

HOLIDAY RAMBLER MOTORHOME LIMITED WARRANTY

WHAT THE PERIOD OF COVERAGE IS:

This Limited Warranty provided by Holiday Rambler® (“Warrantor”) covers those components, assemblies and systems of your new motorhome not excluded under the section “What is Not Covered” and when sold by an authorized dealer, for twelve (12) months from the original retail purchase date or the first 24,000 miles of use, whichever occurs first. However, this Limited Warranty provided by Warrantor covers the steel or aluminum frame structure, only, of the sidewalls (excluding slide outs), roof, and rear and front walls for sixty (60) months from the original retail purchase date or the first 50,000 miles of use, whichever occurs first.

If you use your motorhome for any rental, commercial or business purposes whatsoever, the Limited Warranty provided by Warrantor covers your new motorhome when sold by an authorized dealer for ninety (90) days from the original retail purchase date or the first 24,000 miles of use, whichever occurs first. In addition, the Limited Warranty provided by Warrantor covers the steel or aluminum frame structure, only, of the sidewalls (excluding slide outs), roof, and rear and front walls for twelve (12) months from the original retail purchase date or the first 24,000 miles of use, whichever occurs first. A conclusive presumption that your motorhome has been used for commercial and/or business purposes arises if you have filed a federal or state tax form claiming any business tax benefit related to your ownership of the motorhome.

The above Limited Warranty coverage applies to all owners, including subsequent owners, of the motorhome. However, a subsequent owner must submit a warranty transfer form by filing the form through an authorized Monaco dealer. A subsequent owner’s warranty coverage period is the remaining balance of the warranty coverage period the prior owner was entitled to under this Limited Warranty. Warranty transfer forms can be obtained by contacting the Customer Relations Department. There is no charge for the transfer.

LIMITATION AND DISCLAIMER OF IMPLIED WARRANTIES:

IMPLIED WARRANTIES, IF ANY, ARISING BY WAY OF STATE LAW, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY AND ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE TERM OF THIS LIMITED WARRANTY AND ARE LIMITED IN SCOPE OF COVERAGE TO THOSE PORTIONS OF THE MOTORHOME COVERED BY THIS LIMITED WARRANTY. WARRANTOR DISCLAIMS ALL IMPLIED AND EXPRESS WARRANTIES, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, ON COMPONENTS AND APPLIANCES EXCLUDED FROM COVERAGE AS SET FORTH BELOW. There is no warranty of any nature made by Warrantor beyond that contained in this Limited Warranty. No person has authority to enlarge, amend or modify this Limited Warranty. The dealer is not the Warrantor’s agent but is an independent entity. Warrantor is not responsible for any undertaking, representation or warranty made by any dealer or other person beyond those expressly set forth in this Limited Warranty. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

WHAT THE WARRANTY COVERS:

Warrantor’s Limited Warranty covers defects in the manufacture of your motorhome and defects in materials used to manufacture your motorhome. “Defect” means the failure of the motorhome and/or the materials used to assemble the motorhome to conform to Warrantor’s design and manufacturing specification and tolerances. Also see the section “What the Warranty Does Not Cover” set out below.

WHAT WE WILL DO TO CORRECT PROBLEMS:

Warrantor’s sole and exclusive obligation is to repair and/or replace, at its option, any covered defect if: **(1)** you notify Warrantor or one of its authorized servicing dealers of the defect within the warranty coverage period and within five (5) days of discovering the defect; and **(2)** you deliver your Motorhome to Warrantor or Warrantor’s authorized servicing dealer at your cost and expense. It is reasonable to expect some service items to occur during the warranty period. The performance of warranty repairs shall not extend the original warranty coverage period. Further, any performance of repairs after the warranty coverage period has expired or any performance of repairs to component parts and appliances that are excluded from coverage shall be considered “good will” repairs, which shall not alter the express terms of this limited warranty. If the repair or replacement remedy fails to successfully cure a defect after Warrantor received a reasonable opportunity to cure the defect(s), your sole and exclusive remedy shall be limited to Warrantor paying you the cost of having an independent third party perform repair(s) to the defect(s).

Warrantor may use new and/or remanufactured parts and/or components of substantially equal quality to complete any repair.

Defects and/or damage to interior and exterior surfaces, trim, upholstery and other appearance items may occur at the factory during manufacture, during delivery of the motorhome to the selling dealer or on the selling dealer’s lot. Normally, any such defect or damage is detected and corrected at the factory or by the selling dealer during the inspection process performed by the Warrantor and the selling dealer. If, however, you discover any such defect or damage when you take delivery of the motorhome, you must notify your dealer or Warrantor within five days of the date of purchase to have repairs performed to the defect at no cost to you as provided by this Limited Warranty.

If either three or more unsuccessful repair attempts have been made to correct any covered defect that you believe substantially impairs the value, use or safety of your motorhome, or repairs to any covered defect(s) which you believe substantially impairs the value, use or safety of your motorhome have taken 30 or more days to complete, you must, to the extent permitted by law, notify Warrantor directly in writing of the failure to successfully repair the defect(s) so that Warrantor can become directly involved in exercising a repair attempt for the purpose of performing a successful repair to the identified defect(s).

HOW TO GET SERVICE:

The “Acknowledgement of Receipt of Warranty/Production Information” form must be returned to Warrantor promptly upon purchase to assure proper part replacement and repair of your motorhome. Failure to return the “Acknowledgement of Receipt of Warranty/Production Information” form will not affect your rights under the Limited Warranty so long as you can furnish proof of purchase. For warranty service simply contact one of Warrantor’s authorized service centers for an appointment, then deliver your motorhome (at your expense) to the service center. If you need assistance in locating an authorized warranty service facility, contact Warrantor’s Warranty Department (1-877-466-6226). The mailing address is:

**91320 Coburg Industrial Way
Coburg, Oregon 97408**

In the event the motorhome cannot be driven to a servicing dealer to have warranty repairs performed to it due to a malfunction of a warranted part, Warrantor will pay the cost of having the motorhome towed to the nearest authorized repair facility provided you notify Warrantor prior to incurring the towing charges to receive directions to the nearest repair facility.

Because Warrantor does not control the scheduling of service work by its authorized servicing dealers, you may encounter some delay in scheduling and/or in the completion of the repairs.

WHAT THE WARRANTY DOES NOT COVER:

This Limited Warranty does not cover: any motorhome sold or registered outside of the United States or Canada; items which are added or changed after the motorhome leaves Warrantor’s possession; items that are working as designed but which you are unhappy with because of the design; normal wear and usage, such as fading or discoloration of fabrics, or the effects of moisture inside the motorhome; blistering, crazing, thermal fatigue, cracking, chalking, fading, discoloration, rot, corrosion, mildew, wood separation and core voids of the exterior fiberglass; defacing, scratching, dents and chips on any surface or fabric of the motorhome, not caused by Warrantor; owner maintenance, including by way of example wheel alignments and resealing exterior sealant areas; the automotive chassis and power train, including, by way of example the engine, drivetrain, steering and handling, braking, wheel balance, muffler, tires, tubes, batteries and gauges; appliances and components covered by their own manufacturer’s warranty including, by way of example: the exterior fiberglass panels, microwave, refrigerator, icemaker, stove, oven, generator, roof air conditioners, hydraulic jacks, VCR, television(s), water heater, furnace, stereo, radio, compact disc player, washer, dryer, inverter and cellular phone; or flaking, peeling and chips or other defects or damage in or to the exterior or finish caused by rocks or other road hazards, the environment including airborne pollutants, salt, tree sap and hail. Component part and appliance manufacturers issue limited warranties covering those portions of the motorhome not covered by the Limited Warranty issued by Warrantor. To learn more on what specific component parts and appliances are excluded from the Limited Warranty issued by Warrantor please contact your selling dealership or Warrantor directly or review the warranty packet inside the Motorhome.

EVENTS DISCHARGING WARRANTOR FROM OBLIGATION UNDER WARRANTY:

Misuse or neglect, accidents, unauthorized alteration, failure to provide reasonable and necessary maintenance (see Owner’s Manual), damage caused by off road use, collision, fire, theft, vandalism, explosions, overloading in excess of rated capacities, and odometer tampering shall discharge Warrantor from any express or implied warranty obligation to repair any resulting defect.

DISCLAIMER OF CONSEQUENTIAL AND INCIDENTAL DAMAGES:

THE ORIGINAL PURCHASER OF THE MOTORHOME AND ANY PERSON TO WHOM THE MOTORHOME IS TRANSFERRED, AND ANY PERSON WHO IS AN INTENDED OR UNINTENDED USER OR BENEFICIARY OF THE MOTORHOME, SHALL NOT BE ENTITLED TO RECOVER FROM WARRANTOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES RESULTING FROM ANY DEFECT IN THE MOTORHOME, INCLUDING BY WAY OF EXAMPLE FUEL AND TRANSPORTATION EXPENSES TO DELIVER THE PRODUCT TO THE SERVICING DEALER, HOTEL ROOMS, LOST WAGES AND MOISTURE DAMAGE SUCH AS MOLD AND MILDEW. THE EXCLUSION OF CONSEQUENTIAL AND INCIDENTAL DAMAGES SHALL BE DEEMED INDEPENDENT OF, AND SHALL SURVIVE, ANY FAILURE OF THE ESSENTIAL PURPOSE OF ANY LIMITED REMEDY. Some states do not allow the exclusion or limitation of consequential or incidental damages, so the above exclusions may not apply to you.

LEGAL REMEDIES:

THIS LIMITED WARRANTY DOES NOT “EXTEND TO FUTURE PERFORMANCE.” ANY ACTION TO ENFORCE THIS LIMITED WARRANTY OR ANY IMPLIED WARRANTIES SHALL NOT BE COMMENCED MORE THAN ONE YEAR AFTER THE EXPIRATION OF THE ONE YEAR WARRANTY COVERAGE PERIOD DESIGNATED ABOVE. IF YOU USE YOUR MOTOR HOME FOR COMMERCIAL OR BUSINESS PURPOSES, ANY ACTION TO ENFORCE THIS LIMITED WARRANTY OR ANY IMPLIED WARRANTIES SHALL NOT BE COMMENCED MORE THAN ONE YEAR AFTER THE EXPIRATION OF THE NINETY (90) DAY WARRANTY COVERAGE PERIOD DESIGNATED ABOVE. THE PERFORMANCE OF REPAIRS SHALL NOT SUSPEND THIS LIMITATIONS PERIOD FROM EXPIRING. Some states do not allow the reduction in the statute of limitations, so the above reduction in the statute of limitations may not apply to you.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE.

LARGER PRINT VERSION AVAILABLE WITHIN THE OWNERS MANUAL AND UPON REQUEST ADDRESSED TO YOUR SELLING DEALER OR WARRANTOR’S WARRANTY DEPARTMENT.

ADMIRAL 2007

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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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WARRANTY INFORMATION FILE

In addition to this Owner's Manual you will find a Warranty Information File in your unit. This file contains valuable documents about your motorhome 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. Be sure you read and understand all the information in this file to help you safely operate, maintain and troubleshoot those items.

Additional Information:

Changes, additions and supplemental information in the form of Manual Addendums and "Tech Tips" can be obtained by visiting our Web Site at **www.monaco-online.com**. Select one of the products from the product lineup. Go to the Service menu. A submenu will appear.

It may also be helpful to browse the "Tech Tips" menu for the other product lines. The tips may not completely apply to your particular model but information contained therein can be useful.

REPORTING SAFETY DEFECTS

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

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of motorhomes, it may order a recall or remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer or Monaco Coach. To contact NHTSA you may call the Auto Safety Hot line toll-free at 1-888-327-4236 (TTY: 1-800-424-9153 for hearing impaired) (or 1-202-366-0123 in the Washington D.C. area), visit their websites at **www.nhtsa.gov** or **www.safercar.gov**, or write to:

NHTSA
U.S. Department of Transportation
400 Seventh Street S.W.
Washington, DC 20590

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.

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.

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.

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.

AGM Batteries - A type of battery that suspends acid in a special glass mat.

Alternating Current (AC) - A current that varies periodically in magnitude and direction. A battery does not deliver alternating current. Also referred to as shore power, utility power, inverter power, generator power, etc.

Ampere (Amp) - The unit of measure of electron flow rate of 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 - Powers chassis 12 Volt accessories and starts 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 that you hook-up to 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.

Curbside - This refers to the side of the motorhome which 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.

Cycle - In a battery, one discharge plus one recharge equals one cycle.

Direct Current (DC) - Power that is stored in a battery bank or supplied by photovoltaics, alternator, chargers and DC generators. Direct current is also known as battery power. Current only flows one way.

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.

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.

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 window located in the rear of the motorhome. Egress windows can be easily 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.

LED (Light Emitting Diode) - Indicator light.

LLA Battery - A type of battery that uses liquid as an electrolyte. Periodic maintenance is required, such as cleaning the connections and checking the electrolyte level.

Low Point Drain - The lowest point in the plumbing. Drains are placed here so that water will drain out of the lower end of the motorhome. These 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: $E = IR$. If any two of the three values are known, the third value can be calculated by using the above formula.

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.

Roadside - This refers to the side of the motorhome which faces the road when it is 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 Line - This is the electrical cord which runs from the motorhome to the campground 120 Volt AC electrical supply.

Shore Line Plug - The 120/240 Volt AC outlet allows the motorhome to be hooked up to a campground facility.

Stinger - An arm attachment on a tow truck that is used to lift the motorhome slightly so that it can be towed.

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.

OWNER'S MANUAL SURVEY: ADMIRAL 2007

Your suggestions are very important to us and we are continually striving to improve the quality of our manuals. After becoming familiar with your new recreational vehicle and the accompanying manual, please take the time to answer the following questions. When you are finished please return the survey via mail to our Technical Publications Department, or you may fax the survey to: **(541) 681-8031 Attention: Technical Publications Department**. Feel free to attach an additional page if you desire.

1. Is this your first recreational vehicle? YES / NO (circle one)

2. If no, what was your previous recreational vehicle brand/model? _____

3. Was the overall appearance and lay-out of this manual what you expected to see in your new recreational vehicle?

4. Was the information within this manual helpful in acquainting you with your new recreational vehicle? If not please address any area(s) we need to expand or improve on.

5. Were the operating instructions clearly written, and were you able to follow the steps without any difficulty?

6. Is there any additional information you would like to see incorporated within the owner's manual?

NAME: _____

PHONE: (_____)_____

ADDRESS: _____

VIN # _____

TEAR OFF PAGE AND MAIL TO:

TECHNICAL PUBLICATIONS PLT. 17
MONACO COACH CORPORATION
91320 COBURG INDUSTRIAL WAY
COBURG, OR 97408

LIMITED WARRANTY TRANSFER APPLICATION/CHANGE OF OWNER INFORMATION

Mail to:

**Monaco Coach Corporation
Warranty Transfer
91320 Coburg Industrial Way
Coburg, OR 97408**

Please read terms and representations below before signing.

Submitted By:

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: (_____) _____

☐

Limited Warranty Transfer

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Address Change

A. Current Owner Information:

First Name Initial Last Name

Vehicle Identification Number Unit # (15 digits) (6 digits) Model/Year

B. New Owner Information, Transfer Coverage To:

First Name Initial Last Name

(_____) _____
Phone Number Street Address City State Zip

Date of Transfer (If Applicable) Odometer Reading at Transfer (If Applicable)

C. Signatures:

(New) Owner's Signature Date Selling Dealer's Signature (If Applicable) Date

Terms & Representations

By your signature(s) on face side of this form, and in order to induce Monaco Coach Corporation to transfer its Limited Warranty, you represent the following:

1. That you have received and read a copy of the Limited Warranty.
2. You understand that the unit is to be used only for family camping and cross country travel on improved roads.

3. All information provided by you on face side of this form is true and correct.
4. You understand that you are purchasing a pre-owned recreational vehicle and Monaco Coach Corporation does not make any representation as to its present condition.

TEAR OFF PAGE AND MAIL TO:

WARRANTY TRANSFER, MONACO COACH CORPORATION,
91320 COBURG INDUSTRIAL WAY
COBURG, OR 97408

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DRIVING & SAFETY

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

NOTE:

The motorhome has an electronic data recording device that may record information regarding 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

There are significant differences between a passenger automobile and a motorhome. Always be aware of these differences when traveling. The key to safely operating a motorhome is inspection. Undetected problems could cause problems on the road and may result in lost time and increased repair costs. Several states require a special license endorsement and motorhome inspection prior to registration. Know and observe the laws of the states in which you will be traveling. Laws may vary from state to state. A systematic inspection conducted prior to moving the motorhome can help ensure nothing is overlooked and will assist in familiarizing the owner with the motorhome.

Prior to moving the motorhome perform a general inspection, which includes examining the condition of the motorhome and the surrounding area of the motorhome. Look high and low when walking around the motorhome.

Familiarize Yourself

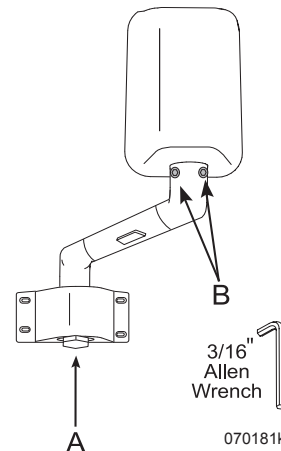
Because the location of the driver's seat in the motorhome is higher and farther to the left than most vehicles, a different perspective of the roadway is created. Rely on the outside mirrors to line up with the center of the road and to check conditions behind the motorhome. The dashboard may include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

Mirror Adjust (Manual)

Prior to starting out, adjust mirrors. It is recommended to have an assistant help with adjustments to prevent damage to the mirror or the motorhome.

Mirror Adjusting:

- ◆ Adjust the driver seat to travel position.
- ◆ Using a 9/16" socket, have the assistant loosen the bolt located at the base of the mirror (see A on illustration).



- ◆ Adjust the mirror for a clear side view of the motorhome.
- ◆ Tighten the base bolt once proper adjustment is made.
- ◆ To adjust the head of the mirror, loosen the 3/16" Allen screw located at point B. Adjust to the left or the right.
- ◆ Ensure the Allen set screws and bolt are tight.

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. **DO NOT** use a seat belt on 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 your size and sitting position. **DO NOT** route belts over armrest.

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. Avoid seat rotation while in transit.

Child Safety Seat:

Children that fit into *Example 1* and *Example 2* require the use of a child safety seat. In the motorhome, the child safety seat can be positioned in two places: the front passenger (co-pilot) seat and the forward facing permanently mounted booth dinette seat.

WARNING:

Only forward facing booth dinette seats equipped with seat belts are designed for occupancy while the motorhome is in motion.

WARNING:

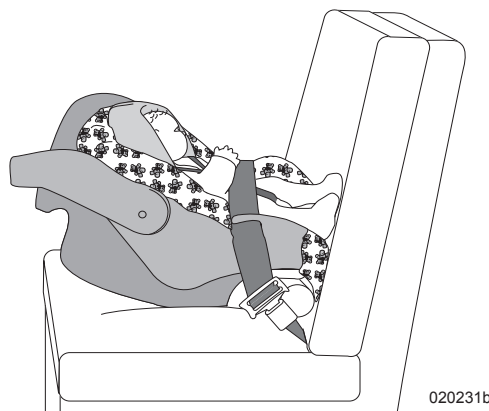
Children must not be transported unrestrained. Infants must be placed in approved safety seats. Small children must be restrained in child safety seats. DO NOT use a single seat belt on more than one child. Failure to comply with these rules can lead to injury or death.

NOTE:

Individual states and Canadian provinces may have laws that can exceed the requirements described above. It is your obligation to know and comply with the laws in the state or province in which you travel.

A child safety seat is required for any child:

- ♦ **Infants** - from birth to one year, or up to 21 lbs., the child is considered an infant. A (convertible) safety seat for an infant must be secured facing to the rear. The top of the head must be below the top of the safety seat. Secure safety seat harness straps at or below the shoulders (*Example 1*).



Example 1: Convertible seat facing to the rear.

- ♦ **Toddlers** - Children over one year and between 20 to 40 lbs. are considered toddlers. A (convertible) safety seat for a child must be secured facing forward. The top of the head must be below the top of the safety seat. Secure safety seat harness straps at or below the shoulders (*Example 2*). Most seats require a top slot for facing forward.

- ♦ **Young Children** - Children (ages four to eight) over 40 lbs. and under 4' 9" require a booster seat. The booster seat places the child's waist and shoulders at the proper height for the supplied safety belt to be effective. The top of the head must be below the top of the safety seat (*Example 2*).



Example 2: High back booster seat facing forward.

WARNING:

Installation illustrations are for reference only, and are not to be used as a guide. Because there are many styles of safety and booster seats, refer to the safety seat manufacturer's manual for proper installation and how to properly install and secure the safety or booster seat.

NOTE:

Individual states and Canadian provinces may prohibit use of a safety or booster seat in the front seat.

Seat Belt Care:

Keep the belt clean and dry. Clean with mild soap and lukewarm water. **DO NOT** clean seat belts with bleach, dye or abrasive cleansers that may weaken the belt material. Periodically **inspect** belts for cuts, frays or loose parts, and replace damaged parts. **DO NOT** disassemble or modify the system. Replace the seat belt assembly after a severe impact, even when damage is not obvious.

DRIVING TIPS

Being familiar with the operation of the motorhome before starting a trip will greatly enhance the traveling experience. Motorhome driving characteristics differ greatly from the average passenger car or pickup truck. The complexity of the vehicle, size and various components requires increased driving awareness. Due to the motorhome length the turning radius will be much wider than that of a standard automobile. Always pay close attention to the perimeter of the motorhome: front, sides, rear, roof and undercarriage. Ensure the surrounding area is clear of obstacles. Utilize the driving mirrors to observe traffic conditions as well as the motorhome exterior: tires, bay doors, blind spots, etc. Use a push-pull method of steering, with both hands parallel on the steering wheel. The motorhome is also heavier than an automobile with a higher center of gravity. These factors affect the reaction time of the motorhome. Swerves and sharp turns, especially performed at high speeds, could result in loss of control of the motorhome. Keep the size of the motorhome in mind and drive with extra caution

to avoid situations which might require quick momentum changes. Increase reaction time by paying attention to traffic and road conditions 12 to 15 seconds ahead of the motorhome's position. Motorhomes are larger in length, weight and width and therefore take up more of the driving lane.

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 the added length of the motorhome.

When descending a long hill, manually shift the transmission to a lower gear and begin the descent at a slow speed. **DO NOT** allow the motorhome to gain momentum before trying to slow down. The transmission and engine will help control downhill speed and can extend the service life of the brake lining.

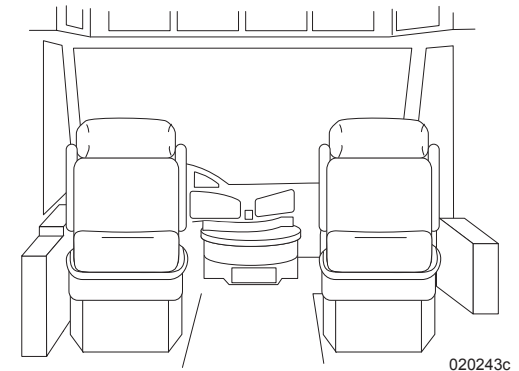
The distance required to stop the motorhome is greater than an automobile. The brakes are designed for the **(GVWR)** Gross Vehicle Weight Rating. Practice stopping away from traffic to get the "feel" of distance required to stop the motorhome.

When backing up, have the co-pilot stand at the roadside rear corner so the co-pilot remains visible in the roadside mirror. The co-pilot can watch for obstacles and give hand signals during the backing up process.

Make sure bridges being crossed can support the weight of the motorhome. Check the tonnage limit of the bridges before crossing. Signs should be posted at bridge entrances. Check the posted height of all overpasses or situations where overhead clearance is limited. Keep in mind that road surfaces may be repaved or packed with snow; therefore, the

actual posted clearance height would not apply in such conditions.

Use the pilot seat controls to set the seat to a comfortable position. Stay seated and adjust the outside mirrors if necessary to gain a clear line of vision down both sides of the motorhome. After the outside mirrors have been adjusted, confirm the rear view camera system is working and clear of any obstruction.



In the normal course of travel different types of roads (urban, rural, primitive) will be encountered along with different weather (rain, wind, snow, sun) and terrain (mountains, desert, coastal). 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.

The cockpit, dash area and windshield are larger than those found on passenger cars and trucks. Pay special attention to keeping 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. In conjunction with the dash defrost, it may be necessary to use a clean cloth to wipe away moisture.

Keeping quality windshield wipers in good working order is a must when driving in adverse conditions.

Keep the windshield clear. Do not operate the motorhome when road, weather and terrain conditions seem unsafe.

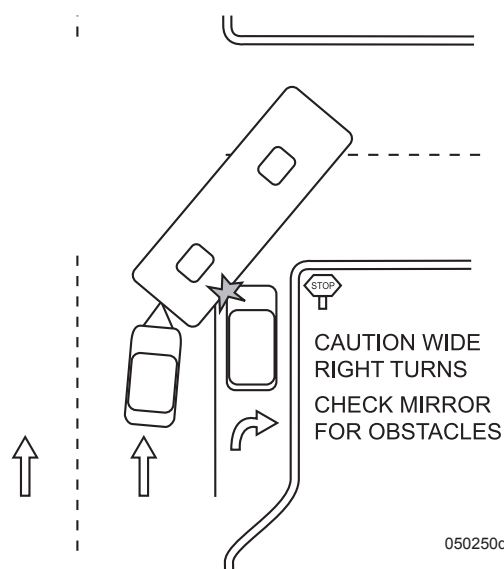
Driving Cautions:

- ◆ Avoid getting too close to the edge of the road. A soft shoulder may not support the weight of the motorhome.
- ◆ Side spacing is best maintained by staying centered in the driving lane.
- ◆ Driving lanes in work zones can be uneven, congested and more narrow than usual.
- ◆ Be cautious of road debris which can damage the undercarriage of the motorhome or become lodged in the dual tires causing damage to the tires, wheel rims or tow car.
- ◆ Keep in consideration that posted speed signs are passenger automobile rated. An extra awareness of the driving conditions and appropriate speed for a motorhome are 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 your hips should be parallel to the roadside curb of the corner being turned. This will aid in avoiding a premature turn.
- ◆ 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** start the turn until the center of the intersection is reached with your hips. If there are two lanes available, take the right hand lane. A car or driver on the left hand side is easier seen.

Ascending a Grade:

When approaching an uphill grade, assess the grade and length before beginning the climb. Prepare early for long climbs. Determine ranges where the motorhome works best by driving long grades when temperatures remain stable for the duration of the climb.

IMPORTANT SAFETY TIP:

Turn on the four way flashers if road speed degrades to the point where the motorhome is moving significantly under the posted speed. Use pullouts if traffic is building. Once in a pullout, if there is sufficient clearance for safety, idle the engine for a while to allow the exhaust and the turbo to cool. While these are cooling, the transmission will also cool. 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). **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, as the brakes can overheat. Over-use can result in the loss of brake effectiveness.

Night Driving:

- ◆ As always be well rested and alert when driving. If necessary, find a safe stopping place to rest until ready to continue.
- ◆ Avoid using interior lights while driving that can create a glare on the windshield and decrease visibility.
- ◆ Dim dash lights to a comfortable level to reduce the level of glare.

Extreme Heat and 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 Conditions:

- ◆ The motorhome should be prepared for cold weather use.
- ◆ Keep speeds slow and steady. Make moves gradually and increase visual distance for a gain in reaction time.

- ◆ If road or weather conditions are treacherous find a safe stopping place and wait for conditions to improve.
- ◆ Avoid downshifting on wet or slippery surfaces, which 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 the risk of hydroplaning.
- ◆ Heavy rain or deep standing water can cause brakes to apply unevenly or grab.

Fuel Economy:

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

Increasing Fuel Efficiency:

- ◆ When starting out, apply the throttle lightly and accelerate gradually. Avoid using excessive throttle and accelerating quickly.
- ◆ Check tire pressure. Low tire pressure is not only a safety hazard, but also increases rolling resistance to increase fuel consumption.
- ◆ Operate the motorhome engine at a low to mid operating range. This will use 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. Wait until engine coolant temperature rises. The engine is now ready for travel.
- ◆ Follow the engine maintenance schedule.

Refueling:

- ◆ Truck stops are good refueling points for motorhomes.
- ◆ Check overhead clearance height before pulling through 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.
- ◆ Use of gloves is recommended for refueling. Store gloves in the outside compartment.
- ◆ 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.

WARNING:

Ensure all flames are extinguished and the primary LP-Gas valve is off before refueling to avoid the risk of fire or explosion. LP-Gas and gasoline are highly flammable and can ignite, resulting in explosion, fire or death.

TRIP PREPARATION

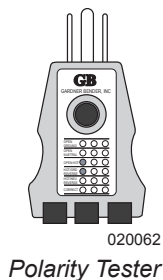
Prior to departure on a trip, several items need to be prepared. Suggestions are listed below to use as a general guideline when preparing to depart.

INFORMATION:

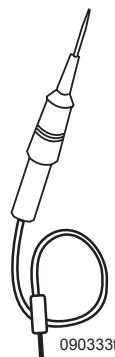
For chassis maintenance details, please refer to the chassis section.

Items To Carry:

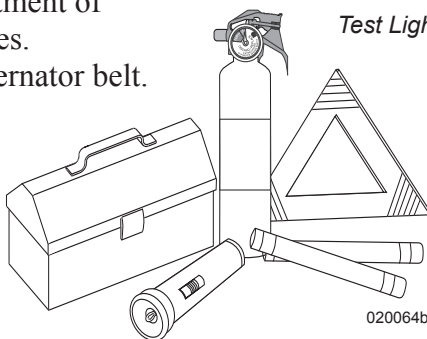
- ◆ Local, State and National Maps. A “Motor Carrier” road atlas can be useful for showing maps, refueling stations and truck repair facilities.
- ◆ Emergency road kit containing a flashlight, road flares, warning signs and a fire extinguisher.
- ◆ Potable/non-potable water hoses and a water pressure regulator.
- ◆ Assortment of termination connectors for sewage.
- ◆ Hand tools.
- ◆ 12 Volt DC test light and a 120 AC Polarity Tester.
- ◆ Battery hydrometer.
- ◆ An assortment of spare fuses.
- ◆ Spare alternator belt.



Polarity Tester



Test Light



Tool Box & Emergency Road Supplies

Interior Items:

- ◆ Start refrigerator operation the night before departure to get a head start on the cooling process. Pre-cool items prior to loading them in the refrigerator.
- ◆ Load pots, pans, utensils, soap, linens, etc.
- ◆ Secure and fasten interior doors. Lock the shower door.
- ◆ Close roof vents and windows.
- ◆ Secure loose, heavy or sharp objects in case of a sudden stop.
- ◆ Close all cabinet doors and drawers.
- ◆ Walk the interior and check for items not secured.
- ◆ Test appliances before leaving home.
- ◆ Turn interior lighting **OFF**.
- ◆ Turn icemaker **OFF**.

Exterior Items:

- ◆ Check operation of all exterior lights, headlamps, taillights, brake and clearance lights.
- ◆ Check the battery fluid level of Liquid Lead Acid batteries.
- ◆ Check all fluid levels on the chassis and generator (see the **Chassis Information** section and OEM generator manual for details).
- ◆ Adjust mirrors.
- ◆ Test the windshield wipers.
- ◆ Fill the LP-Gas tank.
- ◆ Test the generator.
- ◆ Ensure the following items are in the motorhome: sewer connection hose, water fill hose, awning rod and electrical adapters.

Engine Checklist:

- ◆ **Inspect** the engine, transmission and engine compartment for fluid leaks.
- ◆ **Inspect** the area under the motorhome for fluid leaks or puddles.
- ◆ Check all fluid levels: oil, antifreeze, transmission, brake, hydraulic and washer fluid.
- ◆ **Inspect** belts and hoses for wear.
- ◆ **Inspect** wiring for loose, frayed or corroded connections.
- ◆ Start engine and listen for unusual noises.

Driving Preparations:

- ◆ **Inspect** oil bath hub oil level (if applicable).
- ◆ Fill the fresh water tank and confirm waste tanks are empty. Test the water pump.
- ◆ Disconnect and store fresh water hose.
- ◆ Check all tires for accurate pressure. **Inspect** tires for cuts, punctures, weather damage or cracks in sidewalls or tread.
- ◆ Check for foreign objects lodged between dual tires.
- ◆ Ensure all lug nuts are tight. This should be done by an approved repair facility.
- ◆ Secure all awning locks.
- ◆ Secure items in storage bays to prevent shifting or damage to items.
- ◆ Outside compartment doors should be closed and locked.
- ◆ Look around, above and under the motorhome for obstruction.
- ◆ Check fuel level gauge. Fill tank if necessary.
- ◆ Check all other dash gauges for operation and correct level indications.
- ◆ Secure and lock the entry door for travel.
- ◆ Lower the antenna.

Storing Cargo:

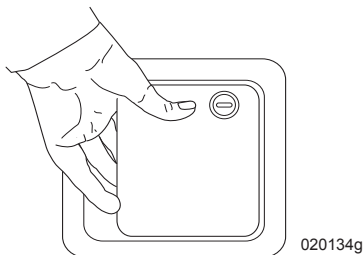
Exercise caution when opening storage bays as cargo may shift during travel. When closing the bay doors, keep fingers clear of openings.

CAUTION:

Open the cargo door slowly as cargo may shift forward 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.



Remember that regardless of how large the motorhome, there is a limit to storage capacity. Pack as lightly as possible to allow for additional storage during the trip. It is often easier to purchase needed items at the final destination rather than discarding items to make room for additional cargo.

When packing the motorhome, keep turning and braking in mind. For the motorhome to handle well, the load will need to be evenly distributed side-to-side and front-to-back. Additionally, heavy items should be stored as low as possible to prevent the motorhome from becoming top heavy. Make sure that everything is secure and safe from quick turns, bumps and sudden stops.

Guidelines for Loading the Motorhome:

- ◆ Distribute the cargo weight evenly from side-to-side and front-to-back. This practice will prevent both handling problems and uneven stress on the components throughout the life of the motorhome.
- ◆ Heavy items should be stored near the rear axle; lighter items toward the front.
- ◆ To maintain a low center of gravity and reduce sway, store light items in overhead cabinets and heavier items near the floor.
- ◆ Secure loose items to prevent weight shifts that could affect the balance of the motorhome.

TIPS:

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

HITCH

Using the Rear Receiver

When using the rear 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 receiver use. Avoid excessive towing loads or other misuse of the receiver. Towing will affect fuel economy. Weight pushing down on the rear hitch must not exceed 10% of the hitch capacity.

It is recommended to weigh the motorhome when fully loaded to ensure proper weight distribution of the **GCVW (Gross Combined Vehicle Weight)**. When weighing the motorhome add all passenger weight to the

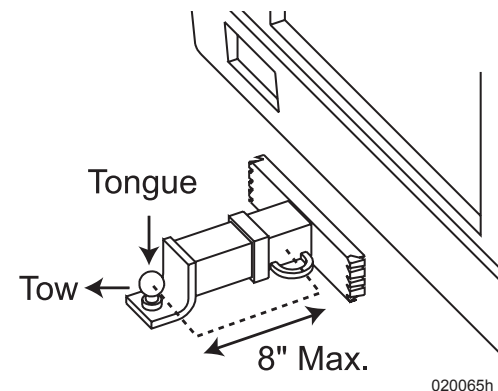
GCVW total. The motorhome fully loaded, including fresh water, LP-Gas and any vehicle or trailer towed, must not exceed the **GCWR (Gross Combined Weight Rating)**.

WARNING:

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

WARNING:

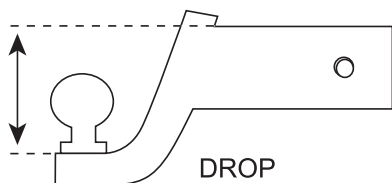
DO NOT tow a trailer or vehicle that exceeds the rated capacity of the hitch receiver. Overloading the hitch receiver can cause unusual handling characteristics and overstress the hitch receiver and chassis. It could also void the warranty. If there are any questions, call Technical Support.



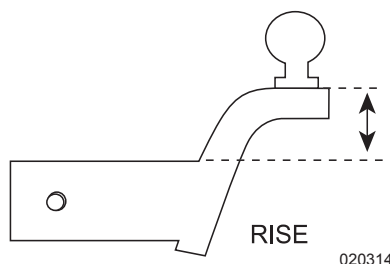
	Tongue	Tow
33' - 37'	400 lbs.	4,000 lbs.
Maximum Rated Hitch Capacities		

Ball Mount:

Ball mounts come in various configurations and weight limitations. Consider three things 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.

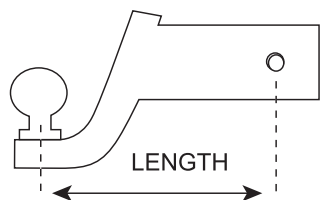


Distance from the shank to the top of the hitch ball platform.



020314

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



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

Weight Distributing Hitches:

A weight distributing hitch uses spring bars of spring steel to compensate for lack of adequate rear suspension of the tow vehicle. This type of hitch is generally used for towing heavier loads as tongue weight and gross tow weight increases. The spring bars attach to the hitch head assembly and the trailer frame.

Hitch Ball:

The hitch ball is what the trailer attaches to. A hitch ball is available in three common diameters, 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 towed load should become uncoupled from the hitch ball, the towing equipment will be cradled by the safety chains. If the towed load does uncouple, do not attempt to 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 that are part of the towing system must be greater than the gross weight of the load being towed. To help define weight capacity of towing equipment, components are classified into weight groups. 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 3500 lbs. Maximum tow capacity is reduced to 3500 lbs.

Many times a component will have a Class weight rating. These groups are shown in chart:

WARNING:

Ensure the weight ratings of the ball mount, tow ball and safety chains are equal to or greater than the load. The 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.

Taillight Configuration:

Taillights come in different configurations referred to as a 2-wire or 3-wire configuration. A 2-wire configuration has all red lenses. A 3-wire configuration usually has red and amber lenses. Amber is used for turn signals only and red for taillight and brake light. These systems are electrically different. Whenever hooking a 2-wire system to a 3-wire system, or vice versa, a converter box must be installed for correct taillight function. 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 taillights and turn signals work correctly on the motorhome and towed vehicle or trailer when the tow plug connection is made.

	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.

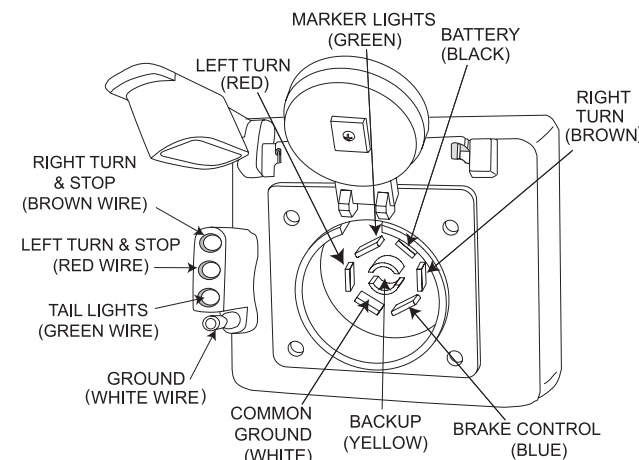
Tow Plug Connection

The motorhome is pre-wired from the factory with an electrical connection for towing, located on or near the hitch receiver. Convoluted tubing protects the tow harness wires. 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.

When preparing a tow plug connection, strip the wires 3/8". Twist the wire strands and place under the clip and secure the screw. Make sure there are no loose strands of wire that could short against the case or other terminals. **DO NOT** accidentally mirror image the trailer connection.

CAUTION:

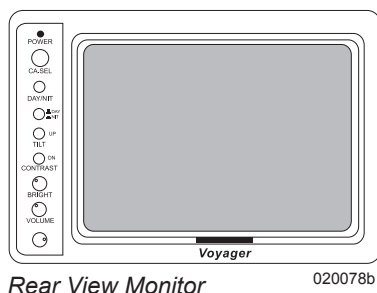
Positive terminal connection of the tow plug remains live at all times. When towing a trailer equipped with a battery, unplug the electrical tow connection when parked. Failure to unplug the tow connection may result in discharged chassis batteries.



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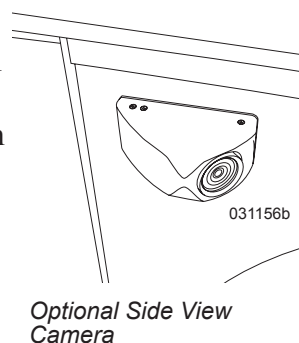
REAR VIEW SYSTEM (Optional)

The rear vision system consists of an adjustable camera with dash mounted monitor to allow the driver to see what is behind the motorhome and a microphone to listen to verbal guidance.



Monitor Features:

- ◆ **Power ON/OFF** button. Turning the main power switch **ON** will allow continuous operation of the rear vision system while the ignition key is **ON**.
- ◆ **Camera Select** button. This is for use with the optional three camera system only. Push the button to change camera views. The camera will automatically change views with drive side or passenger side blinker activation.
- ◆ **Day/Nit** button. Set camera for better picture in varying light conditions.



- ◆ **Contrast and Brightness** knobs.
- ◆ **Volume** control knob.
- ◆ **Tilt Up/Down** buttons are for adjustment of rear camera angle. Optional side cameras are not adjustable.

INFORMATION:

For more detailed instructions see the manufacturer's manual.

BACKING UP A MOTORHOME

Whether you are 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 ground guide's (co-pilot's) directions 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. Prior to backing in a site, get out and walk the area. 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.

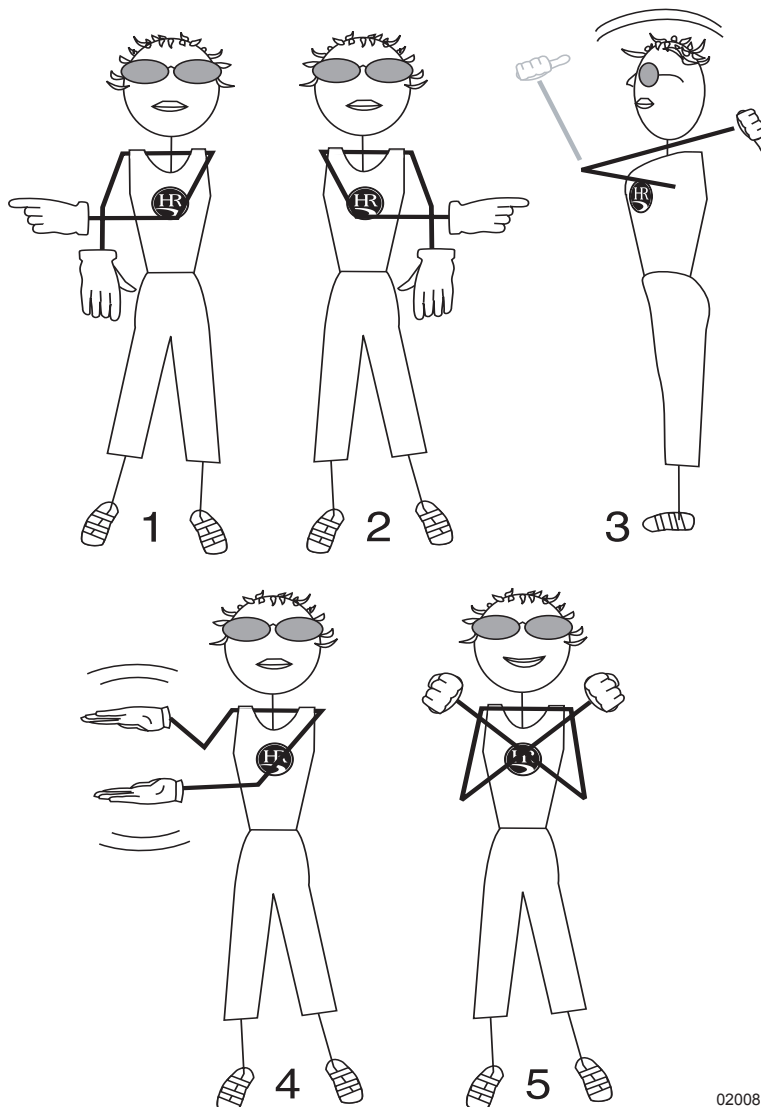
The co-pilot will perform just as important a job as the driver. When guiding the driver, the co-pilot should be located safely at the left rear corner of the motorhome, facing forward, while remaining visible in the roadside mirror at all times. The co-pilot should make a conscious effort to maintain 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, only five clearly defined signals should be used, with only one signal given at a time. Flailing arms with indecisive signals only 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.

The 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.
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 tow device causing the wheels of the towed vehicle to move in a forward “sideways” motion that will cause irreparable and expensive damage. 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. Keep 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, use a short “pull-up” method, pulling forward just far enough to 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, tow vehicle or towing device will result.

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SET-UP PROCEDURE CHECKLIST

If the site for the motorhome provides full hook-ups, use this quick reference checklist as a guide only. The checklist contains information on hooking up the utilities and preparing appliances for use. Specific information on slide room, awning and leveling system operations is discussed in detail in *Section 5*.

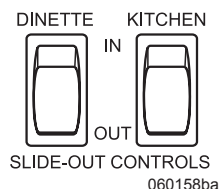
- ◆ Unlock travel locks (if applicable) that may be securing the slide room. Check for lateral clearance before extending the slide-out room.

CAUTION:

Check lateral clearance before extending the slide-out room.

NOTE:

To operate any slide room, turn the ignition switch to OFF and set the park brake.



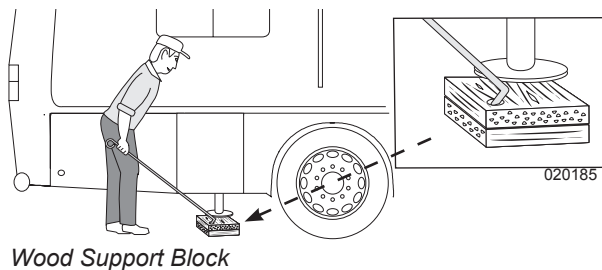
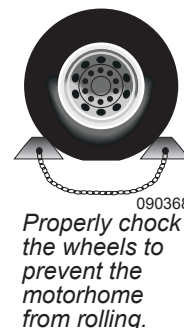
- ◆ Follow procedures and guidelines for “Leveling the Motorhome” in *Section 5*. Confirm that the parking surface will accommodate the weight placed on jacks.

CAUTION:

Prior to leveling the motorhome, survey the area around and under the motorhome for obstructions which can damage the motorhome or undercarriage components.

CAUTION:

Hot asphalt, gravel or dirt may not support the weight that is placed on hydraulic jack pads. Place thick plywood under the jack pads to help disperse the weight. If blocking up a rear jack pad to gain added clearance when the motorhome is on a slope, place a wheel chock at the opposite set of rear wheels to prevent the motorhome from rolling.



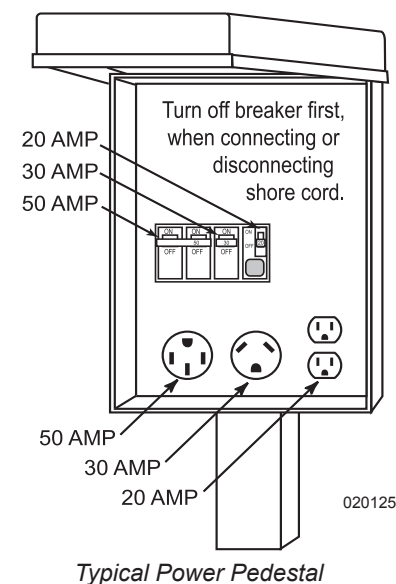
- ◆ Open the LP-Gas tank primary valve.
- ◆ Prepare the shore cord for connection. Uncoil and inspect the cord, and perform necessary cord maintenance. Install electrical adapters if proper service is not provided. Operate electrical appliances in sequence when hooked to limited shore power service. Turn shore power circuit breaker OFF prior to plugging in the shore cord.

NOTE:

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

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!



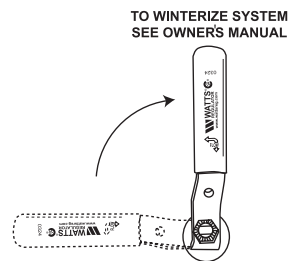
CAUTION:

DO NOT remove cover from 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 management responsibility to fix problems with the shore hook-up at the site.

- ◆ If cable service is provided, hook-up a 75 Ohm RG59 or RG6 cable to the cable connection in the storage bay. If the motorhome has a video selector box press the appropriate viewing button for the item desired.
- ◆ A phone connection port is provided in the storage bay. Phone utility outlets are placed throughout the motorhome, including a phone line attached to the satellite receiver for Pay-Per-View movies and events.
- ◆ Hook the potable water hose to the city water connection in the service center. Install a water pressure regulator to protect the water hose from excess pressure. Turn the hand valve to City Water position.

NOTE:

A water pressure regulator attached between the city water faucet and the potable fresh water hose will protect the hose from swelling or bursting under high city water pressure. Securing the pressure regulator to the hose with pliers will prevent the regulator from being misplaced.



WARNING: POTABLE WATER ONLY
SANITIZE, FLUSH AND DRAIN
BEFORE USING
(SEE OWNERS MANUAL)

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- ◆ 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 (small valve). The black water valve (large valve) remains closed until the tank is full or until time of departure.

DRY CAMPING TIPS

Experience is the best dry camping teacher. Plan ahead and conserve resources.

- ◆ Dry camping requires fully charged and properly maintained batteries. Fill batteries to proper level with distilled water only. Conserve battery power whenever possible.
- ◆ Fill the hot water tank before topping off the fresh water supply. Confirm waste holding tanks are empty. When the fresh water supply is low, drain waste holding tanks prior to refilling the fresh water tank.
- ◆ Confirm the destination can accommodate the size and length of the motorhome. Drive-through sites are preferred for easier access.

- ◆ When navigating campgrounds, watch for low hanging limbs, tree trunks and barriers lining the roadway. Have the co-pilot or campground host provide guidance when negotiating tight curves. Position the motorhome to extend slide rooms and awnings. Before leveling the motorhome, check underneath for obstacles that may damage undercarriage components.

Suggestions for Dry Camping:

- ◆ Switch refrigerator operation from Auto to LP-Gas.
- ◆ Open windows during the day and reduce use of the roof air conditioner.
- ◆ Turn off interior 12 Volt DC power whenever possible. The refrigerator is designed to operate with the power off.
- ◆ Turn on the water heater about twenty minutes before hot water is needed. Once heated, turn it off. Water will remain hot for several hours.
- ◆ Turn on the water pump only when using water.
- ◆ Turn off small items that use battery power, such as porch lights, bay lights, engine compartment lights, etc. Turn off the 12 Volt antenna boost when not viewing the television.
- ◆ Monitor battery voltage. **DO NOT** allow batteries to fully discharge (lights dim) before starting the generator. If possible, run the generator twice a day, morning and afternoon, to charge the batteries.
- ◆ Turn off the inverter when not in use.

- ◆ Use a flashlight inside the motorhome at night instead of turning on interior lights. When interior lighting is desired, choose a light in a central location such as the vanity and unscrew all but one or two bulbs in the fixture to reduce battery drain.
- ◆ Plan what is needed from the refrigerator prior to opening.
- ◆ If weather does not permit eating at the picnic table, or no outdoor table is available, eat at the dinette table by candlelight.
- ◆ Frequently monitor holding tank levels. Careful management of water is critical when dry camping. Conserve water when showering. Turn water off when soaping, then back on to rinse. Take a sponge bath when water conservation is critical. **DO NOT** fill the sink full of water to wash only a few dishes. Use disposable dishes when possible.
- ◆ Use campground showers or bathrooms (if the facility is equipped) to help conserve water and holding tank capacity.
- ◆ Conserve propane and electricity by cooking meals on a campfire.
- ◆ Leave shoes outdoors or at the entry step to avoid tracking in dirt.

Typical Current Draw	
Interior House Power	1.5 Amps
13" TV	1.7 Amps
Rope Light (10 ft.)	1.3 Amps
Porch Light	2.0 Amps
Fluorescent Dual Bulb	2.1 Amps

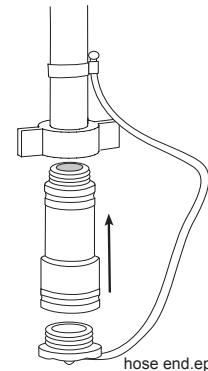
Typical Current Draw

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 and lower the antenna.
- ◆ Disconnect and stow the telephone line.
- ◆ Retract awnings and secure them for travel.
- ◆ Close the primary LP-Gas tank valve.
- ◆ Connect the sewer hose.
- ◆ Drain and flush holding tanks.
- ◆ Disconnect fresh water hose from the source and store with end cap in place. If applicable, remove the water pressure regulator from the city water faucet.
- ◆ Turn shore power breaker off and disconnect the shore line. Wind up and store the shore cord and secure the door.
- ◆ **Inspect** fluid level in oil bath hubs (if applicable) and check all tire pressures.
- ◆ Secure all compartment doors.
- ◆ **Inspect** tires and wheels.
- ◆ Check for fluid leaks under and around the motorhome.



Cap the end of the hose before storage to prevent leakage and to prevent dust and insects from entering hose.

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, antifreeze, transmission, brake, hydraulic and washer fluid.
- ◆ **Inspect** belts and hoses for wear.
- ◆ **Inspect** wiring for loose, frayed or corroded connections.
- ◆ Start engine and listen for unusual noises.
- ◆ **Inspect** gauges and controls for proper operation.

Interior Checklist:

- ◆ Retract optional hydraulic levelers.
- ◆ Clear slide room path, clean floor, move driver seat forward, and after confirming the bay doors are closed, retract the slide room. When the slide room is fully retracted, secure all slide room awning locks.

NOTE:

To operate the slide rooms, the ignition must be OFF and the park brake set.

