped with a propane appliance and electrical system shall be equipped with a propane detector listed as suitable for use in recreational vehicles under the requirements of UL 1484 and installed according to the terms of its listing”.

The propane detector is also sensitive to other fumes such as; hair spray, which may contain butane as the propellant. Butane, like propane, is heavier than air and will settle to floor level. Sulfated batteries (rotten egg odor) can also cause the detector to alarm.



Typical propane detector



### About Propane Leaks:

Propane is heavier than air and generally will settle to the lowest point. Propane leaking from a pipe or fitting will concentrate at the leak and float downwards. Propane escaping from a cooktop burner will concentrate around the burner, cooktop and adjoining counter space and is highly combustible. This concentration of gas can exist for an extended period before the gas reaches the detector's location and sounds an alarm.

### **NOTE:**

**The propane detector indicates the presence of propane only at its sensor. Combustible levels of propane may be present in other areas. The detector is intended for detection of propane only.**

The propane detector is not designed to detect other types of gas. However, some products may cause the detector to alarm, such as; alcohol, liquor, methane, kerosene, gasoline, deodorants, colognes, propellant used in spray cans and cleaning solvents. In some cases, vapors from glue and adhesive used in manufacturing the motorhome can cause the detector to alarm for several months after the date of manufacture. If it is determined that the detector has false alarmed because of the above mentioned nuisance gases, press the Test/Reset button to reset the detector. Ventilate the motorhome with fresh air. Take precautions to ensure one of these cases has not masked an actual propane leak.

The propane detector draws less current than one instrument panel lamp and will detect propane until the battery is discharged to approximately 7.0 Volts DC. The detector may not operate properly at extreme low voltage. The detector will not operate if power is disconnected or if power is interrupted. The propane detector has a self-check circuit running at all times while the detector is powered. In the event that the circuitry fails, a failure alarm will sound and the LED will flash red and green.

### **Propane Detector Operation:**

When the detector is first powered, the LED will flash yellow for three minutes as the detector is stabilizing. At the end of the startup cycle, the LED will turn green indicating full operation. The detector will sound if an unsafe level of propane is present.

### **CAUTION:**

**The detector will not alarm to propane during the three minute startup cycle.**

### **Testing**

Press the Test/Mute switch any time during the warm up cycle or while in normal operation. The LED will turn red and an alarm will sound. Release the switch. Do not use any other method to test the detector.

### **WARNING:**

**Test the operation of the detector after the motorhome has been in storage, before each trip and at least once per week during use.**

## Alarm

The red LED will flash and the alarm will sound whenever dangerous levels of propane or natural gas are detected. The detector will continue to alarm until the gas clears or the Test/Mute switch is pressed.

POTENTIAL SOURCES OF PROPANE LEAKS	
<ul style="list-style-type: none"><li>♦ Cooktop Burners</li><li>♦ Oven</li><li>♦ Refrigerator</li><li>♦ Water Heater</li><li>♦ Furnace</li></ul>	<ul style="list-style-type: none"><li>♦ Defective Propane Connection</li><li>♦ Defective Regulator</li><li>♦ Portable Propane Operated Appliances/Accessories</li></ul>

### Alarm Procedures:

1. Turn off all propane appliances (cooktop/stove, water heater, furnace and refrigerator), extinguish all flames and smoking material. Evacuate immediately. Leave doors and windows open.
2. Turn off the primary valve on propane tank.
3. Determine and repair the source of the leak. If necessary, contact a qualified professional for service.

### **WARNING:**

**Do not operate any electric switch. This can produce a spark and ignite the gas. Do not re-enter until the problem is corrected.**

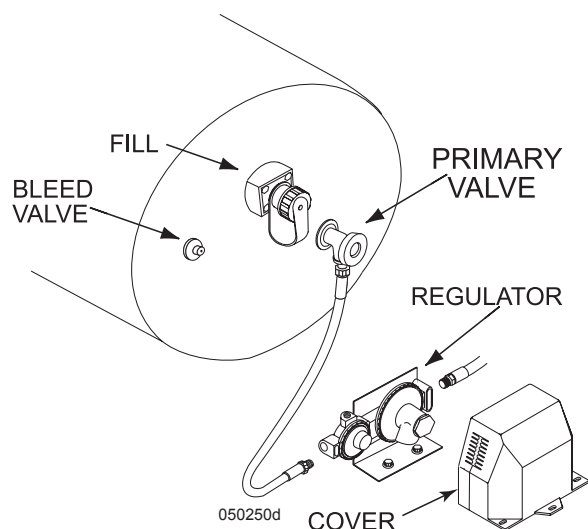
### Alarm Mute:

Press the Test/Mute switch when the detector is in alarm.

1. The red LED will continue to flash and the alarm will beep every 30 seconds until the gas level has dropped to a safe level.
2. The LED will flash green until the end of the Mute cycle.
3. If dangerous gas levels return before the end of the Mute cycle, the alarm will beep four times and return to phase 1.
4. After two minutes the detector will return to normal operation (solid green) or re-sound the alarm if dangerous levels of gas are present.

### Fault Alarm:

Should the microprocessor sense a fault in the detector, the alarm will sound twice every 15 seconds. The LED will alternately flash red to green and the Test/Mute switch will not respond to any command. The detector must be repaired or replaced.

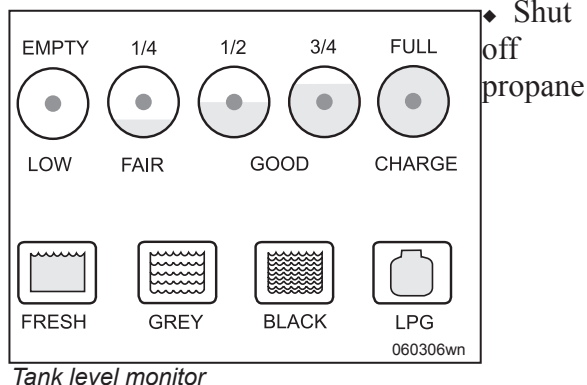


## Maintenance

1. Vacuum the detector cover weekly (more frequently in dusty locations) using the soft brush attachment of a vacuum.
2. Do not spray cleaning agents or waxes directly on the front panel. This can damage the sensor, cause an alarm or cause a detector malfunction.

## PROPANE EMERGENCY PROCEDURES

If a propane smell is detected (a rotten egg or sulfur smell) at any time, perform the following steps immediately:



Tank level monitor

appliances.

- ◆ Manually turn off the primary shut-off valve at the propane tank.
- ◆ **Do not** operate any electric switch. This can emit a spark and ignite the gas.
- ◆ Open windows and doors.
- ◆ Evacuate the motorhome. Stay clear of the surrounding area.
- ◆ Keep all ignition sources out of the area.
- ◆ Contact a qualified service technician to find the source and repair the propane leak.

### **WARNING:**

**A fire or explosion from ignited propane or propane fumes can cause serious injury or death.**

## PROPANE TANK

### Measurement

The motorhome is equipped with a monitor panel to aid in managing the propane tank. Press the Test switch to monitor the tank level. Colored lights represent the tank levels.

Propane Tank Capacity
*14 Gallons Admiral and Vacationer XE
*25 Gallons Vacationer
<i>*Actual filled propane capacity is 80% of listing due to safety shut-off required on tank.</i>

### **⚠ DANGER**

ALL PILOT LIGHTS, APPLIANCES AND THEIR IGNITORS (SEE OPERATING INSTRUCTIONS) SHALL BE TURNED OFF BEFORE REFUELING OF MOTOR FUEL TANKS AND/OR PROPANE CONTAINERS. FAILURE TO COMPLY COULD RESULT IN DEATH OR SERIOUS INJURY.

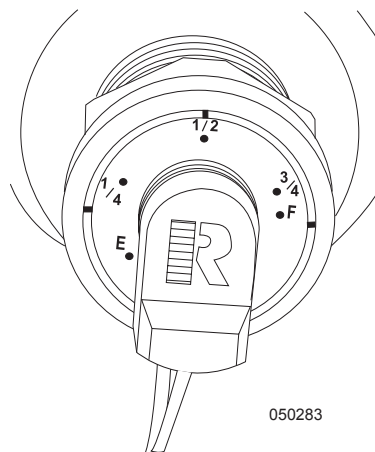
### **⚠ WARNING**

DO NOT FILL PROPANE CONTAINER(S) TO MORE THAN 80 PERCENT OF CAPACITY. FAILURE TO COMPLY COULD RESULT IN A FIRE OR PERSONAL INJURY.

### **⚠ CAUTION**

THIS PROPANE PIPING SYSTEM IS DESIGNED FOR USE WITH PROPANE ONLY. DO NOT CONNECT NATURAL GAS TO THIS SYSTEM.

Securely cap inlet when not connected for use. After turning on propane, except after normal cylinder replacement, test propane piping and connections to appliances for leakage with soapy water or bubble solution. Do not use products that contain



Gauge mounted on propane tank

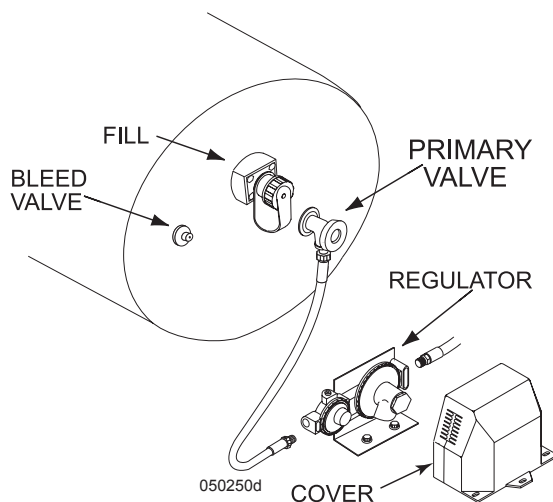
## Tank Capacity

### NOTE:

This chart reflects product specifications available at the time of printing. Actual capacity may differ depending upon model and floor plan.

