
What the Period of Coverage Is:

**WARRANTY
- LIMITED:
2004 MONARCH SE**

If you use your Monaco® motorhome only for recreational travel and family camping purposes, the Limited Warranty provided by Monaco ("Warrantor") covers your new motorhome 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, the Limited Warranty provided by Warrantor covers the steel or aluminum frame structure 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 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.

Limitations of Implied Warranties

ANY IMPLIED WARRANTIES 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. Also see the section "What the Warranty Does Not Cover" set out below.

What We Will Do to Correct Problems

Warrantor will 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 excluded from coverage shall be considered "good will" repairs, which shall not alter the express terms of this limited warranty.

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 final repair attempt for the purpose of performing a successful repair to the identified defect(s).

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 final repair attempt for the purpose of performing a successful repair to the identified defect(s).

The Warranty Registration form must be returned to Warrantor promptly upon purchase to assure proper part replacement and repair of your motorhome. Failure to return the warranty registration 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)**.

How to Get Service

**The mailing address is
91320 Coburg Industrial Way,
Coburg, Oregon 97408**

In the event the motorhome is inoperative due to 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 condensation inside the motorhome; defacing, scratching, dents and chips on any surface or fabric of the motorhome, not caused by Warrantor; routine maintenance, including by way of example wheel alignments; 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 microwave, refrigerator, ice maker, 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.

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 & 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 . 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.

THESE WARRANTIES ARE NOT INTENDED TO "EXTEND TO FUTURE PERFORMANCE" AND ANY ACTION TO ENFORCE THESE EXPRESS OR ANY IMPLIED WARRANTY SHALL NOT BE COMMENCED MORE THAN NINETY (90) DAYS AFTER THE EXPIRATION OF THE RESPECTIVE WARRANTY COVERAGE PERIOD DESIGNATED ABOVE. THE PERFORMANCE OF REPAIRS SHALL NOT SUSPEND THIS NINETY (90) DAY LIMITATIONS PERIOD FROM EXPIRING. THESE TERMS AND ALL EXPRESS AND IMPLIED WARRANTY DISPUTES BETWEEN WARRANTOR AND PURCHASER SHALL BE GOVERNED BY THE SUBSTANTIVE LAWS OF THE STATE OF INDIANA, WITHOUT REGARD TO CONFLICTS OF LAW RULES.

Some states do not allow the reduction in the statute of limitations or a choice of law provision, so the above reduction in the statute of limitations and/or choice of law provision may not apply to you.

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

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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's systems and equipment. Many of the component manufacturer's 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.

WOOD FINISH

Because no two trees look alike, authentic woods vary in color and character markings such as streaks, knots and grain patterns. Since the stains may attach differently to these grain patterns, some natural light and dark areas may result. The beauty lies in these natural variations of color and grain that give each cabinet its own individual charm.

The beauty of these products is protected with a furniture-quality exterior finish. After a period of time, there may be minimal changes in the finish color as it ages in its surrounding conditions. This is an inherent characteristic of this particular finish, and the natural aging process adds to the unique appearance of the cabinetry. Due to the minor differences in tone, it may not be possible to match the finish color of existing cabinets exactly when replacing doors or adding additional cabinets at a later date.

The foregoing is not a warning. See the Limited Warranty or call (877) 466-6226 for warranty information and limitations.

MONARCH SE 2004 SECTIONS

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DRIVING & SAFETY -

EXTERIOR & INTERIOR CARE -

APPLIANCES -

EQUIPMENT -

WATER SYSTEMS -

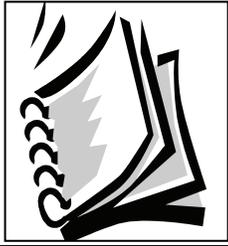
LP-GAS SYSTEMS -

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GENERAL INFORMATION

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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 this 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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SAFETY SYMBOL LEGEND



Indicates a **WARNING**. Information pertaining to personal safety and/or potential extensive damage to the motorhome.



Indicates a **CAUTION**. Information pertaining to potential damage to the motorhome and/or its components.



Indicates electrical **DANGER**. Information pertaining to danger or caution of potential electrical shock to person(s) or component(s), and/or risk of electrical fire to motorhome.



Indicates **FLAMMABLE** or **EXPLOSIVE**. Information concerning fire or explosive material pertaining to personal safety and/or protection of the motorhome and its components.



Indicates **POISON**. Information pertaining to safety and/or use of a poisonous substance or harmful chemical.



Indicates a **NOTE**. Information and reminders concerning operation of motorhome and/or components.



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



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



Indicates **ASSEMBLE/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.



Indicates **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 inside the motorhome.



Indicates a **TIP**. Information regarding helpful hints and/or suggestion for ease of operation of the motorhome and/or its components.

This section contains warranty information and instruction for the operation and care of the motorhome. Not all information may be applicable to your model of motorhome. More detailed information with **CAUTION** or **WARNING** instructions, other than what is found in this chapter, can be found in the manufacturer's owner manuals located in the owner information box.

Safety Instructions:

Many of the safety alert symbols are "Personal Safety Instructions." Definitions for the symbols are located on a previous page under "Safety Symbol Legend." It is important to thoroughly read and understand these safety instructions where the symbols are 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.

Additional Information:

Changes, additions and supplemental information in the form of Manual Addendums can be obtained by visiting our Website at **www.monacocoach.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 "Technical Tips" menu for the other product lines. The tips may not completely apply to your particular model but information contained therein can be useful.

Out and About in the Motorhome:

In time you will develop a knack for spotting wonderful little roadside locations by turning off the main highway and exploring. There are many modern recreational vehicle parks (including state, county and federal parks) with good facilities where you can obtain hook-ups for electrical, water and sewage connections. Directories are published which describe these parks and the availability of services and hook-ups. On overnight or weekend trips, chances are you will probably not fill up the sewage holding tanks, deplete the water or LP-Gas supply, or run down the batteries which supply the living area with 12 Volt DC current. On longer trips, when you have stayed where sewer connections and utility hook-ups were not available, it will be necessary to occasionally empty the holding tanks and replenish the water and LP-Gas supply.

Many gas stations have installed sanitary dumping stations. Publications are available which list these dumping stations. When stopped for the night, the motorhome is built to be safely parked in any spot that is relatively level and where the ground is firm. Try to pick as level a parking spot as possible. Your facilities are with you and the motorhome is fully self-contained.

CUSTOMER RELATIONS

Only by ensuring your confidence and satisfaction with our products and services can we have continued success as a manufacturer of motorhomes. We believe a good relationship with our customers is just as important as improving the technical excellence of our products. Your authorized dealer is pleased to help you with instructions about your motorhome and to offer service when you need it. If problems remain after you have consulted your dealer you are invited to contact our Consumer Service Department. Please have all pertinent information (serial numbers, model number, etc.) when calling. We will work with the dealer and see that every attempt to resolve the matter is made.

**Customer Service Department
91320 Coburg Industrial Way
Coburg, Oregon 97408
877-466-6226**

REPORTING SAFETY DEFECTS

If you believe that your motorhome has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Monaco. 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. To contact NHTSA you may either call the Auto Safety Hot line toll-free at 1-800-424-9393 (or 1-202-366-0123 in the Washington D.C. area) or write to:

**NHTSA
U.S. Department of Transportation
400 Seventh Street
Washington, DC 20590
www.nhtsa.dot.gov**

TAKING DELIVERY *Monaco Responsibilities*

Your motorhome has been manufactured to the highest quality and standards by factory trained personnel. Quality inspections are performed throughout the manufacturing process of your motorhome. The motorhome has been carefully and almost completely hand assembled in our factory. Prior to the motorhome arriving at the dealership, all systems have been carefully tested and inspected to ensure optimum performance. The necessary forms and required manuals have been placed in the motorhome at the time of shipment to the dealership.

The dealer must perform additional pre-delivery inspections and system checks, assist in the customer's understanding of the Limited Warranty and assist in completing any necessary forms. They must do a customer orientation to the motorhome, its systems, components and their operation.

The dealer should also ensure the customer receives a complete Owner's Packet with warranty cards and registrations for the motorhome and for separately warranted products, including detailed operating and maintenance instructions. The dealer is responsible for performing a review of the Limited Warranty provisions with the customer, while stressing the importance of mailing warranty cards and registrations to the manufacturers within the prescribed time limit to avoid loss of warranty coverage. They must assist the customer in completing these forms and locating serial numbers. They should request that the customer read all warranty information when possible and explain any provision not clearly understood.

The dealer should instruct the customer on how to obtain local and out-of-town service on the motorhome and its various individual warranted components, whether the service is warrantable or out of warranty.

As a new motorhome owner you are responsible for regular and proper maintenance. This will help you prevent conditions arising from neglect that are not covered by your Monaco Coach Limited Warranty. Maintenance services should be performed in accordance with this Owner's Manual, and any other applicable manuals. As the owner, it is your responsibility and obligation to return the motorhome to an authorized dealer for repairs and service (see the Limited Warranty). Since the authorized dealer where you purchased your new motorhome is responsible for its proper servicing before delivery, and has an interest in your continued satisfaction, we recommend that Inspection, Warranty and Maintenance Services be performed by the dealership. We suggest that you take your new motorhome on a weekend shakedown before leaving on an extended trip.

Know when to take your motorhome in for service. Give some thought to the appointment time. There are several things to consider when selecting a time for service. Location of the service center and the time of year can be a major issue. Monday and Friday are busy days for most dealers. Therefore, it makes sense to make a mid-week appointment whenever possible. Ask your dealer if additional time is needed for check in and completion of paperwork.

Prepare for the Appointment

If you are having warranty work done, be sure to have your warranty registration papers with you. All work to be performed may not be covered by the warranty; be sure to discuss additional charges with the service manager. Keep a maintenance log of your motorhome service history. This can often provide a clue to the current problem.

Prepare a List

Make a written list of specific repairs needed. It is important the service manager be aware of all previous work which has been done on your motorhome. For example: if the motorhome has been repaired due to an accident. While this may not seem important, it could have a significant effect on the dealer's diagnosis of a problem.

Be Reasonable With Your Requests

Don't leave a list of 20 items to be serviced and expect to have the motorhome back by 5:00 p.m. If you list a number of items, and must have your motorhome back by the end of the day, discuss the situation with the service manager and list items in order of priority. Some items may not be able to be repaired due to work loads or parts availability. Expect to make a second appointment for work not completed or for the long, drawn-out repair item.

No Looking Over the Technician's Shoulder

Please don't be offended when you are told you cannot watch the work being done. Many service area insurance requirements forbid the admission of customers into the service work area.

Inspect the Work Properly

Check out the service or repair job when you pick up your motorhome and notify the service manager of any dissatisfaction. If circumstances prevent returning for immediate corrective work, make an appointment as soon as possible.

AC Electricity - Alternating current also known as household power.

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.)

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

Chassis Battery - Powers chassis 12 Volt DC 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's side.

Current - Alternating (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.

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.

DC Electricity - Direct current also known as battery power.

Direct Current (DC) - Power that is stored in a battery bank or supplied by photovoltaics, alternator, chargers and DC generators.

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.

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.

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 lights and accessories inside motorhome.

LED - (Light Emitting Diode) Indicator light.

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 you fill the water tank.

OHM - A unit for measuring electrical resistances.

Ohm's Law - Express 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.

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's side.

Shore Line - This is the electrical cord which runs from the motorhome to the campground 120 Volt electrical supply.

Shore Line Plug - The 120 Volt 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 motorhome slightly so that it can be towed.

VIM - Vehicle Interface Module.

Volt - The unit of measure for electric potential.

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

Wet Cell Battery - A type of battery that uses liquid as an electrolyte. This type of battery requires periodic maintenance such as cleaning the connections and checking the electrolyte level.

Air Conditioner

Dometic Corp.
800-544-4881
www.dometic.com

Awnings

Carefree
800-622-3230
www.carefreeofcolorado.com

Batteries

Interstate
800-272-6548
www.interstatebatteries.com

Carbon Monoxide Detector

Safe-T-Alert
800-383-0269
www.safe-t-alert.com

Chassis

Workhorse
Workhorse Custom Chassis
877-946-7731
www.workhorse.com

Ford

Ford Motor Company
800-444-3311
www.ford.com

Cooktop

Atwood Mobile Products
815-877-5700
www.atwoodmobile.com

Energy Management System

Intellitec
800-251-2408
www.intellitecsve.com

Entry Step

Kwikkee
800-736-9961
www.kwikkee.com

Fan - Bathroom Exhaust

Fan-Tastic Vent
800-395-4045
www.fantasticvent.com

Fire Extinguisher

Kidde
800-581-6742
www.kiddesafety.com

Flooring - Laminate

Wilsonart
800-433-3222
www.wilsonart.com

Generator

Onan
800-888-6626
www.onan.com

Heat - Furnace

Atwood Mobile Products
800-873-4328
www.atwoodmobile.com

Hitch Receiver

Hidden Hitch of America
800-632-3290
www.hiddenhitch.com

Home Theatre (Opt.)

RCA
877-266-2728
www.rca.com

Inverter

Xantrex
800-446-6180
www.xantrex.com

130w Inverter

Dimensions Unlimited
551-653-7000

Leveling Jacks (Opt.)

RVA
760-746-5732

LP-Gas Detector

Safe-T-Alert
800-383-0269
www.safe-t-alert.com

LP Tank

Manchester Tank
800-877-8265
www.mantank.com

Microwave

Sharp Electronics Corp.
800-237-4277
www.sharp-usa.com

Outside Mirrors

Ramco Industries, Inc.
800-321-4819
www.ramco-eng.com

Rear Vision System

Jensen
800-732-6866
www.jensen.com

Refrigerator

Norcold
800-543-1219
www.norcold.com

Satellite System (Opt.)

Datron DBS 3000
800-287-5052
www.datrondb.com

KVH

(401)847-3327
www.kvh.com

Slide-Out Motor (Opt.)

Power Gear
800-334-4712
www.powergear.com

Smoke Detector

Safe-T-Alert
800-383-0269
www.safe-t-alert.com

Solar Panel (Opt)

RV Solar Consultants
Primary: 541-284-2426
Secondary: 541-937-9812
www.amsolar.com

Television/VCR

RCA
800-336-1900
www.rca.com

Television Antenna/Video Control Box

Winegard
800-788-4417
www.winegard.com

Toilet

Sealand
800-321-9886
www.sealandtechnology.com

Water Filtration

Flowmatic Systems, Inc.
352-465-2000
www.flowmatic.com

Water Heater

Atwood Mobile Products
800-873-4328
www.atwoodmobile.com

Washer/Dryer (Opt)

Splendide
503-655-2563
www.splendid.com

Water Pump

Shurflo
800-854-3218
www.surflo.com

MANUAL ADDENDUMS

www.Monacocoach.com

Click **ENTER** to enter the main web page.
Then click on the **SERVICE** link and choose
MANUAL ADDENDUMS from the drop down menu.

2004 MONARCH SE

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

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

3. 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.

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

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

NAME: _____ **PHONE:** (____) _____

ADDRESS: _____

SERIAL # _____

CUT ALONG
DOTTED LINE



FOLD

Place
Postage
Here

**TECHNICAL PUBLICATIONS PLT. 17
MONACO COACH CORPORATION
91320 COBURG INDUSTRIAL WAY
COBURG, OR 97408-9908**

FOLD



**CUT ALONG
DOTTED LINE**



MONACO

Limited Warranty Transfer Application

Mail Monaco Coach Limited Warranty Transfer Application to:

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

Please read terms and representations below before signing.

DEALER IMPRINT

A PRIOR OWNER INFORMATION

TRANSFER COVERAGE FROM:

FIRST NAME	INITIAL	LAST NAME	VEHICLE IDENTIFICATION NUMBER
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B NEW OWNER INFORMATION

TRANSFER COVERAGE TO:

FIRST NAME	INITIAL	LAST NAME	TELEPHONE NUMBER
STREET ADDRESS		DATE OF TRANSFER	
CITY	STATE	ZIP	ODOMETER READING AT TRANSFER

C SIGNATURES

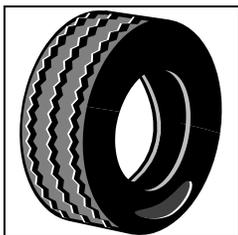
NEW OWNER'S SIGNATURE _____ SELLING DEALER SIGNATURE _____

TERMS & REPRESENTATIONS

By your signature(s) on 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 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.
5. You understand that the Limited Warranty does not cover the chassis, component parts and appliances if they are covered by a separate warranty issued by the chassis, component part or appliance manufacturer.





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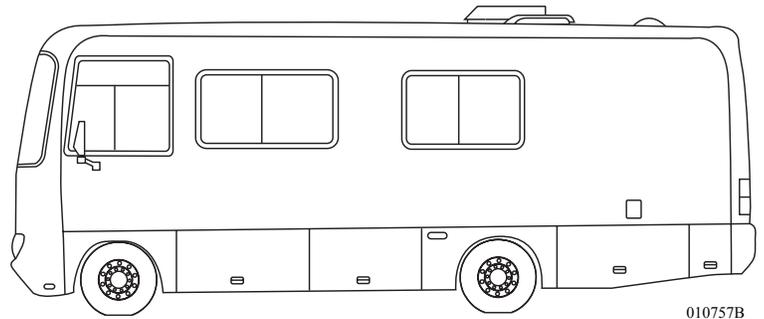
DRIVING & SAFETY

SECTION 2

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

DRIVING & SAFETY



The key to safely operating a motorhome is inspection. Any defect found could result in problems on the road that may cause lost time and money. Several states require that the motorhome be inspected prior to registration. Know and observe the laws of the states in which you will be traveling. Laws may vary from state to state. Prior to moving the motorhome perform a general **inspection** which includes examining the condition of the vehicle and the surrounding area of the motorhome for hazards. Look high and low when walking around the motorhome.

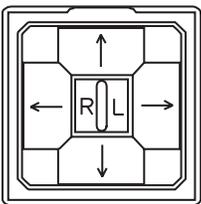
Inspections

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

Familiarize Yourself

The mirrors will need to be adjusted before starting out, it is recommended that you have someone assist with these procedures. This will also prevent any damage to mirror or coach.

Mirror Adjust (Manually)

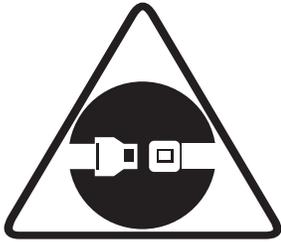


Mirror Adjusting:

- Adjust the driver's seat to the travel position.
- Using a 3/16" Allen wrench, have the assistant loosen the two Allen set screws on front and back of mirror arm below mirror head.
- Position mirror until there is a clear view of the side of the motorhome. Tighten screws.
- Use the mirror adjust switch located on the roadside console to fine tune the view.



Safety Seat Belts



SEATBELT.EPS

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 any seats that are not equipped with a safety belt while the motorhome is in motion. Safety belts are supplied at affixed seating positions. 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; you will hear a click 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. 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. On the front passenger (co-pilot) seat and on the forward facing permanently mounted booth dinette seat.



WARNING: Children must not be transported unrestrained. Infants must be placed in approved safety seats. Small children must be restrained in child safety seats. Failure to comply with these rules can lead to injury or death.



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

A child safety seat is required for a child:

- From birth to one year, or up to 21 pounds, the child is considered an infant. A (convertible) safety seat for an infant must be secured facing rearward. The top of the head must be below the top of the safety seat. Secure safety seat harness straps at or below the shoulders. (See **Example 1**).
- Children over 40 pounds (ages 4 to 8) unless over 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. (See **Example 2**).



CAUTION: Installation illustrations are for reference only, and are not to be used as a guide. Refer to the safety seat manufacturer's guide.



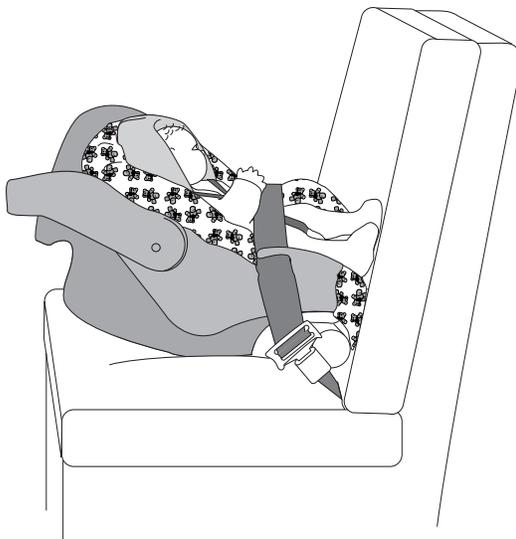
WARNING: There are many styles of safety and booster seats, refer to the manufacturer's manual for proper installation and how to properly secure the safety or booster seat.



CAUTION: Seat belts must only be used on permanently mounted seats. Do not use a single seat belt on more than one person.



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.



020231b

Example 1: Convertible Seat Facing to the Rear.



020230

Example 2: High back booster seat facing forward.

Seat Belt Care:

Keep the belt clean and dry. To clean, use a mild soap and lukewarm water. Never use bleach, dye or abrasive cleaners as they may weaken the belt. Inspect the belts periodically. Check for cuts, frays or loose parts. Replace any damaged parts. Do not disassemble or modify the system. Replace the belt assembly if it has been in a severe impact, even if damage is not obvious.

Driving Tips

The motorhome is a complex vehicle and requires an increased level of driving awareness because of its size and various components. 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 or surroundings 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 the 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.

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. Manually shifting the transmission down to the next gear 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 the distance required to stop the motorhome.

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

When traveling, make sure bridges being crossed can support the weight of the motorhome. Check the tonnage limit of the bridges before crossing them. Signs should be posted at bridge entrances. Check the posted height of all overpasses or situations where overhead clearance is limited. Keep in mind, road surfaces may have been repaved or become packed with snow and therefore the actual posted clearance height would not apply in such conditions.

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 keeping the motorhome centered in the driving lane.
- Driving lanes in work zones can be uneven, congested and narrower 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. Therefore, 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.

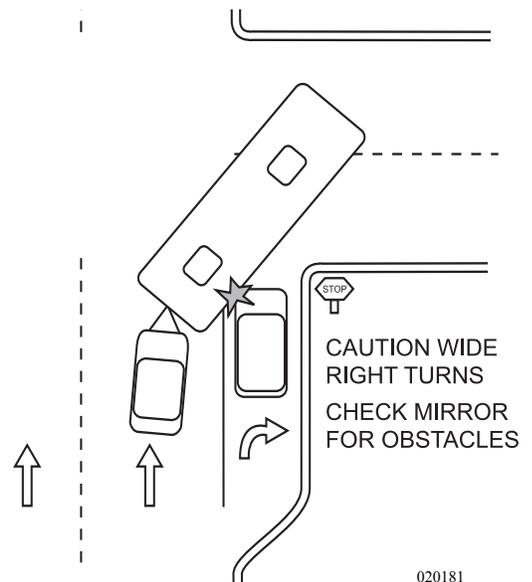
Right Turns:

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 you are about to make the 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, being 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, try to assess how steep and long it is before beginning to climb. Prepare early for long climbs.

Determine the ranges where the motorhome works best by driving long grades in a way that temperatures will remain stable for the duration of the climb.



IMPORTANT SAFETY TIP: If the road speed degrades to the point where the motorhome is moving significantly below the posted speed, turn on the four way flashers. Take advantage of pullouts if traffic is building. Once in the pullout, if there is sufficient clearance for safety, take a break. Idle the engine to allow the exhaust and transmission to cool. Monitor the gauges and enjoy the view while you wait.

Descending a Grade:

When descending a long grade, use the braking force of the engine to maintain a safe, slow speed. Do not rely entirely on the service brakes to slow the motorhome when descending long grades. "Pumping" and riding the service brakes is not recommended when descending a grade, as the brakes can overheat. Over-use can result in the loss of brake effectiveness.

If it is necessary to use the service brakes for additional braking, use moderately heavy pressure on the brake pedal to reduce the motorhome speed to the desired speed of travel, then release it.

Before descending a grade, downshift the transmission to a lower gear and use the engine to slow the vehicle. Monitor the motorhome speed while descending the grade.



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 any interior lights while driving. They can create a glare on the windshield, decreasing visibility.
- Dim the dash lights to a comfortable level to reduce the level of glare.

Extreme Heat and Hot Weather Conditions:

- Observe all gauges frequently. Any variations from the normal conditions should be evaluated promptly.
- Check tire pressure before traveling in hot conditions. Tire air pressure increases with heat. It is not advisable to 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 which 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 down shifting on wet or slippery surfaces, which can cause the drive wheels to skid.
- Wipers should be in good condition and the washer reservoir should have sufficient window wash fluid that has antifreeze included within it.
- Use the mirror heat to keep the mirrors clear.
- Remove any ice build-up from the entry step to avoid accidental slipping.

Wet Conditions:

- The risk of hydroplaning is increased if tires are worn or improperly inflated.
- Be aware that heavy rain or deep standing water can affect brake application causing them to apply unevenly or grab.

Fuel Economy:

Driving styles, wind resistance, terrain, vehicle weight, and engine-driven accessories are some of the many factors that contribute to the fuel economy.

Guidelines to Help Increase Fuel Efficiency:

- When starting out, apply the throttle lightly and accelerate gradually, avoid using excessive throttle and accelerating quickly.
- Check the tire pressure. A low tire is not only a safety hazard, it also increases rolling resistance which increases fuel consumption.
- While operating the motorhome, keep the 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. 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 long enough for normal oil pressure to register. Wait until the engine coolant temperature raises. The engine is now ready for travel.
- Follow the maintenance schedule for the engine, transmission and chassis. Proper maintenance will lead to enhanced fuel economy, motorhome performance, and overall longevity.

Refueling:

- Truck stops are good refueling points for motorhomes.
- Know which side the fuel port is on. There may not be adequate space to turn around in the parking lot to reposition for the pump.
- Check overhead clearance heights before pulling through the fuel island.
- Be aware of the concrete/steel posts installed around the fuel island.
- Avoid running over the fuel hose as it can get hung up on the motorhome, causing body damage.
- Use of gloves is recommended for refueling. Store the gloves in the outside compartment.
- To prevent grease and fuel deposits from being tracked into the motorhome when refueling, change shoes before entering the motorhome. Store the extra pair near the entry door.



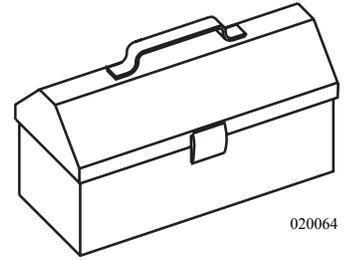
WARNING: Avoid the risk of fire or explosion. Turn off all pilot lights and appliances before entering a refueling station.

The following list highlights items that need to be checked on the motorhome before traveling. Prior to departing several items will need to be prepared. Some suggestions are listed below. Use the lists as general guidelines when preparing to depart. By doing so, there is a better chance of not facing problems during the trip. For chassis maintenance details, please refer to the chassis section.

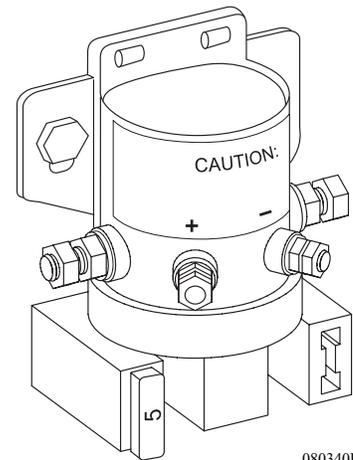
PRE-TRIP PREPARATIONS - CHECKLIST

Items To Carry:

- Local, State and National Maps. Truck atlases can be useful for showing maps, refueling stations and truck repair facilities.
- An emergency road kit containing a flashlight, road flares, warning signs and a fire extinguisher.
- Potable/non-potable water hoses and a water pressure regulator.
- Hand tools.
- 12 Volt DC test light and a 110 AC Polarity Tester. These may be helpful when on the phone with a technician.
- A battery hydrometer to check the condition of battery electrolyte.
- A spare 12 Volt DC continuous duty solenoid.
- An assortment of spare fuses.
- A spare alternator belt.



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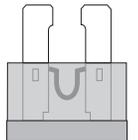


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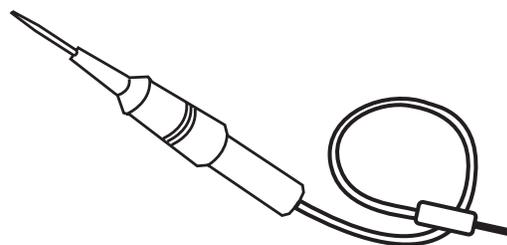
Continuous Duty Solenoid

Interior Items:

- Start refrigerator operation the night before departure to get a head start on the cooling process. Pre-cool items prior to loading the refrigerator.
- If necessary, load pots, pans, utensils, soap, linens, etc.
- Secure and fasten the bi-fold and pocket doors. Lock the shower door.
- Close roof vents and windows.
- Secure any 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 the appliances before leaving home.
- Turn interior lighting off.
- Lift IceMaker arm



060086



Test Light

090333F



Polarity Tester

020062

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.
- Adjust the mirrors.
- Check the windshield wipers.
- Fill the LP-Gas tank.
- Test the generator.
- Make sure 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, hydraulic fluid and washer fluid.
- **Inspect** belts and hoses for wear.
- **Inspect** wiring for loose, frayed or corroded connections.
- Start engine and listen for any unusual noises.



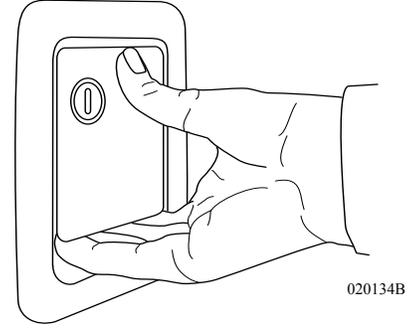
Driving Preparations:

- **Inspect** fluid level (if applicable) in oil bath hubs.
- Fill the water tank and make sure the waste tanks are empty. Test the water pump.
- Disconnect and store the fresh water hose (if applicable).
- Check all tire pressures.
- **Inspect** tires for cuts, punctures, weather damage or cracks in the sidewalls and tread areas.
- Check for foreign objects lodged between dual tires.
- Make sure all lug nuts are tight. This should be done by an approved repair facility.
- Secure all awning locks.
- Check 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 obstructions.
- Check fuel level gauge. Fill the fuel tank if necessary.
- Check all other dash gauges for operation and correct level indications.
- Secure and lock the entry door for travel.



Storing Cargo:

Caution must be exercised when opening as cargo may shift during traveling. When closing the bay doors, be sure to keep fingers away from the openings. When opening the bay doors, use thumb at position shown while opening. Cargo may shift while driving. Push on bottom of door to relieve tension on lock.



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

It is important to remember that regardless of how large the motorhome is there is a limit to its 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 to discard items to make room for additional cargo.

While packing the motorhome, keep two things in mind, turning and braking. 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 keep the motorhome from becoming top heavy. Make sure that everything is secure and safe from quick turns, bumps and sudden stops.



TIP: Multi-purpose items, versatile clothing and periodic removal of unused cargo enables storage of more of what is usually used.

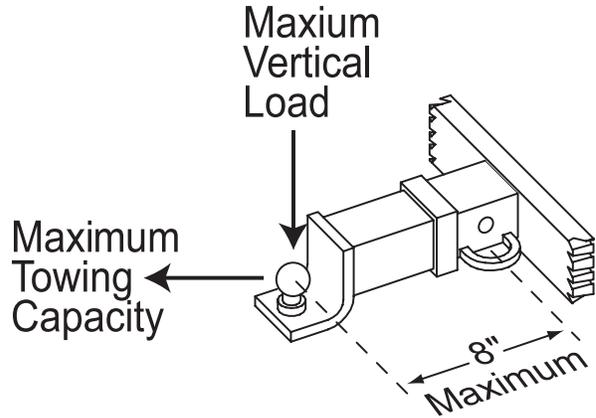
Loading the motorhome guidelines:

- 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 stored toward the front.
- To maintain a low center of gravity and reduce sway, store light items in the overhead cabinets and heavier items near the floor.
- Secure loose items to prevent weight shifts that could affect the balance of the motorhome.

**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 that the receiver be used properly. 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 and LP-Gas and any vehicle or trailer towed by it, must not exceed the GCVW.



020065d



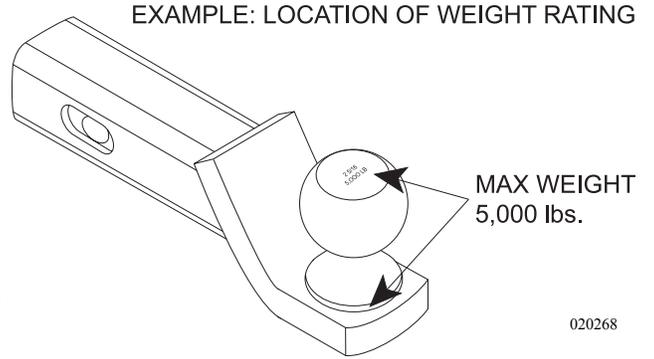
WARNING: Do not tow a trailer or vehicle that exceeds the rated capacity of the hitch receiver. Overloading the hitch receiver can cause unusual handling characteristics and overstress the hitch receiver and chassis. It could also void the warranty. If there are any questions, call a factory technician.

 MONACO <small>COACH CORPORATION</small> Coburg, Oregon Springfield, Oregon Wakarusa, Indiana Elkhart, Indiana Nappanee, Indiana	Do Not Cut, Weld or Modify	03213016
	Do Not Exceed Vehicle Ratings	
	Maximum Towing Capacity 4,000 Lbs. (1,814 Kg.)	
	Maximum Vertical Load 400 Lbs. (181 Kg.)	
	Any Towed Vehicle or Trailer Over 1000 lbs (454 kg) Should Have Separate Functioning Brake System.	
	<i>Refer To Owner's Manual For Additional Towing Guidelines</i>	

 MONACO <small>COACH CORPORATION</small> Coburg, Oregon Springfield, Oregon Wakarusa, Indiana Elkhart, Indiana Nappanee, Indiana	Do Not Cut, Weld or Modify	03213018
	Do Not Exceed Vehicle Ratings	
	Maximum Towing Capacity 5,000 Lbs. (2,268 Kg.)	
	Maximum Vertical Load 500 Lbs. (227 Kg.)	
	Any Towed Vehicle or Trailer Over 1000 lbs (454 kg) Should Have Separate Functioning Brake System.	
	<i>Refer To Owner's Manual For Additional Towing Guidelines</i>	

Tow Car or Trailer:

1. Connect a tow car or trailer to the motorhome with safety chains rated for the weight of load.
2. Make the electrical connection and perform a light check before starting a trip and at each rest stop.
3. Check the tires frequently. Flat tires on a towed vehicle cannot be detected from the motorhome while driving. A flat tire is a safety hazard and may cause extensive damage.

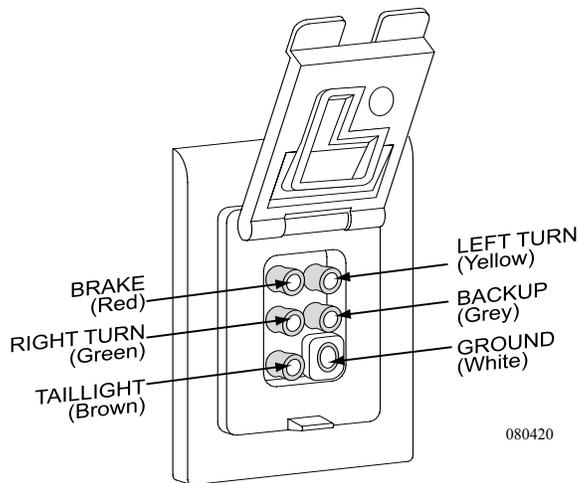


WARNING: Be sure the weight ratings of the ball mount, tow ball and safety chains are equal to or greater than the load. The use of an extension to the receiver or extended ball mount will significantly reduce hitch receiver weight ratings. Modifications to the hitch receiver or use of the hitch receiver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

Ford									
30PDD	32PBD	34SBD	34PBD	34PDT	36PED	36WDD	36DBD	37PCD	37PCT
5,000	5,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000

WORKHORSE										
CHASSIS	30PDD	32PBD	34SBD	34PBD	34PDT	36PED	36WDD	36DBD	37PCD	37PCT
18,000	3,000	N/A								
W-20	N/A	5,000	N/A							
W-22	N/A	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000

Tow Plug Connection



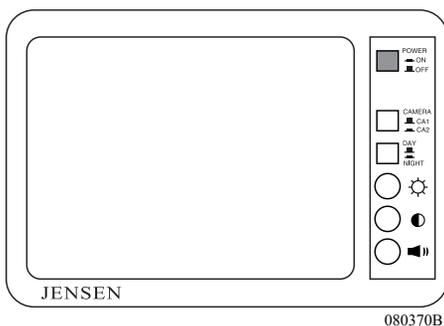
NOTE: When towing a trailer or vehicle with a two-wire system, a turn signal/brake light converter will be needed to adapt the tow plug wiring to the item being towed.

REAR VIEW SYSTEM (Optional)

The motorhome can be equipped with a rear vision and voice system. The factory will provide the wiring behind the dash and at the rear cap for future installation. The rear vision system consists of a camera with a microphone and a monitor.

The rear view system is designed to provide the driver with a view of the rear of the motorhome. The field of view is 140° in the diagonal plane, 121° in the horizontal plane, and 90° in the vertical plane.

The driver can see what is behind the motorhome and listen to an assistant. This is useful during backing procedures. The rear vision system will automatically turn ON when the gear selector is placed in reverse. Turning the main power switch ON will allow continuous operation of the rear vision system when the ignition key is ON.



Power Switch:

The switch, when ON (in) position, engages the monitor for viewing. The green LED indicator illuminates. When the switch is OFF (out), the monitor is in a standby mode of operation. The green LED remains illuminated when the ignition is on. The monitor displays rear viewing when the transmission is shifted to Reverse.

Camera Selector:

This switch should be left in the CA1 (out) position. CA2 (in) position is not used in the motorhome.

Day/Night Switch:

This switch should be left in the DAY (out) position for normal viewing. When set in NIGHT (in), picture brightness is reduced. NIGHT should be used for night viewing and driving through tunnels.

Bright Control:

Clockwise rotation increases the picture brightness. Counterclockwise rotation decreases the picture brightness.

Contrast Control:

Clockwise rotation increases the picture contrast. Counterclockwise rotation decreases the picture contrast.

Audio Control:

Clockwise rotation increases the volume level. Counterclockwise rotation decreases the volume level.

The camera angle may be adjusted to display a suitable rear view. The camera housing cover will need to be removed to gain access to the hexagon mounting bolts. The mounting bolts can be repositioned to the desired angle. Refasten the camera housing cover and seal using an appropriate sealant.

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 reduce the challenge. When backing up, the driver (pilot) should be comfortable using the mirrors, the back-up camera and the co-pilot's directions (ground guide) for assistance. Practice first, backing up with the co-pilot's guidance in a large unobstructed parking lot. Backing up is a team effort.

The backing up process should begin while the motorhome is in forward motion. Maneuver the motorhome to align with the chosen site. This allows straight alignment with the site. Aligning the motorhome with the site after the backing process begins will require considerably more room than an automobile, and 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 straight lines, such as road markings, as reference points when possible.

If the destination does not have "pull-through" sites, try to pick a solid, level site. If possible, pick a site located on the left side. This is the preferred side. The driver will have a better field of vision by using the roadside mirror. If the site is on the right side, the driver will have to use the curbside mirror for backing up, which leaves a blind spot. When a potential site is spotted, stop the motorhome before the site. Get out and observe the area for soft ground, posts, large rocks, low hanging limbs or other obstacles. If the site meets the particular criteria, prepare to back in carefully. Have the co-pilot provide guidance using the five hand signals.

**BACKING UP
A MOTORHOME**

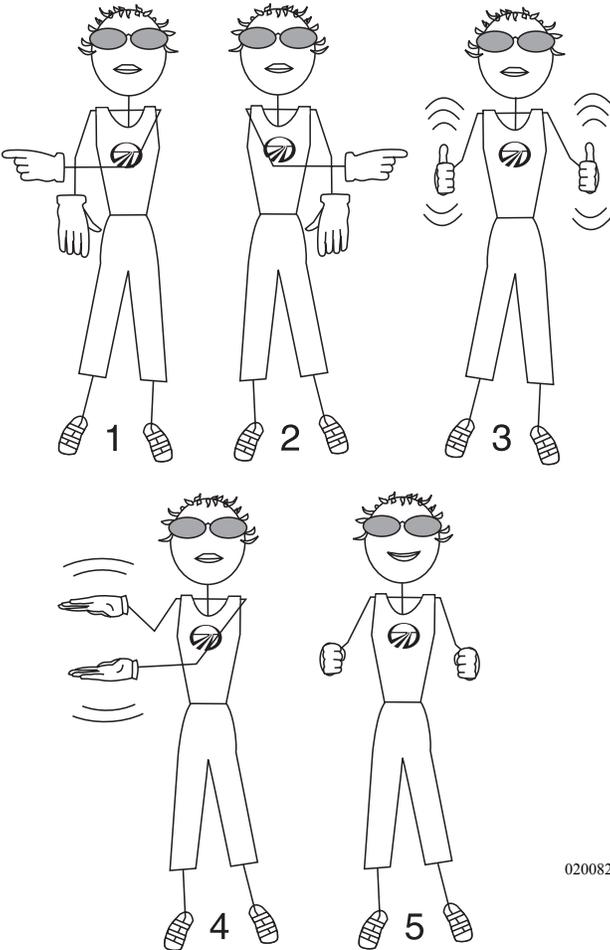
The co-pilot will perform just as important a job as the driver. When guiding the driver, the co-pilot should be located safely at the left rear corner of the motorhome, facing forward, while remaining visible in the roadside mirror at all times. The co-pilot should make a conscious effort to maintain sight of the driver through the roadside mirror as the front of 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. The driver should receive directions only from the co-pilot. If necessary, stop the backing up process to have co-pilot **inspect** other areas or angles of concern. Use of walkie-talkies will aid in guidance.



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. This type of directional signal is easily discerned in the mirror by the driver. The directional signal given will remain steady until desired movement is completed.



The five directional signals are as follows:

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 the 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 indicates STOP.

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Backing Up Trailers:

Trailers have only one pivot point. Trailers may be backed up. Towed vehicles using a tow bar or tow dolly have more than one pivoting point which makes this type of equipment not suitable for backing. If using this type of towing equipment, plan ahead. Park safely along the road and walk a distance, if necessary, to avoid a possible back up situation. Avoid putting the motorhome and tow vehicle in a backing situation. To back up this combination, completely disconnect the tow vehicle from motorhome. Trying to back up the motorhome with a tow vehicle connected will result in damage to the motorhome, tow vehicle and towing device.

The same rules for backing a motorhome may be applied when backing a trailer. When preparing to back a trailer into a space, maneuver the motorhome sweeping wide, then turn back to the opposite direction. This sets the motorhome and trailer in a position to maneuver the trailer into the space. When backing up a trailer, the driver may become disoriented with the direction of the steering wheel in relation to the direction of the trailer. The bottom of the steering wheel must be moved in the desired direction of 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 guiding.



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

Brake - Parking

The motorhome parking brake is a foot pedal brake which operates in the same manner as an automobile parking brake. When at a complete stop, select “**P**” (Park) on the shift lever, then engage the foot pedal brake. The brake is released by the “brake release” handle, located below the lower left area of the dash.

LEVELING SYSTEM (Optional)

The hydraulic leveling system is designed as a leveling system only. The leveling system should not be used to support the motorhome while under the coach or for changing tires. A tire change should be performed by trained personnel with the proper tools and equipment. Attempts to change tires using the leveling jack to support the motorhome could result in damage to the motorhome and risk causing serious personal injury.

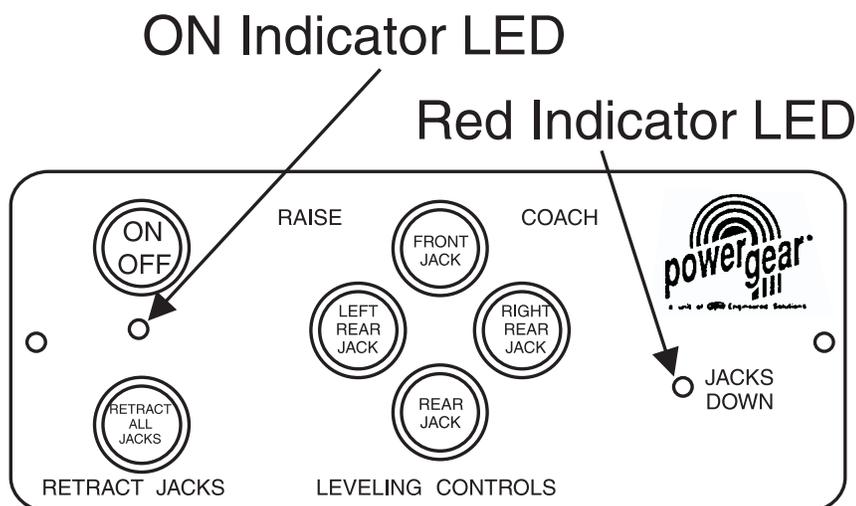
Before Operating the Leveling Jacks

The leveling system shall only be operated under the following conditions:

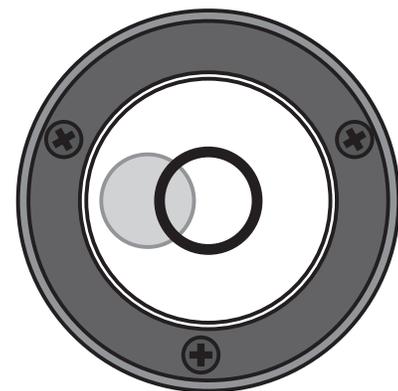
- The motorhome is parked on a reasonable level surface.
- The **PARKING BRAKE** must be engaged.
- The transmission must be in the **NEUTRAL** or **PARK** position.
- The ignition switch is placed in the **IGN** position.

Ensure the potential jack contact points are clear of obstructions or depressions before operation.

Keep all people clear of the motorhome during the leveling system operations. 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.



- Ensure all conditions have been met to operate the leveling system.
- Press the **ON/OFF** label on the control panel. The ON/OFF label will illuminate indicating the system is now operational.
- Should the ON/OFF label not illuminate, verify all conditions have been met.
- Press the **FRONT JACK** label until the jack contacts with ground. This will be felt in the motorhome.
- The **FRONT JACK** and **REAR JACK** labels will be used to achieve a center in the level vial which is pointed front to rear of the motorhome. The air bubble will indicate the high side of the motorhome. Press the button that is opposite the air bubble in level vial (i.e. if bubble is towards front of coach press the **REAR JACK** label). Keep label pressed until the air bubble is centered in vial.
- The air bubble in the level indicator indicates the high side of the motorhome. Push the button opposite of the bubble, either **LEFT** or **RIGHT REAR JACK**, to level the motorhome.(i.e. If the bubble is towards left of the coach push **RIGHT REAR JACK**). Keep the label depressed until the bubble is centered in the vial.



NOTE: Right and left rear jacks are used to level the motorhome side to side. Pushing the “LEFT REAR JACK” label on the control panel will extend the left rear jack. Pushing the “RIGHT REAR JACK” label on the control panel will extend the right rear jack. There is no individual control for right or left front jacks.

Park the motorhome on reasonable solid surface. The jacks may sink into ground on extremely soft surfaces. A load distribution pad or block may be placed under each jack. The system is not designed to lift the wheels off the ground. Doing so may create an unstable condition.

Retracting the Leveling Jacks

- Place the ignition switch in **IGN** position.
- Push **ON/OFF** label on. See first step of leveling.
- Push **RETRACT ALL JACKS** label. All jacks will start to retract and return to full retract position. When all jacks return to full retract position the **JACKS DOWN** light will go out.



NOTE: If you wish to stop jacks from retracting turn system OFF and back ON. You can then re-level the motorhome by following the steps under “Leveling the Motorhome.”

- When the **JACKS DOWN** light goes out push **ON/OFF** label on control panel to de-energize the system. Perform a brief visual inspection around the motorhome to verify that all jacks are fully retracted. You may then proceed to travel.

Drive Away Protection System

When the ignition switch is set to the **RUN** position with the jacks extended, should the transmission be taken out of neutral or park or when the park brake is released, the **JACKS DOWN** indicator will light and the alarm beeper will activate. The system will then automatically retract all jacks until jacks are fully retracted or the park brake is reset and the transmission shifted back to **PARK** or **NEUTRAL**.

- Change the fluid every 36 months.
- Check the fluid level every month. The fluid level should be within $\frac{1}{4}$ inch of fill port lip and checked when all the jacks retracted.
- Inspect and clean all hydraulic pump electrical connections every 12 months.
- Remove dirt and road debris from the jacks as needed.
- If the jacks are down for extended periods it is recommended to spray exposed chrome with automatic transmission fluid every seven days for protection.

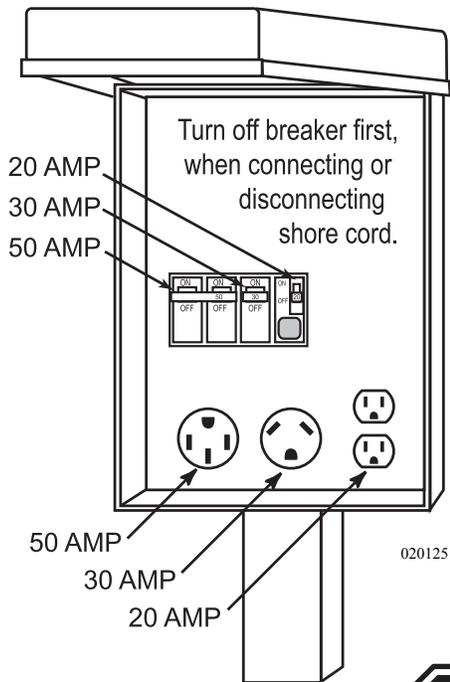
In most applications, the Type A automatic transmission fluid is adequate. If operating in cold temperature (less than 10-F°) the jacks may extend and retract at a slower rate.



WARNING: Never rely solely upon warning lights or warning buzzer to determine position of leveling jacks. Make a visual check to ensure all jacks are fully retracted prior to moving the motorhome.

For cold weather operation, fluids specially-formulated for low temperatures may be desirable. Consult factory for recommended cold weather fluid.

- Useable Reservoir Capacity = 1.2 gal.
- 4-Jack System Capacity = 2.4 gal. (approx.)

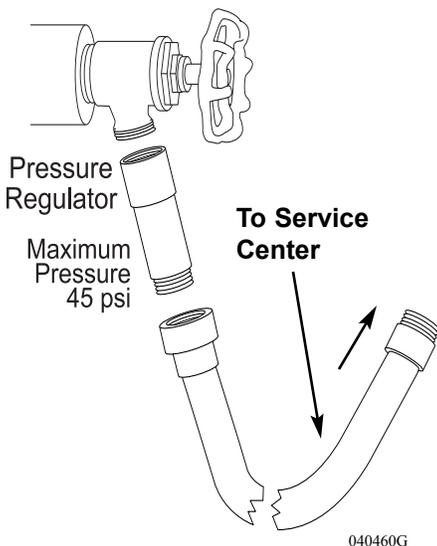


If the site for the motorhome has full hook-ups, use this quick reference hook-up checklist. This hook-up list is only a guide. For detailed information look in the section pertaining to the item of interest.

- Open the LP-Gas tank primary valve.
- If possible, begin appliance operation on LP-Gas for the first 60 minutes. Switch the refrigerator operation to gas, start the water heater and furnace (if needed). This will allow time for the inverter to stabilize the battery charging.
- Prepare the shore cord to be plugged in. Extend and inspect the cord. Perform any necessary cord maintenance. Install proper electrical adapters if anything other than 50 Amp service is provided. Turn shore power circuit breaker OFF prior to plugging in the shore cord. Operate electrical appliances in sequence when hooked to a limited shore power service.



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 manager's responsibility to fix any problems with the park's shore hook up.

- If cable service is provided, hook-up a 75 Ohm RG59 or RG6 cable to the cable connection in the service center. 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 service center. 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."



NOTE: Attach a water pressure regulator between the city water faucet and the potable fresh water hose to 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.

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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. Check to make sure all hose clamps are tight, with the sewer hose properly connected open the grey water valve. The black water valve remains closed until the tank is full or until time of departure.



NOTE: When filling the fresh water tank watch for water to come out of the overflow. Turn water off before a full blast of water comes out. The fresh water tank overflow is located at the curb side rear of the motorhome.

The key to a successful dry camping trip is having a reasonable understanding how the different electrical systems work and interface. Each electrical system operates as a single entity but is usually connected or dependent upon operation of another electrical system. If one electrical system malfunctions, it generally effects the operation of another electrical system. To obtain satisfactory performance, all electrical systems must be in proper working order and operated in the parameters for which they are intended.

When it comes to dry camping, the state of the charge of the house batteries is going to determine how long the interior lighting will last or how long the TV operates from the inverter. Starting a dry camping trip with batteries in a low state of charge, or one battery in the battery bank that is damaged, will ultimately result in a disappointing time. There are several different charging systems, all of which are designed to either charge or offset battery draw. There are three basic charging systems on the motorhome: inverter/converter, alternator and solar panels.

Each charging system performs a specific type of charge profile. The inverter/converter is the preferred method to charge the house batteries. The inverter/converter uses 120 Volts AC supplied by either shore power or the generator. It converts 120 Volts AC to 13.5 to 14.5 Volts DC, depending on state of charge of the batteries and the load placed on them. The alternator maintains battery voltage while traveling and supplies the current necessary to operate various loads placed on the engine and house batteries. Solar panels offset various parasitic loads that are on the house batteries.

Begin with a full fresh water tank and empty waste holding tanks. When the fresh tank is low, the waste holding tanks will more than likely be full. Empty the waste holding tanks before refilling the fresh water tank. Learning ways to save water will ease the burden of camping without hookups. Bottled water is a good alternative for you and your pets to eliminate demands put on the fresh and grey water tanks. By placing a small plastic tub in the sink, grey water can be collected and recycled for use in the toilet. Instead of rinsing dishes under a running faucet, use two plastic sink tubs - one for washing and one for rinsing. When possible, take advantage of campground facilities offering restroom, shower and laundry service.

DRY CAMPING

While showering, turn the water off while soaping and shampooing your hair. Alternate a shower and a sponge bath every other day. A plastic tub from the kitchen sink works well for sponge baths and allows you to save that grey water resource. When brushing teeth, rinse the brush in a cup of water, and gargle with bottled water. A battery charged razor would cut down on water usage while shaving.

Before arriving at your destination, fill up with fuel for the generator. Carefully monitor for voltage draw while dry camping. Plan ahead and conserve resources while dry camping. Dry camping requires fully charged and properly maintained batteries (corrosion cleaned, terminals tightened, cables checked, etc.).

Solar panels are a valuable addition to help charge the batteries. Adding a second panel (and adding a third if possible) will charge the batteries during daylight hours. Clean the solar panels regularly for optimum performance. Dust, dirt, grime and pollution from the road and air will decrease their efficiency. Clean the solar panels with window cleaner and a soft cloth.

Most dry camping locations can accommodate motorhomes of various lengths. Confirm that the facility you plan on visiting can accommodate your motorhome's length and size. Arrive during daylight hours to properly set-up the motorhome and prepare for the night ahead. Getting to a site on narrow and winding campground roads takes skill and patience. Avoid low hanging limbs, tree trunks and barriers lining the roadway. The co-pilot or the campground host should provide assistance when maneuvering the motorhome around curves and bends.

Setting Up for Dry Camping:

- Switch refrigerator operation from Auto to LP-Gas.
- Operate the water heater on LP-Gas. Turn it on about an hour before hot water is needed.
- If the furnace is needed during the nighttime, set the thermostat temperature a bit lower to prevent the furnace from cycling all through the night.
- Check on small items that use battery power, such as the porch light, bay lights, the light under the step, generator compartment lights, engine compartment lights, etc. If the television is not being used, turn off the 12 Volt booster. Even one light accidentally left on, such as under the front cap, reduces battery reserves quickly.
- High curbs can impede step operation. Use care when parked on side streets.
- Some battery draw is unavoidable. The battery cut-off switch at the entry door must be on to operate many interior items such as lights or the furnace.
- Keep flashlights handy. Build a campfire when spending nighttime hours outdoors. Extinguish the flames before retiring for the evening. Many campgrounds place wood or cement barriers between the site space and fire pit. Illuminate any barriers or obstacles in the pathway to the motorhome.
- Place a large flashlight inside the front door for navigating through the motorhome during the night without having to use interior lights. If interior lighting is needed, use one light in a central location, such as the vanity.

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- During the day it is still important to conserve on energy. Turn on the water pump only when using water. Turn the pump off when not in use. The water pump does not draw an abundance of power, however all battery amp hours are important and should be conserved.
 - If it is too early in the morning or too late in the day to run the generator, use the inverter for AC power. Remember to turn off the inverter when not in use. When the rest of the campers are up and about, turn on the generator and run it for a couple of hours to help charge the batteries. Run the generator during clean up and preparation for the day.
 - Check the monitor panel frequently and keep track of water usage and battery consumption. Routinely check the LP-Gas level. Remember the furnace uses more gas in cold weather.
 - Careful management of water is critical when dry camping. Know the motorhome tank capacities. Picture the amount of liquid in a gallon container. Visualize that amount each time you run the water. If you are dry camping for an extended period, limit shower usage. Turn the water off when soaping down in the shower. If water conservation is critical, take a sponge bath. Conserve water while brushing your teeth. Chances are a campground without hookups will not have large comfortable shower rooms or bathrooms. It may only be equipped with primitive facilities, however, if it helps to economize on water, use them.
 - Do not fill the sink full of water to wash a few dishes. Use disposable dishes whenever possible. Conserve propane by cooking dinner over the campfire. However, if cooking over the campfire is not desired, use the cook top or microwave. If you use the inverter to operate the microwave, battery power will be consumed quickly. If possible, use the generator to operate the microwave. It is healthy for the generator to operate under a heavy load such as the microwave.
 - Allow the generator to power up for a couple of minutes before applying a load.
 - To conserve on battery power, plan what is needed from the refrigerator prior to opening it. If weather does not permit eating at the picnic table, or if no picnic table is available, eat at the dinette table by candlelight.
 - Leave shoes outdoors or at the entry step to avoid tracking in dirt. Open windows during the day instead of using the roof air conditioner.
 - Get back to nature and still enjoy the comforts of the motorhome. With a little imagination, the ways to conserve available resources while dry camping are endless.

Typical Current Draw:

- Interior Coach Power requires using a continuous duty solenoid that has a 0.7 Amp draw.
- A 13" TV has a 1.7 Amp draw.
- Rope lights (10 ft) are a 1.3 Amp draw.
- The porch light is a 2.0 Amp draw.
- One fluorescent dual bulb light has a 2.1 Amps draw.
- One halogen ceiling light has a .09 Amp.

BREAKING CAMP

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

Outside Checklist:

- Disconnect the cable TV, lower the television antenna and (if applicable) the satellite dish.
- Disconnect and stow the phone line.
- Retract the awnings and secure them for travel.
- Close LP-Gas tank valve. Check the level of the LP-Gas Tank to ensure a sufficient amount is available.
- Drain and flush the holding tanks. First close the grey water valve, run enough cold water down the sink and shower drains until the grey tank is at least 50% full. Be careful not to overfill or flood the grey tank. Next, open the black tank valve allowing the drain cycle to complete. **If applicable**, connect a **non-potable** water hose to the No-Fuss hose bib and flush the black tank system. Close the black tank valve, open the grey water valve. The water from the grey tank will help flush the solids from the drain hose.
- Disconnect the sewer hose. Flush hose with clean water from a **non-potable** hose. Store the hose. Install the sewer cap.



- Fill the fresh water tank (using the potable hose). Disconnect and store the fresh water hose. Remove any hose protected 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.

- Check all tire pressures.



- Secure all compartment doors and entry door.

- **Inspect** tires and wheels.

- Check for fluid leaks under or around the motorhome.

Engine Checklist:

- **Inspect** the engine, transmission and the engine compartment for fluid leaks.

- **Inspect** the area under the motorhome for fluid leaks or puddles.

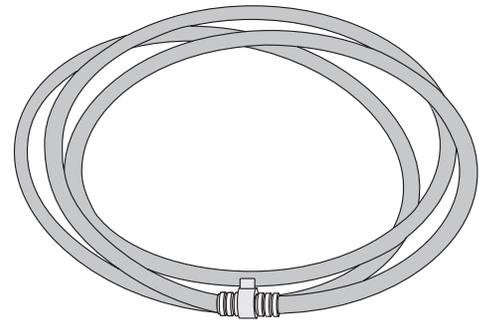
- Check all fluid levels: oil, antifreeze, transmission, hydraulic fluid and washer fluid.

- **Inspect** belts and hoses for wear.

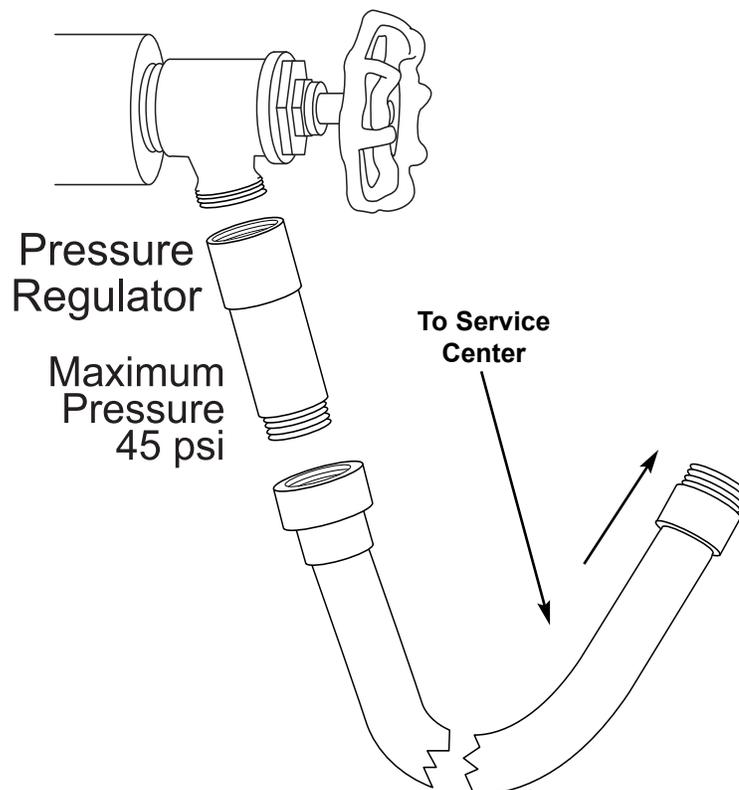
- **Inspect** wiring for loose, frayed or corroded connections.

- Start engine and listen for any unusual noises.

- **Inspect** gauges and controls for proper operation.



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Interior Checklist:

- If applicable, clear the slide room path, clean the floor, move the driver seat forward and make sure the bay doors are shut. Retract the slide room. When the slide room is fully retracted secure any slide room locks.