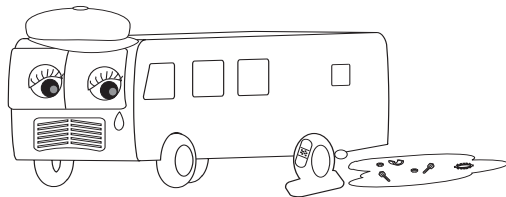
- ◆ Secure and fasten interior doors. Lock the shower door.
- ◆ Close roof vents and windows.
- ◆ Secure all loose, heavy or sharp objects in case of a sudden stop.
- ◆ Close all cabinet doors and drawers.
- ◆ Turn off interior lights.
- ◆ Disengage the water pump.
- ◆ Check the fuel level gauge and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

Departure Checklist:

- ◆ Check items in storage bays to make sure shifting or damage will not occur.
- ◆ Look around, above and under the motorhome for obstructions. Check for debris stuck between the rear dual tires.
- ◆ Walk around the motorhome and camp area checking for forgotten items.
- ◆ Outside compartment doors should be closed and locked.
- ◆ Check operation of all exterior lights, headlamp, taillamp, brake and clearance lights.
- ◆ Carefully pull forward out of the campsite. If necessary, clean the site and check for forgotten items.
- ◆ Secure and lock the entry door for travel.

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 the manufacturer's Customer Support or an emergency service provider.



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Road flares or reflective warning signs should be displayed if the motorhome is alongside of the road for any length of time. Guidelines for placing the warning triangles depend upon the road characteristics and visibility. For example: 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 would also be 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.

EMERGENCY SERVICE PROVIDER		
Equipment	Provider	Emergency Number
Motorhome	Monaco Customer Support	877-466-6226
Chassis	Ford	800-444-3311
Chassis	Workhorse	877-946-7731
Tires	Goodyear	877-484-7376
Tires	Michelin	800-847-3435
Towing	Owner's Advantage Program	877-882-0614

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.



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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 flasher system **ON**. Save the old tire for possible warranty coverage.

Dead Chassis Battery

A weak or discharged battery will not supply the amount of **CCA (Cold Cranking Amps)** necessary to initiate the required voltage to start the engine. If the engine fails to crank, or cranks slowly due to a weak chassis battery, there are electrical back-up systems in place that may increase chassis battery voltage.

Jump starting using battery boost switch:

The Battery Boost switch, located on the driver console, engages a heavy-duty solenoid in the battery compartment 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.

- ◆ With the ignition key off, press and hold the Battery Boost switch for ten seconds. After ten seconds, continue to hold the switch down and turn on the ignition. Start 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, inverter or converter will charge the batteries.
- ◆ Allow the generator to run approximately $\frac{1}{2}$ hour before attempting to start the engine.
- ◆ After $\frac{1}{2}$ hour of generator operation, leave the generator on and hold down the Battery Boost switch for one minute. Release the switch for one minute, then

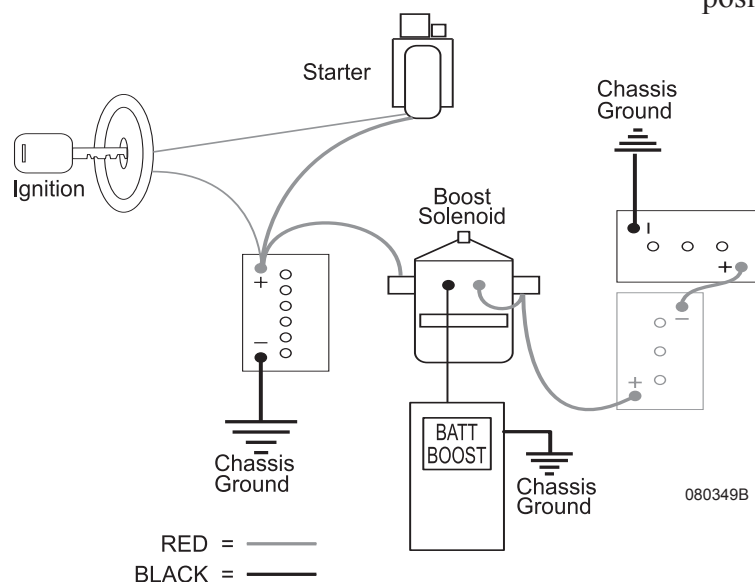
- press the switch again for one minute. Alternate this cycle three to five times to avoid overheating the Boost solenoid.
- ◆ Next, hold the switch down and turn the ignition on. With the Boost switch held down, try to start the engine.
 - ◆ If the engine fails to crank, or fails to crank quickly, the chassis battery may be depleted and the motorhome will require jump-starting or an external charger hooked to the chassis battery. 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 (+).

WARNING:

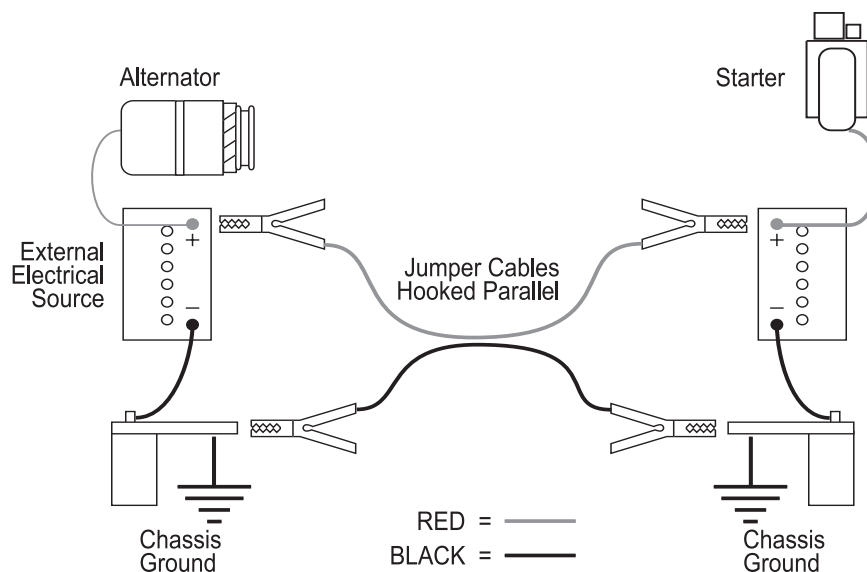
Batteries can emit explosive gas. Always ventilate the battery compartment prior to any work or service to the batteries. Extinguish all smoking material and keep all open flame and spark producing devices away from battery area.

Jump starting using an external source:

1. When using an external electrical source to connect to the chassis battery, turn the main battery disconnect switches **OFF** prior to hooking up the jumper cables.
2. 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.
3. Turn **ON** the battery disconnect switches and attempt to start the engine. **DO NOT** crank the engine more than a few seconds.



Battery Boost Diagram



Jump Starting

4. After the engine has started disconnect the cables. Disconnect the negative (-) cables before disconnecting the positive (+) cables to prevent arcing.
5. 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.

WARNING:

Gas around the battery can explode if exposed to 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. A spark may cause an explosion of the gases that surround the battery. Connect only to the chassis, away from the battery.

CAUTION:

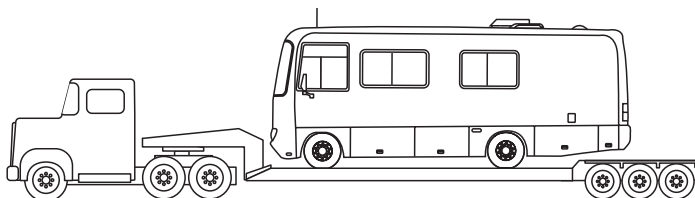
The charging system on the towed vehicle does not supply the amperage necessary to jump-start the motorhome. Voltage sensitive equipment on the towed vehicle can be damaged, leaving the towed vehicle disabled. If a jump-start is necessary, it is recommended to call Roadside Assistance. They will have the equipment necessary to jump-start the motorhome.

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. Voltage fluctuations that occur during a jump-start procedure can damage sensitive electronic equipment and charging systems. Wait a sufficient amount of time for a surface charge to build before attempting to crank an engine when using a jump-start procedure. If uncertain about performing a jump-start procedure, contact a professional. Damage and personal injury can occur if this procedure is not performed correctly.

TOWING PROCEDURES

If calling a towing company for service, it is recommended to use a lowboy/landall 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 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: one to tow the motorhome and the other to tow a trailer or the tow vehicle if it is not operational.



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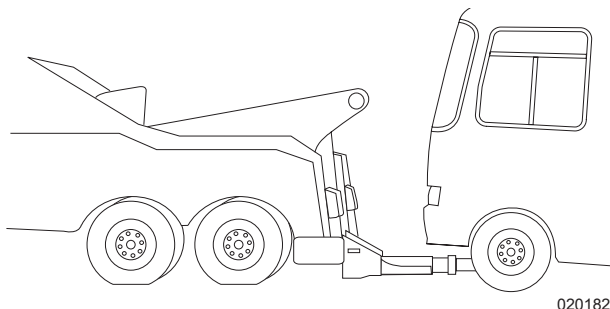
If the motorhome needs to be towed, use the following instructions:

- ◆ 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 to go 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.
- ◆ The drive shaft must be removed to prevent damage to the transmission. Secure end caps to prevent losing or contaminating the needle bearings.
- ◆ The mud flap may need to be removed to prevent damage due to limited ground clearance.

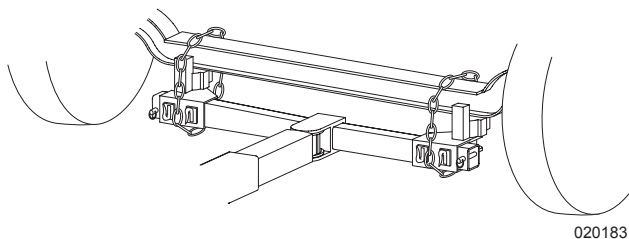
WARNING:

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.

- 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.



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TIRES

Tires designed for the motorhome are a very technical and engineered product. Since the tire is the only contact the motorhome has with road surface, it is critical that proper tire pressures be maintained. Improper tire pressure will lead to abnormal wear or sudden tire failure. The motorhome must be weighed fully loaded before proper tire inflation pressures can be determined. The following information concerning tires and weighing the motorhome are set in the order in which the process is performed or experienced.

The tire performs additional functions of traction for moving, stopping and steering, as well as providing a cushion for the motorhome. Modern tire technology blends a unique mix of chemistry, physics and engineering to provide a high degree of comfort, performance, efficiency, reliability and safety. To obtain the maximum wear and best service from tires, it is helpful to understand the components and functions of the tire.

Tire Components:

Tread: Provides traction and cornering grip.

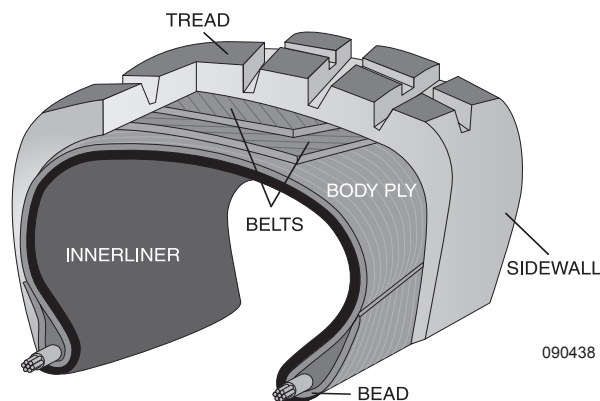
Belts: Stabilize and strengthen the tread.

Sidewall: Protects the side of the tire from road and curb damage.

Body Ply: Gives the tire strength and flexibility.

Bead: Assures an air-tight fit with the wheel.

Inner Liner: Keeps air inside the tire.



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Importance of Air Pressure

The most important factor in maximizing the life of the tires is maintaining proper inflation. Driving on any tire that does not have the correct inflation pressure for the load of the motorhome is dangerous and may cause premature wear, tire damage and/or loss of control of the motorhome.

An under-inflated tire will build up excessive heat that may go beyond the design limits of the rubber and radial cords and could result in sudden failure. An under-inflated tire will also cause poor motorhome handling, rapid and/or irregular tire wear and an increase in rolling resistance that results in decreased fuel economy.

An over-inflated tire will reduce the tire's footprint/contact patch with the road, thus reducing traction, braking capacity and handling of the motorhome. Over-inflation of a tire for the load will result in harsh ride, uneven tire wear and a susceptibility to impact damage.

Maintaining correct tire inflation pressure for each loaded wheel position on the motorhome is of the utmost importance and must be a part of regular motorhome maintenance.

WARNING:

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

Tire Pressure Inflation Guideline

Federal law requires that the specifications for the tire's maximum load rating be molded into the sidewall of the tire. The amount of air pressure to use is dependent on the weight of the motorhome when fully loaded. The tire chart indicates the weights that can be properly supported by varying air pressures. Decreasing air pressure decreases load carrying capacity.

Always comply with the tire manufacturer's recommended pressure inflation guideline. The actual weight of the motorhome can vary significantly depending on how it is loaded. For optimum tire wear, ride and handling always comply with the manufacturer guideline. A tire inflation chart listing proper inflation pressure for different loads can be found in this section.

The tires of the motorhome are inflated to pressure(s) appropriate for the actual weight on each axle in the unloaded, shipped condition. When the motorhome is loaded, check and adjust the inflation pressure on each tire as needed.

Always inflate tires to the pressure indicated in the tire chart for the load carried by the tire. **DO NOT OVERINFLATE OR UNDERINFLATE THE TIRES.**

The **Gross Axle Weight Rating (GAWR)** of the axles listed on the federal certification label attached to the motorhome is the maximum allowable loaded weight on an axle.

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. When loading a motorhome never exceed the motorhome's **Gross Vehicle Weight Rating (GVWR)** or the **GAWR** for each axle.

Contact the tire manufacturer for further information concerning proper tire pressure inflation and other tire issues.

Understanding the Inflation Table:

Tire size is on the left margin of the table. Determine the Single inflation reading or Dual inflation reading, denoted with a D or S on the Table. Single is for the front axle Dual is for the drive axle.

On the following charts, find the corresponding psi at the top columns to see the corresponding maximum weight capacity for that psi.

Rated load capacities are listed for individual tires in a Dual or Single position.

NOTE:

Every load range has a maximum rating as well as a minimum rating. DO NOT exceed those ratings.

WARNING:

DO NOT exceed tire manufacturer's maximum speed rating.

Tire Chart - Michelin

Tire Size	Max Speed	Single (S) Dual (D)	PSI 70	PSI 75	PSI 80	PSI 85	PSI 90	PSI 95
235/80R 22.5	75 MPH	S D	3470 3160	3645 3315	3860 3525	3975 3615	4140 3765	4300 3970

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. Monaco is not responsible for the accuracy of the information disclosed or for any errors within the Tire Inflation Chart.

Tire Chart - Goodyear

Tire Size	Max Speed Rating (MPH)	Single (S) Dual (D)	INFLATION PRESSURE PSI												
			65	70	75	80	85	90	95	100	105	110	115	120	125
8R19.5	75	S D	2410 2350	2540 2460	2680 2610	2835 2755	2955 2865	3075 2975	3195 3085	3305 3195	3415 3305	3525(F) 3415(F)			
225/70R19.5	75	S D		2895 2720	3040 2860	3195 3000	3315 3115	3450 3245	3640(F) 3415(F)	3715 3490	3845 3615	3970(G) 3750(G)			
245/70R19.5	75	S D		3640 3415	3740 3515	3890 3655	4080(F) 3970(F)	4190 4115	4335 4265	4540(G) 4410(G)					
265/70R19.5	75	S D				3970 3750	4180 3930	4355 4095	4540 4300	4685 4405	4850 4560	5070 4805	5170 4860	5355(G) 5070(G)	
9R22.5	75	S D		3370 3270	3560 3410	3730 3550	3890 3690	4080 3860	4235 4005	4390 4150	4540(F) 4300(F)				
10R22.5	65	S D		4080 3860	4280 4045	4480 4230	4675 4410	4850 4585	5025 4760	5205(F) 4940(F)	5360 5075	5515 5210	5675(G) 5355(G)		
11R22.5	75	S D		4530 4380	4770 4580	4990 4760	5220 4950	5510 5205	5730 5415	5950 5625	6175(G) 5840(G)	6320 5895	6465 5950	6610(H) 6005(H)	
12R22.5	75	S D		4940 4780	5200 4990	5450 5190	5690 5390	6005 5675	6205 5785	6405 5895	6610 6005	6870 6265	7130 6525	7390(H) 6780(H)	
245/75R22.5	75	S D		3470 3260	3645 3425	3860 3640	3980 3740	4140 3890	4300 4080	4455 4190	4610 4335	4675(G) 4410(G)			
255/70R22.5	75	S D				4190 3970	4370 4110	4550 4275	4675 4410	4895 4455	5065 4610	5205 4675	5400 4915	5510(H) 5070(H)	
265/75R22.5	75	S D		3875 3870	4070 4040	4255 4205	4440 4370	4620 4525	4800 4685	4975 4805(G)	5150	5205(G)			
275/70R22.5	75	S D					5170 4770	5400 4980	5630 5180	5850 5390	6070 5590	6290 5800	6510 6000	6730 6200	6940(H) 6395(H)
275/80R22.5	75	S D						5500 5080	5745 5305	5985 5530	6225 5750	6460 5965	6700 6185	6930 6400	7160(H) 6610(H)
295/75R22.5	75	S D			4725 4690	4940 4885	5155 5070	5370 5260	5510 5440	5780 5675(G)	5980 5800	6175(G) 6005(H)	6370	6610(H)	
295/80R22.5	75	S D				5480 4855	5750 5100	6020 5335	6285 5570	6550 5805	6810 6035	7070 6265	7320 6490	7580 6720	7830(H) 6490(H)
315/80R22.5	75	S D					6415 5840	6670 6070	6940 6395	7190 6540	7440 6770	7610 6940	7920 7210	8270(J) 7610(J)	
11R24.5	75	S D				5310 5070	5550 5260	5840 5510	6095 5675	6350 5840	6610(G) 6005(G)	6790 6205	6970 6405	7160(H) 6610(H)	
285/75R24.5	75	S D			4770 4740	4990 4930	5210 5205	5420 5310	5675 5495	5835 5675(G)	6040	6175(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. Monaco is not responsible for the accuracy of the information disclosed or for any errors within the Tire Inflation Chart. **WARNING: Do not exceed tire manufacturer's maximum speed rating.**

Inspecting & Pressure

The Load and Inflation Table will help determine correct tire inflation pressure after properly weighing the motorhome. All pressures are 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 the heat generated while driving cause tire pressure to temporarily increase. This means the tire inflation pressure should be checked early and when the motorhome has not been driven more than one mile. Check tire inflation pressure regularly. The check interval should be in the morning, before the "drive" trip and every morning on extended trips. A quality truck tire gauge with an angle airhead is needed to access 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 escaping from the valve stem. If there are extension hoses on the valve stem, make sure they are good quality reinforced stainless steel braid. Attach hoses securely to the outer wheel.

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 in traction could cause rear end gear fight and mechanical damage to the drive train.

CAUTION:

Never let air out of a hot tire.

Over-inflation can cause:

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

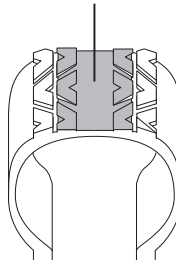
Under-inflation can cause:

- ◆ 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.

WARNING:

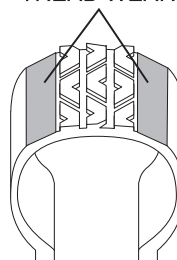
A slow leak may go unnoticed on one of the dual tires. This can cause the good tire to fail by exceeding the load limit. Tires with damaged sidewalls can burst upon inflation. A flat or nearly flat tire can also generate enough heat from friction to ignite.

TREAD WEAR



Over-inflation wears in center of tire.

TREAD WEAR



Under-inflation wears on edges of tire.

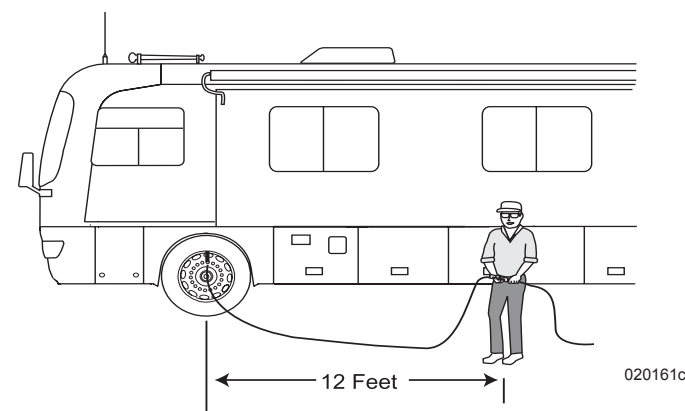
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Unequal tire pressures on same axle can cause:

- ◆ Uneven braking, swerve upon acceleration.
- ◆ Steering lead, torque steer.
- ◆ Reduced handling quality.

WARNING:

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



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WARNING:

Improperly inflated tires can effect handling or cause sudden tire failure possibly resulting in loss of vehicle control of the motorhome. Always use an accurate tire pressure gauge when checking tire pressure.

Air Pressure Checklist

1. When inspecting the tires, confirm the tires are cool before increasing or reducing air pressure. Even driving a short distance can heat up tires.

NOTE:

If the motorhome must be driven a distance to get air, check and record the tire pressure first and add the recorded calculation when reaching the pump. It is normal for tires to heat up and the air pressure inside to go up as driven. Never “bleed” or reduce air pressure when tires are hot.

2. Remove the cap from the valve on one tire.
3. Firmly press a tire gauge onto the valve and record reading.
4. Add air to achieve recommended air pressure.
5. If the tire is over filled, release air by pushing on the metal stem in the center of the valve. Then recheck the pressure with the tire gauge.
6. Replace the valve cap.
7. Repeat with each tire.
8. Visually **inspect** the tires to make sure there are no nails, or other objects embedded that could puncture the tire and cause an air leak.
9. Check the sidewalls to ensure there are no gouges, cuts, bulges, or other irregularities.

NOTE:

Tire air pressure increases (warm weather) or decreases (cold weather) 1 to 2 lbs. for every 10° of temperature change.

Supporting When Leveling

Extreme caution must be taken to ensure that the tires are fully supported when placing blocks under the tires. The load on the tire should be evenly distributed on the support block. In the case of dual tires, distribute the load evenly on blocks for both tires. If not properly supported, the steel cables in the sidewall of the tires may be damaged and could lead to premature fatigue of the sidewall.

CAUTION:

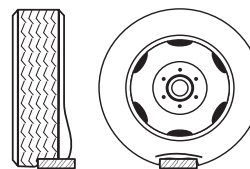
Supporting the tires prevents damage to the sidewall of the tires, but does not prevent tire roll.

Tire "Support" Methods

INCORRECT

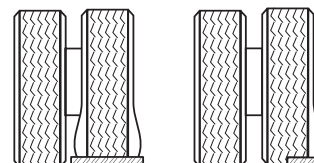
Singles

Only a portion of the tire is supporting the full load.

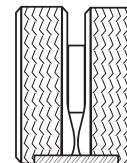


Duals

One tire or a portion of one tire is supporting the full load.

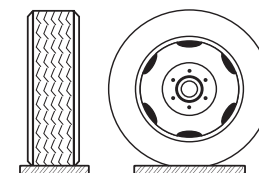


One tire or a portion of the two tires supporting the full load.

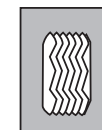


CORRECT

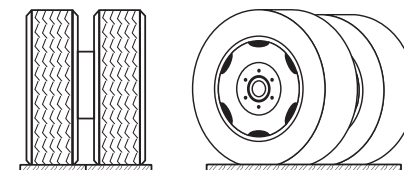
Singles



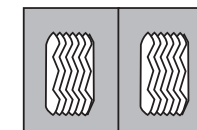
Tire Footprints



Duals



Dual Tire Footprints



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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.

Tread

To prevent skidding and hydroplaning, replace tires when the tread is worn down to 4/32 of an inch on the front, and 2/32 of an inch on the rear. Questions regarding tread wear should be directed to the tire manufacturer.

Built in tread wear indicators, or “wear bars” which look like narrow strips of smooth rubber across the tread, will appear on the tire when the tread is worn down to 2/32 of an inch. When “wear bars” are noticed, the tire should be replaced.

Visually check the tires for signs of uneven wear. Signs of irregular tread wear are usually exhibited by low or unusually smooth areas on the tire surface. Consult the tire manufacturer as soon as possible.

WARNING:

In many instances the life of the tires on the motorhome is not determined by mileage but by age. Tires are subject to weathering. Weathering cracks run in circumference with the tire. Though the sidewall of the tire may look fine and be structurally sound, weathering can occur inside the well of the tread, therefore replacement may be determined not by mileage but age. Have the tire manufacturer inspect the tires for age and weathering.

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 Identification Tag.

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:

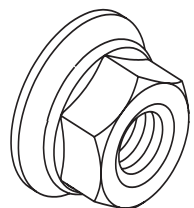
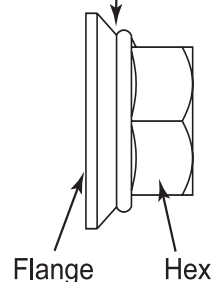
Before removing the motorhome from long-term storage thoroughly **inspect** each tire's tread area and air pressure. If the tires have lost air during storage, inflate them to the correct pressure.

WHEEL MOUNTING

Hub Piloted Mounting:

- ◆ Before using flange nuts that have already been used in service, apply two drops of oil at one point between the flange and hex (Ford chassis only). This will allow parts to rotate freely and provide the proper clamping force when tightened. 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 nut torquing performance. Excessive lubricant makes the nuts hard to handle, attracts dirt, and may cause unsightly appearance to the wheel. Only used nuts require lubrication.

For Used Nuts
Add 2 drops of Oil
Between Flange
and Hex*



090268c
Flange Nut: Front &
Side View.

* Ford chassis only

- ◆ 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.

NOTE:

See the Chassis Owner's Manual for proper tightening sequence. Loosen and tighten lug nuts in pattern. Tighten in sequence first to 50 ft. lbs. , then tighten in sequence to manufacturer's recommended torque specification as indicated in chassis Owners Manual. Over tightening can cause distortion.

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, being careful not to damage stud threads. Snug the nuts in sequence. Do not tighten them fully until all have been seated. Tighten the nuts in sequence (refer to corresponding Chassis Owner's Manual).

Dual Rear Wheels:

Slide the inner dual wheel over the studs, being careful not to damage the stud threads. Align the handholds for valve stem access and slide the outer dual wheel over the studs, again being careful not to damage the stud 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 Owner's Manual for lug nut torque specifications.

Snug the nuts in sequence. Do not tighten them fully until all have been seated. Tighten the nuts in sequence (as shown in chassis's Owners Manual). The 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 miles 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 the air wrench output and adjust the line pressure for the correct torque.

CAUTION:

Dual rear wheels require retightening the lug nuts to the specified torque at 100 miles and again at 500 miles of initial operations and after rotation, changing a flat or any wheel removal.

WEIGHING THE MOTORHOME

Proper weight distribution, load management and operating within established limitations will aide in safe and enjoyable travel. This section provides guidelines and worksheets for weighing procedures.

Proper weight distribution and load management is an individual responsibility. In order to correctly manage load and weight distribution, more than one weight measurement will be required. Each wheel position must be weighed to accurately determine the weight placed on each wheel position for proper weight computations. The entire process of weight management begins with the Gross Vehicle Weight Rating as listed on the Federal Certification Label. This weight cannot be exceeded.

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.

Weight Terms

Numerous Federal, State and local governments mandate weight limits. Understanding the terminology and performing proper weighing procedure will help eliminate confusion. It is important to understand there are two reasons to weigh the motorhome. One to find out the **Cargo Carrying Capacity (CCC)** and the other to ensure no axle is overloaded.

The **Gross Axle Weight Rating (GAWR)** of the axles is listed on the federal certification label attached to the motorhome. This is the maximum allowable loaded weight on a particular axle. This label is generally located to the rear of the driver's seat, on the wall.

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. When loading a motorhome never exceed the motorhome's **Gross Vehicle Weight Rating (GVWR)** or the **GAWR** for each axle.

NOTE:

Contact the tire manufacturer for further information concerning proper tire pressure inflation and other tire issues.

The **Gross Vehicle Weight Rating (GVWR)** and **Gross Axle Weight Rating (GAWR)** Listed on the Federal Certification Label attached to the motorhome details the chassis manufacturer's and/or the RV manufacturer's total vehicle maximum weight rating and per axle weight rating.

The **GVWR** is the maximum total weight for which the motorhome is rated - including passengers, fluids and cargo. The **GAWR** is

the maximum weight for which a single axle is designed. The tires, wheels, axle, motorhome frame and/or other components of the motorhome may limit these per axle and total maximum weight ratings.

The Federal Certification Label is a guide in knowing the maximum loaded axle weight rating **GAWR**, and subsequently the correct tire inflation pressure for that weight. Every recreational vehicle, even of the same make and model, will vary in actual loaded axle weights because of different options and personal loads.

While the actual loaded axle weight should be below the **GAWR**, the motorhome must be weighed in a loaded condition to determine actual weight. Separately weigh the front and, rear axle. It is possible for a motorhome to be within the **GVWR** yet overloaded on one axle. It is even possible for one wheel position to be overloaded, even though the **GAWR** has not been exceeded. For this reason it will be necessary to weigh each wheel position of the motorhome to give a clear indication of exactly how the weight of the motorhome is distributed.

Instructions and diagrams are presented on the following pages. When the total weight and the weight on each axle is known, the tire load data chart in this manual will show the correct cold inflation pressure per tire for each axle.

Two important factors to consider when loading the motorhome are total weight and balance. When loading heavy objects keep them as low as possible, preferably on the floor or below in storage compartments. Load weight must be distributed as evenly as possible.

The following is an explanation of commonly used weight abbreviations:

- ◆ **Gross Vehicle Weight Rating (GVWR):** Maximum permissible weight of this motorhome. **GVWR** is equal to or greater than the sum of **UVW** plus **CCC**.
- ◆ **Unloaded Vehicle Weight (UVW):** Weight of this motorhome as built at factory with full fuel, engine oil and coolants. **UVW** does not include cargo, fresh water, LP-Gas, occupants or dealer installed accessories.
- ◆ **Cargo Carrying Capacity (CCC):** Equal to **GVWR** minus each of the following: **UVW**, full fresh potable water weight (including water heater), full LP-Gas weight, and **SCWR**. Tongue weight of towed vehicle and dealer installed equipment will reduce **CCC**.
- ◆ **Gross Combination Weight Rating (GCWR):** 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.
- ◆ **Sleeping Capacity Weight Rating (SCWR):** The manufacturer's designated number of sleeping positions multiplied by 154 pounds.

Tire Pressure:

A motorhome may weigh slightly heavier on one side. Tire inflation pressure of the heavier side tires determine the inflation pressure for all tire(s) on that axle due to the weight transfer that occurs when cornering.

Improperly inflated tires, or an incorrectly loaded suspension, can result in poor fuel economy, poor handling and over-stressed chassis components. How the motorhome is loaded will influence tire inflation pressure and the load carried by each axle. This is why each wheel position must be weighed. Motorhome axle configuration and floor plan styles may require different weighing procedures.

NOTE:

When weighing a motorhome, 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.

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 access, check the local area telephone book yellow pages under Scales-Public or Weighers. A nominal fee may be charged, but this is money wisely spent.

Weight, scale types and weighing methods determine the procedure used to calculate proper tire inflation pressure and axle loading. Several types of scales are in use today. A platform scale will allow the entire motorhome to fit on the scale to read the GVW in one scale recording. A segmented platform scale is designed to weight one axle at a time. A single axle scale weighs one axle at a time. Some scales read only one wheel position at a time due to physical size. Several scale readings may be required to determine the GAW or GVW total. Each wheel position requires weighing, referred to as a four-point weigh, to accurately determine the correct tire inflation pressure.

NOTE:

The most accurate method to determine proper tire pressure is four-point weighing. Each wheel position must be weighed independently. Weighing the entire axle will not accurately determine the total weight carried by that wheel position. When calculating the drive axle dual tire pressure using a independent corner weigh method, divide the total weight by two to determine the weight carried by each tire. Each wheel position must be weighed and recorded.

When weighing, the scales and the motorhome must be level to obtain an accurate scale reading. Even when an axle is not physically on the scale, a definite lean in the motorhome will produce inaccurate scale readings.

Weight Label

MODEL YEAR: _____ MAKE: _____ MODEL: _____	
UNIT NO. _____ CHASSIS VIN: _____	
	<u>LBS.</u> <u>KGS.</u>
GVWR	(Gross Vehicle Weight Rating) is the maximum permissible weight of this fully loaded motorhome _____
UVW	(Unloaded Vehicle Weight) is the weight of this motorhome as manufactured at the factory with full fuel, engine oil and coolants..... _____
SCWR	(Sleeping Capacity Weight Rating) is the manufacturer's designated number of sleeping positions multiplied by 154 pounds (70 kilograms) _____
CCC	(Cargo Carrying Capacity) is the GVWR minus each of the following: UVW, full fresh (potable) water weight (including water heater), full LP-Gas weight and SCWR (*1)..... _____
GCWR	(Gross Combination Weight Rating) is the maximum allowable combined weight of this motorhome and the towable product. (*1)..... _____
	FACTORY INSTALLED OPTIONS are options installed at the factory but do not include dealer installed after market equipment... _____
<u>CARGO CARRYING CAPACITY (CCC) COMPUTATION</u>	
GVWR	_____
minus UVW	_____
minus fresh water (*2) weight of _____ gallons @ 8.3 lbs./gal	_____
minus LP-Gas weight of _____ gallons @ 4.2 lbs./gal	_____
minus SCWR of _____ persons @ 154 lbs./person.....	_____
CCC for this motorhome (*3)	_____
WARNING: CONSULT OWNER MANUAL(S) FOR SPECIFIC WEIGHING INSTRUCTIONS AND TOWING GUIDELINES INCLUDING AUXILIARY BRAKE REQUIREMENTS FOR ANY TOWED TRAILER OR TOWED VEHICLE.	
Factory installed options do not include dealer installed after market equipment.	
WARNING: DO NOT EXCEED THE GVWR, GCWR AND/OR GAWR AFTER LOADING YOUR MOTORHOME WITH WATER, FUEL, PASSENGERS AND CARGO. GAWR (Gross Axle Weight Rating) means the maximum permissible load weight a specific axle is designed to carry. See Federal Certification Label for disclosure of The GAWR for each axle.	
(*1) Towing capacity is limited by GCWR; your vehicle's towing capacity is the difference between the GCWR and the actual vehicle weight; including all water, fuel, passengers, and cargo. Consult you Owner's Manual for further towing information.	
(*2) Your motorhome's fresh water tank and water heater taken together determine the gross fresh water capacity. Your usable fresh water capacity, however, may be less.	
(*3) Dealer installed equipment and towed vehicle tongue weight will reduce CCC.	

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Four Point Weighing (Example)**NOTE:**

The following scale readings and Gross Axle Weight Ratings are fictitious. Actual scale readings and Gross Axle Weight Ratings will vary with model and options.

The motorhome must be weighed fully loaded to obtain accurate scale readings and to determine the proper tire pressure. All slide rooms, must be in retracted position.

1. Take the **FRONT** axle **Gross Axle Weight Rating (GAWR)** and divide it by two.

Example: FRONT axle GAWR taken from the motorhome Vehicle Certification Label is 13,000 lbs. Divide the figure by 2, using chart, record 6,500 lbs. on line 1.

2. Weigh the driver side **FRONT** corner (Scale A) and record weight on chart scale A, line 2.

Example: 5,000 lbs.

3. Weigh the roadside **FRONT** corner (Scale C) and record weight on chart Scale C, line 2.

Example: 4,000 lbs.

4. Add Roadside and Curbside from line 1, for **Gross Axle Weight Rating (GAWR)** and record on chart under Totals.

Example: 13,000 lbs.

5. Add chart scale A and C, line 2 for actual **Gross Axle Weight (GAW)** and record on chart under Total Axle Weight.

Example: 9,000 lbs.

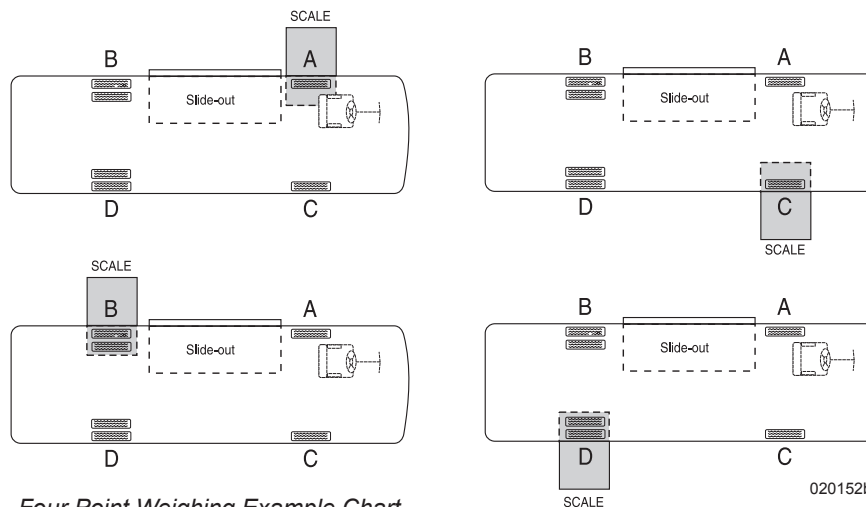
6. Actual **Gross Axle Weight (GAW)**.
Example: 9,000 lbs is not to exceed **Gross Axle Weight Rating (GAWR)**.

Example: 13,000 lbs.

- ◆ Refer to the Tire Chart. Use the highest actual weight, Scale A or C, line 2. Example 5,000 lbs. Determine the proper tire pressure for each tire using the Load Inflation chart. **Example:** 80 psi or stamped on the sidewall of the tire.
- ◆ Repeat above procedures to determine REAR axle Scale B and D, tire pressures.

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.

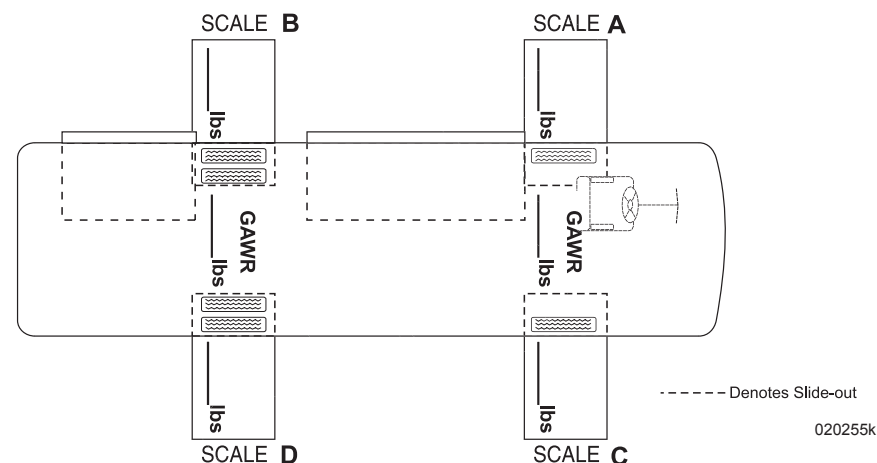


Four Point Weighing Example Chart

	ROADSIDE		CURBSIDE		TOTAL AXLE WEIGHT		GROSS AXLE WEIGHT RATING GAWR		GAWR Minus Total Axle Weight
FRONT AXLE	1. 6,500	+	6,500	=	13,000		13,000		4,000
	2.(A) 5,000		(C) 4,000		9,000				
DRIVE AXLE	1. 10,000	+	10,000	=	20,000		+ 20,000		6,000
	2.(B) 7,100		(D) 6,900		+ 14,000				
			Total Axle Weight		= 23,000 UVW		= 33,000 GVWR		= 10,000 CCC

NOTE:

These measurements are with a full fuel tank and nobody in the motorhome.



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CAUTION:

If actual weight carried by any tire is below the tire chart weight specification minimum tire pressure the minimum inflation pressure must be maintained. Tire pressure below the minimum inflation pressure can overheat and damage the tire casing leading to premature tire failure or blowout.

Load and Inflation Tables:

The Load and Inflation Table will help determine correct inflation for the motorhome tires after properly weighing the motorhome. All pressures are rated at a cold PSI. Cold conditions are defined as early in the morning before the day's ambient temperature, sun's radiant heat or the heat generated while driving have caused the tire pressure to temporarily increase. This means that the pressure should be checked early and when the motorhome has not been driven more than one mile. The check interval should be in the morning, before the "drive" trip and every morning on extended trips. A quality truck tire gauge with a multiple angle airhead is needed to ensure access to both dual wheel positions of the drive axle. Ensure the valve cap is replaced on the stem after the inflation is checked. This 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.

Cargo Carrying Capacity:

When weighing the motorhome it is important to understand that each motorhome, even of the same model year, floorplan and length will weigh different due to options and accessories. The Gross Vehicle Weight Rating (**GVWR**), **Gross Combination Weight Rating (GCWR)** and/or **Gross Axle Weight Rating (GAWR)** must not be exceeded.

GVWR of the vehicle limits the weight of the entire load combination, regardless of the water, LP-Gas, passengers and cargo weight.

It is important to understand that the weighing process is performed in two phases. First, by determining the **Cargo Carrying Capacity (CCC)**; and second, to ensure the **GVWR** is not exceeded when adjusting tire pressures. The weighing process should start by recording the **GVWR** from the Federal Weight Label, then weighing the motorhome unloaded, without passengers and with a full fuel tank. Engine and transmission fluid levels must be full. This is known as the **Unloaded Vehicle Weight (UVW)**. Once this weight has been recorded it can be subtracted from the **GVWR**.

$$\text{GVWR } \underline{35,000} - \text{UVW } \underline{20,000} = \text{A } \underline{15,000}$$

Next, begin to calculate the **Cargo Carrying Capacity (CCC)**.

Fresh water weight and LP-Gas weight can now be subtracted from the remaining total line A.

- ◆ Water weight is the number of gallons multiplied by 8.3.
- ◆ LP-Gas weight is the number of gallons multiplied by 4.2.

A 10-gallon water heater with a 40-gallon fresh tank would total 50 gallons times 8.3, or 415 lbs.

A 30-gallon LP-Gas tank will have 24 gallons of LP-Gas due to the 80% valve. This would mean 24 gallons multiplied by 4.2, or 100.8 lbs.

$$\text{A } \underline{15,000} - 415 = \text{B } \underline{14,585}$$

$$\text{B } \underline{14,585} - 100.8 = \text{C } \underline{14,484.2}$$

Next, calculate the **Sleep Capacity Weight Rating (SCWR)** the manufacturer's designated number of sleeping positions for the motorhome multiplied by 154 lbs.

The 154 lbs. (70kg) is the average weight established by the US Federal Government and Transport Canada, and is used to arrive at **Cargo Carrying Capacity (CCC)**. However, actual sleep capacity weight may be greater. The **SCWR** is not intended to limit the sleeping capacity to a specified weight.

Example: If the manufacturer has designated the motorhome sleeping position at 4 (616 lbs.) and there are four people who weight 200, 200, 178 and 138 lbs., totaling 716 lbs., that does not mean the sleeping capacity is reduced to three individuals, but rather the **CCC** is reduced by 100 lbs. due to the actual passenger weight.

$$\text{C } \underline{14,484.2} - \text{SCWR } 716 = \text{CCC } \underline{13,768.2}$$

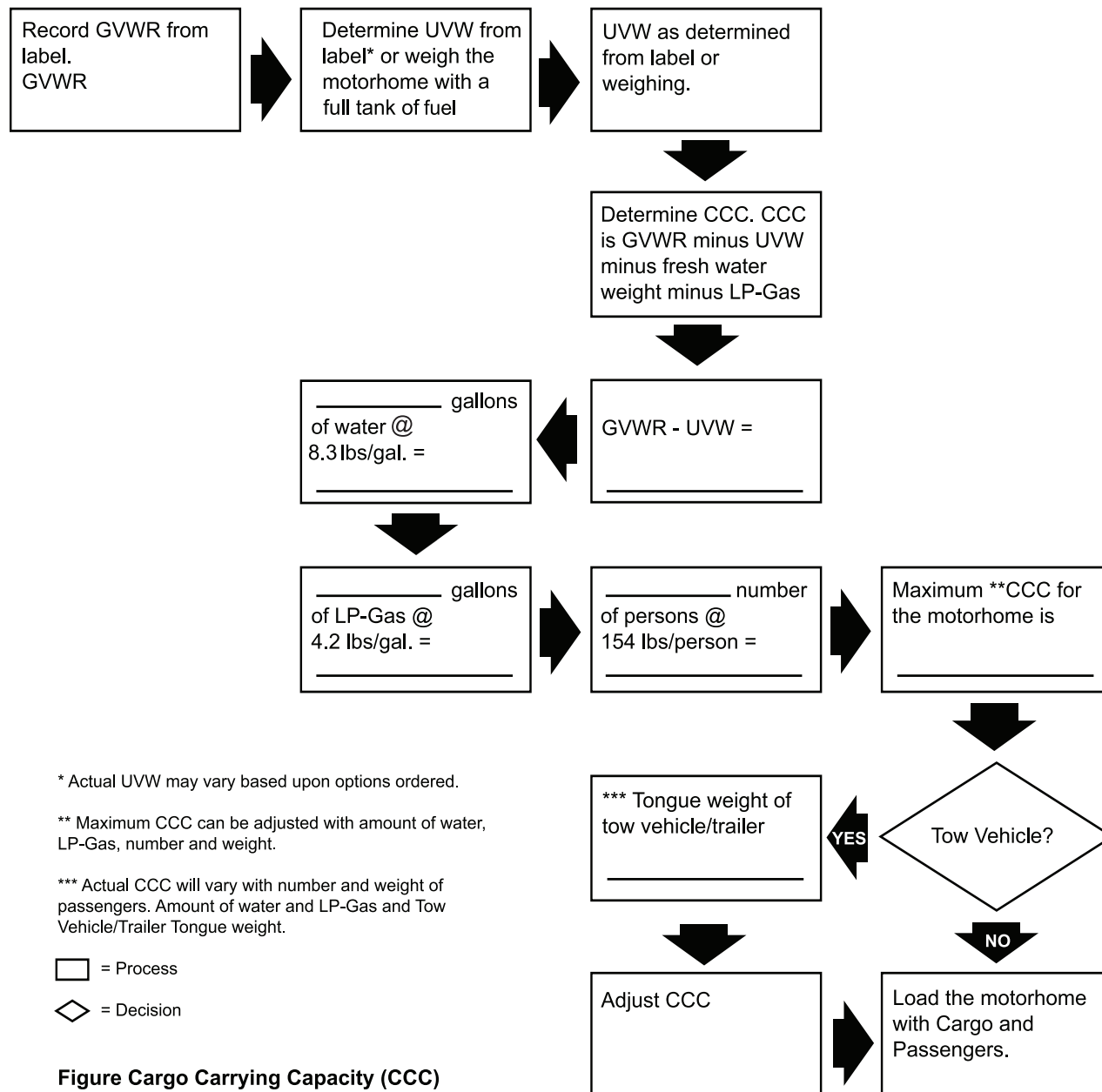
Cargo Carrying Capacity (CCC) is how much cargo the motorhome can carry. However, tongue weight of a towed vehicle will further reduce this amount.

Now the motorhome can be fully loaded and weighed to ensure **GVWR** is not exceeded. Once the motorhome is fully loaded it is ready to be weighed to obtain an accurate scale reading and determine the proper tire pressure. All slide rooms must be in the retracted position when weighing the motorhome.

The motorhome must remain as level as possible on the scale, even when an axle or side is not physically on the scale.

- ◆ Each wheel position must be weighed to accurately determine the weight carried at each wheel position.
- ◆ Refer to the previous examples on how to weigh each wheel position. Each wheel position must be weighed and recorded to determine proper tire inflation.
- ◆ Wheel position weights are not to exceed **Gross Axle Weight Rating (GAWR)** and **Gross Vehicle Weight Rating (GVWR)** as printed on the Motorhome Vehicle Certification Label.
- ◆ Compare wheel position weights with weight ratings on the label. If wheel position weights exceed maximum specifications, items will need to be removed until rating weight is within specification.

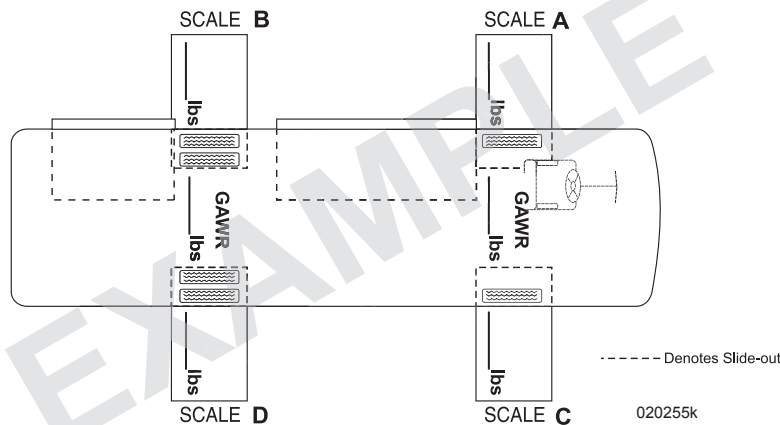
Cargo Carrying Capacity Flowchart



020254c

Weighing Procedure Worksheet

	Roadside		Curbside		Total Axle Weight	Gross Axle Weight Rating GAWR	GAWR Minus Total Axle Weight
Front Axle	1. 6,500	+	6,500	=	13,000	13,000	4,000
	2. (A) 5,000		(C) 4,000		9,000		
Drive Axle	1. 10,000	+	10,000	=	20,000	+20,000	6,000
	2. (B) 7,100		(D) 6,900		+14,000		
			Total Axle Weight	=	23,000 UVW	33,000 GVWR	10,000 CCC

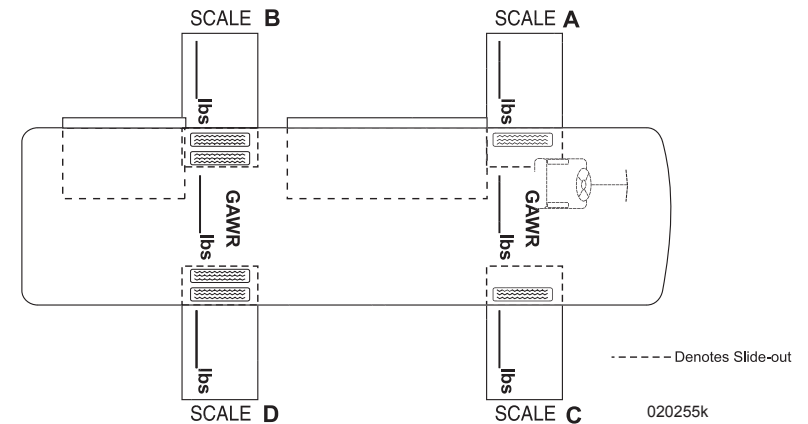


	Formula	UVW 23,000 Capacity	CCC
Fresh Water	Subtract Gallon @ 8.3 lbs/gal	100 x 8.3 = 830	- 10,000
Water Heater	Subtract Gallon @ 8.3 lbs/gal	10 x 8.3 = 83	- 9,170
LP-Gas	Subtract Gallon @ 4.2 lbs/gal	40 x 4.2 = 168	- 9,087
Sleep Capacity Weight Rating	Subtract Persons @ 154 lbs/person	5 x 154 = 770	- 8,919
		Maximum Cargo Carrying Capacity CCC	8,149

Maximum Cargo Carrying Capacity will change by varying any of the capacities. Tongue Weight of a towed vehicle will reduce the Cargo Carrying Capacity (CCC).

Actual Chart

	Roadside		Curbside		Total Axle Weight	Gross Axle Weight Rating GAWR	GAWR Minus Total Axle Weight
Front Axle	1.	+		=			
	2. (A)		(C)				
Drive Axle	1.	+		=		+	
	2. (B)		(D)		+		
			Total Axle Weight	=	UVW	GVWR	CCC



	Formula	UVW 23,000 Capacity	CCC
Fresh Water	Subtract Gallon @ 8.3 lbs/gal	___ x 8.3 = 830	-
Water Heater	Subtract Gallon @ 8.3 lbs/gal	___ x 8.3 = 83	-
LP-Gas	Subtract Gallon @ 4.2 lbs/gal	___ x 4.2 = 168	-
Sleep Capacity Weight Rating	Subtract Persons @ 154 lbs/person	___ x 154 = 770	-
		Maximum Cargo Carrying Capacity CCC	

Maximum Cargo Carrying Capacity will change by varying any of the capacities. Tongue Weight of a towed vehicle will reduce the Cargo Carrying Capacity (CCC).

Weight Record Sheet

DATE:

PLACE:

FRONT:

LEFT

+

RIGHT

=

TOTAL

REAR:

LEFT

+

RIGHT

=

TOTAL

TAG:

LEFT

+

RIGHT

=

TOTAL

=

TOTAL GROSS VEHICLE WEIGHT

DATE:

PLACE:

FRONT:

LEFT

+

RIGHT

=

TOTAL

REAR:

LEFT

+

RIGHT

=

TOTAL

TAG:

LEFT

+

RIGHT

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TOTAL

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TOTAL GROSS VEHICLE WEIGHT

DATE:

PLACE:

FRONT:

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TOTAL GROSS VEHICLE WEIGHT

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 responds to both visible and invisible products of combustion. The smoke detector will automatically return from alarm to normal state when the reason for activation, the presence of smoke, is completely removed. Fires are commonly caused by smoking in bed, leaving children unattended or using flammable cleaning fluids. Please be safety conscious and avoid unnecessary risk.