### NOTE:

Propane tank capacity is estimated based upon calculations provided by the tank manufacturer and represents approximate capacity. The actual "usable capacity" may be greater or less than the estimated capacity. Actual full liquid capacity is 80% of full tank capacity.



### WARNING:

Before entering a refueling station, turn off all pilot lights and propane operated appliances. Most propane appliances are vented to the outside. Fuel vapors can enter an appliance vent that is parked close to a gasoline pump and ignite the vapor, resulting in an explosion or fire.

#### PROPANE STATISTICS

Pounds Per Gallon	4.24
Specific Gravity of Gas	1.50
Specific Gravity of Liquid	.504
Cubic Feet Gas Per Gallon of Liquid	36.38
Cubic Feet Gas Per Pound	8.66
BTUs Per Gallon	91,502
BTUs Per Gallon	21,548
Dew Point in Degrees Fahrenheit	-44° F
Vapor Pressure at 0° F	31
Vapor Pressure at 70° F	127
Vapor Pressure at 100° F	196
Vapor Pressure at 110° F	230
Flash Point	842° F

## Tank Filling

Woodall's Campground and Trailer Guide, and other similar publications, list refueling stations. Many travel parks sell propane. Before filling the propane tank, shut off pilot lights, appliances and igniters to prevent a fire or explosion. Have a trained service person fill the propane tank.

#Capacity	Gallon Capacity	BTU Capacity
5	1.18	107,909
10	2.36	215,807
11	2.59	237,387
20	4.72	431,613
30	7.08	647,420
40	9.43	863,226

The above capacities allow for 20% vapor space on each cylinder. Data taken from the National Fire Prevention Association (NFPA). Pamphlet #58-1998.

#### CONVERSIONS

Gallons to Liters (1 Gallon = 3.785 Liters)  
 Fahrenheit to Celsius ( $F^{\circ} - 32 \div 1.8 = C^{\circ}$ )  
 11 in Water Column = 6 1/4 ozs. per sq. in. pressure.  
 27.7 in. Water Column = 1 lb. per sq. in. pressure.

#### BASIC FACTS ABOUT PROPANE

- ◆ Propane detectors are a federal requirement on all propane equipped recreation vehicles.
- ◆ Propane is a by-product produced by refining oil.
- ◆ Odor is added to propane after the refining process.
- ◆ Each liquid gallon of propane produces 91,502 BTUs (British Thermal Units).
- ◆ Temperature affects pressure of propane. Internal tank pressure can exceed 200 psi.
- ◆ Tanks or valves contain pressure relief valves. The relief valve opens at 125% above tank rating.
- ◆ Propane stops vaporizing at -44° F.
- ◆ Standard propane operating pressure is 11" of Water Column or approximately 6 1/4 ounces per square inch.
- ◆ An inch of Water Column is a measurement of applied pressure to one side of a U-Tube 1/2 filled with water at sea level. The amount of pressure required to raise the water level 11", represents 11" of Water Column.

### WARNING:

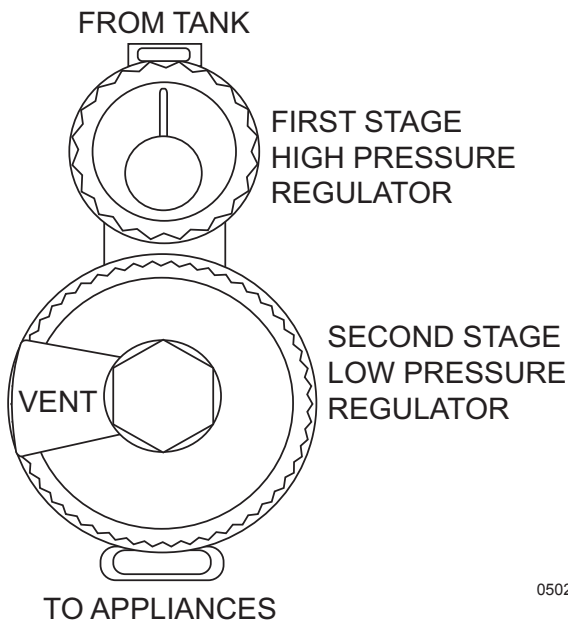
Extinguish all sources of heat, sparks, flames and smoking materials within a 50' radius during the fueling process.

The tank must be filled to the proper level to allow for expansion. An over-filled tank may cause the tank safety valve to release pressure emitting a strong rotten egg odor near the tank and/or a hissing noise.



### **WARNING:**

**Small amounts of propane will escape and evaporate during the fueling process. Protect bare skin. Instant freezing will occur if exposed to propane.**



050251

Propane exists in both liquid and vapor forms inside the tank. Full liquid capacity of propane in the tank is approximately 80% of actual liquid tank capacity. The remaining 20% of tank capacity is space for propane in the form of vapor (gas). The propane capacity indication on the monitor panel is calibrated to indicate full when actual liquid level of propane in the tank is 80% of tank capacity.

Pressure inside the tank varies with the temperature of the liquid. All propane tanks are required to have a safety pressure relief valve to vent excess pressure.

### **NOTE:**

**If the tank is new and being filled for the first time, inform the service technician to purge any air from the tank prior to filling. Mixing propane with non-flammable gas will cause ignition problems and unreliable operation of propane appliances.**

### ***Tank Operation***

- ◆ Manually open the primary shut-off valve located on the propane tank when operating appliances.
- ◆ Turn off the primary shut-off valve on the propane tank when the tank is being filled, during travel and while in storage.
- ◆ The primary valve is designed to be shut off by hand. Do not use a wrench or pliers as this will over-tighten the valve. Over-tightening may permanently damage the valve seat and not allow the primary valve to completely shut off the flow of propane.

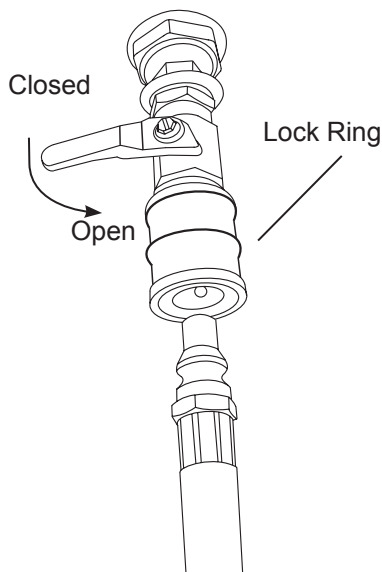
### CAUTION:

In some States and Canadian provinces, it may be illegal to drive the motorhome while primary valve on the propane tank is open.

## PROPANE FUNDAMENTALS

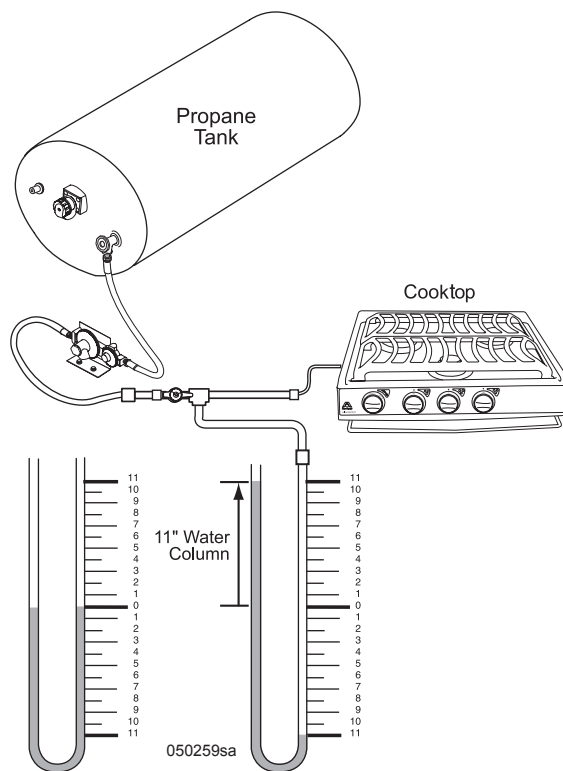
**CAUTION**  
SHUT OFF GAS SUPPLY BEFORE  
DISCONNECTING APPLIANCE.

**ATTENTION**  
COUPER LE GAS AVANT DE  
DECONNECTER L'APPAREIL



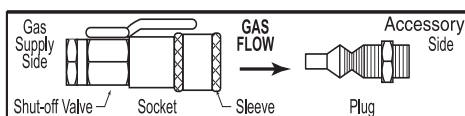
Barbeque quick  
disconnect

050285



U-Tube Testing Layout

### QUICK DISCONNECT FITTING



#### NOTE:

**COUPLING TO BE INSTALLED BY A QUALIFIED  
AGENCY AS DEFINED IN THE NATIONAL FUEL  
GAS CODE (NFPA 54)**

#### INSTALLATION INSTRUCTIONS

- 1) INSTALL SOCKET WITH SHUT-OFF V ALVE ON THE GAS SUPPLY SIDE
- 2) INSTALL PLUG ON THE ACCESSORY SIDE
- 3) LEAK TEST USING SOAPY WATER SOLUTION

#### OPERATING INSTRUCTIONS

##### TO CONNECT:

- 1) CLOSE SHUT-OFF VALVE
- 2) PULL SOCKET SLEEVE BACK
- 3) INSERT PLUG; RELEASE SLEEVE
- 4) PUSH PLUG INTO SOCKET UNTIL SLEEVE SNAPS FORWARD
- 5) OPEN SHUT-OFF
- 6) LEAK TEST USING SOAPY WATER SOLUTION

##### TO DISCONNECT:

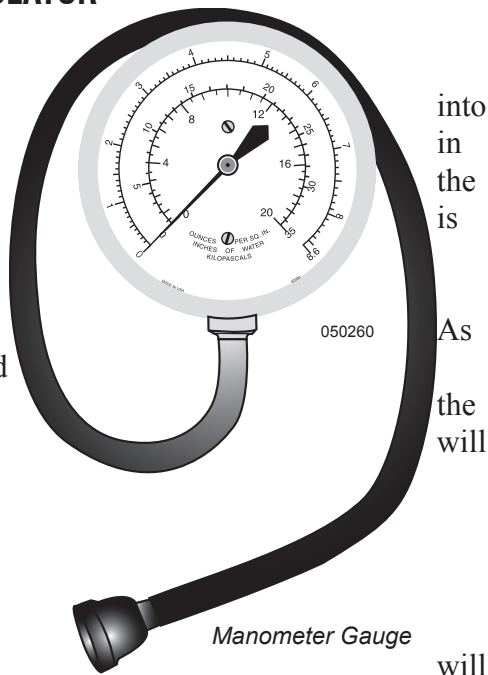
- 1) CLOSE SHUT-OFF VALVE
- 2) TO RELEASE PLUG, PULL SLEEVE BACK AWAY FROM PLUG; PULL OUT PLUG
- 3) INSERT PLUG; RELEASE SLEEVE
- 4) LEAK TEST USING SOAPY WATER SOLUTION

020155b

**NOTE:**  
The propane fundamentals information is not a complete guide for the use of propane tanks or appliances. In cold climates keep propane level above 50% to keep vaporization of propane at the highest level.