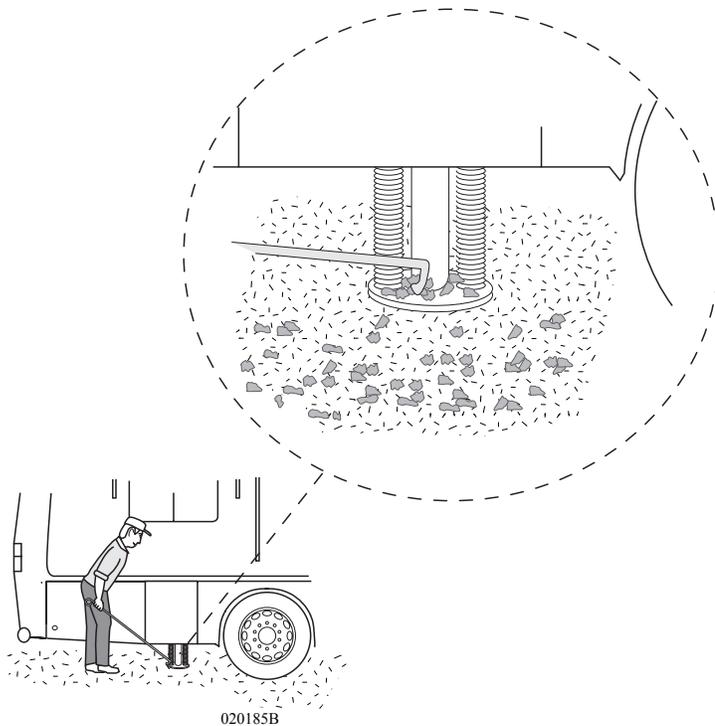


NOTE: To operate the slide-out the ignition must be OFF and the park brake must be set.

- Secure and fasten the bi-fold and pocket doors. Lock the shower door.
- Close roof vents and windows.
- Secure any loose, heavy or sharp objects in case of a sudden stop.
- Close all cabinet doors and drawers.
- Turn off interior lights.
- Turn off water heater, water pump and furnace.
- Walk through the interior and check for any unsecured items.
- Turn the interior lighting off.
- Check the fuel level gauge. Check all other dash gauges for operation and correct level indications.

Departure Checklist:

- Check items in storage bays to make sure shifting or damage of items will not occur.
- Look around, above and under the motorhome for obstructions. Check for debris stuck between the rear dual tires.
- 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.
- Secure and lock the entry door for travel.
- Secure all awning travel locks.
- When using the hydraulic jacks ensure the jack pad is clear of debris when retracted. Loose rocks, gravel and debris can be thrown from the jack pad and can possibly damage the tow car.
- Carefully pull forward out of the campsite. If necessary, clean the site and check for any forgotten items.



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** at **(1-877-466-6226)** or an emergency service provider.

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An emergency road kit should include at least three reflective warning signs, road flares, a flashlight, spare automotive fuses and an assortment of hand tools. For added safety a separate fire extinguisher should be considered. The motorhome is equipped with a fire extinguisher located inside next to the co-pilot seat. 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: The standard placement is 10 feet, 100 feet and 200 feet 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 feet behind the motorhome in order to safely warn approaching traffic.

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 the proper equipment to change the tire. A professional service technician will have the equipment and training needed to repair or replace the tire. In the case of sudden tire failure, avoid heavy braking. Hold the steering wheel firmly and gradually decrease speed. Slowly move to a safe off-road place, which should be a firm level spot. Turn the ignition off and turn the hazard flasher system ON. Save the old tire for any warranty coverage.

In Case Of Flat Tire



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INFO: *Goodyear* emergency service number is 877-484-7376.



INFO: *Michelin* emergency service number is 1-800-847-3435

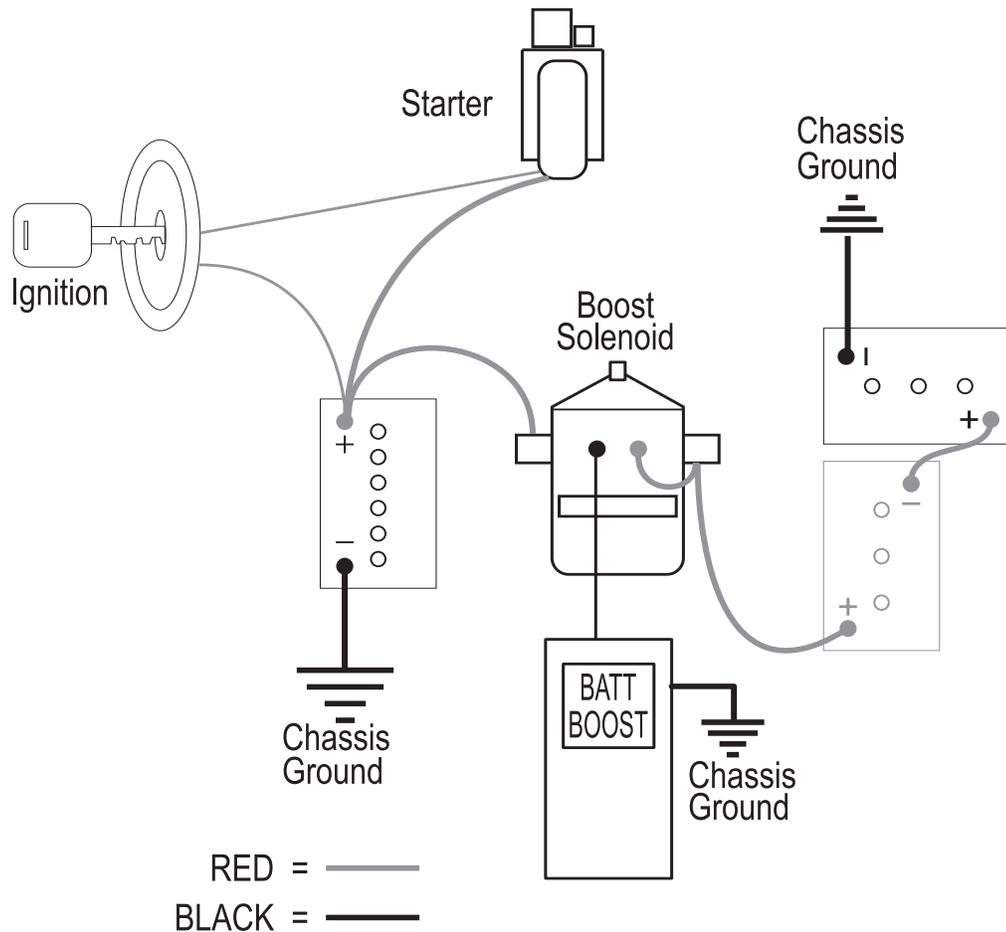
Jump Starting

Alternative Starting Procedure:

A weak or discharged battery will not supply the amount of CCA (Cold Cranking Amps) necessary to initiate and maintain cranking the engine while supplying 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 will increase chassis battery voltage.

Battery Boost Switch:

The Battery Boost switch engages a heavy-duty solenoid to electrically connect the house batteries to the engine battery in the event the engine won't 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.

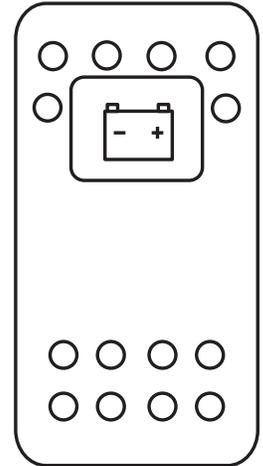


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Typical Drawing

To Use the Solenoid:

- With the ignition key off, press and hold the Battery Boost switch for 10 seconds. After 10 seconds, continue to hold the switch down and turn on the ignition. Observe the battery volt gauge on the dash, it should read at least 12 Volts. If voltage is sufficient, try to 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 ending any future alternative attempts.
- Next, start the generator. This may require using the Battery Boost switch as the generator starts from the engine battery. When the generator is operating, the electrical combination of the generator and the inverter will charge the house batteries.
- Allow the generator to run approximately ½ hour before attempting to start the engine.
- After ½ hour of generator operation, with the generator operating, hold down the Battery Boost switch for one minute. Release the switch for one minute, then engage the switch for one minute. Alternate this cycle three to five times. This will avoid overheating the Boost solenoid.
- Next, hold the switch down for one minute and turn the ignition on. The battery voltage gauge on the dash should indicate at least 12 Volts. If voltage is sufficient 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 (+).



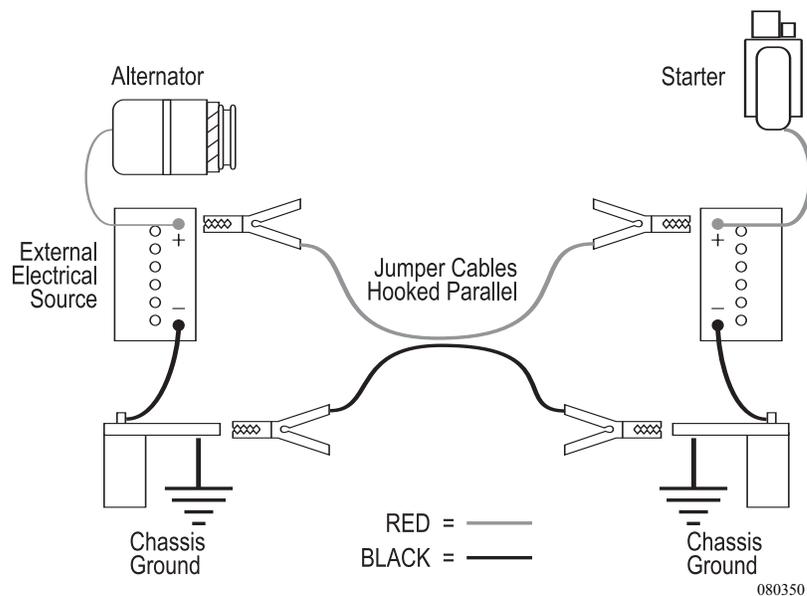
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WARNING: Batteries can emit explosive gases. Always ventilate the battery compartment prior to any work or service to the batteries. Extinguish all smoking material and keep all open flame and spark producing devices away from battery area.



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.



Jump Starting:

- 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.
- Hook up the cables then wait several minutes to allow a surface charge to build in the chassis battery before attempting to start the engine.
- Turn **ON** the battery disconnect switches and attempt to start the engine. **DO NOT crank the engine more than a few seconds.**
- After the engine has started disconnect the cables. Disconnect the negative (-) cables before disconnecting the positive (+) cables to prevent arcing.
- If the engine does not crank, or cranks slowly, **DO NOT CONTINUE.** Obtain assistance from a qualified technician. Extensive damage, fire or injury can occur.

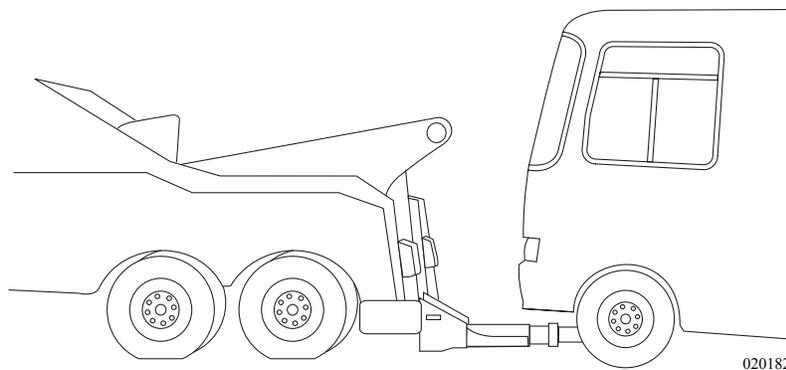
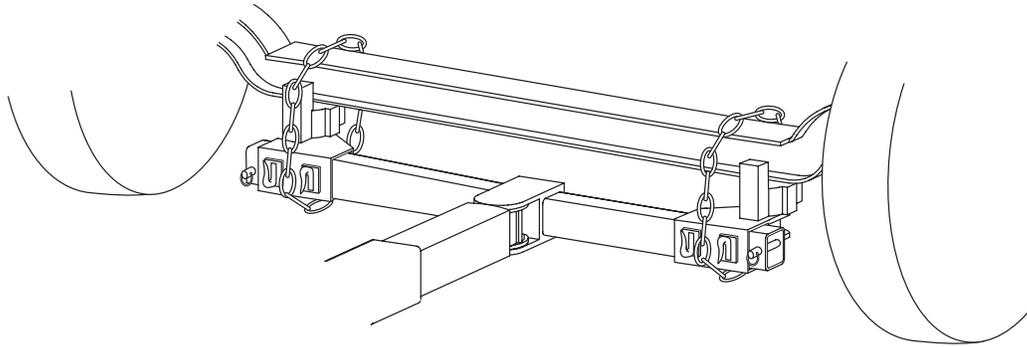


CAUTION: If the motorhome requires jump-starting, it is recommended to call roadside assistance. Do not attempt to jump-start the motorhome using a passenger vehicle. The charging system on a passenger vehicle cannot supply the amperage necessary to jump-start the motorhome, and can damage voltage sensitive equipment on the passenger vehicle.



WARNING: The gases around the battery can explode if exposed to flames, sparks or other sources of ignition. An explosion can result in injury or vehicle damage. Batteries contain sulfuric acid, which burns 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.

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.



Use the following instructions for towing the motorhome:

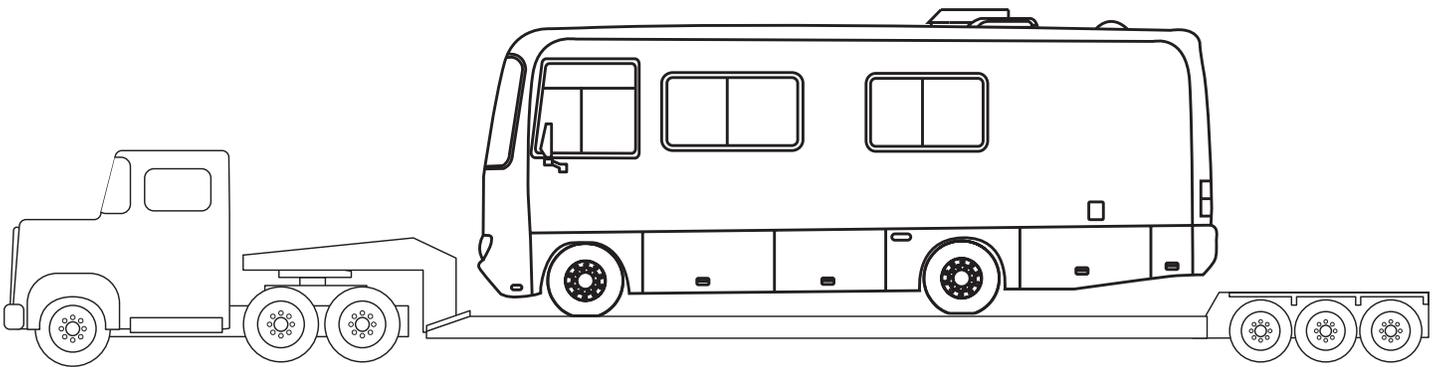


- Secure any loose or protruding parts if the motorhome is damaged.
- **Inspect** the points of attachment on a disabled motorhome. If attachment points are damaged, select other attachment points at a substantial frame structural member.
- Never allow anyone to go under a motorhome while it is being 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.

-
- If the rear wheels are disabled, place the motorhome on a flat bed trailer or use a heavy duty dolly under the rear wheels and tow the motorhome from the front.
 - The drive shaft must be removed to prevent damage to the transmission. Secure the 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.



020228B

A tire designed for a motorhome is a very technical and precisely engineered product. To obtain maximum wear and the best service out of the tires, it is helpful to understand their function. A tire is a "container" that holds air. A combination of air and the tire casing support the motorhome and its contents.

The following information concerning tires, weighing the motorhome and subsequent tire information are set in the order in which the process is performed or experienced. The motorhome must be weighed fully loaded before the proper tire inflation pressure can be obtained. Since the tire is the only contact the motorhome has with the road surface, it is critical that proper tire pressure be maintained so that it will properly support the weight of the motorhome. Improper tire pressure will lead to abnormal wear or sudden tire failure.

The tire performs other functions, such as traction for moving, stopping, steering and 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 of the tires it is helpful to understand the components and function of the tires.

Tire Components:

Tread: Provides traction and cornering grip.

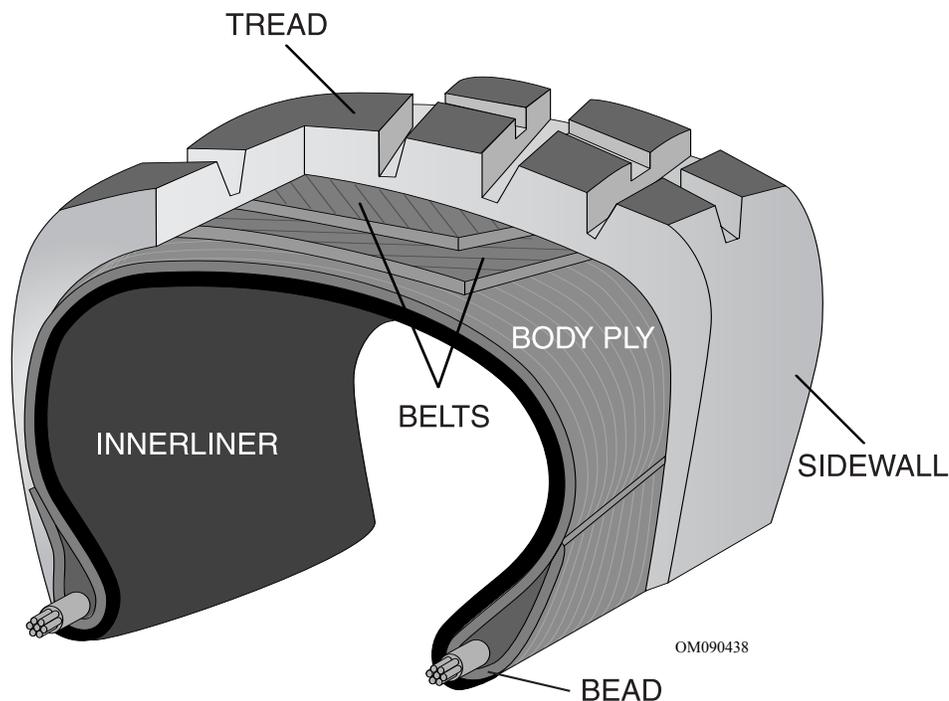
Belts: Stabilize and strengthen the tread.

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.



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, which 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 a 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 a harsh ride, uneven tire wear and is susceptible 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.

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 it is fully loaded. The chart within this section 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 is contained in this section of the manual.

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.

**TIRE CHARTS -
Michelin**

Use the tire chart to locate the recommended air pressure for the weight carried by each tire. A quality truck tire gauge with an angle dual head is recommended. Adjust the tire pressure accordingly.

225/70R19.5 LRF (2) XRV

PSI		70	75	80	85	90	95
lbs per position	S	2895	3040	3195	3315	3450	3640
	D	5440	5720	6000	6230	6490	6830
*kg. per position	S	1313	1379	1450	1503	1565	1650
	D	2467	2595	2722	2826	2944	3100

One Kilogram = 2.2 lbs.

245/70R19.5 LRF - XRV

PSI		70	75	80	85	90	95
lbs per position	S	3440	3540	3640	3740	3890	4080
	D	6430	6630	6830	7030	7310	7720
*kg. per position	S	1560	1605	1651	1697	1764	1850
	D	2916	3007	3098	3189	3316	3500

GoodYear

TIRE SIZE	MAX Speed Rating (MPH)	Dual (D) Single (S)	Inflation Pressure PSI							
			65	70	75	80	85	90	95	100
245/70R19.5	75	D S	65	70	75	80	85	90	95	100
			--	3415	3515	3655	3875(F)	3940	4075	4375 (G)
			--	3640	3740	3890	4080 (F)	4190	4335	4545 (G)

Understanding the Inflation Table

- Tire Size is on the left margin of the Table.
- Determine the "Single" inflation reading or "Dual" inflation reading. This is denoted with a "D" or "S" on the Table. Single is for the Front axle. Dual is for the Drive axle.
- Find the corresponding psi at the top columns to see the corresponding maximum weight capacity for that psi.

Regularly check the tire pressure. A nail or screw can lodge in a tire and create a slow leak. The object may eventually be spotted on a front tire or an outside rear dual. However, if there is a slow leak on an inside dual, it will probably go unnoticed. If you begin driving unaware that an inside dual tire is low on air pressure or is flat, very quickly (in most cases a few miles) the outside rear tire will heat up due to carrying double the load. This can lead to failure of the outside tire resulting in two flat tires on the same side of the same axle.



CAUTION: A slow leak may go unnoticed on one of the dual tires. This can cause the good tire paired with it to fail due to exceeding the load limits it is designed to carry. A flat or nearly flat tire can generate enough heat from rolling resistance to ignite.

Check the tire pressure every two weeks or at least once a month and before any major trip. Check the tire pressure every "drive" morning on both long and short trips (driving a day or less). Check the tire pressure before leaving on a trip and again before starting your trip home. Check the tire pressure before storing the motorhome for any length of time. More importantly, check the tire pressure when removing the motorhome from storage.

Check the tire pressure when the tires are "cold" and have not been driven for more than one mile. The rated load capacity for cold inflation pressure is based on ambient temperature. If you must check the tires when they are warm or hot, allow for a slight increase in air pressure. The pressure should be within a couple of pounds of each other on the same axle. Never let air out of a hot tire.

When checking the inflation pressure, use a high-quality truck tire air gauge. These have an angle dual head. This type of pressure gauge can check the pressure of the inner dual wheel that has the valve stem pointing outward and the outer wheel has the valve stem pointing inward. Nothing should restrict the ability to easily check the tire's air pressure daily when traveling in the motorhome. 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.

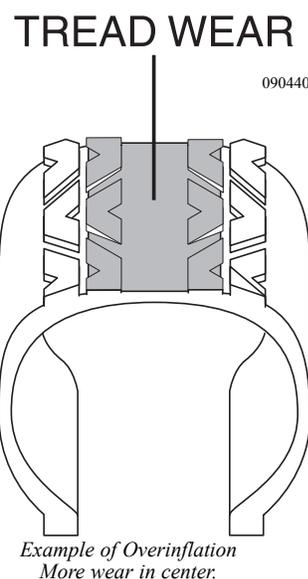
Optimum tire performance is achieved at proper inflation pressure for the load carried. Do not mix tires of different tread patterns on the same axle. The difference in traction could cause rear end gear fight and mechanical damage to the drive train. Never mix tires of a different size or construction on the same axle.

Higher than recommended pressure can cause:

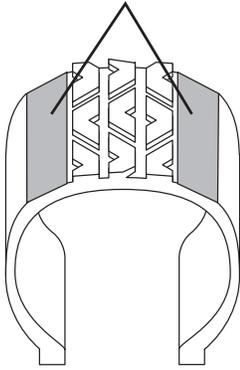
- Hard ride.
- Tire bruising or carcass damage.
- Rapid tread wear in the center of the tire.



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



TREAD WEAR



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*Example of Underinflation
More wear on edges.*

Lower than recommended pressure can cause:

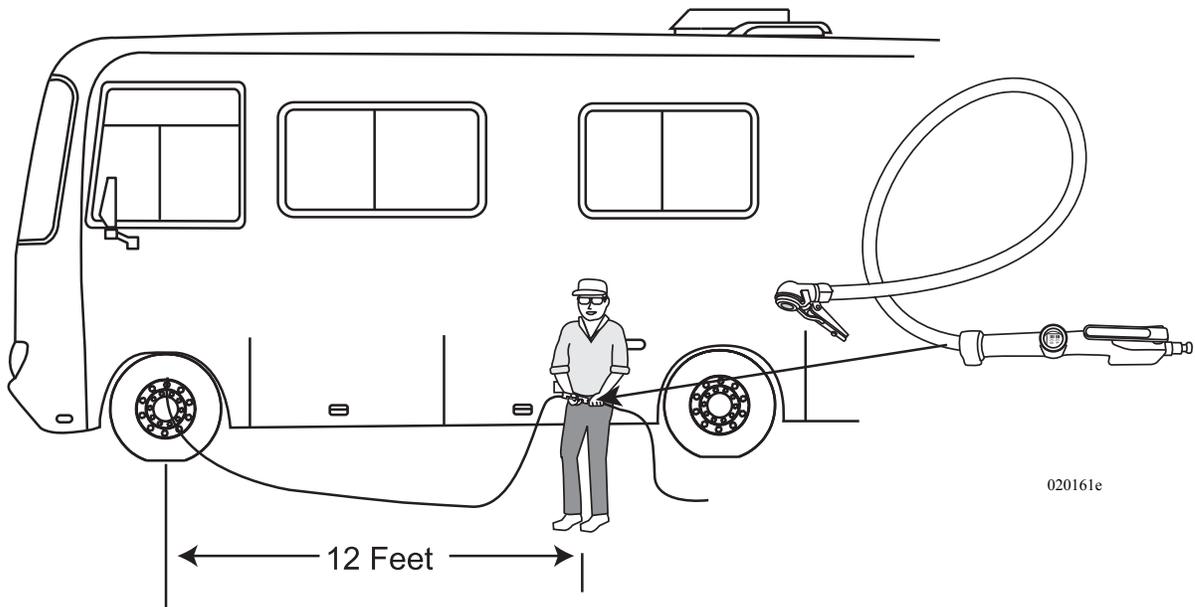
- Tire squeal on turns.
- Separations.
- Rapid and uneven wear on the edges of the tread.
- Circumferential Breaks.
- Tire container may bruise or rupture.
- Higher Risk of Road Hazard.
- Tire cord breakage.
- Loss of Casing Durability.
- Excessive tire temperature.
- High fuel consumption.
- Reduced handling quality.

Unequal tire pressures on same axle can cause:

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



WARNING: Driving on a tire with low air pressure can exceed the design limits of the tire. Damage to the sidewall of the tire can occur. A damaged sidewall can burst upon inflation causing serious damage, injury or death. Aged tires are also susceptible to sidewall damage. For safety purposes clear the area of people and pets during tire inflation. Inflate tires using a remote inflation device.



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1. When checking the air pressure in the tires, make sure 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 appropriate air pressure 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 poke a hole in the tire and cause an air leak.
9. Check the sidewalls to make sure there are no gouges, cuts, bulges, or other irregularities.



NOTE: Air pressure in a tire goes up (in warm weather) or down (in cold weather) 1 to 2 pounds for every 10 degrees 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.



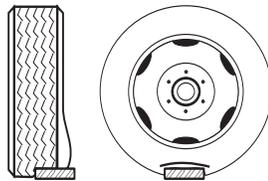
CAUTION: Supporting the tires prevents damage to the sidewall of the tires and does not prevent tire roll.

Tire "Support" Methods

INCORRECT

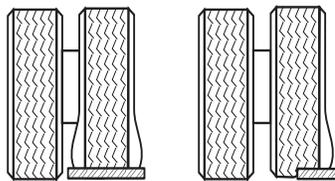
Singles

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

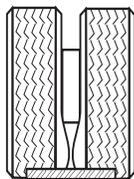


Duals

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

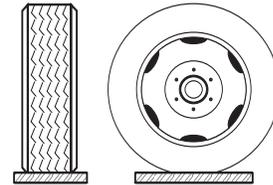


One tire or a portion of the two tires supporting the full load.



CORRECT

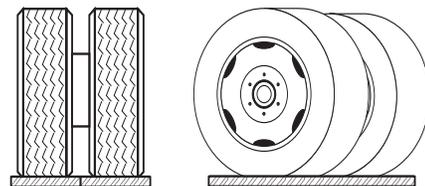
Singles



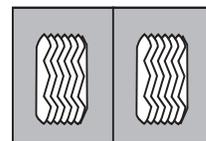
Tire Footprints



Duals



Dual Tire Footprints



020063b modified

Sudden tire failure or blowout is often preceded by tire vibration. Some other 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 immediately after such an occurrence. Continue to inspect the tires periodically thereafter in case minor damage occurred. Rotation forces can continue to stress damaged areas that can manifest later in a sudden tire failure. If an unusual vibration begins, or a bulge is noticed in a sidewall, have the tires evaluated by a qualified professional as soon as possible.

Tire rotation can increase the useful life of the tires by achieving uniform wear on all of the tires. The first tire rotation is the most important in determining which rotation pattern to use. Have the tire manufacturer determine the tire rotation pattern. 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 corrected prior to rotation.

After a tire rotation, check and adjust the inflation pressures for the actual loads of the wheel position accordingly.

Tires are warranted by the tire manufacturer. The motorhome manufacturer is not responsible for warranty coverage or tire wear.

Tires must be replaced when the tread is worn down to $\frac{4}{32}$ of an inch on the front and $\frac{2}{32}$ of an inch on the rear in order to prevent skidding and hydroplaning. If there are questions regarding tread wear consult a tire dealer as soon as possible.

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 one-sixteenth of an inch. When these “wear bars” are noticed, the tire is worn out and should be replaced.

Visually check the tires for signs of uneven wear. The tire may have irregular tread wear if there are high and low areas or unusually smooth areas. 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 weathering.

Tire Care

Road oil will cause deterioration of the rubber. Dirt buildup will help hold chemicals in the air next to the tire and will also cause deterioration.

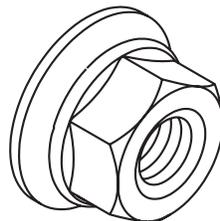
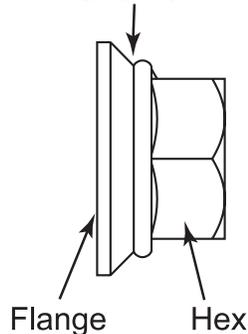
When cleaning any rubber product, proper care and methods in cleaning must be used to obtain the maximum service years out of the tires. Use a soft brush and a mild detergent to clean the tires. If a dressing product is used to “protect” the tires from aging, use extra care and caution. Tire dressings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

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

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. 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, this will not improve the nut torquing performance. Excessive lubricant makes the nuts hard to handle, attracts dirt to the nuts and may cause unsightly appearance to the wheel. Only used nuts need to be lubricated.
- Since flange nuts generate higher clamping force always use grade eight studs with hub mount wheels.

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



090268c

- 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: Loosen and tighten lug nuts in a star pattern sequence. Sequence tighten to 50 ft. lbs. first, then sequence tighten to 150 Ft. lbs. 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 recreational vehicle 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 to 150 ft.lbs in sequence (as shown in the illustration).

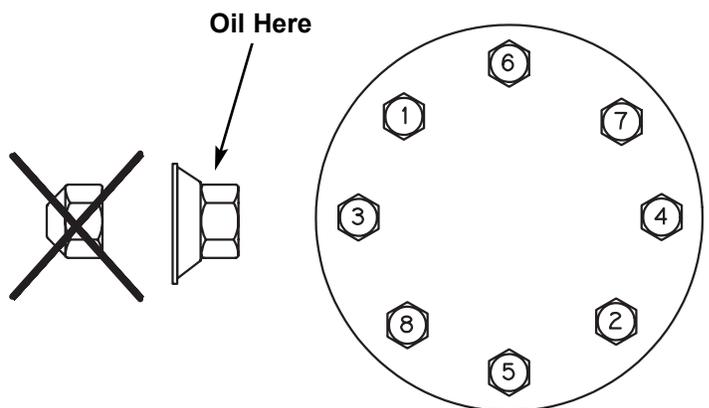
Dual Rear Wheels:

Slide the inner dual wheel over the studs, being careful not to damage the stud threads. Align the handholds for valve access and slide the outer dual wheel over the studs, again being careful not to damage the stud threads.

Snug the nuts in sequence, do not tighten them fully until all have been seated. Tighten the nuts to 150 ft. lbs. using the sequence (as shown in the illustration). 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.



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Nut Tightening Sequence

Storage of Tires - Long Term

The motorhome is designed for recreation, not long-term storage. However, unless you are living in your motorhome full-time you will have a need to store it. Rubber tires age faster when not being used. A cool, dry, sealed garage is the preferred method of storage. Many recreational vehicles are stored outside in the elements. Some storage surfaces may cause tires to age prematurely. Placing a barrier (i.e. cardboard, plastic or plywood) between the tire and the storage floor/ground surface will help to protect the tires.

When the tire is anticipated to be out of service for a period of thirty days or more, the motorhome should be in the long-term storage condition. The ideal conditions include placing the motorhome on “jack stands” to remove all weight from the tires. Then the inflation pressure can be reduced by 15 psi. However, this is not always possible, with a few simple steps the aging effects from long-term storage or a non-use period can be reduced.



NOTE: If the motorhome is stored with weight on the tires they should be inflated to the maximum inflation pressure as indicated on the Federal Identification Tag.

- Thoroughly clean the tires.
- Unload the motorhome so there is minimum weight on the tires.
- Ensure the surface is reasonably level, firm, clean and has good drainage.
- Move the motorhome every three months to prevent cracking in bulge areas as well as flat spotting from prolonged sidewall strain and tread deflection.
- Cover the tires to block direct sunlight and ultraviolet rays.
- Store the motorhome out of a high ozone area.

Failure to take these steps can cause early deterioration and shorten the life of the tires. The type of surface the motorhome is parked upon will have an affect on how much moisture accumulation occurs on the chassis and flooring. Moisture can eventually seep into the interior. Further, the type of surface can affect the tires.

- Gravel covered parking area still allows moisture to evaporate from the ground, through the gravel and to the underside of the motorhome.
- Sealed concrete pads allow better ventilation under the motorhome.
- Storage buildings with sealed concrete floors or heated storage facilities greatly reduce the amount of moisture accumulation and protect the motorhome from moisture damage.
- Wet, oily, or greasy surfaces should be avoided. Highly reflective surfaces, such as sand or snow, should be avoided. Heat absorbent surfaces, such as black asphalt, will cause problems as well.



Before removing the motorhome from long-term storage thoroughly **inspect** each of the tires. This means a close examination of each tire’s tread area and air pressure. If the pressure check indicates the tires have lost air during storage, inflate them to the correct pressure for the current load before putting the motorhome into service

Proper weight distribution, load management and operating within established limitations will aid in safe and enjoyable travel. The information contained in this publication outlines guidelines and provides worksheets for weighing procedures.

Proper weight distribution and load management is an individual responsibility. Once the process and procedures are understood, weighing the motorhome really isn't complicated. In order to correctly manage load and weight distribution, more than one weight measurement will need to be taken and/or repeated. 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.**

Next is the Unloaded Vehicle Weight, meaning the weight of the motorhome full of fuel with engine fluid level full. Cargo Carrying Capacity can then be calculated. Once Cargo Carrying Capacity is determined, the motorhome can be loaded. After the motorhome is loaded it will need to be weighed again. These weight measurements will be used to ensure proper weight distribution and tire inflation pressures.

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 will detail 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, the motorhome frame and/or other components of the motorhome, could 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 know its actual weight. Weigh the front axle, the total unit and the rear axle. It is possible for a motorhome to be within the **GVWR** yet overloaded on an 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.

There are two important factors to consider when loading the motorhome: 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 than on the other. 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. The weight load will be transferred on the opposite side from the direction in which the motorhome is cornering.

Improperly inflated tires, or suspension that is incorrectly loaded, can result in poor fuel economy, poor handling and over-stressed chassis components. Vehicle loading 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 will 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 a variety of places such as moving and storage lots, farm suppliers with grain elevators, gravel pits, recycling companies and large commercial truck stops.

If you are not aware of a nearby public scale, check the local area telephone book yellow pages under "scales-public" section or "weighers." A nominal fee will 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. There are several types of scales in use today. A platform scale will allow the entire motorhome to fit on the scale, which will read the **GVW** with only one scale recording required. A segmented platform scale is designed to weigh only one axle at a time, which may require two or three scale readings to determine the **GAW** or **GVW** total. A single axle scale enables one axle at a time. Some scales will read only one wheel position at a time due their physical size. Several scale readings may be required to determine the **GAW** or **GVW** total. Each wheel position will require weighing. This is referred to as a four corner or four point weigh. This type of weighing procedure will accurately determine what the correct tire inflation pressure should be. Depending on the type of scale being used, several different scale readings may be required.



NOTE: The most accurate method to determine proper tire pressure is a four-corner or four point weigh. 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.

During weighing, the scales as well as the motorhome must be as level as possible to obtain an accurate scale reading. Even though an axle or side is not physically on the scale, a definite lean in the motorhome will produce inaccurate scale readings.

Weight Label (Example)

MODEL YEAR: _____	MAKE: _____	MODEL: _____
UNIT NO. _____	CHASSIS VIN: _____	
	<u>LBS.</u>	<u>KGS.</u>
<u>GVWR</u>	(Gross Vehicle Weight Rating) is the maximum permissible weight of this fully loaded motorhome	
	_____	_____
<u>UVW</u>	(Unloaded Vehicle Weight) is the weight of an exemplar Motorhome as manufactured at the factory with full fuel, engine oil and coolants (*1)	
	_____	_____
<u>SCWR</u>	(Sleeping Capacity Weight Rating) is the manufacturer's designated number of sleeping positions multiplied by 154 pounds (70 kilograms)	
	_____	_____
<u>CCC</u>	(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).....	
	_____	_____
<u>GCWR</u>	(Gross Combination Weight Rating) means the maximum allowable loaded weight of this motorhome and any towed trailer or towed vehicle.(*2).....	
	_____	_____
	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 (*3) 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 (*4)	_____	_____
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) The UVW and CCC have been determined by weighing an exemplar motorhome with some but not all optional equipment available for each model year, make and model of motorhome. The result of the weighing of the exemplar motorhome is then used in calculating the UVW and CCC of other motorhomes of same model year, make and model. Your actual UVW and CCC may vary based upon options ordered. Please contact the manufacturer for the actual weight of each option.		
(*2) Consult your Owner's Manual for towing limitations, restrictions and other guidelines.		
(*3) 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.		
(*4) Dealer installed equipment and towed vehicle tongue weight will reduce CCC.		
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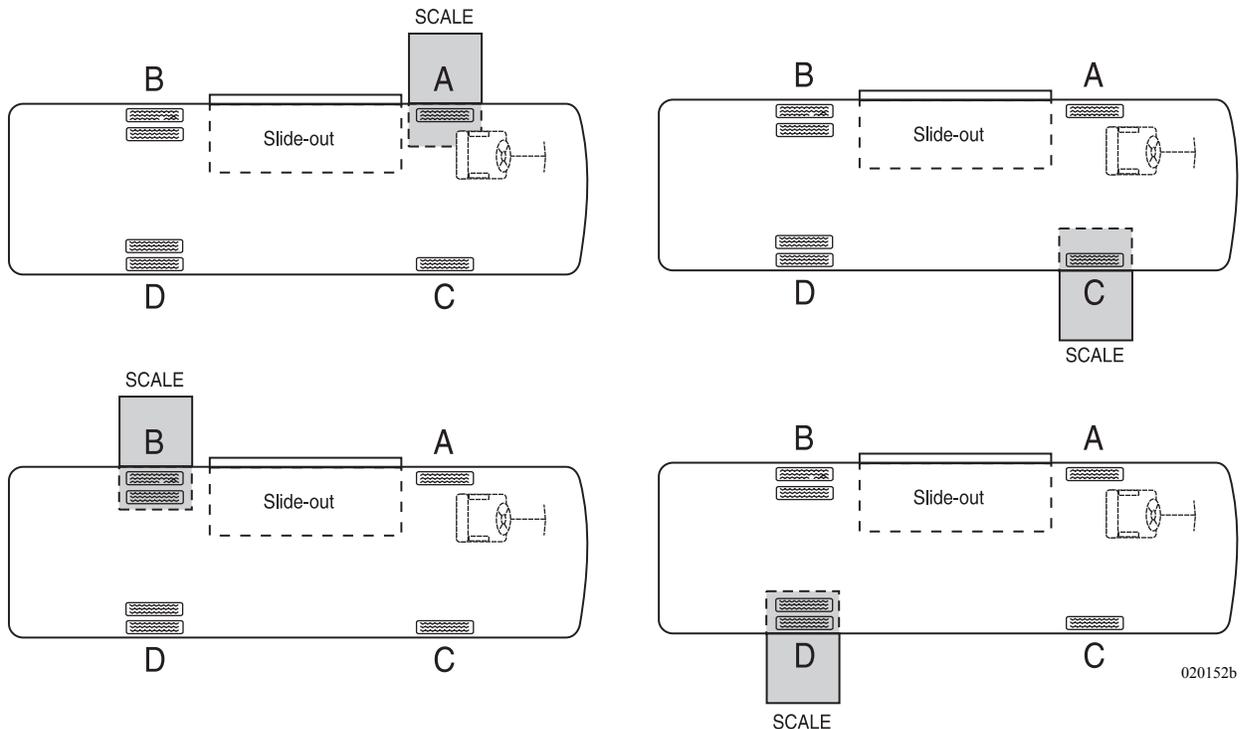
Four-Point Weighing (Example)



NOTE: 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.

- Take the rear axle **Gross Axle Weight Rating (GAWR)** and divide it by two. Example: Rear axle **GAWR** taken from the motorhome Vehicle Certification Label is 20,000 lbs. Divide the figure by 2, using chart below, record 10,000 lbs. on Scale B and D, line 1.
- Weigh the driver side rear corner (Scale B) and record weight on chart Scale B, line 2. Example: 7,100 lbs.
- Weigh the passenger's side rear corner (Scale D) and record weight on chart Scale D, line 2. Example: 6,900 lbs.
- Add chart Scale B and D, lines 1, for **Gross Axle Weight Rating (GAWR)** and record on chart under Totals. Example: 20,000 lbs.
- Add chart Scale B and D, lines 2, for actual **Gross Axle Weight (GAW)** and record on chart under Totals. Example: 14,000 lbs.
- Actual **Gross Axle Weight (GAW)**. Example: 14,000 lbs., is not to exceed **Gross Axle Weight Rating (GAWR)**. Example: 20,000 lbs.



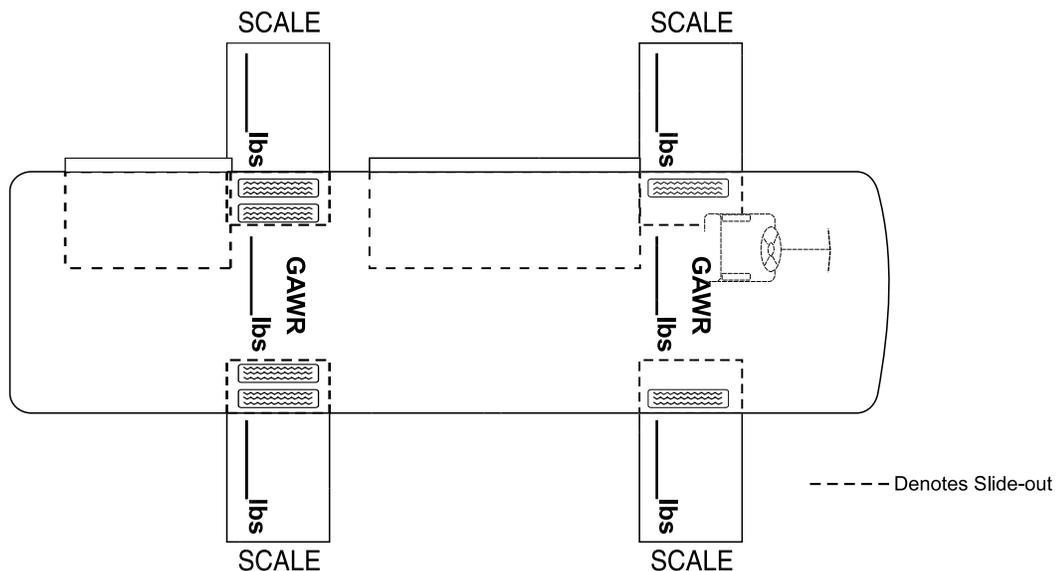
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- Refer to the Tire Chart (Tire size 295/80R22.5). Use the highest actual weight, Scale B or D, line 2. Example 7,100 lbs. Determine the proper tire pressure for each tire using the Load Inflation chart. Example: 115 psi or stamp on the sidewall of the tire.
- Repeat above procedures to determine front axle Scale A and C, tire pressures.

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



CAUTION: 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 helps to determine the correct inflation for the motorhome tire, 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.

Understanding the Inflation Table

- Tire Size is on the left margin of the Table.
- Determine the "Single" inflation reading or "Dual" inflation reading. This is denoted with a "D" or "S" on the Table. Single is for the Front axle. Dual is for the Drive axle.
- Find the corresponding psi at the top columns to see the corresponding maximum weight capacity for that psi.



NOTE: Every load range has a maximum rating as well as a minimum rating. Do not exceed those ratings.

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

TIRE SIZE	MAX Speed Rating (MPH)	Dual (D) Single (S)	INFLATION PRESSURE PSI												
			65	70	75	80	85	90	95	100	105	110	115	120	125
8R19.5	75	D	2350	2460	2570	2680	2780	2880	2980	3070	3160	3375(F)			
		S	2410	2540	2680	2800	2930	3060	3170	3280	3400	3500(F)			
225/70R19.5	75	D		2720	2860	3000	3115	3245	3415(F)						
		S		2895	3040	3195	3315	3450	3640(F)						
245/70R19.5	75	D		3415	3515	3655	3875(F)	3940	4075	4375(G)					
		S		3640	3740	3890	4080(F)	4190	4335	4545(G)					
265/70R19.5	75	D				3750	3930	4095	4300	4405	4560	4805	4860	5070(G)	
		S				3970	4180	4355	4540	4685	4850	5070	5170	5355(G)	
9R22.5	65	D	3120	3270	3410	3550	3690	3820	3950(F)						
		S	3190	3370	3560	3730	3890	4050	4210	4350	4500(F)				
10R22.5	65	D	3690	3870	4040	4200	4375	4520	4670	4875(F)	4970	5110	5250(G)		
		S	3770	4000	4210	4410	4610	4790	4970	5150(F)	5320	5490	5680(G)		
11R22.5	75	D				4760	4950	5120	5300	5470	5750(G)	5800(H)			
		S				4990	5220	5430	5640	5840	6175(G)	6240	6430	6610(H)	
12R22.5	65	D				5190	5390	5590	5780	5960	6150	6320	6500	6750(H)	
		S				5450	5690	5920	6140	6370	6590	6790	7010	7390(H)	
245/75R22.5	75	D		3260	3425	3640	3740	3890	4080	4190	4335	4410(G)			
		S		3470	3645	3860	3980	4140	4300	4455	4610	4675(G)			
255/70R22.5	75	D		3585	3765	3970	4110	4275	4410	4455	4610	4675	5070(H)		
		S		3815	4005	4190	4370	4550	4675	4895	5065	5205	5510(H)		
265/75R22.5	75	D			4040	4205	4370	4525	4685	4805(G)					
		S			4070	4255	4440	4620	4800	4975	5150	5205(G)			
275/70R22.5	75	D				4535	4750	4960	5165	5370	5575	5775	5975	6175(H)	
		S				4885	5080	5305	5530	5750	5965	6185	6400	6610(H)	
275/80R22.5	75	D				4855	5080	5305	5525	5745	5965	6180	6395(H)		
		S				5265	5515	5755	6000	6235	6475	6710	6940(H)		
295/75R22.5	75	D		4690	4885	5070	5260	5440	5675(G)	5800	6005(H)				
		S		4725	4945	5155	5370	5510	5780	5980	6175(G)	6370	6610(H)		
295/80R22.5	75	D			4855	5100	5335	5570	5805	6035	6265	6490	6720	6940(H)	
		S			5480	5750	6020	6285	6550	6810	7070	7320	7580	7830(H)	
315/80R22.5	75	D				5840	6070	6395	6540	6770	6940	7210	7610(J)	7390	
		S				6415	6670	6940	7190	7440	7610	7920	8270(J)	8820	
285/75R24.5	75	D		4740	4930	5205	5310	5495	5675(G)						
		S		4770	4990	5210	5420	5675	5835	6040	6175(G)				

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 mix of water, LP-Gas, passengers, or cargo.

It is important to understand the weighing process is performed in two phases. The first phase is determining the **Cargo Carrying Capacity (CCC)** and the 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 pounds.

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

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

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

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

The 154 pounds (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 pounds) and there are 4 people who weight 200, 200, 178 and 138 pounds, totaling 716 pounds, that doesn't mean the sleeping capacity is reduced to 3 individuals, but rather the **CCC** is reduced by 100 pounds due to the actual passenger weight.

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

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. When weighing the motorhome, all slide rooms must be in the retracted position. The motorhome must remain as level as possible on the scale, even though an axle or side is not physically on the scale. Once the motorhome is fully loaded and weighed to obtain an accurate scale reading, determine the proper tire pressure.

- 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 weight must be weighed and recorded to determine proper tire inflation.
- Wheel position weights are not to exceed any **Gross Axle Weight Rating (GAWR)** and **Gross Vehicle Weight Rating (GVWR)** as printed on the Motorhome Vehicle Certification Label.
- Compare wheel position weights with weigh ratings on the label. Do not operate if wheel position weights exceed maximum specifications. Items will need to be removed until rating weight is within specification.



WARNING: Further instructions for towing guideline, for any towed trailer or towed vehicle, are found in other areas of this manual.

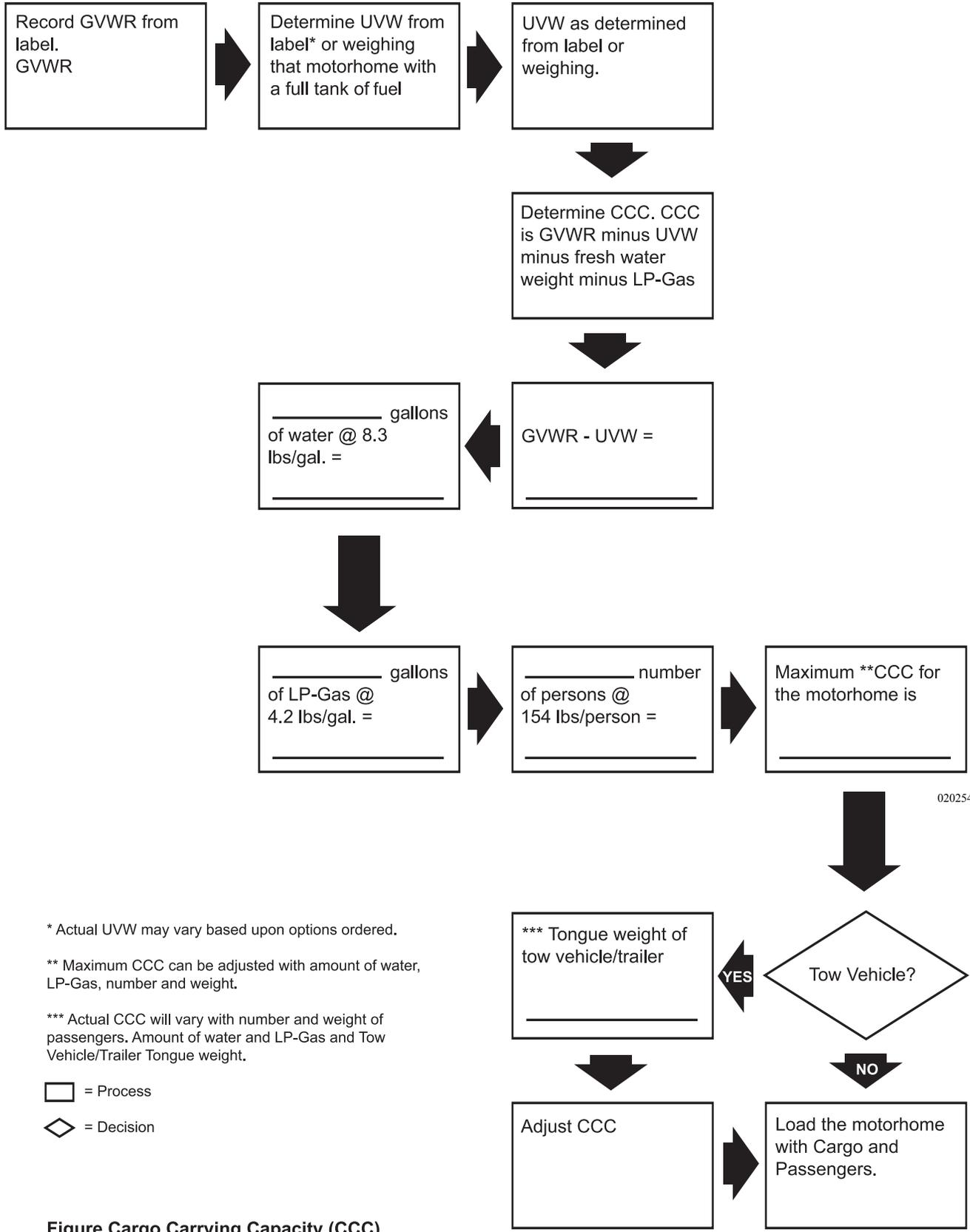
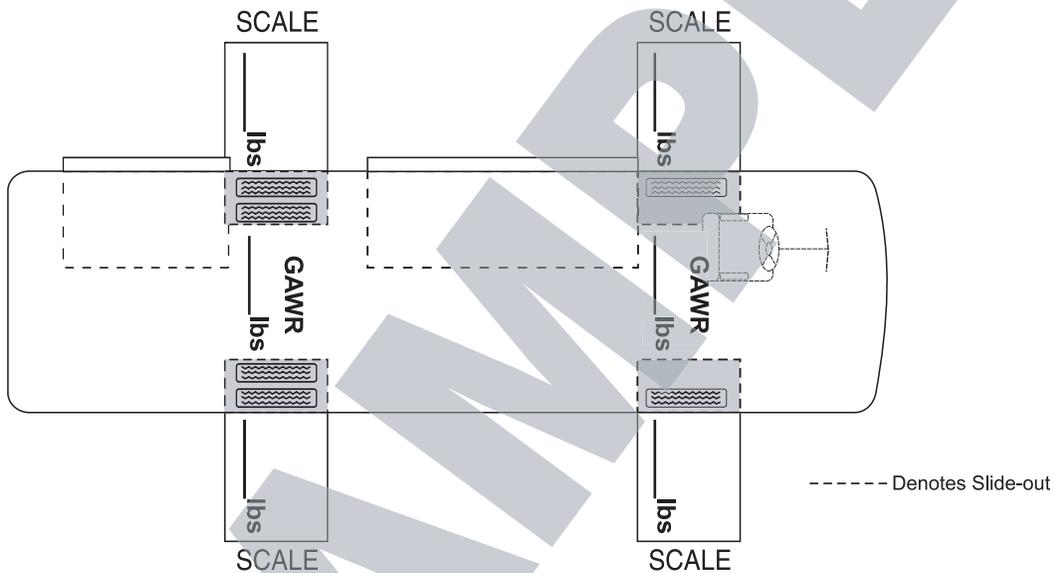


Figure Cargo Carrying Capacity (CCC)

	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.



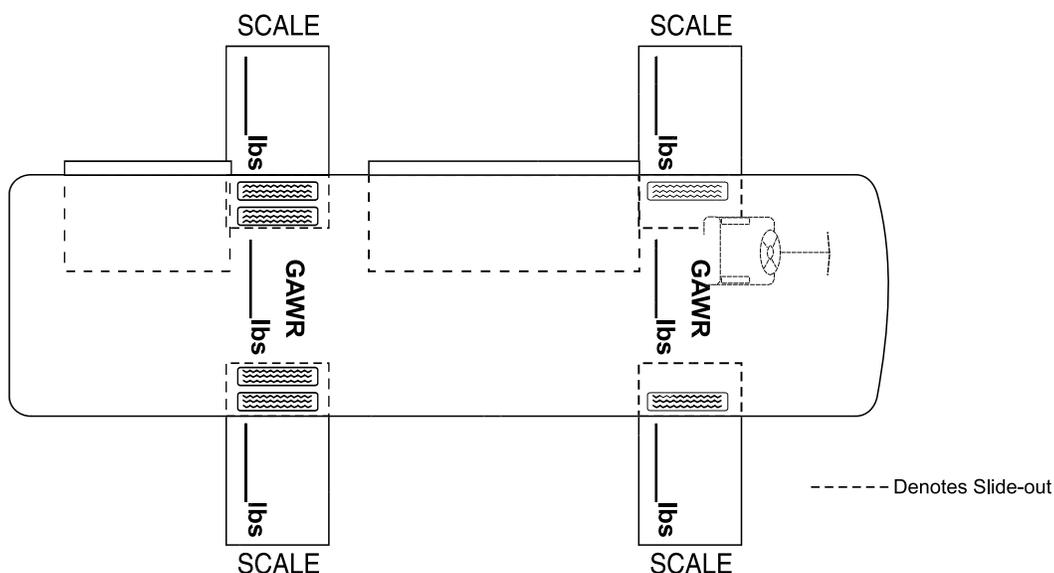
FORMULA		UVW 23,000 CAPACITY	CCC 10,000
FRESH WATER	Subtract Gallon @ 8.3 lbs/gal	100 x 8.3 = 830	- 9,170
WATER HEATER	Subtract Gallon @ 8.3 lbs/gal	10 x 8.3 = 83	- 9,087
LP-GAS	Subtract Gallon @ 4.2 lbs/gal	40 x 4.2 = 168	- 8,919
SLEEP CARRYING WEIGHT RATING	Subtract Persons @ 154 lbs/person	5 x 154 = 770	- 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).		Maximum Cargo Carrying Capacity CCC	8,149

020255b example

	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



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



	FORMULA	UVW CAPACITY	CCC
FRESH WATER	Subtract Gallon @ 8.3 lbs/gal	X 8.3 =	-
WATER HEATER	Subtract Gallon @ 8.3 lbs/gal	X 8.3 =	-
LP-GAS	Subtract Gallon @ 4.2 lbs/gal	X 4.2 =	-
SLEEP CARRYING WEIGHT RATING	Subtract Persons @ 154 lbs/person	X 154 =	-
		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).

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WEIGHT RECORD SHEET:

DATE: _____
PLACE: _____
TOTAL WEIGHT: _____
FRONT: _____
DRIVE: _____

DATE: _____
PLACE: _____
TOTAL WEIGHT: _____
FRONT: _____
DRIVE: _____

DATE: _____
PLACE: _____
TOTAL WEIGHT: _____
FRONT: _____
DRIVE: _____

DATE: _____
PLACE: _____
TOTAL WEIGHT: _____
FRONT: _____
DRIVE: _____

DATE: _____
PLACE: _____
TOTAL WEIGHT: _____
FRONT: _____
DRIVE: _____

DATE: _____
PLACE: _____
TOTAL WEIGHT: _____
FRONT: _____
DRIVE: _____

DATE: _____
PLACE: _____
TOTAL WEIGHT: _____
FRONT: _____
DRIVE: _____

DATE: _____
PLACE: _____
TOTAL WEIGHT: _____
FRONT: _____
DRIVE: _____

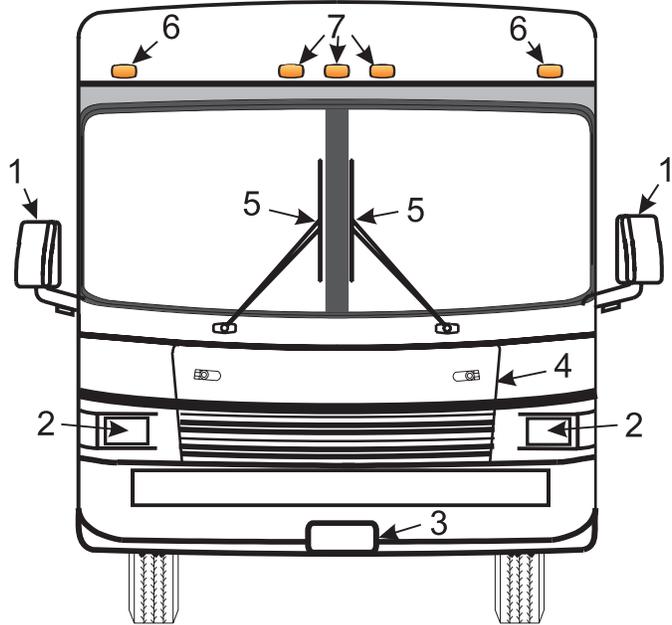
DATE: _____
PLACE: _____
TOTAL WEIGHT: _____
FRONT: _____
DRIVE: _____

DATE: _____
PLACE: _____
TOTAL WEIGHT: _____
FRONT: _____
DRIVE: _____

IEWS - Front

FRONT EXTERIOR

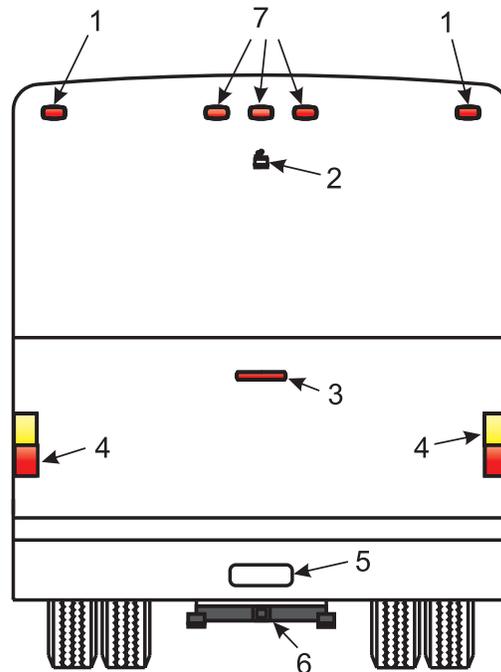
- | | |
|-----------------------|--------------------------|
| 1. Mirrors | 5. Windshield Wipers |
| 2. Headlights | 6. Clearance Lights |
| 3. License Plate | 7. Identification Lights |
| 4. Engine Access Door | |



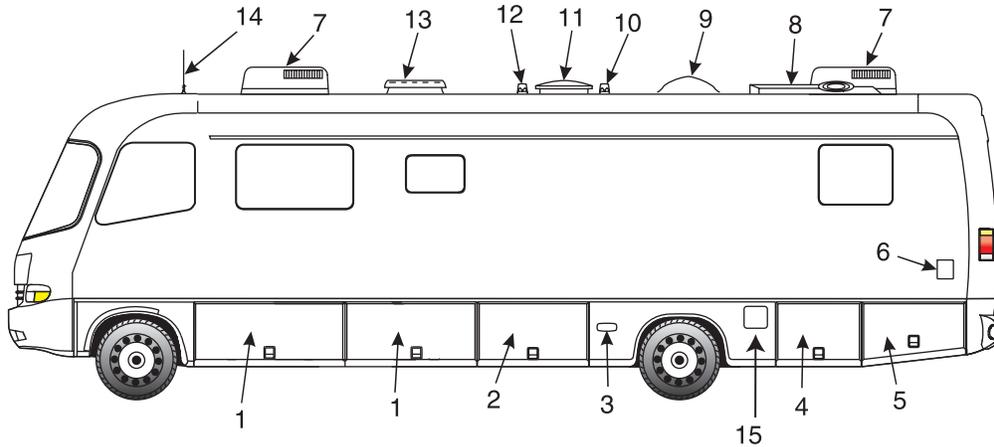
Rear

REAR EXTERIOR

- | | |
|----------------------|--------------------------|
| 1. Clearance Lights | 5. License Plate |
| 2. Rear View Camera | 6. Rear Tow Hitch |
| 3. Third Brake Light | 7. Identification Lights |
| 4. Taillight | |

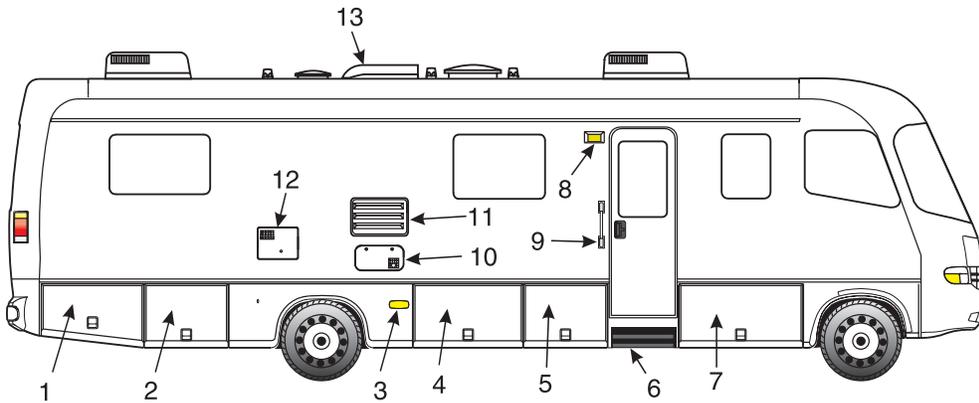


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ROADSIDE EXTERIOR

- | | |
|-----------------------------------|---------------------------|
| 1. Storage Compartment | 8. TV Antenna |
| 2. Generator/Leveling Jack Pump | 9. Skylight Dome |
| 3. Marker Light | 10. Toilet Vent |
| 4. Water Control Service Center | 11. Exhaust Vent - Bath |
| 5. Shore Cord - Electrical Center | 12. Holding Tank Vent |
| 6. Gravity Fill | 13. Exhaust Vent - Galley |
| 7. Roof Air Conditioner | 14. Radio Antenna |
| | 15. Fuel Fill |



CURBSIDE EXTERIOR

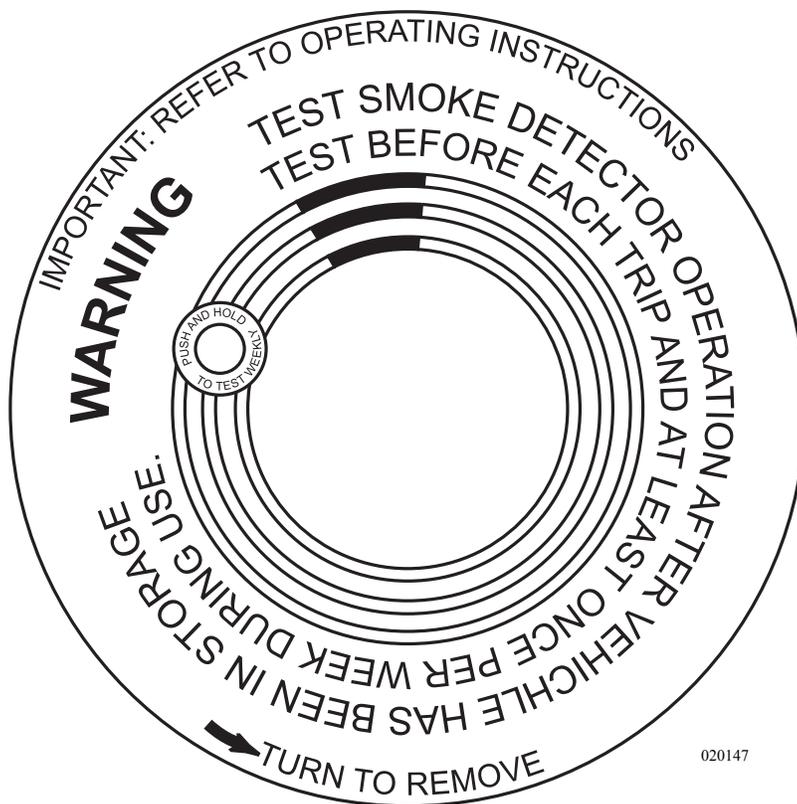
- | | |
|--|---------------------------|
| 1. Storage Compartment | 9. Grab Handle |
| 2. House Batteries & Disconnect | 10. Furnace/Heater Access |
| 3. Marker Light | 11. Refrigerator Access |
| 4. LP Tank Access & Controls | 12. Water Heater |
| 5. Storage Compartment | 13. Refrigerator Vent |
| 6. Entry Steps | |
| 7. Chassis Disconnect & Electrical Panel | |
| 8. Porch Light | |

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 insure there will be no 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.