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.



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Operation

When a 9 Volt DC battery is correctly installed and the smoke alarm is operating, the LED will flash once every 60 seconds showing the battery is supplying power. A loud alarm will sound when smoke is detected.

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

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.

CAUTION:

Never use an open flame to test the smoke alarm as this can ignite and set fire to the alarm and/or the motorhome.

Maintenance

Maintaining the Smoke Detector:

- ◆ Test the smoke alarm once a week.
- ◆ Keep a supply of 9 Volt DC batteries on hand.
- ◆ Vacuum the slots in the cover and sides with a soft brush attachment every month. Test the smoke alarm once the unit has been vacuumed.
- ◆ The smoke alarm will beep once a minute when a low battery condition exists to signify battery must be immediately replaced.

Troubleshooting

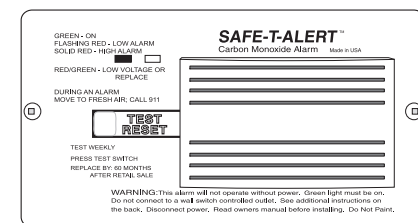
If alarm does not sound when test button is pushed or with a smoke test:

- ◆ **Inspect** 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. If the smoke alarm is within the warranty period and the terms indicate the nature of the problem, return the unit to your dealer. Smoke detectors beyond the warranty period cannot be economically repaired.

CARBON MONOXIDE DETECTOR

American National Standards Institute (ANSI) **A119.2 - Fire & Life Safety 3-4.6 Carbon Monoxide Detectors** states “ *All RVs equipped with an internal combustion engine or designed with features to accommodate future installation of an internal combustion engine and truck campers shall be equipped with a listed CO detector installed in accordance with its listing.* ”



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NOTE:

Replace Carbon Monoxide detector 60 months after purchase of motorhome. For detailed information refer to OEM manual.

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, cardio-respiratory failure and death. Young children and household pets may be the first affected. Other highly sensitive people include the elderly and people 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.

The CO detector is wired to the house batteries to allow reliable and continuous protection by alerting the build up of potentially dangerous levels of CO. Once the unit is powered, it will run through a brief warm-up and self check prior to monitoring for CO gas. There are no switches to accidentally turn off.

WARNING:

CO gas has been detected if the unit is continually beeping and the red light is flashing. Shut off appliances, motorhome engine and water heater. Evacuate the motorhome and call the fire department. Have problems corrected before restarting any appliances or the motorhome.

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 power is present. If the light is not lit, disconnect power and check all wire connections. If power is present 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.

Indicator light displays a specific color to monitor along with a matching sound pattern:

- ♦ **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 horn will not sound.
- ♦ Flashing red indicates low CO alarm condition along with four beeps then **OFF** for five seconds. The alarm horn will sound and can be reset by the **TEST/RESET** button. The CO detector has detected the presence of 70 ppm.
- ♦ Steady red indicates a CO ALARM condition. The detector has sensed the presence of levels over 100 ppm of Carbon Monoxide. The alarm horn will sound continuously until the **TEST/RESET** switch is reset.
- ♦ Alternating red and green indicates a malfunction alarm.

Alarm

When 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 CO Sources when operating the motorhome:

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

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 the alarm by holding the **TEST/RESET** button in until the alarm sounds. The alarm will sound four beeps and the indicator lamp goes 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 a 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 recommended that the Carbon Monoxide detector be replaced every 5 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.**

INSPECT:

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

FIRE EXTINGUISHER

The fire extinguisher in the motorhome is located near the main entrance door. Please read the operating instructions that are printed on the fire extinguisher. If there is any doubt on how to operate the fire extinguisher practice using it. Be sure to replace or recharge the extinguisher immediately after use.

Inspect the fire extinguisher at least once a month. Do so 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.

Use the **PASS** word:

Pull the pin to unlock the extinguisher.

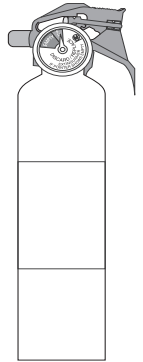
Aim at the base (bottom) of the fire and stand 6 to 10 ft. away.

Squeeze the lever to discharge the agent.

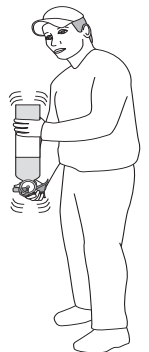
Sweep the spray from left to right until totally extinguished.

WARNING:

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



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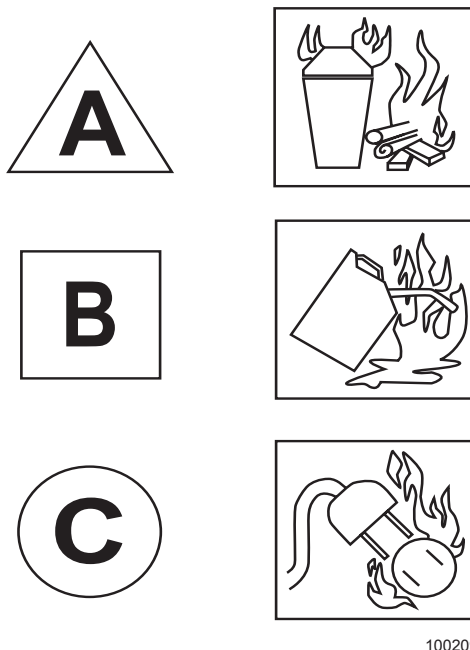


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Classes of Fire

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

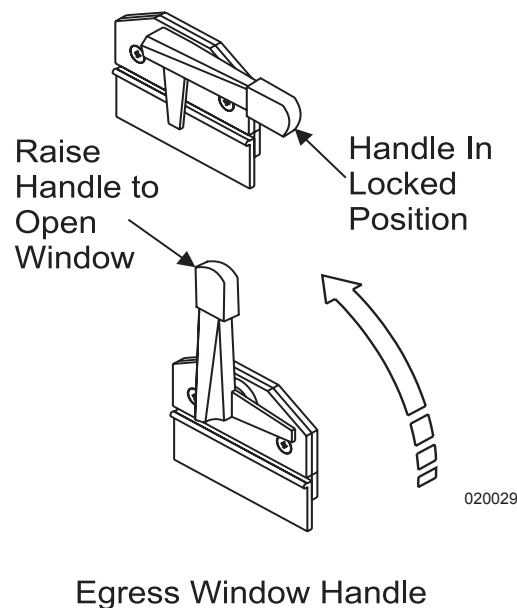


ESCAPE (EGRESS) WINDOW

The Egress window, designated for use as an emergency exit, is identified inside of the motorhome by a red locking handle and Exit label. To open, lift the red handle and push outward. Pull closed and lower handles to lock the Egress window.

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



Egress Window Handle

NOTES

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ADMIRAL 2007

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EXTERIOR CARE

Corrosion

The most common cause of corrosion to the motorhome exterior is accumulation of road salts, grime and dirt. These elements, combined with moisture, may possibly cause early component failure. The undercarriage, around wheel openings and the radiator require periodic cleaning to prevent component failure caused from corrosive materials collected on roadways. If the motorhome is driven in areas where road salts are used it should be washed at least once a week. Otherwise, it is recommended to hose off the undercarriage area at least once a month to help minimize the corrosion process. High pressure washers or steam cleaners are the most effective way of cleaning off the underside and inside wheel openings. Avoid directly spraying the painted surface with a high-pressure washer.

CAUTION:

Exercise caution when cleaning the radiator package. Damage to the fins can result when using a high pressure washer or steam cleaner. Nozzle discharge pressure can exceed 1800 psi. Avoid using high pressure steam cleaners on the exterior paint surfaces. Remove all spattered washing debris from the exterior paint surfaces as soon as possible.

Washing

Periodic cleaning will help to preserve the paint finish. The motorhome is painted with a “base coat, clear coat system.” Clear coat is a polyurethane-based material which brings out the shine and luster to the base coat paint. Care should be used when washing the motorhome. Use only mild detergents or (preferred) specifically designed automotive detergents. Avoid abrasive cleansers or laundry detergents that will scratch the clear coat and leave a soap film. Use a soft cloth to wash the paint finish. Avoid brushes as they can scratch the surface and damage the paint. Before washing the motorhome, remove most of the accumulated dirt and “road wash” behind wheel openings, below the windshield and on the rear of the motorhome. If build up is excessive, run water over a soft cotton cloth while gently wiping the surface in one direction. This will help float away the “build-up” from the clear coat. Avoid back and forth or circular motions as this may act like sandpaper, scratching the clear coat and leaving a haze or “swirl marks.” After removing the heavy build-up, use the mixed detergent solution to wash the motorhome. Start washing at the top of the motorhome working towards the bottom. If possible, wash the motorhome in a shaded area when the exterior is not hot to the touch. If necessary, turn the motorhome around to keep the area being washed in the shade. Try not to allow the detergent to dry onto the clear coat surface. Use plenty of water when rinsing the surface to remove all detergent 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. The popular Carnauba wax is a natural wax from the leaves or fronds of the Carnauba palm tree. Mineral waxes have a paraffin base. There are also waxes which contain silicone.

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 wax to build up. Some very fine scratches or swirl marks may be removed by an 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 an automotive 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:

1. Contact **National Parts** at **1-877-466-6226**.
2. Specify the year, model, serial number and exterior color scheme name (if known).
3. This formula can be mixed at a local BASF paint store.

NOTE:

All special paint schemes require contacting Monaco Coach Corporation directly for paint codes.

Tire Care

Road oil will cause deterioration of the rubber. Dirt build-up can trap chemicals against the tire and cause deterioration.

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 recreational vehicle tires may last longer due to limited annual mileage and exposure.

Wheels - Aluminum (Ford Chassis Option)

Polished aluminum wheels require care. Clean wheels regularly to keep the finish bright and shiny. The use of aluminum wheel polish and carnauba wax will protect the polished wheel surfaces. It will also help prevent corrosion and pitting on the aluminum wheel surfaces caused by natural environmental contamination. Proper care will make future cleaning and polishing easier.

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 any foreign materials 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.

Outside:

1. Clean using high-pressure water to remove debris, grit or dirt.
2. Wash away dirt and grease build up using a 100% cotton cloth and 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. Use an aluminum wheel polish to remove spots and stains from the surface of the wheels as necessary.
5. Carnauba wax can be applied to help protect the finish.

NOTE:

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

CAUTION:

DO NOT use the following items on aluminum wheels:

- ◆ Polishes (unless marked “safe for clear coat” or aluminum).
- ◆ 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.

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.

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 using chemicals to remove road tars, use only automotive products that are recommended for painted surfaces and fiberglass. Observe the warning recommendations and directions printed on the container of any agent being used.

EXTERIOR MAINTENANCE

When parked, 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 something is affixed to the motorhome, such as the “belt line” or vent attached on the roof, a seal prevents water intrusion. There are many types of sealants and each has a specific use. For example, the belt line uses a silicone or urethane base sealant to prevent water intrusion and roof openings use an acrylic based sealant. Moisture intrusion can occur for a number of reasons; therefore regular sealant inspection and maintenance greatly reduces the likelihood of this occurrence and can avoid costly repairs.

The motorhome is sealed at the factory. However, extreme weather conditions can shorten the life of the sealant while harsh road conditions can compromise sealant integrity. Maintaining sealant integrity 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 underneath the removed sealant will need to be cleaned and dried 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 manufactures. 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.

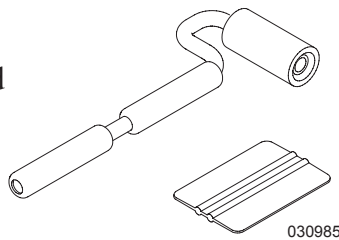
Sealant Types

Butyl Rubber Tape:

This tape is used on the roof seal seams, down the center and at the front and rear. The sealant is available as a peel and stick waterproof membrane that contains UV inhibitors and is temperature resistant providing superior seal protection in all types of weather. Store sealant out of direct sunlight between 50° F and 90° F.

To Apply:

1. Clean the surface with Denatured Alcohol.
2. Set the tape upon desired area, heat to a warm temperature allowing tape to form into place.
3. Use a squeegee to mold sealant into cracks and seams, followed by a roller to roll out tape to get a good uniform seal.

**NOTE:**

Check the Butyl Rubber tape at least twice a year for cracks. Remove old tape with a plastic putty stick and thoroughly clean the surface using 3M adhesive cleaner before applying new tape.

Acrylic Foam Tape:

Read the following instructions to properly install the 3M Acrylic foam tape.

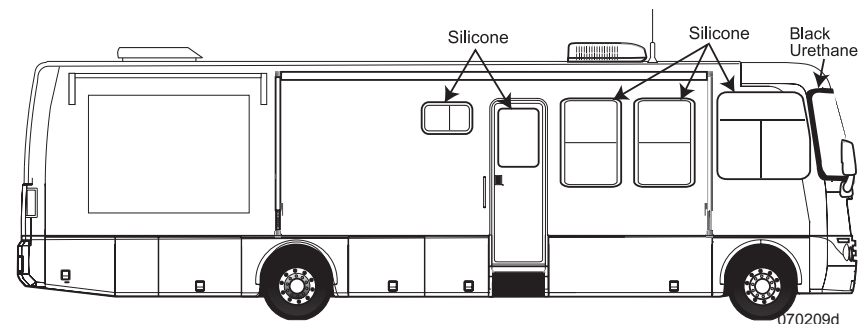
- **Clean Surface** - Use rubbing alcohol to clean the surface of dirt, wax, and any other foreign substances for the best results.
- **Surface Temperature** - The surface where the product is desired should be 75 °F/24°C for proper adhesion.
- **Adhesion Promoter** - Just prior to installation, apply a light coat of adhesion promoter (found at hardware stores) to provide a better bond for the Acrylic Tape.

To install acrylic foam tape, cut the liner for the proper length and then peel back the poly liner from the tape. Apply the tape on the desired line. Continue this process until the project is complete.

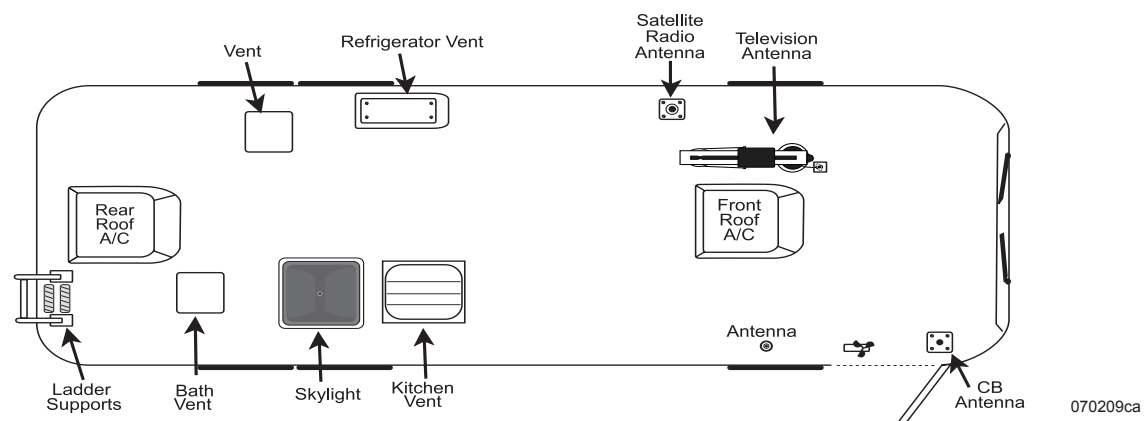
Dolphin Sealants (7549): Used where items are sealed under a painted surface such as the metal corners of the slide-out room. The material is specially formulated to allow paint adhesion.

Black Urethane: Used for sealing the windshields, not to fill holes or other imperfections. Black urethane comes in a tube and it applies much the same way as silicone. Clean up using solvents such as paint thinner. Gloves are required as this material is hazardous.

Silicone Sealant: Primarily used on the sidewalls where a hole has been made and an item installed. This includes windows, doors, handles, beltline molding, latches and around bases of items surface mounted such as clearance lights. Old, peeling sealant should be removed. Avoid using metal utensils which can scratch the painted surface. Use nylon sticks or equivalent. Avoid using lacquer thinners or ketone based solvents as these chemicals can damage the painted surfaces. Be sure the surface is clean and dry before application. Cut the tube at an angle with smallest usable opening.

**Typical Side View:**

Side window seals require silicone. Windshield requires Black Urethane.

**Typical Roof Layout:**

Inspect each item for sealant integrity. Roof A/C's use a special foam gasket.

Avoid a heavy bead as a little goes a long way. Use finger at a 45° angle on 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. Plan ahead before starting a bead. Look for obstacles that may impede application.

Spray Foam: Used as a sealant where a hole has been made for items such as water lines or wires that are coming through a floor opening.

CAUTION:

Spray foam will expand as it sets.

Acrylic Sealants:

Product Manufacturer Geocel Part # 2300

Used where items are sealed under a painted surface such as the metal corners of slide out rooms and roof mounted awning brackets. The material is specially formulated to allow paint adhesion.

Black Urethane:

Product Manufacturer Bostik Part # 1100

Used for sealing windshields only. Black Urethane is available in a tube that applies similar to silicone. Clean up using solvents such as paint thinner. Gloves are required as this considered a hazardous material.

Silicone:

Product Manufacturer Dow Corning Part # 733

Product made in several colors. Primarily used on the sidewalls around windows, doors, handles, belt line molding, latches and bases of surface mounted items such as clearance lights. Old peeling sealant should be removed with nylon sticks or equivalent. Metal utensils can scratch the painted surface. 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. A little goes a long way. Wear a disposable latex glove and use finger at a 45° angle on beaded surface to smooth out product. Keep rags or paper towels handy for clean up.

Use care when applying silicone and plan ahead before applying. Look for obstacles that may impede application.

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.

INTERIOR CARE

Cockpit

The cockpit area dashboard is a molded-fiberglass, vinyl-wrapped pod. The instrument panel is comprised of various gauges and switches. The dashboard and instrument panel each have different cleaning requirements. Clean the vinyl wrapped dash pod following the instructions under Vinyl Care in this section. In the event a blemish or small cut occurs in the vinyl, contact a professional upholstery repair service.

Clean the plastic or Plexiglas® instrument panels using a cloth dampened in a mild soap and water solution. Dry using a separate cotton cloth. Plastic polish products that will help to brighten the appearance of plastic or Plexiglas instrument panels are Novus Plastic Care®, a three-part system; Meguires® and Johnson Paste Wax®, which will require extensive buffing and rubbing.

Glass lens gauges can be cleaned using glass cleaner. Spray cleaner on the cloth, not directly onto the lens, to prevent over spray or runoff.



CAUTION:

DO NOT allow glass cleaners to come in contact with the plastic. Most glass cleaning products are volatile to plastics, and will cause it to become brittle or dull the finish.

TIP:

To determine if the 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

Special care needs to be taken when the motorhome is exposed to a very humid climate for an extended period of time. Protect the fabric from any unnecessary exposure to moisture. 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 a specific backing of the upholstery fabric and are 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 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 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 above 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 they are 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 soapy water containing a diluted bleach until the 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 while in a well-ventilated area. Exercise proper caution by notifying any persons in the area. Keep away from any ignition source. Always wear protective gloves.

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.

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.

Latex Paint:

Fresh paint can be wiped off with a damp cloth. Hot soapy water will normally remove dried latex.

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.

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 which will cause permanent staining. Rinse thoroughly with clean 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.

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. 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.

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

The following steps are to be performed in sequence. Each subsequent step is to be used if the previous step was not successful.

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.

After each process, clean area with warm water.

WARNING:

When using an alcohol solution, avoid open flames or hot lighting.

CAUTION:

It is not recommended to use any abrasive cleaner with this material.

NOTE:

When disinfecting is necessary, a 5:1 bleach and water solution is recommended.

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.
- ◆ Pretest 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 nonflammable spot removal liquid, available in grocery and hardware stores.
- B. Non Oily Nail Polish Remover**
- 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.
- 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.

Spot Removal Guide

	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
SPOTS									
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.

Laminate Floors

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.

- ◆ Wipe away stains with a damp cloth.
- ◆ Stains caused by inks or paints may require a cloth moistened with acetone (nail polish remover).
- ◆ Stains caused by gum or tar should be allowed to harden completely, then gently scrape away.
- ◆ Felt protectors on the bottom of furniture and floor mats can preserve the beauty and appearance of the flooring.

CAUTION:

Abrasive cleaners and scouring pads can scratch and damage the flooring. Never wax, sand or apply lacquer to laminate flooring.

CAUTION:

Flooring may become extremely slippery when wet. Avoid personal injury by wiping up spills and keeping flooring dry.

NOTE:

Some dish washing liquids, oil-based cleaners and one step “polishes” may not be suitable cleaners for the flooring. They can leave an oily residue which attracts soil and reduces gloss.

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 a new sealant, which can be found at most recreational vehicle supply stores.

CEILING

Hardwood, Vinyl and Decorated Paneling:

Certain cleaning agents will affect the surface on both printed and unprinted 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.

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 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, and thoroughly dry to prevent streaking. For stubborn stains, use a clean cloth dampened with a solution of mild non-alkaline soap (dishwashing 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, but this 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 mark between finish coats.
360-600	Super Fine	Removing luster or surface blemishes.

Steel Wool:

Abrasive material composed of long steel fibers of varying degrees of fineness that are matted together. Coarser grades are used to remove paint and other finishes; the 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 that 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 damages to the finish occurs.

Staining the 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:

Check the scratches carefully. If flaking varnish is visible with dark-stained wood underneath, only the clear finish may need to be restored. Rub the loose varnish with fine steel wool or fine synthetic steel wool until you have removed the flaking varnish and slightly roughened a small area of the finish surrounding the scratch. With the tip of a rag, a small brush, or even a cotton swab, apply a thin coat of wipe-on finish. Apply finish to the damaged area only. Several coats may be needed to hide the scratch.

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 to 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***Laminate***

Clean laminate countertops with a damp cloth or sponge. Use a spray cleaner to remove stubborn stains. Avoid using harsh abrasives, scouring powders, peroxides or bleaches as these products may dull or damage the surface. Avoid contact with dyes, bleaches, and indelible inks 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 will damage the surface. Use hot pads under pans taken directly from the stovetop.

NOTE:

DO NOT cut directly on the laminate surface.

STAINLESS STEEL SURFACES

Clean stainless steel once a week with a damp sponge. Apply stainless steel cleaner/polish with the grain, not across, using a non-abrasive cloth or sponge. **DO NOT** use steel wool, wire brushes or abrasive sponge pads. These will mar the finish. Cleaner containing chloride is not recommended; however, if used, thoroughly rinse the surface to prevent corrosion. To avoid water spots, **DO NOT** allow water to evaporate on the 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 we recommend *Cerium Oxide Polishing Compound*, made by C.R. Lawrence, available at most glass shops.

Condensation

Condensation occurs from water vapor present in the air. More vapor is added by breathing, bathing, cooking, etc. and collects wherever there is available air space. When the temperature reaches the dew point, the water vapor in the air condenses and changes to liquid form.

Controlling Moisture Condensation:

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

- ◆ Partially open the roof vents and windows so that outside air can circulate into the interior. Increase the ventilation when large numbers of people are in the motorhome. Even in raining or snowing conditions the air outside will be far drier than interior air.
- ◆ Install a dehumidifier. Continuous use of a dehumidifier is effective in removing excess moisture from interior air. Using 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. Heating with the range or oven 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 aluminum 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 will be air-borne using this method so 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

Guidelines for care and maintenance of polyester blended day/night shades:

- ◆ Leave Day-Night shades in the up position when not in use to help the shades hold their shape.
- ◆ String tension for the shades should be equal.

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 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 to grow 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 infections. 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:

1. 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.
2. Regular vacuuming and cleaning will help reduce mold levels. Mild bleach solutions and most tile cleaners are effective in eliminating or preventing mold growth.
3. 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.

4. 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.
5. **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.
6. 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.
7. If mold cannot be removed from an item, 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 insure 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 re-sealable containers with tight lids.
- ◆ Sweep and vacuum often (especially in eating areas) to help eliminate a food source for pests.
- ◆ Seal cracks, crevices, and gaps around doors and windows.
- ◆ Many pests need moisture to successfully live and reproduce. Limit their access to water or moisture sources by sealing any 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.

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 there are signs of rodent infestation around the motorhome, place traps or poisons in suspected areas. Keep the 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 you are unable to identify the type of insect, 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 fuel tank and around the fuel hoses. Use a vacuum to capture spiders 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 surfaces and floors to remove dust, flea larva and flea eggs, then thoroughly wash 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 of 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. If cracks are detected, seal the cracks and treat the area with a properly labeled indoor pest control product.

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. If the presence of scorpions in the motorhome is suspected, investigate with an UV black light during the nighttime hours.

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 website can be useful resource about common pests. Another good source for information are 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 the slide rooms. **DO NOT** store the motorhome with slide rooms extended.
- ◆ Shut off all appliances. Close the primary LP-Gas valve.
- ◆ Remove all articles from refrigerator/freezer and clean thoroughly. Prop doors open to prevent mildew.
- ◆ Holding tanks should be drained and fresh water system winterized with potable antifreeze or winterize the plumbing system using air pressure.
- ◆ Retract and secure all awnings.
- ◆ Turn **OFF** the interior house power.
- ◆ Batteries should be stored fully charged. Batteries stored in a discharged state will readily freeze.
- ◆ If possible, park the motorhome so that the batteries are accessible for charging or changing without having to move the motorhome.
- ◆ If available, leave the motorhome hooked to shore power. Leave the house battery disconnect switch **ON** and turn the chassis battery disconnect switch off.
- ◆ Careful placement of a small heat source in the interior will help control moisture. Desiccate filter systems will help remove interior moisture.
- ◆ Turn both battery disconnect switches **OFF** if AC power is not available.
- ◆ Store the motorhome inside a storage building if possible.
- ◆ If stored outside, inspect all seams and seals every two weeks for possible leakage.

- ◆ Store the motorhome with a full fuel tank to minimize moisture condensing at top of fuel tank.
- ◆ Vents and windows should be closed to prevent wind driven rain entrance.
- ◆ Leave cabinet doors and draws open to facilitate air movement behind those areas.
- ◆ Tires should be stored at maximum inflation pressure.
- ◆ Make a full interior inspection for water leaks every two weeks. Check behind all cabinet doors and drawers.

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, house or car 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° F. 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:

- ◆ Turn **OFF** all appliances.
- ◆ Turn **OFF** interior house power using the battery cut-off switch.
- ◆ If possible, situate the motorhome so the batteries are accessible for charging or replacing without moving the motorhome.
- ◆ Charge batteries to a full state of charge.
- ◆ Turn the main battery disconnects **OFF**. When the motorhome is stored outside, make a quick reference check of the battery voltage while the motorhome is in storage. Use preventative measures if the voltage readings are low. Removing the motorhome from storage or moving the motorhome in case of an emergency will be a much easier process.

NOTE:

Batteries in a low state of charge will readily freeze. Freezing will damage the battery.

If AC power is available:

The main battery disconnect switches should remain **ON**. The converter will charge both house and engine battery banks. A 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 types to park and 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 air pressure to prevent damage caused by under-inflation.
- ◆ Regularly wash the exterior to help control moss accumulation. Waxing the motorhome twice a year will augment these substances.

Inspect the motorhome:

- ◆ Leave cabinet doors and draws open to facilitate air movement behind those areas.
- ◆ 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.
- ◆ The roof and sidewall seams should be inspected and cleaned 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. Consult the engine manufacturer'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 engine and 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 and 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. Oil locks and hinges. Repair roof seams as needed.
- ◆ **Countertop and Cabinets** - Wash with mild soap and water.
- ◆ **Curtains** - Remove and clean according to care specifications.
- ◆ **Windows** - Cover windows by pulling blinds, closing shades or using a separate cover such as a sheet.
- ◆ **Holding Tank** - Drain and rinse. Close valves.

NOTE:

Add a small amount of 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.
- ◆ **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** - Fuel tank should be full.

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 you have any questions regarding storage or winterization, consult a qualified service technician.

- ◆ Thoroughly **inspect** outside of motorhome. Look for animal nests in the wheel wells or in other out of the way places.
- ◆ Remove all appliance flue vent covers, ceiling vent covers and air conditioning covers. Ensure the refrigerator openings are free 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 batteries state of charge. If necessary, fill Liquid Lead Acid (LLA) battery cells with distilled water only. Charge as necessary. **Inspect.** Cable ends and terminals 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 and allow it to reach operating temperature. Ensure the engine instruments indicate proper readings.

- ◆ With the engine running, check the operation of headlights, taillights, turn signals, back-up lights, license plate light and emergency flasher. Operate the dash air conditioner. If it does not work or the compressor makes unusual noises, have the system checked by a qualified air conditioner technician.
- ◆ Shut the engine down. 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 joints or 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, LP-Gas 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, converter, 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 being charged. 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.
- ◆ Have a qualified technician inspect the LP-Gas system and perform an LP-Gas leak test. The leak test should also include an LP-Gas regulator adjustment (if needed). The test can also verify if the regulator is faulty and should be replaced. Have the LP-Gas tank inspected.
- ◆ Operate each LP-Gas appliance. Observe all burner/pilot flames for proper color and size.
- ◆ Inspect and clean the interior.

- ◆ Check the sealant around all roof and body seams and windows. Reseal if necessary.
- ◆ Lubricate all the exterior locks, hinges and latches with a graphite lubricant.
- ◆ Check the windshield wiper blade condition. 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 check preparation to make necessary adjustments and/or correct defects.

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APPLIANCES - INTRODUCTION

This section covers operation and care of various appliances found in the motorhome: refrigerator, cooktop range, microwave, roof air conditioner and optional appliances. These appliances operate on AC or DC current, LP-Gas or a combination of the three.

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 manufacturer manuals.

WARNING:

Before entering any type of refueling station, turn off all LP-Gas operated appliances. Most LP-Gas appliances used in recreational vehicles 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 an LP-Gas 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.

NOTE:

Features and options vary with floor plans.

REFRIGERATOR

Follow the specific guidelines in the refrigerator manual to ensure longevity and proper operation of the refrigerator. With proper care and maintenance, the refrigerator should provide years of trouble-free service.

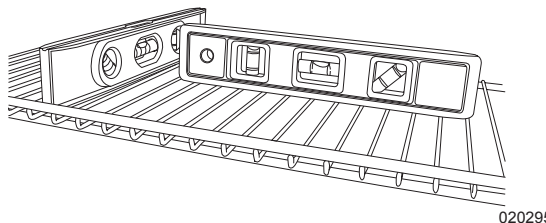
INFORMATION:

Refer to the refrigerator manual for detailed operating and maintenance instructions.

NOTE:

To reduce the possibility of food spoilage, keep the interior box temperature at or below 40° F. The refrigerator will consume more energy to maintain low temperature, especially in hot, humid climates. Lower temperature may also lead to more frost build-up.

- ◆ The refrigerator operates from LP-Gas or 120 Volts AC electric.
- ◆ DC Voltage for control pad operation must be no higher than 15.4 Volts DC or lower than 10.5 Volts DC.
- ◆ AC voltage must be no higher than 132 Volts AC or lower than 108 Volts AC.



020295

Important: Operate refrigerator only when level. Level the refrigerator with a torpedo or bulls eye level. Place the levels on the bottom shelf of the refrigerator. The bubble should be at least half-way inside the circles.

CAUTION:

Operating the refrigerator off-level separates chemicals, causing them to crystallize and block the circulation action of the cooling unit. Damage is cumulative and irreversible.

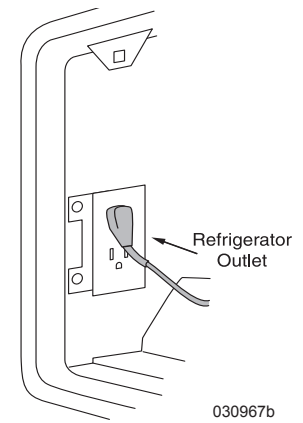
WARNING:

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.

Two Door - Operation Specifics

For the refrigerator to operate:

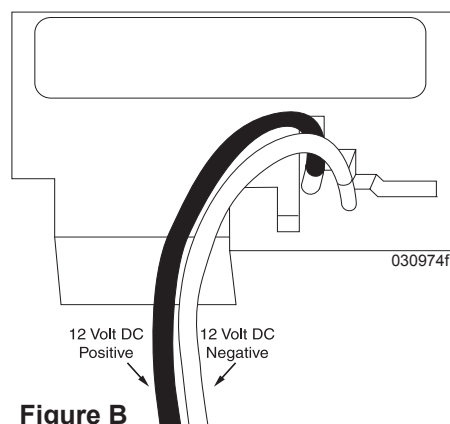
- ◆ House batteries must be fully charged.
- ◆ Primary LP-Gas valve must be on, or an AC source must be available.
- ◆ **Figure A:** The refrigerator 120 Volt AC cord must be plugged in (located outside behind refrigerator access door).



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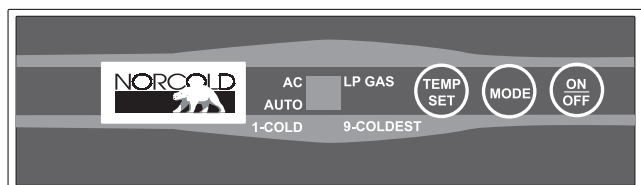
Figure A

- ◆ **Figure B:** If the controls do not light up, check the house batteries charge status or see if the 12 Volt DC wires are plugged into the refrigerator's circuit board (located outside behind refrigerator access door).



Control Panel - Two Door:

- ◆ **ON/OFF Button** - Turns the refrigerator on or off.
 - Push the **ON/OFF** button to start the refrigerator in Auto mode.
 - Push and hold the **ON/OFF** button for two seconds to shut it off.
- ◆ **LED Display** - This screen is used for mode, temperature and fault code display.



Two Door Refrigerator Control Panel

- ◆ **MODE Button** - Controls the operation mode of the refrigerator.
 - Push the **MODE** button to select between Automatic AUTO, AC or LP-Gas operation.
- ◆ **TEMP SET Button** - Adjusts the temperature.
 - To adjust, push and hold the **TEMP SET** button.
 - Number "9" is the coldest setting.

Manual Mode:

When one of the two manual modes is selected:

1. **AC** = The refrigerator is operating on AC electric.
2. **LP** = The refrigerator is operating on LP-Gas.

Automatic Mode (Auto):

This feature selects AC over LP-Gas operation. If AC discontinues, the alarm sounds and the refrigerator switches to LP-Gas operation. If the refrigerator fails to light, the alarm sounds and a code displays.

- ◆ Press and hold the **MODE** button until **AUTO** displays. Release the button.
- ◆ Press and hold the **TEMP SET** button until the desired temperature displays. Release button.
- ◆ In **AUTO** mode, **AUTO/AC** or **AUTO/LP** will alternate three times when a mode has changed.

If the LP-Gas does not ignite within 30 seconds, the control changes to a different energy source or the gas safety valve closes and "F" displays. Turn the refrigerator off then back on. If the gas does not ignite after several attempts consult a dealer or authorized Norcold service center.

Refrigerator Alarm - Two Door:

The refrigerator uses an audible alarm that will sound for the following reasons:

1. DC or AC voltage is higher or lower than allowed.
2. Refrigerator is set to Auto and 120 Volts AC is discontinued.
3. Refrigerator fails to light on LP-Gas or fails to light after a period of operation.
4. Door is open longer than two minutes.
5. The circuit board detects a failure. The control panel will display a code.

NOTE:

If the alarm sounds, note the code in the LED display and turn the refrigerator off to silence the alarm.

INFORMATION:

Refer to the manufacturer's manual for the list of codes and their meanings.

Four Door (Optional) - Operation Specifics

For the refrigerator to operate:

- ◆ House batteries must be charged.
- ◆ Primary LP-Gas valve must be on, electric gas valve must be on or an AC source must be available.
- ◆ **Figure A:** The refrigerator 120 Volt AC cord(s) must be plugged in (located outside behind refrigerator access door).
- ◆ **Figure B:** If controls do not light up, check house battery charge status or see if the 12 Volt DC wires are plugged into the refrigerator's circuit board (located outside behind refrigerator access door).

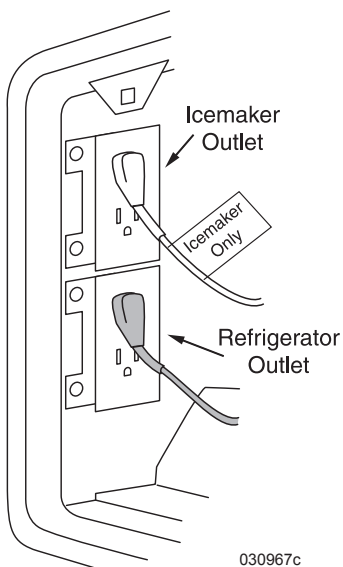


Figure A

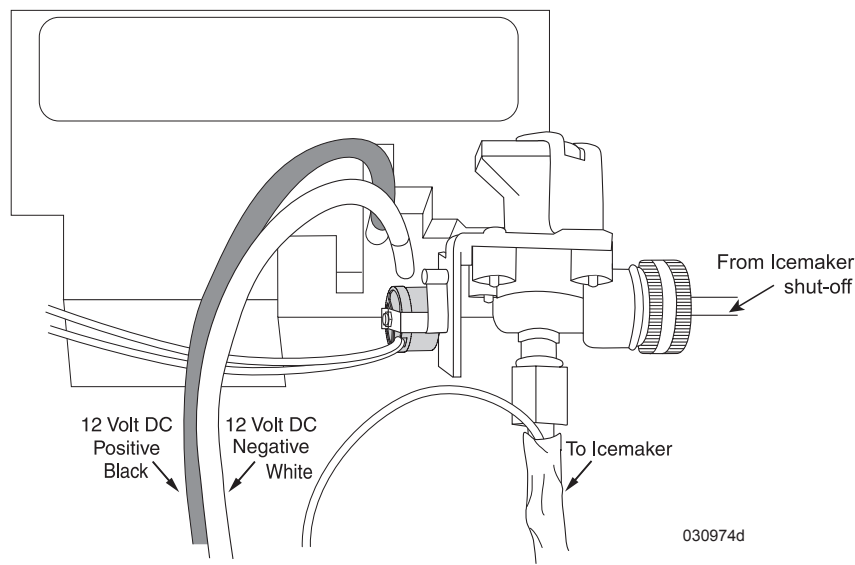


Figure B

Four Door Control Panel (Optional):

- ◆ **ON/OFF Button** turns the refrigerator **ON** or **OFF**.
- ◆ Push the **ON/OFF** button to start the refrigerator in **Auto mode**.
- ◆ Push and hold the **ON/OFF** button for two seconds to shut it off.

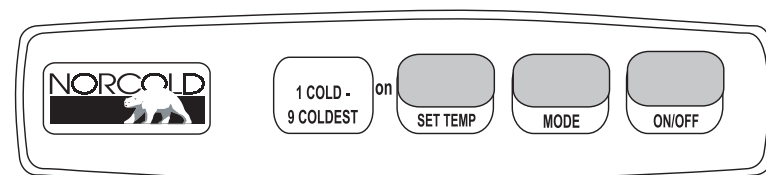
LED Display:

This screen is used for mode, temperature and fault code display.

MODE Button:

Controls the operation mode of the refrigerator.

- ◆ Press the **MODE** button to select between Automatic **AU**, **AC** or **LP** operation.



Four Door Refrigerator Control Panel

SET TEMP Button:

Adjusts the temperature.

- ◆ To adjust, push and hold the **SET TEMP** button.
- ◆ Number “9” is the coldest setting.

Manual Mode (MAN):

The refrigerator will operate on either LP-Gas or electric when one of the two manual modes is selected.

1. **AC** = AC electric.
2. **LP** = LP-Gas.

Automatic Mode (AU):

This feature selects AC over LP-Gas operation. If AC discontinues, the refrigerator will automatically switch to LP-Gas operation. An alarm will sound and a code will display if the LP-Gas igniter fails to light.

- ◆ Press the **MODE** button until **AU** displays. Release the button.
- ◆ Press and hold the **SET TEMP** button until the desired temperature displays. Release button.
- ◆ In **AUTO** mode, **AU/AC** or **AU/LP** will alternate three times when a mode has changed.

If the LP-Gas does not ignite within 30 seconds, the control changes to a different energy source or the gas safety valve closes and “NO” “FL” displays. Turn the refrigerator **OFF** then back **ON**. If the gas does not ignite after several attempts, consult an authorized service technician.

Refrigerator Alarm - Four Door (Optional):

The refrigerator audible alarm will sound for the following reasons:

1. DC or AC voltage is higher or lower than allowed.
2. The refrigerator fails to light on LP-Gas or fails to light after a period of operation.
3. Refrigerator is set to **Auto**, 120 Volts AC is discontinued and LP-Gas fails to light. **NO AC** will display, followed by **NO FL**, and the alarm will sound. Consult the OEM manual.
4. Door is open longer than two minutes.
5. The circuit board detects a failure. The control panel will display a code.

NOTE:

If the alarm sounds, note the code in the LED display and turn the refrigerator off to silence the alarm.

INFORMATION:

Refer to the OEM manual for the list of codes and their meanings.

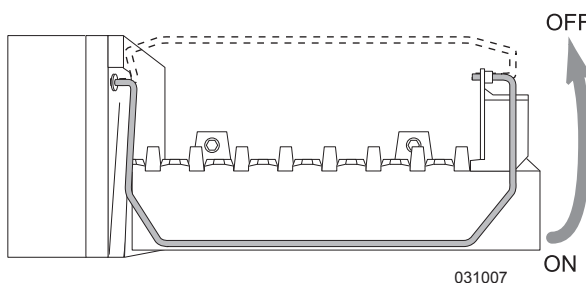
Icemaker - Four Door (Optional):

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 valve for the water supply line to the icemaker must be on. The valve is located in the refrigerator exterior access compartment.

- ◆ Pull the metal arm (bail) down to turn the icemaker **ON**.
- ◆ Push the arm up to turn the icemaker **OFF**.

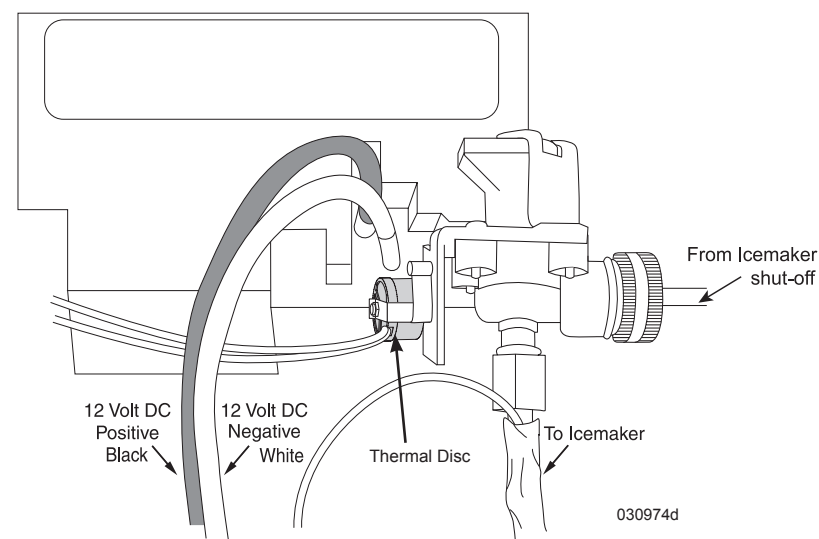
NOTE:

Water may spill out of the ice tray if the icemaker is in operation while the motorhome is in transit. **DO NOT** use the first one or two trays of ice following storage. Operating the icemaker without water pressure supplied to the refrigerator will risk damage to the icemaker assembly.



Water Line Heater:

A thermal disc supplies voltage to heater tape when ambient temperature is less than 38° F. (+/- 4°) and shuts off at temperature greater than 48° F. (+/- 5°). The water line heater is only for the line from the solenoid to the icemaker. The line from the icemaker shut-off valve to the water valve is protected with foam insulation.

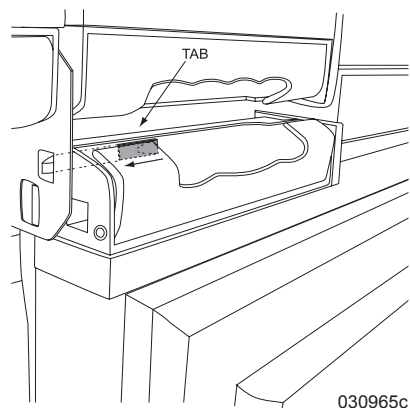


Cooling Unit Fans - Four Door Optional:

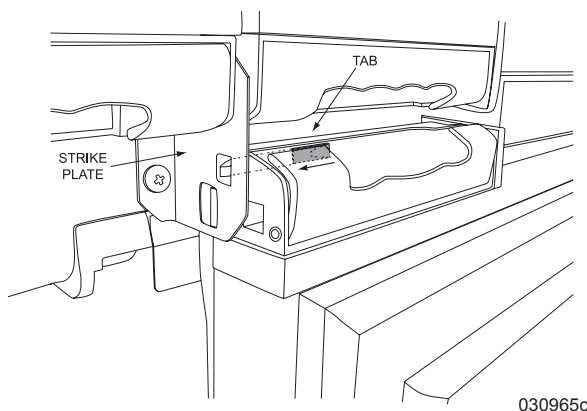
The cooling unit is equipped with a pair of cooling fans that pass air across the cooling unit. These fans start automatically and are audible when in operation.

Refrigerator Doors

The refrigerator doors use a positive latch that secures the door with a “click” to prevent the door from opening during travel.



Door Latch - Two Door



Door Latch - Optional Four Door

Heating Element - Four Door Optional:

The doors use a heating element located in the flapper on the left door. The heating element activates when operating the refrigerator in any mode to help prevent moisture accumulation in high humidity conditions.

Storage Procedures

Mold and mildew may contaminate a completely sealed refrigerator in storage. The motorhome refrigerator has a storage position to lock the doors partially open and promote airflow that will help prevent mold build up.

To use the refrigerator storage position:

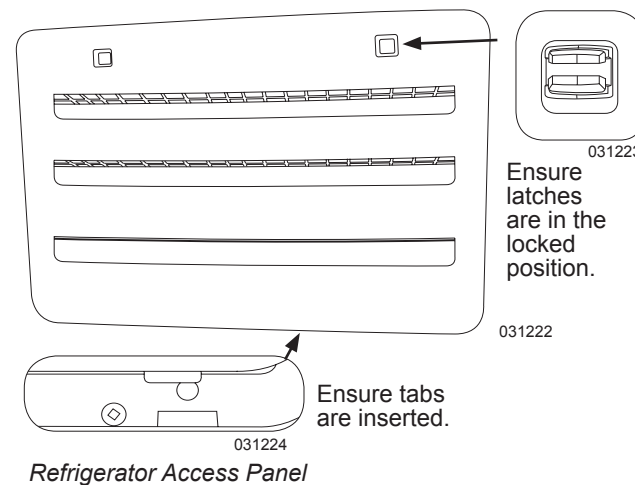
- ◆ Remove all items from the refrigerator.
- ◆ Turn the refrigerator off and disconnect power.
- ◆ Leave the drip tray under the cooling fins. Shorten defrost time by using trays of warm water. **DO NOT** use a heating gun, hair dryer or sharp objects to remove frost as these can damage the interior or cooling unit.
- ◆ Wash the interior using mild spray cleaners or a solution of liquid dish detergent and warm water. **DO NOT** use scouring pads or abrasive cleaners that can damage the interior finish. Rinse with a solution of baking soda and water. Dry with a clean cloth.
- ◆ Lock the doors open. Partially open the doors and slide tab into the cut-out of the striker late.

CAUTION:

DO NOT use a hot air blower to defrost. Permanent damage could result to plastic parts. **DO NOT** use a knife, ice pick or any other sharp instrument to remove ice from the freezer as they can puncture the system.

Service

The LP-Gas function of the refrigerator and LP-Gas pressure will require annual service. Over time, the BTU rating of the flame can change, affecting the refrigerator's performance. 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.



Refrigerator Access Panel

NOTE:

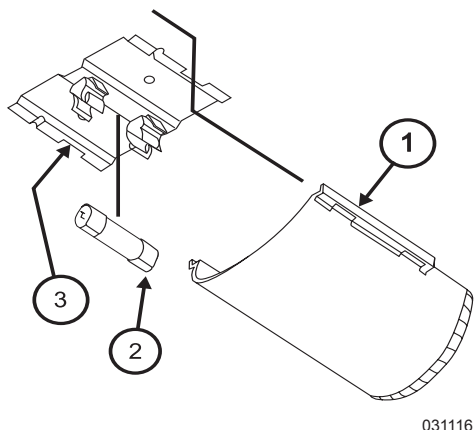
Ensure the exterior refrigerator access panel is properly replaced after removal.

Interior Light

The interior light is located at the top of the fresh food compartment. When the door is open the light will illuminate.

Bulb Replacement:

1. Remove the light cover by pulling it toward the front of the refrigerator.
2. Remove the light bulb from the holder.
3. Install a **GE#214-2** replacement bulb and replace the cover.



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Air in LP-Gas Supply Lines

For safety reasons, the refrigerator will attempt to ignite on LP-Gas within a specified amount of time. LP-Gas lines may contain air when starting the refrigerator for the first time after storage or after servicing the LP-Gas system. Follow procedures on how to remove air from the LP-Gas supply lines.

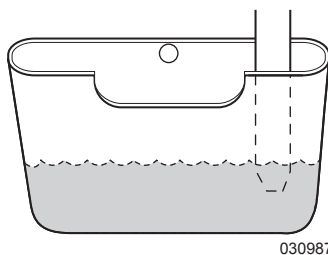
To remove air from LP-Gas supply lines:

- ◆ Ensure the primary LP-Gas valve is open.
- ◆ Try lighting the 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 start a 30 second trial for ignition during which the gas safety valve opens and the igniter sparks.
- ◆ If the refrigerator fails to light, indicated by **"F" (Flame)**, turn the refrigerator off, then back on, and set to LP mode. If after the third attempt the refrigerator fails to light, stop and consult your local dealer or an authorized Norcold Service Center.

Usage Tips

- ◆ Cool items first, if possible, before putting them into the refrigerator.
- ◆ Keep the doors shut. Know what is needed before opening the doors.
- ◆ Allow the refrigerator 24 hours of operation before actual use to help get a head start with the refrigeration process.
- ◆ A box of open baking soda will help absorb food odors.
- ◆ Refrigerator icing can be slowed in high humidity if the end of the drain tube is submersed in drip pan with water. It may be necessary to add water and keep it full so the tube is covered.



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Drip Pan: Located behind the outside access.

MICROWAVE/CONVECTION OVEN

Some motorhomes may be equipped with a microwave or a microwave/convection oven. The following information applies to both unless stated otherwise. **See manufacturer's manual for more information.** The microwave/convection ovens operate from 120 Volt AC supplied by shore power or the generator.

Operation Tips:

- ◆ Check the type of cookware being used to see if it is microwave or oven safe depending on the type of cooking being done. Gold paint or glaze may contain a trace amount of gold which is electrically conductive and not compatible for microwave. Hand painted china commonly contains traces of metal.
- ◆ The glass tray and roller guide must always be in place during cooking.
- ◆ Ensure the door is firmly closed before use.
- ◆ If the control pad is not lit, plug another electrical appliance into the same outlet to verify 120 Volt AC power is present. If the test item works, contact an appliance repair facility to have the microwave/convection oven checked.
- ◆ Steam accumulating inside or around the outside of the oven door may occur when the microwave/convection oven is operated under high humidity conditions and in no way indicates a malfunction of the unit. Wipe away condensation using a soft cloth.

Microwave/Convection Oven Facts:

One of the most useful documents for the microwave/convection oven is the operations manual, located in the owner's information file box. Read it carefully and keep it for reference.

A properly functioning microwave/convection oven presents no hazard with ordinary use. Safety features should be kept in good condition. Never attempt to bypass safety interlocks or allow debris or residue to accumulate on the door or oven face. If the oven is damaged, discontinue use.

Oven adjustments or repairs should be made by qualified service personnel. Check the microwave/convection oven owner's manual for maintenance tips and other information. Remember to register the microwave/convection oven with the manufacturer.

NOTE:

The microwave/convection oven is for food preparation only. DO NOT use the microwave/convection oven to dry clothes, newspapers, shoes or other items.

CAUTION:

If a fire flares up when using the cooktop, turn OFF the microwave/convection oven ventilation fan as it may spread the flames. If the ventilation fan has automatically started from a heated cooktop, it cannot be manually turned off. Turn off the microwave AC breaker to prevent the flames from spreading into the microwave.

Setting the Clock**To Set Clock:**

- Press the **STOP/CLEAR** pad.
- Press the **CLOCK** pad.
- Enter correct time in sequence using the number pads.
- Press the **CLOCK** pad to begin time.

NOTE:

The clock is a 12 hour clock only.

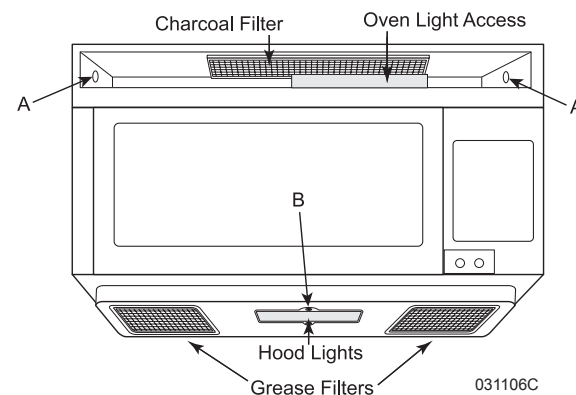
Cleaning the Microwave/Convection Oven

The exterior of the microwave/convection 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.

Charcoal Filter (Sharp Only):

Depending on use the charcoal filter should be replaced every 6 to 12 months. Use the following procedure to remove the louvers to replace the charcoal filter and oven light.