**PROPANE REGULATOR**

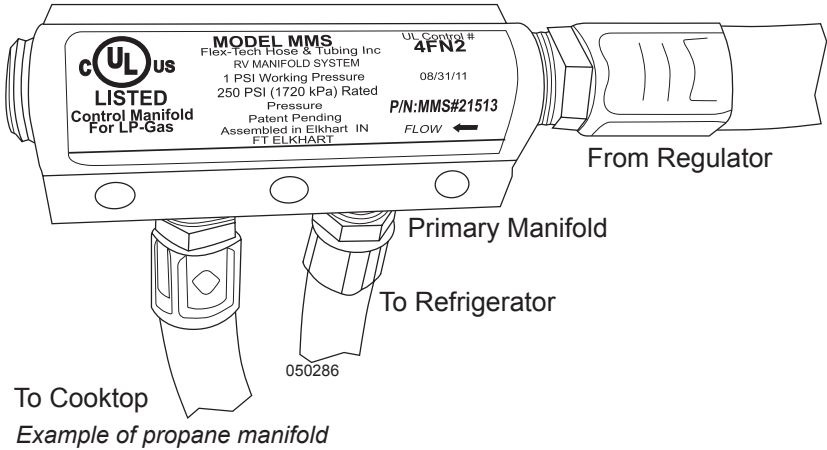
Propane is compressed liquid form in the tank. Only vapor (gas) is used during combustion by the appliance. Vapor is removed from the tank, leaving liquid behind. Liquid vaporizes to maintain pressure that is removed during consumption. This process continues until there is no liquid remaining in the tank. Temperature affects the vaporizing action of the liquid. If temperature of the liquid is - 44° F, vaporization of liquid is nearly stable with tank pressure about 0 psi. If liquid temperature is 100° F., the liquid quickly vaporizes with tank pressure about 200 psi. Tank pressure must remain relatively consistent, regardless of temperature, for the appliance heat output to remain stable. Vapor pressure regulation is performed by the regulator.



The two-stage regulator reduces vapor pressure so that vapor pressure to appliances remains relatively stable in a wide temperature range and safe for use. The first stage of the regulator reduces tank pressure to a range of 10 to 13 psig (pounds per square inch gauge). The second stage further reduces pressure to a working pressure of 0.4 psig (11 Inches of Water Column or about 6¼ ounces psi.). A vent is installed to allow the internal diaphragm to move with changes in atmospheric pressure. It is important to keep the vent clean and clear of obstruction or corrosion. The regulator is mounted so that the vent faces downward. If the vent becomes clogged, pressure from the propane tank may cause erratic pressure regulation. If there is any corrosion, contact a qualified propane service technician.

**WARNING:**  
**Do not attempt to adjust the regulator. Adjustments require special equipment. Failure to follow these instructions may result in a fire or explosion, and can cause severe personal injury or death. Do not operate propane appliances until the propane pressure is checked and a leak down test is performed!**

Typical Appliance BTU Ratings	
<b>Cooktop</b>	
Large - 9,500 BTU	
Small - 6,500 BTU	
<b>Water Heater</b>	
10,000 BTU	
<b>Furnace</b>	
2-25K BTU (front & rear) - 36 feet	



If the vent becomes clogged, clean it with a toothbrush. Under normal atmospheric conditions a propane regulator will not freeze, nor will the propane. Vapor passing through the regulator will expand and cool, condensing moisture in the propane. Moisture will freeze, build up and block the vent. The possibility of freeze up is greatly reduced with the two-stage regulator.

#### **To Prevent Freeze Up:**

- ◆ Ensure the propane tank is totally free of moisture prior to filling.
- ◆ Ensure the tank is not overfilled.
- ◆ Keep the valve closed when the tank is empty.

#### **If A Freeze Up Occurs:**

- ◆ Have an propane distributor purge the tank.
- ◆ If necessary, have the propane distributor inject methyl alcohol in the tank.

Damage to the regulator can occur when the tank is overfilled. The regulator is designed to receive and use vapor only. This is why the tank is filled to only 80% of its liquid capacity. The other 20% allows for vaporization of the liquid. The primary vapor valve is located in the vapor section of the tank. In an overfilled tank, liquid propane can fill the regulator. As the liquid vaporizes, moisture can freeze the diaphragm in the regulator. Tank pressure on a frozen diaphragm can rupture the diaphragm and result in erratic pressure regulation.

Pressure should be checked for proper pressure and accurate regulation during appliance operation. Erratic pressure regulation causes unreliable and potentially dangerous appliance operation and negatively affects performance of refrigerator.

#### **Accessory Hookup**

A propane quick disconnect is provided for use of the propane barbeque (for example) and is to be used for external components only. For safety, only approved propane quick disconnect fittings and flexible hose should be used to connect external accessories to the remote hookup.

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A propane quick disconnect is provided for use of the propane barbeque (for example) and is to be used for external components only. For safety, only approved propane quick disconnect fittings and flexible hose should be used to connect external accessories to the remote hookup.

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installed by a qualified agency as defined in the National Fire Protection Association NFPA (Fire) 54-02 code.

#### **WARNING:**

**Check for leaks on all connections each time the remote hookup is used. If a leak is detected, turn off the primary valve on the propane tanks. Contact a qualified service center for the repairs.**

#### **Manometers**

The manometer is the best way to accurately determine propane pressure. There are two different styles of manometers: Gauge and U-tube. Propane pressure is measured in Inches of Water Column. This is the amount of pressure applied to one side of a U-shaped tube filled half way with water. The amount of pressure needed to raise the column of water 11" represents 11 Inches of Water Column.

## PROPANE HOSE INSPECTION

The hose manufacturer suggests that a flexible propane supply hose undergo regular inspection. As a guideline, it is recommended that all flexible propane lines connecting the slide-out, appliances and tanks be inspected in the spring and fall of each year by a qualified RV technician.

### **Inspection Tips:**

Hose strength is controlled by the plies of reinforcement. Damage in this area cannot be tolerated. It is important that if a damaged propane hose is found, the source of the damage be determined and corrected prior to the replacement.

Small cuts, nicks, or gouges that do not go completely through the cover are not cause for replacement of the hose. Inspection should be performed when the hose is not under pressure.

### **NOTE:**

**Pricking of the cover in the manufacture of this type of hose is common and necessary for satisfactory hose performance. Consequently, the uniformly pricked cover should not be viewed with alarm.**

### **Cause for hose replacement:**

- ◆ Damage to the textile reinforcement or wire braid; wire braid reinforced hose, which has been kinked or flattened so as to permanently deform the wire braid in the non-pressurized state.
- ◆ Blistering or loose outer cover.
- ◆ Slippage; evidenced by the misalignment of the hose and coupling and/or the scored or exposed area where slippage has occurred.

### **CAUTION:**

**Only a qualified service technician should perform repairs or component replacement.**

### **Additional suggested maintenance:**

After performing extensive testing, the manufacturer of the flexible propane supply hoses has determined that the hoses be replaced every ten (10) years as failure rate may increase after this period of time. The motorhome manufacturer recommends following this guideline to assure continued safety and dependable use.

## PROPANE DISTRIBUTION LINES

A primary manifold with flexible distribution lines service the propane system. All secondary lines leading to propane appliances are made of flexible tubing. The flexible tubing lines are of one piece with no splices or connections between the primary manifold and the appliance. Should a leak develop in a flexible delivery line, the flexible distribution line is replaced as a component. For safety and system integrity, it is recommended that propane distribution work be performed by an authorized dealer or an authorized service technician.

Follow the recommended guide lines as outlined in Propane Hose Inspection in this section.

### **INSPECTION:**

**Inspect the rubber flexible lines twice a year for abrasions, tears, kinks or other signs of damage.**

If a propane leak is suspected, have the system inspected and repaired by a qualified service technician as soon as possible.

## PROPANE CONSUMPTION

Each gallon of propane produces 91,502 BTUs of heat. One 27 gallon tank produces two million BTU's. Total consumption depends on the rate of usage by each appliance and the operating time. The water heater and furnace typically uses the most propane.

### **Determine Fuel Consumption:**

To determine approximately how many hours an appliance will operate on one gallon of propane, use the following formula:



### **Determine Fuel Consumption:**

To determine approximately how many hours an appliance will operate on one gallon of propane, use the following formula:

- ◆ Propane appliances are rated in Input BTU (British Thermal Units). The rating is usually stamped or printed on a tag affixed to the appliance. For example: the Input rating of the appliance is 10,000 BTUs.
- ◆ One gallon of propane produces 91,502 BTUs.