When a 9 Volt DC battery is correctly connected, the smoke alarm is operating. The LED will flash every minute showing the battery is supplying power. A load alarm will sound when a production of combustion is sensed.



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

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



CAUTION: Never use an open flame to test the smoke alarm. You may ignite and set fire to the alarm and to the motorhome.

A smoke alarm is designed to be as maintenance free as possible. However, there are some simple steps to perform in order to keep the smoke alarm working properly:

- 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 should be cleaned every six months to help keep the unit working efficiently.
- The smoke alarm will beep once a minute when a low battery condition exists. The battery must be replaced immediately.

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

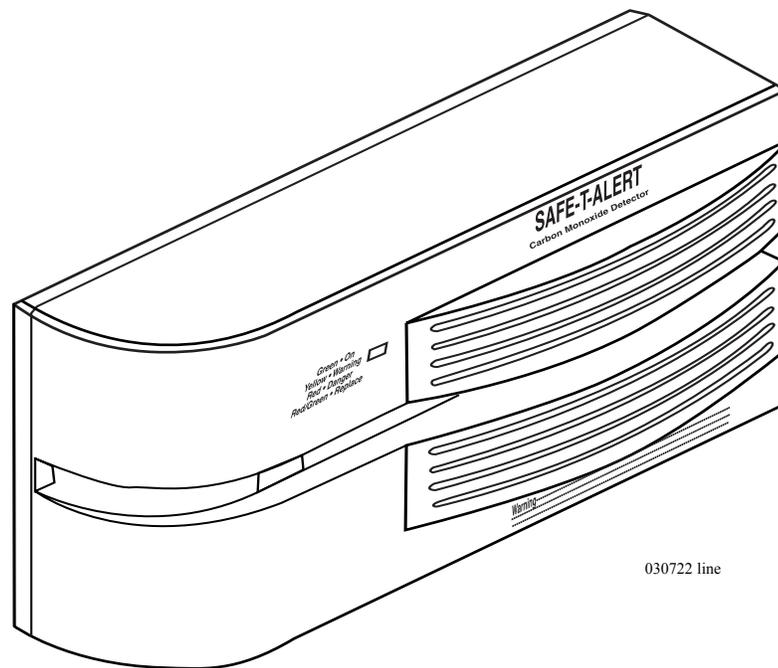
- Inspect for obvious damage.
- Check for the recommended battery type.
- Check the battery for proper connection or replace the battery if needed.
- Gently vacuum as recommended.

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."

The motorhome is equipped with such 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 carrying 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 would 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 both the house and chassis batteries, this allows a 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 that can accidentally be turned off. There is a simple test procedure that should be preformed to ensure the CO detector is functioning properly.



WARNING: If there is constant beeping and the red light is flashing, CO gas has been detected. Shut off appliances, coach engine, and water heater. Evacuate the motorhome and have any problems corrected before restarting any appliances or the coach.

Operation

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

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

Indicator Lights and Sound Patterns:

- **ON** or normal condition is indicated by **green**. The CO detector has power and is sensing air for the presence of CO gas. The alarm horn will not sound.
- Flashing **red** indicates low CO alarm condition along with **four** beeps then **OFF** for 5 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 **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 Sources of CO when operating the motorhome:

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

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 illuminates a steady **red**. Six seconds later the alarm will again beep four times and the indicator light illuminates a 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 indicates 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.

Use a vacuum cleaner to remove dust or any other buildup on the detector. Do not wash. Wipe the detector with a damp cloth and dry with a towel. Do not open the detector for cleaning. Do not paint the detector. It is recommend that the Carbon Monoxide detector be replaced every 10 years.

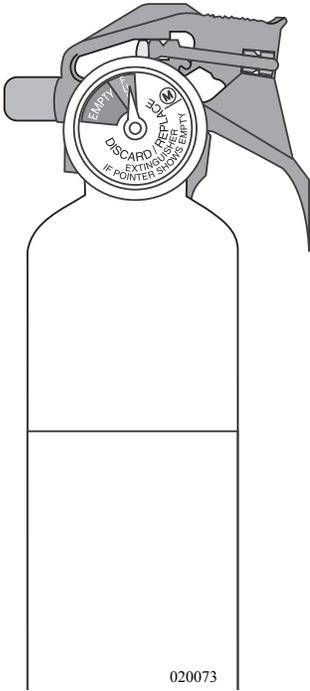
Cleaning

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.**

Troubleshooting

NOTE: 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, you and your family should 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.

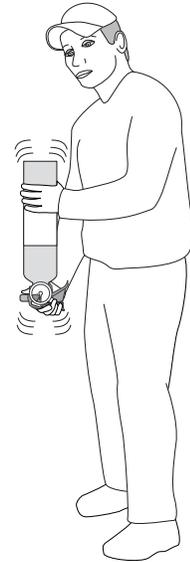
Use the PASS word!

Pull the pin to unlock the extinguisher.

Aim at the base (bottom) of the fire and stand 6-10 feet away.

Squeeze the lever to discharge the agent.

Sweep the spray from left to right until totally extinguished.

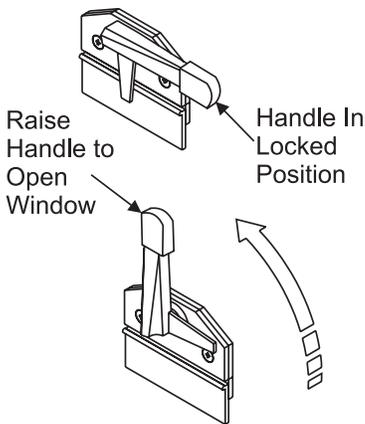


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WARNING: Road vibration will cause extinguisher powder to compact and may cause extinguisher malfunction. Invert and shake extinguisher monthly.

EGRESS EXIT WINDOW



Egress Window Handle

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An egress window is designated for use as an exit in the case of an emergency. Inside the motorhome the egress window is easily identified by the red locking handle. It is also marked as an "EXIT." The glass slider in the egress window operates the same as all other windows.

To open the egress window:

- Rotate the red handle downward. Slide the window open.
- Slide the window closed and rotate the handle to lock the egress window.



CAUTION: The egress window should be opened twice a year to ensure proper operation.



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EXTERIOR & INTERIOR

SECTION 3

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The most common cause of corrosion to the motorhome is the accumulation of road salts, grime and dirt. These elements, combined with moisture, may possibly cause early component failure. Salt air and fog from coastal trips can greatly accelerate the corrosion process. Corrosive materials collected from roadways accumulate on the undercarriage, around wheel openings and on the radiator charge air cooler package. These areas need to be cleaned periodically to help prevent component failure due to corrosion. 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.** Remove road debris and mud that has accumulated. Material left behind can intensify the corrosion problem.



CAUTION: Damage can result when using a high pressure washer or steam cleaner. Nozzle discharge pressure can exceed 1,800 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.

The life of the exterior paint finish can be extended if properly cared for. Periodic cleaning will help preserve the paint finish. The motorhome is painted with a “base coat, clear coat system.” The clear coat is a polyurethane based material which brings out the shine or 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 using abrasive cleansers or laundry detergents as they will scratch the clear coat and leave a soap film. The use of specially designed automotive washing utensils, such as soft bristle brushes, are acceptable as long as they do not trap abrasive material and scratch the surface while being used. 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 the build up is excessive, run water over a soft brush while gently scrubbing 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 any detergent residue.

Washing

Drying

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 until all chamois material has absorbed water. Wring excess water from chamois. Start at the top and work towards the bottom. Use a downward “S” pattern to remove water from the surface and 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

To wax or not to wax? This is a good question. There are many schools of thought on this issue. The two most common thoughts are:

- The clear coat needs to “breathe.” A layer of wax will seal the clear coat not allowing it to breathe, possibly leading to failure of the clear coat.
- If the surface is not waxed, what is protecting the surface from the environment (road salts, acid rain, road tar, ultraviolet light)?

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.



INFO: When selecting a product for use 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, being applied either by hand or by using a polisher with a special pad.

Waxes: Waxes come in many types of chemical make-ups. The popular Carnauba wax is a natural occurring wax from the leaves or fronds of the Carnauba palm tree. Mineral waxes have a paraffin base. There are also other topical application products which contain silicone.

Polishes: Polishes usually contain a combination of wax based substances with an abrasive, getting the two for one idea. 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 all manufacturer’s 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 checking for hazing or swirl marks. If an abnormal reaction to the finish occurs, discontinue product use and consult the product's 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 or cotton baby diapers 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.

Road oil will cause deterioration of the rubber. Dirt buildup will help hold chemicals in the air next to the tire and will also cause deterioration.

Tire Care

When cleaning any rubber product, 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.

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

Care & Maintenance of Wheel Covers

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

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

Bright Metal

All chrome, stainless steel and aluminum should be washed and cleaned each time the motorhome is washed. Use only automotive approved non-abrasive cleaners and polishes on exterior bright work. Aluminum wheels should be cleaned regularly with a non-abrasive cleaner recommended for aluminum wheel care. 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 type products that are recommended for use on painted surfaces and fiberglass. Observe the warning recommendations and directions printed on the container of any agent being used.

EXTERIOR MAINTENANCE

The motorhome is subject to a great deal of outside conditions. While the coach is parked it is exposed to extreme temperatures, humidity, ultraviolet rays, acid rain and other organic environmental conditions. While in operation, the coach is subject to twisting and flexing caused by (for example) going in and out of driveways, bouncing through potholes and driving through winding mountain roads.



Inspect the fiberglass exterior. Periodic inspections may reveal minute cracks in the surface commonly called “spider cracks” or “hairline cracks” which are caused by the flexing of the fiberglass exterior. These are normal. If a crack represents a threat to the integrity of the fiberglass it will open up and the weave of the cloth would be visible. If the exterior has been damaged, prevent moisture penetration, especially in freezing climates. Cover the area as quickly as possible. Use plastic sheeting and tape, if necessary, so that moisture will not get into the motorhome and damage the interior.

Periodic resealing of the joints and seams is necessary to prevent the entrance of moisture into the motorhome. Enough emphasis cannot be placed on this issue. Extreme damage from a water leak can occur rapidly. Never leave the motorhome unattended with the slide room extended. If the motorhome is to be stored outside throughout the winter months, a full interior inspection for water leaks should be made bi-monthly.

Extensive sealing has been done at the factory; however, the normal twisting and flexing that occurs while traveling may have compromised a seal or seam.



INSPECT: All joints and seams should be inspected at least twice a year and recalced as necessary.

Special attention should be directed toward the roof air conditioning seals, ceiling and plumbing vents, skylights, roof mounted antennas, windows, door molding, clearance lights and the beltline molding.

Specific sealant products should be used in the areas for which they were designed. These items can be obtained from recreational vehicle parts suppliers. Listed below are some of the more common sealants and the areas in which they are used. Approved sealants are available at service centers and authorized dealers.

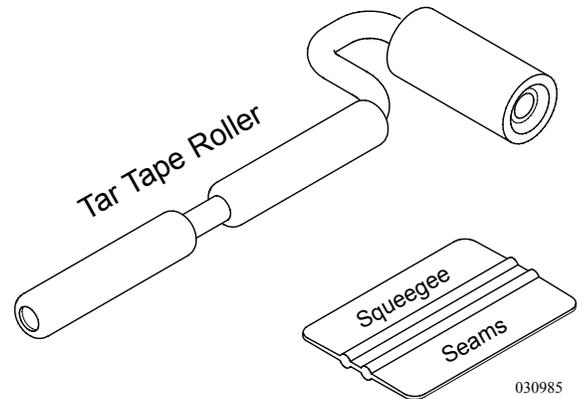


WARNING: Some products may contain hazardous materials which require special handling. Read labels carefully. Follow all of the product manufacturer's safety requirements.

Sealant Types:

Tar Tape:

The tar tape is used on aluminum roofs seal seams at the front, rear and down the center. 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 aluminum surface with Denatured Alcohol.
2. Set the tar 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 tar tape at least twice a year for cracks. Removal of the tar tape is done with a plastic putty stick. Thoroughly clean the surface using 3M adhesive cleaner before applying the new tar tape.

Acrylic Foam Tape:

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

- Clean Surface - Use Pro-Clean 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 Pro-Bond adhesion. The Pro-Bond will make for a better bond for the Acrylic Tape.



NOTE: Use a heat gun to warm the product. When storing the motorhome, store in a warm area if possible.

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. 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.

INTERIOR CARE *Cockpit*

The cockpit area has several areas that require special care and cleaning. The dashboard itself is a molded fiberglass vinyl wrapped pod. The instrument panel is comprised of various gauges and switches, and may also have various other items added. Although the dashboard and instrument panel are part of the cockpit, each has different care and cleaning requirements. The vinyl wrapped dash pod is cleaned using the instructions for Vinyl Care in this section. In the event a blemish or small cut occurs in the vinyl, contact a professional upholstery repair service. There are several methods that can be performed to make these repairs.

The instrument panels are a common grade plastic and should be cleaned using a mild soap and water solution and a 100% cotton cloth. Dampen the cloth with the soap and water solution then wipe the panel. Dry using a separate cotton cloth. Plastic manufacturers recommend any plastic polish product can be used to brighten the appearance. Some products that are available are Novus Plastic Care[®] system. This is a three-part system that will clean, polish and protect as well as remove minor scratches in plastic products. Meguires[®] is another quality polish that can be used. A common product that can be used to remove scratches and polish is Johnson Paste Wax[®]. This will require extensive buffing and rubbing.

Some gauges may use glass lense that should be cleaned using a glass cleaner; others will use plastic or plexiglass lenses. When cleaning a glass face, the cleaner should be sprayed on the cleaning cloth instead of directly on the lens. If sprayed directly on the lens, there is a chance of over spray or runoff contacting the plastic.



CAUTION: Most glass cleaning products are volatile to plastics; extreme care must be used to prevent the glass cleaners from contacting the plastic. This can make the plastic brittle and dull the finish.



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



Use glass cleaner on glass lens only. Do not spray cleaner directly on the lens.

FABRICS

Most fabrics have a designated cleaning code assigned to them. The cleaning code is determined, in most cases, by the content of the fabric. The code represents the cleaning agent and method that is approved by the fabric industry. If the fabric is abused, it can be damaged. Special care needs to be taken when the motorhome is exposed to a very humid climate for an extended period of time. Cover all upholstery and make sure window coverings are down to protect from sun damage.

Protect the fabric from any unnecessary exposure to moisture. Frequently used items will wear accordingly and may require more attention than those items not regularly used.

Use the following guidelines for cleaning upholstery fabrics.

- Water-based cleaners are not recommended.
- If a spill does occur, blot the soiled area. Do not rub it.
- Some solvents are not recommended since they may have an adverse reaction on a specific backing of the upholstery fabric.
- To prevent overall soiling, frequent vacuuming or light brushing are recommended 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.

The codes listed below refer to cleaning instructions recommended by the fabric manufacturing industry. Since most fabrics are hand-selected it is up to you to obtain the cleaning code for a particular fabric. If a spill occurs blot the moisture as quickly as possible. **Do not** use soap and hot water as this may set a stain. Obtain the cleaning code for the fabric as soon as possible.

"W" - Clean this fabric with the foam only of a water-based cleaning agent to remove the overall soil. Many household cleaning solvents are harmful to the color and life of a fabric. Cleaning only by a professional furniture cleaning service is recommended. To prevent overall soil, frequent vacuuming or light brushing to remove dust and grime is recommended.

"S" - Clean this fabric with pure solvents (petroleum distillate-based products such as Energine, Carbona, Renuzit, or similar products may be used) in a well ventilated room. Cleaning only by a professional furniture cleaning service is recommended.

"S/W" - Clean this fabric with the foam only of a water-based cleaning agent or with a pure solvent in a well ventilated room (petroleum distillate-based products such as Energine, Carbona, Renuzit, or similar products may be used). Cleaning only by a professional furniture cleaning service is recommended. To help prevent overall soiling, frequent vacuuming or light brushing to remove dust and grime is suggested.



CAUTION: Use of water-based or detergent-based solvent cleaners may cause excessive shrinking. Water stains may become permanent and unable to be removed with solvent cleaning agents. Avoid products containing Carbon Tetrachloride as it is highly toxic. To help prevent overall soiling, frequent vacuuming or light brushing to remove dust and grime is recommended.

"P" - The article is resistant against perchlorethene, cleaning benzine (spirit), white spirit, R-11 and R-13.

"Dry Clean Only" - Cleaning only by a professional dry cleaner or furniture cleaning service is recommended for this fabric.

"X" - Vacuum only. A non-metallic brush may be used.

***Machine Washing for 100% Polyester:**

"Wash Cycle" - Use synthetic setting and high water level with mild agitation. A mild soap or detergent in water not to exceed 160° F. No bleach or fabric softener.

"Drying" - Use low temperatures, a synthetic setting of 85° F to 90° F maximum should be used. Do not exceed three to five minutes time on the synthetic cycle. If washed at 160° F, the maximum temperature which can be used to dry is 140° F. Hang or fold immediately after drying.

"Finishing" - If necessary, press as following:

- Iron on low setting (275° F) with damp cloth or steam iron using a dry press cloth.
- Grid Head press for short intervals with minimum steam. Do not lock the head.
- Flat bed press dampened drapery using cloth covering.
- Avoid prolonged contact with heat.

Fabric Specifications Chart

APPLICATION	COLOR/PATTERN	CONTENT	CODE
Castle Gate .03a			
Sofa, LR Lambrequin	Warwick Bark	62% Acrylic, 38% Polyester	W
LR Lam, FSD Back, Chair, LR Pillow Booth Dinette	Bouvier Moss	48% Viscose, 31% Polyester, 21% Cotton	W
LR Pillow, FSD Seat	Caceres - Ref 63	65% Rayon 30% Polyester 5% Acrylic	S
Bedsread, BR Lambrequin	Monrovia / Paramount Spice	100% Cotton	W
LR Pillow, Bedroom Accent, Br Lambrequin	Serena Sienna	70% Polyester 30% Rayon	Dry Clean
Bedroom Pillow, BR Welt	Serena Hazelnut	70% Polyester 30% Rayon	Dry Clean
Decorative Pillow Trim	FR-215-A Hazel - Cottage Coll. 1" Loop Fringe	74% Polyester 26% Cotton	P
Windshield	Pearl 009 Natural	100% Polyester	W/S
Vinyl for Furniture	Illusion Taupe	Vinyl	Vinyl
Main Dash Color	Tumbleweed New Oyster	Vinyl	Vinyl
Dash Accent	Tumbleweed Taupe	Vinyl	Vinyl

APPLICATION	COLOR/PATTERN	CONTENT	CODE
Enchantment .04a			
Sofa, LR Lambrequin, LR Chair	New Elements - Atlantis	46% Olefin 42% Acrylic 12% Polyester	W
LR Lambrequin, LR Pillow, Booth Dinette	Bouvier Cornsilk	48% Viscose, 31% Polyester, 21% Cotton	W
LR Pillow, FSD	Alliance Putty	46% Polyester, 32% Olefin, 22% Acrylic	W
Bedsread, BR Lambrequin, Headboard Trim	Ameida / Paramount - Cornflower	100% Cotton	W
BR Lambrequin, Headboard, BR Pillow	Pagoda French Blue	85% Polyester 15% Rayon	Dry Clean
BR Pillow, BR Accent	Pagoda Pongee	85% Polyester 15 Rayon	Dry Clean
Decorative Pillow Trim	FR-118 Golden Pond - Classic Coll. 1 1/2" Brush Fringe	46% Acrylic 54% Polyester	P
Windshield	Pearl 009 Natural	100% Polyester	W/S
Vinyl for Furniture	Illusion Taupe	Vinyl	Vinyl
Main Dash Color	Tumbleweed New Oyster	Vinyl	Vinyl
Dash Accent	Tumbleweed Taupe	Vinyl	Vinyl

APPLICATION	COLOR/PATTERN	CONTENT	CODE
Spun Silver .05a			
Sofa, LR Lambrequin, Booth Dinette	Holler Back MO-36809-020	53% Acrylic 30% Polyester 17% Polypropylene	S
LR Lambrequin, Chair, LR Pillow, FSD	Spin City Celery	74% Olefin 26% Polyester	S/W
LR Pillow, LR Accent	Ania - Ref 999	60% Rayon 29% Polyester 11% Acrylic	S
Bedsread, BR Lambrequin, Headboard Trim	Graz - Ridgewood - Pewter	70% Polyester, 30% Cotton	None
BR Lambrequin, Headboard, BR Pillow	Serena Mushroom	70% Polyester 30% Rayon	Dry Clean
Decorative Pillow Trim - Brush	Paw Print Siamese Fringe Brush	39% Polyester 49% Acrylic Chenille 12% Viscose Wool	S
Windshield	Pearl 009 Natural	100% Polyester	W/S
Vinyl for Furniture	Illusion Taupe	Vinyl	Vinyl
Main Dash Color	Tumbleweed New Oyster	Vinyl	Vinyl
Dash Accent	Tumbleweed Taupe	Vinyl	Vinyl

Vinyl

Several areas of the motorhome, such as the dash, ceiling and items of furniture, may be covered in vinyl. The care and cleaning of these areas are outlined in the Morbern Vinyl section below.

Morbern Vinyl:

Vinyl requires periodic cleaning to maintain its neat appearance and to prevent the buildup of dirt and contaminants that may permanently stain and/or reduce the life of the vinyl if not removed. The frequency of cleaning depends upon the amount of use and the environmental conditions in which the vinyl is subjected. The procedures used for cleaning are dependent upon the end-use circumstances.

Normal Cleaning:

Most common stains can be cleaned using warm soapy water and 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 removed immediately. The procedure for removal of the more severe staining agents are outlined below.



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 Morbern 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:

Permanent Marker Ink spots will stain the vinyl permanently. Wipe the stain immediately with rubbing alcohol in a well ventilated area to remove much of the stain.

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 any vinyl upholstery as it will cause premature embrittlement and cracking. Dilute chlorine bleach before using. Never use full strength bleach.



CAUTION: Paint strippers will remove the print pattern and damage the vinyl if it comes in direct contact.



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.

Latex Paint:

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

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 may 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 make it easier to remove. In a well ventilated area, use a cloth saturated with mineral spirits and gently rub the remaining gum. Rinse thoroughly with clean water.

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

Apply a small amount of mineral spirits with a cloth. Rub gently. Be careful not to spread the stain by smearing it beyond its 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:

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

Blood or Plant Residue:

Rub out any spots with a clean cloth soaked in cool water. If stubborn spots remain 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.



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 “office” 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.

Leather**Spots & Spills:**

Absorb excess liquid immediately with a clean cloth or sponge. Use water only if necessary. Do not use a cleaning product. If water is used, clean the entire area where the spot occurred. An example would be the entire seat cushion or the entire arm. Allow to air dry. Do not dry the wet areas with hair dryers, etc.

Stubborn Spots and Stains:

Use lukewarm water and a mild soap to work up a thin layer of suds on a piece of cheesecloth. Scrub the surface. Rinse with a piece of clean, damp cheesecloth. Allow to air dry. Do not use saddle soap, cleaning solvents, furniture polish, oils, varnish, abrasive cleaners, soaps or ammonia water.



NOTE: These are recommended or suggested methods of cleaning. The manufacturer is not responsible for damage incurred while cleaning. Always test the cleaning method in an inconspicuous area first before applying to the entire area.

Care Instructions:

- Spot clean with mild soap and water
- Air dry or dry quickly with warm setting of a hair dryer.
- For stubborn stains, use mild solvent.
- For tougher stains, try *Fantastik*® brand spray cleaner.
- Disinfect with a **5:1 NON- CHLORINATED** (only) bleach solution.
- Dry clean using commercial dry cleaning solvents only.
- Use a mild detergent for:
 - Red Wine, Liquor - Coffee, Tea, Cola - Milk
 - Ketchup, Mustard, Mayonnaise - Steak Sauce, Soy Sauce
 - Butter, Salad Oil - Chocolate - Lipstick, Make-up, Face Cream
 - Suntan Oil - Machine Oil - Urine, Blood

Removing ballpoint pen stains:

Wipe the stain off with ethanol (ethyl alcohol). If the stain cannot be removed with ethanol, use the following procedure. Proceed with caution when using toxic chemical.

- Prepare bleach. Dilute household bleach (sodium hypochloride) with the same amount of water.
- Place a piece of tissue and apply the solution prepared by step 1 (do not apply too much). Cover it with polyethylene film to prevent the solution from drying.
- Remove the tissues occasionally to check on the condition of the stain. When the stain is almost gone, remove the tissues completely. Do not leave on for more than one hour.
- Wash the stain with sufficient amount of water.

If there is residue of bleach, polyurethane resin and back cloth will deteriorate. Neutralize it by the following method:

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

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

**For more information, please call: Ultrafabrics, LLC
Customer Service: 1-877-309-6648**

FLOORS - Carpet Cleaning

Use the solution specified in order from 1-8 until stain is removed.	A	B	C	D	E	F	G	H	I
	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.

Spot Removal Procedures:

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

Cleaning Solutions:

- A. Dry Cleaning Fluid:** A nonflammable spot removal liquid, available in grocery and hardware stores.
- B. Nail Polish Remover:** Any acetate, which often has a banana like fragrance. Do not use if it contains acetone.
- C. Detergent Solution:** Mix two cups of cold water and 1/8 teaspoon mild liquid detergent (no lanolin, non-bleach).
- D. Warm Water:** Lukewarm tap water.
- E. Vinegar Solution:** One cup white vinegar to one cup water.
- F. Ammonia Solution:** One tablespoon household ammonia to one cup water.
- G. Call Professional:** Additional suggestions, special cleaning chemicals or the ability to patch the area might be available.
- H. Spot Removal Kit:** Available from retail carpet stores or professional cleaners.
- 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.

Tile Floors (Optional)

Tile floors vary in porosity and surface irregularities. This can make it difficult to protect and maintain. Regular maintenance is important to keep the tile in the motorhome looking showroom new. Once the slide-out has been extended, keep the tile floor clean to prevent dirt from scratching the tiles prior to retracting the slide-out.



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

Cleaning Tile:

Use a damp sponge mop or a cloth to clean tile and maintain its luster. If moderate staining occurs, cleaning with a window cleaner such as Windex should do the job. A mild solution of hot water and all-purpose cleaner for tile floors, walls and countertops can also be used. Rinse well with clear water and dry with a soft cloth to prevent streaking. Avoid cleaning tile with soap. Soap forms a film to dull the luster. Soap also promotes the growth of mildew and bacteria. Do not use powdered cleaners on unglazed tile floors. Undissolved powder will dull the surface. Grout sealers are available that protect the porous surfaces. If a sealer is used, follow the sealant manufacturer guideline for application. Never use sealers on unglazed tile. With the exception of terra cotta, which may be oiled or waxed, tile does not need to be polished or buffed maintain its finish.

Grout:

The grout used is a two part concrete mix. It is normal for this type of grout to develop surface cracks over time. In motorhome application, due to the constant flexing of the flooring, this process may accelerate. If the grout requires cleaning, scrub with a plastic brush. Do not use steel wool as small particles may remain and produce unsightly stains.



NOTE: Before using any solution to clean the tile, check the manufacturer's warning label to ensure the safety of the product. If there is any doubt, apply several test patches of the solution in an inconspicuous place to determine the product's suitability.

The vinyl flooring in the motorhome is durable and long lasting when properly taken care of. When a spill occurs, wipe it up with a damp sponge or paper towel. Avoid using cleansers containing abrasives or scouring pads as these may damage the finish of the flooring. Keep the floor clean as dirt, grit and soil can act as abrasives. A 100% latex backed floor mat may help to keep floor clean. Do not use rubber backed mats or rubber casters as they may stain the flooring. Use large protection pads with felt spots on bases of heavy stationary items to help disperse the weight. Felt spots are non-abrasive. High, stiletto type heels may permanently damage the flooring. When moving heavy objects lay a piece of plywood down to prevent accidental galling of vinyl.



NOTE: Some dishwashing 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.



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

Floors - Stains, Spills & Scuff Chart (Vinyl Flooring)

Stains & Spills

Acids, Alkalis	Fruit, Fruit Juices
Blood	Grass
Catsup, Mustard	Iodine, Mercurochrome
Cleaners, Strong Soaps	Urine, Excrement
Dye, Dye Markings	Rust
Food, Candy	

Remedy

- Apply Congoleum Bright 'N Easy No-Rinse Cleaner®, full strength, on a wet sponge.
- Treat stubborn stains by rubbing the area with a 10 to 1 dilution of water to liquid bleach.
- If rust stain does not respond, use lemon juice or a cream of tartar solution.

Paint & Solvent Spills

Dry Cleaning Fluids	Oil Based Paints
Lacquer	Wood Stains
Latex Paints	Varnish
Nail Polish	
Solvents	

Remedy

- Blot up excess at once.
- Rub lightly with a cloth dipped in mineral spirits* or paint thinner*.
- If paint is dry, gently peel it from the floor.
- Clean are with Congoleum Bright 'N Easy No-Rinse Cleaner®.

Stains That Will Not Wipe Up

Adhesives	Grease
Asphalt	Candle Wax
Chewing Gum	Tar
Oil	

Remedy

- Remove excess with a dull kitchen knife. (Avoid sharp instruments that could scratch the floor.)
- Rub lightly with lighter fluid* on a clean cloth.
- Clean area with Congoleum Bright 'N Easy No-Rinse Cleaner®.
- If floor appears dulled apply Congoleum Bright 'N Easy Floor Polish®.

Scuffs & Smudges

Rubber Heel Marks
Shoe Polish
Scuffs

Remedy**

- 1 Spray Fantastik® Cleaner on the scuff. Let stand for 10-15 seconds, then rinse with a sponge or cloth.
- 2 Using a damp sponge, rub scuffed area with a polishing cleaner such as Soft Scrub®. Rinse with a sponge or cloth.
- 3 Wipe scuff with lighter fluid* applied with a clean cloth.
- 4 With a rubbing motion, apply a car polish/cleaner such as Meguirs No. 7® or similar product on the area Rinse thoroughly.
- 5 Remove stubborn scuffs with a mechanical buffer equipped with a lamb's wool pad.

Notes:

* CAUTION: Lighter fluid, mineral spirits and paint thinner are flammable solvents. Carefully read and follow cautionary information on label. Keep traffic off treated area for 30 minutes.

** Methods 1-5 are given in descending order depending on severity of scuff.

Repair:

If the stained area appears to be permanent, a patch may be possible on the sheet of vinyl flooring. Contact a vinyl flooring retailer or installer about the possibility of repair. You can receive a copy of the "How To Repair" brochure by contacting Congo

Laminate flooring used in the motorhome provides style, durability and ease of maintenance. This high-pressure laminated flooring is designed to be incorporated as a floating floor.

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

Cleaning and Maintenance:

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

- 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 scraped 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.



NOTE: Contact Wilsonart at (800) 433-3222 to address any unusual or unique problems concerning the laminate flooring.

SHOWER

Showers are susceptible to soap build up. Showers should be cleaned weekly to prevent burdensome clean-up. Using the same solution used to clean tile floors will be sufficient for the shower. However, to control mildew growth spray the shower with household chlorine bleach and allow it to stand for five minutes. Clean the glass shower doors with window cleaner on a weekly basis to maintain the shine. If water spots cannot be removed from the 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

The ceiling of the motorhome can be a variety of materials or fabrics, many of which require little or no care or maintenance.

The following steps are to be performed in sequence for recommended cleaning methods for the Vinyl Ceiling material. Each subsequent step is to be used if the previous step was not successful.

1. Wipe the soiled area with warm water, a mild detergent soap, and a soft cotton cloth.
2. Spray soiled area with a general household cleaner, such as 409 or a diluted solution of a liquid citrus-based cleaner. Follow the citrus-based cleaners recommendations for diluting. Wipe with warm water using a soft cotton cloth.
3. Dab soiled area with solution of 50% Isopropyl Alcohol and 50% warm water using a soft cotton cloth.
4. Dab soiled area with 100% Isopropyl Alcohol using a soft cotton cloth.

After each process, clean the area with warm water.



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



NOTE: Use care not to puncture the padded vinyl.

Time is very important when removing substance from wall coverings that are solvent based or contain color. 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. **For special cleaning problems:** 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.



cleaner.eps

Care for the Satinesque Wall Covering:

Stains should be removed as quickly as possible to minimize reaction between the staining agent and wall covering. Time is very important when removing substances that are solvent based or contain color. Examples: nail polish, oil, shampoo, lacquer, enamel, paint, ink and lipstick.

Always begin cleaning with a mild detergent such as soap. If necessary, move to a stronger cleaner such as household bleach, liquid household cleaners or rubbing alcohol. Before using one of the stronger cleaners, test the cleaning agent on a small inconspicuous portion of the wallcovering to make sure that the cleaner does not affect the color or gloss of the wall covering.

Stain Removal Procedures for Specific Stain Types:**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 any remaining gum with rubbing alcohol.

Pencil:

Erase as much of the pencil mark as possible. Wipe any 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

Wood should be treated the same as a piece of fine furniture. Care and cleaning of the wood surface is essential in maintaining the natural beauty of wood. Keep in mind that wood finishes can vary widely. Test a new cleaning solution in an inconspicuous area to check for possible damage.

The care and cleaning of the solid wood surfaces and the wood products used in the motorhome depends on individual choices and preferences. Numerous waxes, polishes and finishing products are available for use. Always follow the manufacture's label and instructions. The solid wood surfaces should be cleaned weekly. Dust regularly with a soft, lint-free cloth. Dampen the cloth slightly with water. Wipe one small area at a time and dry immediately.

For stubborn stains, use a clean cloth dampened with a solution of mild, non-alkaline soap (like dishwashing liquid) and water. Dry thoroughly using a soft cloth. Buff lightly, following the direction of the grain. Never use abrasive cleaners, scouring pads or powdered cleansers.

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 to the proper uses, although this may vary from wood type to type. The key to sanding is using the right sandpaper for the repair that is needed. Always sand with the grain.

GRIT	GRADE	USAGE
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 seal.
280-320	Extra Fine	Removing dust spots or marks between finish coats.
360-600	Super Fine	Remove luster of surface blemishes after finish coat.

Steel Wool:

Abrasive material composed of long steel fibers of varying degrees of fineness that are matted together. The 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.



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

Fixing scratches in stained woodwork:

"Quick and simple" rarely describes repairs to stained wood finishes. However, a few tricks can be tried. 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.

Dents:

Dents are the result of wood fibers being crushed and compressed. Dents can be raised back to original level by steam. To raise a dent, place a damp cloth over the dent and hold a medium-hot iron on it. The steam will cause 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 rag, a small brush, or even a cotton swab, apply a thin coat of a 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 several coats. Rub away excess stain with a dry rag. If the wood becomes too dark, use a rag moistened in mineral sprits to lighten the wood. Select a lighter color stain and continue.

Several companies have simplified this repair process by putting oil-based wood stain into marker-like containers. Just rub the stain marker on the scratch. Start with a stain color that is lighter than the original finish, because torn and scratched wood fibers will absorb stain and darken quickly. 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.

Scratches and Nicks:

Several professional woodworkers use similar procedures and tricks when it comes to scratches and nicks, most of which can be easily repaired. Always test an inconspicuous area of the wood prior to repairs to ensure no damages to the finish.

Light scratches will often disappear when carefully rubbed with furniture polish or paste wax. Deeper scratches can be hidden by carefully rubbing with a piece of oily nutmeat such as Brazil nut, black walnut or pecan. Be careful to rub the nutmeat 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).

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.

The Solid Surface was created for a lifetime of easy care. Just follow the simple guidelines listed here to the keep countertop surface looking nice.

COUNTERTOP - SOLID SURFACE

Routine Care:

The motorhome countertops are finished with one type of finish: matte/satin. All solid surface sinks and bowls have a matte/satin finish. Soapy water or ammonia-based cleaners will remove most dirt and stains from all tops and bowls. However, slightly different techniques must be used to remove different stains. Follow the recommendations below.

Cleaning the Countertops:

- Most dirt and stains: Use soapy water or ammonia-based cleaner.
- Water marks: Wipe with damp cloth and towel dry.
- Difficult stains: Use soft scrub and a Grey *Scotchbrite* Pad.
- Disinfecting: Occasionally wipe surface with diluted household bleach (one part water and one part bleach).

Cleaning the Solid Surfaces Sink:

Occasionally clean by using *Soft Scrub Liquid Cleanser* and a Grey *Scotchbrite* pad. Scrub the sink, rinse and towel dry. Do this as often as necessary.

Removing Cuts and Scratches:

Because the beauty of the surface goes all the way through the Solid Surface, countertops are completely renewable. Use the following instructions to remove minor cuts and scratches.

- Sand with 180 grit and then 320 grit sandpaper until the scratch is gone.
- Restore the finish using a Grey *Scotchbrite* pad. Never sand hard in one small area. Feather out lightly to blend restoration.

Preventing Heat Damage:

The Solid Surface withstands heat better than ordinary surface materials; however, hot pans and some heat-generating appliances, such as frying pans or crockpots, can damage the surface. To prevent heat damage always use a hot pad or a trivet with rubber feet to protect the surface. In most cases the surface can be repaired if it is accidentally damaged.



Other Important Tips:

Avoid using strong chemicals on the Solid Surface such as paint removers or oven cleaners. If these chemicals come in contact with the Solid Surface, quickly wash with water. Avoid contact with nail polish or nail polish remover. If contact is made, quickly wash with water.



NOTE: Do not cut directly on the solid surface. Always run cold water into the Solid Surface sink when pouring boiling water into the sink.

Laminate Countertops

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 used on food packages. Do not use laminated countertops as a cutting board. Laminated countertops are resistant to minor heat; however, hot pans, irons and lighted cigarettes will damage the surface. Use hot pads under pans taken directly from the stovetop.

WINDOWS

Water Spots:

Any glass will develop water spots if not cleaned properly. A spotting effect is magnified when the glass has 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 is a natural phenomenon. The amount of condensation will vary with climate conditions, particularly in relative humidity. Condensation occurs from water vapor present in the air. Each of us add more vapors by breathing, bathing, cooking, etc. Water vapor 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 the interior air.
- Install a dehumidifier. Continuous use of a dehumidifier is effective in removing excess moisture from the 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 hot water as it produces steam.
- Do not heat the motorhome interior with the range or oven. Heating with the range or oven increases the risk of toxic fumes and allows oxygen depletion. Also, open flames add moisture to the interior air increasing condensation.
- In very cold weather leave the cabinet and closet doors partially open. The air flow will warm and ventilate the interior of the storage compartments and the exterior wall surface, reducing or eliminating condensation and preventing the possibility of ice formations.

• Dusting:

Regular dusting maintains the appearance of most blinds. Keep the aluminum blind looking its best by periodically wiping them with a soft cloth or a dusting mitt. By tilting the slats down, but not quite closed, you'll be able to clean most of the top surface of each slat. Blinds may be cleaned while hanging in place using this method.

• Vacuuming:

For deeper cleaning, vacuum gently with brush attachment of any 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.

**WINDOW
TREATMENTS**
- *Mini-Blinds*

- **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. The mild detergent cannot contain abrasives. Rinse the blinds using a clean cloth and water to prevent water spots. Place a towel directly under the blinds to absorb any water that might drip down.

- **Ultrasonic cleaning:**

Professional ultrasonic cleaning may be preferred.

- **Tub cleaning:**

1. Immerse entire shade assembly in lukewarm water with mild detergent. Wash for several minutes by gently moving liquid around with your fingers.
2. Rinse with clear water.
3. Close shade before removing from rinse water.
4. Hold rails and tilt the shade to allow excess water to drain off.
5. Re-install damp shade into window opening. Place a towel directly under the blinds to absorb any water that might drip down.
6. Lower shade all the way to allow it to dry completely.

Day/Night Shades

The day/night shades are made of polyester blended material. Use the following guidelines to care and maintain the 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. The tension can be adjusted if the shades will not remain up.

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 ounce clear liquid soap to 8 ounces water.



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

What is Mold?

Mold is a plant belonging to the Fungi group. In short, mold is a type of fungus that occurs naturally in the environment, and is necessary for the natural decomposition of plant and other organic material. Mold spreads by means of microscopic spores borne on the wind, and is found everywhere life can be supported. Due to the fact mold spores are present in all types of environments, motorhome construction is not, and cannot be, designed to exclude mold spores. If the growing conditions are right, mold can grow in the motorhome. Most people are familiar with mold growth in the form of bread mold, and mold that may grow on bathroom tile. Mold spores, as they grow, can leave a musty odor, discolor fabric, and stain surfaces as well as cause considerable damage.

What Does Mold Need to Grow?

Being a plant, mold will need a food source in order to grow. Mold can use a variety of organic materials such as fabric, carpet, wallpaper, or even building materials, such as wood and insulation, to name a few. Grease films contain many nutrients for mold spores to grow when moisture and temperatures are right. Soil on dirty items such as fabrics and furniture may supply enough nutrients for mold to grow. Many of the synthetic fabrics such as acetate, polyester, acrylic and nylon are mildew resistant. However, soil on these fabrics may supply the nutrients to start mold growth.

Mold growth requires a temperate climate. The best growth occurs at temperatures between 40° F and 100° F. Finally, mold growth requires moisture. Moisture is a mold growth factor that can be controlled. By minimizing moisture inside the motorhome, mold growth can be reduced or eliminated.

Moisture in a motorhome can have many causes. Spills, leaks, overflows, condensation, and high humidity, to name a few. Good housekeeping and regular maintenance are essential in the effort to prevent or eliminate mold growth. If moisture is allowed to remain on a growth medium, mold can develop within 24 to 48 hours.

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 owner can, and should, reduce or eliminate the occurrence of mold growth in the motorhome; thereby, minimizing any possible adverse effects that may be caused by mold. Taking the following steps can help reduce or eliminate mold growth in the motorhome.

1. Check for signs of mold prior to bringing items in the motorhome. Potted plants (roots and soil), furnishings, or stored clothing and bedding material, as well as many other household goods, may already contain mold growth.
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 30-60% when venting clothes dryers to the outdoors. Ventilating the kitchen and bathroom by opening the windows, by 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 any 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 conditions) 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. Should the mold growth be severe, call on the services of a qualified professional cleaner.
7. If materials with mold on them cannot be cleaned, they should be removed and properly disposed.



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 ANY DAMAGES CAUSED BY MOLD THAT MAY BE THE CONSEQUENCE OF OR ASSOCIATED WITH DEFECTS IN THE CONSTRUCTION.**

Pests can come in all sizes and shapes, from insects to mammal. 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 health risk and create serious damage to the motorhome. There are a number of host-transmitted diseases that can be carried by a pest.

PEST CONTROL

- 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, pests are the same as humans in the fact they need food, water and a place to live. Eliminating any one of those elements will help significantly in controlling the pest.

To control pest infestation, eliminate those factors that attract pests, and take immediate steps to remove pest as soon as their presence is detected. There are a number of steps that can be taken to help in controlling pest:

- Reduce the 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 food sources for some pests.

-
- Seal cracks, crevices, and other gaps especially around doors and windows. Make sure all windows and doors are screened and fit the screens snug in their frames.
 - 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 110 wiring more than 12 Volt wiring.



NOTE: Although the back cap of most motorhomes 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 the moment a sign of infestation is spotted. If you are unable to identify the type of insect, purchase some sticky traps from the hardware store and place the tape where you have seen the insects. Once caught, seek assistance in identifying the insect and determining 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. Since they are predators and feed on living prey, this would indicate other smaller pest may be found. Immediately remove spider webs. Some types of spiders like to nest on top of the diesel tank and around the diesel hoses. Dispense of spiders using a vacuum. Use care to capture the spider and egg sacs. Throw the vacuum bag away in a sealed bag.

Fruit flies invade the motorhome by attaching themselves to fresh fruits and vegetables. Determine what food items are generating the flies and discard that item in an outdoor trash receptacle. Any remaining 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. To eliminate all ants, the colony must be destroyed. 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 a thorough cleaning of the motorhome. Vacuum vinyl areas and tile floors to remove dust, flea larva and flea eggs. Follow by thoroughly washing those areas with soap and water. Carpets must be vacuumed and treated with a residual flea control product labeled safe for indoor carpet and furniture use. Perform the cleaning treatment daily for three days to insure 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:

On one occasion a motorhome owner, investigating the cause of a failed inverter, discovered that a lizard had crawled in the inverter, shorted out the circuit board and died. Lizards can be captured using glue traps. To remove the lizard from the trap, dissolve the glue with vegetable oil and then release the lizard outside and well away from the motorhome. A scorpion will glow blue-green in UV light. If you suspect the presence of scorpions in the motorhome, investigate with an UV black light during the nighttime hours.

What are the best sources of information about common household pests?

The Internet is a great place to find information about common pests, however, the information is not always correct. The National Pest Management Association website can be useful resource about common pest. Another good source for information are colleges and universities with entomology departments (entomology is the study of insects).

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.

- A good place to start is to inquire as to who has used pest control services. Inquire about the type of pest problem encountered and how satisfied were they 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.

Performing regular scheduled maintenance ensures reliable operation and optimum service life of the various chassis components. Completed maintenance brings peace of mind knowing the various components have received proper service. Failure to follow maintenance guidelines, or perform scheduled maintenance, results in inefficient operation, premature component wear or component failure resulting in breakdown.

Maintenance schedules are usually performed at certain mile or time intervals. When performing high level procedures, lower level service should also be performed. Maintenance procedures for chassis components are located in the chassis section



NOTE: Maintenance schedules are based on normal operating conditions and use. Operating under unusual or adverse condition shortens service intervals.



NOTE: Engine and transmission service intervals are listed in their respective manuals.

Many chassis components require lubrication. The types of lubricants used will vary with the application of the component. A component may fail prematurely due to lack of lubrication or from using an incorrect lubricant type. The component manufacturer usually recommends a particular type of lubricant with a minimum approval rating. Most lubricants are tested under strict guidelines set by the ASTM (American Society for Testing and Materials). The NLGI (National Lubricating Grease Institute) helps disperse information to the grease production industry. Grease containers usually have an approval rating by the SAE (Society of Automotive Engineers), Mil Spec (Military Specification), API (American Petroleum Institute) or by other recognized and accepted organizations. The correct lubricant type with an approved specific rating must be used whenever applying, changing or adding any lubricant. When purchasing lubricants for a specific application be sure the label affirms the type of lubricant required with the tested rating by the term "meets or exceeds" in accordance with the manufacturer specifications.

Lubricants

Lubricants are manufactured in many forms for a variety of applications. There are many different oil and grease consistencies each with a designed application. To properly select a particular type of lubricant for a specific application, the component must be evaluated. Component stress loads, ambient temperature, working temperature and environmental exposure are just a few of the variables to consider. Select the proper lubricant for its intended application. As an example: selecting high viscosity grease to lubricate a lock cylinder results in sluggish lock cylinder operation especially in a cool environment. Conversely, using graphite to lubricate a component that is under extreme temperature and load will result in component failure.

Lubricant Classification

Grease ratings and their base compounds are especially important when selecting a lubricant type for an intended application. Some grease compounds are manufactured for multi-use application. These are acceptable if the grease rating is in accordance with the manufacturer's recommended lubricant type and rating.

Lubricating greases are made from different base compounds giving the grease different lubricating consistencies, properties and maximum operating temperatures. Most containers list the base compound and maximum operating temperature usually listed as melting point or drip point. Lubricating components, such as brake component for example, require a high temperature special base compound grease. Lubricating this type of component with other than specified grease type will result in inadequate lubricating qualities resulting in component malfunction or failure.



Be Observant:

When performing any scheduled maintenance, **inspect** the area around where you are working. For example, changing the oil, look at the rear differential. **Inspect** for visual signs of fluid leaks. Use your nose to detect early signs of trouble. Most fluids and lubricants have a distinct odor. Generally, odors are most detectable soon after parking. Unusual sounds are another method of detecting a problem early. There are many types of sounds that are normal, such as the cyclic purging of the air dryer. Become familiar with the different sounds. If something sounds odd, smells peculiar or looks unusual investigate the situation.

Proper Fluid Disposal

When performing service maintenance on the engine, transmission or rear axle, waste fluids and filters should be properly disposed of or recycled. Package used oils, antifreeze and other fluids in sealed containers. In many cases used oil is accepted free of charge at county disposal sites. Waste fluids are toxic to pets and other animals. Waste fluids should not be left in open containers. The sweet odor of antifreeze is attractive to pets, but highly toxic.



CAUTION: Properly dispose of used antifreeze and waste oil. Animals like the sweet odor of antifreeze and may ingest it if left in open containers. Wipe up any fluid spills. Pets may lie in puddles of fluid, many of which are irritants and can cause severe chemical burns if not properly washed.

When preparing to use a high-pressure grease gun, thoroughly clean all Zerk grease fittings before applying new lubricant. Keep paper towels or disposable rags handy when greasing. When lubricating items such as drive shafts and steer axles components, continued grease application is generally required until new grease appears at exit points.

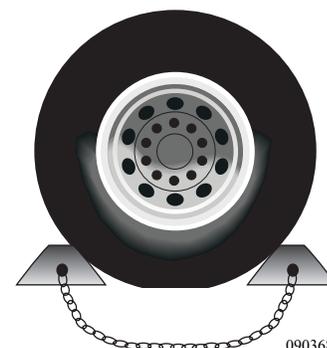
Some items use sealed boots around the component to prevent moisture intrusion. When greasing these types of components care must be given to prevent excess lubricant pressure from rupturing the seal.



WARNING: Always chock wheels before going underneath the motorhome.

To apply grease:

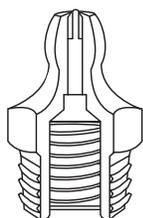
- Clean the grease fitting. Initially operate grease gun until new lubricant discharges from nozzle then wipe nozzle clean. This avoids introducing contaminants into the component.
- Snap nozzle onto grease fitting.
- Nozzle must remain inline with the grease fitting during the application process. If the nozzle is not in line, lubricant will collect around nozzle and grease fitting, failing to lubricate the component.
- Wrap the nozzle with a paper towel or rag to prevent contamination and accidental soiling of other areas.



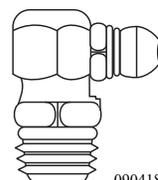
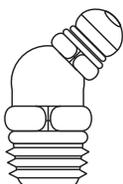
If the component does not accept grease the Zerk fitting may be plugged or damaged. Zerk fittings are replaceable and generally available at most auto supply stores. Zerk fittings come in variety of angles depending on the application. Every effort should be made to lubricate the component, as neglect will only result in premature component failure.



NOTE: Some grease fittings may not be accessible until the steering wheel is turned or the motorhome is moved slightly.



Typical Zerk Fitting.



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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

- If applicable, retract the slide room(s). Do not store the motorhome with slide room(s) 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 battery cut-off switch.
- 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 main battery disconnect switch **ON**.
- Careful placement of a small heat source in the interior will help control moisture. Desiccate filter systems help remove interior moisture.
- If AC power is not available turn the main battery disconnect switches **OFF**.
- If possible, store the motorhome inside a storage building.
- If stored outside, inspect all seams and seals, bi-monthly, 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.
- Tires should be stored at maximum inflation pressure.
- A full interior inspection for water leaks should be made bi-monthly, inspecting behind all cabinet doors and drawers.
- Start and run the generator at least 30 minutes per month.

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.

Preventative measures should be taken and preferable situations used when storing a motorhome. Such measures will aid in protecting and preventing a motorhome from the damaging effects caused by an accumulation of moisture.



NOTE: The natural process of moisture in the air condensing 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 the motorhome is stored in a location where AC power is not available:

- Turn off all the appliances.
- Turn off the battery cut-off switch.
- If possible, situate the motorhome so the batteries remain accessible. This allows a battery to be charged or replaced without moving the motorhome.
- Charge the batteries to a full state of charge.
- Turn the main battery disconnects **OFF**.
- When stored outside, use the available DC Volt meters to make a quick reference check of the batteries while the motorhome is in storage. If the motorhome is stored outside, solar panels may offset the parasitic loads.
- Preventative measures should be used if the voltage readings are low. When using preventative measures, taking the motorhome out of storage or moving the motorhome in case of an emergency is a much easier process.



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



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!

Type of surface to park and store the motorhome on:

- The type of surface the motorhome is parked upon will affect how much moisture accumulation occurs on the chassis and flooring. Moisture can eventually seep into the interior.
- Parking the motorhome on a grass surface, with the tires supported by blocks, is a perfect situation for moisture to accumulate.
- A gravel covered parking area still allows moisture to evaporate from the ground, through the gravel and to the underside of the motorhome.
- Concrete pads should be sealed to prevent moisture coming up through the concrete flooring.
- Storage buildings with sealed concrete floors, or heated storage facilities, greatly reduce the amount of moisture accumulation and protects the motorhome from moisture damage.

If the motorhome is stored outdoors:

- The interior should be heated to help prevent mold and mildew growth. Moisture removing desiccant filter systems are available from hardware and RV supply stores. Place the filter system inside the motorhome to reduce inside moisture condensation or humidity. These systems help control mold and mildew growth.
- 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.
- Cardboard templates can be made for the windows to protect these items from exposure to direct sunlight.
- Tire covers are available to protect the sidewall of the tires from cracking. Make sure the tires contain the correct air pressure. Underinflated tires can be damaged.
- Washing the exterior regularly will help control moss accumulation. The clear coat has UV protective substances. Waxing the motorhome twice a year will augment these substances.

Inspect the motorhome:

- Perform a full interior inspection for water leaks every two weeks while the motorhome is in storage. Open all cabinet doors looking 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. If necessary, use the proper sealants and recommended application procedures.



Fuel:

A full tank of fuel will help minimize moisture condensing at the top of the tank.

Brakes:

Brakes also 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 linings upon the first few applications, reducing the friction action of the linings.

Engine:

Internal combustion engines need to be “exercised” on a regular basis. This will ensure that 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.

Electric Motors:

Electric motors in the motorhome should be operated occasionally to help lubricate and keep surfaces rotating freely. These items include the roof air conditioners, dash fans, dash blower motor, furnace motors and powered roof vents.

Winter Storage - Checklist

- **Plumbing Lines** - Drain and protect by filling with approved RV antifreeze.
- **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** - To protect the interior fabric from fading, cover windows by pulling blinds, closing shades or using a separate cover such as a sheet.
- **Holding Tank** - Drain and rinse. Close valves.



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 the exterior panels and roof vents.
- **Batteries** - Add distilled water and recharge if needed. Disconnect the cables. Remove the batteries and store them in a cool dry place. Check and recharge as needed. Never park the coach where the battery door cannot be opened.
- **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** - Tank should be full of fuel.

If the motorhome was properly and carefully prepared for storage, removing it from storage will not be difficult. The following checklist pertains to items or areas which should be checked before operating or moving the motorhome. If the motorhome was not properly winterized, extensive freeze damage or other serious deterioration may have occurred. Consult a dealer or an authorized service center for advice.

- Thoroughly **inspect** the 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. Be sure 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 state of charge of the batteries. If necessary fill the cells with distilled water only and charge as necessary. Inspect the cable ends and terminals. They should be clean and free of corrosion.
- Check all the chassis fluid levels: engine oil, engine coolant, hydraulic fluid reservoir, transmission oil and rear axle oil.
- Start the engine, allowing it to reach operating temperature. Ensure the engine instruments are indicating proper readings.
- While the engine is running check the operation of headlights, tail-lights, turn signals, back-up lights, license plate light and emergency flasher. Operate the dash air conditioner. If the air conditioner does not work, or the compressor makes unusual noises, have the system checked by a qualified air conditioner technician.
- Shut the engine down. Adjust or add fluids as necessary. **Inspect** the engine for fluid leaks. Look under the motorhome for any other type of 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 ice-maker 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 lights and accessories. If something does not work there may be a bad 12 Volt 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 functioning properly.
- Inspect the 120 Volt electrical system which includes the power cord, inverter/converter all outlets and exposed wiring.



NOTE: Prepare the generator for operation following the instructions in the Generator Manual.

- Start and run the generator.
- Confirm that the batteries are charging. Operate the 120 Volt appliances and air conditioners. If an electrical item or appliance is not functioning properly, contact the dealer or an authorized service center to have it evaluated.



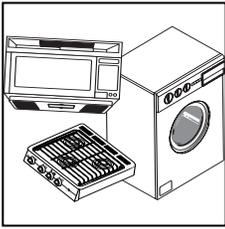
- Have a qualified technician **inspect** the LP-Gas system and perform an LP-Gas leak test. The leak test should also include an LP-Gas regulator adjustment (if needed). The test can also verify if the regulator is faulty and should be replaced. Have the LP-Gas tank inspected.
- Operate each LP-Gas 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 double-check preparation to make any necessary adjustments and/or correct defects.



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APPLIANCES

SECTION 4

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This section covers operation and care of various appliances found in the motorhome. The motorhome is equipped with a refrigerator, cooktop range, microwave, furnace, water heater, roof air conditioner and several optional appliances. Many of 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's manuals.



WARNING: Before entering any type of refueling station make sure all LP-Gas operated appliances are off. 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. 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.

The refrigerator in the motorhome operates on a different principle than a standard household refrigerator. Knowing these differences should answer questions or solve problems that may arise. A standard household refrigerator uses a compressor to pump refrigerant. This system is efficient as long as 120 Volts AC is available.

REFRIGERATOR

The motorhome refrigerator uses a different refrigerant. The refrigerant is heated which causes the refrigerant to circulate and vaporize. Using gravity, the refrigerant returns to the absorber vessel to start the process again. To ensure longevity and proper operation of the refrigerator, follow the specific guidelines in the refrigerator manual. 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.

Operation Specifics

- The refrigerator operates from LP-Gas or 120 Volts AC electric.
- DC Voltage 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.
- It is important to operate the refrigerator only when level. Level the refrigerator (from front view) within 3° side to side and 6° front to back using a torpedo or bulls eye (fence post) level. Place the level on the freezer plate. The level should be within the circle by a half of a bubble. Generally, this is within comfortable living conditions.



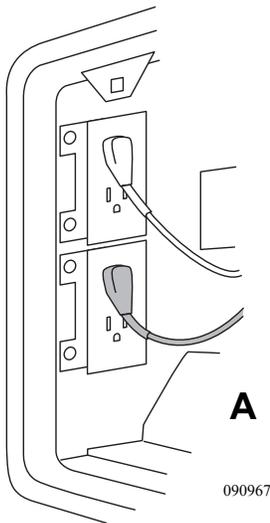
NOTE: Operating the refrigerator "off level" separates the chemicals, causing them to crystallize and block the circulation action of the cooling unit. Damage is cumulative and irreversible.



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.