1. Remove power to the microwave/convection oven.
2. Remove the screws (A) securing the louver.
3. Insert a flat edge screwdriver over each tab pressing downward and move the louver away from the microwave.
4. Remove and replace the charcoal filter ensuring the filter is positioned on the supporting tabs.
5. Replace louver and mounting screws.

**Oven Light (Sharp Only):**

1. Remove the louver as indicated above.
2. Slide the metal light cover forward and lift upwards.
3. Remove the light bulb and replace only with an equivalent watt bulb. **DO NOT EXCEED 30 WATTS.**
4. Replace light cover, louver and mounting screws.

Hood Light (Sharp Only):

1. Remove power to the microwave/convection oven.
2. Remove the screw **(B)** securing the light cover.
3. Remove the light bulb and replace only with an equivalent watt bulb. **DO NOT EXCEED 30 WATTS.**
4. Close the cover and re-secure with screw.

CAUTION:

Light cover may be hot. DO NOT touch glass with lamp ON. Never use the light for prolonged periods, such as a night light.

Grease Filters (Sharp Only):

Operating the microwave/convection oven without the grease filters in place can damage the unit. Grease filters should be cleaned at least once per month. To remove the filters, use the pull-tab to slide the filter to the end of the opening and tip down. Soak the filters in the sink or in a dishpan filled with hot water and detergent.

- ◆ **DO NOT** use ammonia or other alkali-based products that may darken the filter material.
- ◆ Agitate the filter. Use a scrub brush to remove caked on grease.
- ◆ Rinse the filter thoroughly and shake dry. Place the filter back into the opening, tip upward and slide filter to the end of the opening. Lock in place. Be careful not to kink or warp the filter upon installation.

Cleaning Tips:

- ◆ Turn the oven off before cleaning.
- ◆ Cover food while cooking to keep spattering to a minimum.
- ◆ Clean up all spills or spatters before they dry using a damp cloth. Mild detergent may be used for stubborn spills. **DO NOT** use harsh detergent or abrasive cleaner.
- ◆ 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 cleaned regularly 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.
- ◆ 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.
- ◆ If the control panel becomes wet, clean with a soft, dry cloth. **DO NOT** use harsh or abrasive detergents when cleaning the control panel.

AUTOMATIC APPLIANCE SELECTOR

The Automatic Appliance Selector limits the possibility of shore power overload by allowing only the priority appliance to operate. The system uses automatic switching relays to control AC power to the appliances hooked to the Automatic Appliance Selector.

The following appliances are listed in the order in which they are controlled by the Automatic Appliance Selector.

- ◆ Microwave
- ◆ Bedroom roof air conditioner

NOTE:

Only one component can be in use at a time.

The appliances are listed in order of operation priority. Example: When operating the microwave, the bedroom roof air conditioner will not operate until the microwave is turned off.

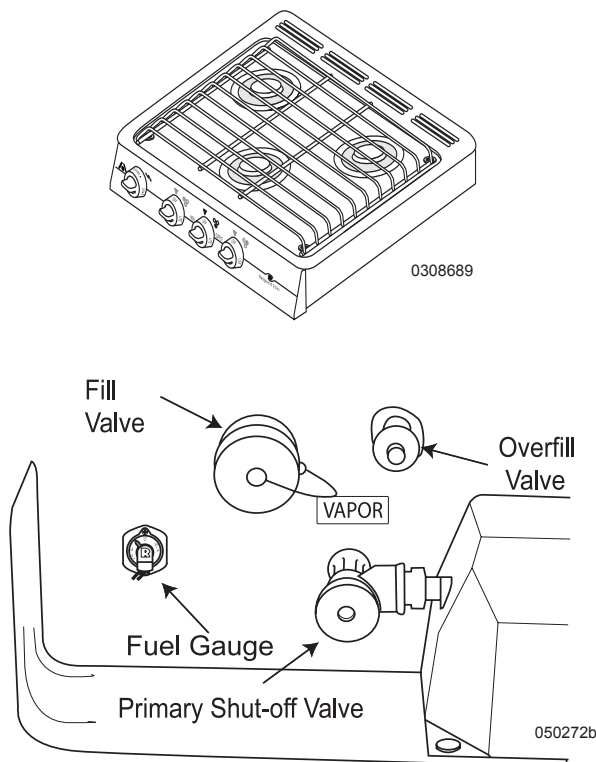
COOKTOP

The cooktop uses LP-Gas as a fuel source. The burners use a piezo type igniter. The cooktop should be used for cooking purposes only and not as a heating source.

When the burner valve is opened the fuel source flows through the valve into the mixture tube. The fuel passes by a hole or venturi in the mixture tube, which draws air in with the fuel for a proper fuel/air ratio. 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, which can leave a black color or carbon on the bottom of a pot or pan.

Operation Requirements:

- ◆ Open the primary LP-Gas valve on the LP-Gas tank.



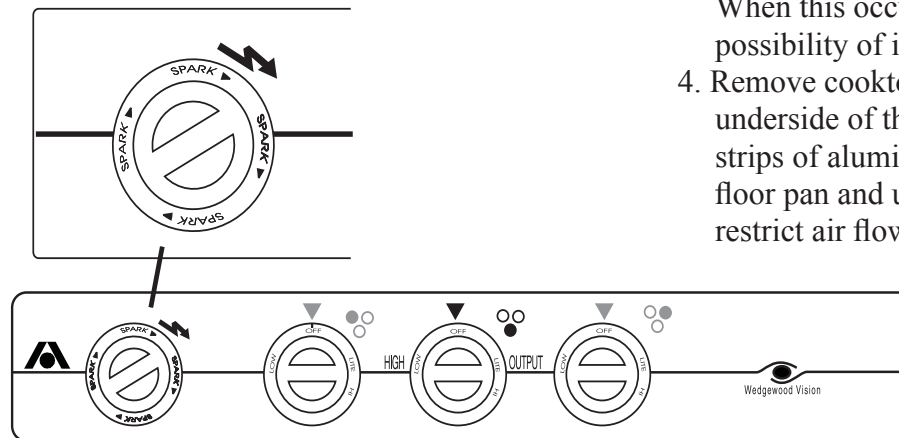
LP-Gas Valve on LP-Gas Tank

Lighting Burners

- ◆ Turn the appropriate burner knob counterclockwise to **LITE**. **DO NOT** attempt to light more than one burner at a time.
- ◆ Turn the **SPARK** knob, located at the left hand side of the cooktop, clockwise one click. If the burner fails to light, continue turning the **SPARK** knob clockwise until the burner lights.
- ◆ Turn the burner knob clockwise to turn the burner **OFF**.
- ◆ Ensure burners are off before installing range covers.

WARNING:

DO NOT heat the motorhome interior with the cooktop or optional oven. Gas combustion consumes oxygen inside the motorhome. Carbon Monoxide is an odorless, colorless and highly poisonous gas.



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WARNING:

If you smell gas, extinguish all open flames and turn off the main gas supply. LP-Gas 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** operate 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.

Operation Tips:

1. A yellow flame is an indication of incorrect fuel/air ratio. Lowered BTU output and carbon build up can occur.
2. Flame appearance may change and BTU output will lower when operating the cooktop at an altitude above 5,000 feet. Allow extra cooking time.
3. **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.
4. Remove cooktop cover to help keep the underside of the cooktop clean. Place strips of aluminum foil on the cooktop floor pan and under burners. **DO NOT** restrict air flow of mixture tubes.

Cleaning

Regular cleaning with a soft cloth and a warm detergent solution is generally enough to keep the cooktop clean. Wash, rinse and dry with a soft cloth. Thoroughly clean the cooktop when it is 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. Glass cleaner sprayed on a paper towel should be used for the cooktop 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. The surface burner grate and caps should be cleaned using the same guidelines as the cooktop surface.

Cleaning Tips:

- ◆ Clean all surfaces as soon as possible after boil overs or spills.
- ◆ Use warm soapy water to clean burner grates, cooktops, painted surfaces, porcelain, stainless steel and plastic items on the range or cooktop. Grit or acid-type cleaners may ruin the surface.
- ◆ Use only non-abrasive plastic scrub pads.
- ◆ **DO NOT** allow foods containing acids (such as lemon, 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 cooktop porcelain can crack.

Removing Burner Grate and Cooktop Cover for cleaning:

- ◆ Place a towel on the counter next to the cooktop.
- ◆ Remove the burner grate by lifting out of rubber inserts of cooktop cover and place on towel.
- ◆ Remove the cooktop cover up by pushing cover toward rear of cooktop and lift cover at the front edge.

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. For further information on care of the porcelain, call *Hopes Cultured Marble Polish* at 1-800-325-4026.

COOKTOP WITH OVEN (Optional)

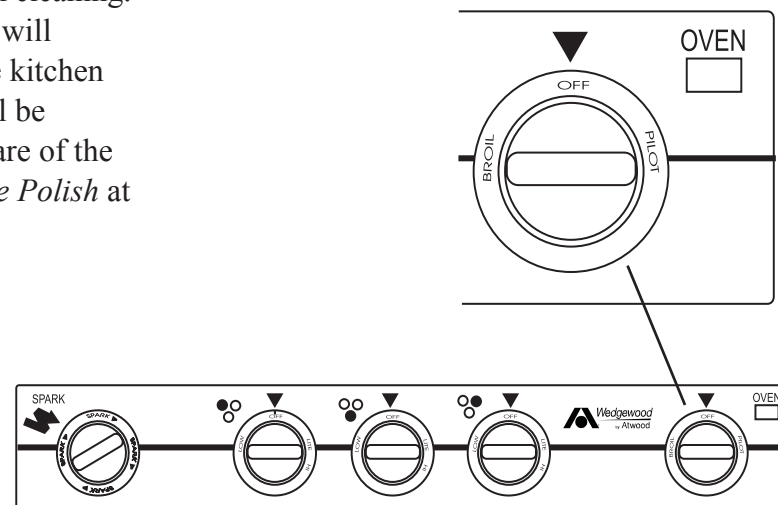
The cooktop range/oven is operated and maintained the same as the standard cooktop, only with an oven.

Oven Operation:

- ◆ The oven may be used with the cover on. **DO NOT** block vent openings on cover.
- ◆ Push in the oven control knob and rotate counterclockwise to **PILOT ON**.
- ◆ Manually light the oven pilot located near the back of the oven, under the broiler shelf and to the left of the oven burner.
- ◆ Set the oven control knob to **PILOT ON** to maintain pilot flame. The oven and broiler are now ready for operation. The oven pilot has been factory set and requires no further adjustment.
- ◆ To extinguish the oven pilot push in the oven control knob and rotate clockwise to **OFF**.

WARNING:

Extinguish all pilots when refueling or traveling. DO NOT block vents in oven with cookware or other objects.



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WALL THERMOSTAT

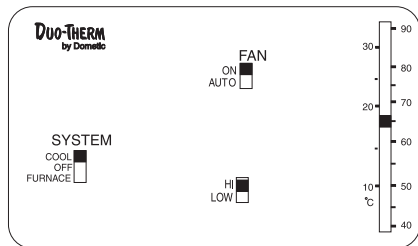
The wall thermostat operates the HVAC (Heating, Ventilating and Air Conditioning) systems. The thermostat requires 12 Volts DC to operate. The thermostat operates the roof air conditioner functions, as well as the LP-Gas furnace.

Fan Operation:

- ◆ Move the Fan switch to the **ON** position.
- ◆ Use the **Hi/Low** switch to select fan speed.

Air Conditioner Operation:

- ◆ Move the System switch to **Cool** and the Fan switch to **Auto**.
- ◆ Set the thermostat to the desired temperature.
- ◆ Use the **Hi/Low** switch to select the fan speed.



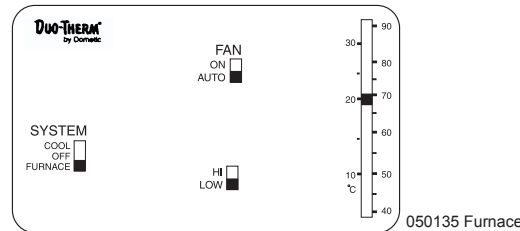
Wall Thermostat with A/C Selected. 050235b

NOTE:

The thermostat in the bedroom performs the same function as the living room thermostat. The Furnace position on the bedroom thermostat is non-functional.

Furnace Operation:

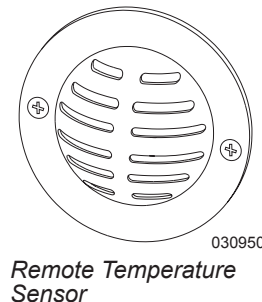
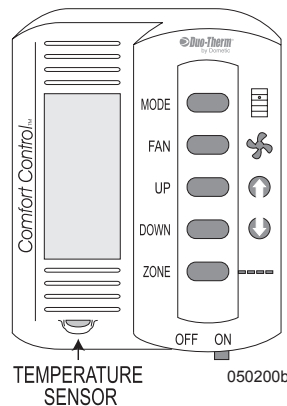
- ◆ Set the Fan switch to **Auto**.
- ◆ Set the thermostat to the desired temperature.
- ◆ Set the System switch to **Furnace**.



Wall Thermostat w/ Furnace Selected

Comfort Control (Optional Heat Pump Models Only)

The comfort control operates the HVAC (Heating, Ventilating and Air Conditioning) system. The comfort control will operate both roof air conditioners and the LP-Gas furnace. The comfort control uses a liquid crystal display to show the current mode status.



Remote Temperature Sensor

The Comfort Control system has five modes: **Off, Fan, Cool, Heat Pump** and **Furnace**. These are selected by repeat pressing of the Mode button. Low and High fan speed control applies only to the blower speed of the roof air conditioner. Selecting the fan speed **AUTO** adjusts the fan speed automatically, depending on temperature set point and actual temperature in a selected zone.

The motorhome is divided into two operating Zones, the living room and the bedroom. The living room is Zone One. The bedroom is Zone Two. The comfort control must be in Zone 1 for the furnace to operate. Press the Zone button to change zones. The selected zone will flash. The Up and Down buttons control the temperature in any mode.

NOTE:

The Comfort Control must be **On** to operate any HVAC function.

NOTE:

The motorhome will not heat or cool faster by selecting a very high or very low temperature setting.

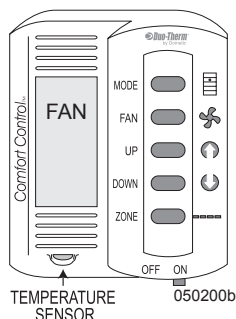
NOTE:

Conflicting modes cannot be selected. One zone cannot be set to Heat mode while another zone is set to Cool mode.

Fan Operation:

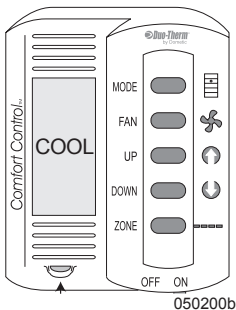
Interior air is circulated using the roof air conditioner blower. The fan speed controls the roof air conditioner blower speed in the following modes: Fan, Cool or Heat Pump.

- ◆ Slide the On/Off switch (on hallway thermostat) to the On position.
- ◆ Press the Mode button repeatedly until Fan is displayed.
- ◆ Press the Fan button to select fan speed.



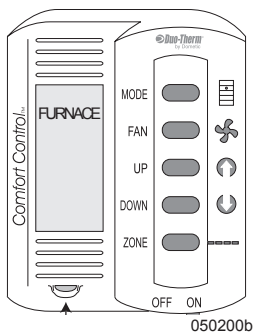
Air Conditioner Operation:

- ◆ Slide the **On/Off** switch (on hallway thermostat) to the **On** position.
- ◆ Press the **Zone** button to select **Zone 1** (front roof A/C) or **Zone 2** (rear roof A/C).
- ◆ Press the **Mode** button repeatedly until **Cool** is displayed.
- ◆ Select fan speed by pressing the **Fan** button.
- ◆ Set desired cooling temperature in each Zone by pressing the **Up** and **Down** buttons.



Furnace Operation:

- ◆ Slide the **On/Off** switch to the **On** position.
- ◆ Press the **Zone** button to select **Zone 1**.
- ◆ Select the **Furnace** mode on the Comfort Control using the **Mode** button.
- ◆ Select the desired temperature using the **Up** and **Down** arrow buttons.



NOTE:

The **Zone 2** function does not operate the furnace.

Heat Pump (Optional - N/A w/Standard Thermostat)

The Heat Pump mode supplies heat by using the air conditioner. The air conditioning principle is reversed, supplying heated air to the ceiling registers instead of refrigerated air.

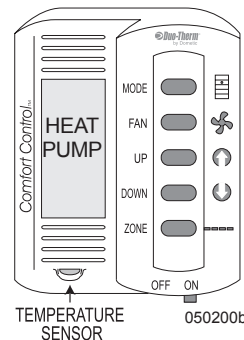
NOTE:

The roof air conditioner will not operate in Heat Pump mode with ambient temperatures at or below 30° F. Aux Heat mode will automatically be selected.

Heat Pump Operation:

When ambient temperature is between 30 to 42° F., a defrost cycle is initiated approximately every 40 minutes of compressor operation. The blower motor will stop for five minutes and Defrost will display. After the defrost cycle, Heat Pump operation will resume.

- ◆ Slide the **On/Off** switch on the thermostat to the **On** position.
- ◆ Press the **Zone** button to select **Zone 1** or optional **Zone 2**.
- ◆ Press the **Mode** button repeatedly until **Heat Pump** is displayed.
- ◆ Set desired fan speed by pressing the **Fan** button.
- ◆ Press the **Up** or **Down** buttons to set desired heating temperature.



Auxiliary Heat - If the Heat Pump mode is selected at or below 30° F., or if operating in Heat Pump mode and temperature drops to 30° F., the air conditioner will stop Heat Pump operation and Aux Heat will be displayed. The furnace will be selected as the auxiliary heat source and will begin operation. The furnace will remain the primary heat source until ambient temperature rises above 42° F.

AIR CONDITIONER - ROOF

The roof air conditioners operate only from 120 Volts AC supplied by shore power or the generator. 12 Volt DC is required to operate the wall thermostat.

NOTE:

The air conditioning system freezes moisture in the air. It is recommended to set the blower fan speed to high when operating in high humidity.

Operation

Operation Requirements:

- 120 Volts AC, from either shore power or the generator, is supplied.
- The interior house power is on and house batteries are charged.

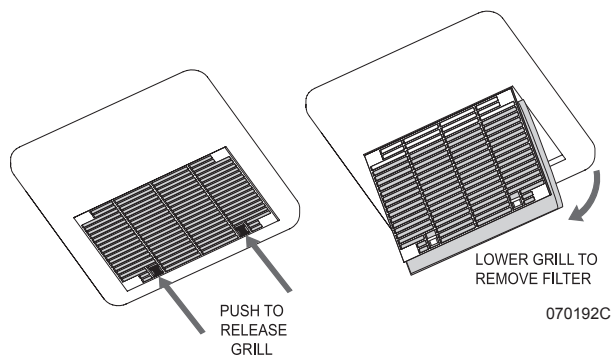
Return Air Filter

Clean the return air filter frequently. The filter is located inside the motorhome behind the intake vent cover. To remove the filter, firmly grasp the leading edge and push back on both tabs.

Never run the air conditioner without the return air filters in place. Dust and other particles will plug the evaporator core and substantially reduce the performance of the air conditioners.

To Clean:

- Wash the filter in warm soapy water. **DO NOT** use solvents.
- Rinse the filter thoroughly with fresh water. Allow it to dry.
- Reinstall the filter and secure the cover.



FURNACE

The furnace and its related components are 12 Volt DC operated, using LP-Gas as the fuel source. Electronic circuitry (automatic ignition) is used to ignite the burner.

The furnace uses outside air for the burner combustion and 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 which can be run throughout the motorhome.

CAUTION:

DO NOT store any items/materials in furnace area. Restricted air flow may hamper furnace operation leading to failure and/or fire hazard.

WARNING:

IF YOU SMELL GAS extinguish all open flames and close the Primary LP-Gas valve. LP-Gas is highly volatile and extremely dangerous. It can explode or ignite, resulting in property damage, injury or death. LP-Gas is heavy and can float on the floor or hide in corners. Open all windows and doors. **DO NOT** operate electrical switches as they can spark and ignite the gas. Keep all open flames, 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.

Operating Instructions

When the furnace is selected a short delay occurs before the blower motor begins. Once the temperature on the thermostat is reached, the burner is extinguished. The blower motor stops approximately two to three minutes after cool down.

Furnace Operation Requirements:

1. LP-Gas primary valve on the LP-Gas tank is open.
2. House batteries in the motorhome are fully charged and the interior house power is on.

NOTE:

The automatic ignition circuit board will attempt to light the burner three times before the ignition board will go into "lock-out." If the burner does not light, the furnace blower motor will continue to run and the wall thermostat will have to be cycled off.

Tips:

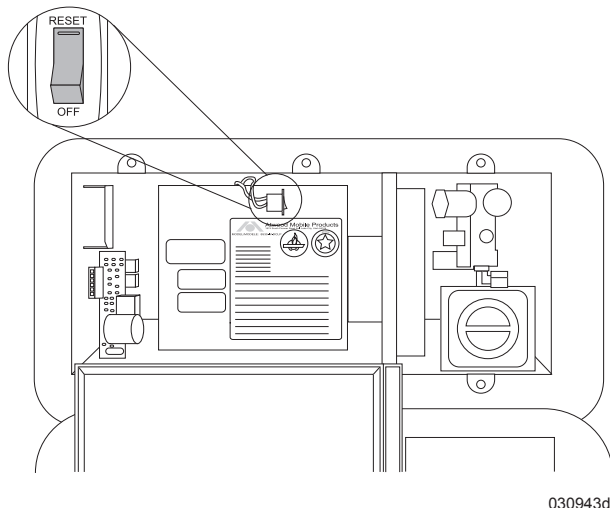
- ♦ The furnace may produce a musty smell during the first couple of cycles after storage.
- ♦ Operating the furnace at an altitude above 5,000 ft. reduces the BTU output due to air/fuel ratio.
- ♦ The furnace will periodically need to be serviced by a qualified technician. If the furnace exhibits unusual symptoms or noises, or has an unusual odor when operating, have the furnace checked or serviced.
- ♦ If the blower fails to operate after verifying the batteries are charged and fuses are good, use a coin or screwdriver to open outside access door and confirm the Reset switch is in the Reset position.

CAUTION:

It is not advisable to use the furnace to heat the inside of the motorhome during transit.

NOTE:

When washing the exterior of the motorhome, avoid a direct stream of water into the outside furnace vents as this can damage the furnace.

***If the Furnace Fails to Light***

If the furnace fails to light make sure the LP-Gas primary valve is open. The furnace will not light if the blower motor is not spinning to its specified speed. This may be due to a low house battery charge condition.

To Charge the House Batteries, either:

- ◆ Hook-up to shore power.
- ◆ Start the generator.
- ◆ Start the main engine.

WARNING:

If you smell gas and the blower motor is spinning, do not attempt additional furnace operation as this may result in an explosion, fire or personal injury. Contact a qualified technician.

WATER HEATER

The water heater operates by two different methods: 120 Volt AC (supplied by either shore power or the on-board generator) or LP-Gas. The heating element for the 120 Volt AC is similar to that of a house water heater. The 120 Volt AC method is efficient if shore power is available.

The LP-Gas is controlled by an automatic ignition board which runs on 12 Volt DC. Water heater thermostats are preset by the water heater manufacturer and are not adjustable. Water is pumped into the bottom of the water heater tank where it is heated and discharged from the top when used. For ease of draining the tank during winterization, the water heater is equipped with a pressure-temperature valve, by-pass valve and drain plug.

NOTE:

DO NOT operate the water heater without water in the tank. Damage to the thermostats and electric heating element can occur.

NOTE:

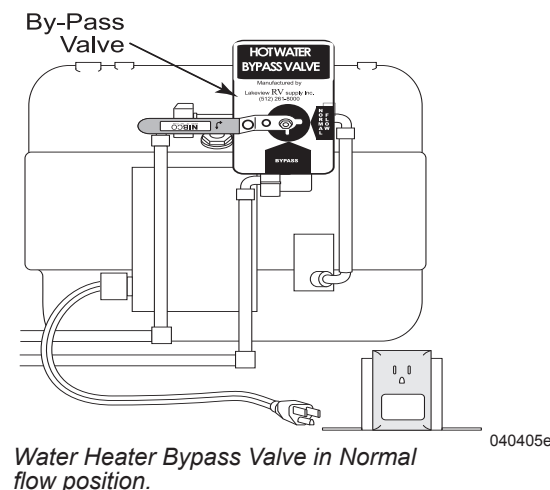
It is not fuel efficient to use the generator to operate the water heater on 120 Volt AC.

Before Using the Water Heater

Purge all trapped air from the water system and water heater before using the water heater.

To Purge Air and Pressurize the System:

- ◆ Remove the interior access panel to the back of the water heater.
- ◆ Turn the water heater Bypass Valve (located at the back of the water heater) to Normal Flow. If necessary replace drain plug.
- ◆ Fill the fresh water tank or hook to city water.
- ◆ Turn on the water pump or city water.
- ◆ Turn on the hot and cold valves for each faucet, one at a time. Operate each faucet, inside and outside the motorhome, until a steady stream of water with no air bubbles or air pockets is present. **DO NOT** operate the water heater until the water system is purged of air.
- ◆ After the system pressurizes, inspect the water heater and water system for leaks.



Water Heater Bypass Valve in Normal flow position.

WARNING:

IF YOU SMELL GAS extinguish all open flames and close the Primary LP-Gas valve. LP-Gas is highly volatile, extremely dangerous and can explode or ignite, resulting in property damage, injury or death. LP-Gas is heavy and can float on the floor or hide in corners. Open all windows and doors. **DO NOT** operate electrical switches. They may spark and ignite LP-Gas. Keep all open flames, 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.

CAUTION:

Air may still be present after purging the water lines and water heater. Use caution when opening a hot water faucet after the first heat cycle of the water heater.

Operation**Heating Water with 120 Volt AC:**

- ◆ Use either shore power or the generator to supply AC voltage.
- ◆ Turn on the electric water heater switch (120 Volt).
- ◆ Both gas and electric functions may be on at the same time. This will speed up the process of heating water for large volume use.

Heating Water with LP-Gas:

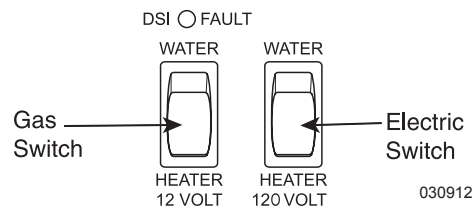
- ◆ Ensure LP-Gas is turned on.
- ◆ Turn on the LP-Gas water heater switch (12 Volt). The water heater will make an audible roar from the burner when ignited.
- ◆ The indicator light on the switch will illuminate briefly, then go out when the water heater is lit. The indicator light will glow steady when the ignition cycle has gone into “lock-out.”

CAUTION:

It is recommended not to operate the water heater on LP-Gas while the motorhome is in transit. Ensure the water heater is off before refueling.

NOTE:

The automatic ignition circuit board will make three attempts to light the burner. If the burner does not light the ignition circuit board will go into “lock-out.” Cycling the On/Off switch will reset the ignition board.



Switches located on the hallway monitor panel.

Ignition Module:

The LP-Gas **On/Off** switch controls the ignition circuit to the water heater.

The indicator lamp illuminates under the following conditions:

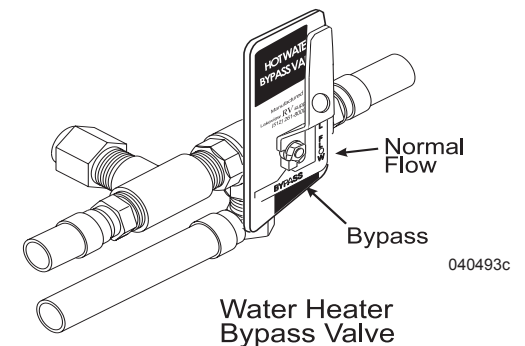
- ◆ Upon initial start-up the lamp illuminates briefly, ignition occurs, and the lamp goes out.
- ◆ If the burner does not light within six to nine seconds, the ignition board will lock out and the indicator lamp will glow steady.

Thermostats:

Separate thermostats are used for LP-Gas and AC electric. The thermostat controls the power to the module board. At 130° F, the thermostat will open, extinguishing the burner.

Water Heater Bypass

The bypass valve is located at the back of the water heater. Turning the valve to **BYPASS** stops water from entering the cold water inlet of the water heater. Turn the valve to **BYPASS** when winterizing. For normal operation, turn valve so that handle points to **NORMAL FLOW**.



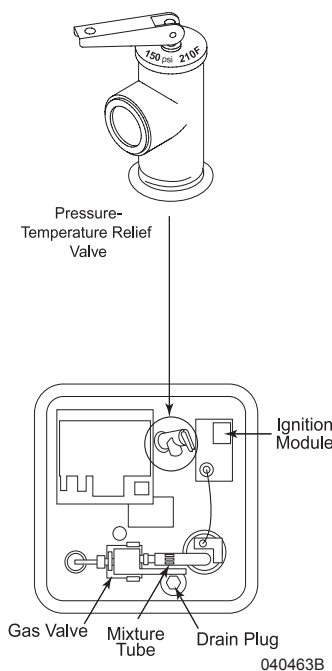
Pressure-Temperature Relief Valve

The water heater is equipped with a Pressure/Temperature relief valve (P & T) that may discharge during the heating cycle due to thermal expansion of water. The P & T relief valve is designed to open if the water temperature in the tank reaches 210° F (98.8° C), or if internal pressure reaches 150 psi. When water pressure and temperature reach these settings, water may drip from the valve until the pressure has dropped. A small discharge is normal and is not necessarily a faulty valve. Avoid opening the P & T valve manually as it may continue to leak.

The water heater has an internal air pocket to reduce the possibility of dripping or weeping.

Eventually, the expansion of the water will absorb the air pocket. When this occurs, the air pocket will have to be replaced utilizing the following procedure.

CAUTION:
Ensure the water heater tank is cool prior to making any check of the valve.



Re-establishing the Air Pocket:

Step 1: Turn **OFF** the water heater.

Step 2: Turn **OFF** the incoming water supply.

Step 3: Open any hot water faucet closest to the water heater.

Step 4: Pull the handle of the P & T valve until the flow of water stops.

Step 5: Close the P & T valve allowing it to snap shut. Close the hot faucet and turn **ON** the water supply.

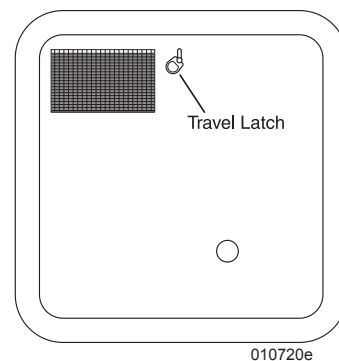
Step 6: Turn **ON** the water heater.

The air pocket is re-established and the process does not need to be repeated until the next discharge of water from the P & T valve. If the discharge does not stop, contact a qualified service center to evaluate the valve and make any required repairs.

Burner Compartment

Periodically check the outside service compartment and screen (in the door) for foreign material that can accumulate to prevent the flow of combustion and ventilating air.

NOTE:
DO NOT
block any
opening.



Tips

- ◆ Conserve LP-Gas by turning off the water heater when not in use.
- ◆ Conserve energy and hot water by shutting off the shower water when not in use.
- ◆ Use caution when hooked to anything less than 30 Amp shore service. When the water heater element is in operation it will use approximately 12 Amps at 120 Volts AC. Appliances will need to be operated in sequence to avoid tripping a breaker.
- ◆ 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.
- ◆ Operate the water heater using LP-Gas when hooked to 30 Amp shore power. This will reduce the likelihood of tripping the shore power breaker.

Draining & Storage

Drain the water heater during winter storage to prevent freeze damage.

1. Turn off electrical power to the water heater.
2. Shut off the primary LP-Gas valve.
3. Open low point drains.
4. Open both Hot and Cold on all faucets.
5. Remove water heater drain plug.
6. Turn the Bypass lever to **BYPASS**.

NOTE:

Refill the water heater with water before resuming operation.

Troubleshooting:

- ◆ If water heater fails to light, check the mixture tube for obstructions. Spiders may make nests in the burner tube. It is recommended to clean the burner tube with a brush and not compressed air. Compressed air may not fully remove the obstruction.
- ◆ If the indicator light on the switch does not light, and the water heater does not light, ensure the battery cut-off switch at the entry door is on or check for a blown fuse in the house distribution panel.
- ◆ If the water heater fails to operate after checking the fuses, the High Temperature safety limit switch may be tripped. Have a qualified technician inspect the water heater.

WASHER-DRYER PREPARED (Optional)

The optional washer-dryer “prep” package includes the following items:

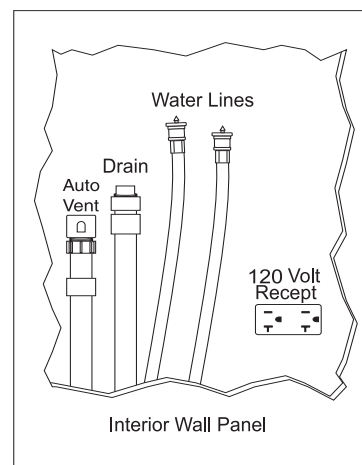
- ◆ Color coded water supply lines. A red line for hot; a blue line for cold.
- ◆ A 1½" waste water drain line with threaded cap, P-Trap and an automatic vent cap. This will drain the waste water into the grey water holding tank.
- ◆ A 120 AC Volt receptacle located in the compartment.

NOTE:

Sidewall dryer vents are not part of the prep package. If a sidewall vent is to be installed, properly seal vent to sidewall.

CAUTION:

It is highly recommended to hook the motorhome to shore services when using the washing machine due to limited fresh water supply and grey tank capacity. The washer may drain into the black tank on some floor plans.



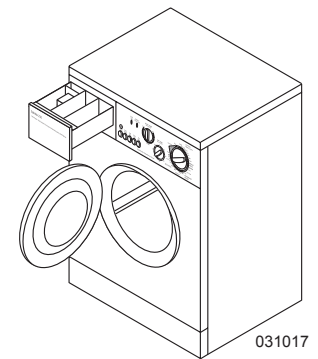
Location of specified parts may vary within wall panel depending on floor plan and model.
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If a washer-dryer is to be installed at a later date, follow all the manufacturer installation instructions. Listed here are further instructions which should be adhered to for safe and reliable operation:

- ◆ **DO NOT** connect the clothes dryer exhaust duct to any other duct, vent or chimney.
- ◆ **DO NOT** terminate the exhaust duct beneath the motorhome.
- ◆ Use proper length fastener when attaching exhaust vent to exterior sidewall. Stainless steel fasteners are best suited for this as they will not rust.
- ◆ If the cabinet or closet in which a washer-dryer is installed does not have vented, louvered doors, the manufacturer's installation instructions may require installation of vented doors or vents to be installed in the doors. This is for sufficient circulation of air.

WASHER-DRYER (Optional)

The automatic washer-dryer is front loading with an extra large door opening for easier access. Several wash and dry programs are available along with variable water temperature settings.



Tips for Operation:

- ◆ Always have the door open when selecting and moving the setting switch. This will keep the contacts from arcing. Then shut the door for operation.
- ◆ The washer-dryer operates on 120 Volt AC from shore power or the generator.
- ◆ The washer-dryer will use approximately 12 to 20 gallons of water per wash cycle.

WARNING:

Open a window or vent while operating the dryer. The washer-dryer can create negative air pressure inside the motorhome that can accumulate Carbon Monoxide or LP-Gas while operating fuel-burning appliances.

CAUTION:

DO NOT use the washer-dryer while traveling. Suspension movement, combined with the weight of the drum while in the wash cycle, can damage the internal components of the washer-dryer.

INFORMATION:

The washer-dryer has many features. Refer to the manufacturer's manual in the owner's information file for detailed operating instructions.

Test Procedure

Before using the washer for the first time, after winter storage or a long period of non-use, conduct a simple test procedure to verify that all the hardware and electronic components are functioning. Wipe the interior and exterior of the washer-dryer with a damp cloth to remove dust that has accumulated.

NOTE:

Perform this test before putting the washer-dryer in use for the first time or after the winter months. This will clear the water lines and drum of winterization antifreeze.

Test Procedure Requirements:

- Make sure water lines are secure and water valves are open.
- Hook to city water or turn on water pump.
- Hook to shore power or start generator.

To Conduct the Test Procedure:

1. Set the selector knob to Reset.
2. Set the Dry Timer knob to 30 minutes. Push the **On/Off** button to **ON**. Wait five seconds. The Auto Dry light should be on and the Status light flashes fast then slow.

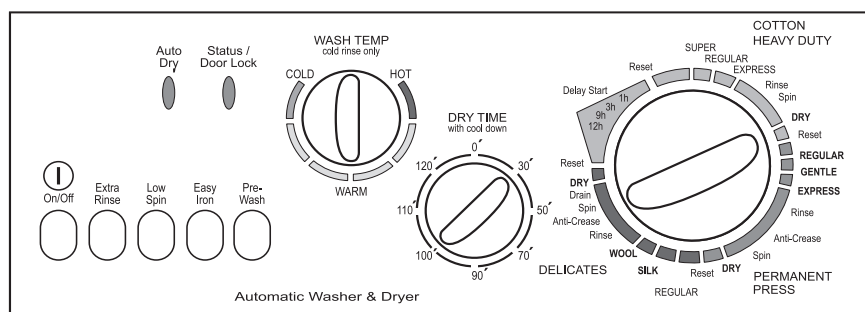
3. Set the selector knob to a wash cycle. Set Wash Temp knob to Warm. Water should flow into washer and the drum should rotate both directions.
4. Set the selector knob to Reset. Wait five seconds.
5. Set the selector knob to Spin. Water should drain and the drum rotation should speed up.
6. Set the selector knob to Reset. Wait five seconds.
7. Set the selector knob to Dry. Dryer fan should begin and the drum should rotate both directions.
8. Set the selector knob to Reset. Wait five seconds.
9. Set the Dry Time knob to zero. The Auto Dry light should go off.
10. The door will unlock in two minutes or less. The Status light flashes fast then slow. The door should now open.
11. Push the **On/Off** button to **Out (Off)** position. The Status light should be off.

WARNING:

DO NOT wash or dry articles that have previously been cleaned, washed, soaked or spotted with gasoline, dry cleaning solvents or other flammable or vaporous substances that could ignite or explode. DO NOT add gasoline, dry cleaning solvents or other flammable or explosive substances to the wash water.

CAUTION:

DO NOT use heat to dry articles containing foam rubber or similar textured, rubber-like materials.



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To begin a wash load:

- Sort and pre-treat clothes.
- Add the measured amount of detergent suggested by the package directions (maximum two tablespoons).
- Load the laundry loosely into the washer. Close the washer door.
- Turn the Wash Temperature knob to the desired temperature setting.
- Choose the desired washing cycle option using the Selector knob.
- Load wash tray with detergent.
- Turn the power **ON**.
- After the cycle is complete, wait two minutes for the door lock to release before attempting to open the door.

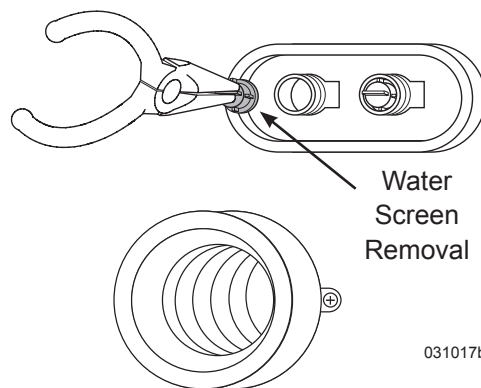
Washer-Dryer Maintenance

Occasionally wipe the exterior cabinet of the washer-dryer with a damp cloth or sponge. Wipe dry with a soft cloth. **DO NOT** use polish on plastic trim. In areas of hard water, detergent can accumulate in the drum. Obtain a packaged water softener. Add quantity as specified by the manufacturer directly to the drum. Run the washer through a complete cycle using hot water. Repeat the process if necessary. Remove hard water deposits using only cleaners labeled as washer safe. Wipe the inside of the washer-dryer door with a soft cloth to remove moisture. Periodically apply a thin coat of paste wax to the inner door, especially to the area that is immediately next to the door window. This will protect the door finish from laundry spills and discoloration.

If water flow to the washer-dryer is reduced, the Hot and Cold water inlet screens may be clogged. Remove water pressure and undo water lines at the back of the washer-dryer. Use tweezers or pliers to remove screens from fittings. Clean and install screens and water lines. Hook to city water or turn on the water pump. Check for water leaks before using the washer-dryer.

NOTE:

Should the washer-dryer need removal for service, care should be taken as the washer-dryer weighs approximately 170 lbs. Proper accommodations should be made to avoid risk of injury or damage to the cabinetry.

**Winterizing the Washer-Dryer****Winterize Washer-Dryer Using Air Pressure:**

1. Hook an airline (regulated to 45 psi or less) to the water inlet of the motorhome.

2. Rotate Selector knob to a wash position with the Wash Temp setting on Warm. Press the power button to On. Air pressure will clear the Hot and Cold water lines.
3. After water lines are clear, rotate Selector knob to Spin. Allow the pump to drain the drum.
4. Set Selector knob to Reset and Timer to zero. The door will unlock in two minutes or less. Open door and pour in $\frac{1}{4}$ gallon of RV antifreeze.
5. Set Selector knob to Spin. The pump will prime with antifreeze. Set selector knob to Reset and turn the power off.

Winterize Washer-Dryer Using RV Antifreeze:

Two methods of introducing antifreeze to the water system can be used. Add antifreeze directly to the water tank or use a separate container of antifreeze with water line hooked to the intake side of the water pump.

1. Turn on the Water Pump. Rotate Selector knob to a wash position with the Wash Temp setting on Warm. Press the power button to On. Allow antifreeze to enter the drum.
2. After water lines are filled with antifreeze, rotate Selector knob to Spin. Allow the pump to drain the drum.
3. Set Selector knob to reset and Timer to zero. The door will unlock in two minutes or less. Turn the power off.
4. Any remaining liquid should contain a sufficient amount of antifreeze to be protected from freezing.

NOTE:

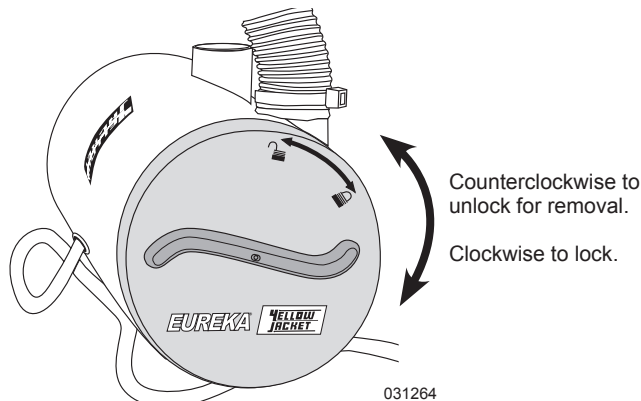
After winter, perform a Test Procedure before washing or drying any laundry to make sure all antifreeze has purged.

CENTRAL VACUUM (Optional) Operation

- ◆ Start generator or plug into shore power.
- ◆ Lift lid on wall receptacle to start vacuum. Insert the hose in the receptacle and release lid.
- ◆ Connect desired attachment on hose and start vacuuming.

NOTE:

Consult OEM manual for detailed operation and maintenance.

**Maintenance**

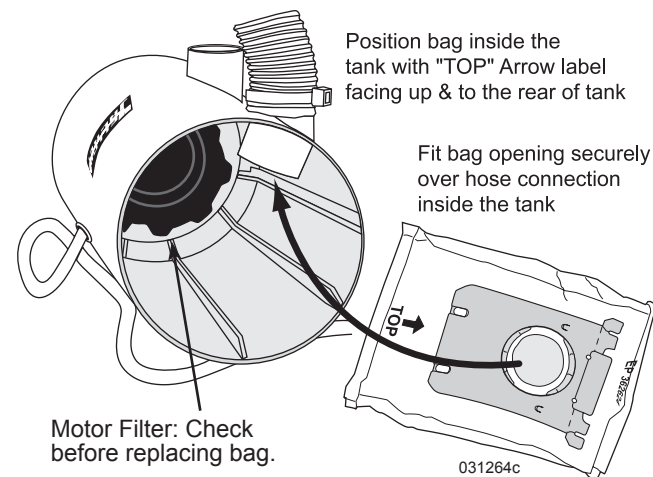
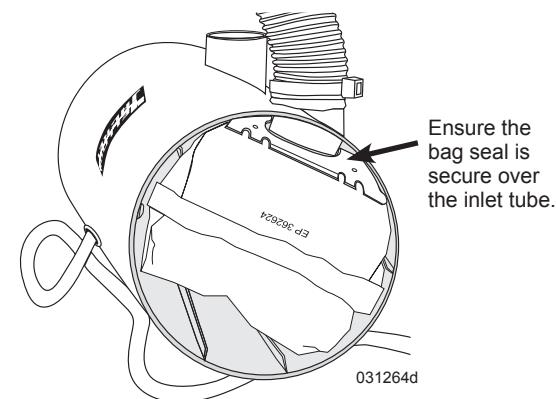
Vacuum has a thermal protector built into the motor to prevent overheating. If motor will not operate, it will automatically reset in about ½ hour. If motor brushes or bearings are worn out, the circuit protector will trip off again after a short period of time. If this happens, contact a qualified service representative.

Changing the Bag:

To keep your vacuum at top efficiency, change the filter bag at regular intervals. To maintain cleanability, replace filter bag when it is about ¾ full.

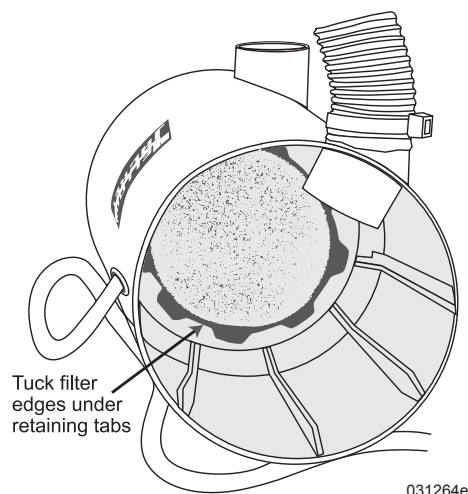
1. Unplug the power unit from grounded outlet.
2. Rotate the bag cover counterclockwise and remove cover.
3. With a finger on each side of the inlet, slide the bag off the inlet tube.
4. Pull the center cardboard tab to automatically seal the bag and prevent dust from leaking out.
5. Remove the bag from the vacuum and discard. **DO NOT** reuse.
6. Check motor filter in back of canister.
7. Unfold the new “OX” bag and insert into the vacuum so the center cardboard seal tab is toward bag cover. The top arrow should point to the bag cover.

8. With a finger on each of the cardboard tabs, slide the bag on the inlet tube.
9. Line up the mark on the bag cover with the unlock symbol and rotate clockwise to lock symbol.



Replacing & Cleaning the Motor Filter:

1. Inspect during each bag change. The filter should be cleaned every fifth bag replacement or when excessively dry.
2. Remove dust bag as previously instructed.
3. Locate the motor filter in the back of the vacuum and lift out.
4. Clean by rinsing under warm water and let air dry if heavily soiled. If the filter is torn or obstructed it must be replaced.
5. Reinstall dry motor filter before use, making sure filter is tucked under retaining tabs.
6. Reinstall bag as previously instructed.

**WARNING:**

To reduce the risk of fire, electric shock or injury:

- ♦ Unplug and disconnect power before servicing.
- ♦ Avoid wet surfaces.
- ♦ Use only manufacturer's recommended attachments.
- ♦ DO NOT use without dust bag and/or filters in place.
- ♦ DO NOT pick up anything that is burning or smoking, such as cigarettes, matches, or hot ashes.
- ♦ Use extra care when cleaning on stairs.
- ♦ DO NOT use to pick up flammable or combustible liquids such as gasoline or use in areas where they may be present.

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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 manufacturer's manual. Optional equipment will also be discussed in this section which may not apply to all motorhomes.

INFORMATION:

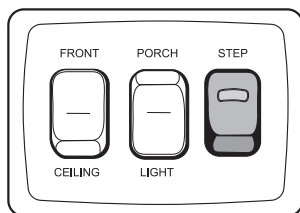
Detailed information with CAUTION or WARNING instructions for the various electronics, other than what is provided in this section, can be found in that specific manufacturer's manual.

ENTRY STEP *Operation*

The exterior entry step features retractable steps with amber ground lights, automatic retract when the ignition key is **ON**, and a “last out” feature. The step switch (located just inside the door) illuminates when the circuit is active.

NOTE:

When dry camping, take note that an illuminated switch indicates that the step circuits are active and drawing current from the chassis battery.



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Operating the Entry Step:

- ◆ Begin with the entry door closed.
- ◆ Turn the **ENTRY STEP** switch on.
- ◆ Open the door. The step should extend and lock in the **OUT** position. The step will retract when the door is closed.
- ◆ With the door open and the entry step extended, turn the **ENTRY STEP** switch off. This will allow the step to remain out while the door is opened and closed (the amber lights will also be off).
- ◆ The first time the door is opened after the ignition is turned off, the entry step will extend and remain extended without turning the entry step switch on. This is the “last out” feature.

NOTE:

When the ignition is on the step will always activate with door movement, regardless of the power switch position.

Automatic Retract Feature:

The entry step will automatically retract when the ignition is turned **ON**. This will happen when the door is closed, regardless of the power switch position.

CAUTION:

High curbs can impede step operation. Use care when parked on side streets.

NOTE:

The steps are self lubricating and require no maintenance.

If the step fails to operate:

- ◆ Verify that the step switch is **ON**.
- ◆ Check the 25 Amp entry step fuse (located in the front distribution panel).
- ◆ 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, there is the possibility of causing major damage to both the step and the motorhome.

ENTRY DOOR

The entry door has three separate seals to eliminate wind noise during travel. There is a lock on the door handle and a separate dead bolt for safety and security. The door also has a primary and secondary latching system that ensures secure and safe latching. If necessary, there are adjustments that can be made to maintain entry door performance.

Adjusting the Entry Door Latch:

- ◆ Determine which bolt needs adjustment.
- ◆ Observe the latch and strike bolt alignment while slowly closing the door. **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 of the door.
- ◆ The entry handle should operate with little effort. Excessive pressure indicates the bolt is set too far back.
- ◆ With a 5/8" box wrench or socket, loosen the movable strike bolt. Make all adjustments in small increments. Tighten the bolt firmly after making adjustments.
- ◆ Test the operation of the dead bolt lock to ensure proper functions.
- ◆ Apply silicone weekly to the entry door rubber gaskets to prevent squeaking while the motorhome is traveling. Use a one inch sponge paint brush, sprayed with silicone for easy application.

CAUTION:

When operating the entry door ensure the dead bolt latch is fully in the unlock position prior to closing the entry door. Failure to do so can result in damage to the dead bolt and/or entry door.

Screen Door Maintenance

Adjusting the Screen Door:

- ◆ The screen door latch/catch permits vertical adjustment. Loosen the two Phillips screws holding the latch to the door. Move the latch far enough to allow it to catch on the striker mounted on the door frame. Tighten screws.

- ◆ The striker mount on the door frame permits horizontal adjustment. Loosen the two Phillips screws holding the striker assembly. Move the striker to center the latch. Tighten screws.

Changing the Slider:

- ◆ Center the slider on door. Pull on the slider at its center. This will bow the slider enough to allow easy removal. To replace, make sure the upper left corner is inserted first. Pay attention to stop tab location.
- ◆ To store the screen for travel, use the clips provided on the bottom half of the screen door.

SLIDE-OUT ROOM

The slide-out room operates by an electric switch that controls an electric motor or hydraulic pump. Slide-out room operation employs safety features to prevent mechanical damage and physical harm. The slide-out room(s) will not operate unless the ignition is off and the parking brake is applied.

The slide-out system requires very little maintenance. To ensure long life of the slide-out system, follow these simple guidelines:

- ◆ **Inspect** the roof of the slide-out for debris such as pine needles, dirt, leaves, sticks, etc. Any debris left on the top may cause damage to the seals when being retracted. If debris is present wash with soap and water, then rinse.

- ◆ When the room is out visually inspect the wipe seal. The seal should be clean and free of dirt or other foreign material. **Inspect** the seal for tears.
- ◆ If the slide-out room leaks, fully retract it. Tape the exterior opening closed with duct tape, if necessary, until repairs to the motorhome can be completed.
- ◆ Open a window or a vent to equalize pressure during slide-out operation.

NOTE:

Perform slide room operation with the motorhome on its suspension.

NOTE:

Slide-out adjustment is not warrantable after 12 months. DO NOT use any petroleum-based products on the slide-out seal. Petroleum based products can damage the paint and will cause premature aging of the rubber seal.

WARNING:

Move the driver's seat forward before activating the slide-out room. Damage to the upholstery can occur. The outside area must be clear of any obstructions restricting slide-out room operation. Ensure there is five or more feet of clear space outside the slide-out room prior to extending, or damage can occur. When retracting the slide-out room, ensure there is sufficient clearance inside the motorhome. Never move the motorhome with any slide-out room extended.

CAUTION:

Continuous operation of the slide-out room can drain the batteries and damage the motor from overheating.

Slide-Out Operation

To Extend the Slide-out Room:

- ◆ Move the driver seat forward.
- ◆ Confirm that there is at least five feet of clearance outside the motorhome for the slide-out room to extend.
- ◆ Ensure ignition key is in **OFF** position.
- ◆ Park brake must be applied.
- ◆ Ensure bay doors are closed.
- ◆ Ensure house batteries are fully charged and interior house power is **ON**.
- ◆ Clear all people, pets and objects from slide-out room path.
- ◆ Remove the lock bar (if applicable).
- ◆ Press and hold the slide-out room switch (on the system monitor panel) in the **OUT** position. The slide-out room will slowly move to the **OUT** position. Release the switch to stop room movement. To continue the room movement, push and hold the switch in.