# House Electrical

## Section 9

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## HOUSE ELECTRICAL - INTRODUCTION

This section contains information, guidelines and procedures on the operation of the house electrical system. Refer to the OEM manuals included in the Owner's Information File box for respective, in-depth, individual component operating instructions.

### General Overview:

The motorhome can utilize various sources of electrical power: shore power connection, generator, chassis batteries and house batteries. All of these electrical power sources, while independent of each other, can be combined in a variety of ways to provide a highly efficient electrical operating system. Two types of electrical systems are used: 120 Volt AC and 12 Volt DC.

The motorhome 120 Volt AC system can be operated from three different power sources: shore power, on-board generator or the inverter. Shore power is the most efficient and should be used whenever possible. The generator can be used when shore power is unavailable. Two different sources supply the main AC circuit breaker panel with power: the shore power cord or the on-board generator.

### **WARNING:**

**The electrical system is engineered and tested for safety. Circuit breakers and fuses protect the electrical circuits from overloading. When planning modifications or additions to the electrical system, ensure safety of the electrical system. Please note that any modifications may void the warranty.**

### **WARNING:**

**Water is electrically conductive. DO NOT use any electrically powered item or outlet that may be exposed to a water source. Such use can result in a serious shock causing injury or death.**

### 12 Volt DC System:

The motorhome has two 12 Volt DC systems: chassis and house. These two systems, for the most part, are separate from one another. The house system does not operate engine functions; the engine system does not operate house functions. However, within the two systems there are some inner connections. For example: While the motorhome is driven, the alternator on the engine will supply charge voltage to the house batteries. Conversely, while the motorhome is plugged into shore power, or the generator is running, the chassis batteries are being charged. Each system will supply 12 Volt DC power to the 12 Volt DC distribution panels.

### Chassis and House System:

The chassis and house systems have their own sets of batteries. The chassis batteries supply 12 Volt DC power to the front electrical panel and front distribution box. These panels contain mostly engine system circuits and wiring such as headlights, taillights, dashboard functions, gauges, etc. The house batteries supply 12 Volt DC power to the distribution panel. This panel contains fuses for the house, interior lighting and appliances. Become familiar with these panels and the items they operate.

### Maintenance:

It is important to keep the 12 Volt DC systems in good working order as many of these systems use electronics. These systems, with their incorporated electronics, are voltage sensitive. Some items can be damaged if the DC voltage is not maintained within the designed specifications.

### Why Batteries are Important:

A majority of the lighting and appliances are designed to operate from 12 Volt DC (direct current) power. This is why the batteries play such an important role in the function of the motorhome. There are exceptions with appliances such as the microwave or television; however, indirectly they still operate from 12 Volt DC power, as they can be operated from the inverter. The chassis functions (engine, transmission, dash air, etc.) are also 12 Volt DC.

## Shore Power:

The motorhome is equipped with a shore power cord to connect the motorhome to outside electrical services. Shore power service is the most efficient source of electrical power. The shore cord is rated 30 Amp 120 Volt AC. Electrical adapters may be necessary to allow a proper and safe connection to the electrical service supply when this type of power source is not available.

### NOTE:

**When 30 Amp shore service is not available, care must be used when operating the appliances and using the outlets to avoid overloading the shore power service.**

## Generator (Optional):

The generator can be selected for use when shore power is unavailable. The maximum amount of generator output power, measured in watts, is calculated at an elevation of 500 ft. above sea level. This figure decreases slightly at higher altitude. Ambient temperature also effects total maximum output. The amount of AC electrical load applied to the generator determines fuel consumption.

## BATTERY CUTOFF

The battery cutoff switch is located on the monitor panel. This switch controls the 12 Volt DC power to the house fuse panels. When the switch is activated, power is supplied to all the interior DC lighting and DC operated appliances.

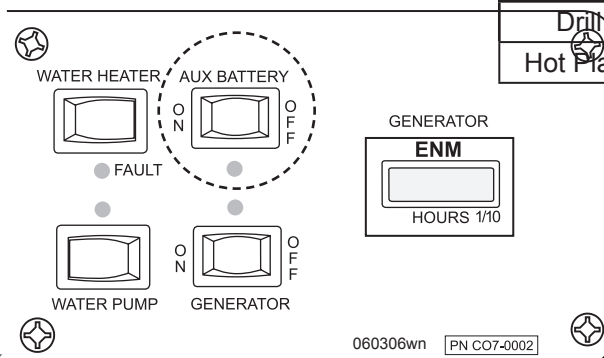
Some appliances require both DC and AC power to operate, such as the roof air conditioner. This switch is helpful when dry camping to conserve house battery power. Refrigerator operation is unaffected by the operation of this switch.

### NOTE:

**The switch is labeled Aux and the term is synonymous with Battery Cutoff.**

### CAUTION:

**To avoid flash damage to electrical contacts, turn off the interior lighting before activating the battery cut-off switch.**  
**SHORE POWER HOOKUP**



*Battery disconnect switch located on monitor panel*

## Power Requirement 30 Amp:

The power requirement for the motorhome is 30 Amp 120 Volt AC single phase. The shore cord is stored in the water service compartment. If 30 Amp shore power service is available, connect the supplied shore power cord. If 30 Amp service is not available, electrical adapters will be required.

The motorhome can be operated from 20 Amp 120 Volt AC but with limited capacity. If less than 30 Amp service is available, electrical adapters will be required and power consumption must be reduced to avoid tripping the shore power breaker.

While there are several onboard appliances, remote appliances such as a coffee maker or hair dryer increase power consumption. Refer to the load charts as a guide to approximate power consumption in total.

Appliances are generally rated

REMOTE APPLIANCES			
DEVICE	AC LOAD	DEVICE	AC LOAD
Blender	3.3 A	Coffee Maker	10 A
Computer	2.5 A	Color TV	1.25 A
Drill	4.2 A	Hair Dryer	8.3 A
Hot Plate	15 A	Iron	8.3 A

*Approximate amperage of typical remote*

*in watts. Watts can be converted to amps using the following formula; Watts divided by Volts equals Amps*

ONBOARD APPLIANCES	
DEVICE	AC LOAD
Microwave	7.1 Amps
Roof A/C	13 Amps
Refrigerator	3.6 Amps
Converter	7.5 Amps

*Approximate amperage of onboard appliances*

**NOTE:**

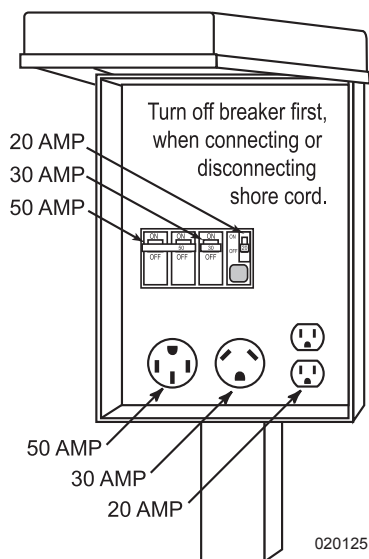
If shore power is less than what is rated for the motorhome, electrical adapters will be required and power consumption must be reduced to avoid tripping the shore power breaker.

**CAUTION:**

Avoid flash damage to the electrical system contacts by turning off all appliances before connecting to shore power, starting the generator or using the inverter.

**WARNING:**

Keep fingers away from metal contacts of the shore plug end. DO NOT stand in water when making electrical connections. Serious electrical shock and personal injury can occur. To avoid the risk of an electrical shock, turn the circuit breaker off for the power supply outlet before making the shore power connection.

**CAUTION:**

Do not remove cover from the shore power supply to troubleshoot electricity to the motorhome. Serious personal injury or death can occur. Inform the park manager if there is no power to the motorhome. It is the responsibility of the park to troubleshoot and repair the power supply.

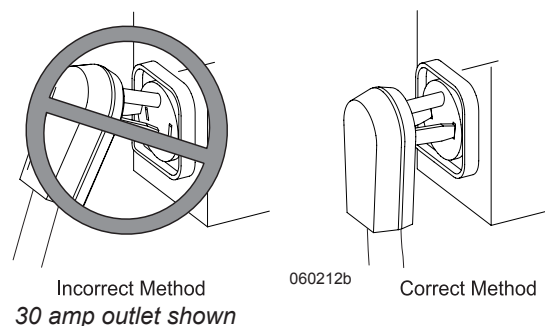
***Plugging in the Shore Cord*****WARNING:**

Keep fingers away from metal contacts of the shore plug end. Avoid standing in water when making electrical connections. Serious electrical shock and personal injury can occur. To avoid the risk of an electrical shock, turn the circuit breaker off for the power supply outlet before making the shore power connection.

- ◆ Ensure all appliances are turned off.
- ◆ Always turn off the shore power breaker before connecting or disconnecting the shore cord. This will prevent accidental shock or flashing of electrical contacts.
- ◆ No electrical adapters are required if 30 amp service is available. If shore power service is less than 30 amps, install the proper electrical adapter on the shore plug to ensure a safe connection.

**THIS CONNECTION IS  
FOR 110/125 VOLT AC,  
60 HZ. 30  
AMPERE SUPPLY.**

AS-32A  
060203b



Incorrect Method

30 amp outlet shown

060212b

Correct Method

- ◆ Align plug terminals of shore cord with socket terminals of outlet. Carefully, without touching electrical contacts, push plug completely into socket until the shore plug is firmly seated.
- ◆ Turn on the shore power breaker after the connection is made.

**Disconnecting the Shore Cord:**

- ◆ Turn off all AC appliances.
- ◆ Turn off the shore power breaker. This will prevent accidental shock and flashing of electrical contacts when disconnecting.
- ◆ Without touching electrical contacts, carefully work plug out and away from socket.
- ◆ Straighten, clean and stow the cord in the compartment.