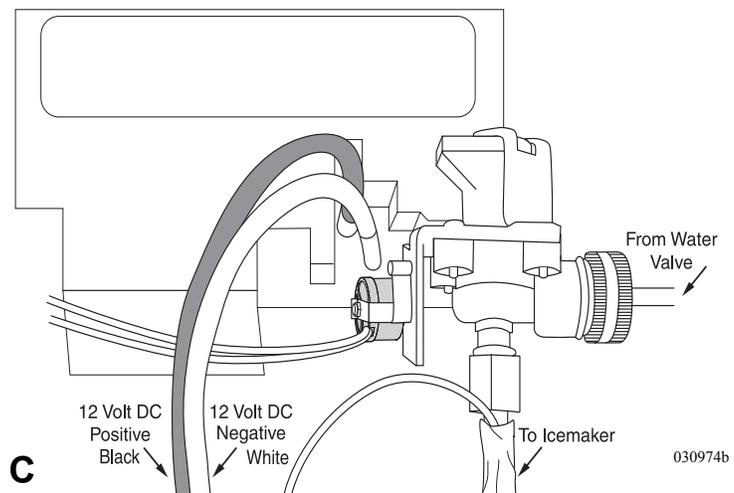
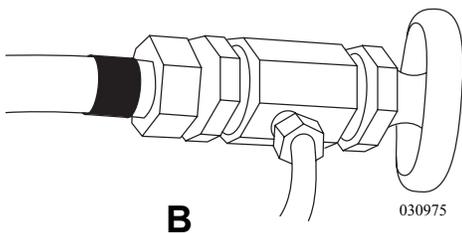
NOTE: To reduce the possibility of food spoilage, keep the interior box temperature at or below 54° F. The refrigerator will consume more energy to maintain low temperature, especially in hot, humid climates. Lower temperature may also lead to quicker frost build-up.

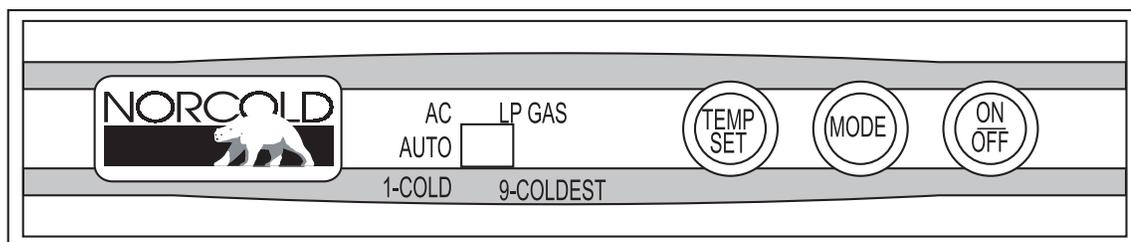


Inverter Models

In order for the refrigerator to operate:

- The house batteries must be charged.
- The primary LP-Gas valve must be on and the electric gas valve must be on.
- **Figure A:** The refrigerator AC cord(s) must be plugged in (located outside behind refrigerator access door).
- **Figure B:** The water valve must be on if the refrigerator is equipped with an icemaker.
- **Figure C:** If the controls do not light up check the house batteries charge status or see if the 12 Volt wires are plugged into the refrigerator's circuit board (located outside behind refrigerator access door).





030908

Two Door Without Icemaker:

The **ON/OFF** button starts and shuts down the refrigerator:

- To turn on the refrigerator, push and release the **ON/OFF** button.
- To turn off the refrigerator, push the **ON/OFF** button for two seconds and then release.

The **TEMP SET** button controls the temperature adjustment of the freezer and the fresh food compartment.

- Push the **TEMP SET** button and the temperature setting "1- 9" appears in the display window.
- Push and hold the **TEMP SET** button and the temperature setting changes.
- When the desired temperature setting shows, release the **TEMP SET** button.
- The temperature setting shows for ten seconds and then the current operation mode of the refrigerator shows.
- The number "9" is the coldest temperature setting.



TIP: The selected temperature adjustment does not change if the mode of operation of the refrigerator changes.

The **MODE** button controls the operation mode of the refrigerator.

- Push and hold the **MODE** button and a light bar indicator is shown in the display window beside each of the operating modes of the refrigerator, one at a time.
- There is one automatic mode of operation and two manual modes of operation.
- When the light bar shows beside the mode of choice, release the **MODE** button to operate the refrigerator in that mode.

Automatic Mode Operation:

When the refrigerator is in **AUTO** mode, it automatically uses the most efficient energy source that is available for operation. During operation, if a more efficient energy source becomes available, the refrigerator controls change from the current energy source to the more efficient energy source as follows:

The first choice is AC operation if 120 Volts AC is available to the refrigerator. The second choice is propane gas operation if 120 Volts AC is not available to the refrigerator.

1. If AUTO and AC bars appear in the center display, it means:

- 120 Volt AC power is available to the refrigerator.
- The refrigerator is operating on AC electric power.

2. If AUTO and LP GAS bars appear in the center display, it means:

- 120 Volt AC power is not available to the refrigerator.
- The refrigerator is operating on propane gas.

Setting Controls for Automatic Mode Operation:

- Push the **ON/OFF** button to turn the refrigerator on.
- Push and hold the **MODE** button until the light bar shows beside **AUTO** and then release.

If 120 Volts AC is available to refrigerator:

- The light bar beside AC also shows in the center display.
- After ten seconds, the light bar beside AC goes off and only the light bar beside AUTO remains.
- The refrigerator is operating on AC electric.

If 120 Volts AC is not available to refrigerator:

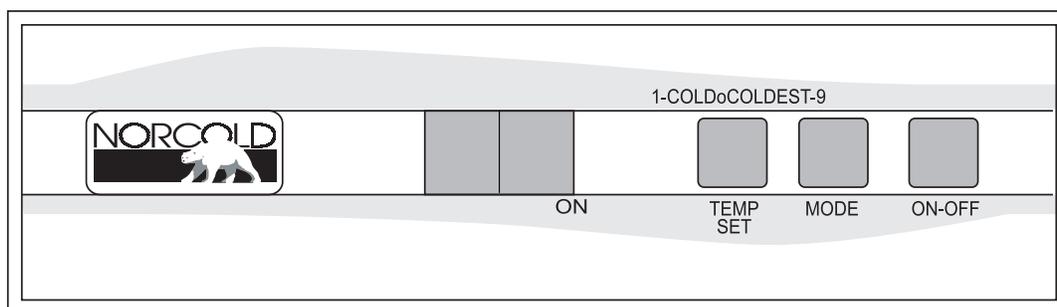
- The light bar beside AC also shows in the center display.
- After a few seconds, the light bar beside AC goes off and the light bar beside LP GAS shows.
- After 10 seconds, the light bar beside LP GAS goes off and only the light bar beside AUTO remains.
- The refrigerator is operating on propane gas.

If an energy source is available to refrigerator, but is not operating correctly:

- A fault code shows in the center display.
- Refrigerator controls try to change to a less efficient energy source.

If a less efficient energy source is not available:

- A fault code shows in the center display.



030864C

Two Door with Ice Maker:

- **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.

- **TEMP SET** Button - Adjusts the temperature.
 - To adjust push and hold the **TEMP SET** button.
 - Number "9" is the coldest setting.

- **MODE** Button - Controls the operation mode of the refrigerator.
 - Push and hold the **MODE** button to select between Automatic AU, AC or LP operation.

Manual Mode:

When one of the two manual modes is selected:

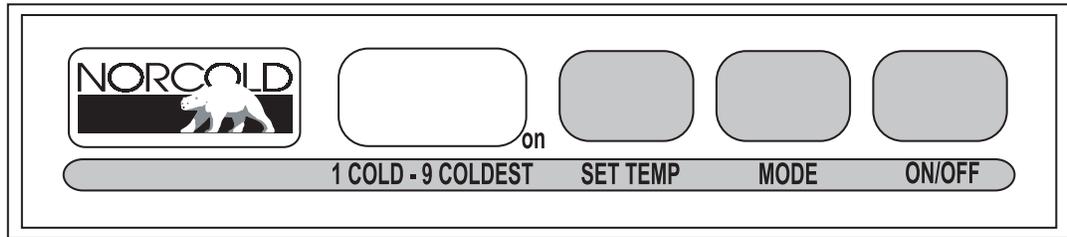
1. **AC** = The refrigerator is operating on AC electric.
2. **LP** = The refrigerator is operating on LP-Gas.

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 a dealer or authorized Norcold service center.

Automatic Mode:

The refrigerator selects AC power over LP-Gas in Auto mode (AU). The controls select the energy source in this sequence.

1. When 120 Volts AC is available "AU AC" flashes in the display. This indicates the refrigerator is operating on AC electric. After ten seconds, the "AU AC" goes off and only a power indicator remains.
2. If 120 Volts AC is not available, "AU LP" flashes in the display. This means the refrigerator is operating on LP-Gas.
3. After the refrigerator is operating, press the TEMP SET button and set the desired temperature.



The Refrigerator Control Panel requires 12 Volt DC to operate.

030864

Control Panel - Four 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.

- **MODE** Button - Controls the operation mode of the refrigerator.
 - Push and hold the **MODE** button to select between Automatic AU, AC or LP 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:

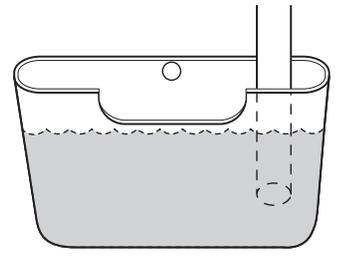
1. **AC** = The refrigerator is operating on AC electric.
2. **LP** = The refrigerator is operating on LP-Gas.

Automatic Mode:

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, AC or LP will remain lit for 10 seconds or 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 a dealer or authorized Norcold service center.



030987

Located behind the outside access.



Tips

- Cool items first, if possible, before putting them into the refrigerator.
- Keep the doors shut. Know what you want 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.

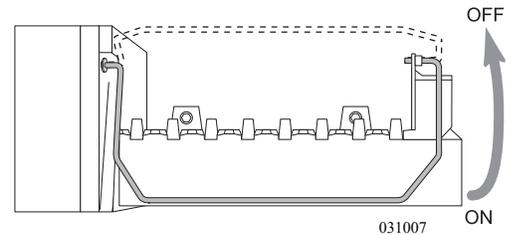
The icemaker works from 120 Volts AC only. The icemaker functions only after the freezer temperature is low enough. City water or the water pump must be on and the valve for the water supply line to the icemaker must be on.

Icemaker

- Pull the metal arm (bail) down to turn the icemaker on.
- Push the arm up to turn the icemaker off.



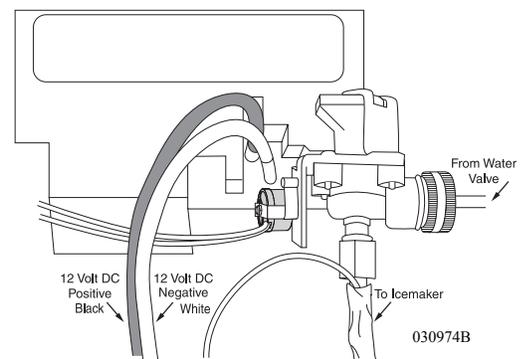
NOTE: If the icemaker is in operation while the motorhome is in motion, water may spill out of the ice tray. Raise the icemaker arm to stop ice production while in transit. Do not use the first one or two trays of ice if the refrigerator has been in storage. Ice cubes may have contaminants. Do not operate the icemaker without water pressure supplied to the refrigerator. This can cause damage to the ice maker assembly.



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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 shut-off valve to the water valve is not protected.

Water Line Heater



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Refrigerator Alarm

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. The 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 displaying 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.



WARNING: Make sure all flames are extinguished and the LP-Gas valve is off before refueling. LP-Gas and gasoline are highly flammable which can ignite, resulting in an explosion, fire or death. Many states have passed laws regarding having the LP-Gas valve open while traveling. Know the laws for the particular state in which you are traveling.

Cooling Unit Fans

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

Doors

The refrigerator doors use a positive latch that secures the door with a "click" to prevent the door from opening while traveling. The doors use a heating element located in the flapper on the left door (four-door model) or in the door (two-door model). The heating element activates when operating the refrigerator in any mode to help prevent moisture accumulation in high humidity conditions.

Service

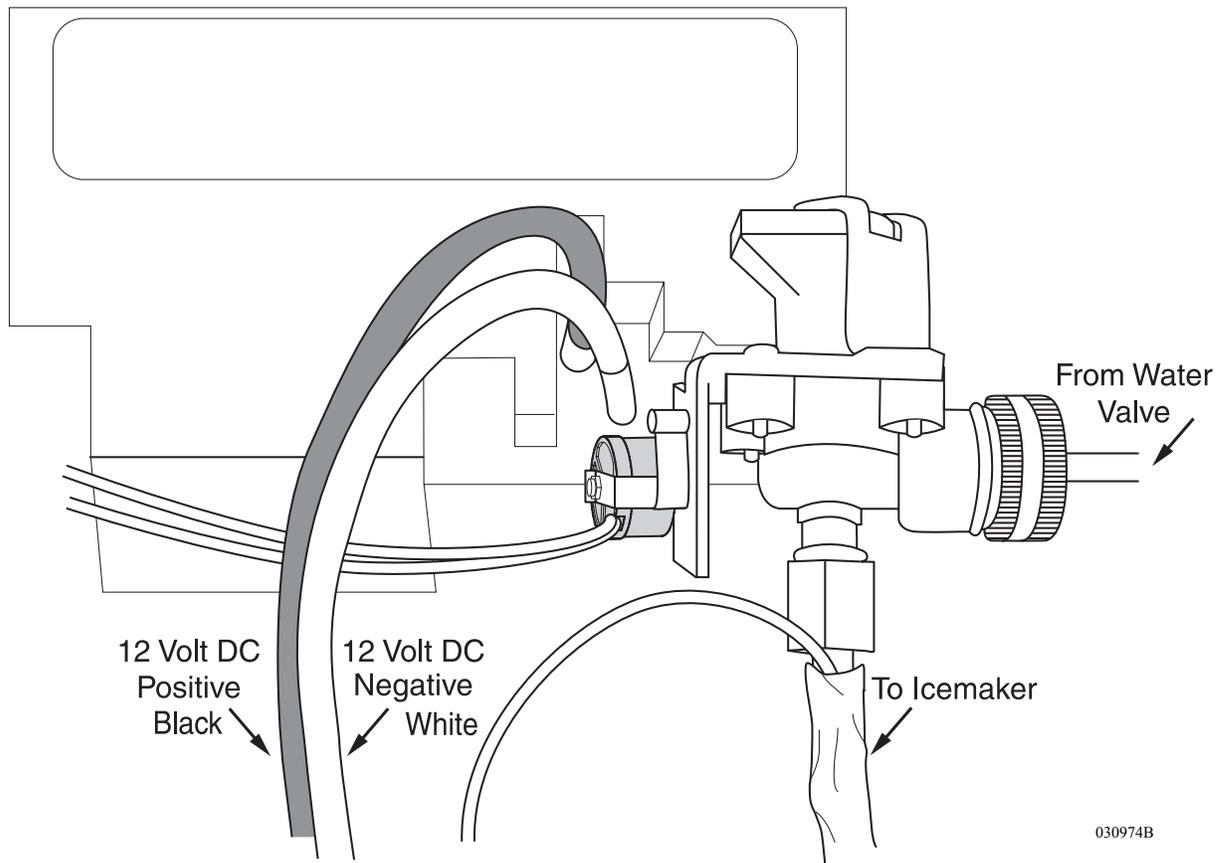
The LP-Gas function of the refrigerator and LP-Gas pressure will need servicing yearly, depending on use. Over time, the BTU rating of the flame can change, affecting the refrigerator's performance. Ambient temperature and humidity can also affect performance and function. The BTU rating lowers when operating on LP-Gas at an altitude higher than 5,500 feet. This affects the refrigerator's performance. If possible, switch mode operation to AC while at a higher altitude.

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

Interior Light

For bulb replacement:

1. Mark the respecting location and remove the 12 Volt DC power supply wires from the power board at the rear of the refrigerator.
2. Remove the light cover by pushing it toward the rear of the refrigerator.
3. Remove the light bulb from the holder.
4. Install a GE#214-2 replacement bulb as the replacement bulb.
5. Install the cover.
6. Connect the 12 Volt DC power supply wires to the power board at the rear of the refrigerator.



Air in Propane Gas Supply Lines

For safety reasons, the refrigerator will attempt to ignite on propane gas within a specified amount of time. When starting the refrigerator for the first time, after storage, or after servicing the gas supply system, the propane gas supply lines can have air in them. Due to the air in the gas supply lines, the refrigerator may not ignite on propane gas within the specified amount of time. Follow the procedure on how to remove air from the LP-Gas supply lines.

To remove the air from the propane gas supply lines:

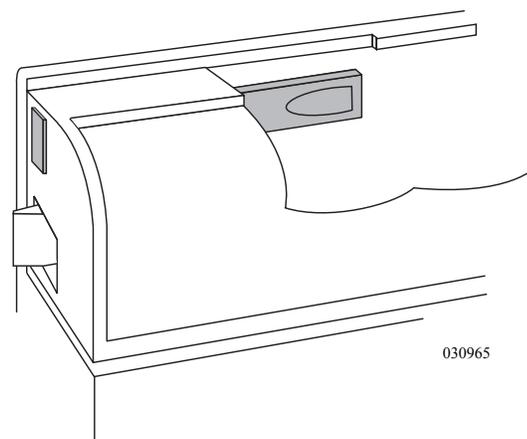
- Make sure the primary LP-Gas valve and any other necessary valves are open.
- Try lighting the cooktop burners first. The cooktop will quickly purge air from the main distribution line. When all cooktop burners are lit, light the Furnace and Water Heater (if equipped) to help purge the branch supply lines of air.
- After the other LP-Gas appliances are lit, this confirms the air is purged from the main distribution and branch supply lines to those appliances. The refrigerator should function on LP-Gas after three or four attempts.
- 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 or NO FL (No Flame), turn the refrigerator off then back on and set to LP mode. If after the third or fourth attempt the refrigerator fails to light, stop and consult your local dealer or an authorized Norcold Service Center.

When storing the motorhome, the refrigerator doors have a storage position that locks the doors partially open. This will help reduce odor from mold and bacteria. A completely sealed refrigerator in storage is a perfect environment for mold and bacteria to grow.

To use the storage feature, partially open doors and slide tab into the cut-out of the strike plate.

To Use the Storage Feature:

- Turn the refrigerator off and remove all items. 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 as these can damage the interior finish.
- Rinse with a solution of baking soda and water. Dry with a clean cloth.
- Lock the doors open.



CAUTION: When defrosting, do not use a hot air blower. 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.

The microwave oven is operate from 120 Volt AC supplied by shore power, the generator or the inverter. Microwaves heat food using sound waves generated at a very high frequency (2,450 MHZ) to agitate the water molecules inside the item being heated. The higher the water content is to solids, the faster the response microwave's two speed ventilation fan. The fan draws air in from the bottom of the microwave through a pair of grease filters then discharges the filtered air out through a charcoal filter at the top. The ventilation fan is controlled by a thermostat and activates automatically from heat produced by the cooktop.

MICROWAVE OVEN



Microwave Tips:

- Turn the oven off before cleaning.
- Keep the inside of the oven clean. When food spatters or spilled liquids adhere to oven walls, wipe with a damp cloth. Mild detergent may be used if the oven gets dirty. The use of a harsh detergent or abrasive cleaner is not recommended.
- 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 detergents or abrasive on the control panel.
- If steam accumulates inside or around the outside of the oven door, wipe it away with a soft cloth. This may occur when the microwave oven is operated under high humidity conditions and in no way indicates a malfunction of the unit.
- 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.
- The glass tray and roller guide must always be in place during cooking.
- Ensure the door is firmly closed before use.
- 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.
- To test utensil for microwave compatibility place it in the microwave with an 8 oz. plastic cup of water. Set the microwave at full power for one minute. Carefully feel the utensil. The entire utensil should be cool to the touch.
- Cover food with a microwave-safe paper towel or upside-down plate to keep food spattering to a minimum. Place a paper towel on the turn table to keep clean-up at a minimum.
- Clean up all spills or spatters before they dry.
- 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.

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- Some food wrappers may be foil lined. Check the wrapping carefully before cooling or heating. A small amount of foil is acceptable if it is not wrinkled or near the sides of the microwave.
 - If the microwave screen is not lit, plug another electrical appliance into the same outlet as the microwave to verify AC power is preset. If the test item works, contact an appliance repair facility to have the microwave checked.

Microwave Facts:

One of the most useful documents for the microwave is the operations manual, located in the owner's information file box. Read it carefully and keep it for reference. Another useful item is a microwave cookbook. Many will contain information about cooking principles, techniques, hints and recipes.

A properly functioning microwave oven presents no hazard with ordinary use. The oven has safety interlocks to prevent use with the door open, and screens to prevent microwave leakage. These safety features should be kept in good condition - never attempt to bypass the safety interlocks or allow debris or residue to accumulate on the door or oven face. If the oven is damaged, do not attempt to use it.

The oven should be adjusted or repaired by qualified service personnel. Check the Owner's Manual for maintenance tips and other information. Be sure to register the microwave oven with the manufacturer.



WARNING: If a fire flares up when using the cooktop turn off the ventilation fan. The fan may spread the flame. If the ventilation fan has started automatically from a heated cooktop it can not be manually turned off. Turn off the microwave AC circuit breaker to prevent the flame from getting up into the microwave and spreading the fire.



NOTE: When dry camping, minimize using the inverter to operate the microwave due to the high rate of battery consumption.



NOTE: The microwave is for food preparation only. Do not use the microwave to dry clothes, newspapers, shoes or other items.

Setting the Clock

Setting The 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.

Convection Oven Cleaning

The exterior of the microwave is plastic and metal. The interior is metal. Do not use scouring pads, harsh or abrasive cleaners, chemical cleaners or petroleum based thinners as these can damage the finish. Use mild soap and water with a damp cloth or paper towel to remove most 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:

Depending on usage 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.
2. Remove the screws securing the Louver.
3. Insert a flat edge screwdriver over each tab pressing downward and moving the Louver away from the microwave.
4. Remove the Louver from the face of the microwave.
5. Remove and replace the Charcoal Filter ensuring the filter is positioned on the supporting tabs.
6. Replace Louver and mounting screws.

Oven Light:

1. Remove the Louver as indicated under the Charcoal Filter.
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:

1. Remove power to the microwave.
2. Remove the screw 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 from step two.



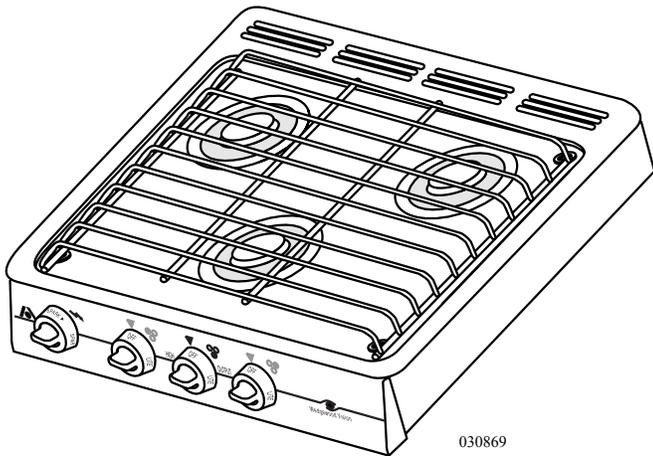
CAUTION: Light cover may be hot. Do not touch glass with lamp ON. Never use the light for prolonged periods such as a night light.

Grease Filters:

Do not operate the oven without the grease filters in place. This can damage the microwave. Grease filters should be cleaned at least one a 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.

COOKTOP



The cooktop uses LP-Gas only 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.

The cooktop will operate when the following conditions are met:

1. The primary LP-Gas valve on the LP tank is open.
2. The battery cut-off switch is on.

Before cooking on the range top the cover must be in full upright and folded position. Push the cover toward the outside wall and lock it into position to prevent it from falling onto the range top during cooking.

To Lift Cover:

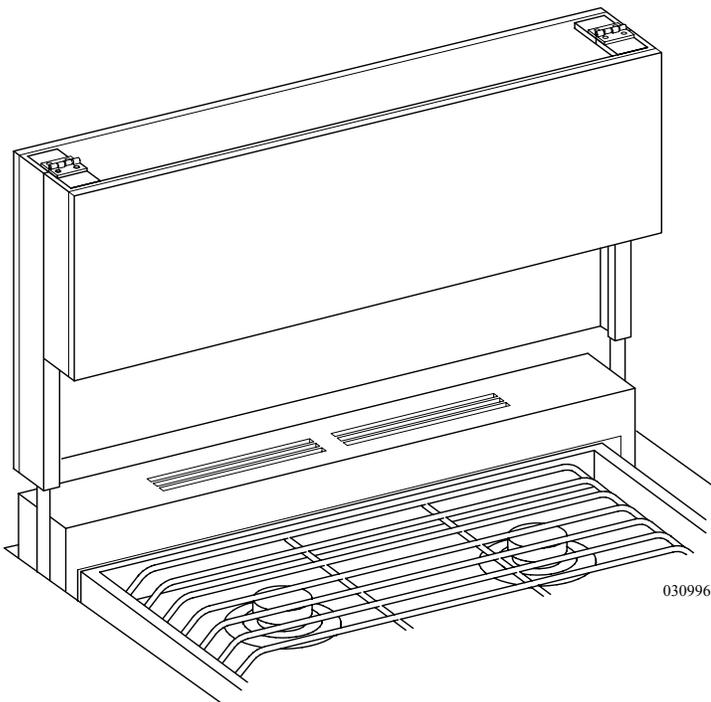
- Lift the cover then fold. The cover will engage the lock when placed into the full upright position.



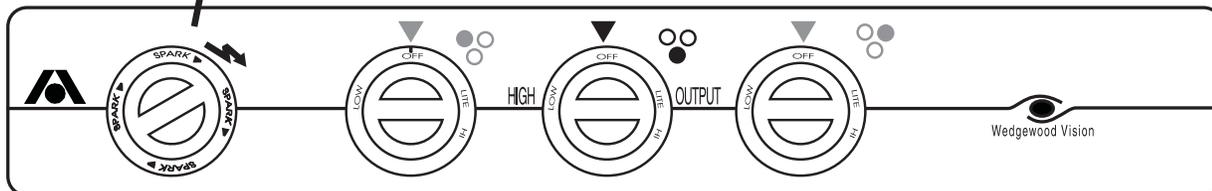
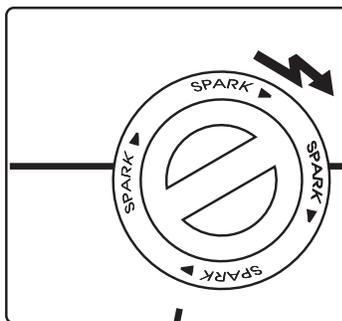
CAUTION: The cover is very heavy.

To Close Cover:

- Allow the cooktop to cool to room temperature before closing cover. Raise cover arms from lock position, lower and unfold cover.



- Turn the appropriate burner knob counter-clockwise 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 OFF, to turn the burner off.
- Never close the cover while the burners are in use.
- Do not use the cover as a griddle.
- The bi-fold cover must always be closed when the motorhome is in transit.



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WARNING: Top cover must be in full upright and folded position when the cooking surface is in operation. Do not cover the oven vent openings while the oven is in operation.



WARNING: Do not heat the motorhome interior with the cooktop or oven. Gas combustion consumes oxygen inside the motorhome. Carbon Monoxide is an odorless, colorless and highly poisonous gas.



WARNING: If you smell gas, extinguish all open flames and turn off the main gas supply. Liquid propane is highly volatile, highly explosive and extremely dangerous. Explosion, fire, property damage, injury or death can result. Propane is a "heavy" gas and will lay on the floor and "hide" in corners. Open all windows and doors. Do not touch any electrical switches. They may cause a spark which can ignite. Contact a qualified service center to have the problem correctly diagnosed and repaired before resuming operation.

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.
5. Pre-heat the oven for 10 minutes prior to use.

Burner Grate

The burner grate is attached to the cooktop cover by two spring clips located on the underside of the cooktop cover. The burner grate can be separated from the cooktop cover for cleaning purposes. Place a towel on the countertop next to the cooktop. Lift the cooktop cover up by pushing cover towards rear of cooktop. Lift cover at the front edge. Place the cooktop cover upside down on the towel. Squeeze both of the grate spring clips to remove the grate from cooktop cover.

Cleaning



cleaner.eps

Glass cleaner should be applied to the cooktop surface using a paper towel. Do not spray cleaner directly on the surface.

- Clean all surfaces as soon as possible after boil overs or spillovers.
- Use warm soapy water to clean the burner grates, cooktops, painted surfaces, porcelain surfaces, stainless steel surfaces and plastic items on the range or cooktop. Grit or acid-type cleaners may ruin the surface.
- Use only non-abrasive plastic scrubbing pads.
- Do not allow foods containing acids (such as lemon or tomato juice, or vinegar) to remain on porcelain or painted surfaces. Acids may remove the glossy finish. Wipe up egg spills when cooktop is cool.
- Allow porcelain surfaces to cool before cleaning. Burns from the heated surface may occur or the cooktop porcelain can crack.

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.

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 800-325-4026.

The cooktop range/oven is operated and maintained the same as the cooktop only with an oven. This option allows for a wider variety in floor plans and provides more storage space.

**COOKTOP
WITH OVEN
(Optional)**

- The oven may be used with the cover down.
- 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.

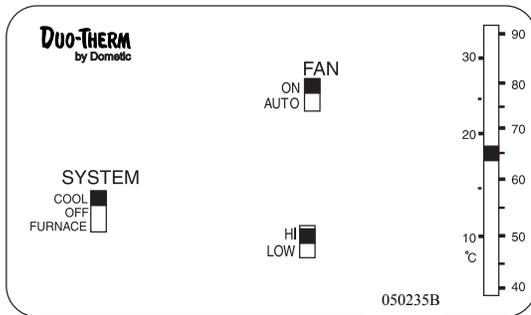
The roof air conditioners operate from 120 Volts AC only. Operation is controlled by a 12 Volt DC wall thermostat. The electronics in the wall thermostat send a signal to the roof air conditioner's circuit board. The circuit board controls the desired roof air conditioner functions. The refrigeration process in the roof air conditioner is similar to the dash air conditioning or a household type refrigerator, functioning as an enclosed system. The refrigeration process repeats in a cycle. Refrigerant is drawn into the compressor and heated from compression. High pressure vapor is sent to a condenser where the heat is expelled into the atmosphere. The vapor leaves the condenser as a high pressure liquid. This liquid is forced into a metered capillary tube and then into the evaporator or low side pressure. The refrigerant changes from liquid form to a vapor as the heat is extracted. The vapor is drawn back into the compressor to start the cycle again.

**AIR CONDITIONER
- ROOF**



NOTE: Air conditioning systems will freeze the moisture in the air depending on the humidity content. Under high humidity conditions it is recommended to leave the HIGH/LOW switch to the HIGH position.

Operation



The roof air conditioner will operate only when the following needs have been met:

- 120 Volts AC from either shore power or the generator is supplied.
- House batteries are charged.
- The battery cut-off switch must be ON.

Thermostat Operation:

The thermostat operates the roof air conditioner and the furnace.

Roof Air Operations:

- **FAN ONLY** - Move the **FAN** switch to the **ON** position. Use the **HIGH** or **LOW** switch to set desired fan speed. Set the thermostat to desired temperature.
- **COOL** - Move the **SYSTEM** switch to **COOL**. Move the **FAN** switch to **ON**. Set the thermostat to the desired temperature. Use the **HIGH** or **LOW** switch to set desired fan speed.



NOTE: The thermostat in the bedroom performs the same function as the living room thermostat. The FURNACE position on the bedroom thermostat is nonfunctional.

FURNACE

The furnace, and 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.

Operation

The furnace operates in the following manner: The wall thermostat sends a signal to the front roof air conditioner circuit board, which closes a relay. Closing a relay sends an electrical signal to the furnace to begin the ignition cycle. There is a small time delay before the blower motor begins. When the blower motor attains a predetermined speed it will close the air prover or sail switch. The sail switch sends the electrical signal through a high temperature protection switch, then to the automatic ignition circuit board. After the thermostat is satisfied, the gas valve closes and extinguishes the burner. The blower motor stops about two or three minutes after cool down.

The furnace will operate when the following conditions have been met:

- The primary LP-Gas valve on the LP tank is open and the LP-Gas valve at the furnace is on.
- The house batteries in the motorhome are charged.
- The battery cut-off switch must be ON.

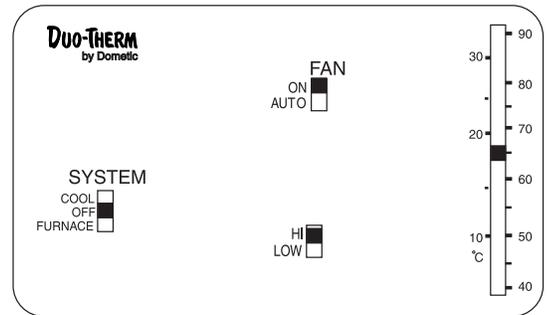
Using the Furnace:

- Set the SYSTEM switch to FURNACE.
- Set the FAN switch to AUTO.
- Set desired temperature.

Using the Furnace



WARNING: IF YOU SMELL GAS extinguish all open flames and turn off the main gas supply. Liquid propane is a highly volatile, extremely dangerous gas. It can explode or ignite, which may result in property damage, injury or death. Propane is “heavy” and can “float” on the floor or “hide” in corners. Open all windows and doors. Do not touch electrical switches. They may spark, which can ignite. 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.



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CAUTION: Do not store any items or materials in the furnace area. Restricted air flow may hamper furnace operation leading to failure and/or fire hazard.



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.



NOTE: When washing the exterior of the motorhome, avoid a direct stream of water into the outside furnace vents. This can damage the furnace.



- After the motorhome has been removed from storage, operation of the furnace may produce a musty smell during the first couple of cycles.
- Operating the furnace at an altitude above 5,000 feet 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.

Tips

If The Furnace Fails To Light

- Make sure the LP-Gas supply valve is open.
- The furnace will not light if the blower motor is not spinning to specified speed. This may be due to a low house battery charge condition. Hook-up to shore power and start the generator or main engine to charge the batteries.
- If the blower motor does not spin and the necessary power requirements have been met, use a screwdriver or coin to open the furnace access panel outside of the motorhome. Make sure the **ON/OFF** switch is **ON** and the circuit breaker is pushed **IN**.



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

WATER HEATER

A ten-gallon water heater is the standard feature for the motorhome. The water heater operates by using one of two methods. The first method is 120 Volts AC, supplied either by shore power or the on board generator. The 120 Volt AC uses a heating element like the one found in a house water heater. The 120 Volt AC method is the more efficient if shore power is available.

The second method uses LP-Gas. The LP-Gas incorporates the use of an Automatic Ignition circuit board operated by 12 Volt DC. Two thermostats control the water temperature: One for the 120-Volt and the other for the LP-Gas. The water heater manufacturer presets the temperature of both thermostats.

The process for heating water is simple. Water is pumped into the bottom of the water heater tank. LP-Gas, 120 Volt AC, or a combination of both, heats the water. The heated water is discharged out of the top of the tank upon usage.

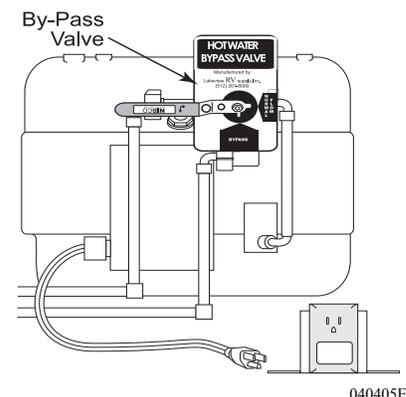
The water heater is equipped with a by-pass valve for easy winterization and a Temperature Pressure Relief valve for safety. The water heater has aluminum clad tank. An anode is not necessary.



NOTE: The automatic ignition circuit board will make three attempts to light the burner. If the burner does not light by the third attempt, the ignition circuit board will go into "lock-out." Cycling the on/off switch will reset the ignition board.



NOTE: Do not operate the water heater by either function without water in the water heater tank. This can damage the thermostats and the electric heating element.



Before using the water heater, purge all trapped air from the water system and water heater.

Before Using the Water heater

To Purge the Air and Pressurize the System:

- Remove the 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 are 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.



CAUTION: After purging the water lines and water heater, air may still be present. Use caution upon opening a hot water faucet after the first heat cycle of the water heater.



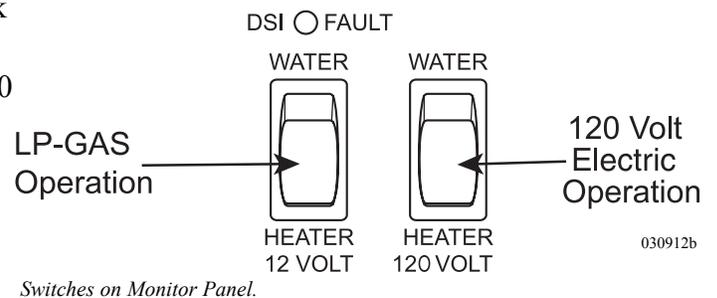
WARNING: IF YOU SMELL GAS extinguish all open flames and turn off the primary LP-Gas valve. Do not touch any electrical switches. They may cause a spark that can ignite. Open all windows and doors. Evacuate the motorhome. Propane is a "heavy" gas and will lay on the floor and "hide" in corners. Liquid propane is highly volatile, explosive and extremely dangerous. Explosion, fire, property damage, injury or death can result. Contact a qualified service center to have the problem correctly diagnosed and repaired before resuming operation.

Water Heater Operation:

- Turn ON the **Battery Cut-off** switch at the entry door.
- 120 Volt AC is supplied from shore power or the generator.
- The house batteries are charged.
- The primary LP-Gas valve on the LP-Gas tank is open.
- Ensure the water heater is plugged into the 120 Volt AC outlet.

Heating Water with 120 Volt AC:

- Have either shore power (preferable) or the generator supplying AC voltage.
- Turn ON the **Water Heater 120 Volt** switch.



Operation

Heating Water with LP-Gas:

- Make sure the primary LP-Gas valve is open.
- Turn ON the **Water Heater 12 Volt** switch. The indicator light on the switch will illuminate briefly then go out when the burner ignites. The burner will make an audible "roar" when lit.
- The automatic ignition circuit board will attempt three ignition cycles to light the burner. If the burner does not light after the third attempt, the circuit board will "lock-out" and the indicator light on the switch will glow steady.
- Check the level of LP-Gas in the tank and make sure the primary LP-Gas valve is on. Cycle the **LP** switch off then back on to reset the ignition board.



NOTE: The LP-Gas and AC electric functions may be on at the same time. This will speed the recovery process of heating water for large volume use.



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



WARNING: Before beginning any service or work on the water heater make sure the LP-Gas is turned off, the 120 Volt AC source has been disconnected and the 12 Volt DC source has been disconnected. Failure to do so can result in explosion, fire or injury. Water has cooled enough to prevent scalds or burns.

Indicator Lamp:

- Illuminates briefly when the **LP** switch is turned on, ignition occurs and the lamp goes out.
- If the burner does not light within six to nine seconds the ignition board will attempt two more ignition cycles. If the burner does not light after the third attempt, the indicator lamp glows steady.

Ignition Module Function

The ignition module will perform the following sequence:

1. The module has a timing circuit, which allows six to nine seconds for ignition to occur.
2. Initially the module supplies current to the gas valve. At the same time, it produces a high-voltage current supply to the electrode to produce a spark at mixture tube.
3. Upon ignition, the electrode senses the presence of flame.
4. If ignition does not occur, the module will wait 20 to 40 seconds before the next ignition cycle.

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. If the thermostat fails, a High Temperature safety limit switch will open. The safety switch will require manual reset.

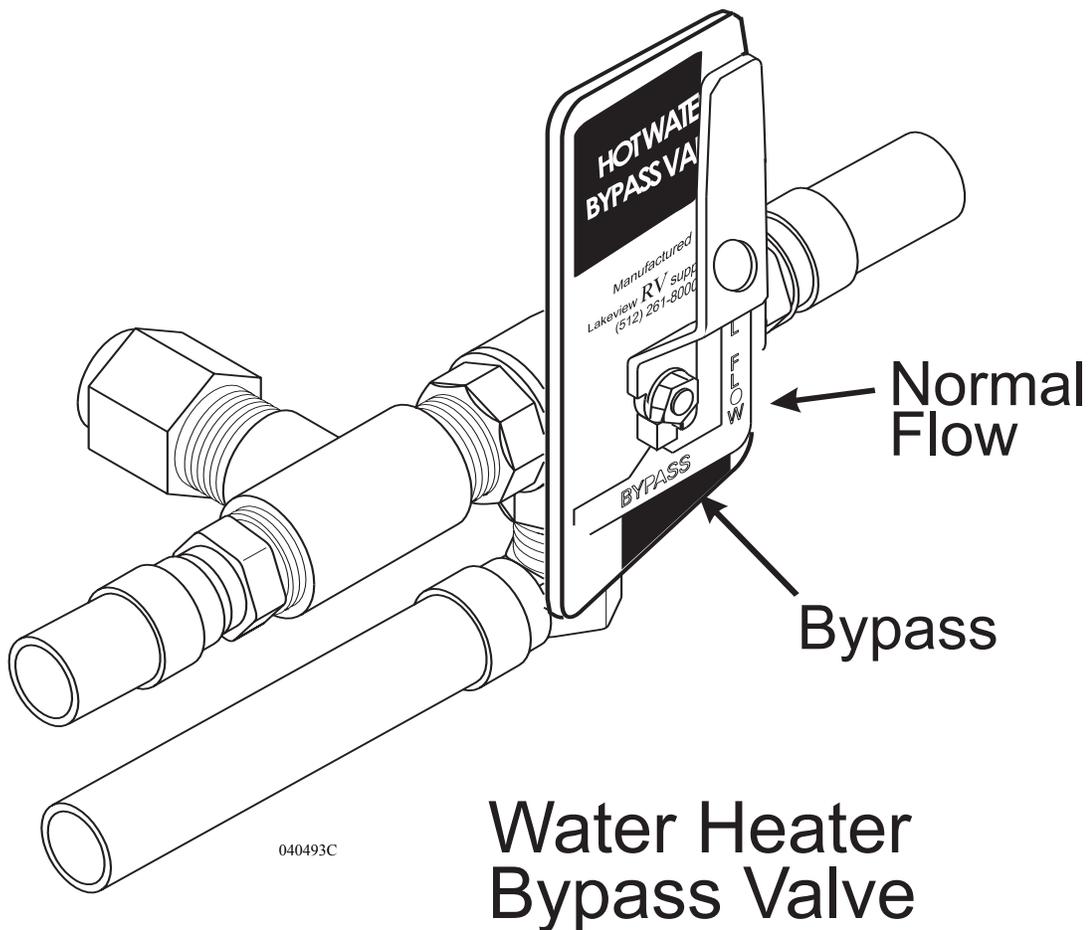
Thermostats



CAUTION: If the High Temperature safety limit should open, discontinue using the water heater. Have the water heater inspected by a qualified technician to determine the cause of the over temperature condition.

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**.

Water Heater Bypass



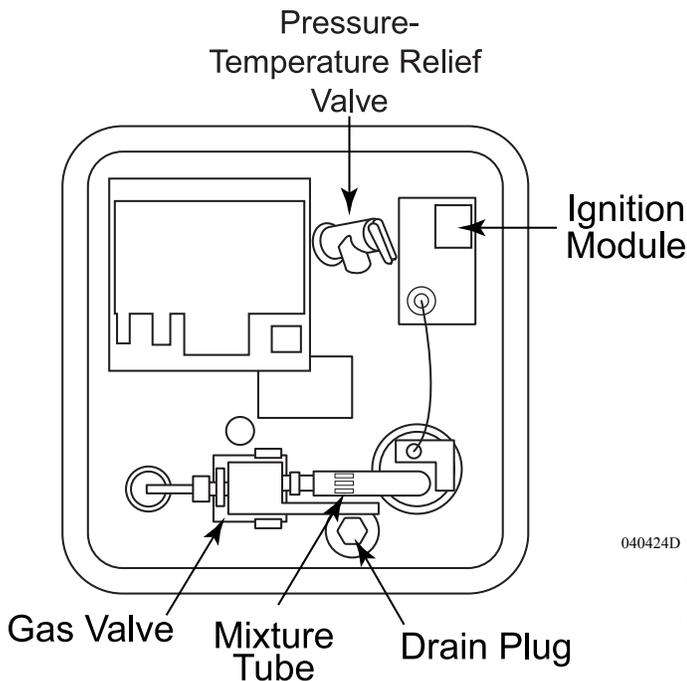
Pressure-Temperature Relief Valve

The water heater is equipped with a Pressure-Temperature relief valve. The water heater may discharge from the Pressure-Temperature relief valve during the heating cycle, due to thermal expansion of water. The Pressure-Temperature 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. A small discharge is normal and is not necessarily a faulty valve. 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:** Shut **OFF** the incoming water supply.
- Step 3:** Open a hot water faucet closest to the water heater.
- Step 4:** Pull the handle of the relief valve until the flow of water stops.
- Step 5:** Close the relief valve allowing it to snap shut. Close the hot faucet and turn **ON** the water supply.
- Step 6:** Turn **ON** the water heater.

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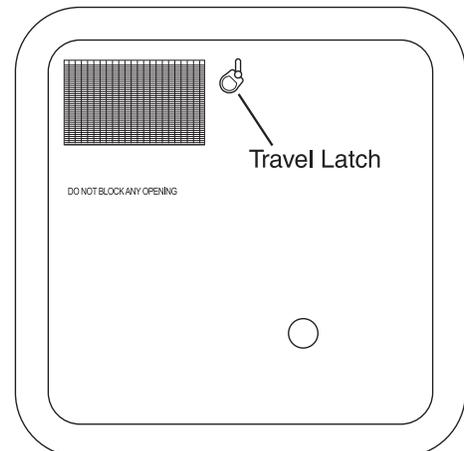
The air pocket is re-established and the process does not need to be repeated until the next discharge of water from the Temperature and Pressure relieve valve. If the discharge does not stop, contact a qualified service center to evaluate the valve and make any required repairs.

Burner Compartment

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



NOTE: Do not block any opening.



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- To conserve LP-Gas, turn off the water heater when not in use.
- When using the shower, conserve energy and hot water by shutting the shower water off when not in use.
- Use caution when hooked to anything less than 50 Amp shore service. When the water heater element is in operation it will use approximately 12 AC Amps. Appliances will need to be operated in sequence to avoid tripping a breaker.
- Water may drip occasionally from the Temperature-Pressure relief valve until the pressure has dropped. Avoid opening the T & P 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.

If the motorhome is to be stored during the winter months, drain the water heater to prevent freeze damage.

Draining & Storage

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: Be sure to 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 by cleaning 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 house power 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.

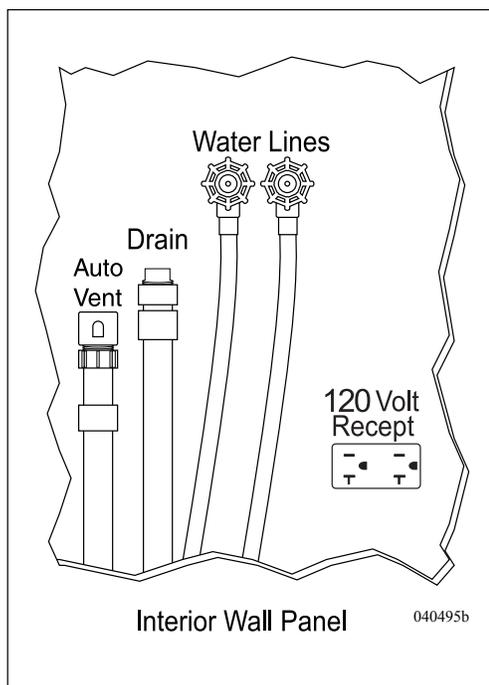
WASHER-DRYER PREPARED

If the motorhome was not ordered with an optional washer-dryer, it will have a washer-dryer preparation package installed from the factory. The washer-dryer “prep” package includes the following items:

1. Color coded water supply lines. A red line for hot; a blue line for cold.
2. An 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.
3. A 120 Volt AC 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.



Location of specified parts may vary within wall panel depending on floor plan and model.

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 drying.

The automatic washer-dryer has a capacity of up to 12 lbs. of dry clothing. It 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.

WASHER-DRYER (Optional)

- 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.



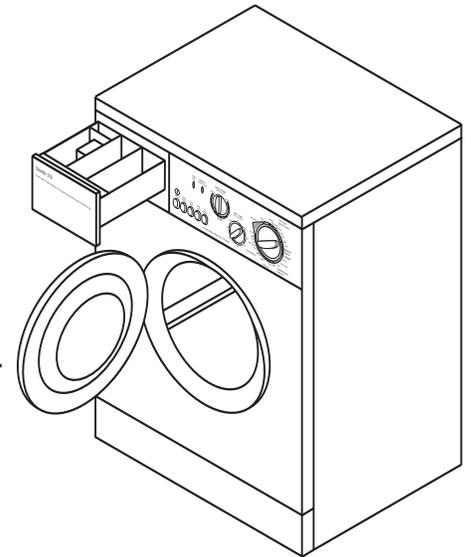
INFO: The washer-dryer has many features. Refer to the manufacture's manual in the owner's information file for detailed operating instructions.



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.



Before using the washer for the first time, after winter storage or a long period of non-use, it is a good idea to conduct this simple test procedure prior to loading the machine for use. This procedure will verify all the hardware and electronic components are functioning properly. Wipe the inside and outside with a damp cloth to remove any travel dust that has accumulated.

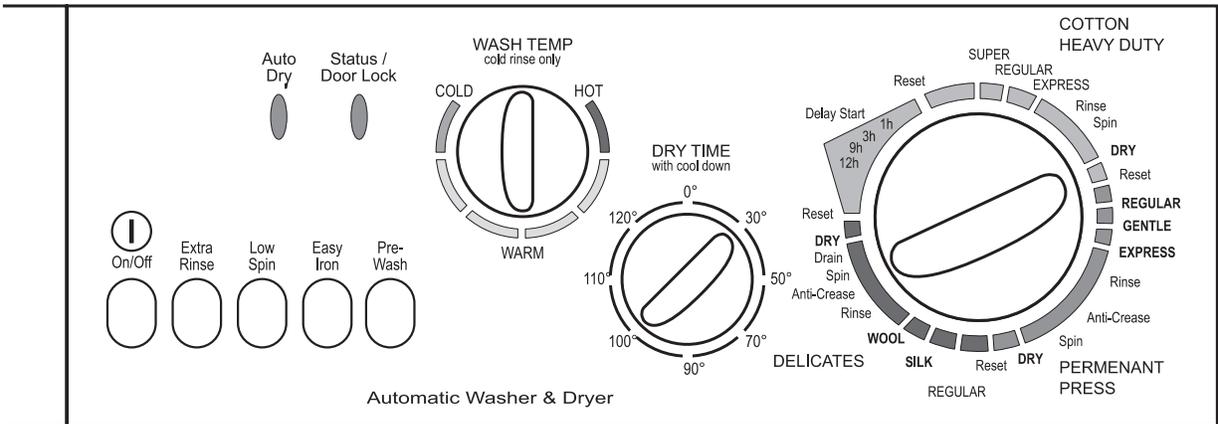
Test Procedure



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 any water valves are open.
- Hook to city water or turn on the water pump.
- Hook to shore power or start the generator.



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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 be flowing into washer and 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 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 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 explosive substances. They give off vapors that could ignite or explode. Do not add gasoline, dry cleaning solvents or other flammable or explosive substances to the wash water. Do not use heat to dry articles containing foam rubber or similar textured, rubber-like materials.

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 clothes 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.

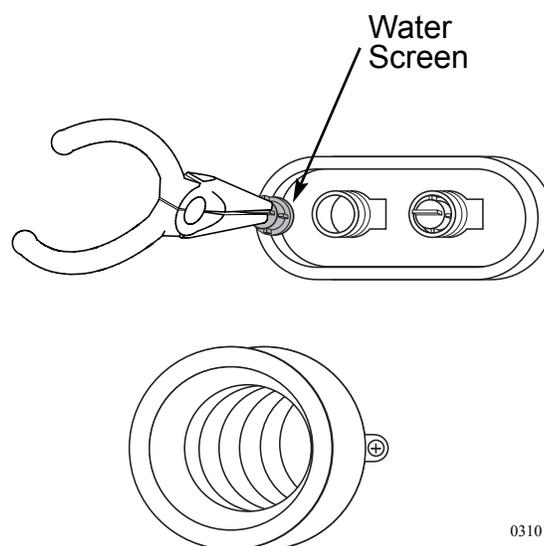
Occasionally wipe the exterior cabinet of the washer-dryer with a damp cloth or sponge. Wipe dry with a soft cloth. Do not use polish on plastic trim. In areas of hard water, detergent can accumulate in the drum. Obtain a packaged water softener. Add quantity as specified by the manufacturer directly 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 any 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.

Washer-Dryer Maintenance



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.



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Winterizing the Washer-Dryer

To Winterize the Washer Dryer with 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 ¼ 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.

To Winterize the Washer Dryer Using RV Antifreeze:

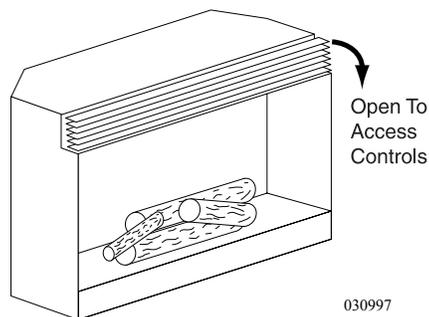
Two methods of introducing antifreeze to the water system can be used. Add antifreeze directly to the water tank or use a separate container of antifreeze with water line hooked to the intake side of the water pump.

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.

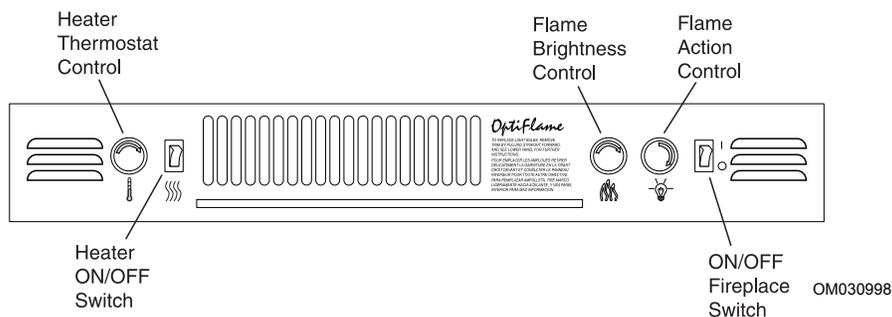
FIREPLACE - ELECTRIC (Optional-Not Available On Certain Models)



The fireplace operates on 120 Volt AC supplied by either shore power or the generator. The fireplace will produce heat from lamps located inside the fireplace. When the fireplace is first used, it may emit a slight, odor. This odor is a normal condition caused by the initial heating of internal heater parts and should only occur on initial use.

When using the fireplace, basic safety procedures should be followed to reduce the risk of fire, electrical shock and injury to persons, including the following:

- Read all instructions before using the fireplace
- The fireplace is hot when in use. To avoid burns, do not let skin touch hot surfaces. The grill directly in front of the heater outlet becomes hot during heating operation. Keep combustible materials, such as furniture, pillows, bedding, paper, cloth and curtains at least 3 feet (0.9m) from the front of the unit.
- Extreme caution is necessary when any heater is used by or near children and/or handicap persons and whenever the fireplace is left operating and unattended.
- Do not insert or allow foreign objects to enter any ventilation or exhaust opening as this may cause an electric shock or fire, or damage the heater.
- To prevent a possible fire, do not block air intake or exhaust in any manner.
- All electrical heaters have hot and arcing or sparking parts inside. Do not store gasoline, paint, or flammable liquids where the unit will be exposed to flammable vapors.
- Do not modify this fireplace. Use it only as described in the OEM (Original Equipment Manufacturer) manual. Any other use not recommended by the manufacturer may cause fire, electric shock or injury to persons.
- Do not burn wood or other materials in the fireplace.
- Do not strike fireplace glass.
- Always disconnect power before performing fireplace cleaning or maintenance.



Operation

The following will explain the function of each convenient control. To access the controls, open the upper grill by pulling, near the top, forward and down. To conceal the controls during operation, return the grill to its original upright position.

MAIN ON/OFF SWITCH:

The ON/OFF switch supplies power to all fireplace functions (Heater/Flame).

Resetting the Temperature Cutoff Switch:

This unit is equipped with a thermostat to control temperature of the room by turning the heater on and off. The heater is protected with a safety device to prevent overheating. Should the heater overheat, an automatic cut out will turn the heater off. Reset by switching the ON/OFF switch to OFF and waiting 5 minutes before switching the unit back ON.



CAUTION: If heater trips continuously, call a local dealer.

FLAME ACTION CONTROL:

Turn the flame action control knob to adjust the flame speed to desired level.

FLAME BRIGHTNESS CONTROL:

Turn the flame brightness control knob to increase or decrease the brightness of the flame and embers.

HEATER ON/OFF SWITCH:

The heater ON/OFF switch supplies power to the heating unit when main ON/OFF switch is ON.

HEATER THERMOSTAT CONTROL:

To adjust the temperature to individual requirements, turn the thermostat control clockwise all the way to turn on the heater. When the room reaches the desired temperature, turn the thermostat knob counterclockwise until a click is heard. Leave in this position to maintain the room temperature at its setting.

For additional heat, turn clockwise until a audible click is heard and the heater will turn ON. Rotate the knob counterclockwise to turn the heater to the OFF position.

Maintenance

Light bulbs need to be replaced if a dark section of the flame or when the clarity and detail of the log exterior disappears. There are two bulbs at the top of the opening which illuminate the log set exterior, and four bulbs under the log set which generate the flames and embers.



WARNING: Turn OFF circuit breaker before attempting any maintenance or cleaning to reduce the risk of fire, electric shock or damage to persons.



NOTE: Allow at least 5 minutes for light bulbs to cool off before touching bulbs to avoid accidental burning of the skin.

To Open the Light Bulb Area:

- Remove the rim by pulling straight forward.
- Hold glass in place while removing retaining top clip.
- Lift glass out and store in a safe place.



CAUTION: Even though the glass is safety glass it may break if bumped, struck or dropped. Care must be taken when handling the glass.

Helpful Hints:

It is a good idea to replace all light bulbs at one time if they are close to the end of their rated life. Group replacement will reduce the number of times needed to open the unit to replace light bulbs.

To Replace the Bottom Light Bulbs Which Generate the Flames and Embers:

Bulb requirements: Quantity of 4 clear chandelier or candelabra bulbs with an E-12 (small) socket base, 60 watt rating. Example GE 60BC or Phillips 60 CTC.

Do NOT exceed 60 watts per bulb.

- Lift up front edge of log until it clears the front tabs. Pull out until the rear tab clears the back ledge, then lift out.
- Examine the bulbs to determine which bulbs require replacement.
- Hold the socket while unscrewing the bulb.
- Hold the socket while screwing in the new bulb.
- Replace the log by pushing it down and in until it rests against the mirror.

To Replace the Top Bulbs Which Illuminate the Log Exterior:

Bulb requirements: Quantity of 2 clear chandelier or candelabra bulbs with an E-12 (small) screw base. Please refer to the label adjacent to the upper lights for the correct wattage for your model. **Do NOT exceed 15 watts per bulb.**

- Examine the bulbs to determine if they need replacing.
- Hold the socket while unscrewing the bulb.
- Hold the socket while screwing in the new bulb.

To Reassemble Light Bulb Area:

- Replace the glass and hold it in place at top.
- Fasten retaining clip to hold glass in place.

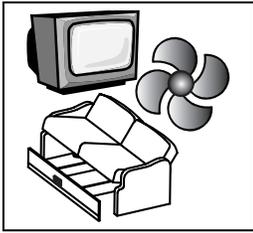
Glass Cleaning:

The glass is cleaned in the factory during the assembly operation. During shipment, installation, handling, etc., the glass surface may collect dust particles; these can be removed by buffing lightly with a clean dry cloth.

To remove finger prints or other marks, the glass can be cleaned with a damp cloth using a good quality household glass cleaner. The glass should be completely dried with a lint free cloth or paper towel. Wait until it is time to change the light bulbs to clean inside glass surface.



CAUTION: Do not use abrasive cleaner on glass surface or spray liquids directly onto any surface.



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EQUIPMENT

SECTION 5

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This section covers the basic operation and care of various types 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 equipment-components, other than what is provided in this section, can be found in the manufacturer's manual.

The entry step features amber lighting under the step, automatic retraction with the ignition key in the **RUN** position and a last out feature. Located just inside the entry door is the step switch.

**ENTRY STEP
- Operation****Operating the Entry Step:**

1. With the entrance door open, turn the step switch on.
2. Close the door. The step should retract and lock in the **UP** position. The step light will remain on.
3. Open the door. The step should extend and lock in the **DOWN** position with the under step light on. The step will retract when the door is closed.
4. The step is equipped with a power switch. When the switch is turned off, the step should remain in the extended position with the door closed and the light off. Close the door and turn on the ignition switch. The step will retract for travel.
5. With the power switch off, the step extended, the entrance door closed and the ignition turned on the ignition override system will go into effect and the step will automatically retract.
6. Turn the ignition off and open the door. The step will extend and lock in the **DOWN** position. This is the "last out" feature. When the ignition is on the step will always activate with the door movement, regardless of the power switch position.



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



NOTE: Turn entry step switch off when dry camping to reduce the possibility of draining the chassis battery.

Tips



If the step fails to operate:

- Verify that the step switch is **ON**.
- Check the main power supply for the step, a 25 Amp fuse is 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.

Lubrication

Lubrication maintenance is essential to keep the step operating smoothly and reliably. Thoroughly clean the step before performing lube maintenance. This may require using a stiff nylon bristle-brush and automotive detergent. Allow the step to thoroughly dry. Use Kwik Lube Spray Lubricant or equivalent every 30 days on all pivot points, rotating linkages and slide mechanisms.



CAUTION: Keep fingers, clothing and other hardware away from moving components.