- ◆ Release the slide-out switch when the room is fully extended (a change in motor sound indicates extension). The slide-out drive motor will not stop automatically; the switch must be released.
- ◆ Extend any additional slide-out rooms.
- ◆ Level the motorhome with the leveling system.

NOTE:

Extensive damage could occur to the slide-out room and awning when extending the slide-out room in snow, sleet, ice or freezing rain. In such conditions, if the slide-out room is extended, clear the awning and ensure free movement prior to operating the slide-out room.

CAUTION:

Dirt and grit trapped under the slide-out room could result in damage to the floor. Continuous operation of the slide-out could cause a drain on the house batteries and damage to the slide-out motor from overheating.

CAUTION:

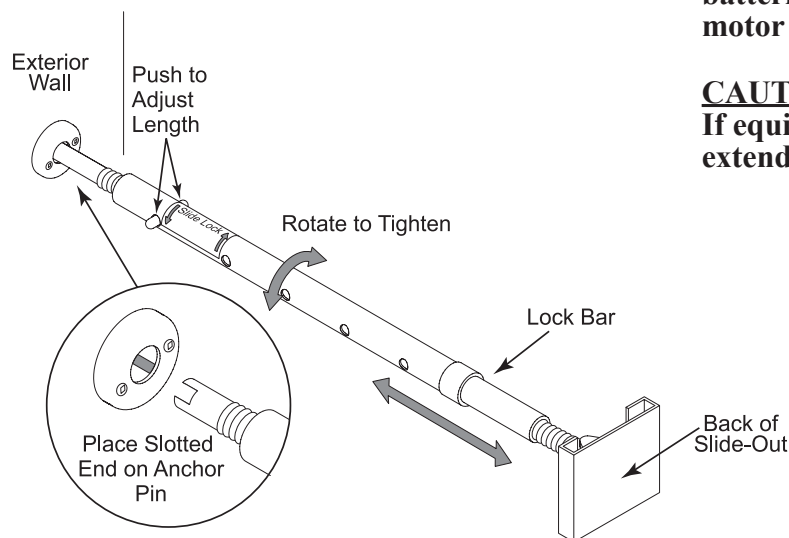
If equipped, remove lock bar prior to extending slide-out.

To Retract the Slide-out Room:

- ◆ Check for sufficient clearance inside the motorhome before retracting the slide-out room.
- ◆ Clean the floor, if necessary, to ensure there is no dirt or grit that could result in floor damage during operation.
- ◆ Move the driver's seat forward.
- ◆ **Inspect** the exterior to ensure there are no sags in the awning material.
- ◆ Remove any debris from the top of the slide-out room.
- ◆ Start the motorhome and retract the leveling jacks prior to operating the slide-out.
- ◆ Turn the ignition switch **OFF**. The slide-out room will not operate with the engine running.
- ◆ The house batteries should be fully charged and interior house power is **ON**.
- ◆ The park brake must be applied.
- ◆ Ensure all people, pets and objects are clear of slide-out room path.
- ◆ Press and hold the switch in the **IN** position. The slide-out room will move slowly in. To stop the slide-out room, release the switch. To continue the room movement, push and hold the switch in.
- ◆ Release the switch.
- ◆ Install lock bar for travel (if applicable).

CAUTION:

Check for sufficient clearance on the inside of the motorhome (driver's seat, etc.) before retracting the slide-out room. Never move the motorhome with the slide-out room extended.

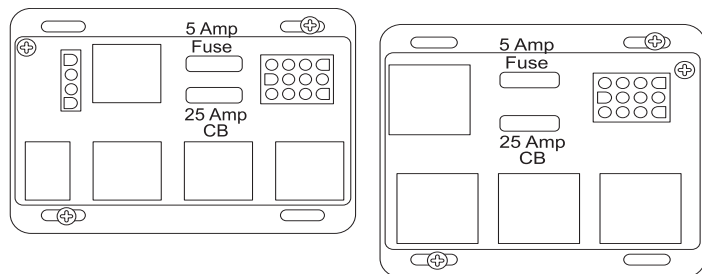


Slide-out Lock Bar

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CAUTION:

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. Retract the room in small increments to allow the water time to run off.



Slide-out Relay Modules: Located in curbside storage.

NOTE:

Ensure the floor is clean before retracting the slide-out room. Trapped dirt or grit under the slide-out room can scratch the floor surface.

WARNING:

Firmly latch all cabinet doors adjacent to the slide-out before extending or retracting the room. Damage to doors or fascia can occur.

Follow steps under the appropriate slide-out manual override procedures to manually operate the slide-out room.

WARNING:

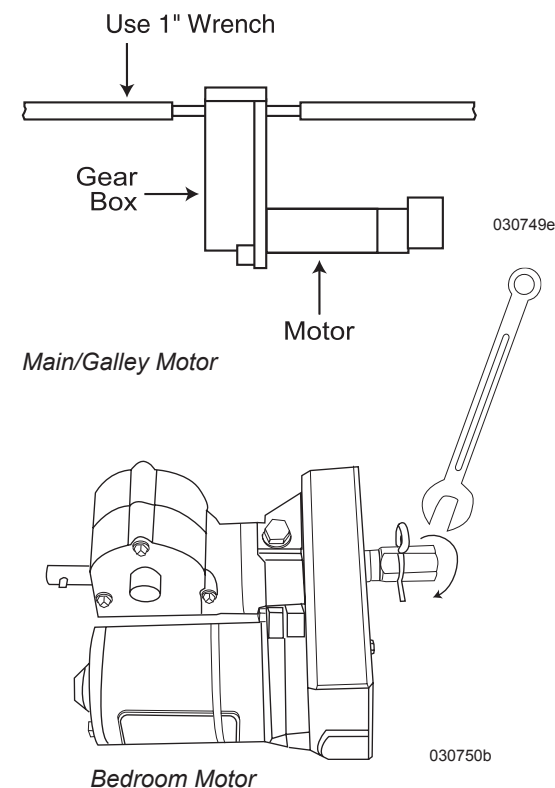
DO NOT work on the slide-out system unless the house and chassis batteries are disconnected.

CAUTION:

Ensure the floor is clean before retracting the slide-out room.

Electric Slide - Manual Override:

1. The bedroom slide-out motor is located under the bed. Lift the bed and remove the access panel. The main slide and wardrobe motors are located inside the exterior storage bays under the slide-outs.
2. Turn off the house battery disconnect switch (located in the battery tray).
3. Remove 12 Volt DC from the motor by disconnecting the plug from the slide-out motor to the power supply.
4. Use a 1" wrench (for main and wardrobe slides) or a 5/8" wrench (for the bedroom slide) to turn driveshaft and retract room.

**Manual Override - Electric Slide**

If the slide-out room does not respond from the switch, confirm that all safety features are in place.

- ◆ Ignition key is **OFF**.
- ◆ Parking brake is applied.
- ◆ Battery cut-off switch is **ON**.
- ◆ House batteries are fully charged.

If the Slide Room Fails to Operate:

Check the fuse and auto-reset circuit breaker on the slide-out relay module located in the black box in curbside storage bay. If the fuses and circuit breakers test okay, it will be necessary to manually override the slide-out mechanism.

5. Once the slide room has been manually retracted, apply pressure to the wrench to firmly set the room. This will prevent room drift.
6. Take the motorhome to an authorized repair center.

CAUTION:

DO NOT continue to turn the motor after the room is fully extended/retracted. Damage to the slide mechanism can occur.

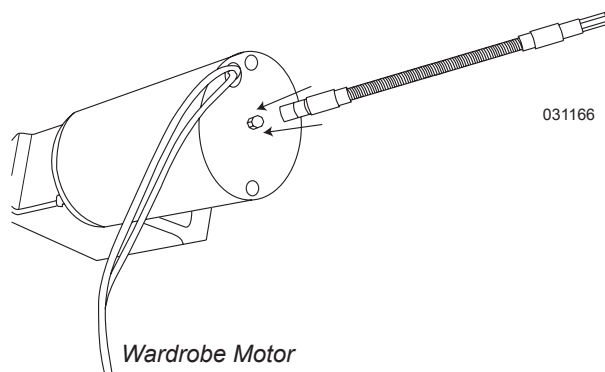
Electric Cable Drive - Manual Override:

1. Turn off both the battery and house disconnect switches (located in rear curbside bay).
2. Locate the slide room motor near the ceiling of the slide-out. Remove the fascia, valance, or both. The fascia and valance may be attached by Velcro® or screws.
3. Disconnect the slide room motor electrical plug. Locate by following the wires that run from the motor to the plug. This removes 12 Volt DC power from the slide-out motor.
4. Attach the flexible shaft to the ¼" fitting on the end of the slide-out motor.
5. Attach a ¼" socket and ratchet or drill to the other end of the flexible shaft.
6. Turn in proper direction to move the room. Reverse direction if the cables tighten and the motor is difficult to turn.

CAUTION:

Over-torquing can result in severe damage.

7. Take motorhome to an authorized repair center.

**Manual Override - Hydraulic Slide**

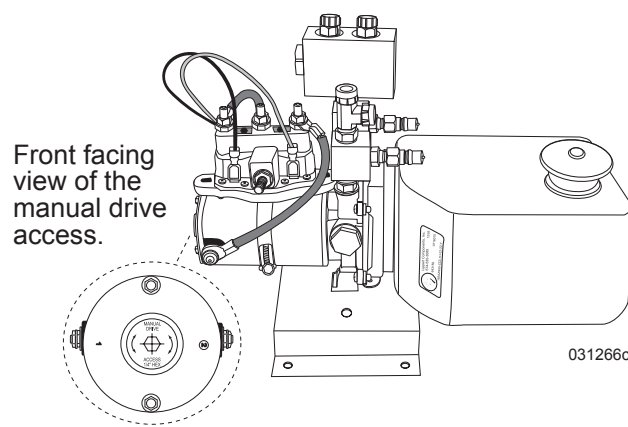
A safety feature may be engaged to prevent room operation if the slide room does not operate.

If the slide room does not operate:

- ◆ Ensure ignition key is **OFF** when extending room.
- ◆ Ensure park brake is applied.

If the slide room does not operate after checking the safety requirements:

- ◆ Ensure all electrical connections at the switch are good.
- ◆ Ensure fuse is good, the house batteries are fully charged and the battery cut-off is on.
- ◆ Check fluid level in reservoir. Maintain fluid within ½" from top of reservoir when slide-outs are retracted.
- ◆ It may be necessary to contact a repair facility to have the problem diagnosed and repaired.



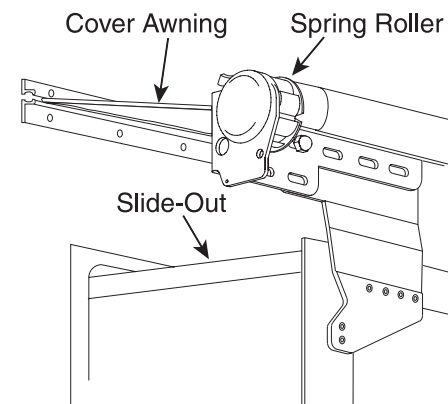
Lippert Slide Motor located in roadside bay.

To move the Slide room manually:

1. Turn off house and chassis battery disconnect switches.
2. Access the slide room hydraulic pump at roadside generator compartment.
3. Remove plastic cover labeled **Manual Drive** at end of pump assembly.
4. Insert a ¼" hex bit connected to a cordless drill, ratchet or screwdriver.
5. Turn clockwise to extend slide-out or counterclockwise to retract slide-out.
6. Remove hex bit and reinstall plastic cover.

**AWNINGS
Slide-out Cover**

The slide-out cover is automatic and designed to react to the slide-out movement. A fixed edge of the slide-out cover is installed into an awning rail, mounted just above the slide-out. A spring-loaded roller with special brackets mounts to the slide-out. In a hard rain, the cover will help prevent water from penetrating the seal of the slide-out.



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The slide-out cover will extend automatically and attain full coverage when the slide-out achieves maximum extension.

NOTE:

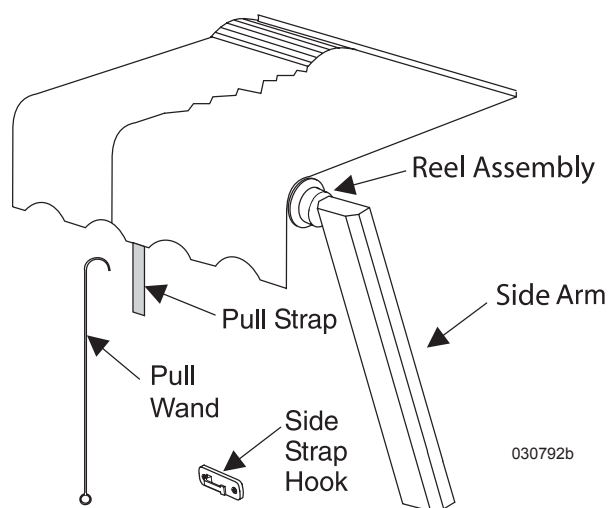
Water may pool on top of the extended cover. As the slide-out is retracted, the water is removed when the cover retracts. Retract room slowly. Pause three or four times to allow any accumulated water to run off.

The slide-out cover retracts automatically and rolls up to the travel position when the slide-out is completely closed.

NOTE:

When retracting the slide-out, stop the room approximately halfway. Confirm that the fabric is rolling properly before fully retracting the slide-out.

Window Awning (Optional)



To Extend the Awning:

- ◆ Hook loop of pull strap with pull wand and pull awning, reel assembly and side arms to extend fully away from motorhome.
- ◆ Hook pull strap on side strap hook, remove pull wand from pull strap and store.

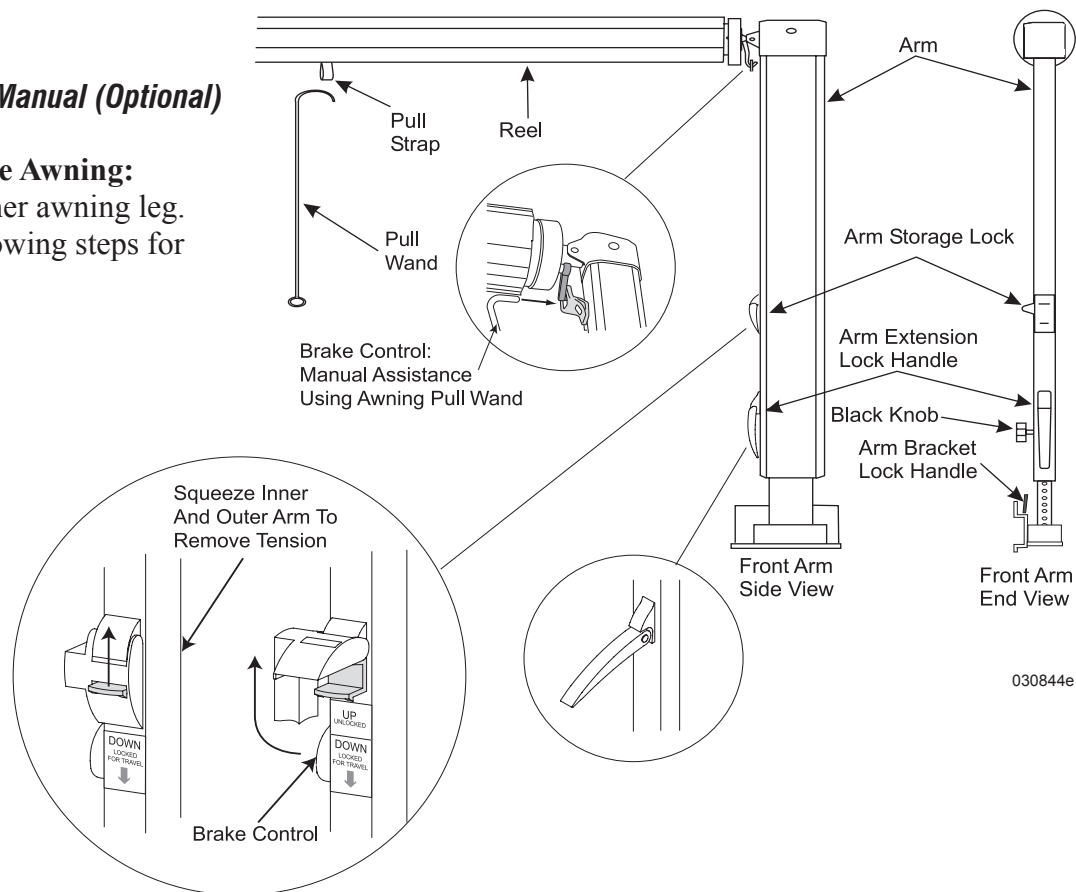
To Retract the Awning:

- ◆ Hook pull wand on pull strap, remove pull strap from side strap hook and slowly allow awning to retract.
- ◆ Remove pull wand from pull strap and store.

Patio Awning - Manual (Optional)

To Unlock the Awning:

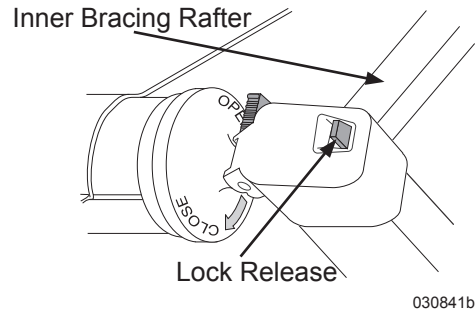
Start with either awning leg.
Repeat the following steps for each leg.



1. Loosen the black locking knob located on the backside of the awning leg (only about six turns are needed). This will allow the support brace to move freely.
2. Unlock the travel lock by using one hand to squeeze inner and outer arm to remove tension from storage lock. Push up on tab and swing lock away.
3. Move the brake control (front leg only), to the up/unlock position.

To Extend the Patio Awning:

1. Insert pull wand into loop of the pull strap. Draw the awning away from the motorhome to the desired extension.

**WARNING:**

Always use the pull strap for extending and retracting awning. Never retract awning while holding onto the awning arm. Hands or fingers caught between the awning arm channel and brace channel during awning retraction may result in serious injury.

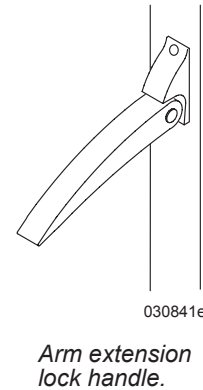
2. Slide the inner bracing rafters to the top of each arm ensuring the bracing is locked in place. Tighten the black locking knob.

NOTE:

Ensure the locking tab on the support brace is latched through the hole in the end cap.

3. If equipped with Canopy Clamps, fasten the clamps at this time.

4. For additional clearance, grasp the outer arm above the Arm Extension Lock Handle with one hand and release the lock with the other hand. Extend the awning to the desired height. Support the awning with one hand and engage the lock handle to set the pin into the hole in the inner arm. Repeat for rear awning arm. Ensure the awning is straight.

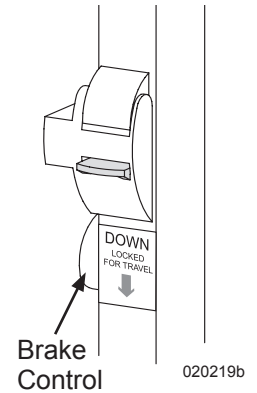


5. Slide the center pull strap to one end of the awning and store it by wrapping the strap around the awning leg.

To Retract the Patio Awning:

1. Loosen the strap from the awning leg if it has been stored there.
2. Support the weight of the awning with one hand while opening the extension lock handle and lower the awning until the arms rest on the lower stop bolt. Loosen the two black locking knobs enough to allow the support brace to travel freely.
3. If equipped with Canopy Clamps, remove and store the clamps at this time.
4. Release the locking tab on the end cap of the awning leg and slide the inner support brace to down the awning leg to the stop bolt. Repeat for opposite side.

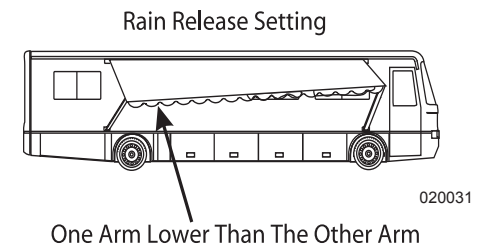
5. While pulling down slightly on the pull strap, slide the brake control down (located on the front awning leg).
6. Keeping downward pressure applied, slide the pull strap to the center of the awning while holding on to the strap.



7. Place the hook end of pull wand into pull strap loop to assist in retracting the awning. Make sure pull wand does not slip out of pull strap loop. Allow the awning to roll up to the stored position.
8. Store the pull wand until needed again.
9. Verify that the brake control is in the locked or closed position. Snap the arm storage locks into the down position and tighten the black locking knobs.

Rain Release Setting:

After the awning has been extended, choose the rain release position to prevent water build up on the awning. To position the awning in the rain release setting, lower one arm of the awning and leave the other arm in the normal position. This will create enough of a slope for adequate water run off.

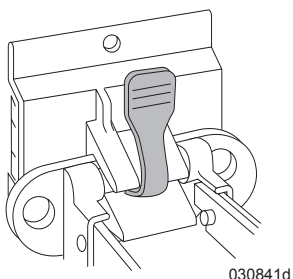


CAUTION:

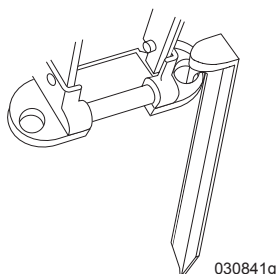
Water can quickly accumulate on the canvas during storm activity and damage the awning or motorhome. Storm related damage is not covered under warranty.

Using the Carport Feature:

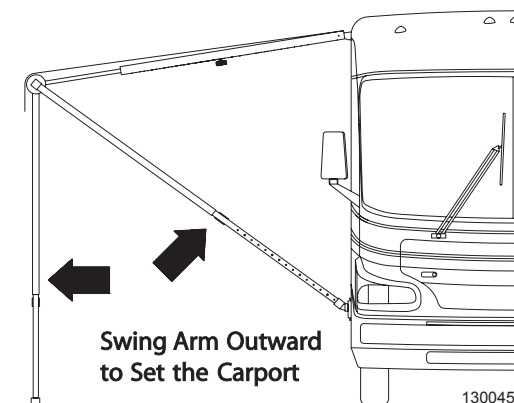
1. Unlock and extend the awning as described under “To Unlock the Awning” and under “To Extend Awning.”
2. Unlatch the bottom of the rear arm by pushing in on the lock handle on the arm bracket. Swing the arm away from the motorhome to an upright position.
3. Drive the stakes through the bottom holes in the arm.



Unlatch the bottom of the front and rear arm.



Drive stakes through holes in bottom of arms.



Swing Arm Outward to Set the Carport

4. Raise the rear arm extension lock handle all the way up or to the desired height and lower the lock handle to lock the arms in place.
5. Repeat instructions 2 through 4 for the front arm.

NOTE:

Reverse the above steps to move the awning out of the carport position.

Securing the Awning for Travel:

1. Awning is fully retracted against the sides of the motorhome.
2. Black locking knobs are tightened.
3. Brake control is in the full down (locked) position, and no red warning is showing.
4. Storage locks are down and in the locked position.
5. Bottom of the front and rear arms are latched properly into the bottom brackets.
6. Awning pull wand is stored away.

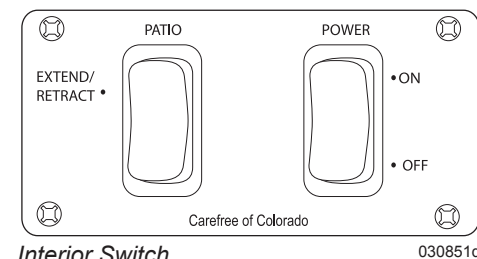
Patio Awning - Eclipse (Optional)

The Eclipse is a box awning that operates on 12 Volts DC by the push of a button. The awning requires 10' of lateral side clearance.

To Operate Awning:

- ◆ The interior awning power switch needs to be on before interior and exterior awning switches will operate.

- ◆ Push and hold switch to extend the awning. Release the switch at any time for partial extension.
- ◆ Push and hold the switch to retract awning.



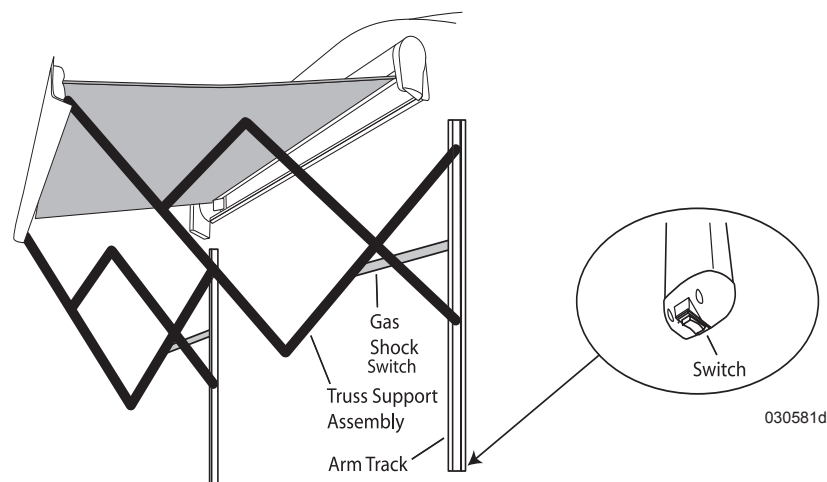
Interior Switch

If the awning fails to operate:

- ◆ Ensure ignition is off.
- ◆ Check power at 15 Amp mini breaker in front electrical bay on the roadside.

INFORMATION:

See OEM manual for more detailed information.



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Care & Maintenance

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 acrylic fabric cleaner may be used to help maintain appearance. Carefully follow the instructions on any cleaning product used. 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.

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.

Vinyl Awnings:

Mildew will not form on the awning material itself, but it 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. 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, extended it as soon as possible to allow it to completely dry.

LEVELING SYSTEM

A remote control panel located on the roadside dash operates the 4-point, fully automatic, electro-hydraulic leveling system. The warning system consists of a Jacks Down light and an alarm that sounds when any jack is extended and the transmission is shifted out of Park or the parking brake is released. The leveling system pump is located in the roadside generator compartment. A 15 Amp system fuse is located in the front distribution box.

CAUTION:

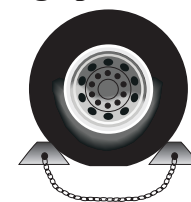
Before leveling the motorhome, survey the area around and under the motorhome to ensure potential jack contact points are clear of obstructions and depressions.

CAUTION:

The hydraulic jack system is designed to reduce sight selection problems and stabilize the motorhome when parked. No single jack should be used solely to level the motorhome. Using an improper leveling process can result in applying excess torsion stress/twist to the chassis, frame and body, resulting in damage to the windshield and/or entry door malfunction. The leveling jacks are not designed for changing tires. This can cause problems with the suspension system, frame alignment and damage to the windshields. Never use the jacks to elevate any wheel position off the ground.

CAUTION:

Hot asphalt, gravel or dirt may not support the weight that is placed on the hydraulic jack pads. Place thick plywood under the jack pads to help disperse the weight. If blocking up a rear jack pad to gain added clearance when the motorhome is on a slope, place a wheel chock at the opposite set of rear wheels to prevent the motorhome from rolling.



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WARNING:

Never access the underside of the motorhome when jacks are operating. Serious personal injury may occur.

Leveling System Safety Features:

The leveling system has safety features to prevent a jack from extending during travel. The control panel will not activate until these safety features are in place.

- ◆ Ignition switch is in the **ON** or **ACC** position.
- ◆ Transmission is in Park.
- ◆ Parking brake is applied.

Warning Features Include:

- ◆ Flashing lights on the control panel and an alarm that sounds when a jack is down and the parking brake is released or the transmission is shifted out of Park.
- ◆ The alarm may activate momentarily when driving over rough roads or when negotiating curves and corners. This usually indicates a low fluid level in the reservoir.

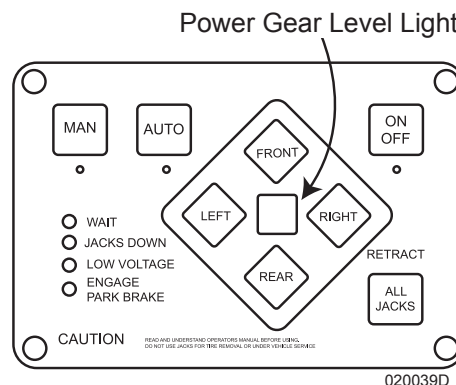
WARNING:

Keep all people clear of the motorhome during the leveling procedure. Never expose hands or other parts of the body near hydraulic leaks. Hydraulic lines are under high pressure. Oil leaks may cut and penetrate the skin causing serious injury.

Automatic Leveling Procedure:

- ◆ Select a level site if possible. Excessive slopes may prevent the jacks from leveling the motorhome.
- ◆ Place the gear selector in Park.
- ◆ Apply the parking brake.
- ◆ Turn the ignition switch to the **ON** or **ACC** position. **DO NOT** start the engine.

- ◆ Press the **ON/OFF** button on the control panel. The **ON/OFF** LED will illuminate when the system is operational.
- ◆ Push the **AUTO** button to begin leveling.
- ◆ The green Power Gear level light will illuminate when the motorhome is level.

**Manual Leveling Procedure:**

- ◆ Push and hold the manual (MAN) button for approximately five seconds until it illuminates. Push the appropriate jack button to adjust the motorhome to preference.
- ◆ Push **ON/OFF** button to turn system off.

CAUTION:

Never lift the wheels off the ground when leveling motorhome.

CAUTION:

DO NOT move the motorhome while jacks are in contact with the ground or extended. Damage to the jacks may occur.

Jack Retract Procedure:

- ◆ Turn ignition switch to **ON** or **ACC**.
- ◆ Push the **ON/OFF** button on control pad. The **ON/OFF** light and **JACKS DOWN** light will illuminate.
- ◆ Push and release the **RETRACT ALL JACKS** button. All jacks will automatically return to fully retracted position.
- ◆ After the **JACKS DOWN** light goes out, push the **ON/OFF** button to turn system off.

NOTE:

Always perform a visual inspection of leveling jacks to make sure they are fully retracted prior to moving the motorhome.

If the jacks fail to extend or retract:

- ◆ Apply the Park Brake, turn the Ignition to the **ON** or **ACC** position and place the transmission in Park.
- ◆ If jacks still do not operate, check the leveling system fuse in the front distribution box.

NOTE:

The hydraulic pump is equipped with an internal thermal breaker for protection against overheating. If the pump is used repeatedly in a short period of time the breaker will trip and then reset automatically in 5 to 30 minutes.

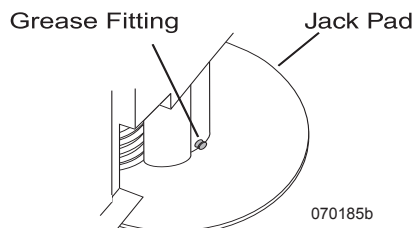
Drive-away Protection:

When the ignition switch is set to the **RUN** position with the jacks extended, the **JACKS DOWN** indicator will light and the warning bell will activate if the transmission is taken out of park or the park brake is released. The system will then automatically retract all jacks until jacks are fully retracted or the park brake is reset and the transmission is placed in Park. A full visual inspection is required to confirm full retraction of jacks before moving motorhome.

Maintenance:

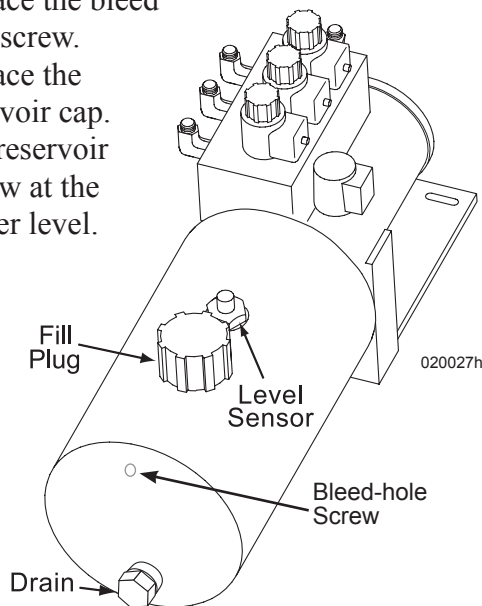
Occasionally use Dexron III to wipe and clean the jack rod while the jacks are fully extended. This will serve as a solvent as well as a lubricant and will help prevent moisture damage of the jack rod. Occasional oil or grease on the extended jack rod is normal and aids in lubrication.

- ◆ Remove dirt and road debris from the jacks as needed.
- ◆ Check the fluid level every month. The fluid level should be within $\frac{1}{4}$ " inch of fill port lip and checked with all jacks retracted.
- ◆ **Inspect** and clean all hydraulic pump electrical connections every 12 months.
- ◆ For jacks equipped with a grease fitting at the bottom of the cylinder, two pumps of grease should be sufficient for 20 to 30 uses. **DO NOT** over grease. Damage to the rod seal may occur from over-greasing.

**Adding Fluid:**

Unusual noise during jack operation may indicate a low fluid level. Alarm sounds while driving around corners or over bumpy roads usually indicates low fluid level.

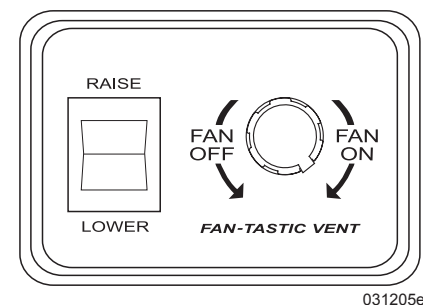
1. Chock a wheel fore and aft for safety.
2. Ensure all jacks are retracted.
3. Remove bleed-hole screw.
4. Unscrew the reservoir cap from the top of the pump. Slowly fill the reservoir with Dexron III automatic transmission fluid until it seeps from the bleed-hole.
5. Replace the bleed hole screw.
6. Replace the reservoir cap. The reservoir is now at the proper level.

**FANS**
Automatic**Fan Operation:**

- ◆ Turn on the battery cut-off switch.
- ◆ Ensure the vent cover knob, located on the fan, is pressed **IN** to the Automatic position.
- ◆ Use the wall switch to raise the vent cover. The vent cover must be open at least 2" before the fan will run.
- ◆ Turn power knob clockwise to turn fan on. The power knob also adjusts fan speed.

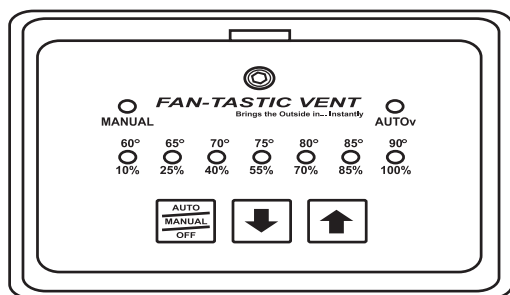
NOTE:

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 cover is closed.

**Automatic w/Electronic Thermostat (Optional)****Fan Operation:**

- ◆ Turn on the battery cut-off switch.
- ◆ Ensure the vent cover knob, located on the fan, is pressed **IN** to the Automatic position.
- ◆ Press the Auto/Manual/Off button on the wall switch once. The vent cover will automatically open.

- ◆ Use the up or down arrows to set the thermostat temperature. Fan speed will automatically adjust according to the disparity between ambient and selected temperatures.
- ◆ Press the Auto/Manual/Off button once more to manually control fan speed. Fan speed is displayed on the wall control in 10% increments. The thermostat is no longer operational in this mode.
- ◆ Press the Auto/Manual/Off button until all wall control lights are off. The fan blade will stop spinning and the vent dome will automatically close.
- ◆ To use the fan as a vent only: leave the wall control switch off, pull the vent cover knob down to the manual position and turn knob to open vent.



Rain sensor switch is located on the fan.

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 cover is closed.

Rain Sensor Operation:

- ◆ Ensure the rain sensor switch located on the fan is set to Normal.
- ◆ The dome will automatically close and the fan will shut off if the rain sensor gets wet.
- ◆ The dome will reopen and the fan will start after the sensor dries.
- ◆ Turn the fan off at the wall control to avoid automatic restart.

NOTE:

Setting the rain sensor switch to “Rain Override” while the fan is running will prevent the fan from automatically turning off and closing during rainy weather.

Tips

- ◆ To keep condensation from accumulating open the vent fan lids slightly to help the air circulate. Condensation occurs naturally from fluctuations in interior and exterior temperatures, humidity and dew point changes, steam from cooking, or boiling large amounts of water on the cooktop. Shower usage also produces condensation.
- ◆ If the fan fails to operate, check for either a blown fuse in the domestic fuse panel or the fuse on the fan.
- ◆ To clean the screen, remove the eight screws holding it in place. Wash the screen using a non-abrasive soap and water. Re-install the screen and tighten the screws.

- ◆ Direct airflow by opening the window(s) on the shaded side of the motorhome to obtain the maximum airflow, especially on hot, sunny days. The area between the open window(s) and the Fantastic Vent provides maximum airflow.

NOTE:

DO NOT leave the vent cover open while the motorhome is stored or unattended for extended periods. High winds, other unusual conditions or obstructions may prevent closing. The resulting leakage could cause serious damage.

POWER SUNVISOR (Optional)

The cockpit blinds are 12 Volt DC operating from the Chassis batteries. Power is supplied by a 5 Amp fuse located in the Roadside front electrical bay. One blind assembly is used for each window located in the cockpit area.

To Operate the Blind:

- ◆ Push the switch down to lower the desired blind.
- ◆ Push the switch up to raise.

NOTE:

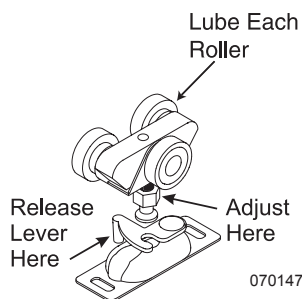
DO NOT attempt to move or drive the motorhome with any blind in the lowered position.

SLIDING DOOR

The sliding pocket door uses two rollers at the top of each door. During the life of the motorhome the sliding door may need adjusting. The sliding pocket door can be adjusted to close tight against the wall. Use a small wrench and turn the adjusting screw upward or downward.

If, for any reason, the pocket door needs to be removed, locate the portion that is secured to the top of the pocket door and rotate the small lever outward to release the latches.

LUBE:
Pocket door rollers should be lubed with a small drop of oil once a year to help increase the life of the rollers and improve the sliding of the door.



REAR LADDER

The rear ladder allows access to the roof. Care should be used when climbing the ladder. Access to the roof should be limited to cleaning and sealing purposes only. The lower portion of the ladder is removable and stored in the cargo bay.

CAUTION:

The roof surface is smooth and slick in all conditions. Exercise extreme caution when accessing the roof.

NOTE:

Maximum weight is 300 lbs.

SEAT CONTROLS

Manual Seat Controls

The Pilot and Co-Pilot seat can be manually adjusted to provide maximum comfort. Seats must be locked in the forward facing direction while traveling.

Forward and Back:

An adjustable lever is located under the front of the seat to move the seat forward or back. Moving the lever to the curbside allows seat to move forward or back.

Swivel Seat:

An adjustable lever is located under the curbside portion of the seat. Moving the lever to the rear of the seat allows the seat to swivel.

WARNING:

Seat must be locked in the forward facing position while the motorhome in transit.

NOTE:

After the seat is rotated 180°, it must be rotated back in the opposite direction rotation originated from. The 12 Volt DC wiring in the seat may disconnect if rotated 360°.

Power Seat Controls (Optional)

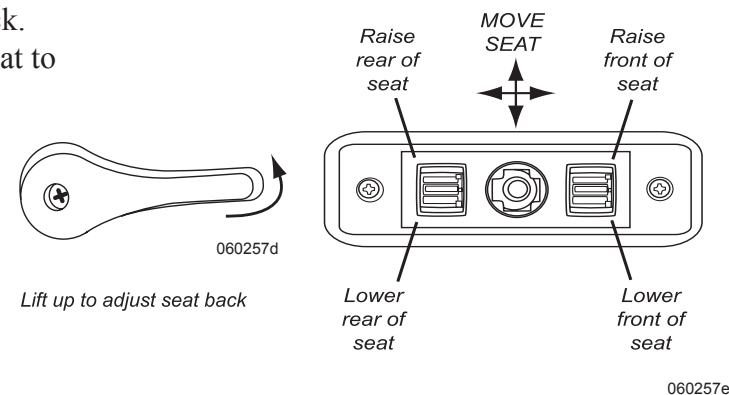
The Pilot seats is adjustable to provide maximum comfort. Seats must be locked in the forward facing direction while traveling.

The battery cut-off switch must be on for the power pilot seat to operate.

NOTE:

The power seat operates from 12 Volt DC house power. The 15 Amp fuse is located in the roadside front electrical bay.

DRIVER SEAT POWER CONTROLS (Optional)



SOFA BED

Several sofa variations can be installed in the motorhome. The standard style of sofa is commonly referred to as a "jackknife" sofa, which has storage space below the seat and a removable front panel. The sofa pulls up and out at the front of the seat, then lays flat to form the bed/sleeper area. Cushions are not removable.

NOTE:

All Flexsteel sofas have a locking mechanism that must be released to convert the sofa to a bed.

Optional sofas that can be installed: Sofa Bed, Convertible Sofa or an Electric Bed.

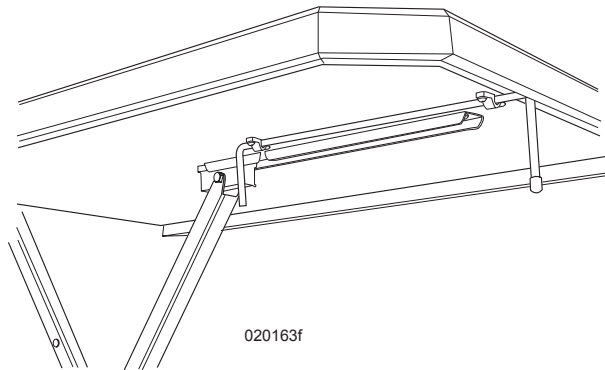
DINETTE BED CONVERSION (Optional)

To Convert Booth Dinette into a Bed:

- ◆ Rotate the lock bar located underneath the table
- ◆ Lift seat cushions to an angled vertical position.
- ◆ Push the table down into position.
- ◆ Use both seat cushions and one back cushion for a mattress. Leave one back cushion in a vertical position.

WARNING:

DO NOT occupy the booth dinette, if not equipped with safety belts, or the dining chairs while the motorhome is in motion. To avoid personal injury to occupants in case of a crash or sudden stop, chairs must be stored in an enclosed area or secured with tie down straps while the motorhome is in motion.



RADIO Dash

Magnadyne Dash Stereo:

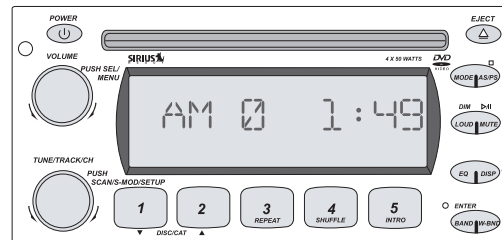
Dash stereo features include a CD/DVD player and an AM/FM radio tuner. There is a radio power switch located on the dash.

Operation:

- ◆ Turn **ON** house battery cut-off switch located at the entry door.
- ◆ Turn **ON** the radio power switch at the dash panel.
- ◆ Press the Power button to turn the radio **ON**.
- ◆ Press the Power button to turn the radio **OFF**.

Clock Adjust:

- ◆ Press and hold the Display (**DISP**) button until clock starts flashing.
- ◆ Turn the tuning knob to the right to adjust minutes and to the left to adjust hours.
- ◆ Press the Display (**DISP**) button when finished.



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NOTE:

See “TV and Entertainment Components” for DVD operations.

SATELLITE RADIO (Optional)

The satellite radio is a digital signal decoder and tuner. Signals are transmitted from a ground station to satellites orbiting over the continental United States. The satellite then transmits the signal to an antenna in the motorhome. The radio receiver decodes the transmission and plays the selected channel within that transmission. Signals are also transmitted to ground repeaters for listeners in urban areas where the satellite signal can be interrupted.

NOTE:

For information regarding subscriptions and service coverage areas, contact the system provider:

Sirius® Radio at 1-888-539-7474
www.siriusradio.com

INFORMATION:

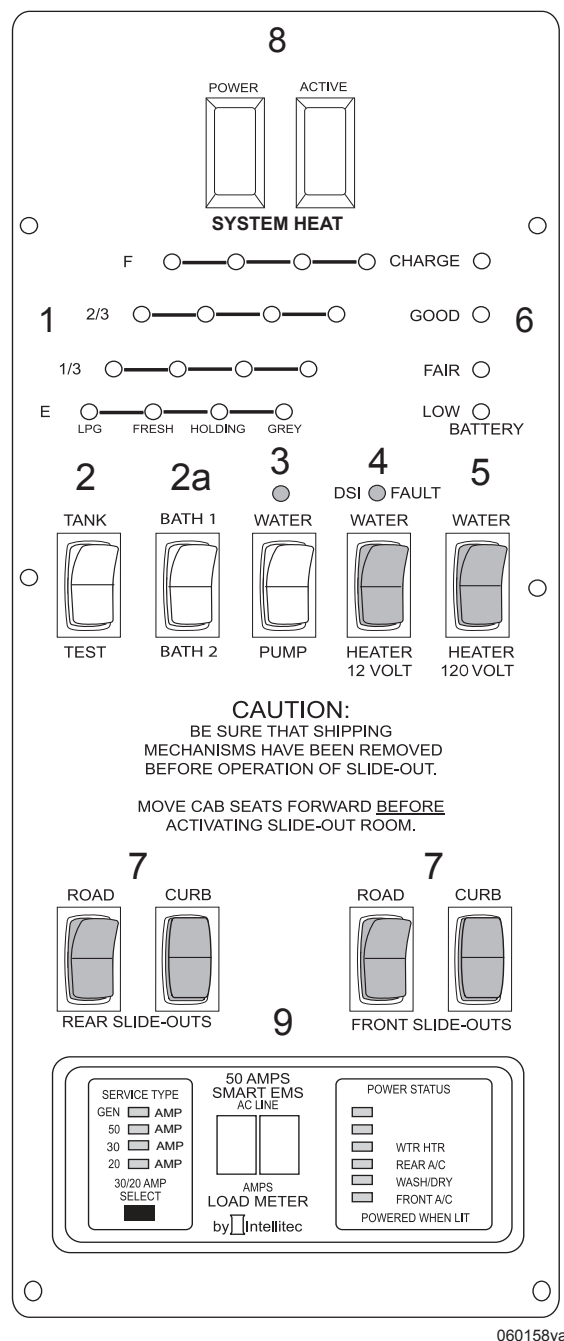
For detailed information, account activation and operating instructions on the satellite radio, refer to the manufacturer’s manual located in the Owner’s Information File box.

SYSTEMS CONTROL CENTER

The System Control Center enables a central location for many of the switches and control monitors used to operate the motorhome. This panel is a flush wall-mounted unit.

- 1. Tank Monitor Panel** - Displays the status of the holding tanks, fresh tank and LP tank. Holding Tank 1 is the black tank and Holding Tank 2 is the grey tank.

2. **Tank Test Switch** - Spring loaded switch used to display tank battery status on the monitoring panel.
- 2a. **Bath 1 & Bath 2** - Spring loaded switch used in conjunction with **Tank Test Switch** to display multiple tank status on monitor panel. Multiple tanks vary with floor plans.
3. **Water Pump Switch** - Applies 12 Volt DC power to operate the Water Pump if operating from the on-board fresh water supply.
4. **Water Heater Switch** - Applies 12 Volt DC power to ignite the Water Heater, if preferring to operate the Water Heater with LP Gas. If the Water Heater fails to ignite, the DSI FAULT lamp will illuminate.
5. **Water Heater Switch** - Applies 120 Volt AC power to the Water Heater if preferring to operate the Water Heater with 120 Volts.
6. **Battery Voltage Meter** - Displays house battery status.
7. **Slide-out Room Controls** - Provides power to operate the slide rooms.
8. **System Heater (Optional)** - Basement Heater.
9. **Energy Management System (Optional)** - Helps prevent overloading limited shore power supply by shedding electrical loads.



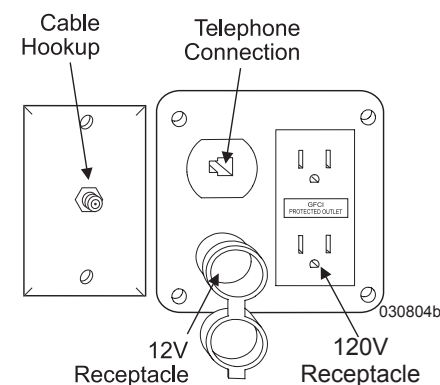
TV & ENTERTAINMENT COMPONENTS

The components used to make up the entertainment center are carefully selected to provide the highest quality in audio and visual enjoyment. The following paragraphs will discuss the operations and various components.

Connections - TV Cable, Computer & Phone

The motorhome is equipped with cable TV and telephone hook-ups, located in the electrical service center. Auxiliary outlets are located on the dash.

Entertainment connections installed in the passenger bay include telephone jack, cable TV hook-up, and a 120 Volt AC electrical outlet.



Television (Front) Lock-out Feature

The ignition switch controls the outlet for the front TV. Only with the ignition **OFF** will the front TV operate. The TV operates on 120 Volt AC power only. This power can be provided by shore power or the generator.

Television Antenna

The television antenna is a manual crank style antenna with built-in electronics that use 12 Volts DC to boost signal strength. Signals that are weak or fuzzy can be amplified by pressing the black selector button on the video selector box. The red LED will illuminate when the antenna boost is in use. The antenna and booster work together to provide the best possible picture for most situations. Certain conditions may occur when no amplification is needed, and in fact may make the picture worse. The television station will send a signal that resembles the waves or rings of water from a rock thrown into a still pond. The radiating television signal can rebound off an object such as a mountain. The antenna will receive a signal from the initial pass and then receive an additional signal from the rebound, resulting in a split or double image. In this case, the picture may be improved by no amplification or even lowering the antenna.

CAUTION:

DO NOT move the motorhome with the antenna raised or partially raised. Damage to the worm gear or antenna breakage can occur from tree limbs or wires.

WARNING:

Visually inspect the surrounding area for obstructions or overhead electrical wires before raising the TV antenna. **DO NOT** raise the antenna near overhead electrical wires as contact may result in serious injury or death. Damage to the antenna, severe shock, personal injury or death can occur from inadequate clearance.

NOTE:

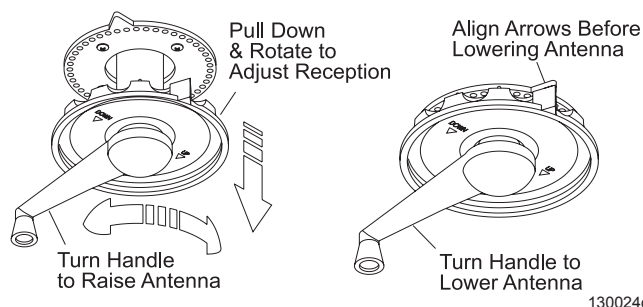
A TV antenna warning light on the dash illuminates when the ignition is in the ON position and the antenna is up.

To Raise the Antenna:

- ♦ Rotate the crank handle clockwise to raise the antenna (approximately 14½ turns).
- ♦ Pull down on the outside directional wheel and rotate the antenna until the best picture is obtained. The directional wheel is spring loaded.

To Lower the Antenna:

- ♦ Pull down on the directional wheel and align arrows together.
- ♦ Rotate the crank handle counterclockwise to lower the antenna fully into the cradle. Visually inspect the antenna to ensure it is properly stowed.



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Video Selector Box

The motorhome is equipped with a video selector box that has five inputs and four outputs. The video selector box interfaces the different input signals from the various components to the televisions and VCR.

Features Include:

- ♦ **Five Inputs:** Satellite Receiver (N/A), TV Antenna, AUX/VCR, Cable TV and Auxiliary.
- ♦ **Three Outputs:** MAIN TV, TV2 (Bedroom TV), VCR/TV3.
- ♦ Built-in 12 Volt TV antenna amplifier.
- ♦ Independent viewing of signals at different televisions.

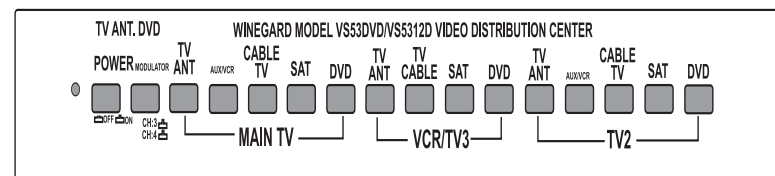
Operating the Components

To Watch TV Using the Antenna:

Press the TV ANT button located above the section marked **MAIN TV** on the switch box. Turn TV on and select channel. Fringe area reception can be improved by pressing the Power button on the switch box. Follow the same procedure for TV 2 (Bedroom TV).

NOTE:

Picture quality from the outdoor TV antenna varies depending on the location of the TV station in relationship to the location of the TV antenna. If picture quality is poor, press the POWER button on the Video Selector Box. Turn off when not viewing from the antenna.



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To Watch TV Using the Shore Cable Signal:

Press the **CABLE TV** button above the section marked **MAIN TV**. Turn the TV on and select channel.

NOTE:

To view Cable TV signals, hook a 75-Ohm cable from the supplied service to the Cable TV input in the Water Service Compartment. Cable TV inputs are available at many of today's campgrounds.

To Play a DVD:

Press the main radio power switch on the dash to **ON**. Press the **POWER** button on the dash Radio/DVD player. Turn **ON** the TV and select channel 3. Select DVD for "Main TV" on the video control box. Insert DVD into Radio/DVD player. DVD will automatically play once inserted into Radio/DVD player. Adjust volume using TV or radio remote.