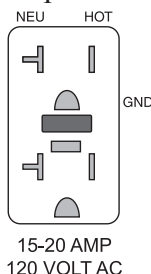


## Maintenance:

Kinks may form in the shore power cord. Routinely extend the cord full length and straighten the cord.

## Power Supply:

- ◆ The continuous amount of current through a breaker or fuse is 80% of its rated capacity. A 30 Amp shore power connection is limited to 24 continuous amps.
- ◆ Use care when hooked to anything less than 30 Amp shore service. 20 Amp shore service is limited to 16 continuous amps.

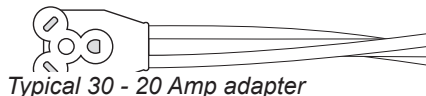


## Electrical Adapters:

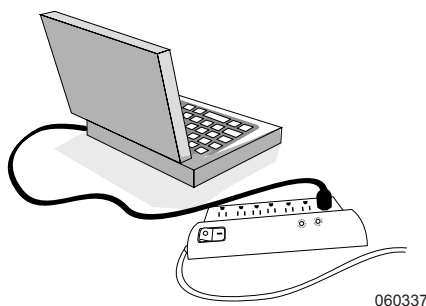
Another common adapter is a 30 to 20 Amp adapter. This type of connector adapts the 30 Amp shore cord to a 20 Amp shore power outlet.

## CAUTION:

If shore power service is



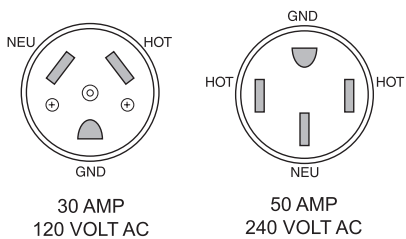
limited to 15 or 20 amps, use of light duty extension cords and electrical adapters will create a voltage loss through the cord and at each electrical connection. Line voltage loss and the resistance at each electrical connection can be a hazardous combination. Damage to sensitive electronic equipment may result!



*It is recommended to use a surge protector to protect voltage sensitive equipment.*

## WARNING:

**Avoid the risk of electrical shock or component damage by disconnecting from shore power during**



**electrical storm activity. Start the generator if AC power is needed.**

## NOTE:

Three types of shore power outlets most commonly used are shown in the illustration.

## WARNING:

**Disconnect from shore power before working on the electrical system. Disconnect the negative 12 Volt DC battery cables at the batteries. Remove rings, metal watchbands and other metal jewelry before working around batteries and connectors. Use caution when working with metal tools. If the tool contacts a battery terminal or metal connected to it, a short circuit could occur causing personal injury, explosion or fire.**

## GENERATOR - 120 VOLT AC

The generator output is 4.0Kw. The generator can be started from the following locations:

- ◆ Generator remote start on the monitor panel.
- ◆ Generator control panel located on the generator.

## INFORMATION:

**Refer to the generator OEM manual for detailed operating instructions and information.**

## Requirement for Operation:

- ◆ House battery disconnect switch must be On.

## Starting the Generator

Prior to starting the generator, perform a general inspection including oil and coolant levels. Keep a maintenance log on number of hours of operation since the last service. Perform any service or maintenance that may be due.

## Before Starting the Generator:

- ◆ Clear people and pets from potential of an electrical shock and any moving parts.
- ◆ All appliances and other large AC electrical loads should be turned off prior to starting the generator.
- ◆ Push and hold the control switch to Start. Release the switch when the generator starts.

**WARNING:**

Excessive cranking can overheat and damage the starter motor. Do not crank the engine more than 30 seconds at any one time. Wait at least two minutes before resuming. If the generator fails to start refer to the generator OEM manual.

**WARNING:**

Position the dash air conditioner vent control to the Off position to prevent exhaust gases from entering the motorhome while parked. Engine exhaust contains Carbon Monoxide, which is poisonous and can cause unconsciousness and/or death. Inspect the exhaust system before starting the generator. Do not block the exhaust pipe or park the motorhome where exhaust gases may accumulate outside, underneath, or inside the motorhome or nearby vehicles. Operate the generator only when there is a safe dispersion of exhaust. Monitor outside conditions to ensure the exhaust continues to disperse safely.

**WARNING:**

When parked near potentially combustible sources of ignition such as grass, be sure that hot exhaust gases or the exhaust pipe does not contact the grass or other combustible material as it can result in a fire.

**CAUTION:**

Exhaust extensions add weight to the generator exhaust system. Exhaust piping or manifold damage can result, allowing Carbon Monoxide to accumulate or leak into the motorhome.

***Stopping the Generator***

Turn off appliances and disconnect other AC loads being used. Allow the generator to run unloaded for at least one minute before shutdown to allow the engine to cool.

Momentarily push the control switch to the Stop position. Release the switch.

**NOTE:**

The generator requires only a momentary stop signal.

***Powering the Equipment***

The generator powers the air conditioners, appliances and electrical outlets of the motorhome. The number of electrical appliances that can be operated at any given time depends upon how much power is available from the generator.

If the generator is electrically “overloaded” or a short circuit causes “over-current,” either the generator will shut down or the circuit breaker will trip. If power consumption, in total, exceeds the generator power output, compensation for temperature and elevation may be necessary. Operate appliances in sequence, rather than all at the same time.

**NOTE:**

The generator may shut down when loaded nearly to full power and an air conditioner (or other large motor load) cycles on. Briefly during start up, an electric motor can draw up to three times the rated power. For this reason it may be necessary to operate some appliances in sequence when air conditioners or other large motor loads are on.

Compensation for temperature and elevation may also be necessary. The generator’s maximum output is rated at 500 ft. above sea level. The generator will lose approximately 3.5% of its rated power for every 1000 ft. increase in elevation. High and low temperatures can also affect generator output. Power decreases 1% for every 10° F. above 85° F. Counteract these effects by operating appliances in sequence rather than at the same time.

**INFORMATION:**

The generator may shut down for reasons other than an overload. If a blink code appears on the control switch, refer to the OEM manual to obtain an explanation for the code.

***Generator Fuel***

Fuel for the generator comes from the main fuel tank. Due to infrequent operation, fuel can become stale or possibly contaminated. Any contamination or degradation of fuel from storage or infrequent use will negatively affect generator operation and cause the generator AC output to be inconsistent which can damage appliances.

**CAUTION:**

The motorhome manufacturer does not cover damage to the generator caused by fuel contamination, or to appliances due to erratic AC voltage.

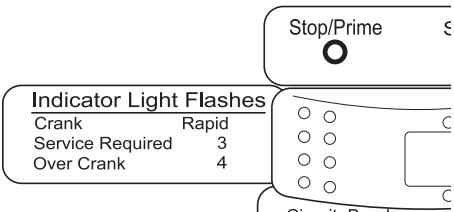
Average Fuel Consumption	4,000 Watts (gal./hrs.)
No Load	.3
Half Load	.5
Full Load	.7

Resetting the Circuit Breaker

If a circuit breaker trips in the load center (AC breaker panel) or on the generator control panel, there may be a short circuit or too much load.

**NOTE:**  
The generator will continue to run after a circuit breaker trips.

If a circuit breaker trips, disconnect or turn off as many loads as possible. To reset the circuit breaker, switch the circuit



Remove cover on generator to

breaker to Off, then switch back to On to reconnect the circuit. If the circuit breaker immediately trips, there is a short in the electrical system or the circuit breaker is faulty. Call a qualified electrician. If the circuit breaker does not trip, reconnect a combination of loads that will not overload the generator or cause the circuit breaker to trip again. Remember to compensate for elevation and temperature changes when reconnecting loads.

**NOTE:**  
An appliance or load may have a short if it causes a circuit breaker to immediately trip after being reset. Do not continue to reset the breaker. Have the problem diagnosed and corrected before resuming operation.

Generator Exercise

If use of the generator is infrequent, “exercise” the generator once a month by operating it at approximately half the maximum rated output for two hours. This “exercise” will help promote better starting, more reliable operation and longer engine life. This procedure drives off moisture, lubricates the internal engine parts, replaces the old stale fuel with a fresh supply, and also promotes removing oxides from the electrical switches and contacts.

**NOTE:**  
Avoid short run periods of the generator. Run the generator under a load for a minimum of one-half hour.

LOAD CENTER

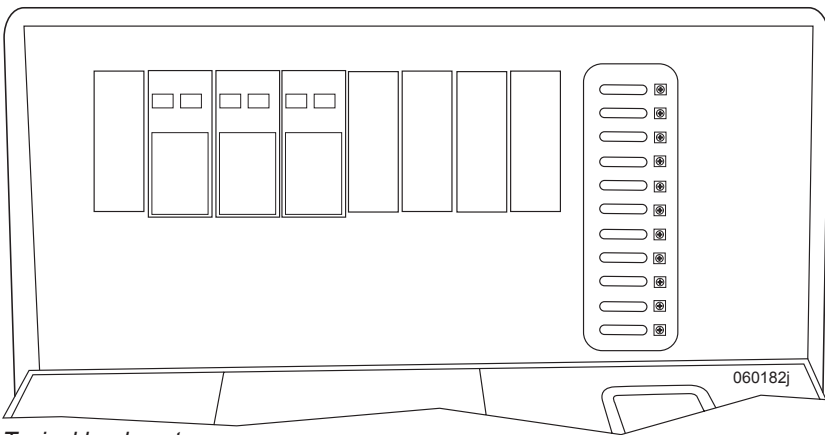
The motorhome is equipped with a 30 Amp 120 Volt AC load center. The load center contains AC circuit breakers and DC fuses as well as a power converter.

Shore power goes to the Main breaker. The main breaker provides power to all individual branch circuit breakers.