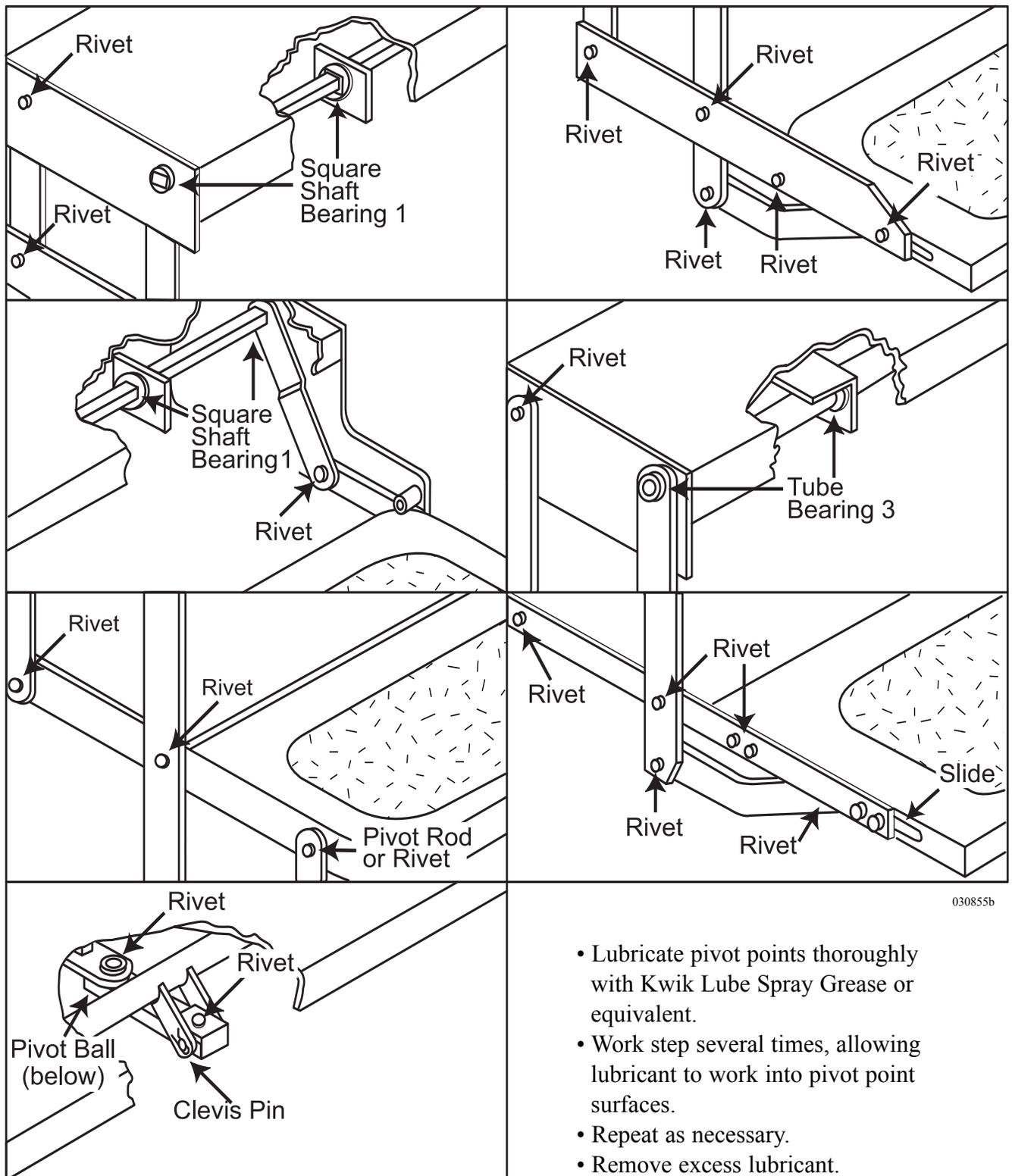
- Apply lubricant to all points in illustration.
- Operate the step several times to allow lubricant to penetrate surfaces. Repeat lubricant application.
- Extend step and clean excess lubricant to reduce road grime accumulation.



NOTE: Clean and lubricate steps more frequently in adverse weather conditions. Mud, snow, road salts and sand quickly breaks down lubricants and corrodes painted surfaces.



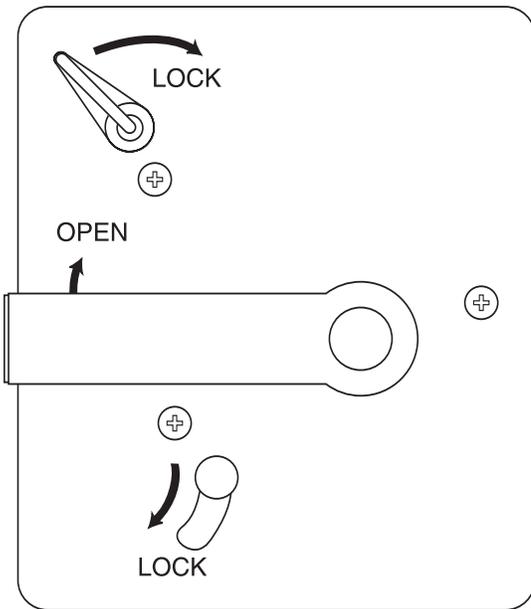
NOTE: Silicone lubricants and WD-40 are not recommended as they evaporate and are not weather resistant. Moving components are then susceptible to the elements.



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- Lubricate pivot points thoroughly with Kwik Lube Spray Grease or equivalent.
- Work step several times, allowing lubricant to work into pivot point surfaces.
- Repeat as necessary.
- Remove excess lubricant.

ENTRY DOOR - *Front Entry*



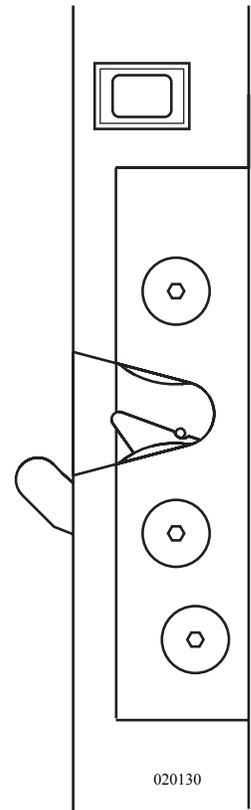
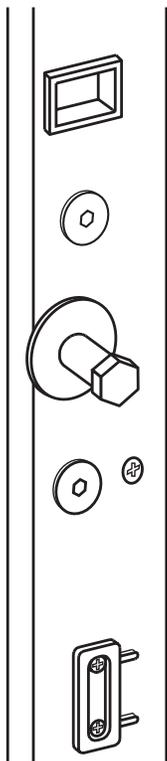
The entry door, by design, is virtually maintenance free. Installed, adjusted and tested at the factory for all operations, the door uses two separate locks for personal safety and security. The door handle incorporates a primary and secondary latching system. One locking system is the door handle and the other is a dead bolt. However, keeping the entry door in good operating condition requires some routine maintenance items on a regular basis. Adjustments can help maintain the entry door performance. These items are as follows:

1. Strike Plate/Bolt Adjustment:

The position of the striker plate or bolt may change over the course of time and with frequent operation of the motorhome. The setting may require adjustment to insure that the door operates smoothly and efficiently.

Adjusting the Entry Door Latch:

- Slowly close the entry door, observing the latch and strike bolt alignment. Do not attempt to close the door if the latch alignment is off. If the latch alignment is correct, close the door allowing the latch to catch in the first (primary) position only.
- The latch should move to the second position with just a slight pressure applied to the entry door. Press on the entry door to see if there is any further movement of the door.
- The entry handle should operate with little effort to open the entry door. If using an excessive amount of pressure is required, this indicates the bolt is set too far back.
- With a 5/8" box wrench or socket, loosen the strike bolt. Make all adjustments in small increments. Tighten the bolt firmly after making adjustments.
- Ensure the three torque head screws holding the latch assembly on the door are tight along with the two on the door jamb.

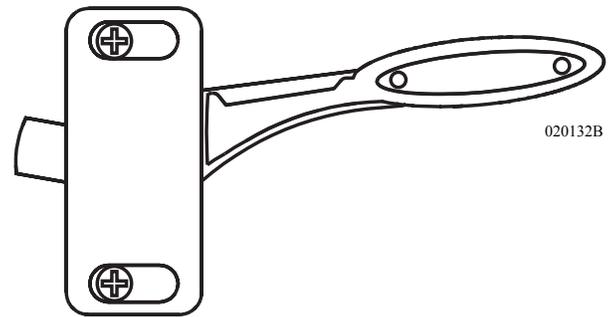


CAUTION: When operating the entry door ensure the dead bolt latch is fully in the unlock position prior to closing the entry door. Failure to do so can result in damage to the dead bolt and/or entry door.

2. Locks: The locking cylinder requires slight lubrication on an annual basis, or as needed. Use powdered graphite, not a petroleum product. Petroleum products gum the cylinder and inhibit smooth operation. The upper lock is the dead bolt, while the lower lock is the privacy lock. Applying a light coating of white lithium grease to the face of the lock bolt helps the latch mechanism to easily engage with the lock bolt.

3. Hinges: The hinges for the door requires slight lubrication annually, or as needed, with any high-quality, dry spray lubricant.

4. Screen Door - Adjusting: The screen door can be adjusted to set flush in the door jam. This requires two separate adjustments be performed. The first adjustment made is at the screen door latch/catch itself. Loosen the two Phillips screws holding the latch to the door. This will permit vertical adjustment. Move the latch far enough to allow it to catch on the striker mounted on the door frame. Tighten both screws. The striker mount on the door frame permits horizontal adjustment. Again, loosen the two Phillips screws holding the striker assembly. Move the striker to center the latch and tighten the Phillips screws in place.



5. Screen Door - Changing the Slider: The sliding cover is a simple procedure to replace. Place the slider in the center. Pulling from the center of the slider will bow enough to allow easy removal. To re-install, reverse this procedure paying attention to install the upper left corner first and the location of the stop tabs.

6. Fiberglass Skin: To maintain their appearance and a long service life, the door skin panels should be washed and cleaned periodically. Cleaning will remove the accumulation of dust and dirt, which can combine with sunlight and wind to attack exposed surfaces both chemically and abrasively.

SLIDE-OUT OPERATION

The slide-out room is electric motor operated and controlled by a rocker switch. Slide-out room operation uses many safety features preventing mechanical damage or physical injury. The slide-out room(s) will not operate until all safety requirements are in place.

The design of 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.



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



NOTE: 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 main slide-out room. Damage to the upholstery and slide-out molding can occur. The outside area must be clear of any obstructions restricting slide-out room operation. To prevent motorhome or property damage, ensure there are five or more feet of clear space outside the slide-out room prior to extending. When retracting the slide-out rooms, ensure there is sufficient clearance inside the motorhome.



WARNING: Never move the motorhome with any slide-out room extended.

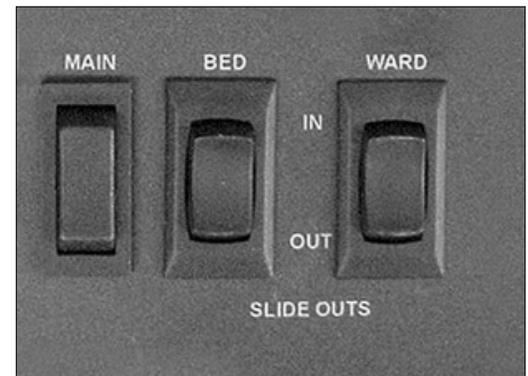
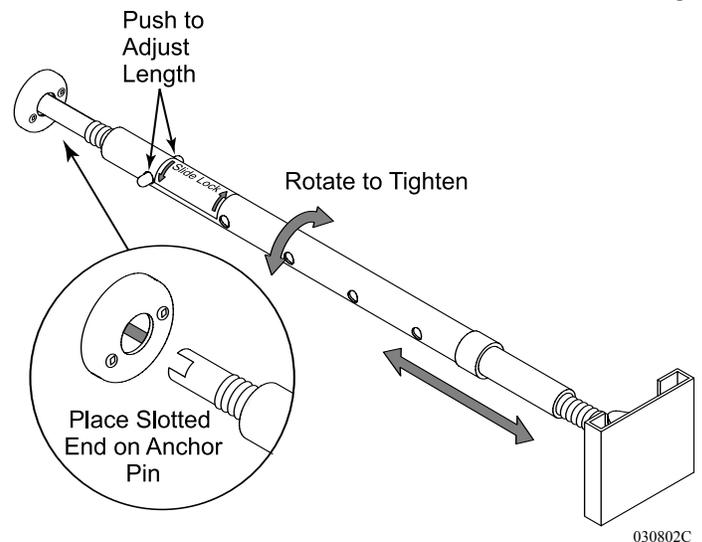


CAUTION: Continuous operation of the slide-out room can drain the batteries and damage the motor by overheating. Dirt and grit trapped under the slide-out room could result in damage to the floor.

Slide-Out Extending

To Extend Slide-Out Rooms:

- Confirm that there is enough clearance outside the motorhome for the slide-out room and awnings to extend.
- The storage bay doors under the slide-outs must be closed.
- If applicable, remove locking bar mechanisms inside the motorhome.
- Move the driver's seat forward if moving the roadside slide-out.
- Ensure the ignition key is in the OFF position
- The park brake must be applied.
- The house batteries are fully charged.
- Ensure all people, pets and objects are clear of the slide-out room path.
- The control switches for the slide-out rooms are located on the systems monitor panel.
- Press and hold the slide-out room switch 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.
- Extend any other slide-out rooms.
- Level the motorhome with the leveling system.



NOTE: If the slide-out room is extended in snow, sleet, ice, or freezing rain extensive damage could occur to the slide-out room and awning. In such conditions clear the awning and ensure free movement prior to operating the slide-out room.

To Retract the Slide-Out Room:

- Inspect the exterior to ensure all bay doors are closed and there are no sags in the awning material.
- Remove any debris from the top of the slide-out room.
- Retract the leveling system.
- Check for sufficient clearance inside the motorhome.
- Clean the floor to ensure there is no dirt or grit that could result in floor damage during operation.
- Move the driver's seat forward before moving the roadside slide-out.
- The park brake must be applied.
- Ensure the ignition key is in the OFF position.

Slide-Out Retracting

-
-
- The house batteries are fully charged.
 - Ensure all people, pets and objects are clear of the 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 when fully retracted.
 - If applicable, install locking bar mechanisms on top of the slide-out inside the motorhome.



NOTE: Be sure there is sufficient clearance on the inside of the motorhome (driver seat, etc.) before you retract the slide-out room. Ensure the floor is clean before you retract the slide-out room. Trapped dirt or grit under the slide-out room can scratch the floor surface. Never move the motorhome with the slide-out room extended.



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 between the top of slide room and the opening in the motorhome. It will be necessary to retract the room in small increments allowing the water time to run off.

Manual Override

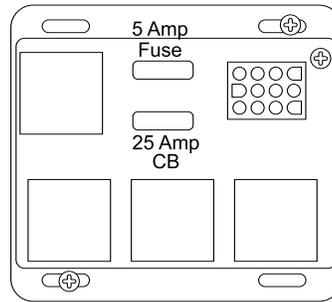
Slide Room Fails to Operate:

If the slide-out does not respond from the switch, check that battery voltage is good and all safety features are in place:

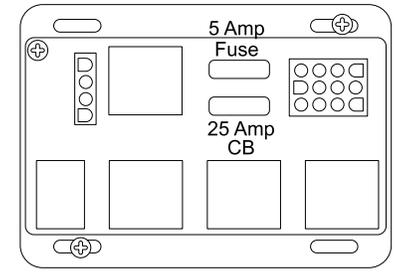
- Ignition key is off.
- The park brake is on.
- Interior house power is on.

Check the fuse and auto reset breaker on the slide-out relay module located in the storage compartment under the slide-out.

If the slide-out room will not operate after verifying the safety features and the fuse and auto reset circuit breakers are okay, it will be necessary to manually retract the slide-out.



Double Slide



Triple Slide

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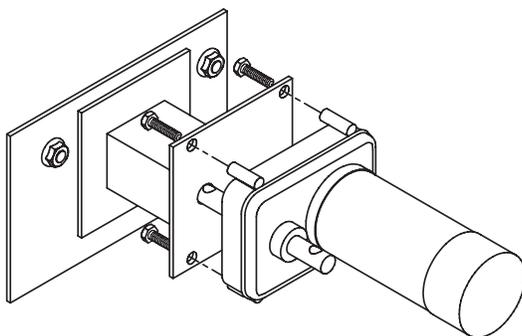
WARNING: Do not work on the slide-out system unless the batteries are disconnected. Make sure the floor is clean before retracting the slide-out room.

After the previous items have been checked and the room still does not move when the slide-out switch is pressed, follow these steps to manually override the slide-out room:

- Disconnect batteries.
- Access slide-out motor: the bedroom slide-out motor is located under the mattress. Lift the mattress and remove the access panel. The wardrobe motor is accessed by opening the curb side bay door and the main slide motor is behind the slide out storage box.
- If necessary, disconnect wire plug to slide-out motor.
- Use a 1" wrench or socket on drive shaft to retract the room.
- After room is retracted, place brake lever to Engage.
- On slide motors without a lock lever: unbolt the four fasteners retaining the motor to the flange. Make sure everything is clear of the slide-out room path. Manually push the room into place. Re-install the motor to secure room.
- Take motorhome to an authorized service center.

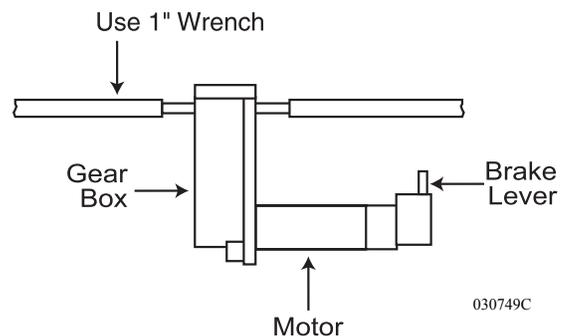


NOTE: Slide-out room is heavy and may take several people to push it in.



Bed Slide Motor
without Brake Lever

090340



Main and Wardrobe Slide
Motor with Brake Lever

030749C

Slide-Out Cover

The slide-out cover is automatic. When the slide-out moves in or out, the cover reacts to the slide-out direction. 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 helps prevent water from penetrating the seal of the slide-out.

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

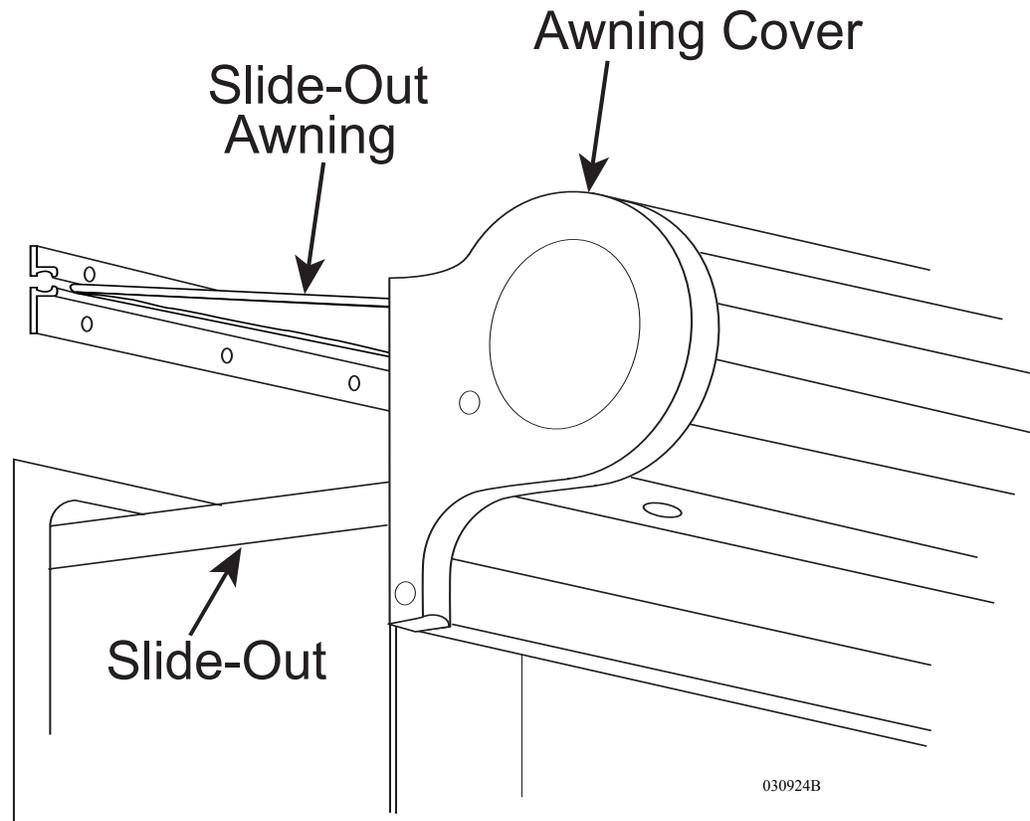


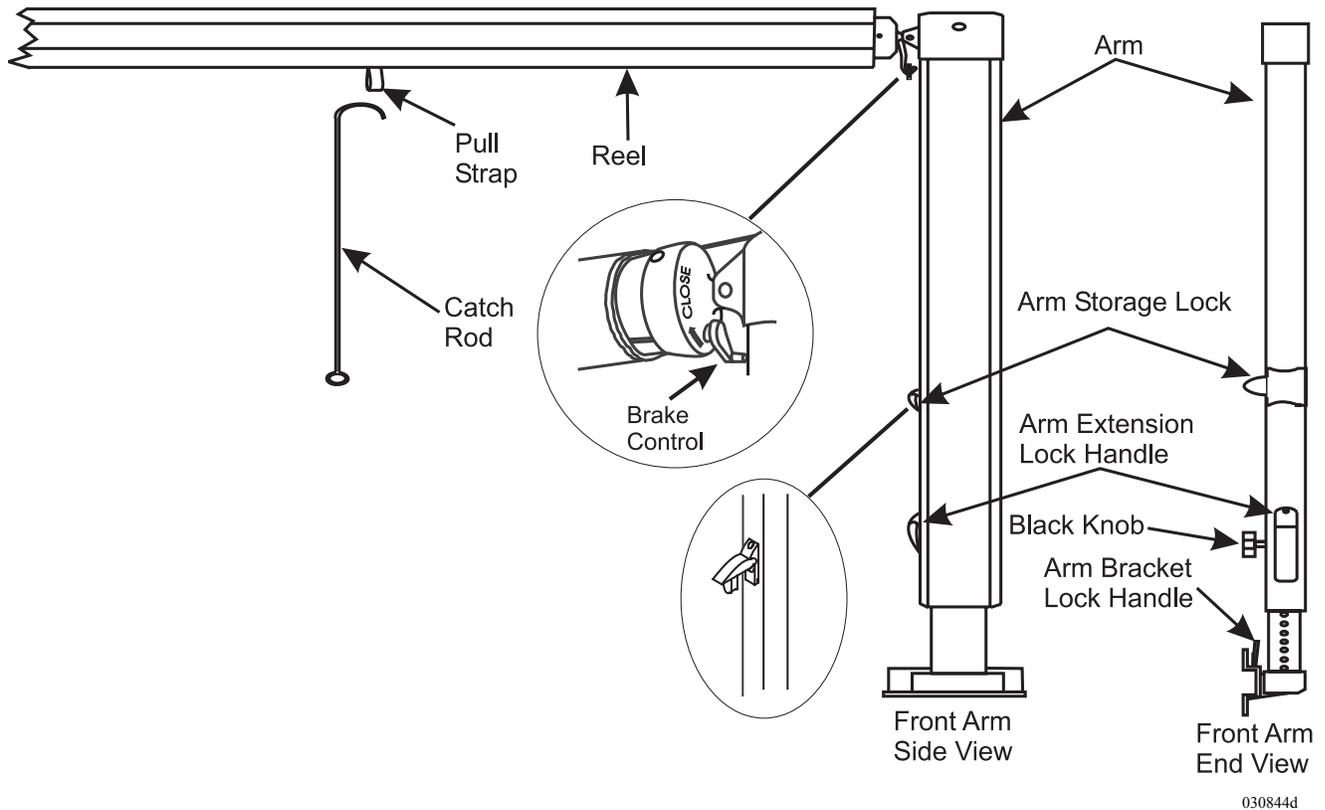
NOTE: Water may pool on top of the extended cover. As the slide-out is retracted, the water is removed when the cover retracts. Retract room slowly. Pause three or four times to allow any accumulated water a chance to run off.

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.

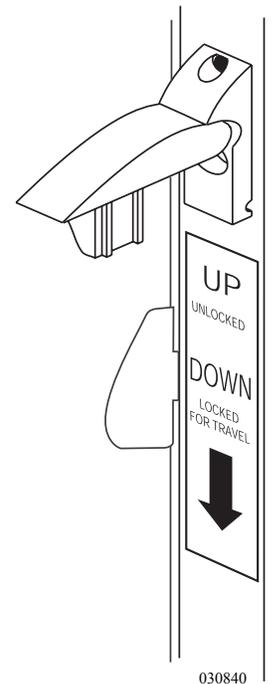




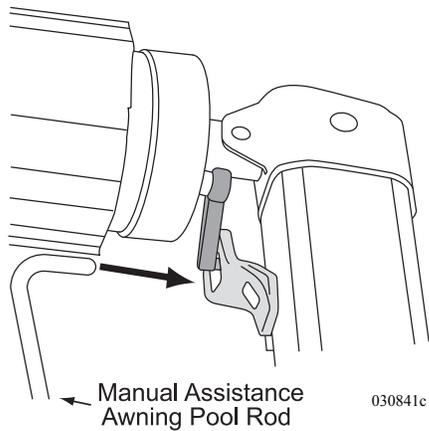
To Unlock the Awning:

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.



Lower Brake Control

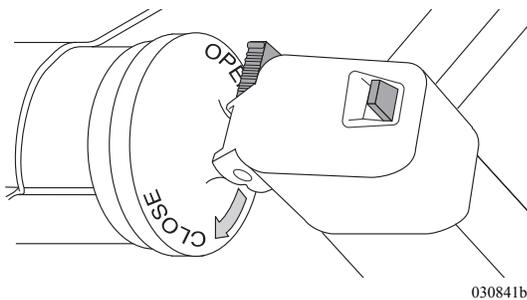


To Extend the Patio Awning:

1. Locate the awning pull rod.
2. Locate the loop of the pull strap and hook it with the awning pull rod. Draw the awning away from the motorhome to the desired extension.



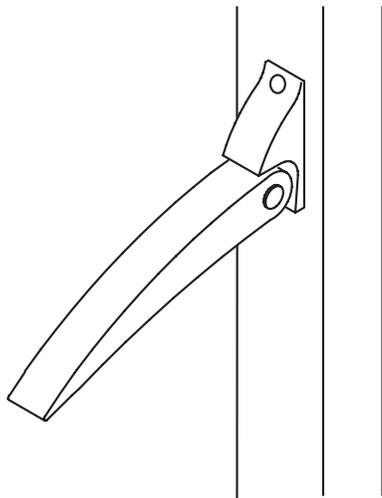
WARNING: Always use the pull strap for extending and retracting awning. Never retract awning while holding onto the awning arm. Hands or fingers caught between the awning arm channel and brace channel during awning retraction may result in serious injury.



3. 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.

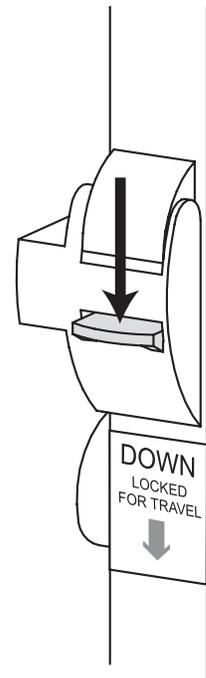


4. If equipped with Canopy Clamps, fasten the clamps at this time.
5. Using the arm extension lock handle, the awning can be hoisted upwards for additional clearance. Grasp upper arm with one hand and lift slightly upward. While lifting upward, push in on the release lever located on the lower portion of the upper arm. Lift front of awning to the desired height. Support the weight of the awning with one hand while relaxing release lever and allow the engaging pin to set into a hole in the lower arm. Go to the other awning arm and do the same. Ensure the awning is straight.

6. 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 awning rod 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 awning rod until it is 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 black locking knobs.



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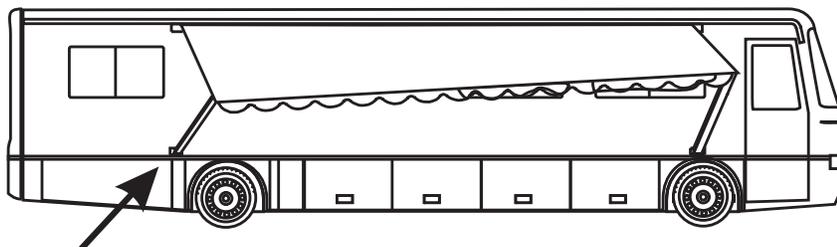
Rain Release Setting:

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.



NOTE: Water weighs 8.33 pounds per gallon. The awning was not made to withstand the 500 to 700 pounds that could accumulate. It is best not to subject the awning and the motorhome to the needless strain.

Rain Release Setting

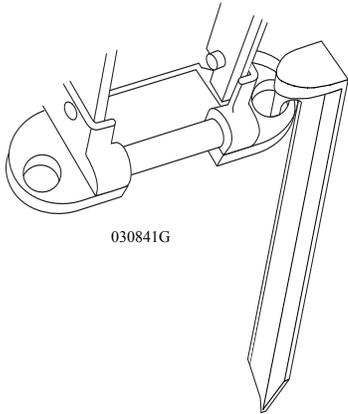


One arm should be set lower than the other for proper water run-off.

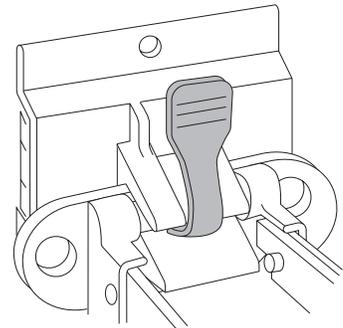
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Using the Carport Feature:

(Not available with Carefree One Touch Awnings.)



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.
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.

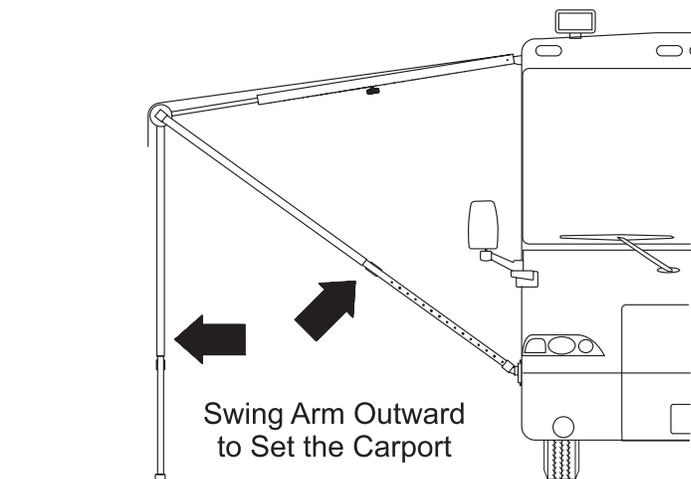


NOTE: To move the awning out of the carport position reverse the above steps.

Securing the Awning for Travel:

Before traveling, check the following:

1. The awning is fully retracted against the sides of the motorhome.
2. The black locking knobs are tightened.
3. The brake control is in the full down (locked) position, and no red warning is showing.
4. The storage locks are down and in the locked position.
5. The bottom of the front and rear arms is latched properly into the bottom brackets.
6. The awning pull rod is stored away.

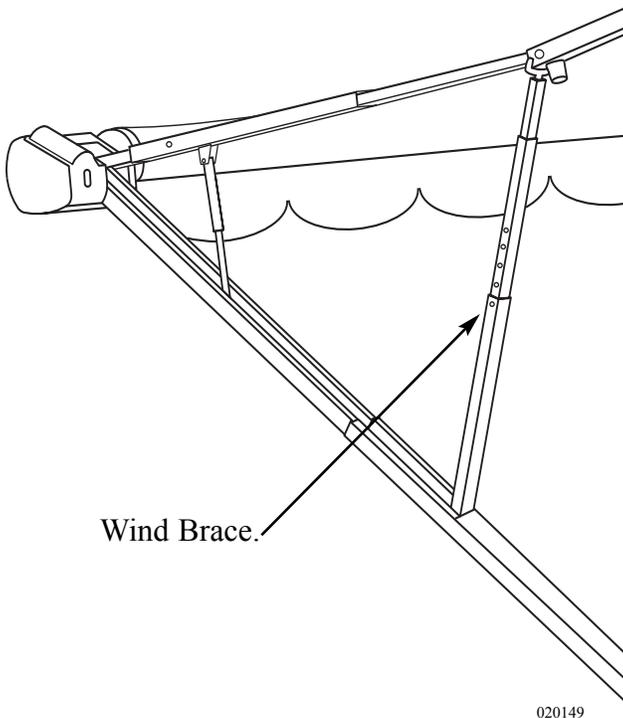


The Carefree One Touch automatic awning requires only “finger tip” operation. A key lock on the One Touch switch pad is provided to prevent accidental deployment of the awning while the motorhome is in motion. The key is removable in the lock or unlock position. Gas filled struts keep the awning fabric tight at any extended position. The 12 Volt DC motor for the One Touch awning uses approximately 15 Amps while in operation.

Awning - Automatic Carefree (Optional)



030821



To Extend the Awning:

- Verify all persons and objects are clear from the extend path of the awning and related hardware.
- Turn the **One Touch** key to the **ON** position.
- Press and hold the momentary switch to **EXTEND**. Motor will automatically stop at full extension.
- Allow 14 seconds for awning to reach full extension.
- Extension distance or fabric tension is adjusted by toggling between **RETRACT** and **EXTEND**.
- Turn the One Touch key to the **OFF** position.
- Install the wind braces (2) between the upper rafter and the main arm. Adjust wind brace so the inner spring is under tension.



CAUTION: The patio awning requires nine feet of lateral clearance from the side of the motorhome. This distance will allow the awning to reach full extension. The One Touch patio awning was not designed with a carport feature or a rain release setting. The awning should be retracted if the motorhome is left unattended or high wind conditions exist. Otherwise, wind damage to the awning may occur.



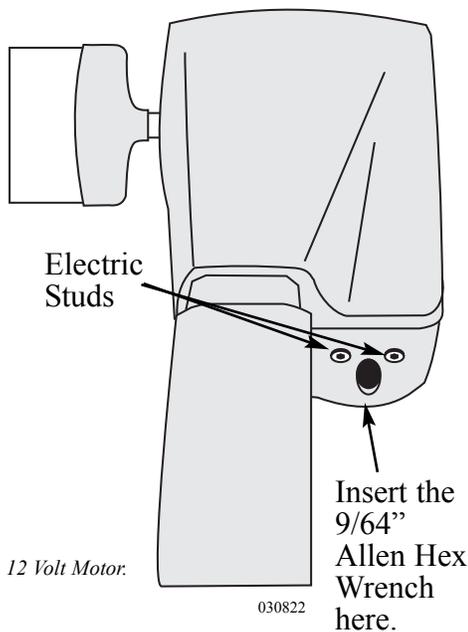
NOTE: It is not required to have the awning at full extension. Awning may be stopped at any time of extension or retraction by releasing the momentary switch.

To Retract the Awning:

- Remove the wind braces.
- Verify all persons and objects are clear from the retract path of the awning and related hardware.
- Turn the One Touch key to the **ON** position.
- Press and hold the momentary switch to **RETRACT**. The motor will automatically stop at full retraction.
- It takes approximately 14 seconds for the awning to travel from the fully extended position to the fully retracted position.
- Turn the One Touch key to the **OFF** position to avoid accidental deployment of the awning while the vehicle is in motion.

Tips - If the awning fails to retract or extend:

- Verify the One Touch key is in the **ON** position.
- The house battery cut off switch is in the **ON** position.
- The house battery voltage is at 12 Volts or above.
- Verify proper electrical connection from the awning motor to the side of the motorhome.



Emergency Retract Procedure:

If the One Touch awning fails to retract and proper DC voltages have been verified, the One Touch awning has two emergency methods of alternately retracting the awning.

1. Two exposed electrical studs are mounted externally at the forward end of the awning at the motor assembly. An alternate 12 Volt DC positive and negative supply may be applied to these connections. If awning fails to move, reverse the polarity of the alternate supply leads.
2. On the motor assembly, mounted externally at the forward end of the awning, is an opening. Insert a 9/64" Allen hex wrench. Using an electric drill, wind the awning to the retract position.



CAUTION: When using an alternate method to operate the awning, use extreme care to keep appendages, hair or loose clothing away from exposed rotating hardware.

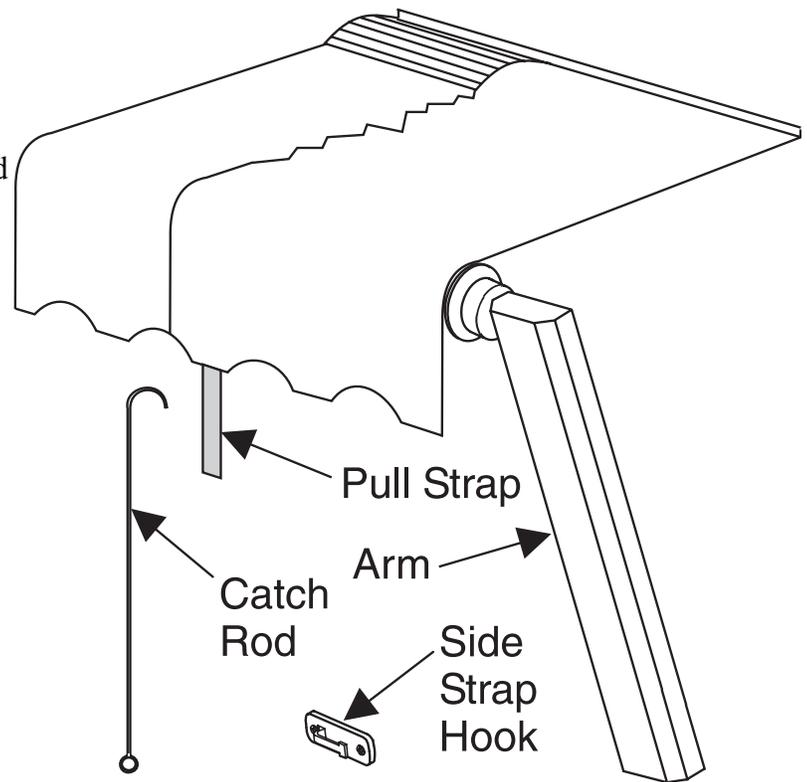
Awning - Window Carefree (Optional)

To Extend the Awning:

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

To Retract the Awning:

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



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Care of Awning Vinyl Fabric:

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 your awning looking new. Be sure to follow the instructions on the container.

Awning Care & Maintenance - Carefree



NOTE: Allow the awning material to thoroughly dry before rolling the awning up. Metal surfaces should be cleaned with soapy water and thoroughly rinsed.

Care of Awning Acrylic Fabric:

The acrylic fabric should be cleaned regularly before substances such as dirt, leaves, etc., are allowed to accumulate on, and become embedded in, the fabric. The fabric can be cleaned without being removed from the awning. Simply brush off any loose dirt, leaves, etc. Hose down and clean with a cloth and mild soap. **Do not use detergents.** Allow to air dry, preferably on a warm sunny day. If the awning has to be retracted while the fabric is wet, it should be extended at the first opportunity to finish air drying.

Avoid leaving the awning partially extended during rainy conditions. The awning is at the strongest setting when the awning is fully extended.

Cleaning and Maintenance:

- **Washing:** 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 hose. This process can be made easier with awning maintenance products. Saturate the fabric with the solution and leave it on for 15 to 20 minutes. Wash both sides of the awning using an awning brush. If necessary, reapply the solution to keep fabric saturated. Rinse the awning thoroughly. Repeat, if necessary, until most of the stains disappear.
- **Water Leaks:** If leaking occurs after washing, it generally results from insufficient rinsing. If water drips through the needle holes in the stitching use a commercial seam sealer which 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.

It is normal for slight leakage to occur through the fabric where water is allowed to accumulate or pocket on the fabric. See information under “**Storm Precautions**” for proper awning settings for water drainage. Sometimes soap or chemical residue, such as from active agents in insect fog or sprays, 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 repeating the washing and thoroughly rinsing, please contact *Carefree of Colorado* concerning further maintenance.

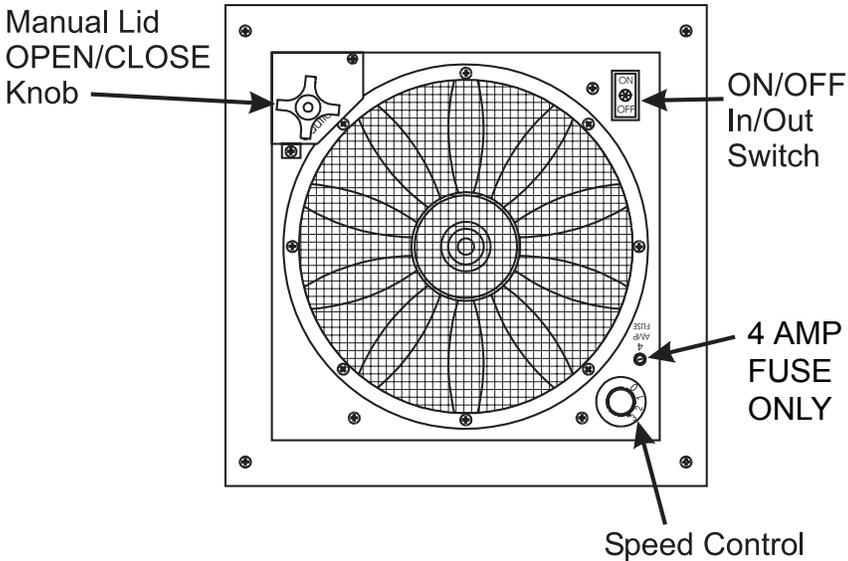
Storm Precautions:

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. If you are leaving or retiring for the night, close the awning. This takes only a few seconds and it gives the best protection for the awning. If unable to close the awning, lower both ends of it as far as you can. This will create a sufficient slope for water run-off. One end may be lowered to sufficiently divert the water, if the awning is being monitored.

Water weighs 8.33 pounds per gallon. The awning was not made to withstand the 500 to 700 pounds that could accumulate. It is best not to subject the awning and the motorhome to the needless strain.

FANS - Exhaust Fan

The exhaust fan is a three-speed fan with a “0” or **OFF** position on the fan. The exhaust fan requires the presence of 12 Volt DC to operate. There are two basic controls located on the ceiling vent fan. The knurled knob manually opens and closes the dome cover. The rotary knob selects the operating speed of the fan. When the dome cover opens approximately two inches, the fan motor begins to operate. During normal operations the knurled knob offers manual control of the dome cover for opening and closing.



To Operate the Fan:

- The battery cut-off switch needs to be set **ON**.
- The dome manually opens and closes using the knurled knob.
- Select the desired fan speed on the Speed Control dial:

0 = OFF.

1 = LOW.

2 = MEDIUM.

3 = HIGH.

030832 E



NOTE: Let fan come to a complete stop before changing fan direction. If the speed switch is in the "0" position the fan operates only as a vent.



CAUTION: It is recommended to travel with the vents closed. High winds and vibration can damage the Plexiglass dome.



Tips:

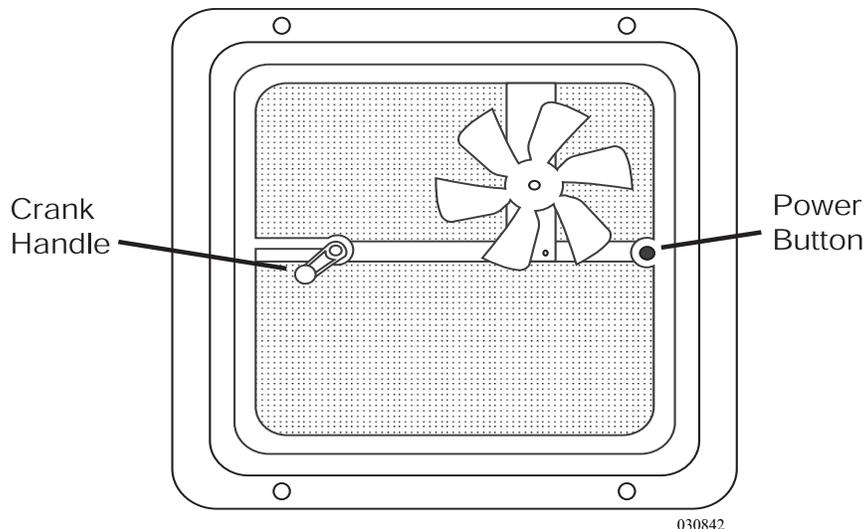
- To keep condensation from accumulating open the vent fan lids slightly to help the air circulate. Condensation occurs naturally from fluctuations in interior and exterior temperatures, humidity and dew point changes, steam from cooking, or boiling large amounts of water on the cooktop. Shower usage also produces condensation.
- If the fan fails to operate, check for either a blown fuse in the domestic fuse panel or the 6-amp 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.
- Keep all the vents closed when using the Fantastic Fan Vent. Direct the airflow by slightly opening the window(s) on the shaded side of the motorhome to obtain the maximum airflow, especially on hot, sunny days. Close all the roof vents. The area between the open window(s) and the Fantastic Vent supplies the maximum airflow and providing the most comfort.



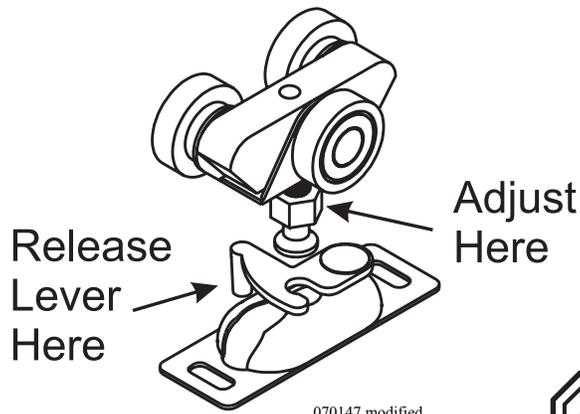
NOTE: Do not leave the vent cover open while the motorhome is stored or unattended for extended periods. High winds, other unusual conditions or obstructions may prevent closing. The resulting leakage could cause serious damage.

The motorhome is equipped with roof air vents which are manually operated. The vent is opened or closed by simply turning the crank handle in the desired direction. The fan, which is for ventilation only as it will not help cool the motorhome, can be operated by pushing the small power button. The vent must be opened before using the power fan. To close the power air vent, push in the power button to stop the fan and close the vent.

Bathroom Fan



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. Locate the 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: The pocket door rollers should be lubed with just a small drop of oil once a year to help increase the life of the rollers and improve the sliding of the door.

REAR LADDER (Optional)

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.



NOTE: Maximum weight 300 lbs.

There are several sofa variations that can be installed in the motorhome. The standard sofa is commonly referred to as a "Jackknife" sofa. This style sofa has storage space below the seat and a removable front panel. The sofa will pull up and out, at the front of the seat then lay flat to form the bed/sleeper area. Cushions are not removable.



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

Several optional sofas that can be installed:

- Sofa Bed
- Magic Bed
- Convertible Sofa
- Air Coil Mattress
- Electric Bed

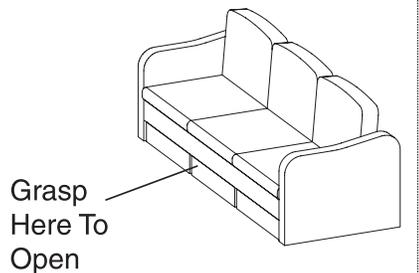
Magic Bed:

The Magic Bed requires a flat floor for installation. There can be NO obstructions under the area for the installation of a Magic Bed Sofa therefore; there is no storage area.

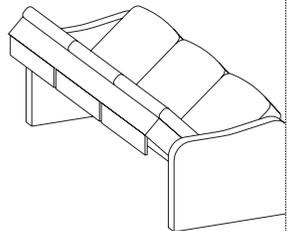
The back of a Magic Bed consists of cushions that are removed when the bed is pulled out. Simply lift up and out, at the bottom-center of the seat. Legs automatically extend down to support the front section of the sofa bed. Then flip the top of the seat cushion toward the back wall, exposing the mattress. On the Magic Bed there is a mattress cover to sleep on, not the upholstery fabric.

Convertible Sofa:

This sofa is most commonly called the "Hide-A-Bed," similar to ones found in many home guest rooms. The conventional sofa has a spring mattress. The newest addition to this style of hide-a-bed is the Air Coil mattress.

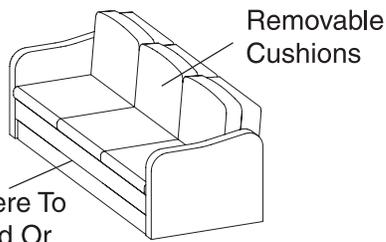


Sofa Bed Conversion or Jackknife Bed Conversion



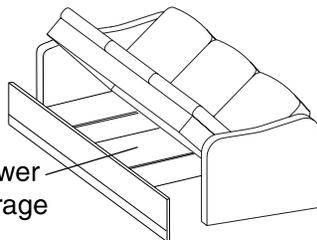
Standard Sofa Bed

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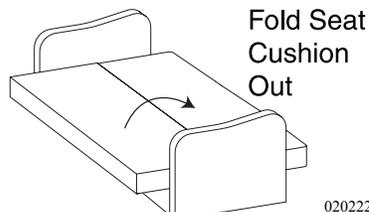


Grasp Here To Open Bed Or Pull Out Drawer

Sofa Wonder Bed



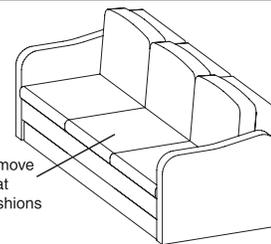
Drawer Storage



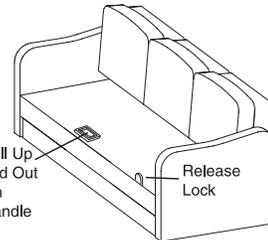
Fold Seat Cushion Out

Magic Bed

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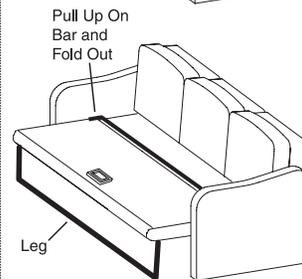


Remove Seat Cushions



Pull Up and Out On Handle

Release Lock



Pull Up On Bar and Fold Out

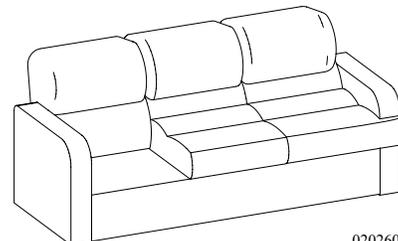
Leg

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Convertible Sofa

Air Coil Mattress:

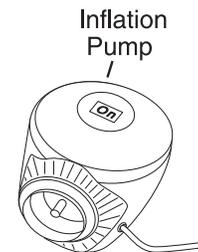
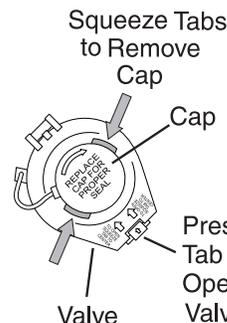
The Air Coil Mattress inflates and deflates in a matter of seconds. Use the hand-held electric pump to inflate the mattress. The pump operates from any 120 Volt AC outlet.



020260

To Inflate the Mattress:

1. Remove and store the seat cushions.
2. Open the Convertible Sofa allowing the mattress to lie flat.
3. Unzip the corner of the mattress labeled Air Valve Access to access the valve.
4. Ensure the valve is locked firmly in place.
5. Open the cap on the valve.
6. Place the pump on the valve and turn 1/4 turn locking the pump in the valve.
7. Plug in the pump motor to inflate to a desired firmness.
8. Remove the handheld pump, replace the valve cap and zip the mattress cover.
9. Place bedding items on the mattress.



020260b

To Deflate the Mattress:

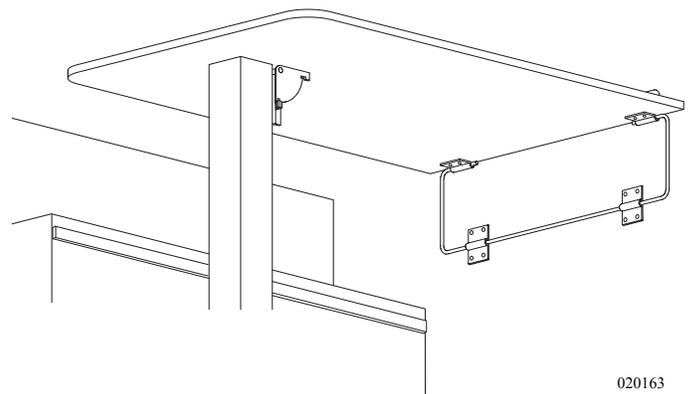
1. Remove bedding items.
2. Unzip the corner of the mattress where the air valve is located.
3. Lift the valve release.
4. Once deflated, close the valve release, zip the mattress cover and close the convertible sofa.

Electric Bed:

The newest generation of sofa sleeper is the electric bed. This sofa uses 12 Volt DC to operate the slide mechanism.

The booth dinette easily converts into a bed:

- Lift seat cushions to an angled vertical position.
- Firmly grip and lift up the front edge of the table approximately six inches. Push table leg lock to side.
- Swing the table leg up and lock into a horizontal position.
- Continue lifting table until table stays are clear of retainers. Pull outward and lower table down.
- Use both seat cushions and one back cushion for a mattress. Leave one back cushion in a vertical position.
- Reverse the procedure to convert back to a dinette table.



DINETTE BOOTH

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When the booth dinette is in the table configuration, it is possible to slide tabletop from the front to the rear along the wall. Lift the table slightly to raise the table leg. Adjust the tabletop towards the desired direction. Lower the tabletop, ensure the table leg is in the vertical position.

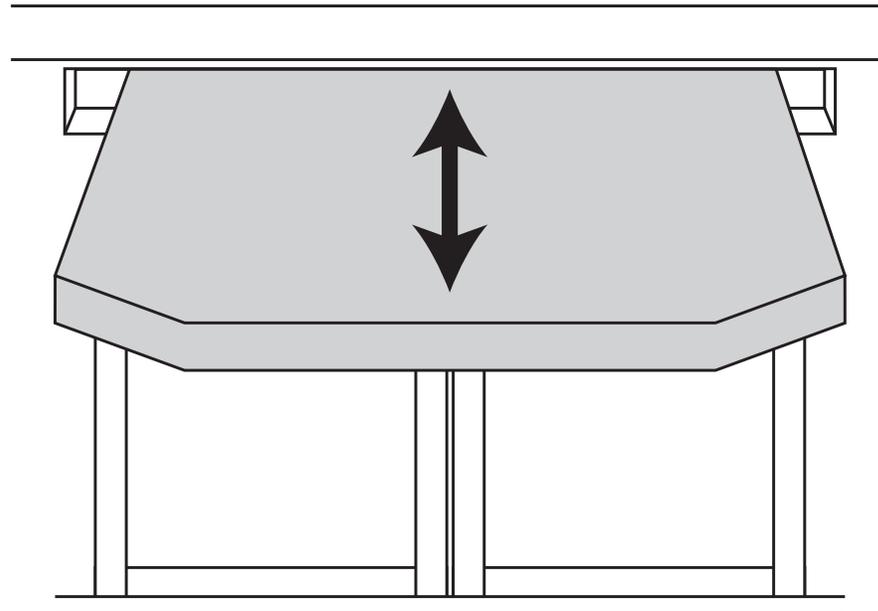
For convenience, the dinette table is designed with a few unique features. Along with room for storage of small items, the table is also adjustable. The table can be extended for more table space. When preparing for travel the extra table leaf can be removed and the table retracted.



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.

DINETTE TABLE

The dinette table is designed with room for storage of small items. The table is also adjustable and can be extended for more table space. When preparing for travel the extra table leaf can be removed and the table retracted.



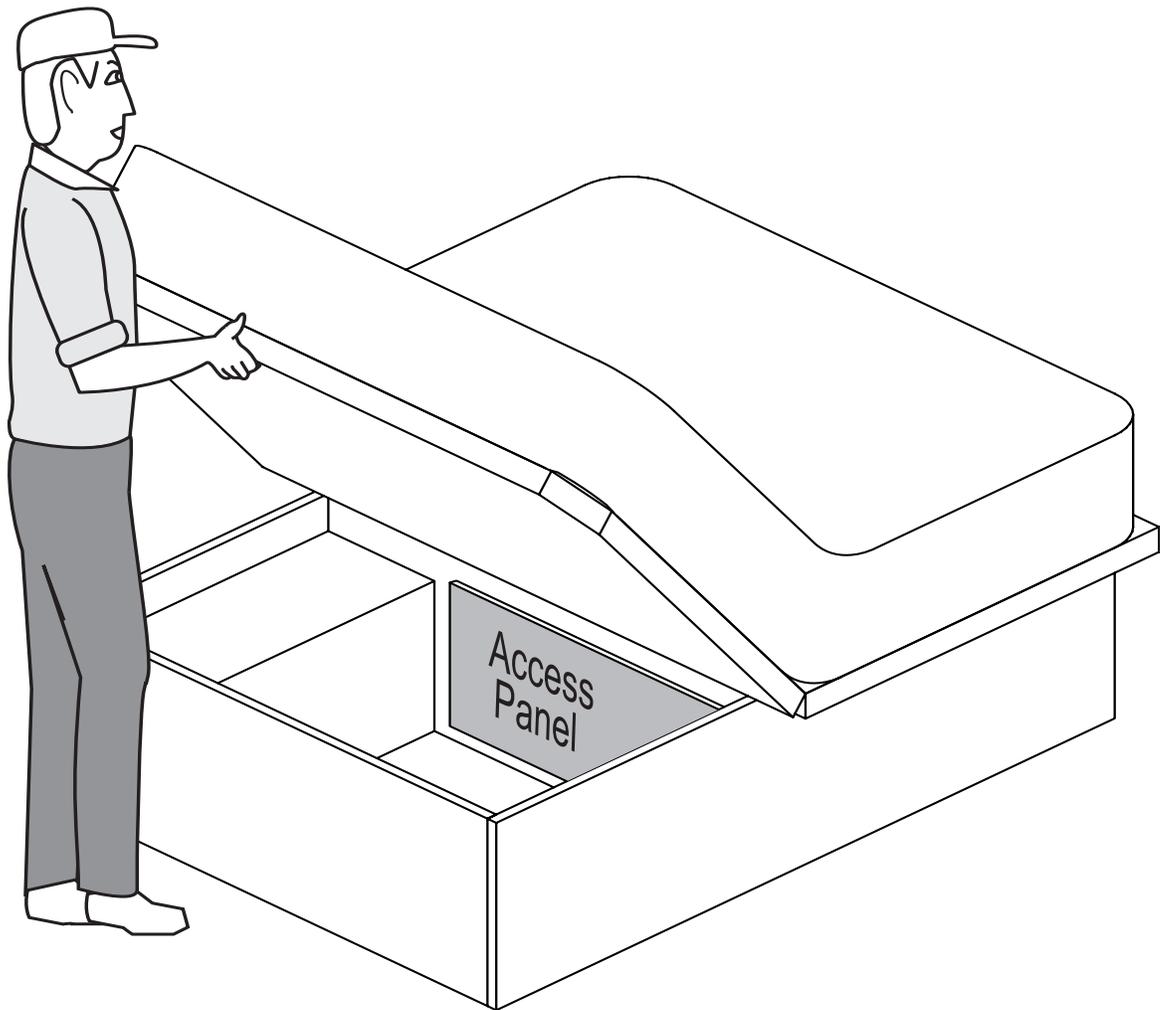
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To use the storage compartment located under the bed, locate and unlock the bed deck latches. Lift up the bed by the front edge of the mattress platform. Gas struts hold the mattress and platform open.

STORAGE - UNDER BED



NOTE: Do not over stress gas struts by rapidly opening or closing the bed access cover, as this action can damage the struts or mounts. In extreme cold gas struts may not hold the mattress platform in the open position.



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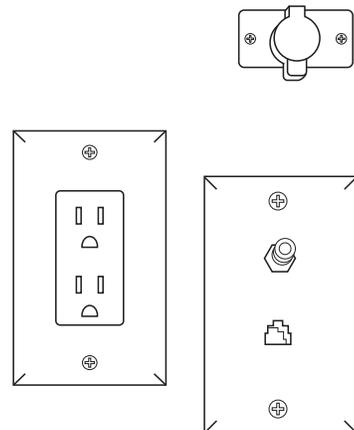
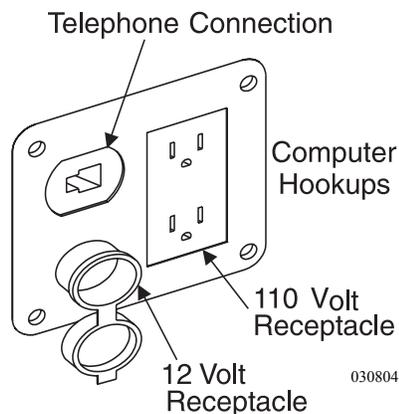
TV - ENTERTAINMENT CENTER

The components used to make up the entertainment center are carefully selected to provide the highest quality in audio and visual enjoyment. There are several pieces of equipment, which encompass the entertainment center. The following paragraphs will discuss the operations and various components. Use the instructions given in the Video Selector Box section to use these components.

Hook-ups - TV Cable, Computer & Telephone

The motorhome is equipped with cable TV and telephone hook-ups, located in the electrical service center. For convenience, there are auxiliary outlets located at the co-pilot seat and on the optional computer desk. This connection is set up for a telephone or laptop computer.

Entertainment connections are provided for convenience in the passenger bay. These include telephone jack, cable TV hook-up, a 12 Volt DC utility outlet and 120 Volt AC electrical outlet.

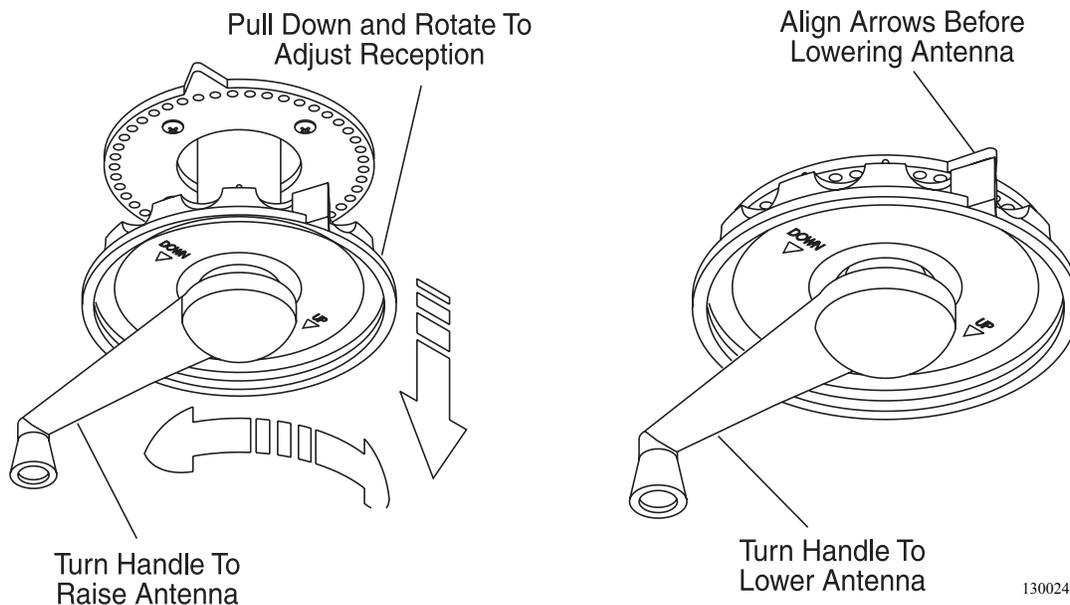


Television (Front) w/Lock-out Feature

The Main TV has lockout circuitry. Simply stated, the ignition switch controls the front TV power outlet. Only with the ignition OFF will the front TV operate. No other television set is affected by the lockout circuitry. The TV operates on 120 Volt AC power only. This power can be provided by shore power, the generator or the inverter. Viewing time of the front TV from the inverter depends on the state of charge of the house batteries and any additional 12 Volt DC circuitry which is being operated.

Television Antenna

The television antenna is a manual crank up 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 turning on the Power switch on the Video Selector Box. The antenna and booster work together to provide the best possible picture for most situations. Certain conditions 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 hit an object such as a mountain and come back. The result one sees in the television picture is a double image. 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.