Bedroom Television Operation (Optional)**To Watch Bedroom TV Using the Antenna:**

Press the **TV ANT** button located above the section marked **TV2** on the switch box. Turn TV on and select channel. Fringe area reception can be improved by pressing the Power button on the switch box.

NOTE:

Picture quality from the outdoor TV antenna varies depending on location of the TV station in relationship to the TV antenna. If picture quality is poor, press the **POWER** button on the Video Selector Box. Turn off when not viewing from the antenna.

To Watch TV Using the Shore Cable Signal:

Press the **CABLE TV** button above the section marked **TV2**. Turn the TV on and select channel.

NOTE:

To view Cable TV signals, hook a 75-Ohm cable from the supplied service to the Cable TV input in the Water Service Compartment. Cable TV inputs are available at many of today's campgrounds.

To Play a DVD:

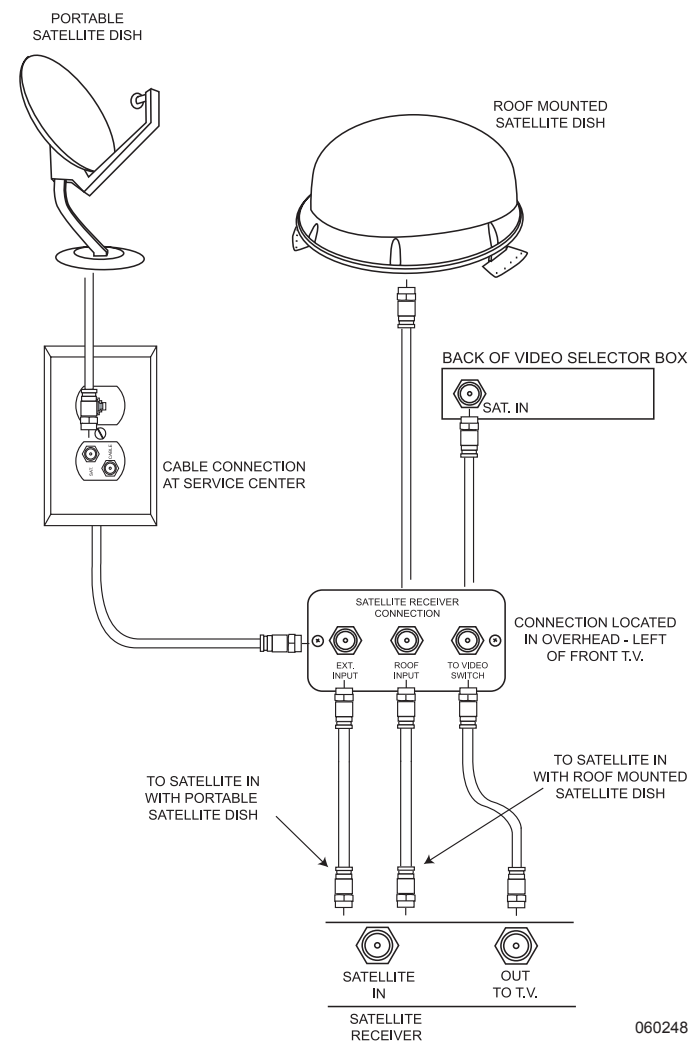
Press the main radio power switch on the dash **ON**. Press the **POWER** button on the Dash Radio/DVD player. Turn on the TV and select channel 3. Select DVD for TV2 category on the video control box. Insert a DVD into the Radio/DVD player. The DVD will automatically play once inserted into the Radio/DVD player. Adjust volume using the TV or radio remote.

DIGITAL SATELLITE PREP

The motorhome is pre-wired for a roof-mounted or a portable Digital Satellite System. The pre-wire consists of a Satellite Receiver Connection, a coax wire, a 12 Volt DC power connection and a phone cable for Pay-Per-View programming.

Installing the satellite dish:

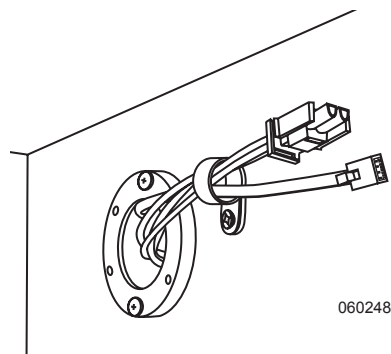
The coax and wire for the Antenna Up indicator are located in the ceiling behind the first ceiling light in the living room. The satellite dish should be mounted just forward of the ceiling light to secure the mounting base of the satellite to the backing plate that is built into the roof. Install satellite according to installation instructions provided with the satellite dish.



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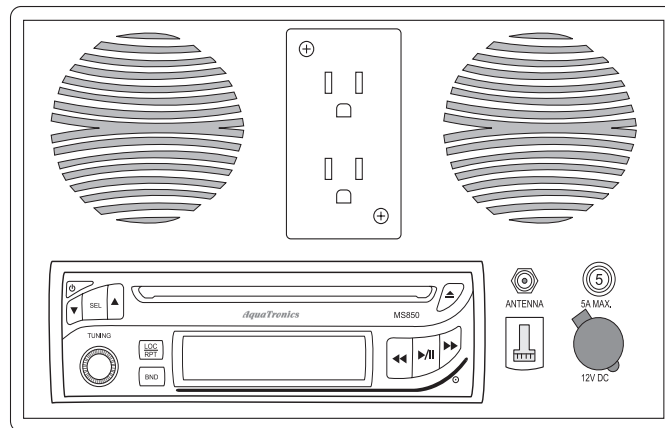
Connecting the satellite receiver (IRD):

- ◆ Connect a coax from the Roof Input on the Satellite Receiver Connection in the overhead cabinet above the pilot seat to the Satellite In connection on the back of the receiver.
- ◆ When using a portable satellite dish connect a coax from the Exterior Input on the Satellite Receiver Connection to the Satellite In on the back of the satellite receiver.
- ◆ Connect a coax from Satellite Out on the back of the satellite receiver to To Video Switch on the Satellite Receiver Connection.
- ◆ Connect the provided phone cable to Tel Line on the back of the satellite receiver.
- ◆ A 12 Volt DC power connection is provided for use with satellite systems that require 12 Volt DC power to control satellite dish movement. Power comes from the front electrical box on the road side.



12 Volt DC Power and Phone Connection.

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ENTERTAINMENT CENTER - EXTERIOR (Optional)

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Functions:

- ◆ **ON/OFF Power Button** - Press this button to turn the unit on or off.
- ◆ **Volume Control** - Press up button to increase volume and down button to decrease.
- ◆ **Select Button** - Select audio function (volume, treble, bass balance or fade) to be adjusted with Volume controls.
- ◆ **AM/FM Band Selector** - Changes radio band during radio use.
- ◆ **Tuner** - To manually tune in a station, turn knob in appropriate direction.
- ◆ **Disc Slot** - Gently insert CD label side up until loading mechanism engages.
- ◆ **Track Select** - Used to scan forward or back from track to track.

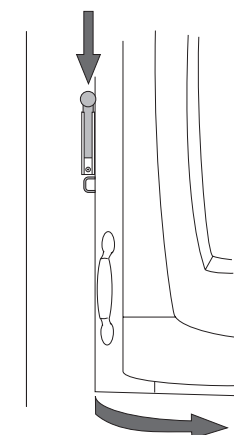
- ◆ **CD Play/Pause Button** - Press this button to pause playback. Press again to resume play.
- ◆ **Repeat (RPT) Button** - Push button to repeat current track. Track will repeat until button is pushed again.
- ◆ **Disc Eject** - Pushing button will stop CD play, eject disc, or change to Radio depending on current function.

BEDROOM TV SWIVEL**Bedroom TV Swivel (Certain Models):**

- ◆ Unlock the TV when parked. Pivot the TV outward to desired angle.
- ◆ Stow the TV into the cabinet when preparing for travel. Lock the TV into position.

CAUTION:
Failure to lock TV in travel position can result in damage to the TV and cabinets.

Secure for Travel



Swing out to View

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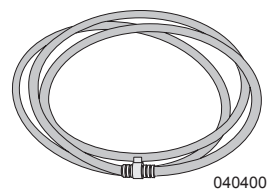
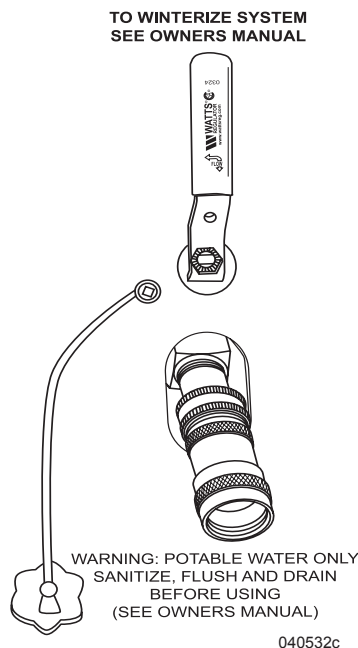
WATER SYSTEMS - INTRODUCTION

This section contains information about the operation and care of the various water system equipment found in the motorhome. Optional water equipment will also be discussed, so not all information may be applicable to the motorhome. More detailed information with **CAUTION** or **WARNING** instructions for the various equipment, other than what is found in this section, can be found in the manufacturer's manual in the owner information box.

It is hard to imagine how much water is used by the average person. Newcomers to a self-contained motorhome soon discover water does not last long unless consumption is drastically reduced. For example, less water can be used for showering if the shower is turned off while soaping down, then turned back on to rinse. This way a good shower uses a couple gallons of water or less. There is plenty of water to meet personal needs once habits are adjusted.

Fresh Water System:

The fresh water system consists of the fresh water tank, water pump, water filter, a city/fresh water connection, and a water hose (not supplied) for potable water use only. Proper care of fresh water connections is a must. After each use, drain the water hose and screw the ends together. A pressure regulator is attached to the city water/tank fill connection. After each use, attach the end cap to keep out debris and insects.



Water Hose (Not Supplied):
Screw ends of hose together before storage to prevent leakage and to prevent dust and insects from entering hose.

Waste Water System:

The waste water system consists of a waste holding tank (grey water), a sewage holding tank (black water), flush system, toilet and drains.

WARNING:

Water is electrically conductive. DO NOT use any electrically powered item or electrical outlet that may be exposed to a water source. Such use can result in a serious shock causing injury or death.

WATER TANKS Measurements & Calibration

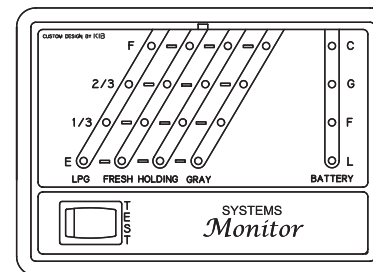
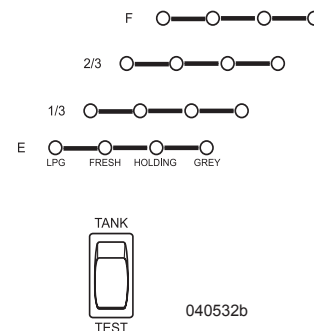
The motorhome is equipped with monitor panels to aid in managing the storage tanks. The monitor panels are located on the Status Monitor Panel in the hallway area and in the water service bay (optional). The switch marked **TEST** is a momentary switch which requires being held down while testing the level of the storage tanks. Read the scale for the desired storage tank that is to be monitored. Each scale uses colored lights along with a corresponding scale reading. The light and scale indications are as follows:

- ◆ **GREEN** lamps indicate good or normal ranges.

- ◆ **YELLOW** lamps indicate fair ranges.

- ◆ **AMBER** lamps indicate partial ranges.

- ◆ **RED** lamps indicate full or empty ranges.

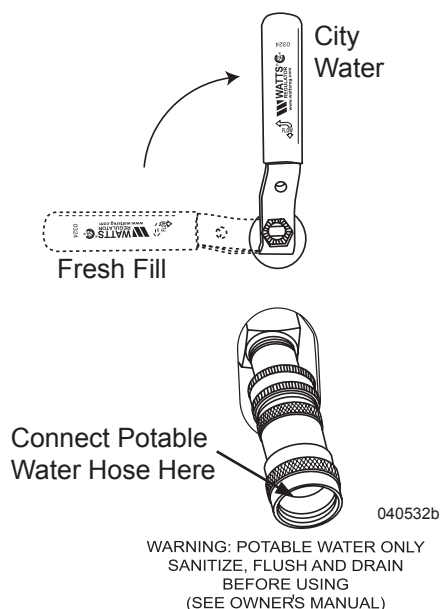


Service Center Monitor (Optional)

WATER - POTABLE

City Hook-Up

- ◆ Connect a potable water hose to the city/fresh water hook-up located in the service center on the roadside of motorhome.
- ◆ City water hook-up in the service center is equipped with a pressure regulator and one-way check valve. The pressure regulator limits the water pressure to approximately 45 PSI.
- ◆ Turn the city water/tank fill valve to the city water position (as shown).
- ◆ Turn **ON** the water supply.
- ◆ The water pump can be either **OFF** or **ON**. It will not affect the water pump to leave it on.



Valve shown in City Water position

NOTE:

When connecting the motorhome to fresh water be sure to use a hose manufactured and labeled for potable water to ensure that the hose will not flavor the water.

CAUTION:

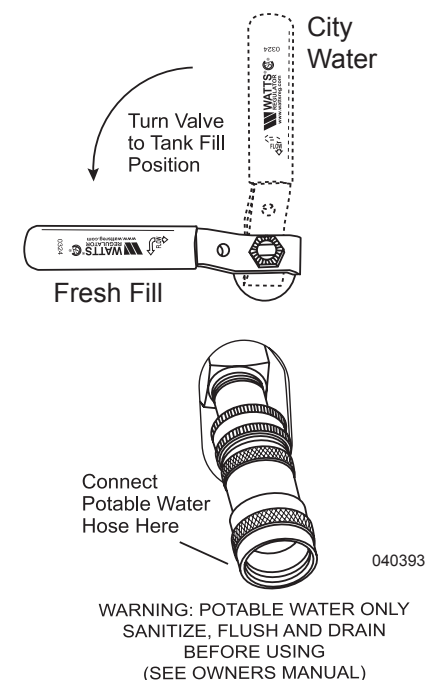
Some outside water sources develop high water pressure, particularly in mountainous regions. High water pressure is anything over 55 psi (pounds per square inch). Excessive water pressure may cause leaks in water lines and/or damage the water heater. An additional pressure regulator can be connected to the city water faucet to regulate the pressure to the potable water hose. Excess pressure on a hot day can cause the water hose to swell and burst.

Fresh Tank Fill

- ◆ Ensure the water pump is **OFF**.
- ◆ Connect a potable water hose to the city/fresh water hook-up located in the service center on the roadside of the motorhome.
- ◆ Turn the city water/tank fill valve to the Fresh Water Fill position.
- ◆ Turn on the water supply.
- ◆ The system monitor in the service center or in the hallway area may be used to observe the fresh water tank level.
- ◆ After the system monitor shows the tank approaching full, watch for water to come out of the overflow pipe.
- ◆ The water tank is full when water comes out of the tank overflow pipe. Shut the water **OFF** as soon as possible.

NOTE:

When filling the fresh water tank, do not leave the hose unattended.



Valve shown in Fresh Tank Fill position

Gravity Fill

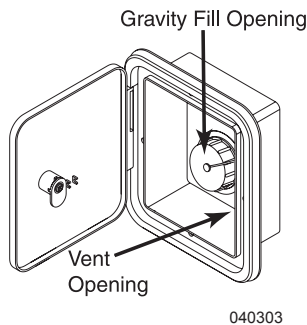
The gravity fill inlet allows fluids to be added directly into the fresh water tank. When dry camping, water can be poured directly from a container into the fresh water tank. The gravity fill inlet can be used to pour disinfecting solution into the fresh water tank. Use only potable water sources, solutions and delivery systems when using the gravity fill inlet.

Filling the Tank:

1. Unscrew fill cap taking care to keep cap and inlet clean.
2. Insert potable water hose into inlet.
3. Fill tank until water overflows from inlet.

NOTE:

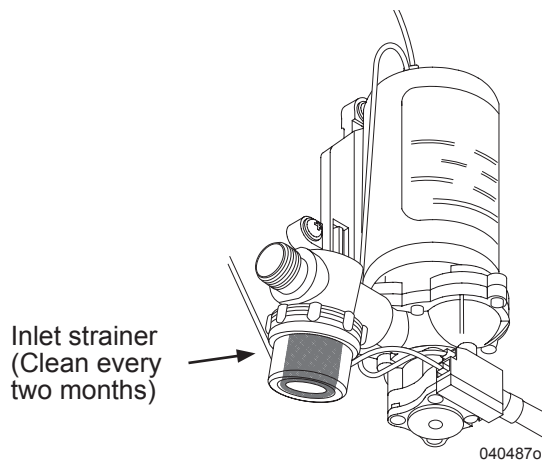
DO NOT leave the gravity fill inlet unattended when in use.



040303

WATER PUMP

The water pump pressurizes the fresh water system when not connected to city water. The water pump is self-priming, operating on demand as water is used. The water pump is located behind the plumbing service center.



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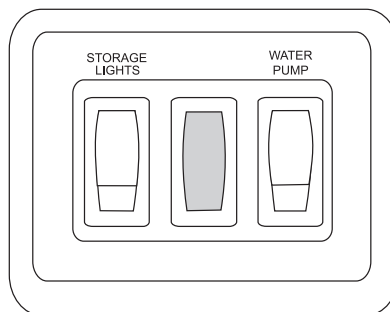
Water Pump Located in Plumbing Service Center

WARNING:

Before leaving the motorhome for extended periods of time (i.e. overnight or longer) be sure that the city water and the water pump have been turned OFF. Damage from neglect will be the responsibility of the owner, not the manufacturer.

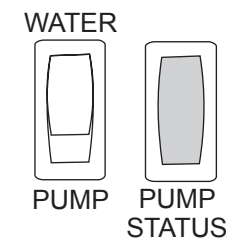
To turn the water pump ON or OFF:

- ◆ Momentarily press the water pump switch on system monitor in hallway or in service bay. The indicator lamp will illuminate when the water pump is turned on.



Service Center Water Pump Switch

040538



Monitor Panel Water Pump Switch: Located in hallway.

CAUTION:

DO NOT continue water pump operation if the fresh water holding tank is empty. Damage to the water pump or electrical supply system may result.

Using the water pump to pressurize the fresh water system after removal from storage:

- ◆ Close all drain valves and low point drains.
- ◆ Fill the fresh water tank.
- ◆ Open the hot and cold water valves of each faucet.
- ◆ Turn the water pump on. Wait for the water lines to fill.
- ◆ Close each faucet when it delivers a steady stream of water.

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 fuse:

- ◆ Check the electrical connections at the water pump, located in the Roadside water bay, fuse or breaker, water pump switch and ground connection.
- ◆ Ensure that voltage present at the pump. If voltage is present, the pressure switch may be faulty.
- ◆ 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 pump frozen).

**Water pump will not prime or sputters
(No discharge/motor runs):**

- ◆ Check the pump inlet strainer to see if it is clogged with debris.
- ◆ Check if there is water in the tank or if air has collected in the water heater.
- ◆ Check the inlet tubing and plumbing to see if air is being sucked in 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 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.
- ◆ If water pump continues to run, take to an authorized dealer for service.

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:

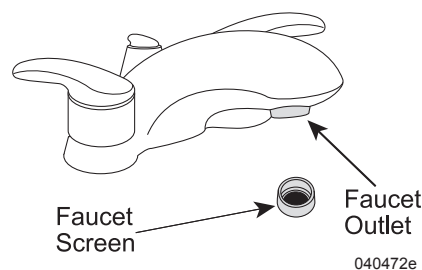
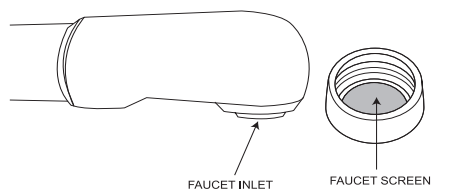
- ◆ Look for restrictive water flow in the faucets or shower heads.

FAUCETS

Fresh water may contain lime deposit or debris that will attach to the faucet screen and restrict or plug the flow of water. All faucet screens should be checked and cleaned every two weeks of use.

To clean faucet screens:

- Unscrew the screen retainer from kitchen faucet head.
- Lavatory/vanity - remove threaded collar from faucet outlet.
- Clean screen using a small soft brush, if necessary, and a de-liming solution.
- Install screen and check water flow.

*Bathroom Faucet Screen**Kitchen Faucet Screen***WATER SYSTEMS
Troubleshooting**

Improper winterizing, poor maintenance, road vibration and campsite water pressure variations are common culprits of water system failure. Check all plumbing connections for leaks at least once a year.

Disinfecting Fresh Water

Disinfecting the water system with household bleach (super chlorination) protects against bacteriological or viral contamination from common water sources.

When to disinfect the fresh water system:

- ◆ The motorhome is new.
- ◆ The motorhome has been in storage.
- ◆ Every three months during use.

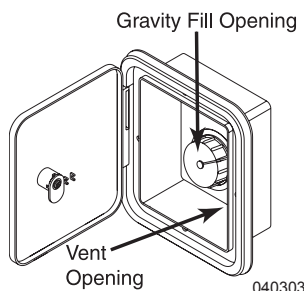
To Disinfect the Water System:

1. Drain the fresh water tank. Close drain when done.
2. 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 this solution for every 15 gallons of tank capacity.
- ◆ Multiply tank capacity (in gallons) by 0.13. The result is the amount (in ounces) of household bleach to pour into fresh water tank.

These methods will yield a 50 PPM (parts per million) disinfecting solution in the water system that will act 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.

3. Pour solution into the gravity fill opening.



4. Top off tank with fresh water.
5. Turn on the water pump in the motorhome.
6. Open each faucet and run the water until you smell a distinct bleach odor.
7. Turn OFF all faucets and allow the system to stand for four hours.
8. Drain the fresh water tank of the mixed solution.
9. Fill the water tank with fresh water. Thoroughly flush hot and cold lines with fresh water. Repeat this process until the chlorine bleach smell is no longer detectable in the water system.

INFORMATION:

Household bleach is 5.25% Sodium Hypochlorite. Higher concentration will increase PPM Ratio.

WASTE WATER SYSTEMS

Proper Waste Disposal

Dumping raw sewage from toilet holding tanks, 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 the 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 offer dump facilities at selected stations.

What Not to Put in Waste Holding Tanks

- ♦ **DO NOT** use strong or full strength detergents to deodorize and disinfect. Only use odor control chemicals made especially for holding tanks.
- ♦ Automotive antifreeze, ammonia, alcohol or acetone in holding tanks will dissolve plastic.
- ♦ **DO NOT** put large table scraps in the tanks. They could stick in or damage the valve seals.
- ♦ Facial tissue is thicker and stronger than a rapidly dissolving tissue. White toilet paper dissolves faster than colored. Paper designed specifically for holding tanks is available at most RV supply stores.

TIP:

To test tissue dissolving ability, immerse one tissue square into a jar of water. Shake the jar five times to determine if the tissue disintegrates into pieces or remains in one piece. **DO NOT** use any type of tissue that remains in one piece.

NOTE:

Never 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

Black Water Tank:

Before initially operating the toilet, treat the sewage holding tank with a pre-charge 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, mix the chemicals, in accordance with the manufacturer instructions, with approximately one gallon of water. Pour mixture through toilet to the holding tank. Be careful not to spill the chemical on your 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 to the holding tank each time the 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 any products that contain petroleum distillate or ammonia in place of RV odor controlling chemical. Petroleum distillate or ammonia will damage the ABS plastic holding tanks and seals.

Grey Water Tank:

The grey water waste tank stores sink and shower 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, drain pipe and drain hose. Empty the waste holding tanks weekly to prevent stagnation and overfilling.

Waste Drain & Sewage Tanks

The waste drain system provides adequate and safe storage and/or discharge of waste materials. The drain system uses ABS plastic piping and fittings connected to sinks, shower, toilet and holding tank drains. The motorhome should be reasonably level for optimum waste systems operation. The wastewater holding system consists of a grey water tank that stores the sink, and shower drain water, and a black holding

tank that stores waste from the toilet.

Drain valves and a tank flush system dispose of waste through a common termination. Each holding tank has a separate drain valve dumping the waste water (grey water) and sewage (black water) through a common single discharge outlet. The tank drain valves are located in the roadside service center. Use the systems control center to monitor tank levels. When ready to drain the tanks, drain the sewage tank first. Next, flush the black tank with the flush system. Close black tank valve after flushing tank. Drain the grey water tank. Using this sequence helps to flush solids from the sewer hose. Both tanks should be empty (or less than half full) when traveling.

Waste Drain Hose

A flexible three-inch sewer hose attaches between the termination drain and the shore facility. The termination drain is adjustable and should be periodically exercised. Sewer hoses usually come in 10 or 20 ft. lengths. The sewer hose is stored in a tube accessed through a door in the water service bay. The shore fitting for the sewer hose may be a 3" or 4" male or female thread pipe, or a 4" pipe with no threads covered by a metal plate. Different adapters are available to fit most configurations. Hose ladders may also be purchased to support the hose.

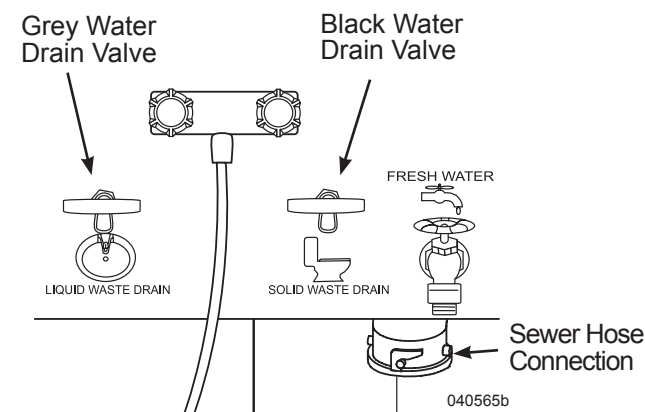
It is important that the hose remains secure. Always tighten clamps and restraining devices before use. Lay the hose in-line between the termination outlet and the shore fitting. Restrain the hose to prevent movement during use. Wear protective and/or disposable gloves when handling the sewer hose.

To Exercise the Termination Drain:

- ◆ Grasp the drain firmly on both sides of the drainpipe.
- ◆ Swivel the pipe up and down several inches to exercise the internal O-rings.
- ◆ The drainpipe may be left in the upward position to prevent residual material from leaking out.

To Attach the Hose:

- ◆ Remove sewer hose from carrier.
- ◆ Remove termination cap. Align coupler tangs with termination tabs. Twist coupler clockwise 90° locking coupler to termination outlet.
- ◆ Unscrew the access deck plate and feed the drain hose through the opening.
- ◆ Rotate the drainpipe downward for maximum flow.
- ◆ Attach the other end of the hose to the drain service. Restrain hose to prevent movement during use.
- ◆ Open the grey water valve(s).



Plumbing Service Center on roadside.

The black water valve(s) 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.

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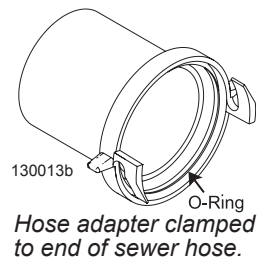
Lubricate the O-ring on the sewer hose adapter periodically with silicone spray.

NOTE:

Close the grey water valve(s) 24 hours prior to departing to allow the tank to fill with liquid to help in the dumping process.

NOTE:

Use care when connecting the sewer hose adapter to the termination outlet in cold weather.

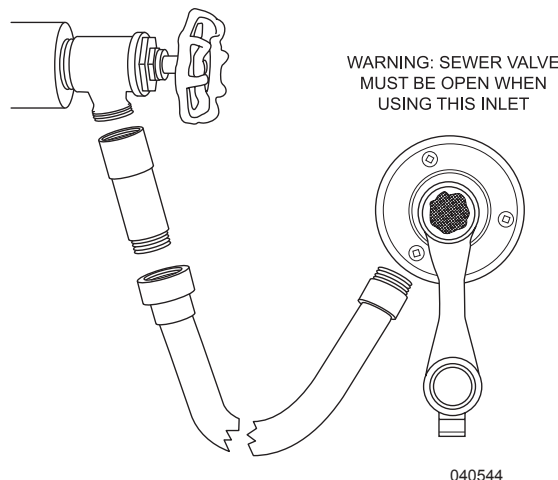


Black Tank Flush

The black tank comes equipped with a flush nozzle, located on the curbside, to help reduce solid build up. Flush the tank each drain cycle. Failure to thoroughly flush the tank may result in accumulated solids and a clogged spray nozzle.

Dumping the tanks:

1. Close grey water valve and fill grey tank to at least 50% by running water in the shower or sinks. Use the Systems Control Center to observe tank fluid levels. When the grey tank is 50% full, stop filling the tank.
2. Attach waste drain hose.
3. Open black water valve. Allow the black tank to drain.



4. Connect a non-potable water hose with pressure regulator to the flush system fitting located in the service center. Turn on faucet and allow water to rinse the black tank for at least three minutes. Never operate the system unattended. Ensure water flows freely through the sewer hose. When completed, turn off the faucet and close the black water valve.

5. Open the grey water valve. The water in the grey tank will flush remaining solids from the sewer hose. The grey valve remains open until the next drain cycle, or time of departure.

WARNING:

Never operate the flush system unattended. Flooding may occur. Use the tank flush system each time the holding tanks are cycled. Failure to routinely use the flush system will result in a clogged spray nozzle. Turn off the water supply when finished flushing the tank.

Preparing for travel:

1. Close black and grey valves. Undo restraining devices from the sewer hose. Disconnect the sewer hose from the termination outlet by rotating the fitting counterclockwise 90°.
2. Drain the sewer hose using a hand over hand method while working the sewer hose towards shore fitting. Rinse the sewer hose with outside facility and repeat the hose drain process.
3. Remove the sewer hose from shore fitting. Install sewer hose in carrier and lock door. Secure the termination cap (required by law in some states).
4. If desired, add chemicals to the tanks to control odor. Follow the directions given by the manufacturer of the chemical.

NOTE:

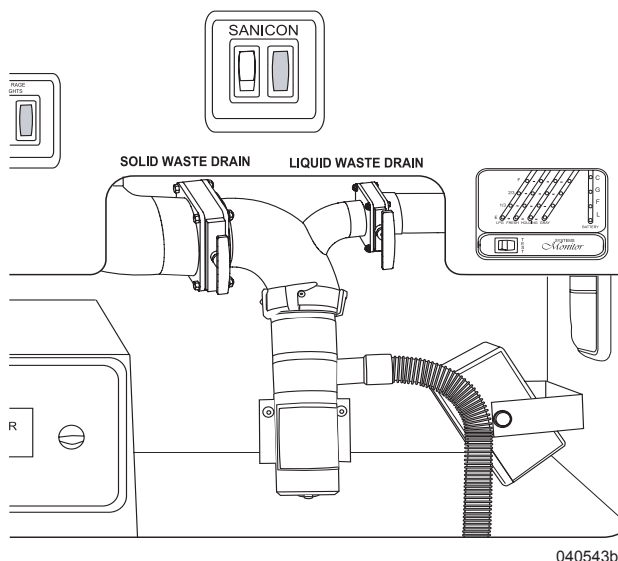
Dump the black tank before driving.

Waste Pump (Optional)

The waste pump is a self-priming impeller pump designed to minimize clogging when draining the tanks. The system comes with a 1½" outlet hose with sewer pipe adapter and a 13 gallon per minute macerator pump.

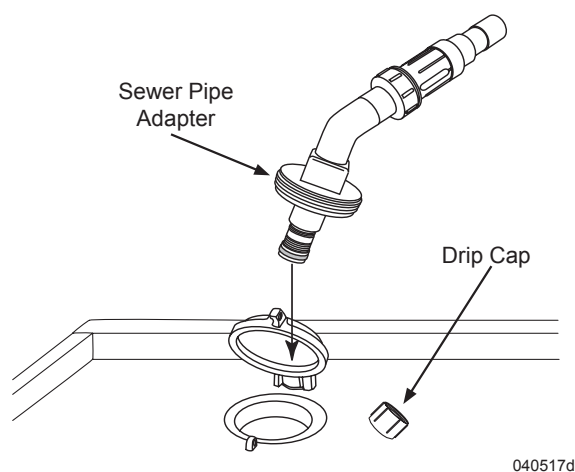
To Empty the Black Tank:

- ◆ Ensure the connector on the macerator pump to the termination point on the dump connection is secure. Ensure waste pump outlet hose is secure.
- ◆ Remove the drip cap at the bottom of the sewer pipe adapter.
- ◆ Insert the adapter into the sewer connection.
- ◆ Open the solid (black) waste drain valve at the plumbing service center.
- ◆ Turn on the macerator pump using the switch on the service center panel.
- ◆ When the black tank is empty, turn off the pump.



To Flush the Black Tank:

- ◆ Ensure the sewer pipe adapter is inserted in the facility sewer connection.
- ◆ Ensure the solid waste drain valve is open, the liquid waste drain valve is closed and the grey tank is at least 50% full.
- ◆ Connect a non-potable water hose with pressure regulator to the flush system fitting in the plumbing service center. Turn on the water supply and waste pump. Allow the water to rinse the black tank for at least three minutes. Never operate the system unattended. Ensure the water flows freely through the waste pump outlet hose.
- ◆ When completed turn off the faucet.
- ◆ Close the solid waste drain valve and open the liquid waste drain valve. Turn on the waste pump. The water in the grey tank will flush the remaining solids from the sewer hose. The liquid waste drain valve remains open until the next drain cycle or time of departure.



Inserting sewer pipe adapter into sewer connection.

When Preparing for Travel:

- ◆ Empty the tanks and close both the solid and liquid waste drain valves. Undo restraining devices from the waste pump outlet hose. Drain the hose using a hand over hand method while working the hose toward the shore connection. Remove sewer pipe adapter from shore fitting and install drip cap. Coil and store hose in water bay.
- ◆ If desired, add chemical to the tanks to control odor. Follow the directions given by the manufacturer of the chemical.

NOTE:

Drain both waste tanks before traveling.

Troubleshooting:

- ◆ The house battery disconnect switch in the battery compartment needs to be on for the macerator pump to operate.
- ◆ 12 Volt DC power for the macerator pump is supplied by the house batteries and is protected with a 20 Amp mini breaker located in the battery bay in the electrical enclosure.

TOILET

Operating Instructions

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.

CAUTION:

Most chemical mixtures for holding tank odor control are poisonous. Follow the product manufacturer's directions and warnings when using any holding tank additive.

Toilet Operation:

- ◆ Using a foot, lift up the flush lever to add water to the bowl. 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.

Water flow pressures vary at different locations; therefore, holding the flush lever down for several seconds may be required. Release the flush lever by allowing it to snap back, which permits positive sealing around the flush ball. A small amount of water should remain in bowl.

NOTE:

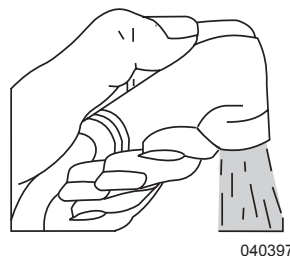
Holding the flush lever down longer than necessary will result in excessive water usage.

Cleaning & Maintenance

Cleaning the Toilet:

The toilet should be cleaned regularly for maximum 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 several gallons of fresh water through with one cup of dry laundry detergent. Add odor control deodorant, in the amount specified for your holding tank capacity, after cleaning and every few days during use.



Maintenance - Checking for leaks:

To find leaks, check behind or under toilet. Take 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 leaking water it will immediately change texture.

NOTE:

If the motorhome is in storage for six months it is a good idea to spray silicone on the toilet valve and work it back and forth. Perform this maintenance monthly (silicone will evaporate in about 30 days).

Troubleshooting

Leaks:

- ◆ **Back of toilet:** check water supply line connection.
- ◆ **Between closet flange and toilet:** Check the screws for tightness. If the leak continues, remove the toilet and check flange height. Adjust the height, if necessary, to 7/16" above floor. Replace the flange seal if it is damaged.

Poor flush:

A good flush should be obtained within two to three seconds. If the problem persists, remove the water supply line and check the flow rate. The flow rate should be at least ten quarts (9.5 liters) per minute.

Bowl will not hold water:

Check for foreign material in the valve blade groove in the flush drain.

NOTE:

Most chemical mixtures for holding tank odor control are poisonous. Follow the product manufacturer's directions and warnings when using any holding tank additive.

Drain Traps & Auto Vents

Sinks, shower and clothes washer drains incorporate a water trap (P-Trap) and auto vents to prevent waste water holding tank odor from entering the motorhome.

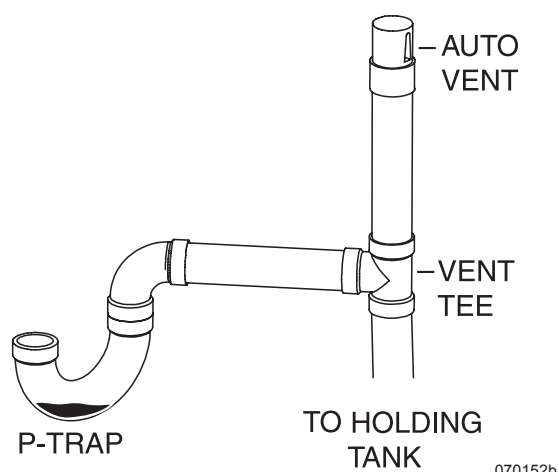
Drain Traps:

P-Traps are usually within 54" of a vent tee and must contain water to block odors. During storage, water can evaporate and allow odor into motorhome. If odor is detected, run water into sinks, shower and clothes washer to fill P-traps.

Auto Vents:

The auto vent is designed to assist in the smooth flow of water in the drain without creating a vacuum. If stuck in the open position, the auto vent can allow grey tank odors to enter the motorhome.

Some auto vents can double as “clean outs” in the event the line needs to be snaked out.

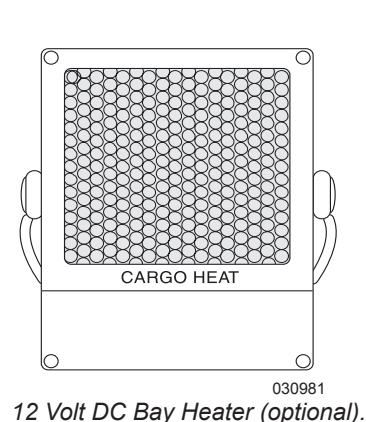


COLD WEATHER CONDITIONS

The motorhome is not designed for extended use in below freezing (32°F/0°C) weather. Precautionary measures can be taken for extended cold weather use. Interior water lines, fixtures, and drains above the floor are normally protected from moderate freezing temperatures as long as the furnace is operating. Cold temperatures can adversely affect water systems below the floor level because the LP-Gas furnace heat does not provide heat to these components.

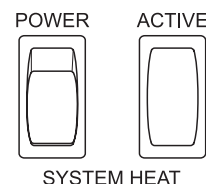
System Heat (Optional)

An optional 12 Volt bay heater and thermal snap disc are located in the water service bay. The System Heat switch on the monitor panel operates the plumbing service center bay heater and should be turned on when ambient temperature approaches 44° F. (+/- 6° F.) and freezing temperatures may occur.



12 Volt DC Bay Heater (optional).

NOTE:
A heat pad for the fresh water tank (included with system heat option) also activates with system heat.



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System Heat Operation:

1. Turn the Systems Heat switch **ON** to supply power to the snap disc thermostat.
2. When the bay temperature reaches 40° F. (+/- 6° F.), the snap disc thermostat will close. The bay heater and the systems heat Active light will turn on. The heater will continue to operate until bay temperature reaches 55° F. (+/- 6° F.). The bay heater and Active indicator light will turn **OFF**.

NOTE:

The bay heater consumes about 20 Amps when operating, which can quickly consume house battery power. It is recommended to hook to shore power when operating Systems Heat.

Cold Weather Storage

If the motorhome is stored where freezing temperatures may occur, drain the domestic fresh water loop. Drain the fresh water tank by opening the fresh tank drain valve in the storage bay.

NOTE:

Icemakers, water filters, and water heaters use domestic water and should be drained and stored in accordance with the manufacturer's recommendation for winterization.

WINTERIZATION

The fresh and waste water systems require winterization when the motorhome is placed in storage. To winterize, use compressed air to evacuate all liquids and/or antifreeze to replace all liquids.

The recommended method of winterizing is using air pressure to remove liquids that may freeze and cause damage to the various systems and appliances. The lines can then be left empty, or filled with an FDA approved RV antifreeze. When plumbing lines are drained, antifreeze is not necessary, and the decision to use antifreeze is left to the motorhome operator. FDA approved RV antifreeze is required to winterize drain lines.

NOTE:

ONLY FDA approved RV antifreeze should be used to winterize the water systems in the motorhome.

NOTE:

Some items require special winterizing procedures which can be found in their respective owner's manuals.

CAUTION:

It is recommended that a qualified RV service technician familiar with motorhomes, such as an authorized dealer, perform the winterizing procedure.

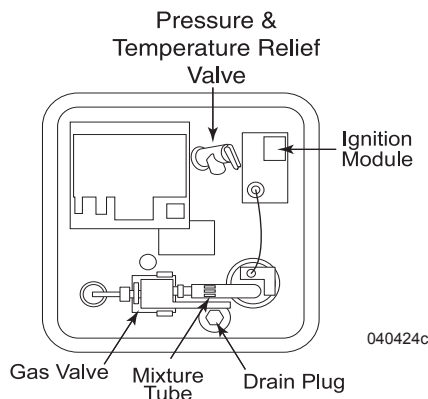
Using Air Pressure

Access to an air compressor, and an adapter to connect the air line regulator to the water system, will be necessary. Air adapters used for winterizing are available at RV supply locations. When attached to the water lines, air pressure should not exceed 40 PSI. Higher pressure can damage the lines.

NOTE:

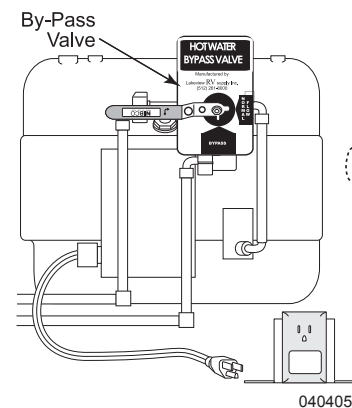
Freeze damage is not covered under warranty.

1. Empty and flush the holding tanks.
2. Drain the fresh water tank by opening the drain valve located in the bay next to the service center.
3. Open all low-point drain valves and allow the water to drain.
4. Remove water heater exterior access panel. Open the high temperature/pressure relief valve to vent water heater. Remove drain plug to allow tank to drain. Replace plug.



Open high temperature/pressure relief valve to vent water heater.

5. Go to the interior hot water tank access point. Place the water heater bypass valve in bypass position.
6. Connect an air hose with regulator to the city/fresh water fill connection, with valve positioned for city water. Set regulator for 40 psi and turn on air. (Air adapters for winterizing are available at RV supply locations.)
7. When water stops flowing from the drain valves, open and close the faucets one at a time, hot and cold, until only air comes out. **DO NOT** forget any outside faucets.



Place bypass valve in bypass position. Valve shown in normal flow position.

TO WINTERIZE SYSTEM
SEE OWNER'S MANUAL



WARNING: POTABLE WATER ONLY
SANITIZE, FLUSH AND DRAIN
BEFORE USING
(SEE OWNER'S MANUAL)

Standard City/Fresh Water Fill
Connection. Valve shown in
City Water Position.

8. Hold the toilet flush mechanism open until the water has stopped running.
9. Disconnect the air hose with adapter.
10. Close all valves and faucets.
11. One gallon of FDA approved RV antifreeze is needed to protect various water drain lines in the motorhome. Pour one pint into both the kitchen and bath shower drains. Pour three pints into the bath sink drain. This will protect the P-Traps, with some of the antifreeze going into the grey tank to protect the drain valve. Open the valve on the toilet. Pour four pints into the toilet, letting the antifreeze run into the black tank to protect the drain valve. Use a soft cloth to wipe out the sinks, shower and toilet (after the antifreeze is poured in) to protect the surfaces from stains.

WARNING:

Ensure the water is not hot when draining the low-point drain lines. Hot water from the lines can cause burn injuries.

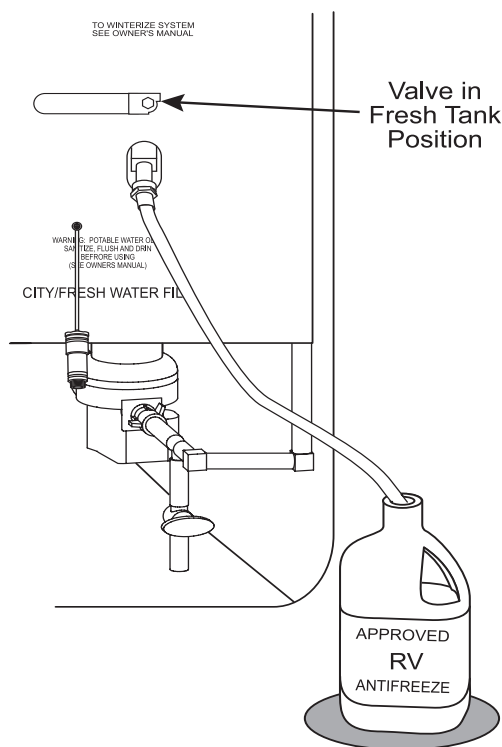
NOTE:

Some items require special winterizing instructions, which can be found in the specific owner's manuals.

Using Nontoxic Antifreeze

Approximately three gallons of FDA approved RV antifreeze will be required to winterize the motorhome.

1. Empty and flush the holding tanks.
2. Close all faucets, drain valves and low point drains.
3. Turn water heater bypass valve to bypass position. Remove drain plug and drain water heater.
4. Connect the supplied winterizing hose to the Fresh Tank Fill/ City Water connection at the service center.
5. Turn the Fresh Tank Fill/ City Water Valve to the Tank Fill position.
6. Close the winterization valve located between the water pump and fresh water tank.
7. Insert winterizing hose into the container of antifreeze.



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NOTE:

Some items require special winterizing procedures which can be found in their respective owner's manuals.

CAUTION:

It is recommended that a qualified RV service technician familiar with motorhomes, such as an authorized dealer, perform the winterizing procedure.

8. Turn on the water pump.
9. Open all faucets, one at a time, hot and cold starting with the faucet farthest from the pump. Turn the faucet OFF when you see antifreeze. Hold the toilet flush mechanism open until antifreeze appears.
10. Use a soft cloth to wipe out the sinks and shower to protect surfaces from antifreeze stains.
11. One gallon of FDA approved RV antifreeze is needed to protect various water drain lines in the motorhome. Pour one pint into both the kitchen and bath shower drains. Pour three pints into the bath sink drain. This will protect the P-Traps, with some of the antifreeze going into the grey tank to protect the drain valve. Open the valve on the toilet. Pour four pints into the toilet, letting the antifreeze run into the black tank to protect the drain valve. Use a soft cloth to wipe out the sinks, shower and toilet (after the antifreeze is poured in) to protect the surfaces from stains.

12. Turn off the Water Pump.

NOTE:

Clean up antifreeze spills immediately to prevent permanent staining.

NOTE:

Ensure the water is not hot when draining the low-point drain lines. Hot water from the lines can cause burn injuries.

NOTE:

Some items require special winterizing instructions, which can be found in the specific owner's manuals.

De-winterization

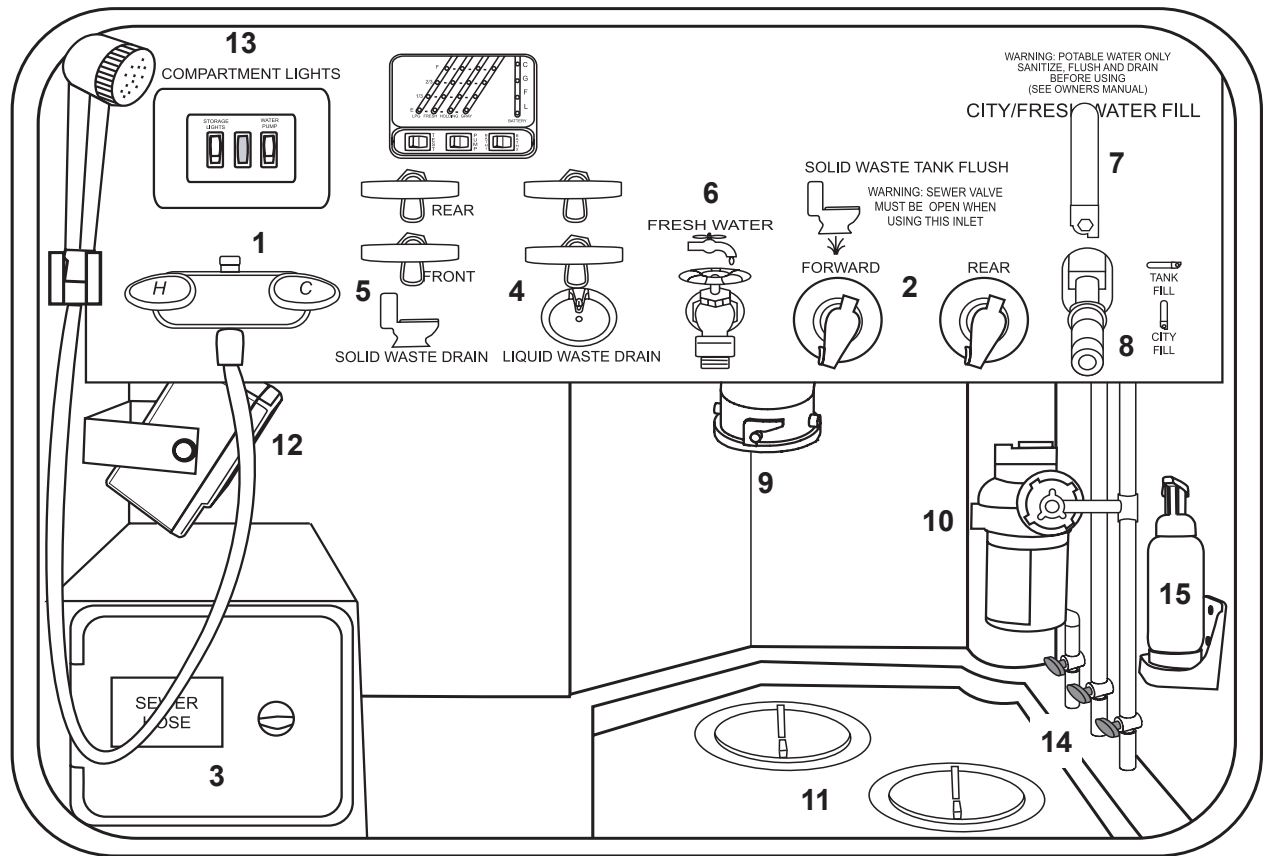
To de-winterize drain and fill the fresh tank with water, turn on the water pump. Operate all faucets, one at a time, until clear water is present.

NOTE:

Depending on length of storage, the fresh water tank may need to be sanitized.

SERVICE CENTER**NOTE:**

Layout of service center and location of components may vary with floor plans.

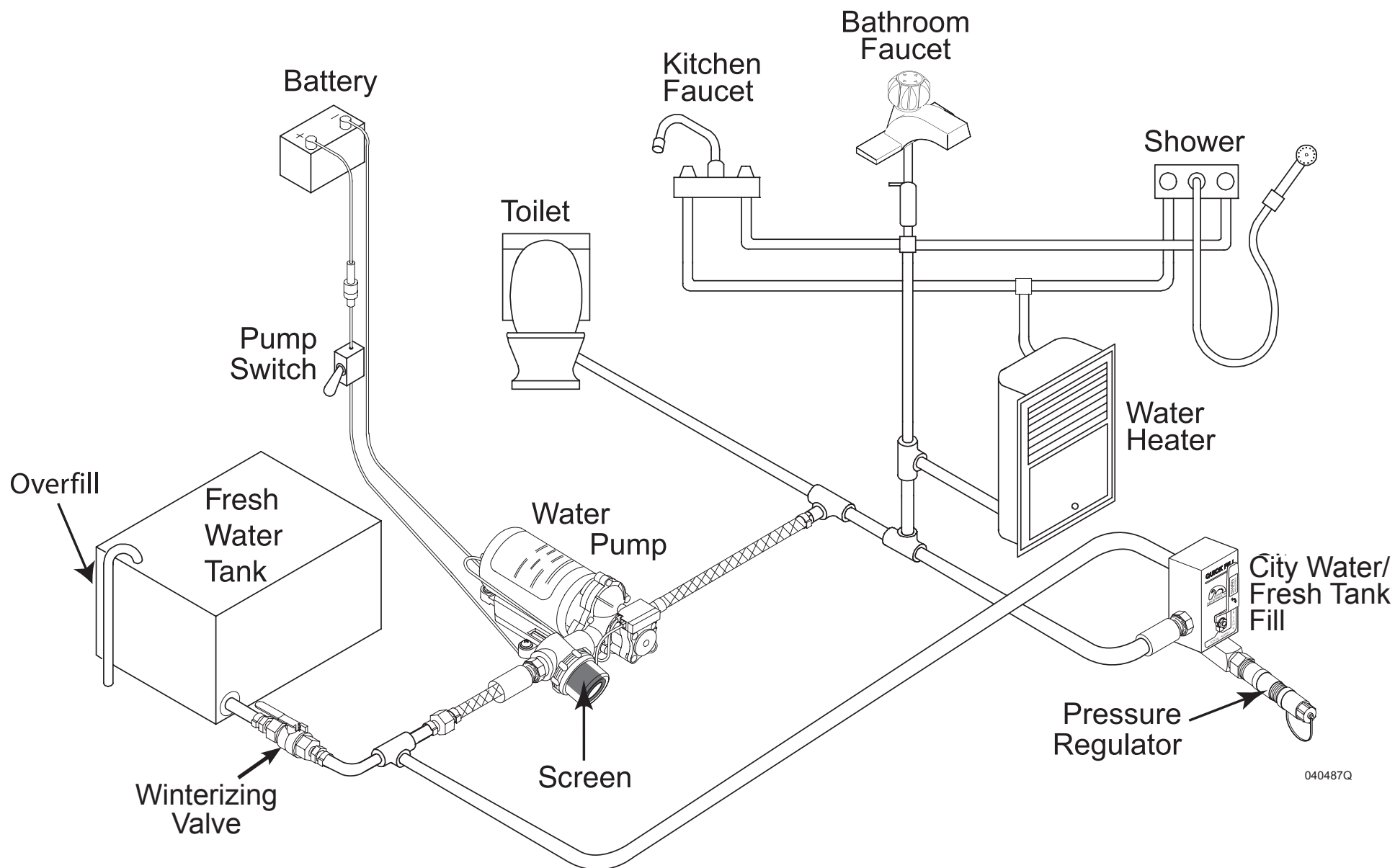


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1. Exterior Shower
2. Black Tank Flush
3. Waste Hose Storage
4. Grey Water Drain Valve
5. Black Water Drain Valve
6. Fresh Water Valve
7. City/Fresh Water Valve
8. City/Fresh Water Connection

9. Termination Drain
10. Water Pump
11. Deck Plates
12. Bay Heater
13. Storage Light & Water Pump Switch
14. Low Point Drains
15. Soap Dispenser

WATER SYSTEM DIAGRAM (TYPICAL)



NOTES

[illegible]

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LP-GAS SYSTEMS

This section contains safety information and operating instructions of the Liquefied Petroleum Gas (LP-Gas) system and related equipment in the motorhome. Some items discussed may not be applicable to all motorhomes. More detailed information with **CAUTION** or **WARNING** instructions for various equipment other than items within this section, can be found in the equipment manufacturer's manual in the owner's information box.