**WARNING:**  
This panel contains high voltage that can cause serious injury or death. Before beginning any work or testing procedures involving the electric panels or any of the branch circuits, be sure to unplug the motorhome from shore power. Certain testing procedures can require the AC power to be on. Only qualified technicians with electrical backgrounds should attempt any testing or repair procedures.

DC fuses supply power to individual circuits for interior lighting or the furnace for example. Refer to the panel labels for specific circuit assignments.

Branch circuits supply AC power to the different items or “loads.” An electrical load is any item or device that uses current when supplied with an electromotive force.



Typical load center

ITEM	
Microwave	
AC #1	
Port Appl	
Gen Pur #2	
Main	
Gen Pur #1	

Example of DC

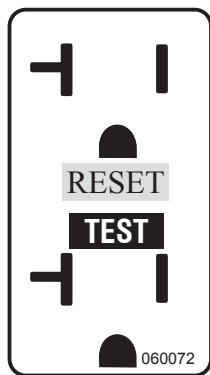
Should a breaker “trip” from an over-current condition, or from a shorted circuit, the load to which the breaker is supplying the electromotive force should be reviewed or disconnected to determine the cause of the trip. If no cause is found, or not readily apparent, reset the breaker by toggling the breaker to the Off position, then back to On.

Should the breaker trip again after the load is reapplied, it may indicate a fault with that particular load. Do not continue to reset breaker until the problem is diagnosed and corrected.

### **GFCI Breakers & Outlets**

A Ground Fault Circuit Interrupter (GFCI) can be found in two different types of applications. One type is incorporated in a breaker used in 120 Volt AC breaker panels; the other is incorporated in an outlet.

The GFCI, whether it is a breaker or an outlet, offers two types of protection. One type of protection is from over-current or shorts to guard against hazardous ground fault currents that can result in injury or death. Ground fault currents are currents that flow from the “hot” or power terminal through a person to the ground. Example: touching a faulty appliance while making contact with an electrical ground such as a water fixture or the earth.



120 Volt GFCI

Test the ground fault outlet or breaker once a month to ensure it is operating. Use the TEST button on the outlet or breaker. It should trip with an audible “click.” The breaker or outlet will not trip if AC power is not present at the device. If power is present and the device will not trip, replace it before using that circuit.

The GFCI offers protection against the type of shock that can result from faulty insulation, wet wiring from inside an appliance, or any device or equipment plugged in or wired to that circuit. The ground fault portion of the outlet or breaker uses sensitive electronics inside the outlet or breaker to detect a ground fault problem.

The electronics monitor the normal current of power flowing to the hot (black) wire through the load (eg. a light bulb or appliance) and coming back on the neutral (white) wire. If a small amount of current comes back on the safety ground wire, the electronics will trip the breaker or outlet, stopping the flow of electricity.

The amount of current it takes to trip the device from a ground fault varies slightly from the different outlet or breaker manufacturer (approximately 4 to 6 milliamps).

#### **NOTE:**

**One milliamp is 1/1000 of one Amp.**

Electrical shocks resulting from ground faults can be felt, but such a shock is considerably less than one without ground fault protection. People with medical conditions that make them susceptible to shock can still be seriously injured. A GFCI outlet or breaker will not protect against shock from a normal current flow.

Example: a shock from touching both metal prongs of an electrical cord or appliance while plugging it in.

#### **WARNING:**

**If a breaker or outlet continually trips, do not continue to reset breaker or outlet until the problem has been identified and corrected.**

#### **CAUTION:**

**GFCI outlets do not protect sensitive electronic equipment such as laptops from voltage surge. Plug sensitive electronic equipment into a separate surge protection device.**

### **DC Branch Fuses**

The 12 Volt DC fuses are the standard automotive type. When a fuse is “blown”, the wire in middle of the plastic case will be burnt. A broken, bad or “blown” fuse must be replaced with a fuse of the same rating and type.

ITEM	AMP
TV Power	20 Amp
Water Pump	10 Amp
Appliances	20 Amp
Living Lights	20 Amp
Galley Lights	20 Amp
Bath Lights	20 Amp
Bed Lights	20 Amp
Tank Heater	20 Amp
Ext Ent Cnt	20 Amp
Swing TV	10 Amp

*Example of AC circuit assignments  
Refer to actual label*



Using a fuse with a different rating or type will defeat the circuit protection provided by that fuse and could result in damage to the electrical system.

**WARNING:**  
**If a fuse blows, replace the fuse with same amperage rating and type. Installing a higher amperage fuse can damage the wiring or the item the fuse is protecting or may cause a fire. If the fuse repeatedly blows after replacing, do not continue to replace it. Have the problem diagnosed and corrected by a qualified technician.**

The 12 Volt DC fuses service the interior house lighting, ventilation fans, furnace and monitor panel. Fuses are color coded to indicate the rated amperage. Fuse current set points follow much of the same electrical principle as the 120 Volt AC breakers.

Using 12 Volt DC as the electromotive force can make it more susceptible to outside influences, such as corrosion from weathering or oxidation.

The danger from shocks with this voltage is minimized but can still occur. A good example is when a magnetic field is generated then collapses when the power supply is turned off. The result is a discharge that can reach tens of thousands of volts for a short time period. Care should be used when working with this voltage as current values can be quite high, as in the case of battery cables. Shorting a battery cable to ground with a battery at a reasonable state of charge can result in a fire or serious personal injury from a burn.

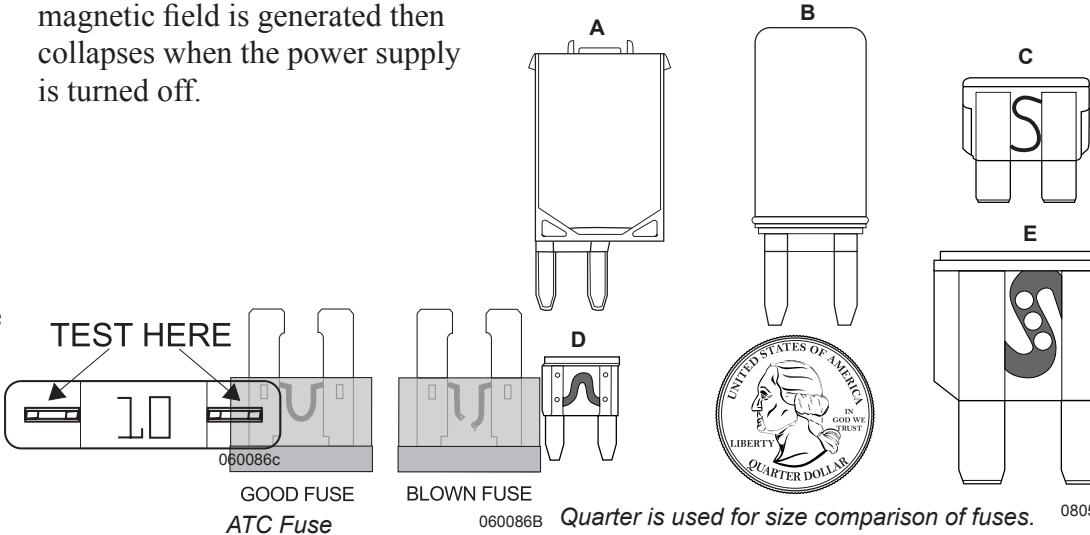
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Quarter is used for size comparison of fuses.  
A. Manual Reset Circuit Breaker D. Mini Fuse  
B. Auto Reset Circuit Breaker E. Maxi Fuse  
C. Standard Fuse  
Representation of various fuses and a circuit breaker

BLADE FUSE GUIDE			
	Mini	Standard	Maxi
Black	1		
Gray	2	2	25
Violet	3	3	
Pink	4	4	
Tan	5	5	70
Brown	7 1/2	7 1/2	35
Red	10	10	50
Blue	15	15	60
Yellow	20	20	20
Clear	25	25	80
Green	30	30	30
Blue-Green	35		
Orange	40		40

Mini, Standard and Maxi fuse colors and amperage ratings



## BATTERIES - HOUSE

House batteries are designed for use with 12 Volt DC operated lights, appliances and inverter.

### Type of House Batteries:

- ◆ Liquid Lead Acid (LLA)

### Deep Cycle Batteries:

Deep cycle batteries are best suited for use with 12 Volt operated lights, appliances and inverter. Deep cycle batteries are designed to have half of their capacity discharged before being recharged.

### CAUTION:

Tap water contains minerals that can alter battery chemistry and ruin the battery. Use only distilled water when refilling a liquid lead acid battery.

### CAUTION:

Petroleum based products or battery byproducts can damage the paint finish. Do not allow these chemicals to get on the paint finish. If the chemicals splatter on to the painted surfaces, immediately rinse the surface using plenty of water and a mild detergent.

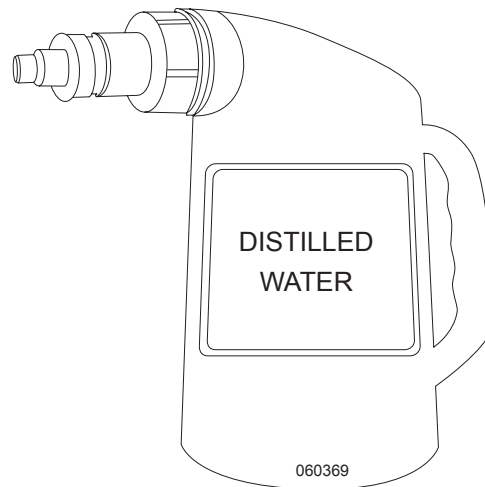
### Battery Maintenance

Check the water level in each battery cell at least once a month. The electrolyte level should be approximately 3/8" below the well to allow room for expansion while the battery is being charged. Over-filling the battery can cause the electrolyte solution to be pushed out of the battery caps.