NOTE: Do not move the motorhome with antenna in the raised position, it can be damaged by tree limbs or wires.



WARNING: Before raising antenna make an outside, visual inspection for any obstructions or overhead electrical wires. Damage to the antenna, severe shock, personal injury or death can occur from inadequate clearance.

To Raise the Antenna:

- Rotate the crank handle clockwise to raise the antenna (it is approximately 14 ½ turns).
- Pull down on the outside directional wheel and rotate the antenna until the best picture is obtained. The directional wheel is spring loaded.



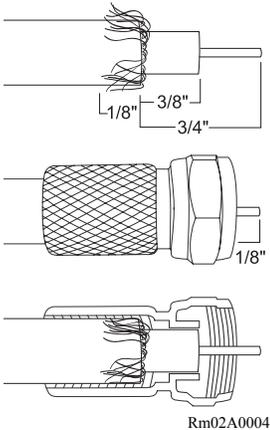
WARNING: Do not raise a TV antenna near overhead electrical wires as contact may cause serious injury or death. The motorhome must not be driven with the antenna in a raised or partially raised position. Worm breakage may result. Damage to the worm gear could result.

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. Make an outside visual inspection to ensure the antenna is properly stowed.

Troubleshooting the Coax Wire:

Weak or no picture can indicate a possible shorted or open coax. The coax cable is made of two conductors: A center conductor usually of copper and a ground that is woven of braided aluminum. The "die-electric" insulating material separates the two conductors. The ground and center conductors are to remain electrically separate from one another. When installing a F-connector onto a coax cable, use care so none of the woven ground strands make contact with the center conductor. A continuity tester is required to test a suspected fault in a coax wire. Unscrew both ends of the suspected bad coax run. With the continuity tester, check between the center conductor and the outside threaded ring. If continuity is present, the coax is shorted. To test for an open connection of a particular coax run, use one test lead and touch the threaded end of the coax. With the other test lead, touch the threaded ring at the opposite end. Continuity should be present. Perform the same test procedure on the center conductor. Proper electrical coax operation should indicate continuity from the center conductor at one end to center conductor at other end. Continuity should be present between each coax terminal end. There should be no continuity between the terminal end and center conductor. Though damage does not usually occur from a shorted or open coax cable, picture quality is compromised.



Television Set

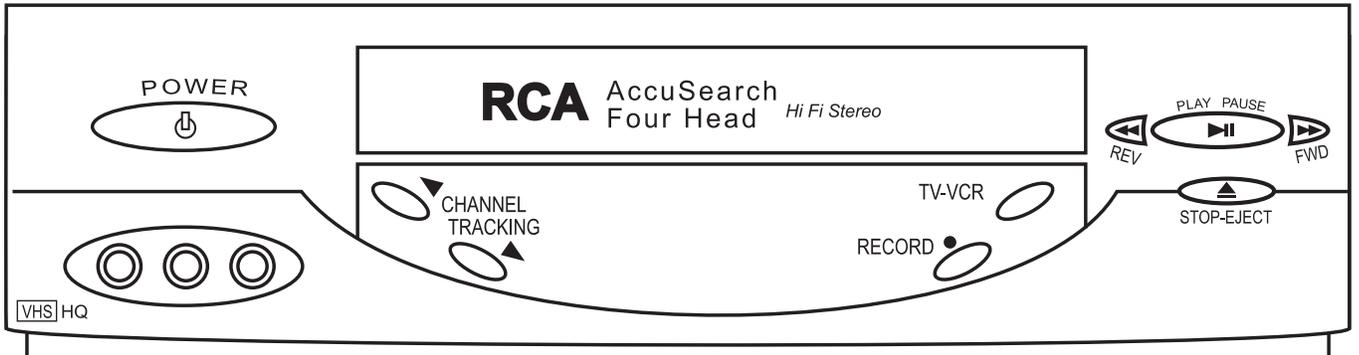
Ensure the television set will select channel 3. The TV menu may need programmed. ie: Input Video Signal Type, Channel Programming or Signal Output Levels.



NOTE: TV channels and the alternate input FRNT may need to be programmed. To program press Menu on the TV remote. Select 4 Channel from the main menu. Select 3 List and Labels. Use cursor to select channel. FRNT is located below channel 2.

The videocassette recorder is the same one found in most homes. The VHS compatibility allows recording and playing back programs on standard VHS tapes. The Audio/Video Input Jacks in the front allows for quick, easy connections of additional video equipment.

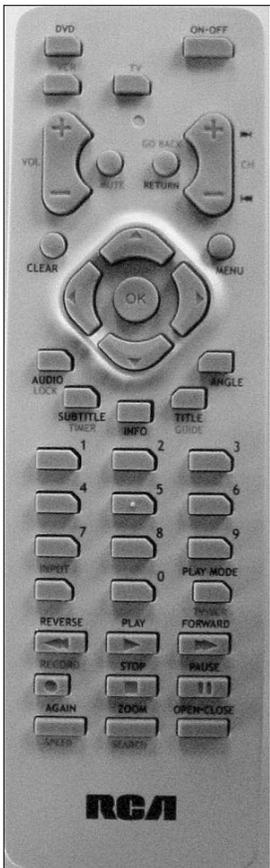
**Video Cassette Recorder (VCR)
(Optional)**



030977

The DVD player is a multi-function component. It plays Digital Video Discs, built in radio and amplifier. The power button on the DVD player must be pushed on to place the system in Stand-by mode. The DVD player will then respond manually or when using the remote control.

**DVD Player
(Optional)**



MVC-307



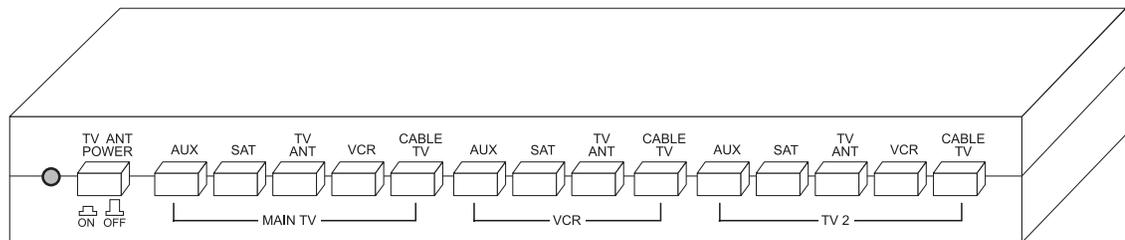
MVC-304F

Video Selector Box

The motorhome is equipped with a video selector box which has five inputs and three outputs.

Features Include:

- Push button controls allow you to send signals from any one of five different inputs to two TVs and VCR.
- Five inputs are Satellite Receiver, TV Antenna, VCR, Cable TV & Auxiliary.
- 3 Outputs: Main TV, TV2, VCR.
- Built-in +12 VDC TV antenna power supply eliminates need for separate wall mounted TV antenna power supply.
- Self-resetting fuses used in antenna power supply prevent failure caused by shorted connections.
- Video switch allows for independent viewing of signals at different TVs, with a record option from VCR.



030861B

To Watch TV Using the Antenna:

Press the **TV ANT** button located above the area marked "MAIN TV." Turn TV **ON** and select channel. Fringe area reception can be improved by turning **ON** the **POWER** button. Follow the same procedure for TV 2 (Bedroom TV).



NOTE: The 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, turn the Power button on the Video Selector Box. Turn off when not viewing from the antenna.

To Watch TV Using the Cable Signal:

To view Cable TV signals, press the **CABLE TV** button above the area marked "Main TV." Follow the same procedure for TV 2. 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.



NOTE: TV channels and the alternate input FRNT may need to be programmed. To program press Menu on the TV remote. Select 4 Channel from the main menu. Select 3 List and Labels. Use cursor to select channel. FRNT is located below channel 2.

To Play or Record using the VCR:

Press the **VCR** button above the area marked "Main TV." Follow the same procedure for TV2. Turn the TV **ON** and select channel **3**. Turn the VCR **ON** and insert videotape. To record, select the component in the VCR section.

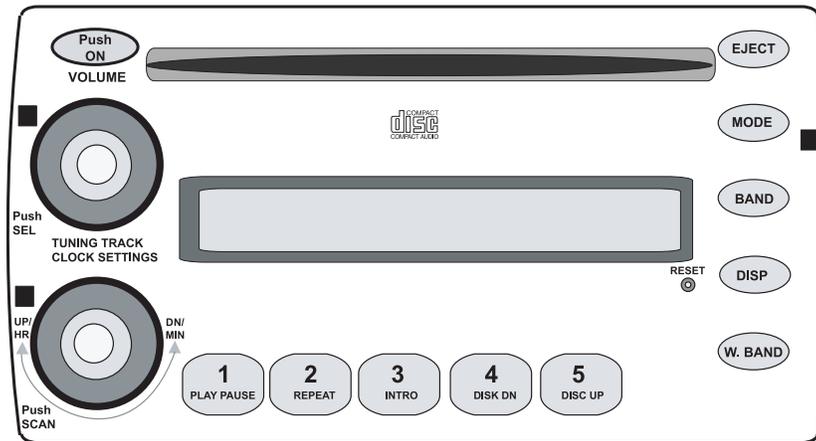
To Play a DVD:

Press the **POWER** button on the DVD player. Press the **FUNCTION** button on the DVD player or DVD remote until DVD displays on player. Open the tray and place disc on tray label side up. Turn **ON** the TV using the TV remote. Press the channel **UP/DOWN** or **INPUT** button on the remote until **FRNT** displays on the TV. Press **PLAY**.

RADIOS - Dash

Magnadyne CD Player (Standard)

The dash radio will control the multi-functions for the dash audio. There are many features associated with the dash radio. The tuner will hold pre-set AM and FM stations. Turn the radio power off at the dash.



Operation:

- Turn ON the house power disconnect switch.
- Turn ON house battery cut-off switch, located at the entry door.
- Turn ON the radio power switch at the dash panel.
- To turn the radio ON, push the Push ON button.
- To turn the radio OFF, push the push ON button.

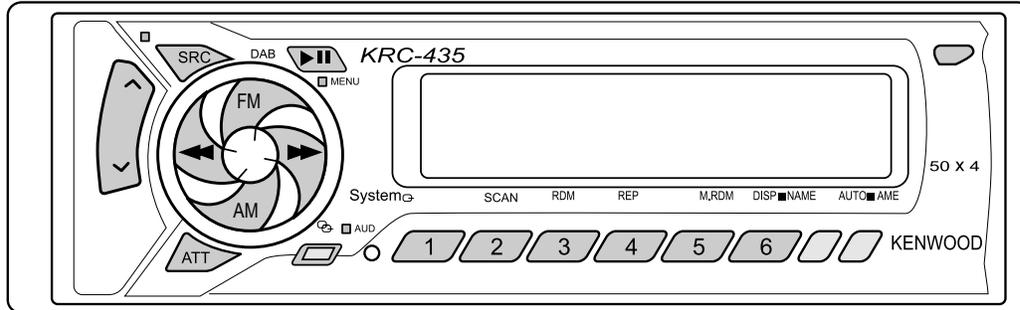
Clock Adjust:

- Press and hold the menu button until clock adjust is displayed.
- Press the left and right buttons until the desired time is displayed.
- Press the menu button once the correct time is displayed.

Kenwood AM/FM Cassette (Optional)

**Radio
(Optional)**

The dash radio is a tuner and a cassette player. The tuner will hold pre-set AM and FM stations. Other features are an attenuate mode; loudness control, clock display and auto seek tuning. The cassette player features are fast forward and reverse, random track play, repeat and pause.



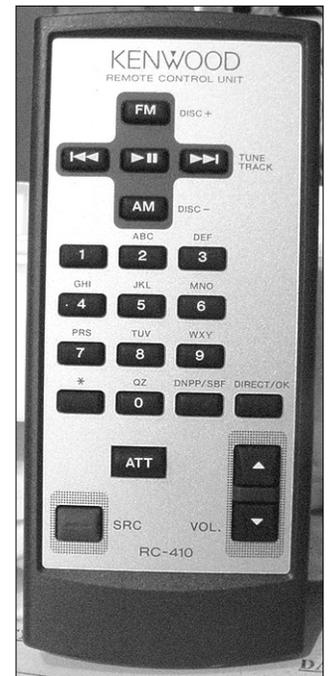
031009

Operation:

- Turn on the house battery cut-off switch, located at the entry door.
- Press the SRC button to turn on the radio.
- Press and hold the SRC button to turn off the radio.

Function of features:

- Volume- Use the Volume Control (up/down arrows) to increase or decrease volume.
- Press the upper right button to open the radio to insert cassette.
- Open the radio to detach face. Move face left and tip right side out and away. Reverse procedure to install.



MVC-740F.Tif

Clock Adjust:

- Clock Set/Adjust- Press and hold the Menu button for three seconds. The main menu will appear.
- Use the AM or FM button to scroll until CLK ADJ displays.
- Press and hold either the Left or Right arrow button for two seconds until the clock time appears then release the button. Press and hold the right button to increase time or left button to decrease time.
- Press the Menu button once to return to the menu or twice to exit the menu.
- Insert a cassette. Press the SRC button to toggle between tuner and tape.
- Press the ATT button to attenuate the sound. Press and hold the SRC button for "loud" bass control.



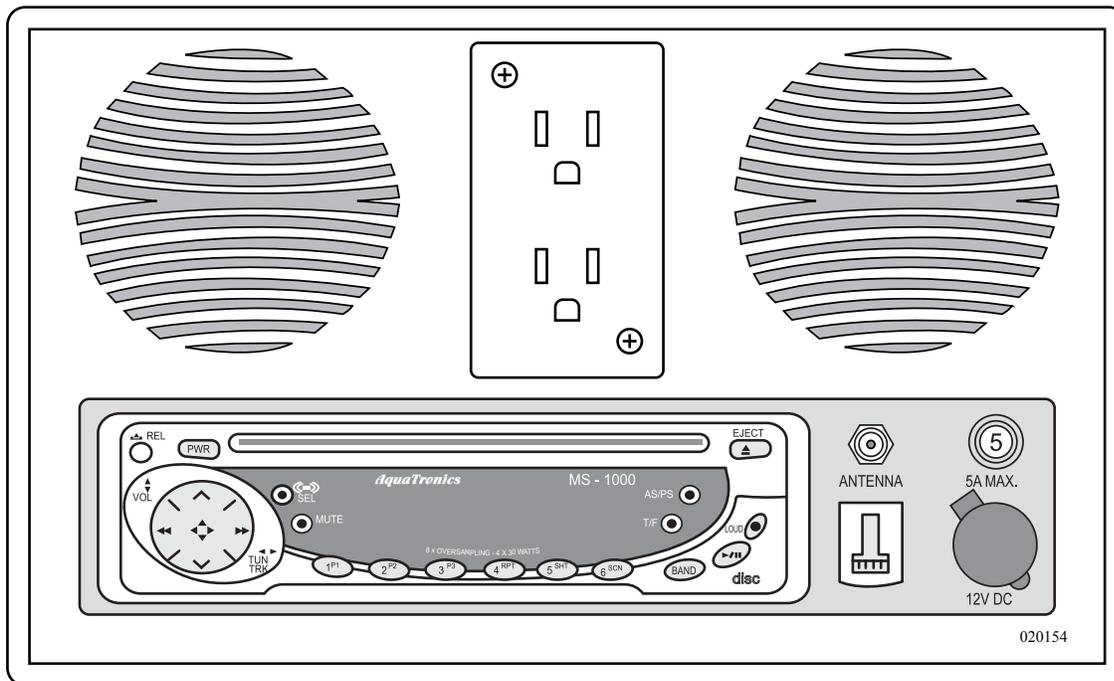
NOTE: The radio is Sirius satellite compatible. An additional satellite receiver and special antenna are required before the system will receive Sirius satellite radio services.



Tips:

- If the radio does not function, check the house power switch to make sure it is on.
- The LCD may become difficult to read at temperatures at or below 41 degrees F.

ENTERTAINMENT CENTER - EXTERIOR (OPTIONAL)



The optional entertainment center has a AM/FM marine stereo radio with two speakers. The stereo has a conformal coated circuit board to withstand salt air and humidity along with UV stable detachable control panel and electronic tuner.

Included are a 12 Volt DC, 120 Volt AC outlets and Antenna receptacles. The locking cover should be closed and locked when the entertainment center is not in use.

Function of Features:

- **ON/OFF POWER BUTTON (PWR)** - Press this button to turn the unit on or off.
- **VOLUME/LEVEL CONTROL (VOL)** - To increase the volume level, press the up arrow button. To decrease the volume level, press the down arrow button.
- **SELECT BUTTON (SEL)** - This button is used to select the audio function (volume, treble, bass, balance or fade) to be adjusted using the Level Control. Pressing the Select button once will set the unit for volume adjustment (“VOL” will appear on the display panel). Pressing the button additional times will select treble (“TRE” on the display), bass (“BAS”), balance (“BAL”), fader (“FAD”) or volume (“VOL”).

-
-
- **AUDIO SETTING MEMORIES (P1/P2/P3)** - Three pre-set buttons are provided on this unit to store desired audio level positions into memory and easily recalled. To set any of the three audio memory use the following procedure:
 1. Use the Select button and Level control to adjust the setting of the volume, treble, bass, balance and fader to the desired positions.
 2. Press the **SELECT** button to call any of the audio functions on the display. Within two seconds of pressing the Select button, and while the audio function is still on the display panel, press the **PRE-SET** button (1 through 3) to be set and continue to hold it in. After approximately two seconds the pre-set number (“P-1”, “P-2”, or “P-3”) will appear on the display panel indicating that the audio levels are now set into that memory position. The settings can be recalled at any time by pressing the **SELECT** button and then that **PRE-SET** button within two seconds.
 - **AUDIO MUTE (MUTE)** - This button is used to mute the volume from the system. By pressing the button the indication “MUTE” will appear on the display panel and the volume will be muted. Pressing the **MUTE** button again will return the volume level to the setting in use before the Mute function was activated.
 - **AM/FM BAND SELECTOR (BAND)** - During radio operation each momentary press of this button will change the radio band. The indication “AM1”, “AM2”, “FM2” or “FM3” will appear on the display panel according to your selection.
 - **MANUAL UP/DOWN TUNING & AUTOMATIC SEEK TUNING (TUN)** - Each time the **RIGHT ARROW** button is tapped, the radio will tune one frequency step higher. Similarly, each tap of the **LEFT ARROW** button will tune one frequency step lower. To manually tune in a station tap the button of the appropriate direction until the desired frequency is reached. Pressing either button for longer than 0.5 seconds and then releasing will activate the Automatic Seek Tuning function. The radio will seek the next available station and stop at the frequency. The Seek function can be stopped by pressing the button again or activating any other tuning function.

-
-
- **AUTO-STORE TUNING (AS) & PRE-SET SCAN TUNING (PS) -**
During radio operation press this button momentarily to scan the six stations pre-set into the memory of that band. The unit will stop at each pre-set station for five seconds before continuing to the next pre-set station. Press the button again momentarily to stop Pre-Set Scan operation and remain on the selected frequency. Pressing the button for longer than two seconds will activate the Auto-Store Tuning feature which will automatically scan the band and enter up to 6 strong stations into the six pre-set memories.

 - **STATION PRE-SET MEMORIES -** To set any of the six pre-set memories in each band use the following procedure:
 1. Turn the radio on and select the desired band.
 2. Select the first station to be pre-set using the Manual Up/Down or Automatic Seek Tuning controls.
 3. Press the pre-set button to be set and continue to hold it in. After approximately two seconds the pre-set number will appear on the display panel indicating that the station is now set into that pre-set memory position. The station can now be recalled at any time by pressing that button.
 4. Repeat the above procedure for the remaining five pre-sets on that band and for the other four bands on the unit.

 - **DISC SLOT -** With the label surface facing up, gently insert the disc into the slot until the soft-loading mechanism engages and disc play begins.

 - **TRACK SELECT (TRK) -** These buttons are used to quickly select the beginning of a particular track. With each momentary tap of the **Forward Track Select button** (right arrows) the next higher track number will be selected as shown on the display panel. Similarly, with each momentary tap the **Backward Track Select button** (left arrows) the next lower track number will be selected.

 - **CD PLAY/PAUSE DESELECTOR (II) -** During disc play, press this button to temporarily stop play of the disc. Press the button again to resume play of the disc from the point at which it was stopped.

 - **REPEAT PLAY SELECTOR (RPT) -** During disc play, press this button to repeat the play of the selected track (“RPT” will appear on the display panel). Play of the track will continue to repeat until the button is pressed again.

- **SHUFFLE PLAY SELECTOR (SHF)** - During disc play, press this button to play the tracks on the disc in a random shuffled order (“SHF” will appear on the display panel). The Shuffle Play mode can be cancelled by pressing the button again.
- **TRACK SCAN (SCN)** - During disc play, press this button to play the first 10 seconds of each track on the disc (“SCN” will appear on the display panel). When a desired track is reached, press the **SCAN** button again to cancel the function and play of the selected track will continue.
- **DISC EJECT (UP ARROW)** - Disc play is stopped, the disc is ejected and the unit will change to radio operation by pressing this button.
- **TIME/FREQUENCY SELECTOR (T/F)** - This unit can be set so that either the clock time or radio frequency/CD player functions will normally appear on the display panel. Pressing the **TIME/FREQUENCY SELECTOR** button when the radio frequency or CD player track indication is shown will change the display to show the time. Pressing the **TIME/FREQUENCY SELECTOR** button will change the display to show the radio frequency/CD player indication.
- **FRONT PANEL RELEASE BUTTON** - This button is used to release the mechanism that holds the front panel to the chassis. To detach the front panel press the button so that the left side of the panel is released. Grasp the released side and pull it off the chassis. To reattach the panel position the right side of the panel in place first and then press the left side of the panel until the mechanism locks it into place.

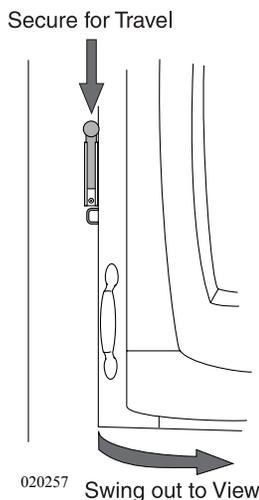
BEDROOM TV SWIVEL

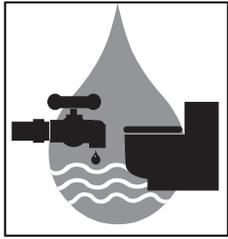
Bedroom TV Swivel (Certain Models):

- 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 cabinetry.





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WATER SYSTEMS

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The Water Systems section contains information and instruction for the operation and care of the various water system equipment found in the motorhome. The motorhome is equipped with two separate water systems. 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.

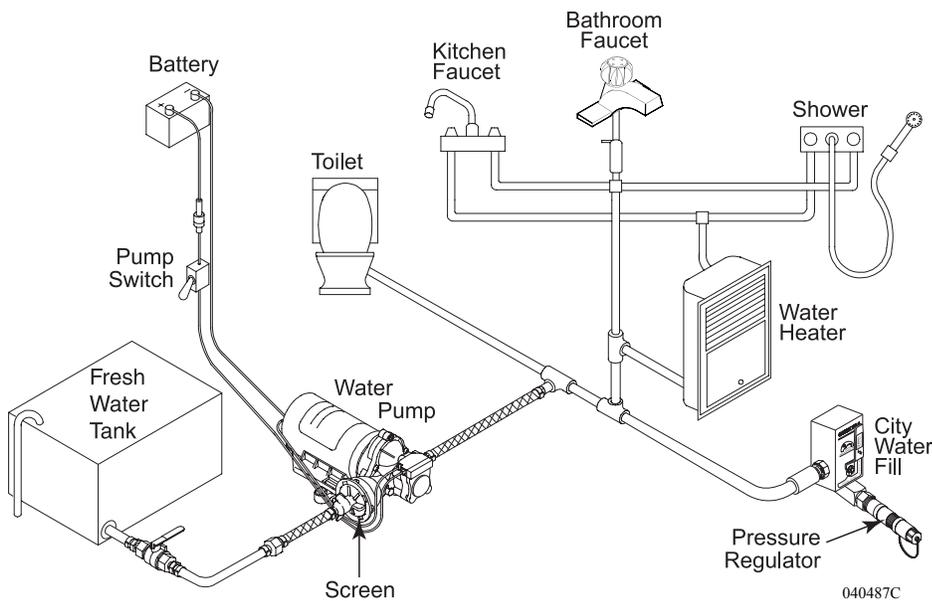
It is hard to imagine how much water is used by the average person everyday. Newcomers to a self-contained motorhome soon discover water does not last very long unless consumption is drastically reduced. For example, less water can be used for showering if the shower is turned off while soaping down, 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 motorhome contains a full freshwater plumbing system capable of operating as a self-contained unit (Fresh Water) or for utilizing a pressurized water source (City Water). The fresh water system consists of the fresh water tank, water pump, gravity fill water filter and a city/fresh water connection. For the standard model units, use a water hose that is marked for potable water use only. Care of the hose is a must. **After each use, drain the water hose and coil the hose neatly. Attach the ends together to keep debris and insects out of the hose.**

Domestic Hot Water:

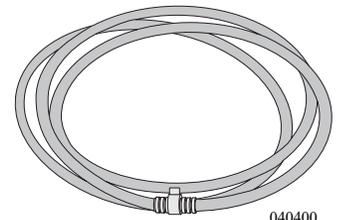
Domestic hot water will be supplied using a LP-Gas/Electric water heater. The system is highly efficient in producing and maintaining an adequate supply of hot water.



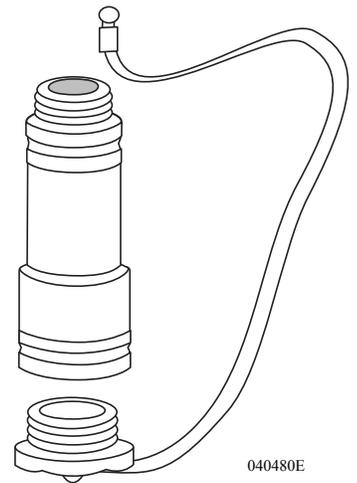
WATER SYSTEMS - INTRODUCTION



Watersys.eps



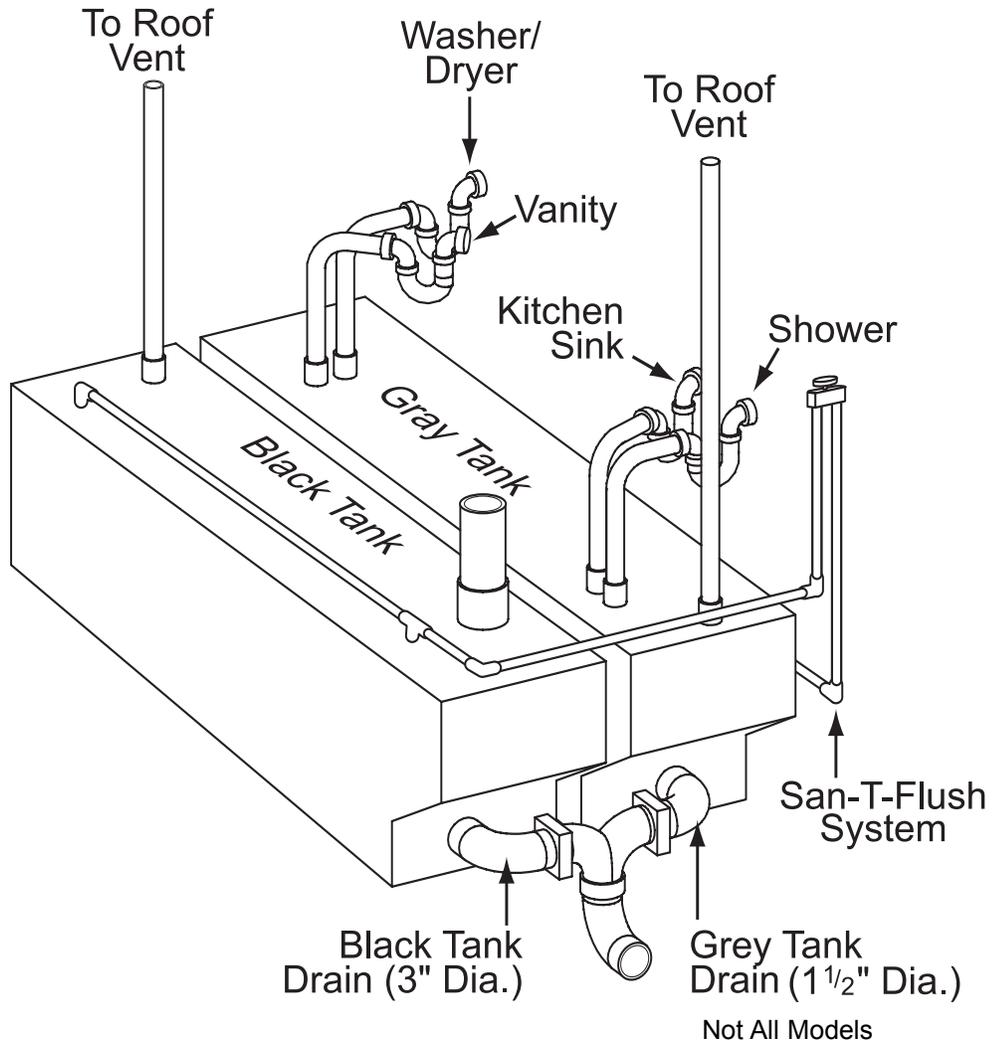
Screw the ends of the hose together before storage to prevent leakage and to prevent dust and insects from entering hose.



Pressure Regulator Supplied

Waste Water System:

The Waste Water Holding system makes the motorhome fully self-contained. All appliances and fixtures can be operated without a sewer hook-up. The waste-water holding tanks will allow waste to be stored until it is convenient to properly dispose. The waste water system consists of a waste holding tank (grey tank), a sewage-holding tank (black tank), flush system, toilet and drains. Also included is a flexible hose and adapter for dumping the waste holding tanks.



TYPICAL WASTE HOLDING TANKS

040488



NOTE: The actual location of each component varies with floor plans and models.

The motorhome is equipped with a monitor panel to aid in managing the storage tanks located in a main Status Monitor Panel in the hallway area. The switch marked **TEST** is a momentary switch to be 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 lights and scale indications are as follows:

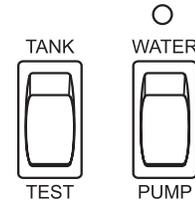
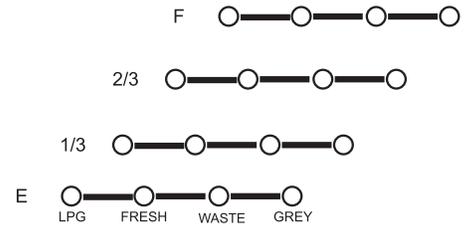
LP-Gas Tank & Fresh Tank

- Red = Empty
- Orange = 1/3 Full
- Yellow = 2/3 Full
- Green = Full

Waste and Grey Holding Tanks

- Green = Empty
- Yellow = 1/3 Full
- Orange = 2/3 Full
- Red = Full

**MONITOR PANEL (WATER TANK)
- Measurement**



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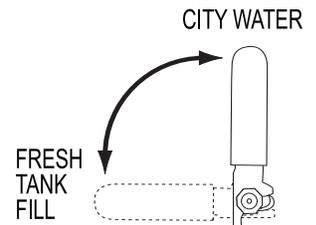
To Hook up to city water:

- Remove hose plug and install a water pressure regulator to the water hose.
- Connect the water hose to a city water hook-up.
- Using the City Water/Tank Fill valve, select either City Water or Fresh Tank Fill.
- Turn on the water supply.
- If used for filling the water tank, water will flow out of the overflow underneath the motorhome when the tank is full. Shut the water supply off as soon as possible.

To Disconnect City Water:

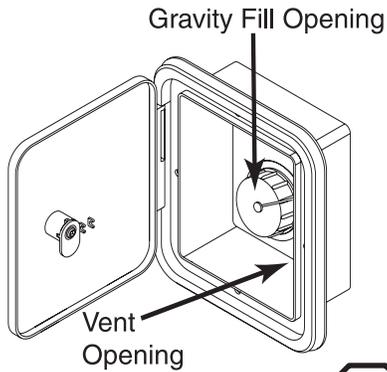
- Disconnect the water hose from the faucet. Do not leave water regulator attached to faucet.
- Install plug in hose when not in use or roll up hose and screw ends together to keep out contaminants and insects.

**WATER TANK
- Fresh Water Fill**



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. A pressure regulator should 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 Gravity Fill



040393



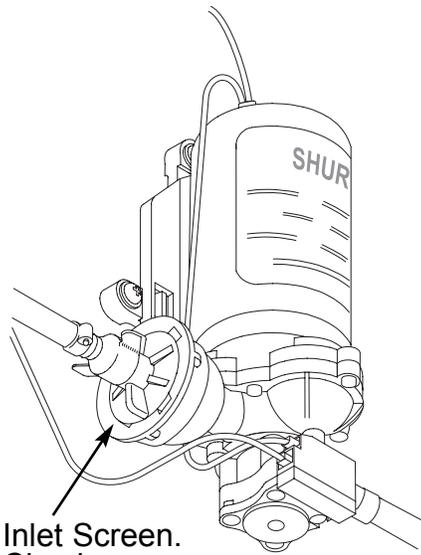
The gravity fill inlet allows fluids to be introduced directly into the fresh water tank. When dry camping water can be poured directly from a container into the fresh water tank. The gravity fill inlet can be used to pour disinfecting solution into the fresh water tank or when using potable RV antifreeze to winterize the fresh water system. 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: When filling tank do not leave hose unattended.

WATER PUMP



Inlet Screen. Check every 3 months.

040487H



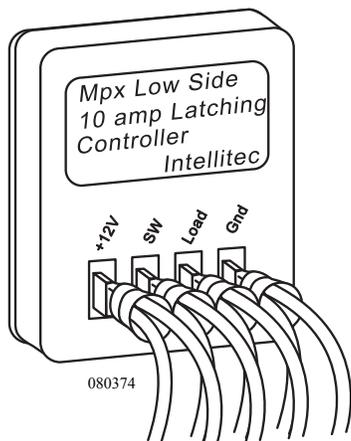
WARNING: Before leaving the motorhome for extended periods of time (i.e. overnight or longer) be sure that the city water and all water pumps have been turned off. Damage from neglect will be the responsibility of the owner, not the manufacturer.

Latching Controller:

The circuitry of a latching controller allows multiple switch locations to operate the water pump. Pressing one of the water pump switches provides a momentary ground signal to the latching controller, turning the water pump on or off from any location. An indicator lamp at each water pump switch illuminates when the water pump is on.



NOTE: The latching controller is located in the service center.



080374

The water pump can be operated from the following locations:

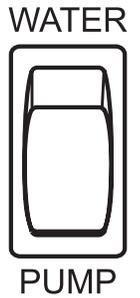
- Monitor Panel
- Bathroom
- Service Center

To turn the water pump on or off:

- Momentarily press the water pump switch. The indicator lamp will illuminate when the water pump is turned on.



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.



Water pump switch.eps

Use the following procedure to operate the water pump after unhooking from the city water supply or after 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 and the hot water tank to fill.
- Close each faucet when it delivers a steady stream of water (cold water faucets first).

Vibration induced by road conditions can cause the plumbing or pump hardware to loosen. Check for system components that are loose. Many symptoms can be resolved by tightening the hardware. Check the following items:

The water pump will not start or blows the fuse:

- Check the electrical connections, fuse or breaker, main switch and ground connection.
- Check the electrical connections at the latching controller.
- Is voltage present at the pressure switch? Bypass the pressure switch.
- Is the latching controller grounding the water pump?
- Check the charging system for correct voltage and good ground.
- Check for an open or grounded circuit or motor.
- Check for seized or locked diaphragm assembly (water frozen).

The water pump will not prime/sputters: (No discharge/motor runs):

- Is the strainer clogged with debris?
- Is there water in the tank or has air collected in the hot water heater?
- Is the inlet tubing/plumbing sucking in air at plumbing connections (vacuum leak)?
- Check for proper voltage with the pump operating.
- Look for debris in the pump inlet/outlet valves or dry/swollen valves.
- Check the pump housing for cracks or loose drive assembly screws.

Water Pump Troubleshooting

The water pump will not shut-off or runs when the faucet is closed:

- Check to see if the fresh water tank fill valve is completely closed.
- Check output side (pressure) plumbing for leaks and **inspect** for a leaky toilet or valves.
- Look for loose drive assembly or pump head screws.
- Are the valves or the internal check valve held open by debris or is the rubber swollen?

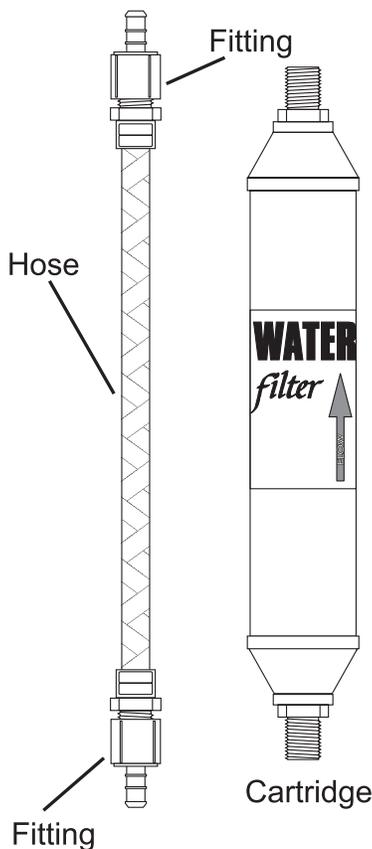
The water pump is noisy or rough in operation:

- Check for plumbing which 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.

The water pump is rapid cycling:

- Look for restrictive plumbing/flow restrictors in the faucets or shower heads.

Water Filter



The motorhome is shipped with a diverter hose in place of the in-line water filter. To initially install a water filter or to replace a water filter, use the procedures as follows:

- Locate the water filter diverter hose in the galley sink area.
- Remove the top and bottom fittings from either the hose or filter.
- Connect top and bottom fittings to the filter to purify the system.
- Store diverter hose for use when winterizing the water system.

A fresh replacement cartridge is needed when the flow of water from the faucet becomes slow. The life of the filter depends upon incoming water conditions and water consumption.

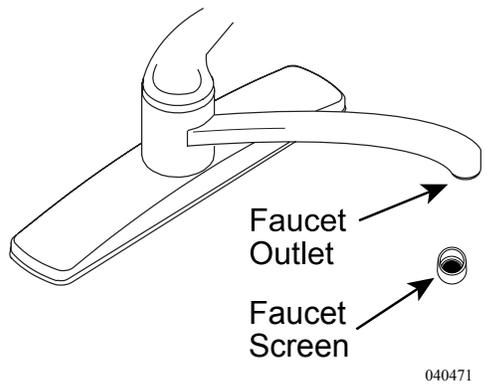
As water passes through the water filter, dirt particles are trapped in the tiny pores of the micro-pure coating on the filtering element inside the cartridge. As the cartridge removes the impurities from the water, microscopic pores slowly permeate and the amount of water flowing from the cartridge gradually decreases.

When the flow of water from the water filter becomes too slow for convenience it requires servicing. If the cartridge is not changed the flow will eventually stop. Even when a decreasing water flow does not demand the cartridge be replaced, it is recommended the filter be replaced at least once a year for continued reliable performance from the purification system.

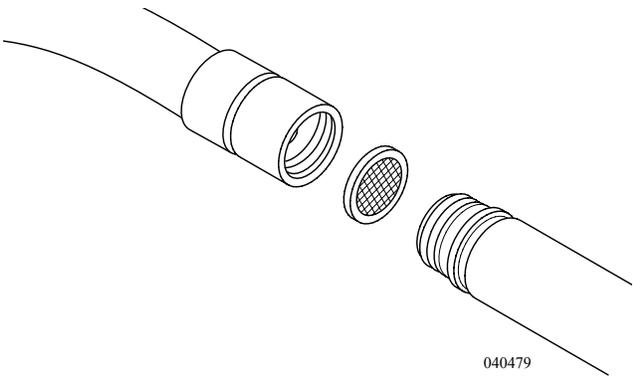
Fresh water sources will vary by location. Build up of lime deposits or debris on the faucet screens will restrict or plug the flow of water coming from the faucets. All faucet screens should be checked and cleaned every two weeks of use.

- Faucet screens are normally located on the outlet side of the faucet and held in place with a threaded collar. If your motorhome has a "Moen" faucet you will need to remove the faucet head and remove the screen from the handle.
- Remove screen from faucet.
- Clean screen using a small soft brush and a de-liming solution.
- Reinstall screen and check water flow.

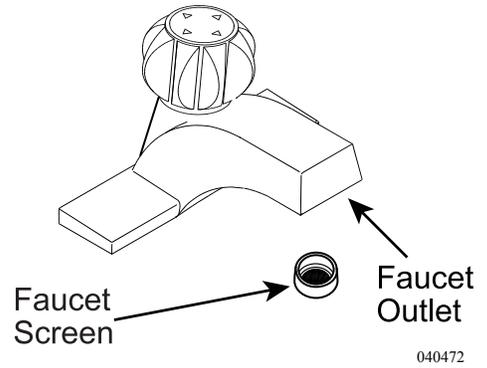
Faucet Screens



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Water system problems and leaks usually fall into two categories: system problems and problems caused by improper use or lack of attention. These problems result from improper winterizing, poor maintenance, road vibration and campsite water pressure variations. Check all plumbing connections for leaks at least once a year. If the water pump runs when a faucet is not open, check for a water leak. If a water line or fitting is leaking, tighten the fitting. Have the leak repaired before returning the supply line to service. In addition, opening the city water/tank fill valve with the water pump off will remove all water line pressure within the motorhome.

WATER SYSTEMS - Troubleshooting



NOTE: A small water leak can cause severe water damage. Shut off the water supply and have the leak repaired.

Disinfecting Fresh Water System

Disinfecting the water system with chlorine bleach (superchlorination) protects the drinking water from bacterial or viral contamination that may come from any common water source.

Disinfect the Water System:

- If the motorhome is new.
- If the motorhome has not been used in a long time.
- Every three months.

Use the following procedures to disinfect the water system.

- Remove any water filter elements that may be installed and install divert caps or hoses as needed.
- Prepare a chlorine bleach solution using one gallon water and $\frac{1}{4}$ cup of chlorine bleach. Use 1 gallon of solution for every 15 gallons of tank capacity. For example: Add $2\frac{2}{3}$ gallons solution to a 40 gallon tank. Add $4\frac{2}{3}$ gallons solution to a 70 gallon tank. Add $6\frac{2}{3}$ gallons to 100 gallon tank. This mixture puts a 50 PPM (parts per million) disinfecting solution in the water system. This concentration 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.
- Another method of introducing the chlorine bleach would be to multiply the number of gallons by 0.13. The result would be the amount in ounces of chlorine needed to be introduced into the fresh tank with water.
- Drain the fresh water tank. Close the drain and prepare to introduce the solution into the fresh water tank. The method of introduction is up to the owner.
- Turn on the water pump in the motorhome.
- Open each faucet and run the water until you smell a distinct chlorine bleach odor.
- Turn off all faucets allowing the system to stand for four hours.
- Drain the fresh water tank of the mixed solution.
- Fill the water tank with fresh water. Flush hot and cold lines thoroughly with fresh water. Repeat this process until the chlorine bleach smell is no longer detectable in the water system.
- Install new water filter.

WASTE WATER SYSTEMS - Proper Waste Disposal

Most State Parks have strict regulations about discharging wastes except into authorized disposal systems. 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 of the modern rest areas along the interstate now have dump stations available. You will find a list of dumping stations from coast to coast in 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. Some major oil companies offer dump facilities at selected stations. Usually, very few inconveniences are experienced when holding tank waste is properly and legally disposed of.

- Do not use strong or full strength detergents to deodorize and disinfect. Use odor control chemicals made especially for holding tanks.
- Do not put automotive antifreeze, ammonia, alcohol or acetone in holding tanks. Some chemicals will dissolve plastic.
- Do not put large table scraps in the tanks. They could be stuck in or damage the valve seals.
- Do not flush facial tissues. They are treated chemically to strengthen them and will not dissolve like toilet paper. Special holding tank tissues are available at most RV supply stores.
- Household tissues are thicker, softer and stronger than a rapidly dissolving tissue. White toilet paper dissolves faster than colored papers.

What Not to Put in Waste Holding Tanks



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.



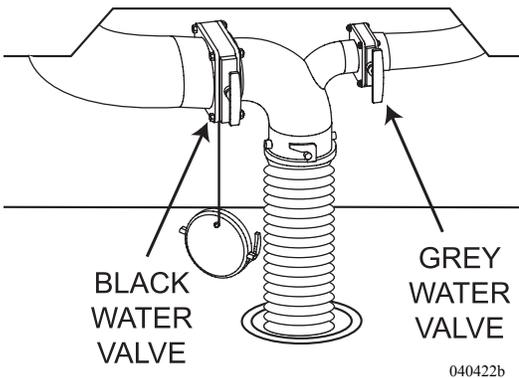
CAUTION: Do not use any products that contain petroleum distillate or ammonia in place of RV odor controlling chemicals. Petroleum distillate or ammonia will damage the ABS plastic holding tanks and seals.

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 tanks draining to an outside termination. The motorhome should be reasonably level for optimum operation of the systems. The wastewater holding system consists of a wastewater holding tank (grey tank). The grey water tank stores the sink, shower and clothes washer drain water. A sewage holding tank (black tank) stores waste from the toilet only.

Drain valves and a tank flush system dispose 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 service center on the roadside. Use the water monitor panel to observe 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 flush solids from the sewer hose. When traveling, it is recommend both holding tanks be empty or less than half full.

Drain Hose



A flexible three-inch sewer hose attaches between the termination drain and the shore facility. The termination drain by design is adjustable and should be exercised periodically. Sewer hoses usually come in 10 or 20 foot lengths. The sewer hose is stored in a tube accessed through a door on the roadside next to the rear tire. The shore fitting for the sewer hose may be three or four-inch pipe, which could be male or female thread. Another possibility may be a four-inch pipe, with no threads, covered by a metal plate. There are many configurations. Different style 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 inline 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.

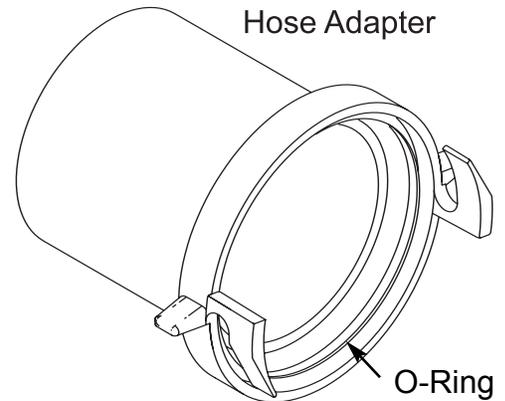


To Exercise the Termination Drain:

- Grasp the drain firmly on both sides of the drainpipe.
- Swivel the pipe up and down several inches. This exercises the internal O-rings.
- The drainpipe may be left in the upward position to prevent any 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 (small) grey water valve.



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

The black water valve remains closed until the tank is full or until time of departure. This will help prevent accumulation of solids. Use the outside faucet or shower attachment for washing or rinsing.



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



NOTE: Use care when connecting the sewer hose adapter to the termination outlet in cold weather.

Before initially operating the toilet, treat the sewage holding tank with a pre-charge of water and an odor-controlling 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 as it can permanently stain. Extremely 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.

***What to Put in
Holding Tanks
- Black Water Tank***



WARNING: Most chemical mixtures for holding tank odor control are poisonous. Follow the product manufacturer's directions and warnings when using any 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.

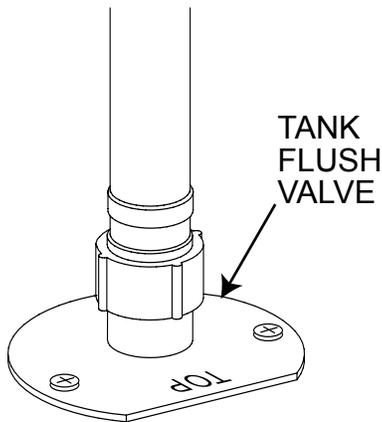
What to Put in Holding Tanks - Grey Water Tank

The grey water waste tank stores the sink, shower and clothes washer drain water. No chemical is required in this holding tank; however, a waste holding tank can produce odors. A reduced mixture of chemicals can help with odor control.

Ensure that there is enough liquid in the holding tanks prior to dumping the waste holding tanks. This provides a smooth flow through the valve, drain pipe and drain hose. When cycling the tank with sufficient liquid, a swirling action should remove accumulated solid wastes along with the waste liquid. Empty the sewage tank weekly to prevent stagnation and overfilling.

The motorhome comes equipped with a power flush system to aid in cleaning the holding tank. The power flush nozzle, located in the black tank, helps reduce solid build-up. Use the tank flush each drain cycle. Failure to thoroughly rinse the tank each drain cycle may result in solids accumulating and a clogged spray nozzle.

Black Tank Flush



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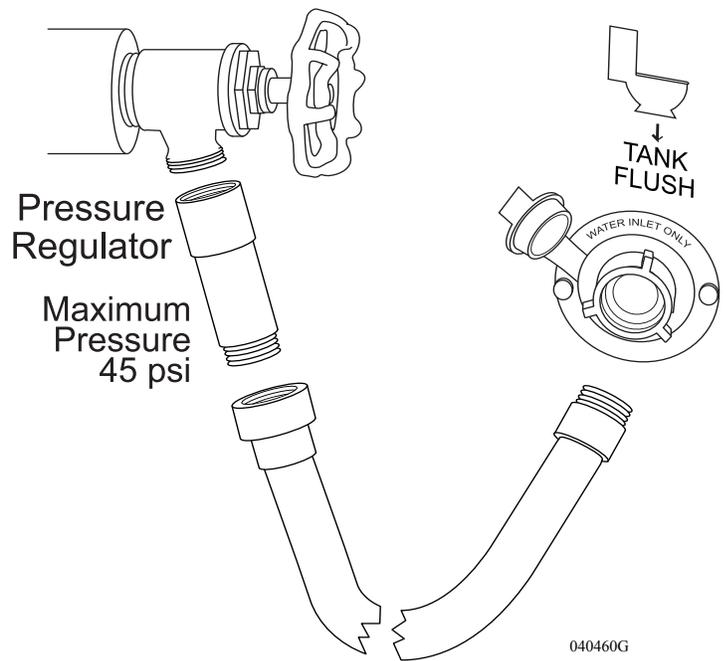
Dumping the Tanks:

1. When preparing to dump the black tank, first close the grey water valve.
2. Fill the grey tank to at least 50% by running water in the shower or sinks.
3. Use the monitor panel to observe tank fluid levels. When the grey tank is 50% full stop filling the tank.
4. Open the black water valve. Allow the black tank to drain.
5. Use the tank flush system.
6. Connect a non-potable water hose, with pressure regulator, to the flush system fitting located in the service center.
7. Turn on the faucet allowing water to rinse the black tank at least three minutes. Never operate the system unattended. Ensure the water flows freely through the drain hose.
8. When completed turn off the faucet and close the black water valve.
9. Open the grey water valve. The water in the grey tank flushes any remaining solids from the hose. With the grey water valve open, run two gallons of water down any drain to flush the grey tank. The grey valve remains open until the next drain cycle or 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.

10. If preparing for travel, close both the valves. Undo any restraining devices from the hose. Disconnect the hose from the termination outlet by rotating the fitting counterclockwise 90°.
11. Raise hose and drain using hand over hand method working hose towards shore fitting. Rinse the hose with outside facility and repeat the hose drain process.
12. Remove the hose from shore fitting. Install hose in carrier and lock door. Secure the termination cap (required by law in some states).
13. If desired, add chemicals to the tanks to control odor. Follow the chemical manufacturer's directions.



NOTE: Dump the black tank before driving.

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).

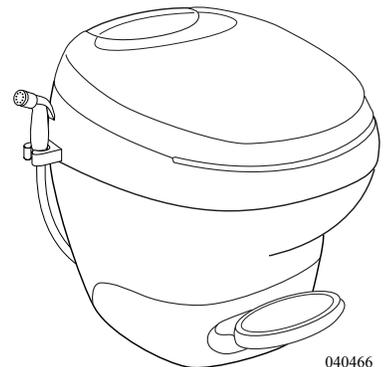


NOTE: To prevent accumulation of solids below toilet, add several gallons of water to the holding tank before use.



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



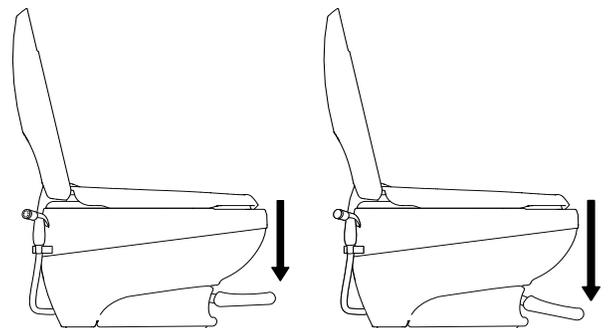
Toilet Operation:

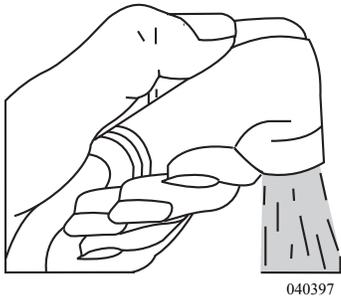
- Using a foot, lift up the flush lever to add water to the bowl. Generally, more water is required only when flushing solids.
- To flush the toilet, push the lever all the way down until the sewage leaves the toilet.

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 flush lever down longer than necessary results in excessive water usage.





Hose Sprayer:

To operate the remote mounted hose sprayer, push the flush lever down. Press the handle on the sprayer to wash rim and bowl.



NOTE: Never dispose of sanitary supplies or other non-dissolving items into the toilet. Facial tissue, wet strength tissue, paper towels or an excessive amount of toilet tissue can clog the tank or termination valve.

Cleaning & Maintenance

Cleaning:

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 using the tank flush system. If additional flushing is desired, flush with several gallons of fresh water and 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.

Checking for Leaks:

- Back of toilet: Check water supply line connection. Toilet tissue works well to find leaks. The tissue changes texture when it contacts moisture.
- Between closet flange and toilet: Check flange screws making sure they are snug. Do not over tighten screws. If leak continues, remove toilet and check flange height. Adjust, if necessary to 7/16" above floor. Replace flange seal if damaged.
- Poor flush: A good flush should be obtained within 2 to 3 seconds. If problem persists, adjust the water level. If it continues, the water pressure may be low or the water flow rate is low. Remove the water supply line and check flow rate. The flow rate should be at least ten quarts (9.5 liters) per minute. Water pressure should not be below 25 psi.
- Bowl will not hold water: Check for foreign material in ball valve.



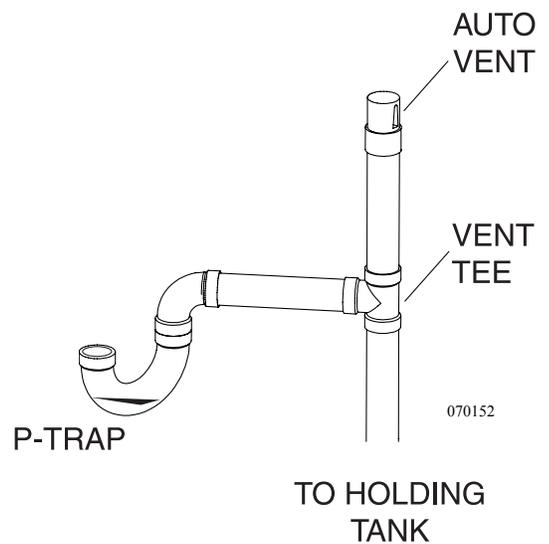
NOTE: If the motorhome is in storage for six months, it is a good idea to spray silicone on the ball valve. Perform this maintenance monthly (silicone will evaporate in about 30 days).

Sinks, shower and clothes washer drains incorporate a water trap or "P-trap" and auto vents to prevent waste water holding tank odor from entering the motorhome. These P-traps are usually within 54" of a vent tee. These traps must have water in them to block odors.

During storage water can evaporate and allow odor into motorhome. If odor is detected run water into sinks, shower and clothes washer to fill drain traps. The auto vent by design is to assist in the flow of water in the drain lines. They enable a smooth flow of water in the drain without creating a vacuum.

If the auto vent is stuck in the open position, grey odors may enter the motorhome. Some auto vents can double as "clean-outs" in case the line has to be "snaked" out.

Drain Traps & Auto Vents



WARNING: Most chemical mixtures for holding tank odor control are poisonous. Follow the product manufacturer's directions and warnings when using any holding tank additive.

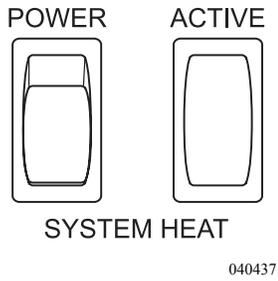


NOTE: During cold weather antifreeze must be added to the drain traps.

The motorhome is not designed for extended use in below freezing (32°F/0°C) weather. There are precautionary measures that 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. A supplement 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 bay heater and should be turned on when ambient temperature approaches 44°F (+/- 6°F) and freezing temperatures may occur.

COLD WEATHER CONDITIONS

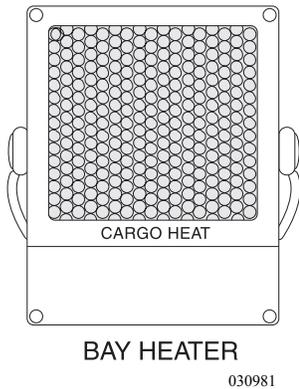


System Heat Operation:

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. House battery power can be quickly consumed. It is recommended to hook to shore power when using Systems Heat.



Storing the Motorhome in Cold Weather Conditions:

If the motorhome is stored where freezing temperatures may occur, drain the domestic fresh water loop completely of water. When draining the domestic fresh water system begin with draining the fresh water tank by opening the point drain lever for the fresh tank and allowing the water to drain.



NOTE: Ice makers, water filters, water purifiers and water heaters all use domestic water and should be drained and stored in accordance with the manufacturer's recommendation for winterization.

WINTERIZATION

The water, plumbing and sewer systems will need to be winterized when the Motorhome is placed in storage. Winterization is an easy process that only takes a few minutes if the proper equipment is used. Two basic methods may be used, or combined to winterize. The use of compressed air to evacuate all liquids, and replacing all liquids with FDA approved RV antifreeze.

The recommended method of winterizing the motorhome is using air pressure to remove liquids that may freeze causing damage to the various systems and appliances. The lines can then be left empty or filled with an FDA approved RV antifreeze. Antifreeze is not necessary and the decision to use it is left to the customer.

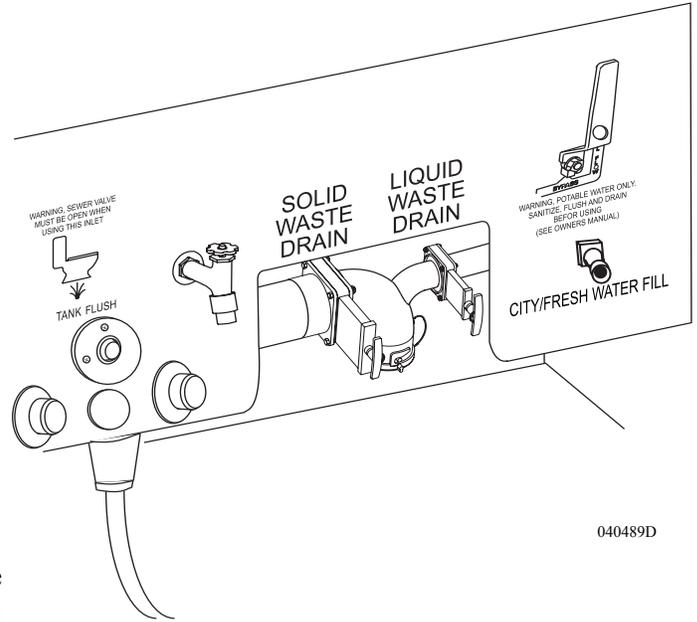


NOTE: ONLY FDA approved RV antifreeze should be used to winterize the water systems in the Motorhome.

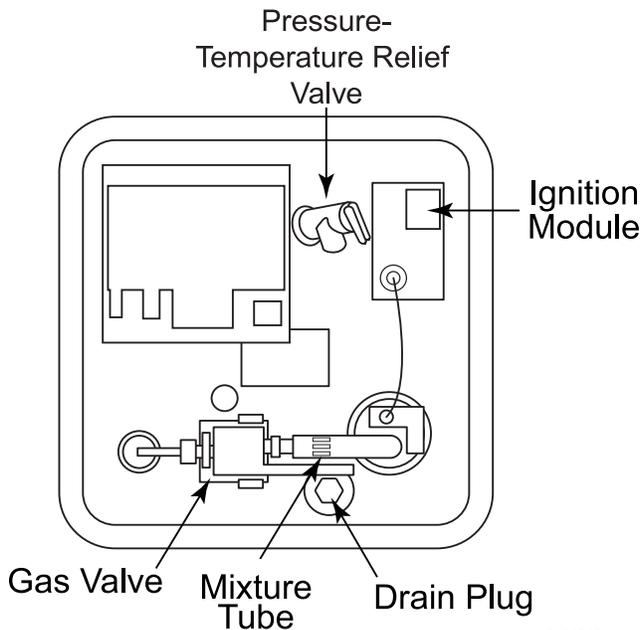
Access to an air compressor and an adapter to connect the air line with regulator to the water system will be needed. Air adapters for winterizing are available at RV supply locations. When attached to the water lines the pressure should not exceed 40 PSI. Higher pressure can damage the lines.

Using Air Pressure

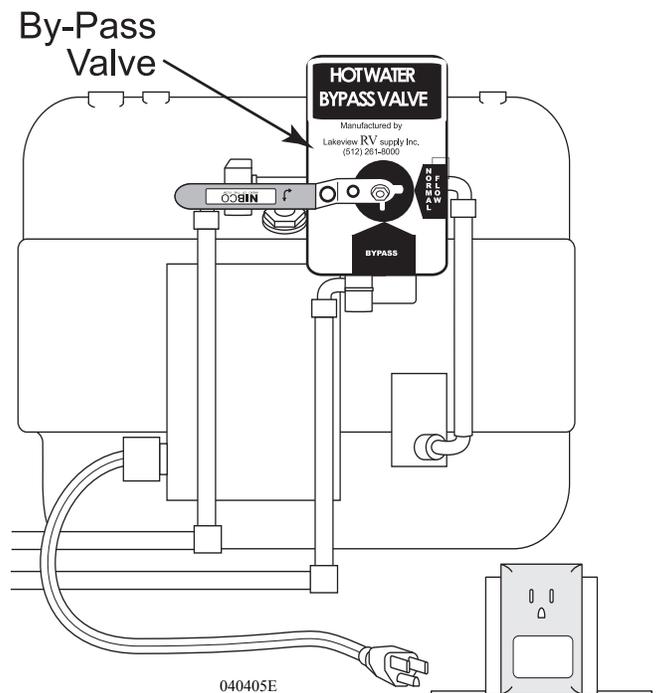
1. Empty and flush the holding tanks.
2. Drain the fresh water tank by opening the drain valve located inside the water service center of the Motorhome.
3. Open all low-point drain valves. Let all the water drain.
4. Drain the water heater by removing the drain plug. This will be located near the bottom, inside the access door on the outside of the Motorhome. The tank will need to be vented to allow water to come out. This can be accomplished by opening the high temperature/pressure relief valve located near the top, inside the access door. Set the bypass valve to "bypass" position. When the water heater is empty replace the drain plug and close the relief valve.
5. Locate water filter under sink and remove filter cartridge. Install Diverter Hose.