The LP-Gas tank mounted in the front fuel bay contains LP-Gas that is under high pressure. As fuel is used, the liquid vaporizes and passes through the primary tank valve to a regulator that reduces pressure. Low-pressure gas is then distributed to components through a pipe manifold system.

Component ignition problems are commonly caused by air in the manifold system or incorrect gas pressure. **DO NOT** attempt to adjust the regulator. Adjustments must be made by a dealer or an authorized service personnel with the proper equipment. In higher elevations or extreme cold weather (10° F/-12° C or lower) a shortage of LP-Gas may be experienced. If LP-Gas is going to be used in higher elevations or cold climates for a long period of time, have authorized service personnel adjust the LP-Gas regulator for these conditions.

Have the LP-Gas system tested by an authorized dealer or service center at least once a year and before every extended trip. The test will include having the system checked for leaks and the regulator pressure checked and tested for functionality. Although the manufacturer and the dealer test the system carefully for leakage, travel vibrations can loosen fittings.

WARNING:

When storing portable LP-Gas tanks that are not connected to an LP-Gas system, install an approved plug in the tank outlet hole to prevent leaks. DO NOT store or transport empty LP-Gas 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 LP-Gas area. Shut off all appliances and the primary LP-Gas tank valve when the motorhome is in storage. If this warning is ignored, a fire or explosion could result.

Leaks (identified by the odor of rotten eggs or sulfur) can be found by applying a leak detector solution on all connections. Never light a match, have an open flame or use any spark producing equipment or appliance to test for leaks. Leaks can usually be repaired by tightening the fittings. If not, shut off the primary gas valve at the tank. Hand-tighten the primary valve only. **DO NOT** use a wrench or pliers as over tightening may damage valve seats and cause leaks. If a leak is suspected, immediately see an authorized dealer or service center for repairs.

WARNING:

LP-Gas is highly volatile and extremely explosive. DO NOT use matches or a flame to test for leaks. Only approved LP-Gas leak testing solution for leak detection should be used. Unapproved solutions can damage copper tubing and brass fittings. A liquid dish soap solution of 10 parts water may be used. Shake the solution until bubbles form and then apply the mixed solution to fittings and accessory control valves. All fittings tested should be thoroughly rinsed and dried after testing. Never attempt to adjust LP-Gas regulators. Only qualified service personnel should perform maintenance or repairs to the LP-Gas system.

NOTE:

It may be illegal to travel in some states and Canadian provinces with the primary LP-Gas valve open. Failure to comply with these State and Canadian province requirements may result in fines and/or pose a safety hazard.

LP-GAS DETECTOR

The LP-Gas detector is required safety equipment in RVs. **American National Standards Institute (ANSI) A119.2 - Fire & Life Safety 3-4.8 LP Gas Detectors** states “A LP-Gas detector must be installed in any RV that contains an LP-Gas appliance and an electrical system. The LP-Gas detector must be listed as suitable for use in recreational vehicles under the requirement of UL 1484 Residential Gas Detectors, and installed according to the terms of its listing.”



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LP-Gas is heavier than air and will settle to the lowest point in the motorhome. The LP-Gas 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 the floor level. Sulfated batteries (rotten egg odor) will also sound the alarm. When this occurs, reset the detector to stop the alert sound.

About the LP-Gas Detector:

Be aware of the difference between a leak versus LP-Gas escaping from an unlit, open burner. Pure LP-Gas vapors from a leaking pipe or fitting are heavier than air and will build up heaviest concentration at the leak and float down to mix with air. LP-Gas from open burners is intentionally mixed with air to induce burning and dissipate into the air. When mixed with air, LP-Gas becomes only marginally heavier and expands outward. If a burner is left on, the area around the burner, range and adjoining counter space is combustible and can cause injury and damage when ignited. This condition will exist for an extended time. Eventually, LP-Gas will reach the detector's location and cause the alarm to sound.

NOTE:

The LP-Gas detector indicates the presence of LP-Gas only at its sensor. Combustible levels of LP-Gas may be present in other areas. The detector is intended for detection of LP-Gas only.

The LP-Gas detector is not designed to detect other types of gas. However, some products may cause the detector to alarm, such as alcohol, liquor, kerosene, gasoline, deodorants, colognes, propellant used in spray cans and cleaning solvents. In some cases, vapors from glue and adhesive used in the manufacturing of the motorhome may also 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, reset the detector and ventilate the motorhome with fresh outside air. Take precautions to ensure one of these cases has not masked an actual LP-Gas alarm condition.

The LP-Gas detector draws less current than one instrument panel lamp and will detect gas until the battery is drained down to 7.0 Volts. A voltage higher than 7.0 Volts is needed for the detector to operate properly. If the power source is disconnected, or if the power is otherwise interrupted, the detector will not operate.

The LP-Gas 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 operating indicator will cease to light.

LP-Gas Detector Operation:

Upon first application of power the LED will flash yellow for three minutes while the detector is stabilizing. At the end of the start cycle the LED will turn Green indicating full operation. If the detector senses unsafe levels of LP-Gas it will immediately sound an alarm. The LP-Gas detector draws power from the chassis batteries at a rate of less than 1/10th of one amp.

CAUTION:

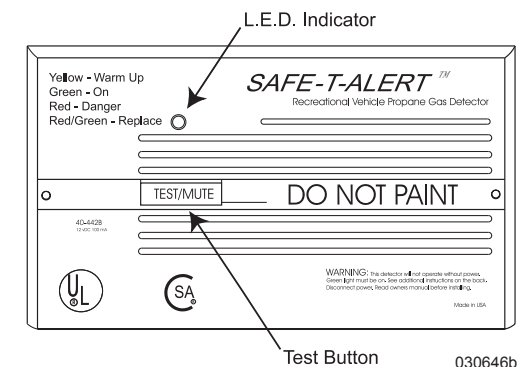
The detector will not alarm during the three minute warm up cycle.

Testing

Press the TEST 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. This is the only way to test full operation of the detector.

WARNING:

Test the operation of this detector after the motorhome has been in storage, before each trip and at least once per week during use.



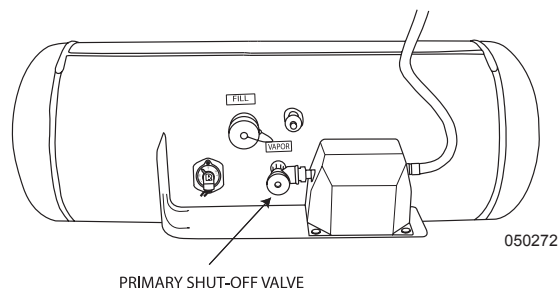
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Alarm

The red LED will flash and the alarm will sound whenever dangerous levels of LP-Gas or natural gas are detected. The detector will continue to alarm until the gas clears or the **Test/Mute switch** is pressed.

Alarm Procedures:

1. Turn off all LP-Gas appliances (stove, water heater, furnace, refrigerator), extinguish all flames and smoking material. Evacuate immediately. Leave doors and windows open.
2. Turn off primary valve on LP-Gas tank.
3. Determine and repair the source of the leak. If necessary, contact a qualified professional for service.



POTENTIAL SOURCES OF LP-GAS LEAKS WHEN OPERATING THE MOTORHOME

- | | |
|-------------------|--|
| ♦ Cooktop Burners | ♦ Defective LP-Gas Connection |
| ♦ Oven | ♦ Defective Regulator |
| ♦ Refrigerator | ♦ Portable Propane Powered Appliances/ Accessories |

WARNING:

DO NOT operate any electric switch. This can produce a spark and ignite the gas.

CAUTION:

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 resound the alarm if dangerous levels of gas remain in the area.

Fault Alarm:

Should the microprocessor sense a fault in the gas detector, a fault alarm will sound twice every 15 seconds. The LED will alternately flash red to green and the **MUTE** switch will not respond to any command. The gas detector must be repaired or replaced.

Maintenance

1. Vacuum the dust off 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 onto the front panel. This action may damage the sensor, cause an alarm or cause a detector malfunction.

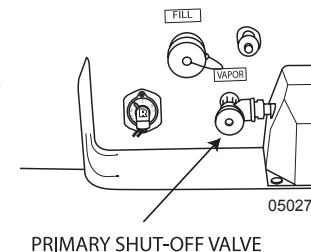
LP-GAS EMERGENCY PROCEDURES CHECKLIST

If you smell gas (a rotten egg or sulfur smell) at any time, perform the following steps immediately:

- ♦ Shut off LP-Gas appliances.
- ♦ Manually turn off the primary shut-off valve at the LP-Gas tank.
- ♦ **DO NOT** operate any electric switch. This can produce 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 gas leak.

WARNING:

A fire or explosion from ignited gas or gas fumes can cause serious injury or death.



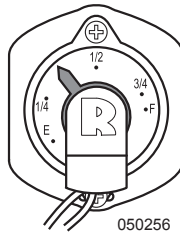
LP-GAS TANK Measurement

Tank Measurement:

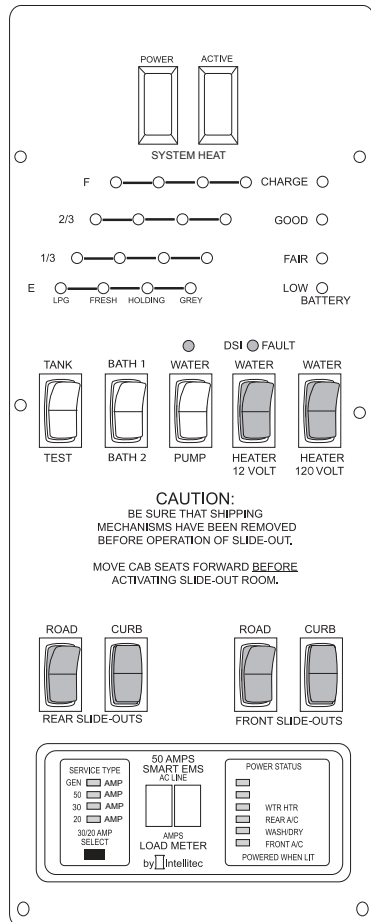
To measure level of a tank, press the Tank Test switch on display panel. Observe the indicator lamps corresponding to the tank of interest.

NOTE:

Calibration of the LP-Gas gauge is preset and not adjustable.



Sensor mounted on LP-Gas tank



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Tank Capacity

LP-Gas Tank Capacity
24 Gallons*
*Actual filled LP-Gas capacity is 80% of listing due to safety shut-off required on tank.

NOTE:

This chart reflects product specifications available at the time of printing. Floor plans introduced thereafter may not be reflected in the chart. All other information contained throughout the manual will still apply.

NOTE:

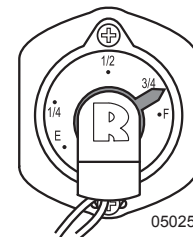
LP-Gas tank capacity is estimated based upon calculations provided by the tank manufacturer and represents approximate capacity. The actual “usable capacity” may be greater or less than the estimated capacity. Actual full liquid capacity is 80% of full tank capacity.

Tank Filling

Woodall’s Campground and Trailer Guide, and other similar publications, list refueling stations. Many travel parks sell LP-Gas. Before filling the LP-Gas tank, shut off pilot lights, appliances and igniters to prevent a fire or explosion.

NOTE:

Have a trained service person fill the LP-Gas tank. Inform the service technician to purge any air from the tank before filling if the tank is being filled for the first time.

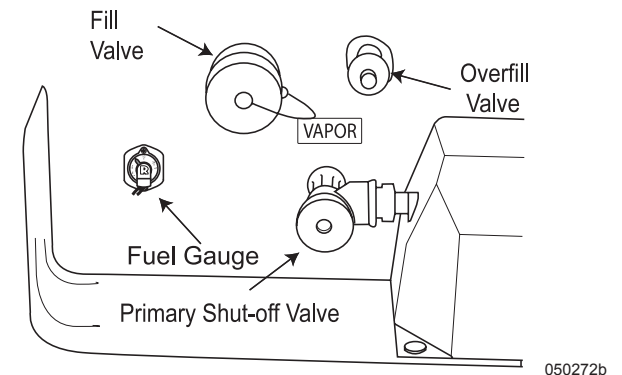


LP Tank Gauge Located on tank.

The LP-Gas tank fill is located in the curbside compartment. When the tank is filled to the proper level, there is space available for the conversion of liquid into gas. If a tank is over-filled, it may cause the safety valve to release pressure. When this happens, a strong rotten egg odor near the tank and/or a hissing noise may be detected.

CAUTION:

Pressure inside LP-Gas tanks can reach over 200 psi when exposed to direct sunlight. A high-pressure safety relief valve will purge excess high pressure, if necessary. LP-Gas will stop vaporizing as the LP-Gas tank temperature approaches -44° F.



LP-Gas exists in both liquid and vapor form within the tank. A “Full” tank is approximately 80% liquid. The pressure inside the tank varies with the temperature of the liquid. All tanks are required to be equipped with a safety pressure relief device. The purpose of the safety valve is to release excess pressure. When the tank is full, the gauge on the tank will only read 3/4 full. The monitor panel is adjusted to indicate “full” at this point.

WARNING:

Before entering any type of refueling station turn off all LP-Gas operated appliances. Most LP-Gas appliances used in recreational vehicles 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.

NOTE:

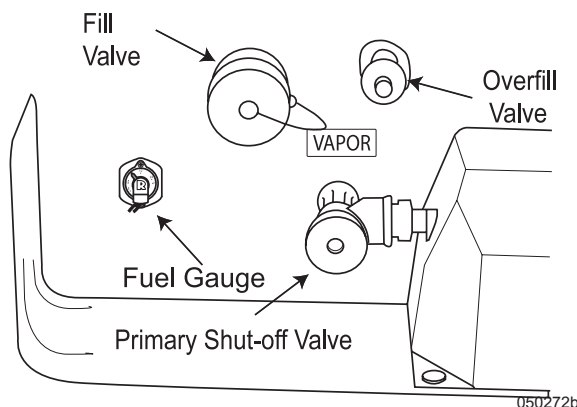
Actual full liquid capacity is 80% of full tank capacity.

WARNING:

Extinguish all sources of heat, sparks, flames and smoking materials within a 50' radius during the fueling process.

Tank Operation

- ♦ Open the primary shut-off valve located on the LP-Gas tank.
- ♦ Turn off the primary valve on the LP-Gas tank when the tank is being filled, when driving, in between trips and when in storage.



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- ♦ Hand-tighten the primary valve only. **DO NOT** use a wrench or pliers, as this will over-tighten the valve.
- ♦ The primary valve is designed to be closed by hand, over-tightening may permanently damage the valve seat.

NOTE:

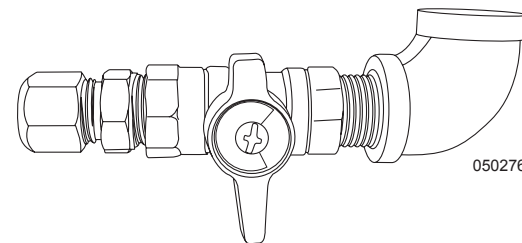
In some states and Canadian provinces, it may be illegal to drive the motorhome while the primary valve on the LP-Gas tank is open.

Accessory Hookup**Exterior Gas Line Hookup Prep:**

An auxiliary remote LP-Gas hookup is for external LP-Gas accessories and is to be used for external components only. For safety, only approved LP-Gas quick disconnect fittings and flexible hose should be used to connect external accessories to the remote hookup. A LP-Gas Quick Disconnect fitting should be installed by a qualified agency as defined in the Nation Fire Protection Association NFPA code 54-02.

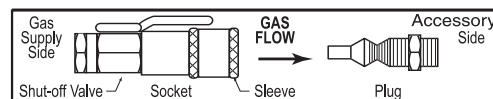
**NOTE:**

Every time the remote hook-up is used, check for leaks on all connections. If a leak is detected, turn off the primary valve at the main LP-Gas tank. Contact a qualified service center for the necessary repairs.



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Located in the bay with the LP-Gas Tank

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 VALVE 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

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LP-GAS FUNDAMENTALS

#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.

LP-Gas 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
BTU Per Gallon	91,502
BTU Per Pound	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

Basic Facts About LP-Gas:

- LP-Gas detectors are a federal requirement on all LP-Gas equipped recreation vehicles.
- LP-Gas is a by-product produced by refining oil.
- Odor is added to LP-Gas after the refining process.
- Each liquid gallon of LP-Gas produces 91,502 BTU (British Thermal Units).
- Temperature affects pressure of LP-Gas. Internal tank pressure can exceed 200 psi.
- Tanks or valves contain pressure relief valves. The relief valve opens at 125% above tank rating.
- LP-Gas stops vaporizing at -44° F.
- Standard LP-Gas 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.

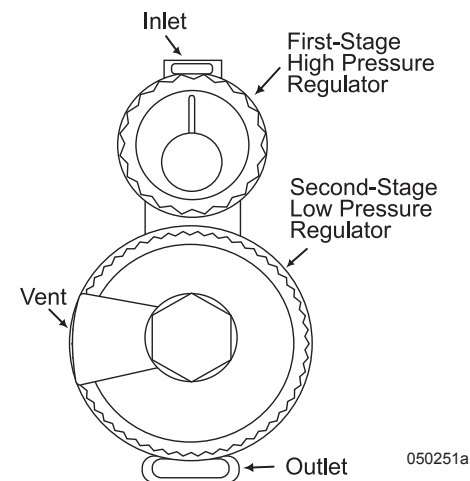
NOTE:

LP-Gas fundamental information is not a complete guide for the use of LP-Gas tanks or appliances. In cold climates keep LP-Gas level above 50% to keep vaporization of LP-Gas at the highest level.

LP-GAS REGULATOR

LP-Gas is compressed into liquid form in the tank. Only the vapor is used during combustion by an appliance. As vapor is removed from the tank, the remaining liquid will vaporize to maintain pressure that is removed during consumption. This process will continue 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, the liquid remains stable with tank pressure, about 0 psi. If liquid temperature is 100° F, the liquid quickly vaporizes with tank pressure at about 200 psi. Vapor pressure must remain relatively consistent, regardless of temperature, for the appliance heat output to remain stable. Vapor pressure regulation is performed by the regulator.



050251a

The two-stage regulator reduces vapor pressure so that it is 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 atmospheric pressure change. It is important to keep the vent clean and clear of obstruction or corrosion. If the vent becomes clogged, pressure from LP tank may cause erratic pressure regulation. If there is any corrosion, contact a qualified LP-Gas service technician. The regulator is mounted so that the vent faces downward. If the vent becomes clogged, clean it with a toothbrush.

Under normal atmospheric conditions an LP-Gas regulator will not freeze, nor will the LP-Gas. Vapor passing through the regulator will expand and cool, condensing moisture in the gas. The moisture will freeze, build up and block the vent. The possibility of freeze up is greatly reduced with the two-stage regulator.

To Prevent a Freeze Up:

- ◆ Ensure the LP-Gas 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 LP-Gas distributor purge the tank and inject methyl alcohol into it.

Damage to the regulator can occur when the tank is overfilled. The regulator is designed to work with 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, liquefied petroleum can fill the regulator. As the liquid vaporizes, it can freeze the diaphragm. High tank pressure on a frozen diaphragm can cause a rupture and result in erratic pressure regulation. This is why it is important to have the LP-Gas pressure checked for proper pressure and accurate regulation during appliance operation. Erratic pressure regulation dramatically affects refrigerator operation on LP-Gas.

Manometers:

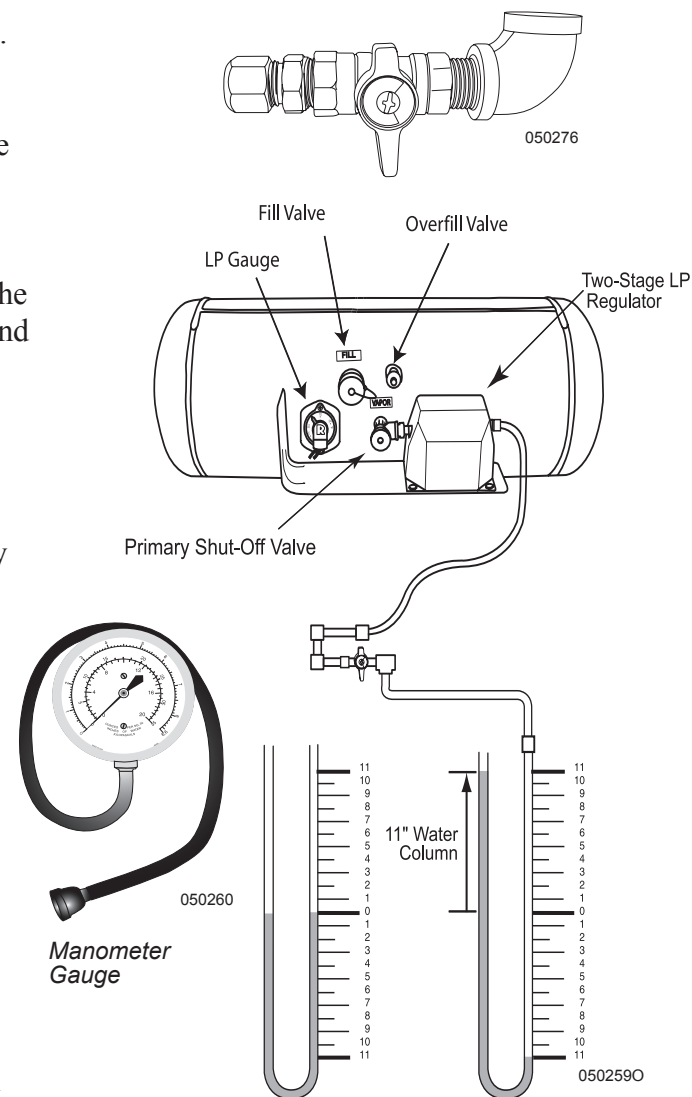
The manometer is the best way to accurately determine LP-Gas pressure. There are two different styles of manometers: Gauge and U-tube. Gas pressure is measured in Inches of Water Column. This is the amount of pressure applied to one side of a U-shaped tube half filled with water. The amount of pressure needed to raise the column of water 11" represents 11 Inches of Water Column.

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 LP-Gas appliances until the LP-Gas pressure is checked and a leak down test is performed.

TIP:

Attach the manometer gauge to the accessory hookup line to avoid loosening any interior LP-Gas line connection.



LP-GAS HOSE INSPECTION

It is suggested by the hose manufacturer that the LP-Gas supply hoses used on the motorhome undergo regular inspection. As a guideline, we suggest that all flexible LP-Gas lines connecting the slide-out, appliances and tanks be inspected in the spring and fall of each year by a qualified RV technician.

INSPECTION:

Inspect the outside cover of the hose for blistering, abrasion or cuts and coupling slippage. Cuts in the hose cover that expose or damage the reinforcement are cause for replacement. Hose strength is controlled by the plies of reinforcement and damage in this area cannot be tolerated. Small cuts, nicks, or gouges that do not go completely through the cover are not cause for replacement of the hose.

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.

According to the manufacturer, inspection should consist of the following procedures, and performed when the hose is not under pressure:

- ◆ Damage to the textile reinforcement or wire braid is cause for hose replacement. Wire braid reinforced hose, which has been kinked or flattened so as to permanently deform the wire braid in the unpressurized state, shall be removed from service.

- ◆ Blistering or loose outer cover is cause for hose replacement.
- ◆ Examine couplings for slippage. Slippage is evidenced by the misalignment of the hose and coupling and/or the scored or exposed area where slippage has occurred. Any evidence of slippage is cause for hose replacement.
- ◆ It is important that if a damaged LP-Gas hose is found, the source of the damage be determined and corrected prior to the replacement of the LP-Gas hose.

NOTE:

Only a qualified RV technician should complete replacement of LP-Gas components.

It is also suggested, that the flexible LP-Gas supply lines on your recreational vehicle be replaced every ten years. The manufacturer of the LP-Gas supply lines recommended this schedule after performing extended testing and determining that the failure rate may increase after this period of time. The motorhome manufacturer recommends following these guidelines to assure continued safety and dependable use.

LP-GAS DISTRIBUTION LINES

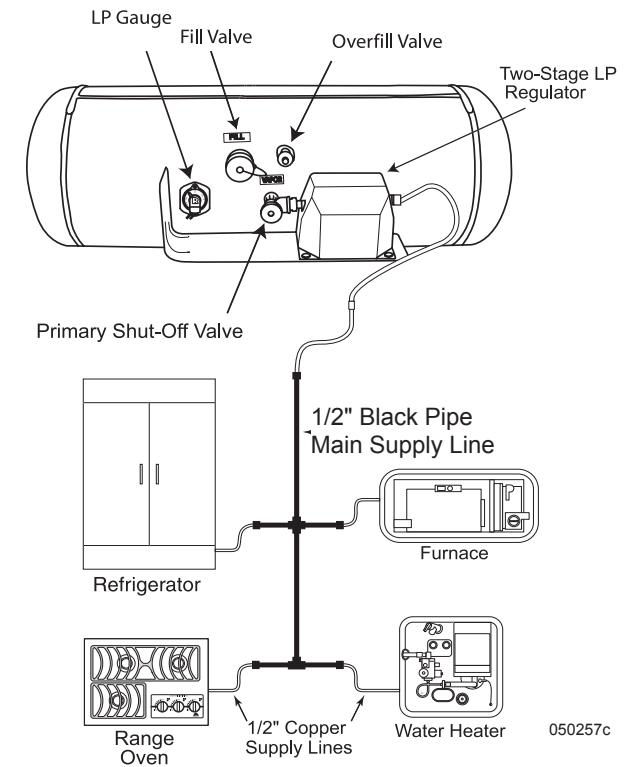
A primary manifold black steel pipe running throughout the motorhome distributes LP-Gas to secondary lines. All secondary lines leading to gas appliances are made of copper tubing with flared fittings. If any lines rupture do not attempt to splice them. Always run a new line. It is recommended that gas distribution work

be performed by an authorized dealer or an authorized service technician. When removing or servicing any gas appliance, manually close the primary valve located on the LP-Gas tank. This will prevent dangerous gas leakage that could result in an explosion and possible serious injury.

INSPECTION:

Inspect the rubber flexible lines, twice a year, for abrasions, tears, kinks or other signs of damage.

If a gas leak is suspected, get the system inspected and repaired by a qualified service technician as soon as possible.



Typical LP-Gas System Layout

LP-GAS CONSUMPTION

Each gallon of LP-Gas produces 91,502 BTU's of heat. One 24 gallon tank produces 1.75 million BTU's. Total consumption depends on the rate of usage by each appliance and the operating time. The stove typically uses the most LP-Gas.

NOTE:

LP-Gas 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.

Determine Fuel Consumption:

To determine approximately how many hours an LP-Gas appliance will operate on one gallon of LP-Gas, use the following formula:

- ◆ LP-Gas appliances are rated in Input BTU's (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 BTU's.
- ◆ One gallon of LP-Gas produces 91,502 BTU's.
- ◆ Divide the amount of BTU's of one gallon of LP-Gas (91,502) by the rating on the appliance in this example 10,000. Net continuous operation time for one gallon of LP-Gas for this appliance would be approximately 9.2 hours.

The above formula can be useful when trying to determine the approximate length of time a tank of LP-Gas will last. Generally, LP-Gas appliances do not operate continuously. An example would be the typical cycling of the furnace or water heater.

Determining how long a LP-Gas tank will last:

- ◆ Combine the BTU input totals of all appliances, and the approximate length of time these appliances operate per day.
- ◆ Multiply the number of liquid gallons in the LP-Gas tank by 91,502.
- ◆ Divide the total of BTU's of the LP-Gas tank by the total number of BTU's the appliances consume, equals the approximate number of hours of operation before refueling.

Typical Appliance BTU Ratings

Water Heater (Atwood)

10 gallon - 12,000 BTU

Furnace (Atwood)

35,000 BTU

Cooktop

9,000 BTU - Large

6,500 BTU - Small

7,100 BTU - Oven

Refrigerator (Norcold)

2-door 1500 BTU

4-door 2200 BTU

WARNING:

LP-Gas is highly volatile and extremely explosive. Never use matches or open flame to test for leaks. Use only approved LP-Gas leak testing solution to test for leaks. Unapproved solutions can damage copper tubing and brass fittings. Never attempt to adjust LP-Gas regulators without the use of proper equipment. Improper LP-Gas regulator adjustment will affect the performance of LP-Gas operated appliances. Incorrect flame or explosion can occur. Only qualified personnel should perform any maintenance or repair to the LP-Gas system.

LP-GAS SAFETY TIPS

LP-Gas is one of the safest and most reliable fuels available on the market when handled properly. LP-Gas, however, does have a great explosive "potential" if handled improperly. Danger is minimized by becoming familiar with and following a few safety precautions, and by learning how to properly operate LP-Gas appliances. Use of LP-Gas requires the responsibility to enforce extra safety measures.

The motorhome is equipped with many LP-Gas operated appliances because it is a convenient and efficient source of fuel. LP-Gas appliances must be operated and maintained in accordance with the product manufacturer's instructions.

The National Propane Gas Association (NPGA) has a special service program offered called GAS® (Gas Appliance System) Check. The GAS® Check program is aimed at educating users about the convenience of propane with safety and peace of mind. For information on the NPGA Gas® Check program, call (202) 466-7200 or visit www.npga.org.

LP-Gas Tanks and Cylinders:

Tanks are built to American Society of Mechanical Engineers (ASME) Code. The cylinders are built to DOT (Department of Transportation) Code. The major difference between cylinders and tanks is in required testing and inspection procedures, and in construction of the containers. Both tanks and cylinders are required to undergo pressure testing and inspection; however, the procedures for how they are tested and inspected differ.

The difference between the two codes are that the valves, fittings and brackets are located only on the ends of the DOT cylinders; however, on the ASME tanks they may be located on ends, as well as the sides. There is also a difference in how the tanks are rated. Required tank ratings are in gallons (ASME ratings) or pounds (DOT) water capacity. The Federal DOT (Department of Transportation) regulations require periodic inspections and re-qualifications of cylinders.

American Society of Mechanical Engineers (ASME) tanks or bulk containers are generally used in motorhomes, and are permanently mounted on to the unit.

An alloy steel two-piece welded and brazed tank is used on all towable products. The marking on the collar, DOT 4BA240, identifies the DOT specifications and service pressure. Other pertinent information included on the collar is Water Capacity (WC) and Tare Weight (TW), both which are measured in pounds, and the manufacture date (one of the most important items). There is a required 12 year re-qualification. The final piece of information is Dip Tube (DT) length. This is part of the overfill protection and maximum liquid allowance in the cylinder.

Maintenance and Safety Tips for LP-Gas Refrigerator and Furnace:

- ◆ Have the refrigerator and furnace systems inspected annually by an authorized service center.
- ◆ Before firing up the refrigerator or using the LP-Gas furnace for the first time each season, have the venting system checked for blockage. Insects may have built nests that will obstruct flow.
- ◆ At the first indication of incomplete combustion (yellow flame instead of a blue flame or soot is present) contact a service technician immediately. Improper combustion can cause Carbon Monoxide buildup, which is potentially fatal!

Maintenance and Safety Tips for the LP-Gas Range:

- ◆ Burner flame should be a blue color, indicating complete combustion. If not, have the unit serviced by a qualified technician.
- ◆ **DO NOT** cover the oven bottom with foil. Air circulation will be restricted.
- ◆ Never use LP-Gas ranges or ovens for heating purposes.
- ◆ Always have pot handles turned inward.
- ◆ Ensure children understand never to turn or play with the knobs on the front of the LP-Gas range.

Maintenance and Safety Tips for the LP-Gas Water Heater:

- ◆ Have the Water Heater venting system inspected annually or before first use of the season.
- ◆ Keep flammable substances away from the water heater. **DO NOT** store items close to it as this may block the airflow the water heater needs to operate completely.
- ◆ At the first indication of the incomplete combustion (yellow flame instead of a blue flame or soot is present) call a service technician immediately. Improper combustion can cause Carbon Monoxide buildup, which is potentially fatal!

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.

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HOUSE ELECTRICAL - INTRODUCTION

The motorhome 120/240 Volt AC system can be operated from shore power or the on-board generator. Shore power is the most efficient and should be used whenever possible. The generator can be used when shore power is unavailable.

The AC circuit breaker panel is supplied with power by the 50 Amp shore power cord or the on-board generator. The power source used is automatically selected by a switching device known as a transfer switch.

WARNING:

The electrical system is engineered and tested for complete safety. Circuit breakers and fuses protect the electrical circuits from overloading. When planning modifications or additions to the electrical system, we strongly recommend consulting an authorized dealer for assistance to ensure continued integrity and 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 electrical outlet that may be exposed to a water source. Such use can result in a serious shock causing injury or death.

Shore Power:

The motorhome is equipped with a shore power cord to connect to outside electrical services. Shore power service is the most efficient source of electrical power. The plug end of the shore power cord is 50 Amp, 240 Volt. When this type of power service is not available,

electrical adapters will be required to allow a proper and safe connection to the electrical service supply.

NOTE:

When 50 Amp shore service is not available, care will have to be used when operating the appliances and using the outlets to avoid overloading the shore power service.

Generator:

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 will decrease slightly at higher altitude. Ambient temperature also affects total maximum output. The amount of AC electrical load applied to the generator determines fuel consumption.

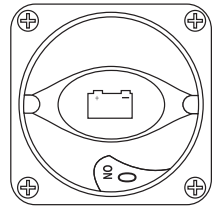
Inverter (Optional):

The Inverter is an auxiliary 120 Volt AC power source that inverts 12 Volt DC house battery power to 120 Volts AC. This device has limited AC power output, measured in watts, and operates only selected appliances or outlets.

BATTERY DISCONNECT - HOUSE

The main house battery disconnect switch turns the house battery power supply on or off by disconnecting 12 Volt DC power to the domestic fuse panels in the bedroom and front roadside electrical bay.

Turn the house battery disconnect switch off when the motorhome is going to be stored or before performing electrical maintenance. If possible, leave the motorhome plugged into an AC source with the battery disconnect switch on to help prevent the possibility of dead house batteries. Turning off the battery cut-off switch at the entry door will not turn off all DC electrical items or other parasitic loads present on the house battery. Some are federal mandate items such as the LP-Gas detector. If an AC power source is not available, and the motorhome is going to be stored for more than 48 hours, it is recommended to turn the house battery disconnect switch off.



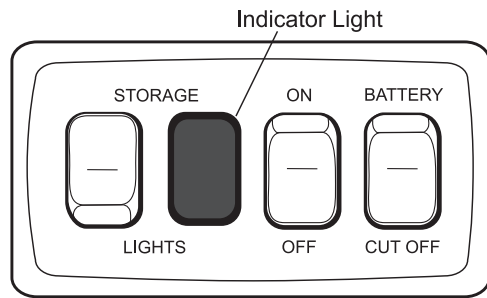
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Located in the curbside rear battery compartment.

BATTERY CUT-OFF SWITCH

The battery cut-off switch is located inside next to the entry door. This switch controls the 12 Volt DC power to the domestic fuse panel. The switch is spring loaded to help prevent interior DC power from being accidentally turned on or off.

When the switch is activated, power is supplied to all interior DC lighting and DC operated appliances. Some appliances will 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.



Battery Cut-off Switch

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Refrigerator operation is unaffected by the operation of this switch. When the interior house power is off, there are still parasitic loads on the house batteries, and therefore is not a substitute for the main battery disconnect switch.

CAUTION:

To avoid flash damage to electrical contacts, turn off the interior lighting before activating or deactivating the battery cut-off switch.

SHORE POWER HOOK-UP

The power requirement for the motorhome is 50 Amp 240 Volt AC single phase. The shore cord is stored in the rear roadside compartment. If 50 Amp shore power service is available, connect the supplied shore power cord. If 50 Amp service is not available, electrical adapters will be required.

CAUTION:

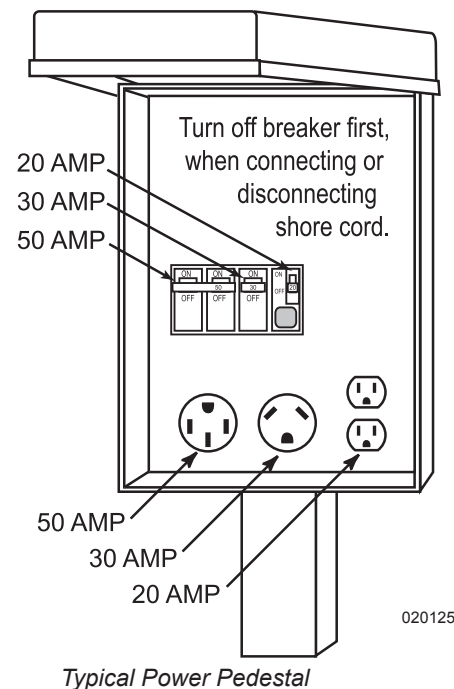
Avoid flash damage to the electrical system contacts. Before plugging the motorhome into shore power, starting the generator or using the inverter make sure all the appliances are off.

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 electrical shock, turn the circuit breaker off at the power supply outlet before making the shore power connection.

CAUTION:

DO NOT remove cover from 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 problems with the shore power hook-up.

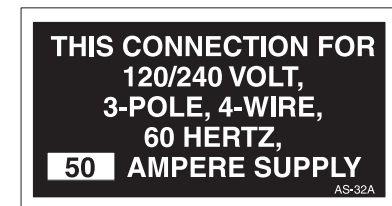


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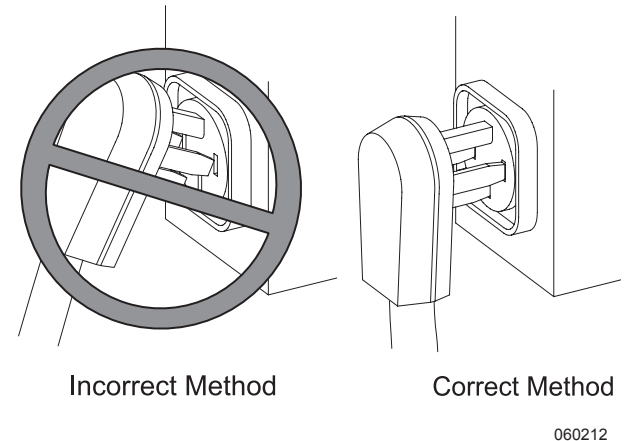
Typical Power Pedestal

Connecting Shore Cord:

- ◆ The shore power cord is located in the rear roadside storage compartment.
- ◆ Unscrew the deck plate and insert the end of the shore cable through the deck plate.
- ◆ If 50 Amp service is not available, install the proper electrical adapter(s) to the opposite end of the cord.
- ◆ Always turn off the shore power breaker to the power supply outlet before connecting or disconnecting the shore cord. This will prevent an accidental shock and flashing of electrical contacts.
- ◆ Make the connection to the outlet and turn the shore power breaker on. The transfer switch should make an audible click.



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Disconnecting the Shore Cord:

- ◆ Turn off all AC appliances. This will prevent accidental shock and flashing of electrical contact when disconnecting.
- ◆ Turn off the shore power breaker.
- ◆ Grasp housing of electrical cord without touching electrical contacts, and work cord out and away from socket.
- ◆ Straighten and clean cord, then stow in compartment.

CAUTION:

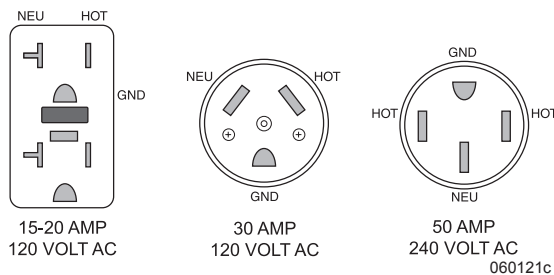
If shore power service is limited to 15 or 20 Amps, use of light duty extension cords and electrical adapters will create voltage loss through the cord and at each electrical connection. Line voltage loss and the resistance at each electrical connection, can be a hazardous combination. Damage to sensitive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

WARNING:

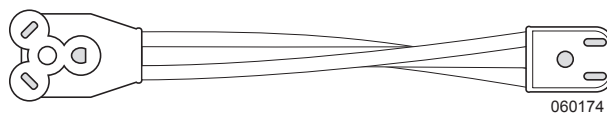
Avoid the risk of electrical shock or component damage by disconnecting from shore power during electrical storm activity. Start the generator if AC power is needed.

NOTE:

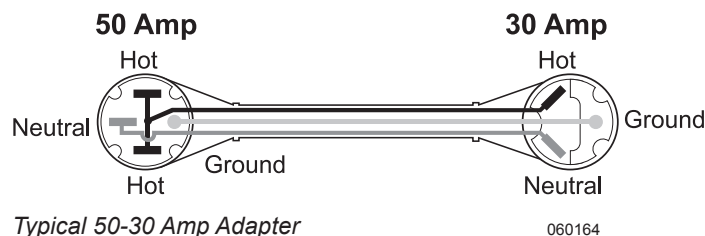
Three types of shore power outlets most commonly used are shown in the illustration.

**Electrical Adapters:**

There are many different electrical adapters to suit a variety of needs. Only UL approved adapters should be used. A common adapter used is the 30-20 Amp adapter. Always install the adapter to the cord prior to making the connection to the outlet.



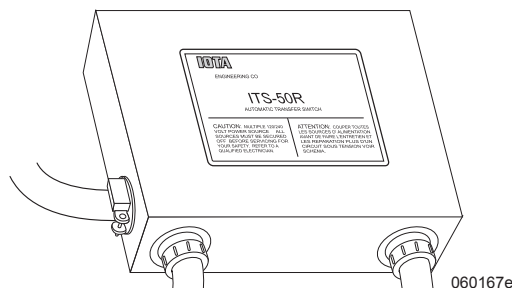
Typical 30-20 Amp Adapter: Adapts 30 Amp Shore Cord to 20 Amp Shore Power Outlet



Typical 50-30 Amp Adapter

TRANSFER SWITCH

The transfer switch automatically transfers AC power from the shore power cord or generator through the transfer switch to the 120/240 Volt AC breaker panel. When using the generator as the power source, the transfer switch has a time delay built in before transferring power to the AC breaker panel. This allows the generator time to warm up before applying an AC load.



When operating the generator while hooked to shore power, the transfer switch automatically selects generator power as priority over shore power.

NOTE:

The shore cord is NOT electrically connected to the generator. When the generator is operating, the electrical contacts of the unplugged shore cord are not electrically energized.

NOTE:

DO NOT have appliances on or AC loads plugged into outlets when hooking up to shore power or starting the generator to prevent damage to the transfer switch contacts. The transfer switch will begin to disengage at approximately 90 Volts AC. Operation at this voltage may damage the transfer switch, appliances or other items plugged into outlets. Start the generator and disconnect from shore service until the shore service supply voltage stabilizes.

GENERATOR - 120 VOLT AC

The generator is located in a service compartment on the roadside of the motorhome. The generator can be started from the following locations:

- ◆ Generator remote switch on the dash.
- ◆ Generator control panel located on the generator.

Pre-Start Checks

Prior to the first start of the day perform a general inspection including oil and coolant levels.

Keep a maintenance log on number of hours in operation since the last service. Perform any service or maintenance that may be due.

Before Starting the Generator:

- ◆ Clear people and animals from hazards of electrical shock and moving parts.
- ◆ All appliances and other large AC electrical loads must be **OFF**.

NOTE:

The generator may require priming. Hold control switch in the OFF position to prime. Repeat if necessary. The generator fuel pick-up tube is cut to approximately ¼ tank so as not to run the main engine out of fuel.

Starting the Generator

Push and hold the control switch in **START** position until the generator starts. Release switch. The control switch may flash up to 15 seconds, indicating engine preheat.

WARNING:

Excessive cranking can overheat and damage the starter motor. **DO NOT** crank the engine for more than 30 seconds at a time, in two minute intervals. If the generator fails to start, refer to the manufacturer's manual.

WARNING:

When the motorhome is parked, position the dash air conditioner vent control in the OFF position to prevent exhaust gases from entering the motorhome during generator operation.

Engine exhaust contains Carbon Monoxide, an odorless and colorless gas that is poisonous and can cause unconsciousness and/or death. **Inspect** the exhaust system thoroughly before starting the generator. **DO NOT** block the exhaust pipe, or situate the motorhome where the exhaust may accumulate around the motorhome or nearby vehicles. Operate the generator only when safe dispersion of exhaust can be assured. Monitor outside conditions to ensure the exhaust continues to safely disperse.

WARNING:

When parking near high grass, be sure that the hot exhaust gases or the exhaust pipe does not contact the grass and ignite, resulting in a fire.

CAUTION:

An exhaust extension adds weight and stresses the generator exhaust system. Damage to the exhaust piping or exhaust manifold can result, allowing Carbon Monoxide gases to accumulate under or leak into the motorhome.

Stopping the Generator

Turn off the 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.

Powering the Equipment

The AC output of the generator powers the motorhome air conditioners, the converter, AC inverter, all appliances and items plugged into electrical outlets. The number of appliances that can be operated at any given time depends upon how much power is available from the generator. If the generator is overloaded, or a short circuit causes over current, the generator will shut down or the circuit breaker will trip.

Compensation for temperature and elevation may also be necessary. The generator's maximum output is rated at 500 ft. above sea level. Beyond this point, the generator will lose approximately 3% of its rated power for every 1000 ft. gained in elevation. High and low temperatures can also affect generator output. Counteract these effects by operating appliances in sequence rather than 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. For a brief moment 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.

INFORMATION:

The generator may shut down for reasons other than an overload. If a blink code appears on the control switch, refer to the manufacturer's manual to obtain an explanation for the code.

Generator Fuel

There is always a possibility fuel may be contaminated. Any contamination of fuel will greatly reduce the total output of the generator, and may cause erratic AC output.

NOTE:

The motorhome manufacturer does not cover damage to the generator caused by fuel contamination, or to appliances due to erratic AC voltage.

Generator Exercise

Average Fuel Consumption	5,500 Watts (gal./hrs.)
No Load	.3
Half Load	.6
Full Load	.9

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 helps 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 helps prevent the carburetor from varnishing and jet clogging. It also promotes removing oxides from the electrical switches and contacts.

NOTE:

Avoid short run periods of the generator. Run the generator set under a load for a minimum of one-half hour.

Resetting the Circuit Breaker

If a circuit breaker trips in the main 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 breaker to **OFF**, then switch back to **ON** to reconnect the circuit. If the circuit breaker immediately trips, the electrical distribution system has a short 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 re-connecting loads.

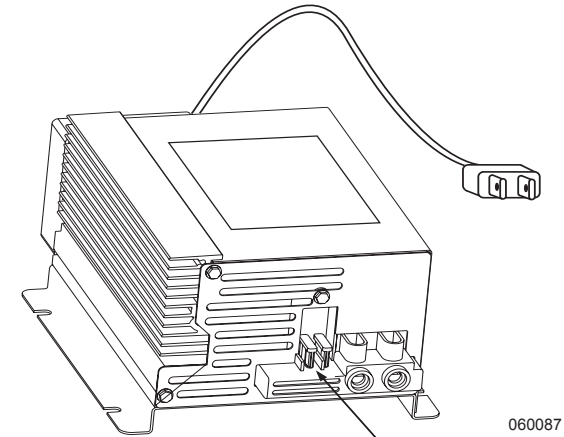
NOTE:

An appliance or load may have a short if it causes a circuit breaker to trip after re-connecting. DO NOT continue to reset breaker. Have the problem corrected before resuming operation.

CONVERTER

The power converter automatically charges and maintains the house batteries when either the generator or shore power is engaged. The converter converts AC power to 12 Volt DC power for charging batteries. Tests can be performed to ensure the power converter is functioning properly.

- ◆ Units with converters have two house batteries.
- ◆ Output on terminals should read 13.6 Volts DC +/- .3 Volts.
- ◆ **Inspect** fuses to ensure they are not blown.
- ◆ Power requirement for the converter is 120 Volts AC.
- ◆ Good air flow required. **DO NOT** store anything on converter.



Typical View of Converter.

If converter output is correct, but the battery is not charging, there may be a problem with an open wire between the converter and battery.

If the fuses are blown, the battery was connected in reverse. It only takes one second of reverse connection to blow the fuse.

If the power requirement for the converter is met, the fuses are good, and there is no output from the converter, the converter is bad and will need to be replaced.

NOTE:

DO NOT store objects close to the converter. This may disrupt the air flow to and from the converter, possibly causing damage due to overheating.

INVERTER - 600 WATT (Optional)

The inverter can be used when shore power is not available or when not able to operate from the generator. The inverter uses 12 Volts DC power from the house batteries to make 120 Volts AC power to operate selected appliances or outlets. Use of the inverter quickly consumes house battery power so it should be used sparingly.

The inverter is located in a curbside compartment and supplies 120 Volts AC power to the front television and bedroom television.

When shore power or generator power is present, the inverter senses this incoming voltage and automatically transfers to stand-by mode (if inverting) and passes AC power supplied by shore power or generator power through the inverter to operate the appliances.

Operation:

- ◆ Push the **On/Off** button (on the inverter) to turn the inverter on/off. The green LED will flash once per second when inverting and glow steady when hooked to shore power or when operating the generator.
- ◆ Battery voltage must be greater than 10 Volts DC for the inverter to operate.
- ◆ Ensure the inverter is off when not in use. This will help conserve house battery power.

NOTE:

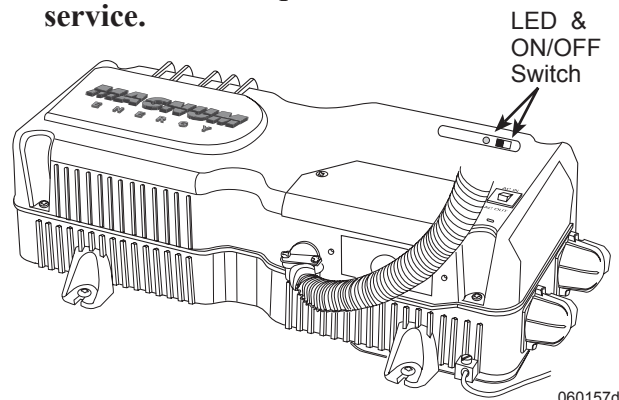
The on/off switch will not turn the LED off when hooked to shore power or operating from the generator. Should any of the following conditions occur; low battery, high battery, AC over-load, over-temperature or internal faults, the inverter will shutdown and LED will blink.

NOTE:

For complete operating instructions consult the manufacturer's operations manual or visit manufacturer's website at www.magnumenergy.com.

WARNING:

Do not operate inverter if it is damaged and do not dismantle the inverter. Take the inverter to a qualified technician for service.



Typical View of Converter.

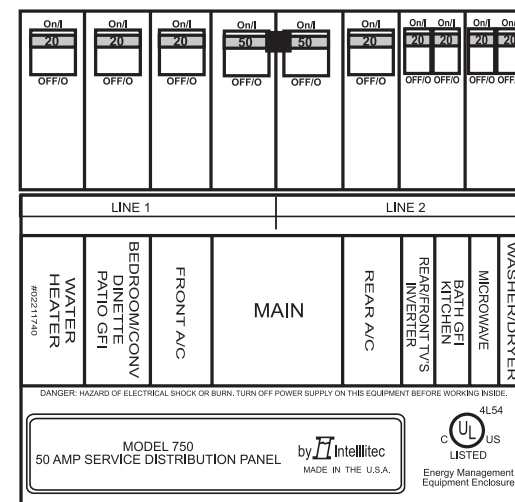
DISTRIBUTION PANEL - 30 AMP

The AC distribution panel is located in the bedroom. The main AC panel 120 Volt circuit breakers receive power from the transfer switch, which is powered by either shore power or the on-board generator. Power is introduced into the panel to the 50 Amp MAIN breaker first, followed by power being fed into the individual branch circuit breakers.

WARNING:

This panel contains high voltage which 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

the motorhome is unplugged from shore power and the generator is not running. Certain testing procedures can require AC power to be on. Only qualified personnel with electrical background should attempt any testing procedures.



060101g

The panel label describes the breaker layout and the item, outlet or appliance to which they pertain.