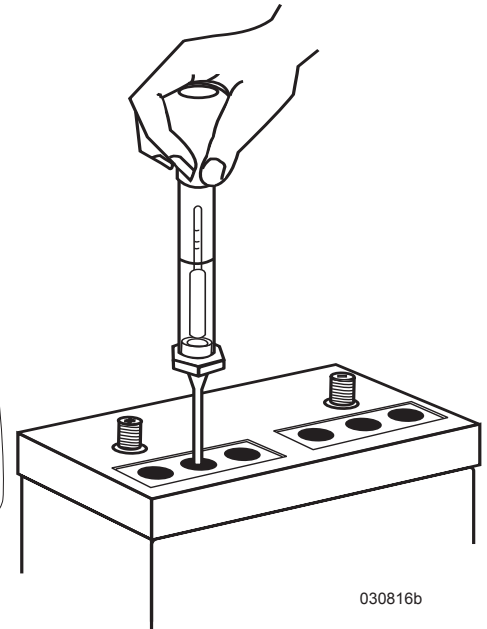
Use only distilled water to refill the battery. A battery with a low electrolyte level will rapidly boil out the water once the plates have been exposed to air.

### NOTE:

The cap on individual cells is threaded onto the battery and can be removed to inspect water level.

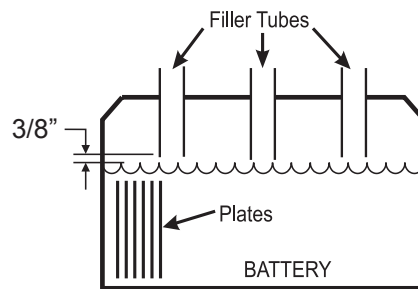


Example of battery filler bottle



Battery hydrometer

030816b



Battery State of Charge	Spec. Gravity	Voltage
100%	1.265	12.7
75%	1.225	12.4
50%	1.190	12.2
25%	1.155	12.0
Discharged	1.120	11.9 or Less

NOTE: The distilled water level in battery should be 3/8" below the filler tube. 020034

## Testing the Battery

The battery can be checked at the monitor panel but the most accurate way to test the electrolyte is with a battery hydrometer.

## Checking the Electrolyte Solution (LLA Only):

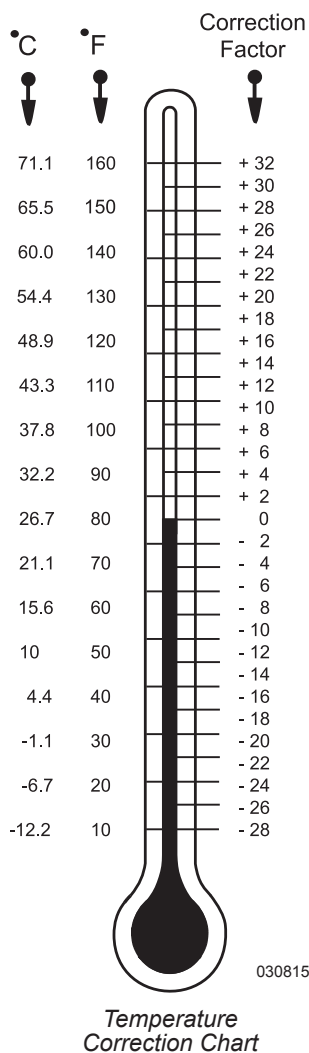
There are different styles of battery hydrometers; from types with cylinder graduation (shown in the illustration) to types with floating balls. Hydrometers with cylinder graduation are graphed and the exact state of specific gravity can be determined. Hydrometers can be purchased from most auto parts stores.

The hydrometer tests the battery's electrolyte solution that is measured in specific gravity. Distilled water has a specific gravity of 1,000. The hydrometer is calibrated to this mark.

Pure sulfuric acid has a specific gravity reading of 1,840. The acid is 1.84 times heavier than water. The electrolyte solution is about 64% water to 36% acid (fully charged battery). A fully charged battery at 80° F., has a specific gravity reading of 1265 per cell.

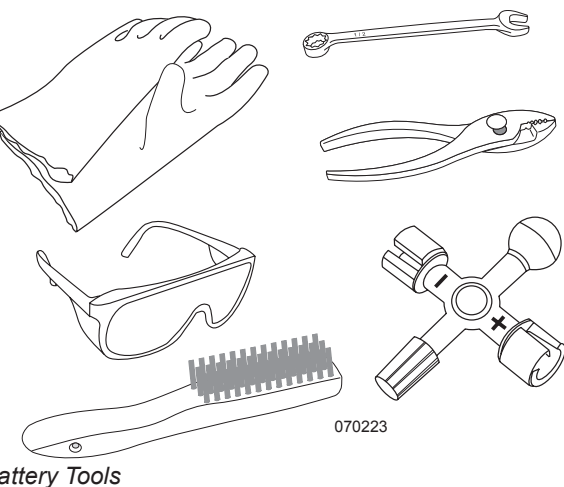
If one cell in a particular battery bank being tested is at a 50% state of charge and the other cells indicate a full state of charge, charge only the low battery to see if the low cell will come up and at the same time do not over-charge the healthy cells.

If the low cell does not improve after charging, this battery can damage the rest of the battery bank and should be replaced. An accurate digital Volt meter + - .5% will also give an indicator of the battery's state of charge.



### NOTE:

See the chart for temperature compensation. Liquid levels should be even between the cells of the battery being tested as it will affect the accuracy of the test.



Battery Tools

Temperature and recent battery activity (charging or discharging) affect the hydrometer readings. It is best to check the battery when it has been at rest for at least three hours, although readings taken at other times will give a ballpark figure. When using the hydrometer, draw the electrolyte solution up into the tube.

Allow the hydrometer to attain the same temperature as the electrolyte solution. Note the reading for that cell. Complete the same test for the rest of the cells on that battery bank. The hydrometer is calibrated at 80° F. Temperature affects the hydrometer readings.

The higher the electrolyte temperature, the higher the specific gravity reading. The lower the temperature, the lower the specific gravity reading. Add or subtract four points for each 10° variance from the 80° F. chart. Readings between cells should not vary more than 50 points.

Periodically check the batteries for corrosion and cracks. Replace vent plugs that are cracked or missing. Keep the top of the batteries clean. The accumulation of electrolyte and dirt may permit small amounts of current to flow between the terminals that can drain the battery.

Check the battery connections

for tightness and corrosion. Battery cables will occasionally need the corrosion removed to clean the cable ends and battery terminals. The batteries and trays will also need to be cleaned.

### **WARNING:**

**Liquid lead acid batteries produce hydrogen gas while charging. Do Not smoke around batteries and keep all sources of ignition or flames away from batteries. Hydrogen is an extremely flammable gas and can explode resulting in fire, personal injury, property damage or death.**

### **WARNING:**

**Sulfuric acid in the batteries can cause severe injury or death. Sulfuric acid can cause permanent damage to eyes, burn skin, and eat holes in clothing. Always wear splash-proof safety goggles when working around the battery. If the battery electrolyte is splashed in the eyes, or on skin, immediately flush the affected area for 15 minutes with large quantities of clean water. In case of eye contact, seek immediate medical aid. Never add acid to a battery once the battery has been placed in service. Doing so may result in hazardous splattering of electrolyte.**

### **Battery Tools:**

A few simple hand tools are required to work on the batteries and should be kept aside for working on batteries only.

- ◆ Wear old clothes. Clothing is easily damaged when in contact with batteries.
- ◆ Wear thick rubber gloves that are solvent and thinner proof.
- ◆ Keep a ½" box-end wrench, wire brush and pair of adjustable pliers separate from other tools.

### Safety Precautions:

Working on batteries requires a few safety procedures:

- ◆ Never short battery terminals or cables with anything metallic to “test” batteries for power.
- ◆ Wear safety glasses. Even a small amount of corrosion or acid can be very painful and harmful to the eyes.
- ◆ When wire brushing terminals, work the brush in one direction away from you. Avoid contacting opposite polarity terminals. Avoid breathing the powder. A particle mask can be helpful.

Before removing cables or performing major maintenance procedures, draw a diagram of how the batteries fit in the tray and the relative locations of the positive and negative terminals. Draw a diagram of cable routing, polarity and how the cables attach to the batteries. If available, take several pictures of the batteries as the pictures can be referenced during assembly.

Mark all cables positive and negative respectively. One misplaced cable can have disastrous results.

- ◆ Before removing any cables, stop all charging or discharging current.
- ◆ Unhook from shore power or stop the generator.
- ◆ If the motorhome has solar panels, remove the fuse near the battery connection or place a blanket over the top of the panels. Unhooking charge wires from the solar panel during daylight hours can damage the controller.
- ◆ Remove all rings and wristwatch to prevent short circuits. A severe burn can instantly occur.
- ◆ Open the battery compartment door and slide tray (if equipped).
- ◆ Turn off interior house power.
- ◆ Wear safety glasses and thick rubber gloves when working around batteries. Battery tools required: a wire brush, 1/2” box-end wrench, adjustable pliers and a box of baking soda. Prepare a baking soda/ water solution. Keep paper towels handy.
- ◆ Thoroughly rinse batteries with plain water before disconnecting cables. Remove all cables large and small. Remove the batteries, if necessary.
- ◆ Wire brush cable ends and battery posts. Dip the ends of the cables in baking soda (neutralizing) solution.

- ◆ With battery caps securely in place, carefully apply solution to the terminals. Using a paper towel, dip it into the solution and wipe the top of each battery.
- ◆ **Do not** allow solution to get into any battery cell. This will neutralize acid and ruin the battery.
- ◆ Rinse cables and batteries thoroughly with clear water.
- ◆ Use the rest of solution to clean battery tray. Thoroughly rinse tray, battery area and sidewall of the motorhome with water.
- ◆ Install the batteries in correct order noting their relative post location.
- ◆ Install tie-downs securing the batteries into position.
- ◆ Carefully install all positive cables. Double check before making each connection to confirm they are in the right location.
- ◆ Install the negative cables. When hooking up the ground cable going to the frame there will be a small spark indicating a momentary current draw. This is a normal process of charging the capacitors in the inverter. If there is a heavy flash STOP. Something is wrong. Double-check all wiring and battery post location for error.
- ◆ Verify proper voltage in the system before turning on the main battery disconnects.
- ◆ Coat terminals and posts with a protective coating to seal the connections from the gas and electrolyte.