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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 coming out of the drain valves, open and close the faucets one at a time hot and cold, until only air comes out. Don't forget the toilet and any outside faucets.
 8. Hold the toilet flush mechanism open until the water has stopped running.
 9. Disconnect the air hose with adapter and turn the city/fresh water valve to the tank fill position.
 10. Close all valves, faucets and replace plugs.
 11. One (1) gallon of FDA approved RV antifreeze is needed to protect various water drain lines in the Motorhome. Pour 1 pint into both the kitchen and bath shower drains. Pour 2 pints into the bath sink drain. This will protect the P-traps, with some of the antifreeze going into gray tank to protect the drain valve. Open the valve on the toilet. Pour another 3 pints into the toilet, letting the antifreeze run into the black tank to protect the drain valve located there. Use a soft cloth to wipe out the sinks, shower and toilet (after the antifreeze is poured in) to protect the surfaces from stains. Pour the last pint into the washer/dryer drain.



WARNING: When draining the low-point drain lines and the water heater ensure the water is not hot. Hot water from the lines can scald causing burn injuries.

Ten gallons of FDA approved RV antifreeze will be required to winterize the Motorhome.

***Using Nontoxic
Antifreeze***

1. Empty and flush the holding tanks.
2. It is not necessary to blow out the lines with air. Close valve located between water pump and fresh water tank.
3. At the back of the water heater, turn the water heater by-pass valve to By-pass. Remove the drain plug from the front of the water heater. Open the "high temperature/pressure valve" located near the top of the compartment.
4. Locate water filter under sink and removing filter cartridge. Install Diverter Hose.
5. Close all faucets, drain valves and low point drains.
6. **Two ways to pump RV - Antifreeze into system:**
 - 6a. If you have a pump for winterizing, (available at RV supply locations) attach the "out" side of the pump to the waterline on the outlet side of the motorhomes water pump, or winterizing connection if so equipped. The "in" side of the winterizing pump should have a hose attached and placed into the antifreeze source.
 - 6b. The gravity fill can be utilized to introduce approximately 8 to 10 gallons of FDA approved RV anti-freeze into the fresh water tank. The valve between water pump and fresh water tank must be in the open position for this method.
7. Turn on the pump.
8. Turn on all the faucets, one at a time, hot and cold starting with the faucet farthest from the pump until you see antifreeze and turn it off. Be sure to do hot and cold. Don't forget the toilet in its turn as well as any outside faucets.
9. Use a soft cloth to wipe out the sinks and shower to protect surfaces from antifreeze stains.



WARNING: Use only specifically designed, non-toxic, FDA Approved RV antifreeze for potable water systems. NEVER use Automobile engine antifreeze. If ingested, antifreeze can cause serious injury or death.



WARNING: It is recommended that a qualified RV service technician familiar with motorhomes, such as an authorized dealer, perform the winterizing procedure.



NOTE: Some items such as icemakers, washer/dryers and dishwashers require special instructions, which can be found in each respective manual.



NOTE: Clean up any spilled antifreeze immediately. It can stain permanently.



CAUTION: Turn off water heater and let it cool before starting any winterizing procedure. Hot water can scald resulting in burn injuries.

De-Winterizing

To De-Winterize, drain and fill the fresh tank with water. Connect the power supply line for the water pump. Install drain plug to water heater and switch by-pass valve to Normal Flow. Operate all faucets, one at a time, until clear water is present.



CAUTION: Discard the first two trays of ice from the icemaker. They may contain contaminants.

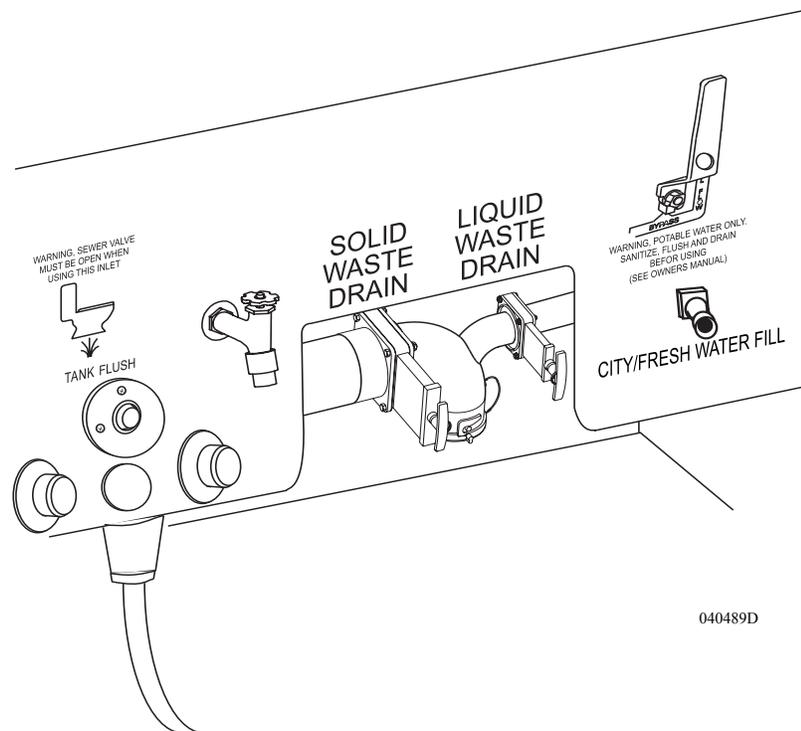
Tank Capacities	30PDD	32PBD	34SBD	34PBT	36PED	36WDD	36DBD	37PCD	37PCT
Water Heater	10 gal								
Grey Tank	42 gal	42 gal	42 gal	42 gal	54 gal	54 gal	42/39	54 gal	54 gal
Black Tank	42 gal	42 gal	42 gal	42 gal	45 gal	45 gal	42/39	54 gal	54 gal
Fresh Tank	45 gal	60 gal	55 gal	60 gal	60 gal				
LP Tank*	24 gal								

* Actual filled LP 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. Therefore any floor plans introduced thereafter may not be reflected in the chart. All other information contained throughout the manual will still apply.

SERVICE CENTER



NOTE: Layout of Service Center and location of components may vary with floor plans.



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LP-GAS SYSTEM

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LP-GAS SYSTEM

The LP-Gas System section contains information and instruction for the operation and care of the various Liquefied Petroleum (LP-Gas) system equipment found in the motorhome. The motorhome is equipped with several appliances and various equipment which are capable of operation on LP-Gas. Some items discussed may not be applicable to all motorhomes. 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's information box.

All components for the motorhome LP-Gas systems are approved for use in recreational vehicles by a nationally recognized testing laboratory. When properly handled, LP-Gas is a clean-burning dependable fuel for heat producing components. The LP-Gas tank mounted in the motorhome contains liquid petroleum gas that is under high pressure. As the fuel is used, liquid gas vaporizes and passes through the tank valve to a regulator that automatically reduces pressure. Low-pressure gas is then distributed to components through a pipe manifold system.

Component lighting problems are commonly caused by an improperly adjusted gas regulator. Do not attempt to reset the regulator. Adjustments need to be made by a dealer or an authorized service person.

In higher elevations or extreme cold weather (10° F/-21° C or lower) a shortage of LP-Gas may be experienced. Usage can be modified by running only one component at a time. For example, turn off the furnace while using the range. If LP-Gas is going to be used in higher elevations or cold climates for a long period of time, have an authorized service person adjust the LP-Gas regulator for these conditions.

Have the LP-Gas system checked by an authorized dealer at least once a year, and thereafter before every extended trip. Although the manufacturer and the dealer test the system carefully for leakage, travel vibrations can loosen fittings.

Leaks can be easily found by applying a leak detector solution on all connections. Leaks can usually be repaired by tightening the fittings. If not, shut off the primary gas valve at the tank. Immediately see an authorized dealer for repairs. Hand tighten the tank valves only. Do not use a wrench or pliers as over tightening may damage valve seats and cause leaks. If a leak is suspected (which can be easily identified by the odor of rotten eggs or sulfur) never light a match, have an open flame or use any spark producing equipment or appliance.

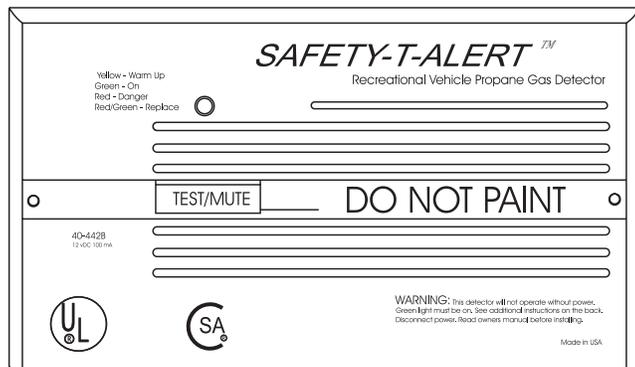


WARNING: LP-Gas is highly volatile and extremely explosive. DO NOT use matches or a flame to test for leaks. Only approved LP-Gas leak testing solution should be used. Unapproved solutions can damage copper tubing and brass fittings. Never attempt to adjust LP-Gas regulators. A liquid dish detergent solution of 10 parts water may be used. Shake the solution until bubbles form and then apply the mixed solution to all fittings and accessory control valve. All fittings tested should be thoroughly rinsed and dried after testing. Only qualified service personnel should perform any maintenance or repair to the LP-Gas system.



Lp 2.eps

LP-GAS DETECTOR



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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 " *An 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.*"

The detector senses both LP-Gas and methane gas. Liquefied Petroleum (LP) Gas is heavier than air; methane gas is lighter than air. LP-Gas will settle to the lowest point, generally the floor of the motorhome. Methane gas will rise. The gas detector is also sensitive to other fumes such as hair spray, of which most contain butane as the propellant. Butane, like propane, is heavier than air and will settle to the floor level where it will be detected. 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:

It is important to be aware of the difference between a gas leak versus gas escaping from an unlit, open burner. Pure propane vapors from a leaking pipe or gas fitting are heavier than air and will build up their heaviest concentration at the leak and float down until they mix with air. Gas from open burners is intentionally mixed with air to induce burning and will dissipate into the air. When mixed with air, the gas becomes only marginally heavier than air and will expand outward. If a gas burner is left on, the area around the burner, range, and adjoining counter space will be combustible and can cause injury and damage if ignited. This condition will exist for an extended time period and eventually the gas will reach the detector's location and be detected.



NOTE: The LP detector only indicates the presence of propane gas at its sensor. Combustible levels of propane gas may be present in other areas. This detector is intended for the detection of propane gas ONLY.

The LP-Gas detector is not intended to detect other types of gas. However, other volatile gases (nuisance gases), most of them flammable in various concentrations, may cause the detector to alarm. Some products that may cause the detector to alarm are alcohol, liquor, kerosene, gasoline, deodorants, colognes, propellant used in spray cans and cleaning solvents. In some cases vapors from glues and adhesives 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 air out the motorhome with fresh outside air.

Take precautions to be sure one of these nuisances has not masked an actual gas alarm condition. The detector draws less current than one instrument panel lamp. The detector will operate to detect gas until the battery is drained down to 7.0 Volts. The detector must be supplied with a voltage higher than 7.0 Volts, for it to operate properly. If the power source is disconnected, or if the power is otherwise interrupted, the detector will not operate.

The LP-Gas leak detector has a self-check circuit which runs 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 gas it will immediately sound an alarm. The gas detector operates on 12 Volt DC, with a current draw less than 1/10th of one amp.



CAUTION: The detector will not alarm during the three minute warm up cycle.

Press the **TEST** switch any time during the warm up cycle or while in normal operation. The LED should flash red and the alarm should sound. Release the switch. This is the only way the detector should be tested. The test feature checks full operation of the detector.

Testing



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.

Alarm

The **red** LED will flash and the alarm will sound whenever a dangerous level of propane or methane gas is detected. The detector will continue to alarm until the gas clears or the **Test/Mute** switch is pressed.

Procedures to Take During an Alarm:

1. Turn off all gas appliances, (stove, heaters, furnace), extinguish all flames and smoking material. Evacuate, leave doors and windows open.
2. Turn off the primary valve on the LP tank.
3. Determine and repair the source of the leak. Contact a qualified professional for service, if necessary.



CAUTION: Do Not re-enter until the problem is corrected.



WARNING: Turn off the primary LP valve on the LP tank.

Potential Sources of LP Gas Leaks When Operating the Motorhome:

- Cooktop Burners
- Oven
- Furnace
- Refrigerator Equipment
- Water Heater
- Defective Regulator
- Defective LP-Gas Connection
- Portable Propane Powered

Alarm Mute:

Press the **Test-Mute** button when the detector is in alarm.

1. The **red** LED will continue 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.

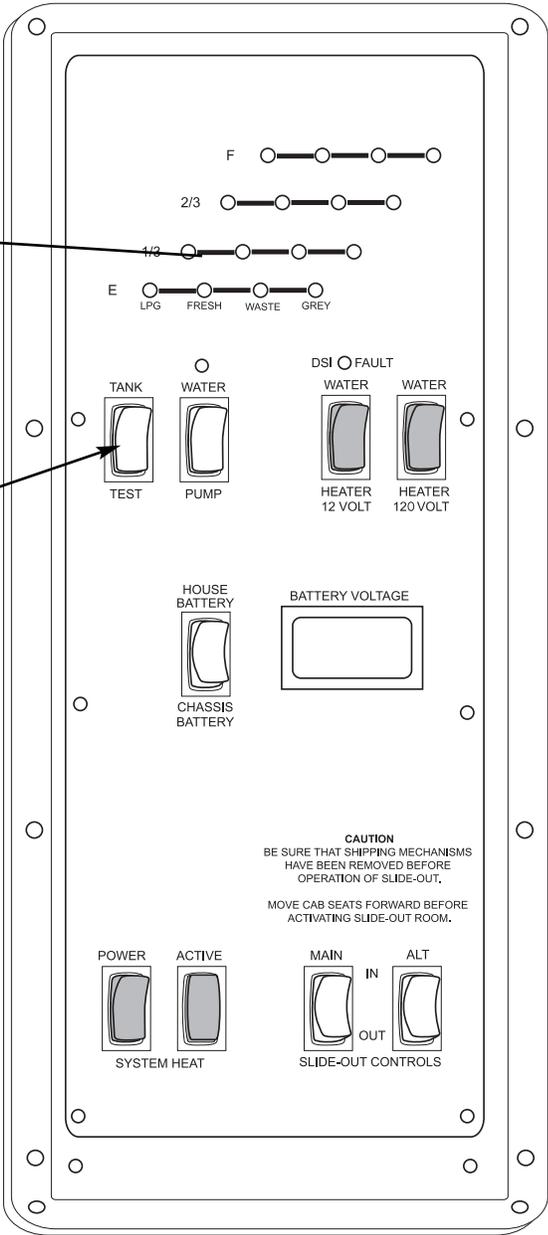
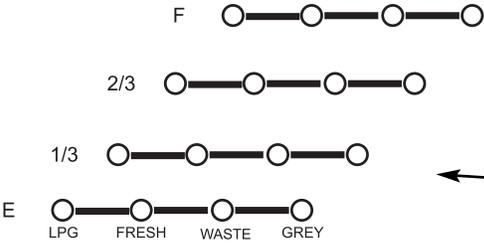
Fault Alarm:

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 the 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.

MONITOR PANEL (LP TANK) - Measurement



Tank Measurement:
To measure level of a tank simply push button on display panel corresponding to tank you wish to measure. Observe the gauge.

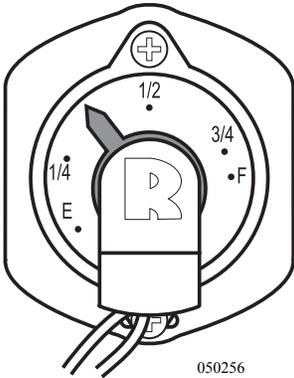


*Use this switch to test tanks.
Momentary push & hold.*

Calibration:
The monitor panel is calibrated at the factory for accuracy.



NOTE: The LP-Gas gauge is not adjustable.



LP Tank Gauge

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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 gas appliances.
- Manually turn off the primary shut-off valve at the LP-Gas tank.
- Do not attempt to operate any electric switch as this can produce a spark and ignite the gas.
- Open windows and doors.
- Evacuate the motorhome. Stay clear of the surrounding area.
- Keep open flames, spark producing devices and smoking material 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 seriously injure person(s) or cause death.

LP-GAS TANK - Tank Capacity

LP-GAS TANK CAPACITY	
All Models	24 Gallons*

**Actual filled LP-Gas capacity is 80% of listing due to safety shut-off required on tank.*

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. Have a trained service person fill the LP-Gas tank.

The LP-Gas tank fill is located in the curbside compartment. Inform the service technician to purge any air from the tank before filling if the tank is new and being filled for the first time. 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.

LP-Gas exists in both liquid and vapor within the LP-Gas 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.

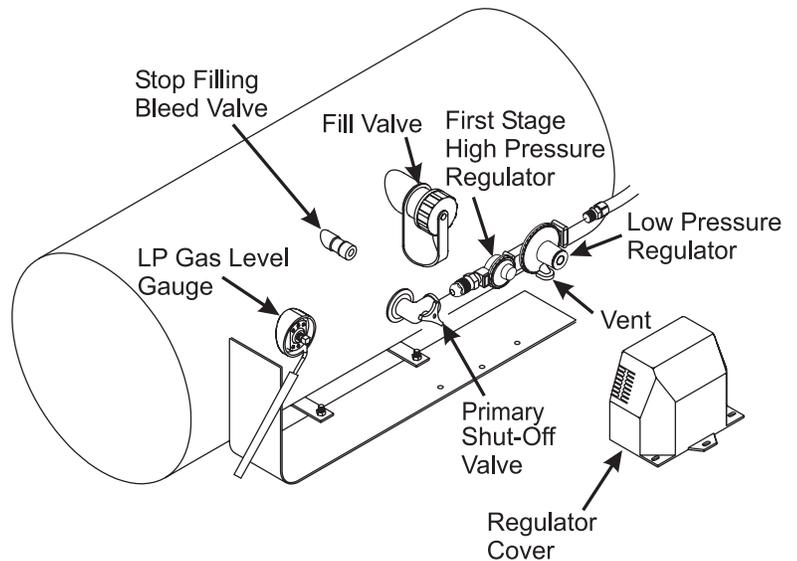


NOTE: Actual filled liquid capacity is 80% of full tank capacity.



WARNING: Extinguish all sources of heat, sparks, flame and smoking materials within a 50-foot radius during the fueling process.

1. Turn off pilot lights, all appliances and the engine.
2. Remove dust cover to fill valve. Screw fill nozzle to fill valve.
3. Turn on dispensing pump, then open 80% bleed valve.
4. Open valve on fill nozzle dispensing liquid into tank.
5. Close valve on fill nozzle as liquid just begins to expel from 80% bleed valve. Tank should automatically stop filling at 80% due to overfill protection valve.
6. Close 80% valve then shut off dispensing pump.
7. Open high-pressure bleed valve on fill nozzle to remove high pressure between dispensing pump and fill nozzle. Remove fill nozzle from fill valve.
8. Install dust cover.



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WARNING: It is common for small amounts of liquid propane to escape and evaporate during the fueling process. Protect bare skin. Instant freezing will occur if exposed to liquid propane.



WARNING: When storing portable LP-Gas tanks that are not connected to an LP-Gas system, install an approved plug in the tank outlet holes to prevent leaks. Do not store or transport empty LP-Gas tanks, portable tanks, gasoline or other flammable liquids inside 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 (located on the LP-Gas tank underneath the motorhome) when the motorhome is in storage. If this warning is ignored, a fire or explosion could result.



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 - 40° F. Appliances that consume large amounts of LP-Gas, such as the water heater or furnace, may need to be operated in sequence in extremely cold environments.

LP-Gas Tank Operation

- Manually 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, in between trips and when in storage.
- 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.



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 SOAP 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

Exterior Gas Line Hook-Up Prep:

An auxiliary remote LP-Gas hook-up is for external LP-Gas accessories and is to be used for external components only. For safety, only approved LP-Gas quick disconnect fitting and flexible hose should be used to connect external accessories to the remote hook-up. A LP-Gas Quick Disconnect Fitting should be installed by a qualified agency as defined in the National Fire Protection Association (NFPA (Fire) 54-02) code.



NOTE: Every time the remote hook-up is used, check for gas leaks on all connections. If a leak is detected, turn the primary valve off at the LP tank. Contact a qualified service center for service repairs.

LP-GAS FUNDAMENTALS

# Capacity	Gallon Capacity	BTU Capacity
5	1.18	107,903
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:

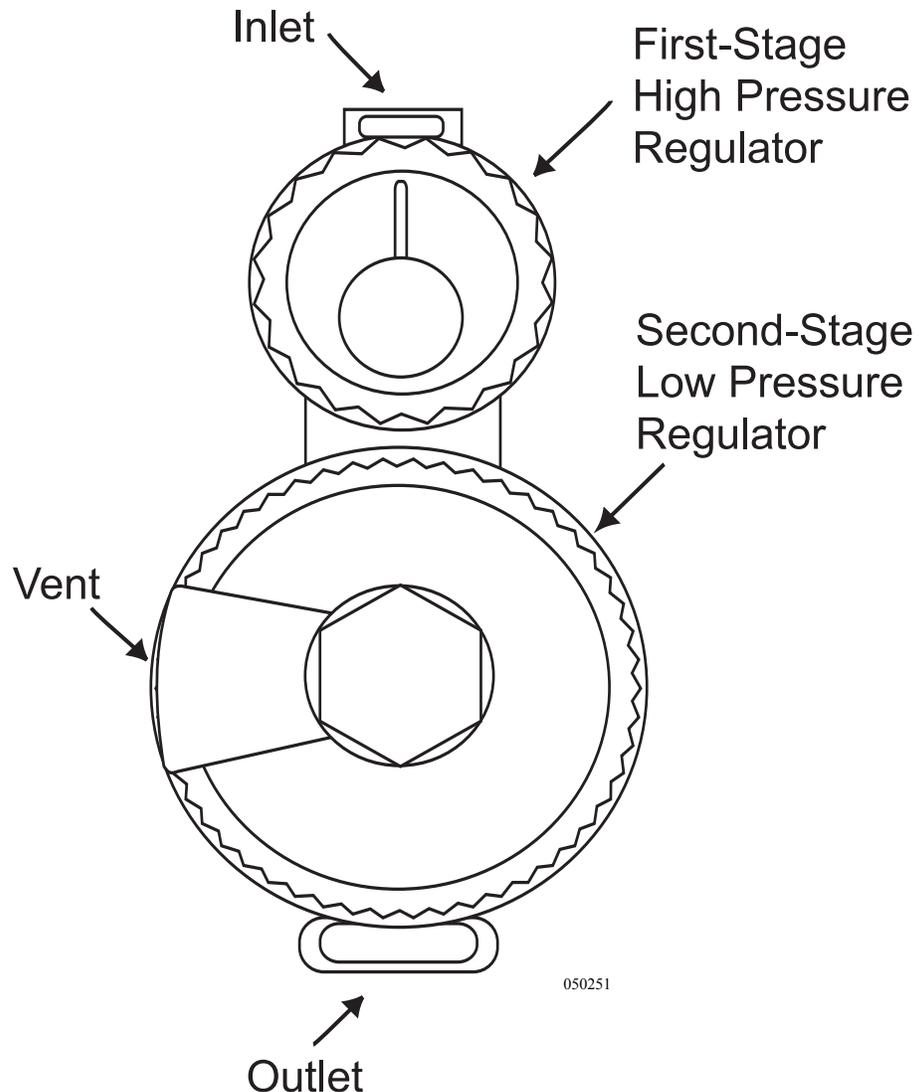
- LP-Gas detectors are a federal requirement on all LP-Gas equipped recreation vehicles.
- LP-Gas is a by-product produced by refining oil.
- Odor is added to LP-Gas after the refining process.
- Each liquid gallon of LP-Gas produces 91,502 BTU (British Thermal Units).
- Temperature affects pressure 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 ¼ ounces per square inch.
- An inch of Water Column is a measurement of applied pressure to one side of a U-Tube ½ filled with water at sea level. The amount of pressure required to raise the water level 11", represents 11" of Water Column.



NOTE: The above information is not a complete guide for the use of LP-Gas tanks or appliances. In cold climates keep fuel levels above 50% in order 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 action of the liquid to vaporize. 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, about 200 psi. Vapor pressure must remain relatively consistent regardless of temperature so that appliance heat output remains stable. Vapor pressure regulation is performed by the regulator.

The regulator is the heart of the LP-Gas system. The regulator reduces vapor pressure so that it is safe to use. The regulator on the motorhome is a two-stage regulator. 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.). The regulator has a vent that allows 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 could cause erratic pressure regulation. If there is 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 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 which can build up and partially or totally block the vent. The possibilities of freeze up are greatly reduced with the two stage regulator.

To Prevent Freeze Up:

1. Ensure the LP tank is totally free of moisture prior to filling.
2. Ensure the tank is not overfilled.
3. Keep the valve closed when the tank is empty.

If a Freeze Up occurs:

1. Have an LP-Gas distributor purge the tank.
2. Have the LP-Gas distributor inject methyl alcohol in the tank.

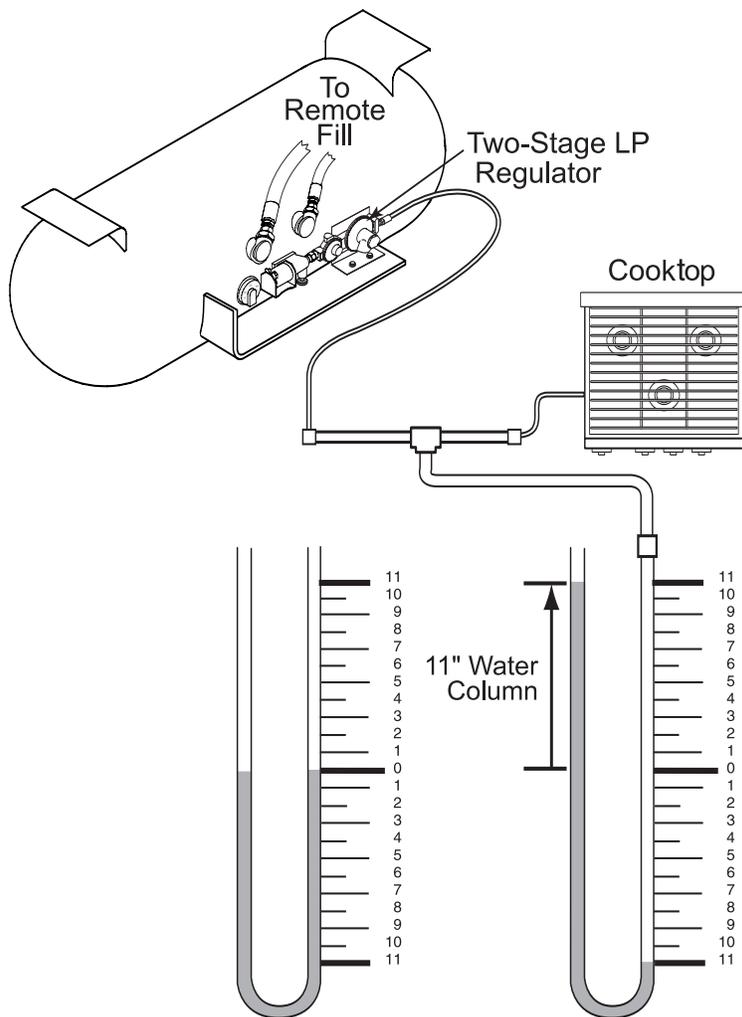
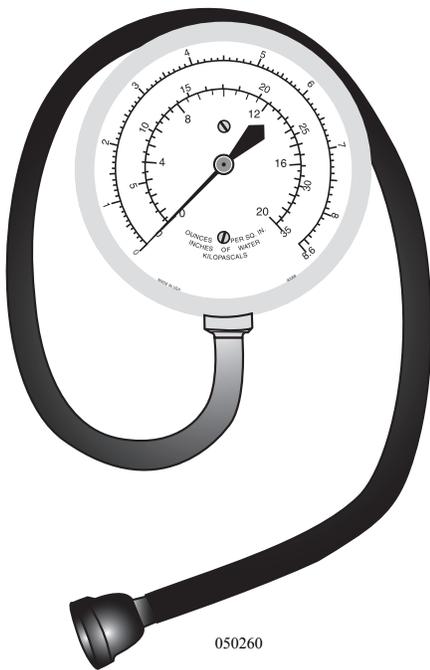
Damage to the regulator can occur when the tank is overfilled. The regulator is designed to work with vapor only. This is why the tank is filled to only 80% of its liquid capacity. The other 20% allows for vaporization of the liquid. The primary vapor valve is located in the vapor section of the tank. 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 resulting 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 effects 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, a gauge and a 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, it is preset at the factory. If adjustments need to be made it requires special equipment. Failure to follow these instructions may result in a fire or explosion and cause severe personal injury or death. Do not operate any LP-Gas appliance until the LP-Gas pressure is checked and a leak down test is performed!



Example of Operation

It is suggested by the hose manufacturer that the Liquid Propane Gas (LP-Gas) supply hoses, used on the motorhome, be subject to regular inspection. As a guideline, we suggest that all flexible LP lines connecting the slide-out, appliances, or tanks be inspected in the spring and fall of each year by a qualified RV technician.

According to the manufacturer, the inspections should consist of the following procedures and be performed when the hose is not under pressure:



1. **INSPECTION:** Inspect the outside cover of the hose for blistering, abrasion or cuts and coupling slippage. Cuts in the hose cover, which expose or damage the reinforcement, is cause for replacement. Hose strength is controlled by the plies of the reinforcement and damage in this area cannot be tolerated. Small cuts, nicks, or gouges in the cover that do not go completely through the cover will not be 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.

2. 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.
3. Blistering or loose outer cover is cause for hose replacement.
4. 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.
5. 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 (10) years. The manufacturer of the LP-Gas supply lines recommended this schedule after performing extended testing and have determined that the failure rate may rise after this period of time. The motorhome manufacturer recommends following these guidelines to assure continued safety and the dependable use of the recreation vehicle.

LP-GAS CONSUMPTION

Each gallon of LP-Gas produces 91,502 BTU's of heat. One 27 gallon tank produces two million BTU's. Total consumption depends on the rate of usage by each appliance and the operating time. The stove and heating systems typically use the most gas. With sub-freezing temperatures and high winds, consumption by the furnace can be very high. Check the tank level often in cold weather.

Determine Fuel Consumption:

To determine approximately how many hours an LP-Gas appliance will operate on one gallon of LP use the following formula:

- LP-Gas appliances are rated in Input BTU (British Thermal Units). The rating is usually stamped or printed on 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.

TYPICAL APPLIANCE BTU RATINGS

Water Heater (Atwood)
10 Gallon - 10,000 BTU

Furnace (Atwood)
35,000 BTU

Cooktop
9,000 BTU - Front
6,500 BTU - Rear
7,100 BTU - Oven

Refrigerator (Norcold)
2-Door - 1,500 BTU
4-Door - 2,200 BTU

Determining how long a tank of LP-Gas 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 tank by 91,502.
- Divide the total of BTU's of the LP tank by the total number of BTU's the appliances consume equals the approximate number of hours of operation before refueling.



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.

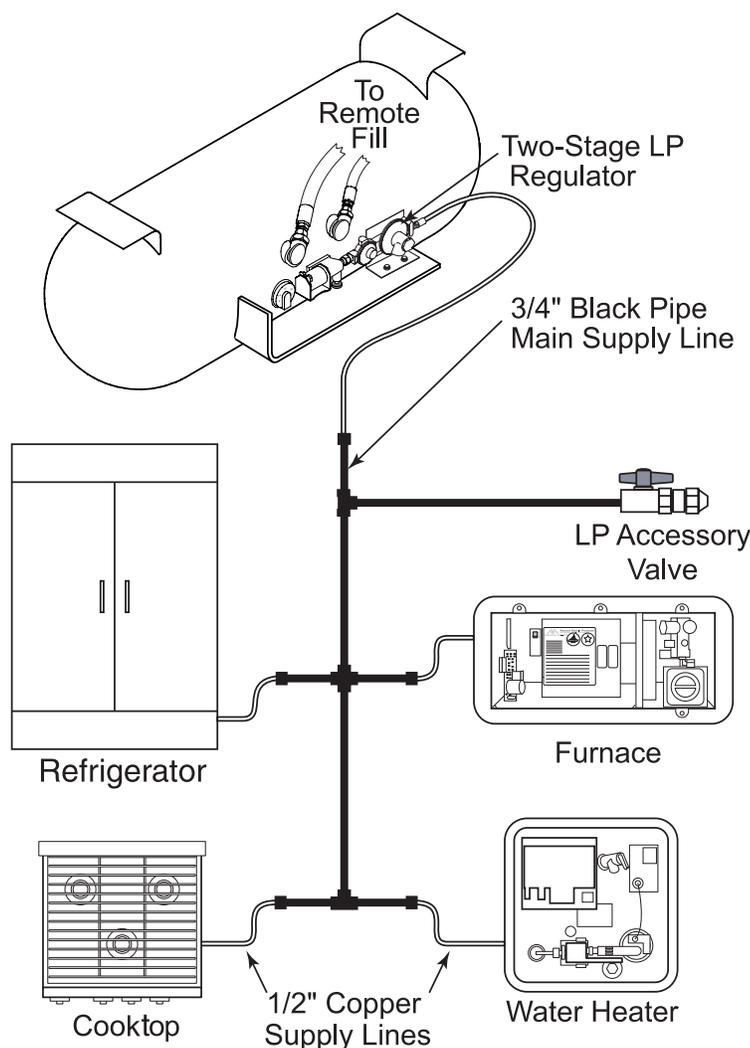
LP-GAS DISTRIBUTION LINES

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 side of 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.



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LP-GAS SAFETY TIPS

Liquid Propane gas is one of the safest and most reliable fuels available on the market if it is 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 the users in the association about the convenience of propane use with safety and peace of mind. For information on the **NPGA Gas[®] Check program, call (630) 515-0600 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 the construction of the containers. Both tanks and cylinders are required to undergo pressure testing and inspections; 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 the motorhomes and motorized products. These tanks 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 the water capacity (WC) and the 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 for the Dip Tube (DT) length. This is part of the overfill protection and maximum liquid allowance in the cylinder.

Maintenance and Safety Tips for the LP-Gas Refrigerator:

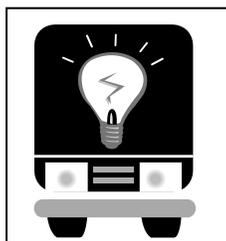
- Have the refrigerator, furnace and venting **inspected** annually by an authorized service center.
- Before firing up the refrigerator, or using the propane gas furnace for the first time each season, have the venting system checked for blockage. Insects may have built nests that will obstruct flow.
- 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 Propane 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 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 propane gas range.

Maintenance and Safety Tips for the Propane Water Heater:

- Test the operations of the temperature and pressure relief valve. Maintain setting at no more than 210° F. to reduce the chance of hot water scalding.
- 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 properly.
- 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!



MONARCH SE 2004

ELECTRICAL SYSTEM

SECTION 8

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The motorhome 120/240 Volt AC system can be operated from two different power sources: shore power, and the on-board generator. Shore power is the most efficient and should be used whenever possible. The on board generator can be used when shore power is unavailable.

Two different sources supply the main AC circuit breaker panel with power: the 50 Amp shore power cord or the on-board generator. The power source used is selected automatically by an automatic electrical switching device known as a transfer switch.



WARNING: The electrical system is engineered and tested for complete safety. Circuit breakers and fuses protect electrical circuits from overloading. If modifications or additions to the electrical system are made, we strongly recommend consulting your dealer for assistance to ensure continued integrity and safety of the electrical system. Please note that any modifications may void the warranty.



NOTE: (Optional) 130W inverter is only used for Front TV.



WARNING: Inverter uses a lot of battery power and should be used sparingly.

The AC system power requirement for the motorhome is 120/240 Volt AC single phase. This can be either 20 amp, 30 amp or 50 amp service. Ensure the power distribution panel is configured to handle the load. If shore power service is available connect the motorhome to the shore power source using the supplied shore power cord. The shore power cord plugs into the shore power source and can be adapted to the smaller receptacles. The motorhome shore power cord is located on the roadside of the motorhome and is permanently attached.

Shore Power



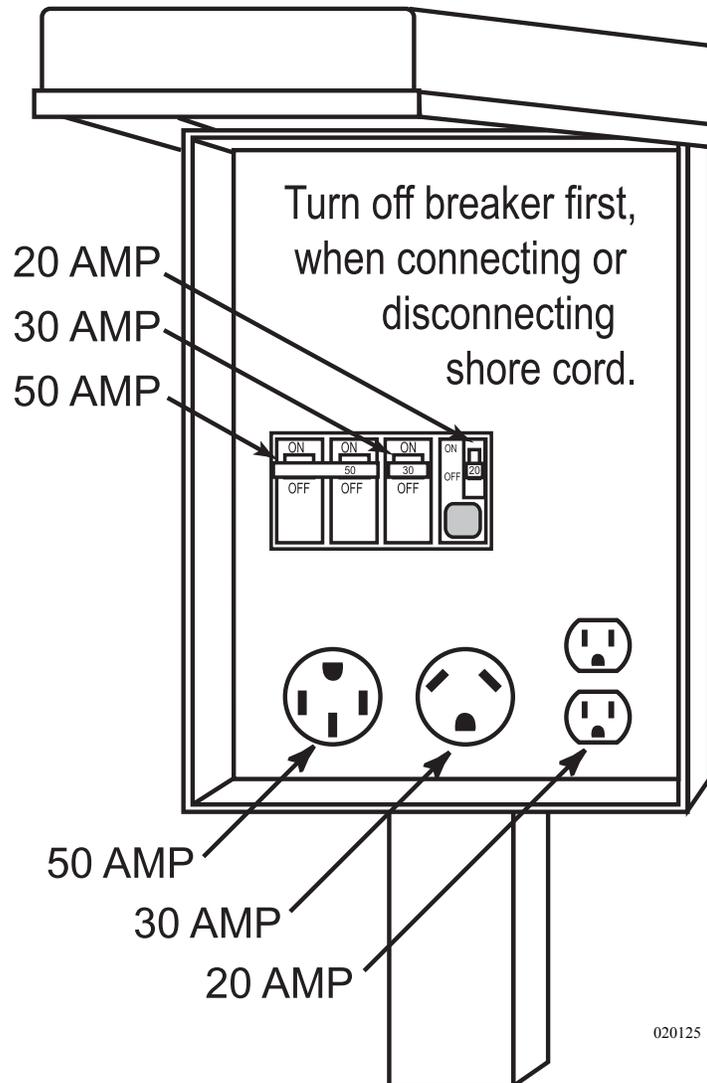
NOTE: In instances when 30 Amp (50 Amp Option) shore service is not available, care will have to be used when operating the appliances and using the outlets so the shore power service will not be overloaded.

SHORE POWER HOOK-UP

The power requirement for the motorhome is 30 Amp 120/240 Volt AC single phase. The shore cord is stored in the roadside compartment. If 30 Amp shore power service is available, all that is necessary is connect the supplied shore power cord. If 30 Amp service is not available, electrical adapters will be required.



CAUTION: Avoid flash damage to the electrical system contacts. Before hooking up to 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. Avoid standing in water when making electrical connections. Serious electrical shock and personal injury can occur. To avoid the risk of an electrical shock, turn the circuit breaker off for the power supply outlet before making the shore power connection.



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 any problems with the park's shore hook up.

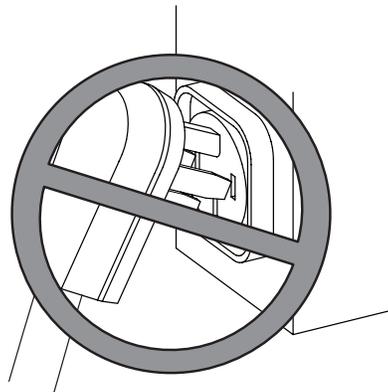
Shore Power Supply:

Different amperage shore power supplies vary greatly in the amount of available current.

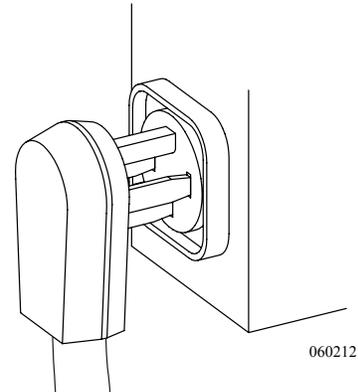
- The continuous amount of current through a breaker or fuse is only 80% of its rated capacity.
- 50 Amp 240 Volt AC shore power service consists of two power supply conductors, a neutral and a safety ground. The 50 Amp breaker simultaneously limits each power supply conductor to no more than a short-term maximum of 50 Amps for each conductor. The 50 Amp 240 Volt service actually provides 80 continuous amps.
- Use care when hooked to anything less than 50 Amp shore service. Shore power service less than 50 Amps consists of one power supply conductor, a neutral and a safety ground. 30 Amp shore service is limited to 24 continuous amps. 20 Amp shore service is limited to 16 continuous amps.

Plugging in the Shore Cord Power Supply:

- Located in the roadside compartment is the shore power cord.
- Manually extend a sufficient amount of cable to reach the power supply. If 30 Amp service is not available, install the proper electrical adapter(s) to the cord.
- Always turn off the shore power breaker to the power supply before connecting or disconnecting the shore cord. This will prevent an accidental shock and flashing of electrical contacts.
- After the connection is made, turn the shore power breaker on. The transfer switch should make an audible click.
- Go inside the motorhome to verify AC power is available. The “AC IN” light on the inverter remote panel should be lit and the microwave display should be lit.



Incorrect Method



Correct Method

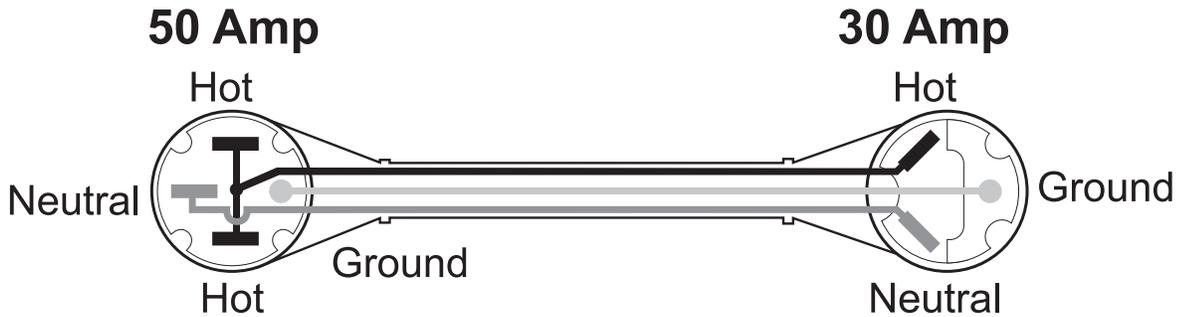
After connecting the motorhome to shore power, wait approximately one minute for the inverter/charger or converter to "stabilize" charging of the batteries before starting air conditioners or other large AC loads. In the instance 50 Amp service is not available, use caution not to overload the supplied shore service breaker. Operate appliances and outlets in sequence rather than all at the same time.

Disconnecting the Shore Cord:

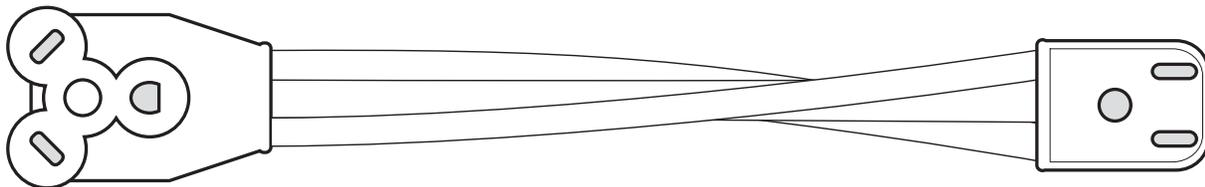
- Turn off all AC appliances. This will prevent accidental shock and flashing of electrical contacts when disconnecting.
- Turn off the shore power breaker.
- Grasp housing of electrical cord. Without touching electrical contacts, work cord out and away from socket.
- Straighten and clean cord.
- Stow in Compartment.

Electrical Adapters:

There are many different electrical adapters available to suit a variety of needs. Only UL approved adapters should be used. The most common adapter is a 50-30 Amp adapter. The type of connector adapts the 50 Amp shore cord to a 30 Amp shore power outlet. Always install the adapter to the cord prior to making the connection to the outlet.



Another common adapter is a 30 to 20 Amp adapter. This type of connector adapts the 30 Amp shore cord to a 20 Amp shore power outlet.



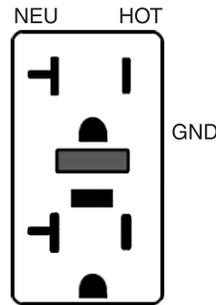
CAUTION: If shore power service is limited to 15 or 20 Amps, use of light duty extension cords and electrical adapters will create a voltage loss through the cord and at each electrical connection. Line voltage loss and the resistance at each electrical connection can be a hazardous combination. Damage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



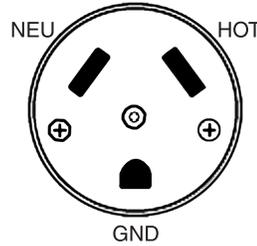
CAUTION: Avoid the risk of electrical shock or component damage by disconnecting from shore power during electrical storm activity. Use the inverter or start the generator if AC power is needed.



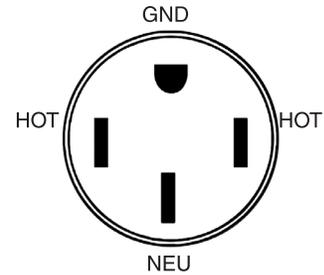
NOTE: Three types of shore power outlets most commonly used are shown in the illustration.



15-20 AMP
120 VOLT



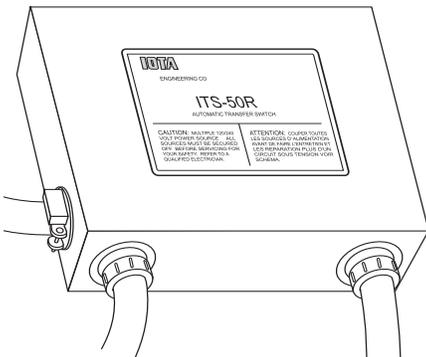
30 AMP
120 VOLT



50 AMP
220 VOLT

060121

TRANSFER SWITCH



060167E

The transfer switch automatically transfers AC power from the shore power cord or generator through the transfer switch to the 110/240 Volt AC breaker panel. When using the generator as the power source, the transfer switch has a time delay built into it 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 shore cord are not electrically energized.

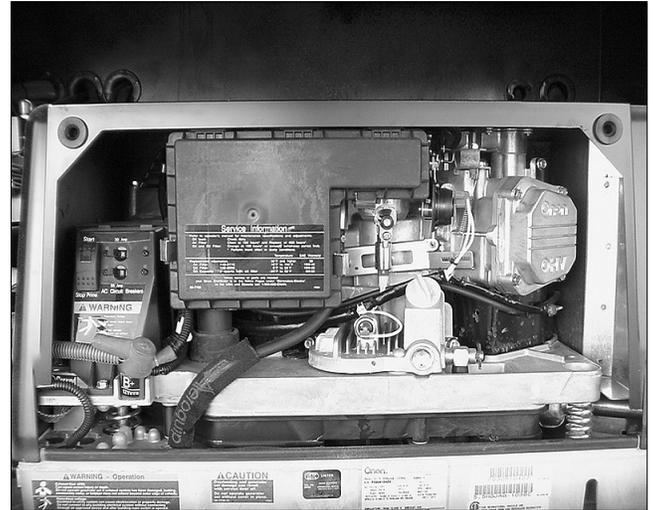


CAUTION: To prevent damage to the transfer switch contacts do not have appliances on or AC loads plugged into outlets when hooking up to shore power or starting the generator. The transfer switch will begin to disengage at approximately 90 Volts AC. Operation at this voltage may damage the transfer switch, appliances or other items plugged into outlets. Start the generator and disconnect from shore service until the shore service supply voltage stabilizes.

The motorhome is equipped with a 5.5 kW 120 Volt AC gasoline operated generator located in a service compartment on the roadside of the motorhome. It operates at a 60-Hertz frequency with 54.2 amps of current. The generator may stop running before the chassis fuel tank is empty. This is a safety feature to prevent the motorhome from running out of fuel.

GENERATOR
Generator 120 AC
(Gasoline)
5500 kW

The generator can be selected for use when AC shore power is not available. The generator maximum amount of output power, measured in watts, is calculated at an elevation of 500 feet above sea level. This figure will decrease slightly with a higher altitude. Ambient temperature also effects total maximum output. The amount of AC electrical load applied to the generator determines fuel consumption.



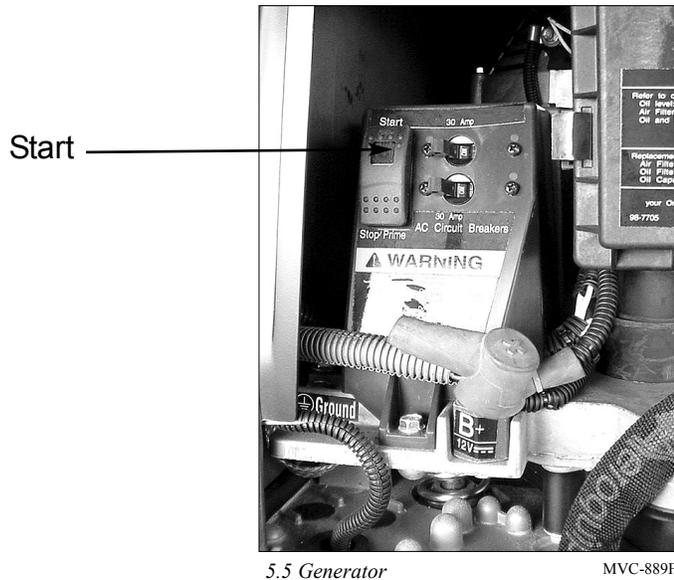
MVC-891F



120ACLP7.5Gen.eps

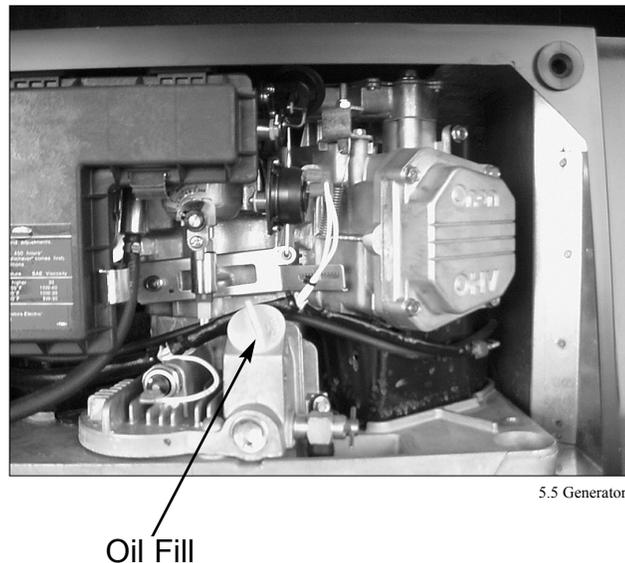
The generator can be started from the following locations:

- The generator remote switch on the dash.
- The control panel on the generator.



Pre-start Checks

Prior to the first start of the day perform a general inspection including oil level. 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:

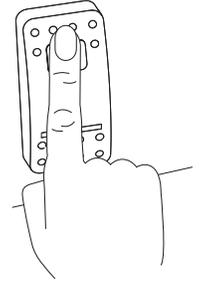
- People and animals must be clear of hazards of electrical shock and moving parts.
- All appliances and other large AC electrical loads must be off.

To start generator:

1. Push and hold control switch in START position until the generator starts.
2. Release switch.

Starting the Generator

Press Top to
START



080357



Warning: Excessive cranking can overheat and damage the starter motor. Do not crank the engine more than thirty seconds at any one time. Wait at least two minutes before resuming.



INFORMATION: If the generator fails to start refer to the generator manufacturer's owner'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. The engine exhaust contains carbon monoxide, which is an odorless and colorless gas. Carbon monoxide 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 either outside, underneath, or inside the motorhome or any nearby vehicles. Operate the generator only when safe dispersion of exhaust can be assured. Monitor the outside conditions to be sure that the exhaust continues to disperse safely.

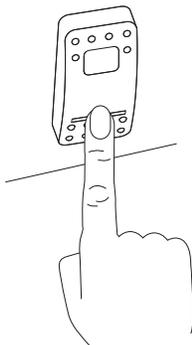


WARNING: When parking, be aware of area around generator. The hot exhaust or exhaust gases may ignite dry grass or other flammable materials.



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.

Press Bottom to
STOP



080357

Turn off the appliances and other AC loads being used. Allow the generator to run unloaded for at least one minute before shutdown. This will allow the engine to cool. Momentarily press the control switch to the STOP.

Stopping the Generator

Powering the Equipment

The AC output of the generator powers the motorhome air conditioners, the AC inverter/converter charger, all appliances and items plugged into the electrical outlets of the motorhome. The number of electrical appliances that can be operated at any given time depends upon how much power is available from the generator. If the generator is "overloaded" or a short circuit causes "over current," the generator will shut down or the circuit breaker will trip. If power consumption, in total, exceeds the generator power output, compensation for temperature and elevation may be necessary. Operate some appliances in sequence rather than all at the same time.



NOTE: The generator may shut down when it is loaded to nearly 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.

It is important to remember that air density decreases as altitude increases, causing the generator engine power to decrease. Power decreases at approximately 3% of the rated power each 1,000 feet (305M) of increase in elevation above sea level. It may be necessary to operate fewer appliances at the same time when the camping location is at a higher elevation. For example: 5500 watt generator at 5,000 ft. = 4675 watts net. Temperature also effects maximum output power.



INFORMATION: The generator may shut down for reasons beside "overloads". A blink code may appear on the control switch. Refer to the manufacturer's manual to obtain an explanation of the codes.

Generator Fuel

When refueling there is always a possibility the fuel may be contaminated. Contamination of fuel affects the performance of the generator. The fuel may contain water. Any contamination of fuel greatly reduces the total output of the generator and may cause erratic AC output.

AVERAGE FUEL CONSUMPTION	GAS 5.5kW (gal./hr.)
No Load	0.3
Half Load	0.6
Full Load	0.9



NOTE: The motorhome manufacturer does not cover damage to the generator caused by fuel contamination, or to appliances due to erratic AC voltage.

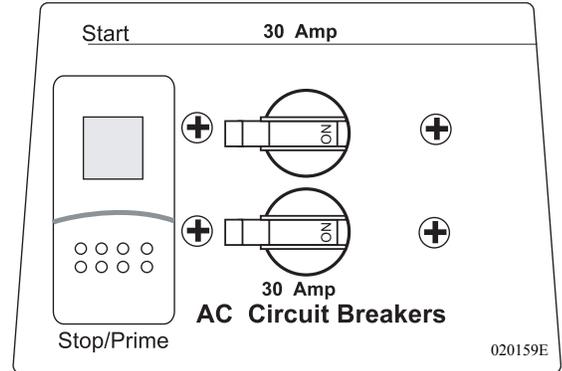
If a circuit breaker trips in the main AC breaker panel, or on the generator control panel, there may be a short circuit or too many loads.

Resetting the Circuit Breakers

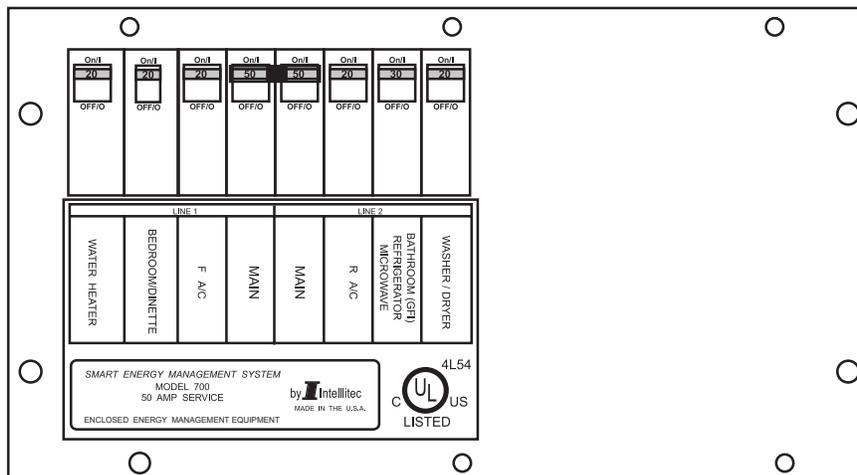


NOTE: The generator will continue to run after a circuit breaker trips.

If any 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 reconnecting loads.



5.5 Generator



Main AC Breaker Panel

060101



NOTE: An appliance or load may have a short if it causes a circuit breaker to trip after reconnecting. DO NOT continue to reset breaker. Have the problem corrected before resuming operation.

Generator Exercise

If use of the generator is infrequent, "exercise" the generator once a month by operating it at approximately half the maximum rated output for a half hour. This will help promote better starting, more reliable operation and longer engine life. This procedure drives off moisture, re-lubricates the internal engine parts and 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 set. Run the generator set under a load for a minimum of one-half hour.

DISTRIBUTION PANEL - 30 AMP AC Fuses & Circuits

The Combination distribution panel contains AC breakers and DC fuses. The 12 Volt house contains fuses (located in the bedroom cabinet) that protect the electrical circuits. These fuses are the standard automotive type. When a fuse is "blown," the wire in middle of the plastic case will be burnt. A broken, bad or "blown" fuse must be replaced with a fuse of the same rating and type. Use of a fuse with a different rating or type will defeat the circuit protection provided by that fuse and could result in damage to the motorhome's electrical system.

Fuse Assignments are as Follows:

1. Bath Lights/Vents - 15 Amp Fuse
2. Dinette/Porch/Rt. Overhead - 15 Amp Fuse
3. Bedroom/ODS Lights - 15 Amp Fuse
4. Kitchen/Left Overhead, Stove Vent (Opt Vent - 15 Amp Fuse)
5. Ceiling Lights - 15 Amp Fuse
6. Furnace - 15 Amp Fuse
7. Monitor Panel - 15 Amp Fuse
8. Slide-out - 15 Amp Fuse
9. Radio - 5 Amp Fuse

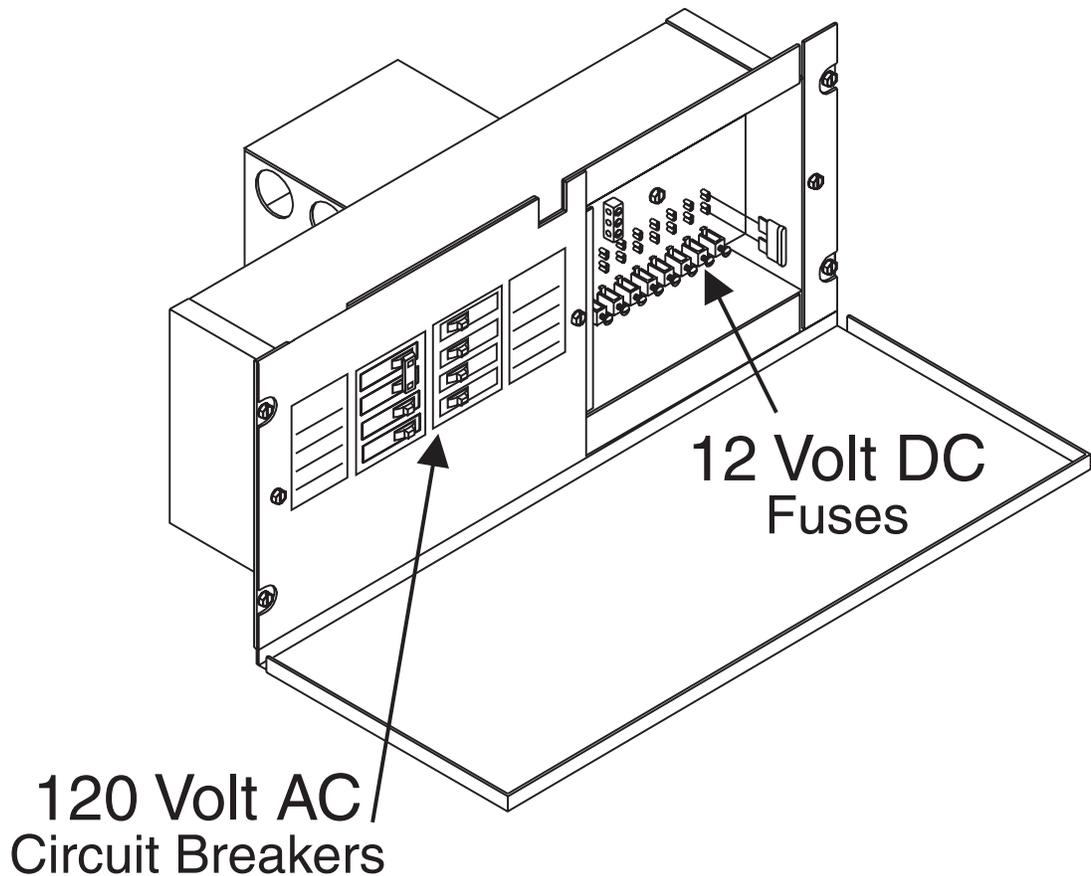
Circuit Breaker Assignments are as Follows:

Left Side

- 30 AMP MAIN
- Front Air Conditioner
- Rear Air Conditioner

Right Side

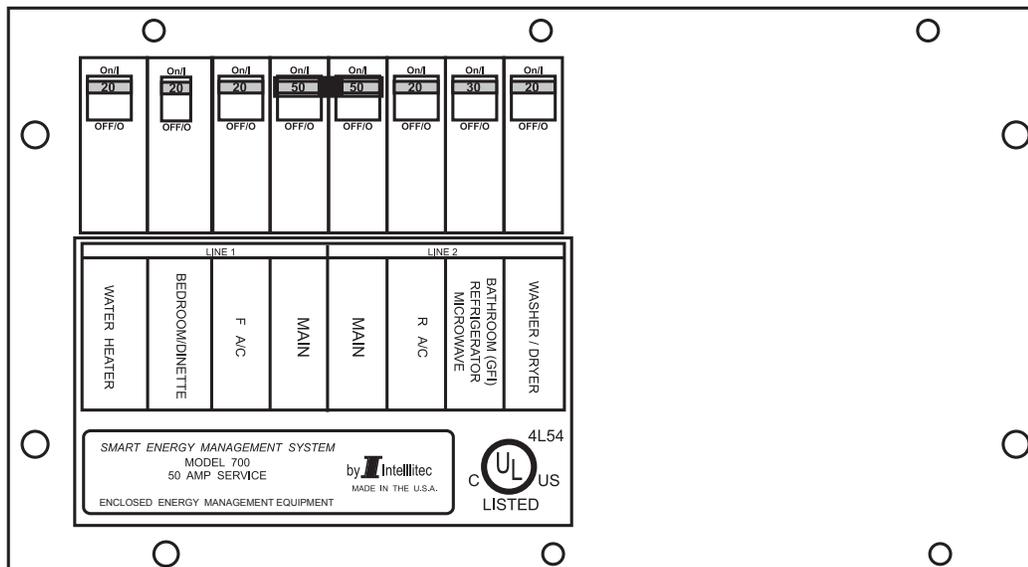
- Converter, Bedroom TV, Dining Room
- Bathroom, Kitchen, Refrigerator, TV, VCR
- Water Heater
- Microwave



060057

DISTRIBUTION PANEL - 50 AMP (Optional)

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. The panel label describes the breaker layout and the item, outlet or appliance to which they pertain.