NOTE:

This panel will change with options.

Circuit Breaker

Branch circuit breakers supply AC power to the different items or loads. Should a breaker trip from over current use or a short circuit condition, the load should be tested or disconnected to determine the reason the breaker tripped. If no cause is found (or not readily apparent), reset the breaker by switching the breaker to the OFF position, then back to ON. Should the breaker

trip again after the load is re-applied, there may be a fault with that particular load. **DO NOT** continue to reset breaker until the problem has been diagnosed and corrected.

The internal configuration of the circuit breaker is designed to trip when excess current causes the breaker to heat up. The trip action of the circuit breaker can occur within milliseconds due to the speed at which electricity can travel. Breakers are designed to operate at a continuous load of 80% of the breaker's rated capacity. For example: A breaker with a 20 Amp rating will operate a continuous 16 Amp load. This design leaves a small amount of working capacity within the breaker. When an inductive load is applied, such as when an electric motor turns on, the motor starts to spin and current consumption may momentarily exceed the rated capacity of the breaker. As the electric motor comes up to operating speed, the electric motor's current consumption will decrease. The AC current load then falls back into the breaker's rated 80% set point. This electric principle should be kept in mind when using anything other than 30 Amp shore service and using appliances with electric motors, such as air conditioners. When using outlets, care should be considered when applying loads such as electric motors, heaters, coffee makers, toasters, hair dryers or other large current consuming loads. The current rating is usually stated on most electrical items. The current rating will either be rated in amps or watts. Current ratings stated on electrical items will change slightly with voltage fluctuations.

As voltage increases, current consumption decreases. As voltage decreases, current consumption increases. This may explain why in some instances items operated at borderline

voltage to current tolerances may seem fine in one location but problematic in another.

NOTE:

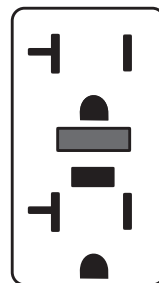
To calculate watts to amps simply divide the watt figure by the voltage of which the item operates from. For example: The electrical item is rated at 1370 watts. Divide that by the operating voltage of 115 Volts which equals 11.913 Amps. Use this formula to calculate the amount of load to the available power supply.

GFCI OUTLETS

A ground fault circuit interrupter (GFCI) is incorporated in an outlet. The GFCI 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 power terminal through a person to the ground. For example: touching a faulty appliance while standing on, or making contact with, an electrical ground such as a water fixture, bath tub or the earth. The GFCI will offer 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 uses sensitive electronics inside the outlet to detect a ground fault problem. The electronics monitor the normal current of power, flowing to the hot



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GFCI Outlet

or black wire through the load (eg. a light bulb or appliance) and coming back on the neutral, or white wire. If just a small amount of the current comes back on the safety ground wire, the electronics will trip the 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 manufacturers (approximately 4 to 6 milliamps or less).

Electrical shocks resulting from ground faults can be felt, but such a shock is considerably less than one without ground fault protection. People with heart conditions, or other conditions that make them susceptible to shocks, can still be seriously injured. A GFCI outlet will not protect against shock from a normal current flow, such as a shock from touching both metal prongs of an electrical cord or appliance while plugging it in.

WARNING:

If an outlet continually trips, DO NOT continue to reset the outlet until the problem has been identified and corrected.

NOTE:

The ground fault outlet should be tested once a month to ensure it is operating. Use the TEST button on the outlet. It should trip with an audible “click.” The 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.

NOTE:

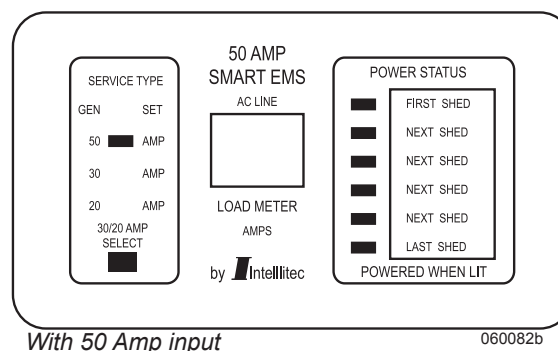
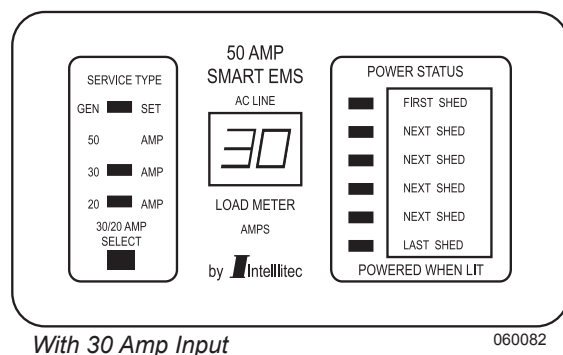
One milliamp is 1/1000 of one amp.

ENERGY MANAGEMENT SYSTEM (Optional)

The Energy Management System is easily identified by the remote display panel located inside motorhome. The 50 Amp Smart EMS consists of two elements: the display panel and the bedroom distribution panel. The distribution panel, located in the bedroom, is a completely self-contained, 120/240 Volt AC power distribution and energy management system intended to be used in recreational vehicles. It is housed in a sheet metal enclosure with removable front panel. It provides circuit protection for all the 120 Volt AC loads in the motorhome and a system of energy management to minimize the over-loading and tripping of circuit breakers.

Circuit Breakers:

The distribution panel offers slots for eight single or dual, standard 120 Volt circuit breakers. Two of these breakers, located in the two center positions, must be a 50 Amp unit that act as main input protection for each of the lines supplying the remainder of the branch breakers (up to 12).



Energy Management:

The 50 Amp Smart EMS automatically senses the available power to the motorhome, determining whether it is connected to a 120 Volt AC-30 Amp shore power source, 50 Amp shore power source or generator source. Depending upon available power, the EMS controls the operation of six possible loads as indicated on the distribution panel. These are typically heavier loads that can be postponed until the correct current is available. If the available power source is 120 Volt AC - 30 Amp shore power, the EMS attempts to keep the total 120 Volt current draw to less than 30 Amps.

Operation:

If 120 Volt AC is not available at the distribution panel, L1 or L2 outputs, the system shuts itself off. This feature is intended to prevent the system from drawing current from the +12 Volt DC battery supply when not in operation.

When 120 Volt AC power is applied, the system automatically powers up and determines the nature of the power source. On 50 Amp Shore power, the load meter will not indicate Amp load.

If the generator is running, 120 Volt AC will be present at the distribution panel L1 (Line 1) and L2 (Line 2) inputs. In this mode the energy management feature is disabled and all control relay contacts are closed, energizing all of the controlled loads. The control module sends a signal to the display panel causing the load meter to display actual load current, the GEN SET service indicator to light and all power status indicators to light.

If 120 Volt AC is present at the distribution panel L1 and L2 inputs, the system will assume that 120 Volt AC, 30 Amp shore power is available and the energy management feature will be enabled. The load meter will indicate the Amp's Load. If only 20 Amp service is available the user must select the 20 AMP service mode by momentarily pressing the 20/30 Amp select switch on the Control Panel.

Initially, all relay contacts are closed and the total current is monitored. If the total current should exceed the service limit, the system will turn off the first load in the shedding table and calculate the amount of current that was removed. This value is placed in memory. If the current remains above the service limit, the system will turn off the next load in the shedding table, again calculating the amount of current that was removed and placing this value in memory. The system continues to turn off loads until the total current falls below shore power amperage or all of the six controlled loads have been shed. Through this process the system has "learned" the amount of current that each particular load draws.

This feature compensates for the differences in current draw over a range of line voltage and ambient temperature, by re-learning the load each time it is turned off or “shed.”

The 50 Amp Smart EMS now waits until the total current is lower than the service limit and enough current is available (as compared with the amount in memory for the last load shed) before turning that load back on. This assures that there is sufficient current to operate the load.

NOTE:

There is a two minute minimum delay period after a load is shed before the load will be turned on again to prevent air conditioners from turning on with a head pressure.

Three Hour Averaging:

The RVIA (Recreational Vehicle Industry Association) in conjunction with the NEC (National Electrical Council) have established rules regarding the rating of electrical systems and the use of energy management systems. One of these rules requires that, if any energy management system is used, the average total load current for the system over a 3 hour period be limited to 80% of the service rating. For that reason the 50 Amp EMS calculates the average running current for the system and, if it exceeds 80% of the service rating, the EMS sheds loads to reduce the average current below that limit.

For example, if a system operating under 120 Volt AC, 30 Amp service has been running at the 30 Amp limit for three hours, the EMS will change its shedding threshold to 24 Amps and turn off loads until the 24 Amp limit is attained.

If the user selects the 20 Amp service mode this limit will translate to 16 Amps. Because the EMS calculates a running 3 hour average, if the average load current drops below the limit the system will restore power to loads based on their impact on the limit. If the system is in the averaging mode the decimal point at the lower right corner of the load meter on the display panel will illuminate.

Display Panel:

The display panel connects to the distribution panel located in the bedroom. Six power status LED's indicate power is applied to those loads. These LED's are on when the power is applied. The load meter has a two digit display to indicate the amount of current actually being drawn by all the appliances in the motorhome.

Four service type LED's indicate the source for 120/240 Volt AC power. Three of these sources are automatically detected and indicated by the EMS, namely: Gen Set Service, 50 Amp Service and 30 Amp Service.

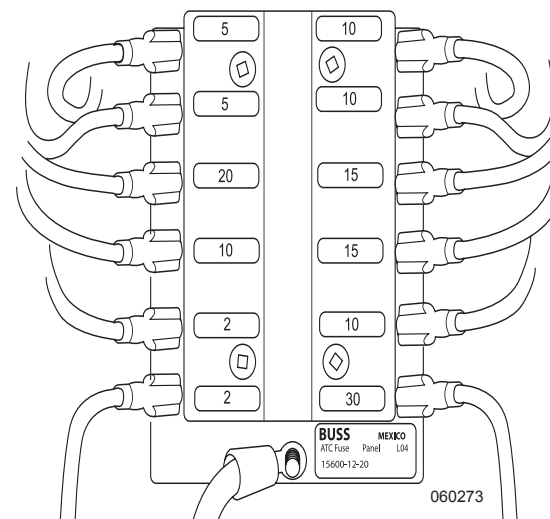
NOTE:

The 20 Amp service mode is not automatically detected and the operator must manually select the 20 Amp mode when 20 Amp service is available.

The service select button allows the current threshold to be set to either 30 Amps or 20 Amps, to match the incoming service.

DISTRIBUTION PANEL - HOUSE 12 VOLT DC

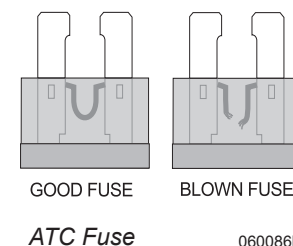
The 12 Volt DC house distribution panel contains fuses (located in the bedroom) that protect the electrical circuits. These fuses are a standard automotive type.



Fuse Panel: Located in bedroom closet.

FUSES

The 12 Volt DC fuses, located in this distribution panel, service the interior house lighting, ventilation fans, monitor panel, furnace and water heater. Should a fuse blow it is evident by the broken metal strip located in its center.



Replacement fuses should be of the same amperage. If a higher rated fuse is installed damage can occur to the wiring. 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.

AMPERAGE	COLOR
1	BLACK
2	GRAY
3	VIOLET
4	PINK
5	GOLD
7.5	BROWN
10	RED
15	BLUE
20	YELLOW
25	CLEAR
30	GREEN

The large variety of applications this voltage can be used in makes it a staple for most of the recreational vehicle and automotive industries. 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 cut. 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, like 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.

HOUSE BATTERIES

House batteries are designed for use with 12 Volt DC operated lights and appliances. The alternator and converter maintain and charge the house batteries.

- ♦ **Converter:** converts 120 Volt AC power from shore power or the generator into 12 Volt DC for battery charging.
- ♦ **Alternator:** when the engine is running, the alternator maintains the chassis battery voltage. When chassis battery voltage reaches approximately 13.5 Volts, a solenoid is engaged (located in the front distribution box) which allows the alternator to maintain house battery voltage.

NOTE:

The alternator is not a battery charger. It is designed to maintain proper electrical system voltage. Low battery State of Charge (SOC) or a dead battery may overheat and damage the alternator.

Type of House Batteries:

- ♦ Liquid Lead Acid (LLA)

NOTE:

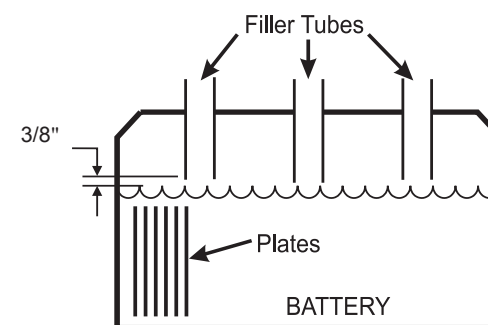
Tap water contains minerals which can alter battery chemistry and ruin the battery. Use only distilled water when refilling the LLA battery.

Battery Maintenance

Liquid Lead Acid (LLA) battery cells should be checked at least once a month. The level should be above the top of the plates, but not overfull. 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 will allow the electrolyte solution to boil or gas out of the battery cap.

Remember to 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.

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, which can drain the battery.



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.

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Check the battery connections for tightness and corrosion. If corrosion is found, disconnect the cables (mark cable locations) and carefully clean them with a mild solution of baking soda and water, or an aerosol product specifically designed for battery maintenance. **DO NOT** allow cleaning solution to seep into the battery and damage the electrolyte balance. Use water to rinse the top of the battery and surrounding

area when done. Carefully hook the cables back to the battery. The battery cable to battery terminal connections should be metal to metal. Coat the terminals with petroleum jelly or an anti-corrosion grease.

WARNING:

Liquid lead acid batteries produce hydrogen gas while being charged. This is highly explosive. DO NOT smoke around batteries and keep all source of ignition or flames away from batteries. The hydrogen gas may explode resulting in fire, personal injury, property damage or death.

CAUTION:

Many types of petroleum based products or battery by-products can damage the paint finish. DO NOT allow these types of 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 automotive detergent.

Testing the Battery

A battery can be tested and monitored several ways. The Monitor Panel on the Systems Control Center in the hallway shows the voltage of the house batteries. The most efficient way of testing the LLA batteries is to check the electrolyte solution using a hydrometer.

Checking the Electrolyte Solution:

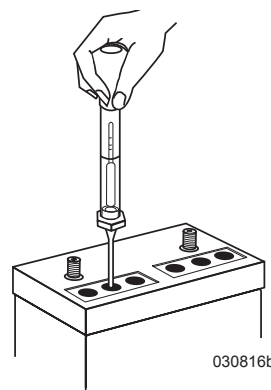
Hydrometers are available in different types, such as cylinder graduation (shown here) or floating ball types.

Hydrometers can be purchased from most auto parts stores. The hydrometer tests the battery electrolyte solution, measured in specific gravity. Distilled water has a specific assigned 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). Hydrometers with cylinder graduation are graphed and the exact state of specific gravity can be determined.

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.



Hydrometer (cylinder type) shown testing LLA type battery.

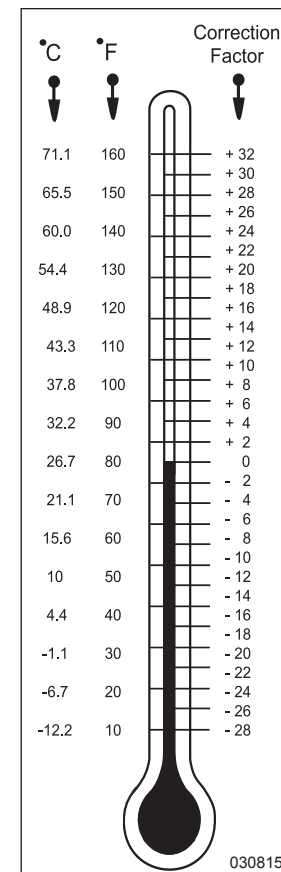
Add or subtract four points for each 10° variance from the temperature correction chart. Readings between cells should not vary more than 50 points.

If one cell in a particular battery bank being tested is at a 50% state of charge while the others are indicating a full charge, charge only that battery to see if the low cell will come up. At the same time, do not over charge the “healthy” cells.

If the low cell does not come up 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.

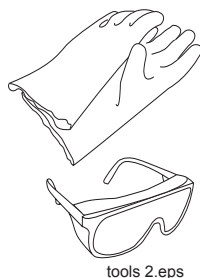


Temperature Correction Chart

WARNING:

Always wear splash-proof safety goggles when working around the battery. Sulfuric acid in the batteries can eat holes in clothing, cause permanent damage to eyes, burn skin and cause severe injury or death.

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.

**Placing a load on the battery:**

Another test 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 battery(s) while monitoring voltage to see if they will perform to their specific rated capacities.

Battery Charge Time & Consumption Rate**Calculating Run Times:**

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 short durations, 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.

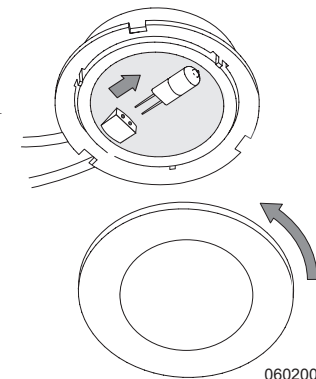
The working range of a deep cycle battery is between 50 and 100% state of charge (SOC). Deep cycle batteries should not be cycled below 50% state of charge. Discharging a deep cycle battery below 50% state of charge shortens the life of the battery. Deep cycle batteries use an amp hour rating which is 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 which occur when a battery is discharging. Actual discharge time for a 10 Amp load may be closer to eight hours of discharge time. Increasing the load 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.

LIGHTS - INTERIOR HALOGEN

The bulbs inside the halogen lighting are replaceable.

To Replace a Bulb:

1. Remove outer trim ring by rotating outer trim ring counterclockwise.
2. Remove safety lens by pressing lens towards a retaining tab. Pull the lens down and away.
3. Carefully grasp the bulb and pull from the socket.
4. 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 may result in immediate bulb failure.
5. Align contacts of bulb with terminals in fixture base. Insert bulb until contacts are firmly seated.
6. Replace safety lens.
7. Align tabs in trim ring with slots in fixture base. Rotate lens clockwise until trim ring locks 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. Clean bulb with alcohol if the bulb is touched.

Map Lights

The overhead map lights are powered by 12 Volts DC and require the Battery Cut-off Switch at the entry door to be turned on for power.

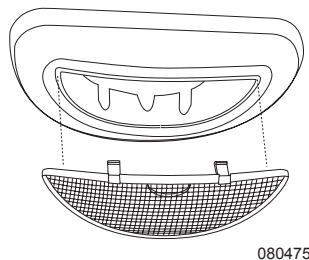
Overhead Lights:

Turn the headlight switch fully counterclockwise to turn the overhead map lights on. Swivel the lens to direct lighting.



To Replace a Bulb:

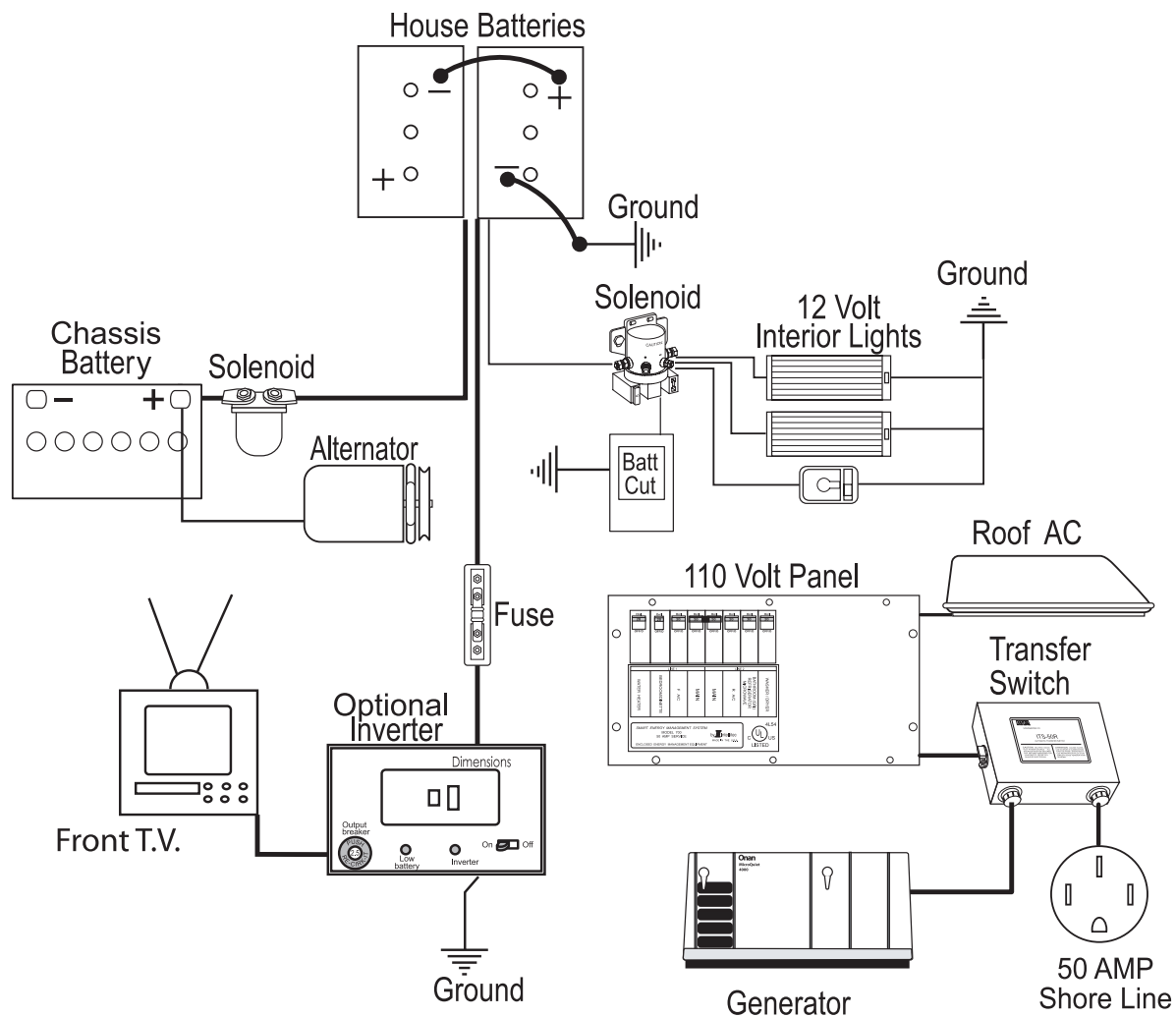
1. Insert a small screwdriver into the slots on the map light lens to release locking tabs.
2. Replace with a 12 Volt, type 906 bulb.
3. Install cover.



BULB USAGE - INTERIOR

LOCATION	BULB NUMBER
WALL LAMPS	12 V 912 OR 921
CEILING LIGHTS	GE F IST8-CW
COSMETIC/VANITY LAMP	93 OR 1003
PORCH LIGHT	1141
ROUND 3" HALOGEN CEILING LIGHT	12 V 10W 4J
MAP LIGHT (OVERHEAD)	12 V TYPE 906
DASH LAMP	GE 161
BEDROOM CABINET LIGHTS	Sylvania 912 or 921
DINETTE	921

ELECTRICAL LAYOUT (TYPICAL)



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CHASSIS ELECTRICAL - INTRODUCTION

A majority of the chassis electrical functions are designed to operate from 12 Volt DC (direct current) power. This is why the chassis battery plays such an important role in the function of the motorhome. Therefore, it is important to keep the 12 Volt DC system(s) in good working order. These systems, with their incorporated electronics, are voltage sensitive. If DC voltage is not within specification, some electronic items may be damaged.

The two different systems, chassis and house, have their own batteries. The chassis battery supplies 12 Volt DC power to the front distribution panel located in an outside compartment by the roadside front wheel. This panel contains mostly engine system fuses and wiring such as headlights, taillight, dashboard functions, gauges, etc. The house batteries supply 12 Volt DC power to the distribution panel located in the bedroom. This panel contains fuses for the house, interior lighting and appliances.

WARNING:

When welding is involved for motorhome repair or modification, only qualified, experienced technicians should weld on the chassis. Improper welding procedures and materials may weaken the assembly or result in damage that is not obvious and may not cause an immediate problem or failure. Unauthorized modifications or repairs to the chassis could result in a forfeiture of warranty coverage.

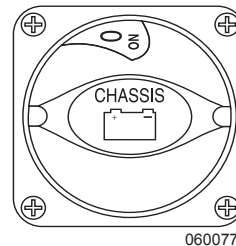
WARNING:

Due to the sensitive nature of the electronics on the chassis, the following precautions are required to protect electrical components in the motorhome chassis:

- 1. Disconnect the (+) positive and (-) negative battery connection.**
- 2. Cover electronic control components and wiring to protect from hot sparks.**
- 3. Disconnect the terminal plugs from the engine Electronic Control Unit, located on the front firewall over the engine.**
- 4. Disconnect all the plugs from the transmission Electronic Control Unit, located in the roadside front electrical bay.**
- 5. Disconnect the wiring from the alternator.**
- 6. DO NOT connect welding cables to electronic control components.**
- 7. Attach the welding ground cable no more than two feet from the part to be welded.**

BATTERY DISCONNECT - CHASSIS

The main battery disconnect switch, located in the forward curbside storage compartment, controls the DC power to the front electrical bay.



*Battery Disconnect:
Located in the Front
Curbside Compartment*

Most chassis and engine functions are interrupted when the battery disconnect is turned off. Some electronic components of the engine and transmission require a constant power source, and will continue to draw power when the disconnect is **OFF**.

Turn the main battery disconnect switch off when the motorhome is going to be stored for more than 48 hours, or when performing electrical maintenance.

BATTERY - CHASSIS

The chassis battery is designed for high output cranking power. The chassis battery is equipped with thin plates (as opposed to the thick plates of deep cycle batteries) to allow a high output of current for a short period of time. This is measured in Cold Cranking Amps (CCA) which represents the amperage output that can be sustained for 30 seconds at 0° F without falling below a manufacturer-specific voltage. The thin plates of the chassis battery will warp if the battery is discharged and reduce battery capacity. Turn off the chassis battery disconnect switch if storing the motorhome for more than 48 hours to help prevent battery discharge.

The chassis battery is located in the engine compartment. Keep the tray and mounting hardware tight and corrosion free.

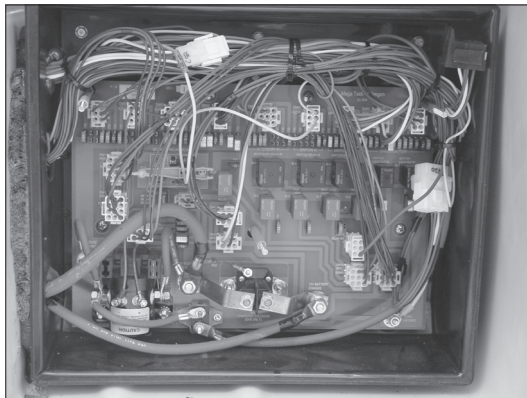
NOTE:

Replacement batteries should have the same cold cranking amp (CCA) rating.

FUSES & CIRCUITS

Front Distribution Panel

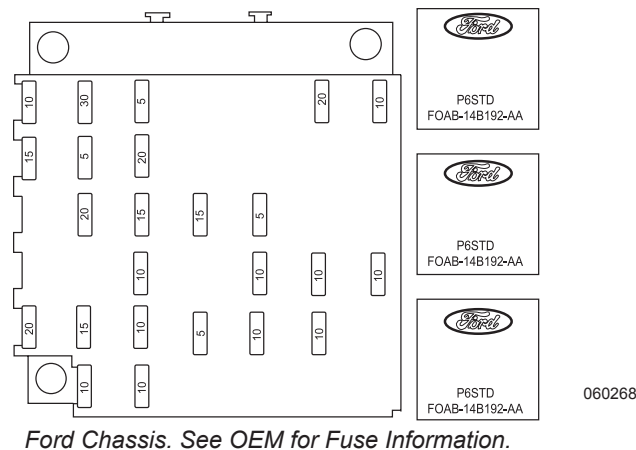
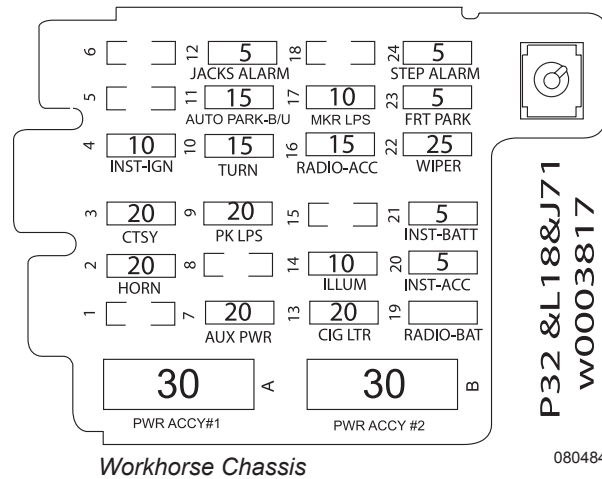
The front distribution panel is located in the front roadside compartment and contains the fuses, self resetting supply circuit breakers, solenoids and relays. Automotive fuses and emergency flashers are located in this panel. Fuses are the standard plug-in type (ATO). When a fuse blows, the wire in middle of the plastic case will be broken. A bad or blown fuse must be replaced with a fuse of the same rating and type. Using a fuse of a different type or rating will defeat the circuit protection provided by the fuse, which could result in damage to the motorhome's electrical system. If a fuse has been replaced and it blows repeatedly, that may be an indication that a fault exists or an electronic component has failed. It is recommended that the motorhome be taken to a qualified RV technician before any future use to diagnose and repair the problem. Circuits are identified on the fuse label located on the inside of the electrical cover. Remove three wing nuts and turn the cover over to view.



Workhorse and Ford Chassis

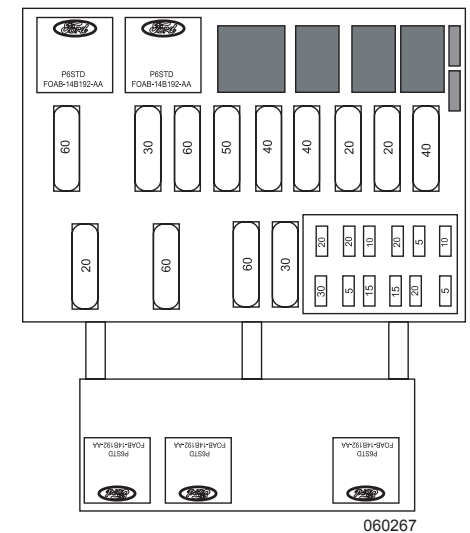
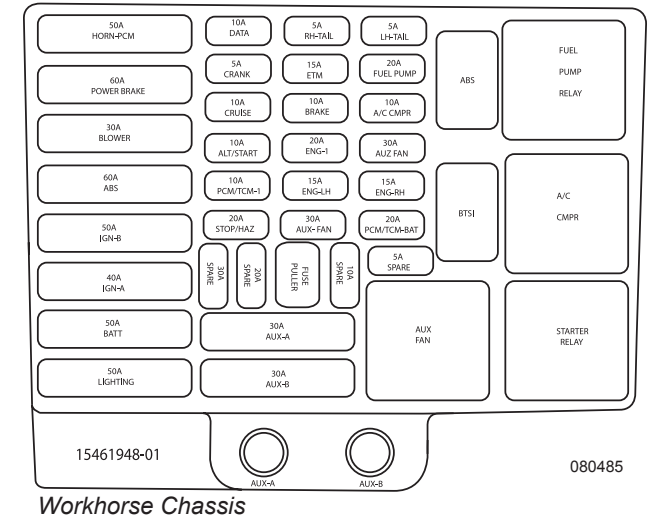
Central Distribution Box

The Central Distribution Box is located underneath the driver's side dash.



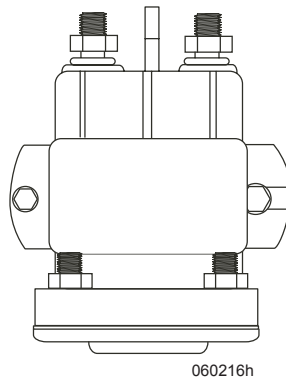
Battery Junction Box

The Battery Junction Box is located in the front engine compartment.



Battery Boost Solenoid

The battery boost solenoid is located in the front distribution box. A dash-mounted momentary switch is added to provide a boost for the chassis battery from the house batteries in case the chassis batteries are weak and will not crank the engine.

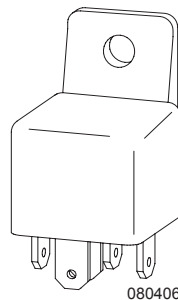


When traveling, the solenoid is engaged, charging both the house and chassis batteries at the same rate of voltage.

Relays

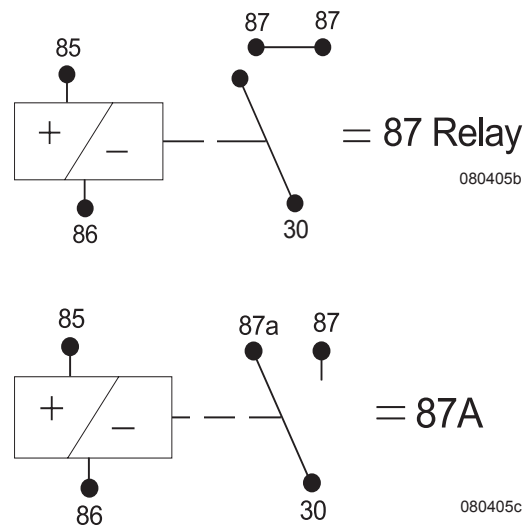
The motorhome uses various relays to operate electrical equipment such as lights and motors. If a relay needs to be replaced, carefully record the location of each wire and all markings or labels.

Relays can look the same in appearance, but differ in function. Note that on the side of the relay is a schematic drawing identifying the relay as 87 or 87a. These current ratings differ, and if mixed, will create problems. Ensure the replacement relay is of the current rating to assure proper operation.



Another indicator to the type of relay is the post or legs. Turn the relay over and look at the post.

- The 30 post is the incoming fuse and/or breaker power. Some relay applications supply power to the 30 post. Some use it for ground. The 30 post can be used many different ways.
- The 85 post is one side of the coil, tripped different ways.
- The 86 post is the opposite side of the coil, tripped different ways.
- The 87 posts are not common to the 30 post until the relay is tripped. When the relay trips, both 87 posts are common to the 30 post.
- Using an 87a relay, the 30 post and the 87a post are common. When the coil is tripped, the 87a post becomes inactive and the 30 post becomes common to the 87 post located on the outside of the relay.

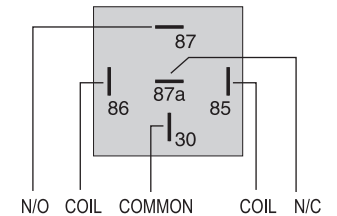


A **Single Pole Single Throw relay (SPST)** is an electro-magnetic switch consisting of a coil (terminals 85 & 86), one common terminal (30), one normally closed terminal (87a), and one normally open terminal (87).

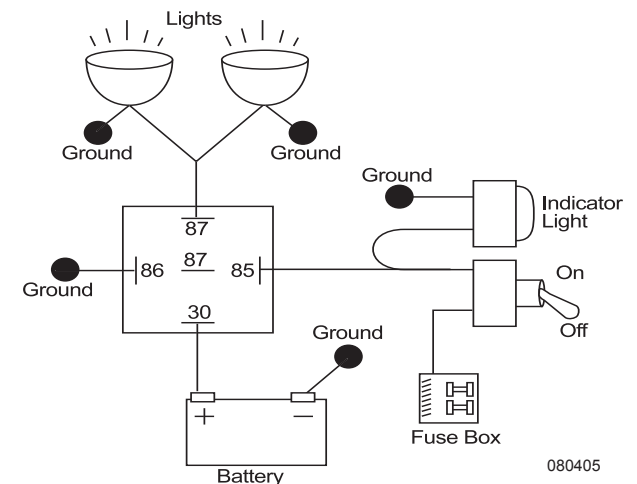
When the coil of the relay is at rest (not energized) the common terminal (30) and the normally closed terminal (87a) have continuity. When the coil is energized, the common terminal (30) and the normally open terminal (87) have continuity.

NOTE:

When there is power applied to the coil, the coil sets up a magnetic field in the windings. When the power is removed, the field collapses. A momentary high voltage discharge will occur. This is how an ignition coil works.



Single Pole Single Throw Relay.



DASH Park Brake

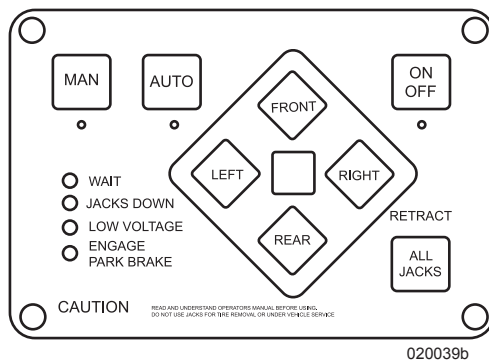
The parking brake is a foot pedal brake which operates in the same manner as an automobile parking brake. Bring the motorhome to a complete stop and place the transmission in Park. Engage the pedal brake. The brake release handle, located below the lower left area of the dash, will disengage brake.

Leveling Controls

The four-point hydraulic leveling system is operated from the control panel to level the motorhome. The control features a warning system with a flashing light and an audible alarm to alert of a jack down. See section 5 for further leveling instructions.

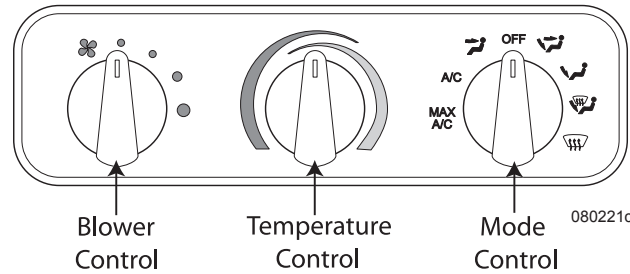
NOTE:

Hydraulic leveling works only with the ignition in ACC or ON position.



Air Conditioner & Heater Controls

The system is designed to provide heating, cooling and defrost for the pilot and co-pilot area. The system is not capable of heating or cooling the entire motorhome.



Blower Control Switch:

This switch controls the four speeds of the blower motor. Use of the blower is one of the most effective methods of controlling temperature. The blower will not activate if the **Mode Control** switch is set to **OFF**.

Temperature Control Switch:

Setting the switch to the red zone controls an electric water valve regulating the amount of engine coolant passing through the heating coils in the system. Rotating to the blue zone sets the cut-in/cut-out temperature of the air conditioning compressor on the engine.

Mode Control Switch:

This switch directs air flow by opening or closing damper doors. Use the **Mode Control** switch to direct airflow where it is needed to maximize comfort in the cockpit area.

**MAX
A/C**

MAX A/C - Recirculated air is drawn from the passenger area and discharged through the dash louvers.

A/C

A/C - Fresh Air is drawn from outside into the system and discharged through the dash louvers.



VENT - Fresh air is drawn in and discharged throughout the dash.

OFF

OFF - The blower motor does not operate. The fresh air inlet door will close, minimizing outside air infiltration into the motorhome.



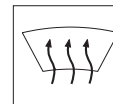
BI-LEVEL - Fresh air is drawn in and discharged through the dash and the floor.



FLOOR - Fresh air is drawn in and discharged through the floor louvers.



MIX - Fresh air is drawn in and discharged through the floor and defrost louvers. The **A/C** system operates to dehumidify the discharged air.



DEFROST - Fresh air is drawn in and discharged through the defrost louvers. The **A/C** system operates to dehumidify the discharged air.

NOTE:

The air compressor is activated when operating **MAX A/C**, **A/C**, **MIX** or **DEFROST**.

Heat and Defrost Operation:

The air conditioning compressor operates in all modes except **VENT**, **FLOOR** and **OFF** to dehumidify the air. Rotate the Temperature Control switch to set discharge air temperature.

- ◆ Set the **Mode Control** switch to the desired position.
- ◆ Set the **Temperature Control** switch to the red zone.

A/C Operation:

- ◆ Setting the **Mode Control** switch to **A/C** will allow outside air into the system.
- ◆ Setting the **Mode Control** switch to **MAX A/C** will recirculate inside air. When maximum cold air is desired, select this position.
- ◆ Set the Temperature Control switch to the blue zone.

NOTE:

The temperature control switch must be set to the blue zone for cool air.

NOTE:

Activate the A/C system monthly to keep internal components of the compressor lubricated.

Winter Use:

- ◆ De-ice the windshield using the **DEFROST** mode.
- ◆ The system will heat up faster with a slower blower speed until normal engine operating temperature is obtained.

Summer Use:

- ◆ Close all windows and vents preventing hot and humid outside air from entering the motorhome.
- ◆ **MAX A/C** and **HI** blower will provide quick cool down.
- ◆ Use a lower blower speed to produce cooler air.

Operating Tips and Hints:

- ◆ Air intake and discharge temperatures are greatly effected by ambient temperature and relative humidity.
- ◆ A large amount of cooling capacity is used to dehumidify air as well as cool it. After three to five minutes of A/C compressor operation, the discharged air temperature should be approximately 30° F. cooler than the fresh or recirculated air entering the A/C system.
- ◆ The air system on the motorhome must have adequate pressure to operate the vacuum generator or damper doors will not function.
- ◆ At the beginning of the day, activate the compressor with the engine at idle. This will avoid sudden high speed activation resulting in damage from lack of internal compressor lubrication.
- ◆ Use the dash A/C and heater system monthly to keep compressor lubricated.

Heater:

The heater warms the air in the dash area. Engine coolant is passed from the radiator to an electronic water valve. The water valve, when open, will allow the coolant to flow through the heater core. Air is drawn into the system by a blower motor through the outside recirculation door opening. Air is blown through the A/C evaporator core and then through the heater core. Coolant flows through the heater core when the temperature control is in the **WARM** position. Coolant flow bypasses the heater core when the temperature is in the **COOL** position. In either position air flow is felt at the discharge vents.

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CHASSIS - INTRODUCTION

This section contains information regarding the motorhome chassis. Optional equipment may be discussed, so not all information will be applicable to the motorhome. Complete instructions and further information can be found in the original equipment manufacturer's (OEM) operators manual included in the Owner's Information File Box.

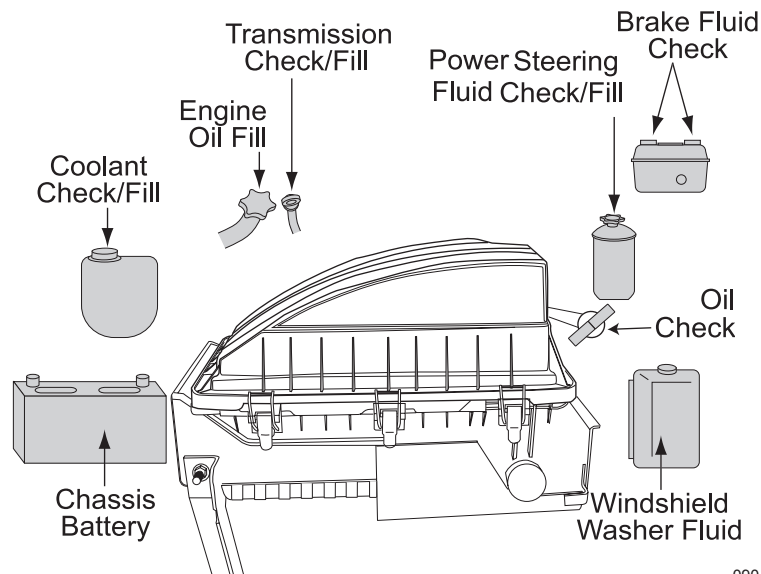
CHASSIS - UNDER HOOD

Ford Chassis

Engine Oil - Check oil level when engine is off and cool. Oil should be within crosshatched area on dipstick. **DO NOT** fill above **MAX** mark. **SAE 5W-20** with API certification recommended for all temperatures. **Refer to OEM manual for details**

Automatic Transmission Fluid - Check when engine is running at normal operating temperature. Fluid should be within crosshatched area of dipstick. Use **MOTORCRAFT MERCON®** Automatic Transmission Fluid.

Power Steering Fluid - Check when engine is off and cold. Fluid level on dipstick should be between arrows in **FULL/COLD** range. Use **MOTORCRAFT MERCON®** Automatic Transmission Fluid.



Engine Coolant Reservoir - Level with **COLD FILL RANGE** when cold; use 50% Ford Premium/Engine Coolant or equivalent and 50% water.

WARNING:

Remove coolant cap only when safe and engine is cool. Use only recommended engine coolant, see Owners Guide for more information.

NOTE:

If the coolant system runs dry, the Fail Safe Cooling System will shut down half of the cylinders (alternating) and the Service Engine Soon warning light (See Instrument Panel) illuminates. If the temperature rises too high, engine automatically shuts off to help prevent further damage; service cooling system as soon as possible. Cooling fan clutch will increase engine noise when engaged. This is normal. Refer to OEM manual for details.

NOTE:

DO NOT mix different types of antifreeze.

Brake Fluid Reservoir - Clean filler cap before removing. Check the chassis manufacturer owner's manual for correct fluid type or check the brake fluid reservoir for information stamped in the cap. Use only new fluid from a sealed container.

Windshield Washer Reservoir - Fill with windshield washer fluid, not water.

NOTE:

Use only the recommended fluids as specified by the OEM (Original Equipment Manufacturer) manual.

Workhorse Chassis

Engine Oil - Check oil level when engine is off and cool. Oil should be within crosshatched area on dipstick. **DO NOT** fill above **MAX** mark. **SAE 5W-30** with API certification recommended for all temperatures. **Refer to OEM manual for details.**

Automatic Transmission Fluid - Check with engine running at normal operating temperature. Fluid should be within crosshatched area of dipstick. Use **DEXRON-III®** Automatic Transmission Fluid.

Engine Oil Fill Cap - SAE 5W-30 with API certification recommended for all temperatures.

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Engine Coolant Reservoir

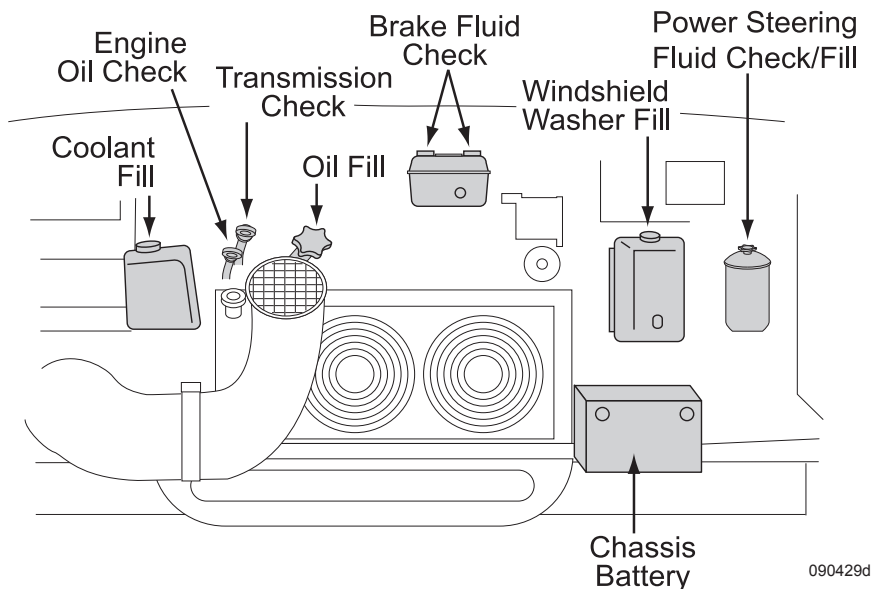
- Level with **COLD FILL RANGE** when cold; use GM Maxlife Premium/Engine Coolant or equivalent and 50% water.

NOTE:

DO NOT mix different types of antifreeze.

WARNING:

Remove coolant cap only when safe and engine is cool. Use only recommended engine coolant. See Workhorse Owners Manual for more information.



090429d

Windshield Washer

Reservoir - Fill with windshield washer fluid, not water.

Brake Fluid Reservoir -

Clean filler cap before removing; use only **DOT 3** fluid from a sealed container.

Power Steering Fluid - Check with engine **OFF** and cold; fluid level on dipstick should be between arrows in **FULL/COLD** range. Refer to OEM manual for details.

Battery - See **ELECTRICAL SYSTEMS**.

NOTE:

Use only the recommended fluids as specified by the OEM (Original Equipment Manufacturer) manual.

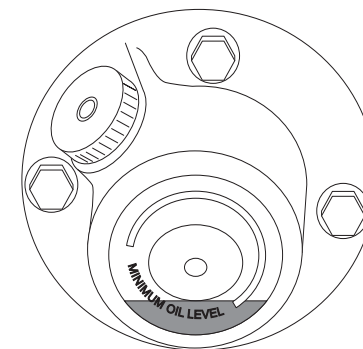
**FRONT AXLE - WORKHORSE
Oil Filled Bearings**

All front axles use oil to lubricate the wheel bearings. **Inspect** the oil level before every trip and every 5,000 miles. The oil is drained and refilled without removing the wheel end assembly. Remove hubcap to access the bearing cover and drain plug.

To Inspect the Oil Level:

- ◆ Wait 30 minutes after driving so oil level can stabilize.
- ◆ Remove the chrome hubcap.
- ◆ Locate the full and add mark on the outside of the clear plastic cover.
- ◆ If the lubricant level is low, add the recommended fluid until full.

The recommended oil change interval is based on the operating conditions, speeds and loads. Limited service applications may allow the recommended interval to be increased. Severe applications may require the recommended interval to be reduced.



090311b

Recommended Change Interval:

- ◆ Change the fluid whenever the seals are replaced, the brakes are relined or at 30,000 miles (48,000km). However, check the lubricant twice a year (spring and fall) for contamination. Change as needed.
- ◆ If yearly mileage is less than 30,000 miles, change it twice a year (spring and fall).

Lubricant Type:

- ◆ See the Workhorse owner's manual for recommended lubricant type.

To Drain:

- ◆ Place a suitable container below the bearing cover and remove the drain plug.
- ◆ Fill bearing assembly to the full level with the recommended lubricant.

NOTE:

Dispose of old oil properly and in accordance to all laws and requirements, ordinances, rules, specifications and instructions on labels.

Engine Specifications

FORD	
Engine Type	Ford V10 Gas Fuel Injection
Engine Size	6.8L V10
Cubic Inch Displacement	415
Tire Size	235 80R 22.5G
Fuel Tank (Aprox Gal)	75
Alternator (Amp)	130
Rear Axle Ratio	5.38:1

WORKHORSE	
Engine Type	V8 Gas Fuel Injection
Engine Size	8.1L V8
Cubic Inch Displacement	496
Tire Size	235 80R 22.5G
Fuel Tank (Approx Gal)	75
Alternator (amp)	145
Rear Axle Ratio	5.86:1

NOTE:

These charts reflect product specifications available at the time of printing. Therefore any floor plans introduced thereafter may not be reflected in the charts. All other information contained throughout the manual will still apply.

SPECIFICATIONS**Tank Capacities**

Tank Capacities (Approx. Gallons)							
Model Size	33PBD	33SFS	34SBD	36PCT	36DBD	37PRT	37PCT
Water Heater	10 gal	10 gal	10 gal	10 gal	10 gal	10 gal	10 gal
Grey Water	45 gal	54 gal	40 gal	Eng	42/39 gal	45 gal	45 gal
Black Water	54 gal	42 gal	42 gal	Eng	42/39 gal	54 gal	54 gal
Fresh Water	60 gal	60 gal	60 gal	60 gal	60 gal	60 gal	60 gal
LP-Gas*	24 gal	24 gal	24 gal	24 gal	24 gal	24 gal	24 gal

*Actual filled LP-Gas Tank Capacity is 80% of listing due to safety shutoff required on tank.

NOTE:

All tank capacities are estimated based upon calculations provided by the tank manufacturers and represent approximate capacities. The actual “usable capacity” may be greater or less than the estimated capacities.

Battery Specifications Charts

Application	AH (20 HR)	RC (75A @ 80° F) Minutes
6 Volt Domestic* U2200 (2 each)	225	75 Amp @ 80° F = 230 Min.

*Four batteries connected in a Series configuration.

Approximate Hours of Ampere Load					
U2200	5 AMPS	10 AMPS	15 AMPS	20 AMPS	25 AMPS
	55	55	12.5	9	7.5

Battery State of Charge vs Voltage/Specific Gravity			
Voltage	Specific Gravity	State of Charge	Depth of Charge
12.65	1.265	100%	0%
12.45	1.225	75%	25%
12.25	1.190	60%	50%
12.05	1.145	25%	75%
11.90	1.100	0%	100%

Voltage Reading: Battery fully charged at rest for one hour.

MAINTENANCE RECORDS

After scheduled services are performed, record the date, odometer reading and who performed the service in the boxes provided after the maintenance interval. Any additional information from “Owner Checks and Services” or “Periodic Maintenance” can be added on the following record pages. **In addition, retain all maintenance receipts.** The owner information portfolio is a convenient place to store them.

LUBRICATION SERVICE RECORD

KEY TO SERVICES

A – Lubrication & Inspection
A1 – Motor Oil & Filter Change
A2 – Transmission Oil Change

A3 – Drive Axle Oil Change
A4 – Wheel Bearing Service
B – Prescribed Service

C – Prescribed Service
D – Prescribed Service
E – Prescribed Service

MILEAGE	SERVICES										JOB PERFORMED	
	A	A1	A2	A3	A4	B	C	D	E	DATE	BY	
1												
2												
3												
4												
5												
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