- ◆ Turn on the main battery disconnect switches.

**WARNING:**

**Liquid lead acid batteries produce hydrogen gas while charging. Hydrogen gas is highly flammable. Do Not smoke around batteries. Extinguish all flames in the area. Hydrogen gas can explode resulting in fire, personal injury, property damage or death.**

**Placing a load on the Battery:**

Another test that can be performed is to place a specific load on the battery for a predetermined length of time equal to that particular battery's rating.

This machine is usually an adjustable carbon pile that can vary the load being applied to the batteries while monitoring voltage to see if they will perform to their specific rated capacities.

***Charge Time & Consumption Rate***

**Calculating Run Times:**

Calculating run time figures when operating 120 Volt AC electrical items with an inverter can be exponential due to battery characteristics. Flow characteristics of electrons vary with different battery types and chemical compositions. Deep cycle batteries are generally designed to slowly release a majority of their charge capacity.

Deep cycle batteries are rated in amp hours (Ahrs) with the discharge occurring over an extended period of time before the battery is charged. Engine starting batteries are designed to quickly release large amounts of current for a short duration, without depleting battery reserves.

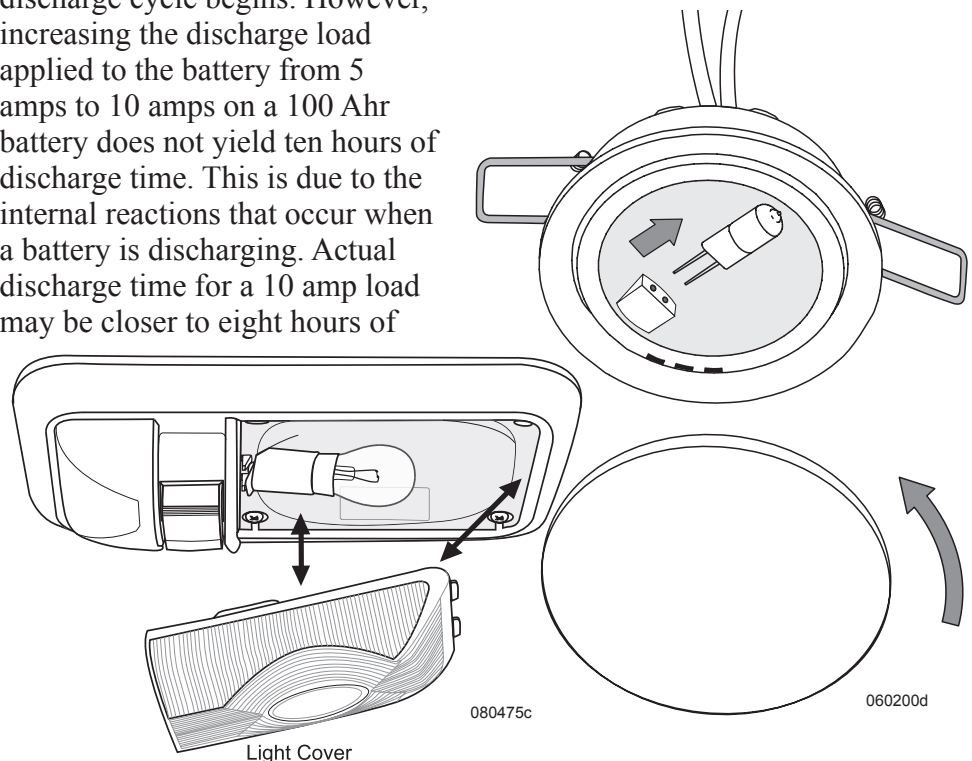
Commercial type batteries bridge the gap of deep cycle and engine batteries. Commercial batteries release medium amounts of current over a longer period of time but they are not designed to cycle their charge capacity.

The working range of a deep cycle battery is between 50 and 100% state of charge (SOC). Deep cycle batteries should not be cycled below 50% state of charge. Discharging a deep cycle battery below 50% state of charge shortens the life of the battery.

Deep cycle batteries use an amp hour rating that is usually calculated over a 20 hour discharge interval. For example: A deep cycle battery with a rated capacity of 100 Ahrs. is designed to release current at the rate of 5 amps per hour. Multiply a 5 amp load over a 20 hour discharge period equals the rated 100 Ahr. capacity.

These discharge figures are calculated with the battery starting at 100% state of charge with the battery at 80° F. when the discharge cycle begins. However, increasing the discharge load applied to the battery from 5 amps to 10 amps on a 100 Ahr battery does not yield ten hours of discharge time. This is due to the internal reactions that occur when a battery is discharging. Actual discharge time for a 10 amp load may be closer to eight hours of

applied to the battery to 20 amps will not yield five hours discharge time but may be less than three hours. It might be understood as a point of diminishing return.



discharge time. Increasing the load



Calculating applied loads to an inverter to approximate run time from the battery amp hours available is not an equal trade up when voltage is inverted and amperage is calculated. When the inverter is used to operate an AC load it uses approximately eleven times the DC current needed from the battery when inverting 12 Volts DC to operate the 120 Volt AC item.

There is also a small efficiency loss of about 10% when inverting. For example: When using the inverter to operate an AC electrical item, which has a current draw rating of 2 amps, the inverter will use over 20 amps DC power from the batteries.

#### **Determining Current Consumption:**

First determine the amount of current used by an AC item. For example: The television is rated at 200 watts at 120 Volts AC. Calculate watts to amps. Divide 200 watts by the operating voltage of 120, this equals 1.6 amps. Multiply 1.6 amps AC current by a factor of ten the inverter will use, this equals 16 amps DC battery current. Add the revised 10% efficiency loss figure, this calculates to a total of 17.6 amps DC. If the battery bank capacity is rated at 500 Ahrs., actual elapsed time to the suggested 50% state of charge would net viewing time for the television at approximately 13 hours in ideal conditions.

The run time figure will vary greatly with the actual state of charge of the battery bank when the discharge process begins. Ambient temperature, combined with other working loads, such as lights and parasitic loads applied to batteries, affect run times.

Calculating the exact run time is not precise due to all the variables and equations involved; however, an approximate time figure can be obtained. Proper battery maintenance and charge cycles affect battery performance. Observe the battery condition with hydrometer and voltage readings. Use only distilled water when filling batteries. To achieve the highest quality of battery performance and longevity maintain the batteries in their proper operating range.

#### **How long will the batteries last?**

Conduct this eight-hour test to determine how long your particular battery bank will operate before dropping below 50% state of charge.

1. Before beginning the test, be sure the batteries are at 100% charge by verifying with a hydrometer or an accurate voltmeter.
2. Turn the interior house power on. Turn on several lights.
3. After the eight-hour period, turn off the lights, refrigerator and interior house power. Allow the battery electrolyte to stabilize for at least one to three hours.

Test the batteries again with a hydrometer or voltmeter. Are the batteries above or below 50% State of Charge? This test will give an idea of how long your particular battery bank will actually last.

## **LIGHTS**

Depending on floor plan, actual styles may differ.

#### **To Replace a Bulb:**

1. Carefully squeeze the lens cover then gently pull the cover out. The cover has tabs that lock the cover in place.
2. Using a clean cloth or piece of tissue carefully grasp the bulb and rotate to the unlock position.
3. Remove bulb from the socket.
4. The bulb replacement is 1141 12V 21CP.
5. Using a clean cloth or piece of tissue grasp the new bulb and align the prongs on the bulb with the slot on light socket.
6. Push bulb in and rotate to lock position.
7. Gently squeeze lens cover and insert tabs on cover into fixture.

#### **INFORMATION:**

**Confirm replacement bulb number before ordering or obtaining a replacement.**

**CAUTION:**

**Allow bulb to cool down before replacing.**

***Interior Halogen*****To Remove:**

1. Grasp light fixture and pull down slightly then tilt fixture to one side. This will allow one spring clip to come out.

**CAUTION:**

**Push spring clip inward with a finger as clip is being eased out. Hold clip to prevent clip from pinching fingers.**

2. Tilt fixture to other side and ease the other spring clip out.
3. Unscrew the light lens counterclockwise and remove.
4. Carefully grasp bulb and pull from socket. Replace with the same type of bulb.
5. Use a clean cloth or piece of tissue to grasp new bulb. Do not touch bulb directly as this can cause a "hot spot" and result in immediate bulb failure.
6. Align contacts of bulb with terminals in fixture base. Insert bulb until contacts are firmly seated.

**To Reinstall:**

7. Align tabs on light lens with slots in fixture base. Rotate lens clockwise until light lens locks into place.
8. Fold up both spring clips and insert light fixture into opening. Once in opening the spring clips will expand and lock

light fixture into place.

**CAUTION:**

**Do not touch halogen lighting while on. They can cause a burn. Do not touch replacement bulbs. Oil in the hands can cause a "hot-spot" to occur. If the bulb is touched, allow it to cool and clean the bulb with alcohol.**

**If Interior Halogen Lights Fail to Operate:**

- ◆ Ensure battery switch (by entry door) is turned on.
- ◆ Check for blown bulb.
- ◆ Check fuse in the distribution panel.

## Notes

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

# Maintenance Records and Index

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**MAINTENANCE RECORDS**

After scheduled services are performed, record the date, odometer reading and who performed the service. Any additional information can be added on the following pages. In addition, retain all maintenance receipts.

MILEAGE	A	A1	A2	A3	A4	B	C	D	E	DATE	BY
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WEIGHT RECORD SHEET

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TOTAL GROSS  
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## Notes

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