060101



NOTE: Circuit assignments are labeled on panel. These assignments will vary with floor plans.



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 the AC power to be on. Only qualified personnel or personnel with electrical backgrounds should attempt any testing procedures.

Branch circuit breakers supply AC power to the different items or “loads.” An electrical load is any item or device that will use current when supplied with an electromotive force. Should a breaker “trip” from over current use, or a short circuit condition, the load to which the breaker is supplying the electromotive force should be reviewed or disconnected to determine the cause of the trip. If no cause is found, or not readily apparent, reset the breaker by toggling the breaker to the OFF position, then back to ON. Should the breaker trip again after the load is reapplied it may indicate a fault with that particular load. Do not continue to reset breaker until the problem has been diagnosed and corrected.

Breaker current ratings are current set points in which the breaker is designed to operate. The internal configuration of the circuit breaker is designed to trip when excess current is drawn through the breaker. The trip action of the circuit breaker can occur within milliseconds due to the speed at which electricity can travel. Breaker ratings are set to operate on a continuous load at 80% of the breaker’s rated capacity. For example: A breaker with a 20 Amp rating will handle a continuous load of 16 Amps. This designed set point is when an inductive load is applied, such as when an electric motor turns on. As the motor starts to spin, 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 fall. 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 50 Amp shore service and using appliances with electric motors. When using outlets care should be considered when applying loads such as electric motors, heaters, coffee makers, toasters, hair dryer or other large current consuming loads. If the current rating of a load is not known it is usually stated on most electrical items. The rating will either be 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 load to current supply ratio.

The chassis fuse boxes are placed in two locations. One panel is located inside the motorhome under the dash panel. The box located under the dash is referred to as the **Central Junction Box**.

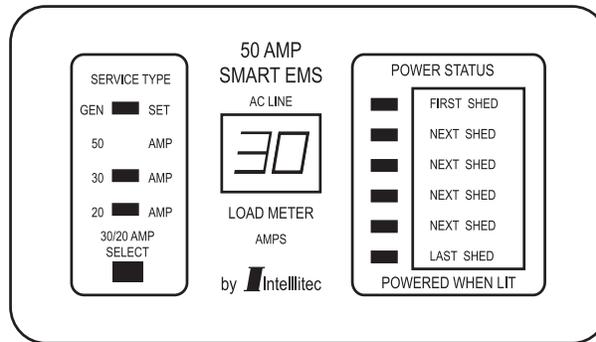
The other panel is located outside, mounted on the front firewall. This box is referred to as the **Power Distribution** or the **Battery Junction Box**.

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 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 a 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 6 possible loads as indicated on the distribution panel. These may be any type load, but are typically heavier loads; those whose use can be “postponed until a time when current is available for use. 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.

If the generator is running, 120 Volt AC will be present at the distribution panel L1 and L2 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. **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, turning the loads off and calculating the amount of current that was removed, which is the value for that load. 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, which is the value of that load, 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 display 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.

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.

Circuit Breakers

Breaker current ratings are current set points in which the breaker is designed to operate. The internal configuration of the circuit breaker is designed to trip when excess current is drawn through the breaker. The breaker will heat up from the excess current causing the breaker to trip. 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 fall. 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 50 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.

The power converter is designed to provide a filtered 12 Volt DC power to the lighting and appliance circuits. It will also recharge and maintain the unit's battery. The power converter is virtually maintenance free. There are some tests which can be performed to ensure the power converter is functioning properly.

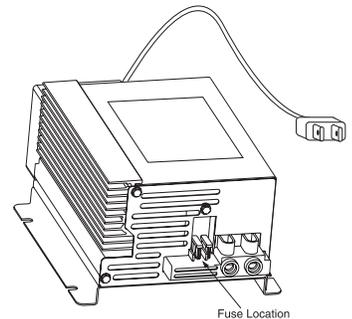
CONVERTER - 55 AMP

- The output on terminals should read 13.6 Volts DC +/- .3 Volts.
- Inspect the fuses to ensure they are not blown.
- The power requirement for the converter is 120 Volts AC.

If the 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.



Typical View of Converter
OM060087.eps

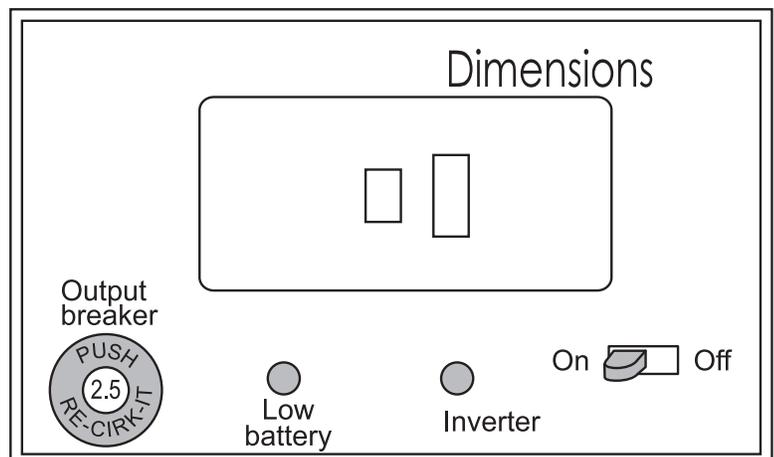
When the inverter is turned ON and shore power or generator power is not used, inverter operates on power from the house battery. The inverter is located in a front overhead compartment. The inverter supplies AC power to the television and VCR. Use of the inverter operating from the house battery will greatly increase battery power consumption.

INVERTER - 130 WATT (OPTIONAL)

The inverter has a 120 AC cord plugged into a 120 AC receptacle. When shore power or generator power is present the inverter automatically turns OFF and 120 AC power is routed directly to the inverter outlet. The outbreaker protects the inverter from over heating and short circuit.

Operation:

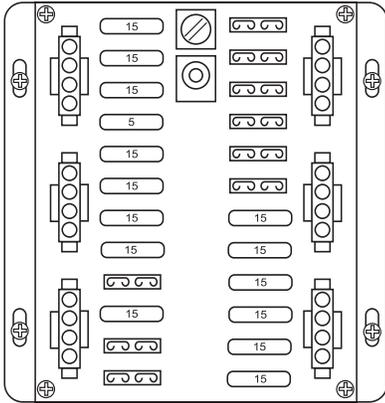
- Battery power must be greater than 11 Volts for the inverter to operate.
- Push slide switch to the **ON** position. The green **LED** will be illuminated.
- The red Low Battery light will be illuminated when the battery drops below 10 1/2 Volts and the inverter will turn **OFF**.
- The inverter should be turned **OFF** when not in use.



080410

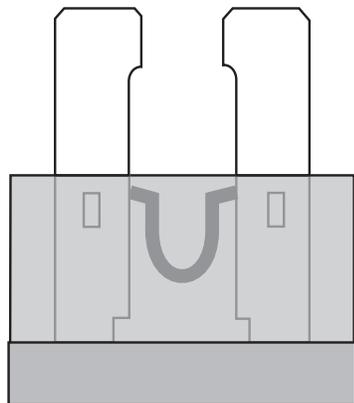
**House 12 Volt
DC Panel
(Optional
w/ 50 Amp
Service)**

The 12 Volt house contains fuses (located in the bedroom overhead cabinet) that protect the electrical circuits. These fuses are the standard automotive type. When a fuse is “blown,” the wire in middle of the plastic case will be burnt. A broken, bad or “blown” fuse must be replaced with a fuse of the same rating and type. Use of a fuse with a different rating or type will defeat the circuit protection provided by that fuse and could result in damage to the motorhome’s electrical system.

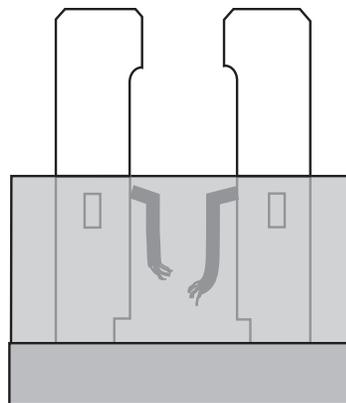


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Fuse	Col	GA	AMP	Circuit
F1	BLU	14	15	BATH LIGHTS
F2	YEL	14	15	LIVING ROOM
F3	GRN	14	15	BED ROOM
F4	VIO	14	15	VENT
F5	RED	14	15	KITCHEN
F6	RED	14	15	POWER AWNING
F7	GRY/BLK	14	15	REAR RADIO (OPT).
F8-12	OPEN			
F13	GRY	14	15	FURNACE
F14	RED	12	10	MONITOR PANEL
F15	BLK	10	15	SLIDE OUT
F16	GRY	16	5	RADIO
F17	RED	14	15	COMP TABLE (OPT)
F18	BRN	14	15	PWR TOILET (OPT)
F19	GRN	14	15	BED RM S/O (OPT)
F20	RED	10	15	TRIPLE S/O (OPT)
F21	VIO/BLK	14	15	EXT RADIO (OPT)
F22	GRN/BLK	14	15	110V, REL, WTR, HTR
F23	GRY/BLK	14	15	KIT/FURN, (OPT)
F24	OPEN			



GOOD FUSE



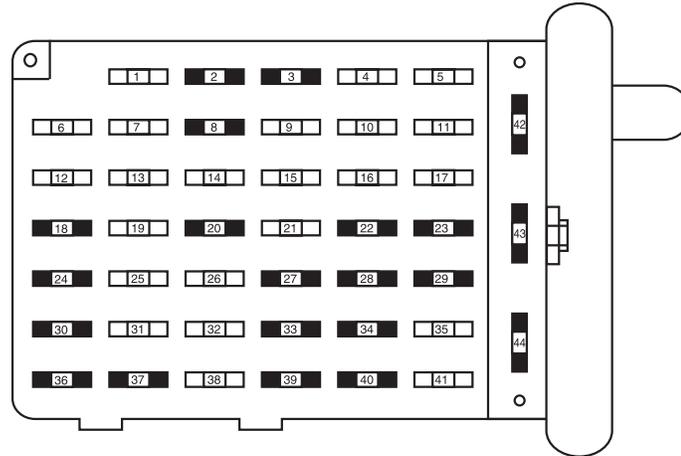
BLOWN FUSE

060086B

**DISTRIBUTION PANEL -
12 VOLT FRONT
Ford Chassis**

The chassis fuse boxes are placed in two locations:

- One panel is located inside the motorhome under the dash panel. The box located under the dash is referred to as the Central Junction Box.
- The other panel is located outside, mounted on the front firewall. This box is referred to as the Power Distribution or the Battery Junction Box.



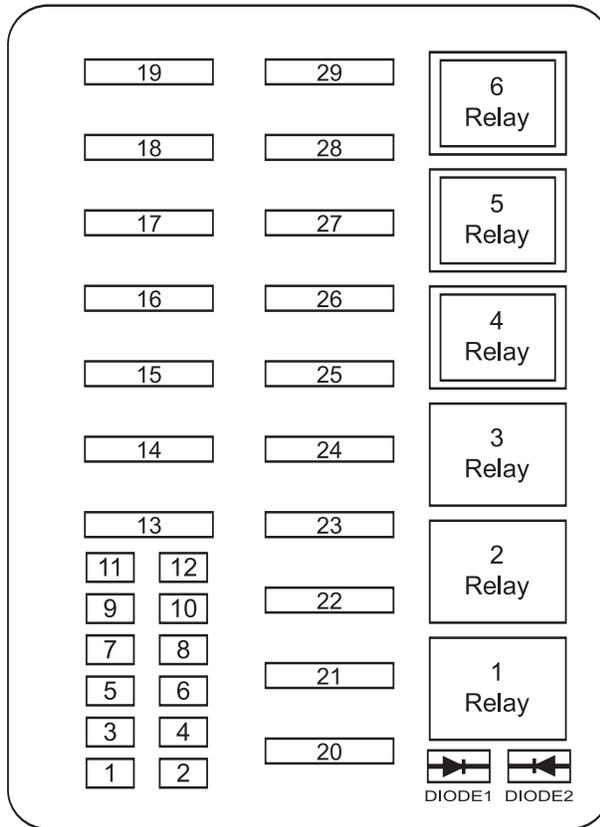
080224

Central Junction Box

Fuse Position	AMPS	Circuits Protected
1	20	Right Turn Signal Relay Coil, Left Turn Signal Relay Coil, Right Turn Indicator, Body Builder Right Rear Turn/Stop Feed, Body Builder Turn/Stop Feed.
2		NOT USED
3		NOT USED
4	15	Interior Lamp Relay
5	10	Accessory Feed #1
6	10	Trailer LH Turn/Stop Lamp
7	15	Blower Motor Relay
8		NOT USED
9	20	Trailer Tow Electrical Brake Controller Feed, Body Builder Right Rear Turn/Stop Feed, Body Builder Left Rear Turn Stop Feed, Body Builder Stoplamp Feed
10	5	Instrument Cluster, Hydromax Lamp
11	30	Windshield Wiper/Washer Module, Wiper Feed
12	10	Trailer Tow Right Stop/Turn Feed
13	10	4 WABS Module
14	10	Instrument Cluster, Hydro-Max Monitor, Warning Chime Module, Transmission Control Switch
15	15	LH Turn Relay
16	20	Body Builder Battery Feed
17	5	Body Builder Radio Feed
18		NOT USED
19	5	DRL On-Off Relay
20		NOT USED
21	15	RH Turn Relay

Fuse Position	AMPS	Circuits Protected
22		NOT USED
23		NOT USED
24		NOT USED
25	10	Body Builder Right Headlamp (Low Beam)
26	10	Shift Lock Acuator, Speed Control Servc
27		NOT USED
28		NOT USED
29		NOT USED
30		NOT USED
31	10	Body Builder Left Headlamp (Low Beam)
32	10	Digital Transmission Range (DTR) Sensor (Reversing Lamp Feed)
33		NOT USED
34		NOT USED
35	20	Headlamp High Beam, High Beam Indicator
36		NOT USED
37		NOT USED
38	10	Body Builder Accessory Feed #2 (Run)
39		NOT USED
40		NOT USED
41	10	Headlamp Switch, Dimmable Light, Body Builder Feed, Instrument Cluster Illumination
42		NOT USED
43		NOT USED
44		NOT USED

Power Distribution or Battery Junction Box



080225b

HIGH CURRENT FUSE VALUE AMPS	COLOR CODE
20A PLUG-IN 30A PLUG-IN 40A PLUG-IN 50A PLUG-IN 60A PLUG-IN	YELLOW GREEN ORANGE RED BLUE

060094

#	Circuit	Fuse
1	Power Brake Assist Module	5*
2	A/C System	10*
3	4R100 Transmission, Vapor Management Valve Solenoid, Heated Exhasut Gas Oxygen (HEGO) Sensors	20*
4	Powertrain Control Module Memory	5*
5	Powertrain Control Module Power Fuel Pump Relay Coil, Fuel Injectors, Mass Air Flow Sensor with IAT, A/C System Relay Coil	15*
6	Parklamp Feeds, Instrument Panel Fuse #41, Warning Chime Module, Trailer Tow Running Lamp Relay Coil, 1/P Dimmer Module	20*
7	Starter Relay Coil, BB Neutral Sense	15*
8	Stoplamp Switch (Logic): Brake Pressure Switch, Power Brake Assist Module***, Speed Control Module, Powertrain Control Module, ABS Module, Brake Shift Interlock Actuator	10*
9	Alternator	5*
10	Daytime Running (DRL) Lamps	20*
11	Ignition Coils, Radio Capacitors #1 and #2, Powertrain Control Module Relay	30*
12	Trailer Tow Running Lamps Feed, Trailer Tow Backup Lamps Feed, IP-Backup Lamp Feed	20*
13	Trailer Tow Electrical Brake Controller Feed	30**
14	Instrument Panel Battery Feed (Fuse #9,15,21)	60**
15	Not Used	
16	ABS Module	60**
17	Not Used	
18	Horn Feed	20**
19	Not Used	
20	Powertrain Control Module Relay	40**
21	Fuel Pump Motor	20**
22	Diagnostic Tool Connector, Cigar Lighter Feed	20**
23	Blower Motor Feed	40**
24	Instrument Panel Battery Feed (Fuses #4, 10,16)	40**
25	Ignition Switch Feed (Instrument Panel Fuses # 1, 5, 7, 11, 13, 14, 17, 19, PBD Fuses # 7,9,11)	50**
26	Ignition Switch Feed (Instrument Panel Fuses #5, 11, 17, 26, 32, 38)	60**
27	Multifunction Switch (Headlamps)	30**
28	Not Used	
29	Power Brake Assist Motor***	60**
Relay 1	Daytime Running Lamps ON/OFF Relay	
Relay 2	Fuel Pump Relay	
Relay 3	Horn Relay	
Relay 4	A/C System Relay	
Relay 5	Blower Motor Relay	
Relay 6	Powertrain Control Module Relay	
Diode 1	Powertrain Control Module Diode	
Diode 2	Park Brake Diode	

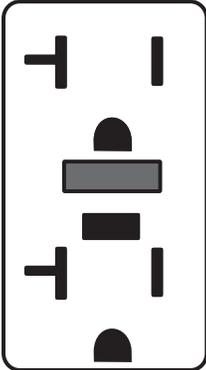
* Mini Fuses ** Maxi Fuses *** Vehicle with Hydromax Brake Assist Only

WORKHORSE FUSES & CIRCUIT BREAKERS

Workhorse Chassis

Name	Circuit Protected	Fuse	Circuit Breaker
HTR	Circuit Protected	25A	N/A
PWR	Not Used By Body Manufacturer	N/A	30A
HORN/DM	Not Used By Body Manufacturer	20A	
ACC Radio	Accessory and Wiper Motor Feed	N/A	10A
TURN-B/U	Turn Signal Flasher, PARK/NEU POSN & B/U LP SW	15A	N/A
ECM-BAT	Fuel Pump Relay, Engine Oil Pressure IND Sensor, Vehicle Control Module	20A	N/A
TAIL LPS	Head Lamp Switch	20A	N/A
GAUGES	DTL Relay & Control Module, AC Compressor Relay, Instrument Panel Cluster, Audio Alarm, Alternator, Ignition Feed	20A	N/A
I-3	Cruise Control Module & Switch, Vehicle Control Module, Stop Lamp/TCC Switch, ABS Module	15A	N/A
ENG-BAT	AC Compressor Relay, Data link	15A	N/A
STOP-HAZ	Hazard Lamp Flasher, Stop Lamp Switch	15A	N/A
ECM-I	Fuel Injectors, Ignition Coil, Electronic Ignition Control Module, Vehicle Control Module, Crankshaft Position Sensor, Instrument Panel Cluster	20A	N/A
AUX	Not Used By Body Manufacturer	N/A	30A
WIPER	Not Used By Body Manufacturer	25A	N/A
ENG-I	Sensors, Mass Air Flow Sensor, Vehicle Control Module, EGR Valve Solenoid Evaporative Emissions Canister Purge Valve Solenoid, Fan Control Relay	20A	N/A
INSTR-LPS	Audio Alarm, PRNDL Lamp, Instrument Panel Cluster, Manufacturer Instrument Lamps	5A	N/A
TRANS	Transmission	10A	N/A
CRANK	Starter Relay	10A	N/A
AUTO APPLY	Park Brake Low Pressure Switch, Auto Apply Park Brake Switch	10A	N/A

GFCI Breakers & Outlets



GFCI Outlet. 060072

A ground fault circuit interrupter “GFCI” can be found in two different types of applications. One type is incorporated in a breaker used in 120 Volt AC breaker panels, the other is incorporated in an outlet. The GFCI, whether it is a breaker or an outlet, offer two types of protection. One type of protection is from over-current or shorts. It also provides protection for persons against hazardous ground fault currents which can result in injury or death. Ground fault currents are currents that flow from the “HOT” or power terminal through a person to the ground. 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. If the device has been properly installed it 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 or breaker uses sensitive electronics inside the outlet or breaker to detect a ground fault problem. The electronics monitor the normal current of power, flowing to the “hot” 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 breaker or outlet, stopping the flow of electricity. The amount of current it takes to trip the device from a ground fault varies slightly from the different outlet or breaker manufacturers (approximately 30 mils 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 shock, can still be seriously injured. A GFCI outlet or breaker will not protect against shock from a normal current flow. For example, a shock from touching both metal prongs of an electrical cord or appliance while plugging it in.



WARNING: If a breaker or outlet trips continually DO NOT continue to reset breaker or outlet until the problem has been identified and corrected.



NOTE: The ground fault outlet or breaker should be tested once a month to insure it is working properly. Use the “TEST” button on the outlet or breaker. It should trip with an audible “click.” The breaker or outlet will not trip if no 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 mil is 1/1000 of one amp.

One of the most widely used tools for testing a 12 Volt problem is the test light. Test lights come in a host of varieties, such as a light bulb with a probe and ground clip, to the more elaborate electronic ones that measure a wide scale of voltages and perform a variety of functions. A VOM or Volt Ohm Meter is used to perform a multitude of tests. It is generally used when exact values are needed for evaluation. These meters come in an analog or digital format. Either of these two testing tools may be used, depending upon personal preference. If a 12 Volt light is not working, the test light may be better suited for this. In the case of a charging system problem the meter may be the tool of choice. In any situation the testing tool is an invaluable piece of equipment when it comes to determining an electrical problem.

If it is necessary to use testing tools, use precautions and consider three things. First, recognize when the problem is beyond your skill level. Nothing will create more problems than being armed with tools and going in an unknown direction. Good intentions can lead to major problems. The second item to consider is if something will cause more grief by being dealt with now than if it were left alone and repaired by a professional at a more convenient time. Items that seem as if they should only take a few minutes, may end up taking an entire day. The third item to consider is whether or not the current situation may be potentially dangerous if left to be repaired at a more convenient time.

Know When to Say No

NOTE: Check all related fuses before assuming you have encountered an electrical problem or situation. Spare fuses should be kept on hand and can be purchased from auto parts stores. A fuse description label is on the distribution panel cover.



WARNING: If a fuse blows replace the fuse with same amperage rating and type. Installing higher amperage fuses can damage the wiring or the item the fuse is protecting, or may cause a fire. If the fuse repeatedly blows after replacing it do not continue to replace it. Have the problem diagnosed and corrected by a qualified technician.

BATTERY - How It Works

Batteries come in different sizes, types, amp hours, voltages and chemistries. There are nearly as many descriptions of battery types and how they should be used as there are people willing to offer advice on them. Although it is not possible to cover batteries in their entirety, there are guidelines that can be followed to ensure that the batteries are well maintained.

The operation of the battery is based on a chemical reaction. The battery is a container of lead plates, insulators and a solution of distilled water and sulfuric acid. The solution, when mixed together, is known as “electrolyte.”

The 12 Volt battery is actually six batteries in one case. When charged, each cell has a voltage of 2.1 Volts. When six cells are hooked together this makes a 12.6 Volt battery (fully charged).

Electrons are stored on the negative plates. When a load (eg. a light bulb) is put between the positive and negative terminals, the electrons move from the negative plate to the positive plate through the “load” and then back to the ground terminal. At this time the sulfuric acid leaves the water and adheres onto the plates of the battery. The electrolyte solution keeps the electrons from flowing while the battery is in the “at rest” position.

Charging the battery moves the sulfuric acid back into solution with the distilled water. A battery left in a low or discharged state will cause the acid to “sulfate.” In attempting to recharge the battery, the acid has become hardened and no longer will leave the plates and enter into the liquid solution with the distilled water. The lowered acid to water ratio has a direct affect on the battery’s ability to release the stored electrons (power output) and the length of time it can perform (reserve capacity). Batteries left in a discharged condition will readily freeze. This can crack the case allowing the solution to spill, it can also warp the plates. The acid acts like an “antifreeze” for the battery. This is why batteries should not be left or stored in a “discharged” condition.

Battery Types

Starting Batteries:

Starting batteries are designed for high output cranking power, but not for deep cycling like the house batteries are designed to do. Starting batteries will not last long in deep cycle application. The way they are rated should give a good indication of their intended use. “Cold Cranking Ampere” is a measurement of amperage output that can be sustained for 30 seconds. Starting batteries use thin plates to maximize the surface area of the battery. This allows a very high starting current but lets the plates warp when the battery is deep cycled (discharged).

Deep Cycle Batteries:

Deep cycle batteries are best suited for use with 12 Volt operated lights, appliances and inverters. Deep cycle batteries are designed to have a majority of their capacity used before being recharged. These are available in many sizes and types. The most common is a non-sealed, liquid electrolyte battery. The non-sealed types have battery caps. The caps should be removed (monthly) to check the level of electrolyte. When a cell is low, only distilled water should be added. Water consumption will vary depending on many factors: how far the batteries are depleted, how long the voltage is being applied to charge the batteries, how much voltage is used and how often this occurs. Generally, the batteries should be checked every two or three weeks when continuously hooked to shore power.



NOTE: Tap water contains minerals which can alter battery chemistry and ruin the battery. Use only distilled water when refilling the battery.

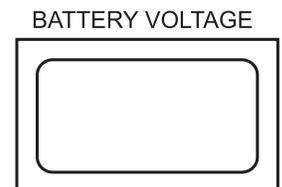
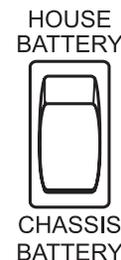
There are several ways that a battery can be tested and monitored. The motorhome uses a monitor panel that shows the status of the batteries at a quick glance. Press and hold the test switch to display the desired battery bank voltage.

A more efficient way of testing the batteries is to check the electrolyte solution. The only way to test a battery's electrolyte solution is with a hydrometer. Hydrometers can be purchased from most auto parts stores.

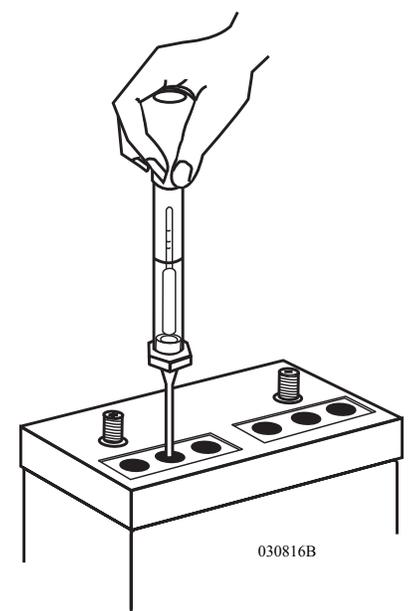
Many styles are available, from types with cylinder graduation (shown here) to types with floating balls. The hydrometer tests the battery's electrolyte solution which is measured in specific gravity. Distilled water has a specific assigned gravity of 1,000. The hydrometer is calibrated to this mark. 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.

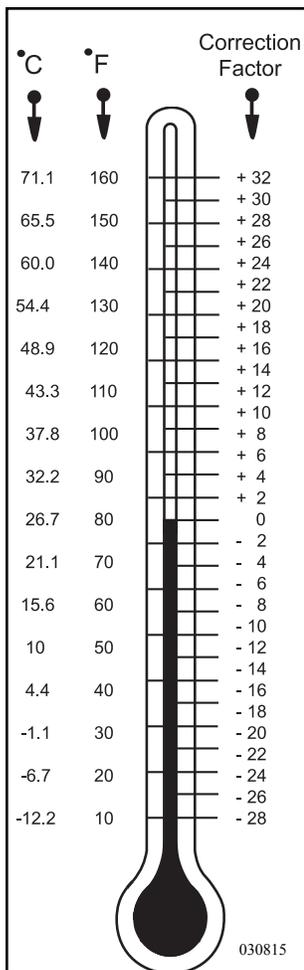
Testing the Battery



060158c mod



030816B



Temperature Compensation Chart

The hydrometer is calibrated at 80° F. Temperature affects the hydrometer readings. The higher the electrolyte temperature, the higher the specific gravity reading. The lower the temperature, the lower the specific gravity reading. Add or subtract four points for each 10° variance from the 80° F chart. Readings between cells should not vary more than 50 points.

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.

Another test that can be performed is to place a specific load on the battery for a predetermined length of time equal to that particular battery’s rating. This machine is usually an adjustable carbon pile that can vary the load being applied to the battery(s) while monitoring voltage to see if they will perform to their specific rated capacities.



NOTE: See the Temperature Compensation Chart. Liquid levels should be even between the cells of the battery being tested as it will affect the accuracy of the test.



WARNING: Sulfuric acid in the batteries can cause severe injury or death. Sulfuric acid can cause permanent damage to eyes, burn skin and eat holes in clothing. Always wear splash-proof safety goggles when working around the battery. If the battery electrolyte is splashed in the eyes, or on skin, immediately flush the affected area for 15 minutes with large quantities of clean water. In case of eye contact, seek immediate medical aid. Never add acid to a battery once the battery has been placed in service. Doing so may result in hazardous splattering of electrolyte.

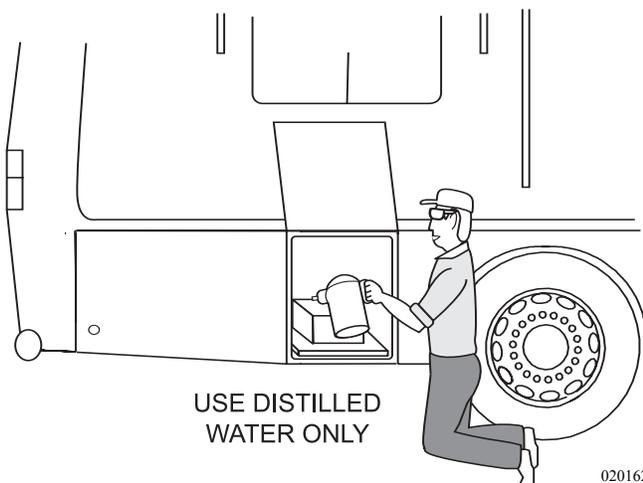
At a minimum, the battery electrolyte level should be checked at least once a month. Check the level sooner if the battery is frequently used. The level should be above the top of the plates, but not overfull. Most batteries have a plastic cup or well. The electrolyte level should be approximately 3/8" 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 boil the water out rapidly once the plates have been exposed to air. This process may take only a matter of hours. If this has happened the battery is more than likely damaged.

After checking the battery's electrolyte levels it is also a good idea to check the battery connections for tightness and corrosion. If any corrosion is found disconnect the cables (make sure to mark their locations) and carefully clean them with a mild solution of baking soda and water. There are also aerosol products available that will work. This will neutralize any acid that may be present. Do not allow the solution to enter the battery as this will 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. Coat the terminals with petroleum jelly or an anti-corrosion grease.

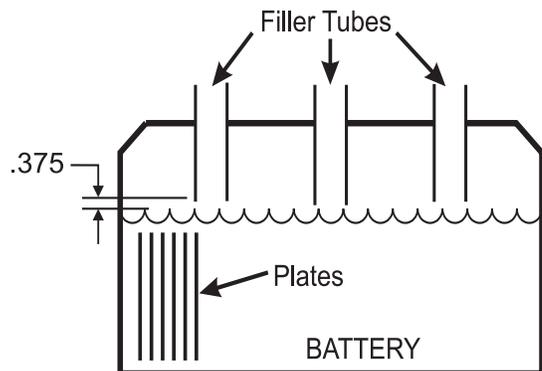
The battery cable to battery terminal connections should be metal to metal. Periodically check the batteries for corrosion. Look for cracks and check the vent plugs. Replace them if they are cracked or missing. Keep the top of the batteries clean. The accumulation of electrolyte and dirt may permit small amounts of current to flow between the terminals, which can drain the battery.



WARNING: Liquid lead acid batteries produce highly explosive hydrogen gas when charging. Keep sparks, flames and other sources of ignition away from batteries. The hydrogen gas may explode resulting in fire, personal injury, property damage or death.



020162F



Battery State of Charge	Spec. Gravity	Voltage
100%	1.265	12.7
75%	1.225	12.4
50%	1.190	12.2
25%	1.155	12.0
Discharged	1.120	11.9 or Less

NOTE: The distilled water level in battery should be 3/8" below the filler tube.

020034

1. Physical Condition:

Active material flakes off the plates and falls to the bottom of the cell. This is normal, but sediment accumulation under the plates can short out a cell. The plate separators fail to insulate positive and negative plates in a cell and the cell becomes shorted, ruining the battery.

2. Insufficient Electrolyte:

This allows exposed portions of the plates to sulfate rapidly. This reduces the battery's ability to accept a charge and the battery capacity is reduced.

Accelerated erosion of the lower portions of the plates occur from higher than normal acid content due to water loss. Only the water evaporates, not the acid. The battery also has a higher internal resistance when low on water. Add only distilled water. Fill each cell to the bottom of the vent well when the battery is warm. Filling a very cold battery with water to the bottom of the vent well will cause overspill when the battery warms up and the plates expand. A Battery Formula For Failure: the battery has a higher internal resistance when low on water, therefore:

high resistance = more heat = shorter battery life!

3. Sulfation:

When a battery remains discharged for too long the accumulated lead sulfate in the plate material solidifies and cannot reenter the electrolyte. When a battery is left in a discharged state the lead sulfate will crystallize. Charging the battery does not move the crystallized lead sulfate off the battery plate. The battery is damaged.

4. Overheating:

The chemical reaction inside of the battery is increased when the battery temperature rises above 125° F. This increases the corrosion of the plates and reduces the battery life. When overheated, the battery plates tend to buckle and destroy the structural integrity of the battery.

5. Freezing:

When the electrolyte freezes, ice formed dislodges the active material from the plates. The battery case may crack and the electrolyte will leak out when thawed. It is especially important to keep a battery at full charge in cold weather to prevent freezing. The high specific gravity of a fully charged battery does not freeze as easily. Never attempt to charge a frozen battery. Warm it up first.

6. Corrosion:

Corrosion from spilled or splashed electrolyte form deposits that can conduct electricity and can cause battery drain. Clean off all corrosion, especially around the battery terminals and on the top of the battery. Prevent accumulation by coating the terminals and the exposed metal cable connectors with high temperature grease.

7. Overcharging:

Overcharging rapidly converts water to gas and decreases the electrolyte's water content as the water evaporates. The electrolyte level drops and becomes more acid in content. This subjects the plates to a higher concentration of sulfuric acid and results in early battery failure.



NOTE: Any time more than one or two ounces of distilled water is added per-cell per-thousand miles, check the motorhome charging system for overcharging. Prolonged overcharging generates excessive heat inside the battery, which buckles the plates and destroys the battery. It is a fact that over 50% of battery failures are caused by overcharging.

Why does the voltage on a discharged battery measure the same as a fully charged battery until the loads are applied? The simple answer to this might go as follows: A battery creates electrical power by converting energy from a chemical reaction into electrical energy. As this reaction slows down the battery voltage will drop. In a lead acid battery the electrolyte conductivity (how well electrical current can flow through it) changes. The same current may be available but the rate of the reaction decreases, causing a voltage drop.

Another way of looking at this is to use the analogy of a water pump (a battery is an electric pump). The pressure in psi (pounds per square inch) that a pump delivers is like a battery's voltage. The volume of water in GPM (gallons per minute) is like the electrical current. Look at a 12 psi pump with no loads (the pump is running but the outflow valve is turned off). The pump will run and the internal pressure of the pump will build up to some point higher than 12 psi. When the valve is opened, and the water is free to flow into the loads, the pressure will drop to the rated output pressure of 12 psi, but only if the load is not too big. If the pump is designed to maintain 12 psi at 15 GPM, and a load demanding 20 GPM is connected, the pump will not be able to keep up and the pressure will get sucked down to a lower psi. If the load is reduced or removed the pump will catch up and return to its rated 12 psi pressure. If the pump has an infinite source of water, such as a lake or the water utility (this is like the grid, no battery), the pump will never run out of pressure. If the pump never runs out of pressure, and is operated at or below its 15 GPM level, it will hold 12 psi. However, a pump that is connected to a water tank with a finite capacity will start to lose the ability to hold pressure as the level of water in the tank drops. Think of siphoning water from a bucket. As the level of the water drops, the volume of water exiting the siphon slows down.

Battery Voltage & Current

When the tank is full it is capable of feeding more “pressure” to the pump inlet due to gravity, and the pump always has enough water available to maintain its rated pressure and volume. However, if the water tank gets low the pump will not have enough water volume coming in to maintain 12 psi at 15 GPM. If the loads are removed from the pump by closing the valve on the outflow, even with low pressure in the tank the pump will eventually pressure up to 12 psi. It will just take it longer to get there. When the valve is opened the pump will sustain 12 psi for a brief period, but since the tank is no longer feeding the pump as fast as needed the pressure will eventually drop. This analogy can be restated by replacing the pump with a battery, pressure with voltage, volume with amps, outflow valve with a switch, water with electricity and the water tank with the battery electrolyte.

The level of the tank could be thought of as the rate of the reaction occurring in the electrolyte. When the battery is fully charged the electrolyte has an excess of reactions taking place to feed the battery terminals. This tapers off with time as the electrolyte is spent, so maintaining voltage becomes possible. With no loads, the discharged electrolyte is capable of producing close to the rated voltage, but only after a period of time has elapsed for enough of a reaction to take place to bring the voltage back up. This explains why a battery measured at rest can indicate close to its rated voltage, but will not run a load.

Battery Charge Time & Consumption Rate

Calculating Run Times:

Calculating run time figures when operating 120 Volt AC electrical items with an inverter can be exponential. This is due to battery characteristics. Flow characteristics of electrons vary with different battery types and chemical compositions. Deep cycle batteries are generally designed to slowly release a majority of their charge capacity. Deep cycle batteries are rated in amp hours (Ahrs) with the discharge occurring over an extended period of time before the battery is charged. Engine starting batteries are designed to quickly release large amounts of current for 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 10 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.

Calculating applied loads to an inverter to approximate run time from the battery amp hours available is not an equal trade up when voltage is inverted and amperage is calculated. When the inverter is used to operate an AC load it uses approximately ten times the DC current needed from the battery when inverting 12 Volts to operate the 120 Volt item. There is also a small efficiency loss of about 10% when inverting. For example: When using the inverter to operate an AC electrical item, which has a current draw rating of 2 Amps, the inverter will use over 20 Amps DC power from the batteries.

Determining Current Consumption:

First determine the amount of current used by an AC item. **For example:** The television is rated at 200 watts at 120 Volts. Calculate watts to amps. Divide 200 watts by the operating voltage of 120, this equals 1.6 Amps. Multiply 1.6 Amps AC current by a factor of ten the inverter will use, this equals 16 Amps DC battery current. Add the revised 10% efficiency loss figure, this calculates to a total of 17.6 Amps DC.

If the battery bank capacity is rated at 500 Ahrs., actual elapsed time to the suggested 50% state of charge would net viewing time for the television at approximately 13 hours in ideal conditions.

The run time figure will vary greatly with the actual state of charge of the battery bank when the discharge process begins. Ambient temperature, combined with other working loads, such as lights and parasitic loads applied to batteries, affect run times. Calculating the exact run time is not precise due to all the variables and equations involved; however, an approximate time figure can be obtained. Proper battery maintenance and charge cycles affect battery performance. Observe the battery condition with hydrometer and voltage readings. Use only distilled water when filling batteries. To achieve the highest quality of battery performance and longevity keep batteries in their proper operating range.

BATTERY SPECIFICATIONS - HOUSE

Application	Ah (20hr)	CCA†	RC (25A @ 80° F)
12 Volt Chassis (Workhorse) Catalog # 1812 - AC Delco		690	130
12 Volt Chassis (Ford) BXT-05-750 - Motorcraft		750	130
6 Volt Domestic** U2200 (2 each)	225		75Amp@ 80° F. = 230 Min.

*Batteries connected in parallel. **Battery connections are made in Series. †CCA Ratings are at 0° F. These are the minimum requirements.

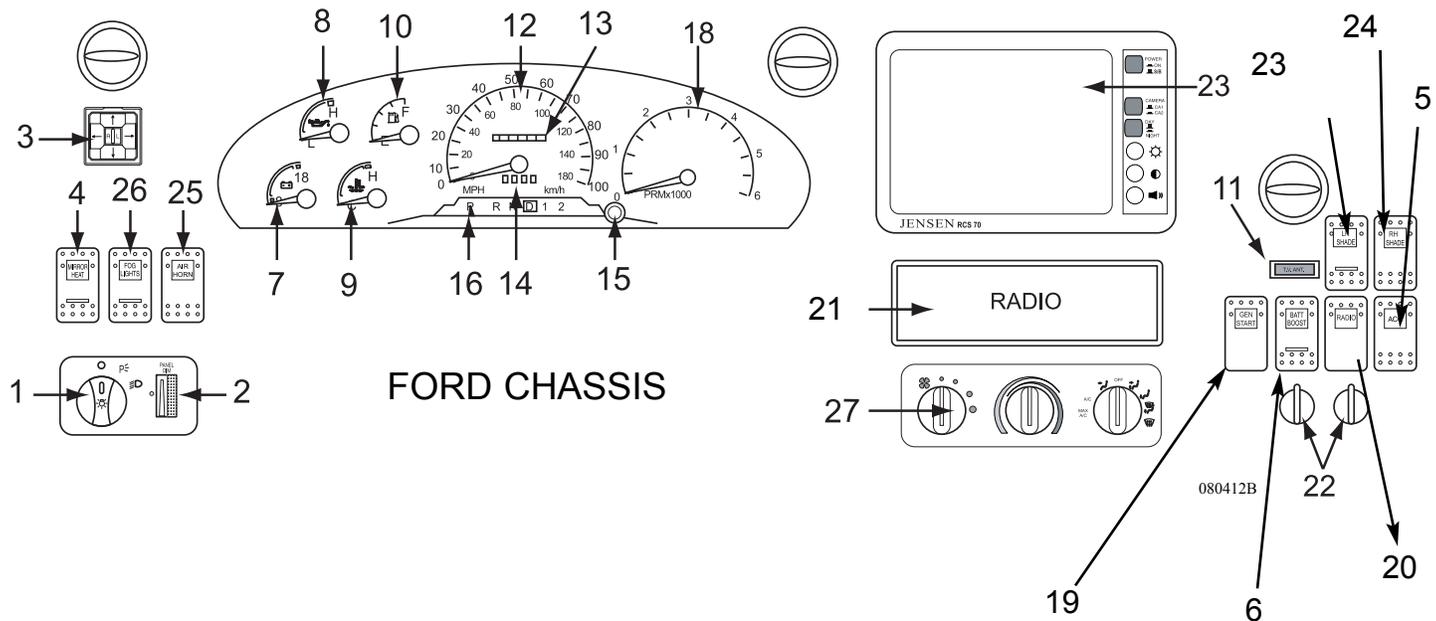
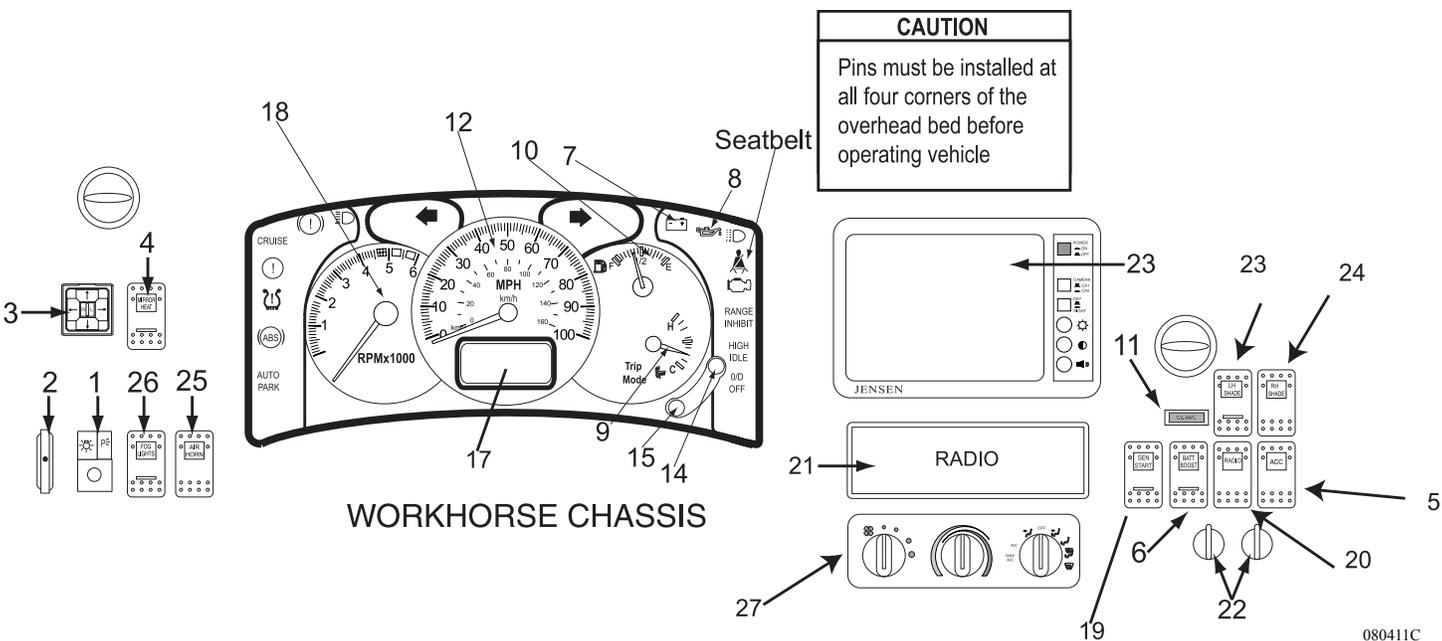
Approximate Hours at Ampere Load*					
	5 AMPS	10 AMPS	15 AMPS	20 AMPS	25 AMPS
U2200 (2 each)	55	22	12.5	9.1	7

* Loads conducted @ 80° F. with battery fully charged to 1260 per cell specific gravity. Voltage to maintain 1.75 Volts per cell (10.5 Volts for 12 Volt battery).

Battery State of Charge vs. Voltage / Specific Gravity			
Voltage	Specific Gravity	State of Charge	Depth of Charge
12.66	1.265	100%	0%
12.45	1.225	75%	25%
12.25	1.190	50%	50%
12.05	1.145	25%	75%
11.90	1.100	0%	100%

Voltage Reading: Battery fully charged at rest for one hour.

DASH PANEL



-
-
1. **Headlight Switch:** Turns the headlights on and off.
 2. **Panel Light Switch:** Dims the dash panel backlighting.
 3. **Mirror Control:** Adjusts the upper mirror of the rearview mirror. The small selector in the middle of the switch must be placed in the desired side. The middle position is to prevent accidental bumping of the switch and changing the mirror position.

Mirror Care and Cleaning:

After you complete washing the motorhome, clean the outside mirrors with a good quality glass cleaner. **DO NOT** use anything abrasive on the mirror and the outside chrome of the mirror.

4. **Mirr Heat:** Turns on the heaters in outside rear view mirrors. The mirror heaters should be used when defogging or deicing is needed. Mirror heat should not be left in the ON position unless continuous fogging conditions occur. The outside mirrors have been placed so they can be easily adjusted with an Allen wrench. After taking delivery of the new motorhome it will be necessary to sit in the driver's seat and have the mirrors adjusted for accurate visibility. Make sure you can see out of both the driver and the passenger side mirrors before heading out on the road.
5. **Accessory Switch:** The Accessory switch is prewired with a hot wire and ground wire for additional accessories which may be added in the future.
6. **Battery Boost:** The Battery Boost switch is used in the event the motorhome chassis battery has been drained or is at a low charge level where the engine cannot start. This switch momentarily "jumps" the house battery to the motorhome domestic battery to assist in starting the engine. The boost switch used in conjunction with engine starting procedures should not be held for more than 30 seconds. This time period is long enough to prevent the boost solenoid from overheating.
7. **Battery Indicator:** Indicates a fault in the charging system.
8. **Oil Pressure Gauge:** Registers oil pressure of engine. An engine temperature reading in midrange area is considered average.
9. **Engine Temperature Indicator:** Indicates oil pressure, not amount in system and registers oil pressure of engine. As oil temperature rises, oil pressure lowers, even with multiviscosity oil.
10. **Fuel:** Fuel gauge will register approximate fuel level in tank when ignition switch is in run position.



NOTE: Fuel mileage varies with driving style and road conditions. Always average more than one tankful to obtain a more accurate figure. The Generator will use fuel from main tank and will affect fuel mileage figures. The Generator will not operate below 1/4 tank to insure there is enough fuel to run main engine.

- 11. Antenna Up Warning Light:** This light illuminates when TV antenna is in raised position with ignition switch ON. Do not move motorhome until the antenna is lowered.
- 12. Speedometer:** Indicates the speed of the motorhome. The gauge indicates MPH and KPH. Located on center of the instrument cluster.
- 13. Odometer:** The odometer indicates the actual mileage of the motorhome.
- 14. Trip button:** The trip meter will display the current mileage of the trip since the last reset.
- 15. Mode Button:** Used to scroll through different mode items for desired selection.
- 16. On The Column Shift Selector:** The indicator shows the position on the transmission.

Workhorse	Ford
P - Park.	P - Park.
R - Reverse.	R - Reverse.
N - Neutral.	N - Neutral.
D - Drive.	D - Drive.
3 - Lower Drive.	2 - Lower Drive.
2 - Lower Drive.	1 - Lower Drive.
1 - Lower Drive.	

- 17. Liquid Crystal Display (LCD):** Displays odometers, trip meter, battery, voltage, oil pressure and other readings.
- 18. Tachometer:** Displays engine speed in revolutions per minute (RPM).
- 19. Gen ON/OFF:** Starts and stops generator from the dash area.
- 20. Radio power switch:** Turns radio on and off independent of main switch on radio.
- 21. Radio:** Complete instructions for operation of radio are in your Owner's Information Packet.

- 22. **12 Volt Power Supply:** Can be used as a power source for cellular phone.
- 23. **Rear View Camera Monitor:** Used with the backup camera and will display the rear view of the motorhome.
- 23. **Driver Shade:** Operates the power sun visor located on driver side.
- 24. **Pass Shade:** Operates the power sun visor located on passenger side.
- 25. **Air Horn:** Energizes the circuitry needed for the air horns. This should only be used on the highway and open areas.
- 26. **Fog Light:** Turn fog lights ON and OFF for better visibility. The fog lights will operate with the Low Beam of the headlights.
- 27. **A/C Controls:** Dash / AC and Heater Controls

AIR CONDITIONER & HEATER CONTROLS

The system is designed to only 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:

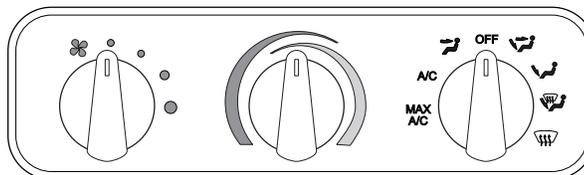
This switch controls the four speeds of the blower motor. Use of the blower is one of the most effective methods of controlling temperature. The blower will not activate if the Mode Control Switch is set to OFF.

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.



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**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 louvers.



OFF

OFF - The blower motor does not operate. The fresh air inlet door will close, minimizing outside air infiltration into the motorhome.



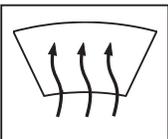
BI-LEVEL - Fresh air is drawn in and discharged through the dash and the floor louvers.



FLOOR - Fresh air is drawn in and discharged through the floor louvers. A small amount of air discharges through the defrost vents.



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 compressor operates to dehumidify the discharged air.

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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:

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.

- 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.
- Using a lower blower speed will 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.
- The dash A/C and heater system should be used monthly to keep the compressor lubricated.

Trouble Shooting:

The dash A/C/Heat system uses a combination of compressed air (developed by the chassis system), vacuum air (developed by the vacuum generator) and electric relays and vacuum switches. Therefore, any repair can be classified in one of five categories:

- **Electrical**
- **Vacuum**
- **Air Conditioner**
- **Heater**
- **Defroster**

The following information is provided to assist in troubleshooting common operational problems which may occur.

No Heating:

1. A/C switch is turned off.
2. Blower switch is turned off.
3. Verify the proper engine coolant level.
4. Verify that the engine is reaching operating temperature.
5. Verify engine coolant is reaching water valve attached to unit.
6. Verify operation of water valve to permit engine coolant to pass through valve to heater core.
7. Check unit fuses.
8. Check power supply to water valve and grounding.
9. Check wiring.
10. Engine thermostat faulty.

No Cooling:

1. Check blower is operating, A/C switch is in **A/C** or **Max** position, temperature control is turned to Max cooling (blue area).
2. System fuses are not blown.
3. Condenser fan is operating.
4. Check power supply to unit and grounding of system.
5. Check wiring.
6. Coolant valve is leaking.
7. Drive belt is loose or broken.
8. Compressor Clutch is inoperative, will not engage.
9. Expansion Valve is faulty or frozen.
10. Thermostat control is faulty.
11. Mode control switch is faulty.
12. Compressor is faulty.
13. Loss of refrigerant.

Reduced Cooling:

1. Coolant valve not operating correctly.
2. Air passages are obstructed.
3. Loose or worn drive belt.
4. Check blower and select switch.
5. Thermostat control valve is faulty.
6. Expansion valve is faulty.
7. Compressor is faulty.
8. Low refrigerant charge.

Blower Does Not Operate or Runs Slow:

1. Check fuses.
2. Check for loose or corroded connection.
3. Check wiring.
4. Check to ensure ignition switch is “ON.”
5. Check blower and select switch.
6. Motor shaft has seized.
7. Blower wheel is out of alignment.

Damper Doors Do Not Operate:

1. Does the motorhome air tank have pressure?
2. Is the vacuum generator being powered and producing a vacuum?
3. Check the vacuum line entering the unit for vacuum.
4. Check that the vacuum solenoid mounted on unit is receiving power from the mode switch. If operating properly, the vacuum solenoid will feel hot if current is engaging the solenoid.
5. Check the mode switch.
6. Check wiring.
7. Check for a pinch in the vacuum line leading to the vacuum motor that operates the damper door in question.

Air Conditioner Refrigeration Components:

Compressor - The compressor is belt driven from the engine through the compressor and electronic clutch pulley. The compressor will pump freon from a low pressure gas into a high pressure, high temperature gas. This is the start of the refrigeration process.

Condenser - The condenser in front of the radiator is made of coils and fins which provide rapid transfer of heat from the refrigerant as external air passes over the coils. The high pressure gas is changed to a high pressure liquid.

Condenser Fan - A steady flow of cooling air is maintained across the condenser during system operations. The fan is part of the hydraulic system.

Receiver-Drier - Freon leaves the condenser, enters the dehydrator and is stored until needed. The drier filters out moisture in the system. It only takes one drop of moisture to cause a malfunction in the cooling unit.

Expansion Valve - The expansion valve suppresses the refrigerant into the evaporator according to the cooling requirements. The pressure is reduced in the restrictive effort of the expansion valve. A part of the valve is the capillary tube assembly. The capillary tube is the sensing bulb at the outlet of the evaporator.

Evaporator - A tube core and fins are used in the evaporator similar to the condenser. Air is blown through the fins to allow the evaporator to cool and reduce the pressure.

Blower and Motor - Just as the condenser has a fan, the evaporator has a fan called the blower. The blower will draw air from the cab area and force the air over the evaporator coils and fins. This forced air will ensure continuous vaporizing of the R134a.

Relays and Switches - Both electronic and vacuum switches are used in the control and operations of the system.

About Refrigerants

Chemical Stability:

The air conditioning system life and efficient operations depends upon the chemical stability of the refrigeration system. The refrigeration system is made of Refrigerant-R134a and Polyakylene Glycol (PAG) synthetic lubricant. It is very important that all materials contained within the refrigerant system be chemically compatible.

The only suitable compound for use with R134a is PAG. The total amount of PAG within the refrigerant system is approximately 18% of the total refrigerant in the system.

How much refrigerant is in the system? How much should be used when charging? You will need 1 oz. of PAG for each 7 feet of hose after the first 15 feet of hose. Roughly, a 40 foot motorhome will use 92 feet of refrigerant hose. Take 15 feet off the measurement and the result would be 77 feet. This 77 feet is then divided by 7 for total of 11. This represents the number of ounces of PAG oil needed for the A/C system (11 oz.).

Carrying the formula one step further, the 11 oz. equal approximately 18% of the entire system. The total will equate to approximately 61 oz. or 3.8 lbs. of R134a.

High pressure readings are another way to determine the amount of charge. The ambient temperature reading is measured one inch away from the condenser. The ambient temperature reading, plus 40° F, will equate to a value from the pressure table.

EXAMPLE:

90° F. 1 inch from condenser + 40° F = 130° F ----- 198.90 PSIG -

On fully charged system the expected pressure that should be seen on the HIGH-SIDE gauge will be around 200 PSIG.

TEMPERATURE	PSI GAUGE	TEMPERATURE	PSI GAUGE	TEMPERATURE	PSI GAUGE
16° F	15.69	60° F	57.47	112° F	151.30
18° F	17.04	65° F	64.10	114° F	156.10
20° F	18.43	70° F	71.19	116° F	161.10
22° F	19.73	75° F	78.75	118° F	166.10
24° F	21.35	80° F	86.80	120° F	171.30
26° F	22.88	85° F	95.40	122° F	176.60
28° F	24.47	90° F	104.40	124° F	182.00
30° F	26.10	91° F	106.30	126° F	187.50
32° F	27.79	92° F	108.20	128° F	193.10
34° F	29.52	93° F	110.20	130° F	198.90
36° F	31.32	94° F	112.10	135° F	213.70
38° F	33.17	95° F	114.10	140° F	229.40
40° F	35.07	100° F	124.30	145° F	245.80
42° F	37.03	102° F	128.50	150° F	263.00
44° F	39.05	104° F	132.90	155° F	281.00
45° F	40.09	106° F	137.30	160° F	300.10
50° F	45.48	108° F	141.90	165° F	320.00
55° F	51.27	110° F	146.50	170° F	340.80

psi_gauge_temp.eps

R-134a Refrigerant:

R-134a is classified non-explosive, non-flammable and non-corrosive.

There is hardly any odor and it is much heavier than air. R134a is ozone friendly; however, it is not technician friendly. Proper care in handling and adequate ventilation must be observed. Under normal atmospheric pressures and temperatures R134a will evaporate so quickly it will freeze anything it comes in contact with. The open container boiling point for R134a is minus 21.7° F. This low boiling point makes for an ideal refrigerant. The tremendous amount heat transfer which occurs when a liquid boils, or vapors condense, forms the basic principles of all A/C systems. The amount of heat required to raise or lower the temperature of one pound of water by 1° F equals one British Thermal Unit (BTU). The BTU is the standard measurement of an air conditioner system.

Safety and Handling of 134A and Pag Oil:

- When working with any refrigerant system wear eye protection and hand protection.
- Pag Oil irritates the skin. Flush with water immediately if in contact with any body part.
- Ensure any service work performed on the A/C system is in a well ventilated work area.
- Keep open flame away from service area. The discharge of a refrigerant gas near an open flame can produce a very poisonous gas.



NOTE: O-rings used in a 134A system are Hydrogenated Nitrile Butadiene Rubber (HNBR). These are green in color and required for the 134A system.

A/C Heater:

The A/C system will also produce heat to warm the air in the dash area. Much like the refrigeration side of the system, a liquid will be used in the process. This liquid is the engine coolant. The 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. The heater core is tubing and fins. 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. When the temperature control is in the **WARM** position coolant flows through the heater core. When the temperature is in the **COOL** position coolant flow bypasses the heater core. In either position the air flow is felt at the discharge vents.

Diagnosis of Electric Water Valve:

Theory of Operation: The thermostat is a potentiometer. The water valve, which controls the water flow to the heater core, is opened and closed by a stepper motor mounted on the water valve. A control module compares the output voltage from the potentiometer to the feedback for the stepper motor of the water valve. The control module then drives the motor to within one-half volt of the control potentiometer voltage.

Functional Test:

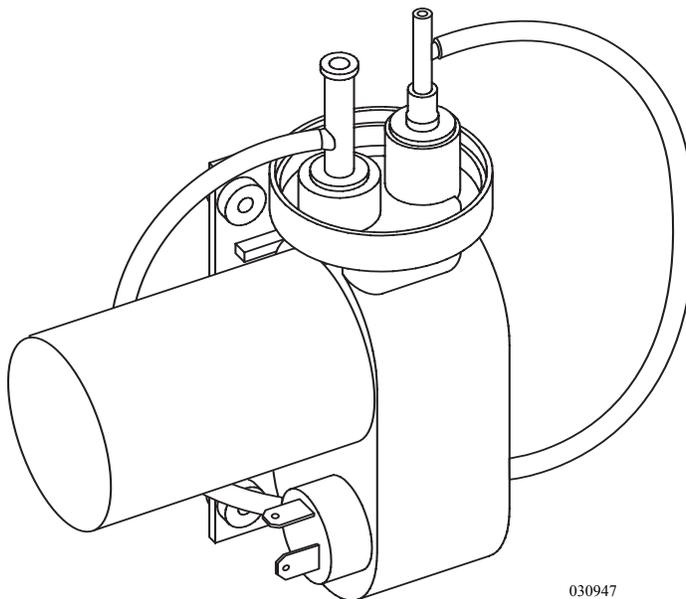
- Start and operate the engine until the water reaches normal operating temperature.
- Set the HVAC temperature control to the full hot position.
- The discharge air outlets should have hot air.
- Rotate the temperature control to full cold position.
- Allow 10 minutes for the temperature to stabilize.
- The discharge air outlets should have cold air.

No Heat:

- Check the blower and air mode operations. Repair prior to proceeding.
- Verify the engine is reaching normal operating temperature. (Check with engine manufacturer for proper procedure.)
- Check the inlet hose at the water valve. The hose has hot water at the valve inlet. The inlet water temperature should be the same as the engine water temp.
- With the temp control on full hot position, check the outlet hose of the water valve. The hose should be at engine water temperature.

Vacuum Generator:

The vacuum generator is important to the operation of the dash heating and A/C systems. This provides the vacuum to open and close the vacuum switches. When the vacuum generator is operating it creates 15 inches of vacuum and is passed to a reservoir ball. Most dash heater and A/C systems will only require 10 inches of vacuum to operate the switches. The output from the reservoir is sent to the vent control knob. The control knob will then direct the vacuum operation to the appropriate vacuum switch to open or close vents and switches. The vacuum generator uses the air from the front air storage tank through a 1/4 inch red air line. Whenever the ignition is ON, and the A/C is operating, the vacuum generator will operate.



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LIGHTS - *Interior Halogen*

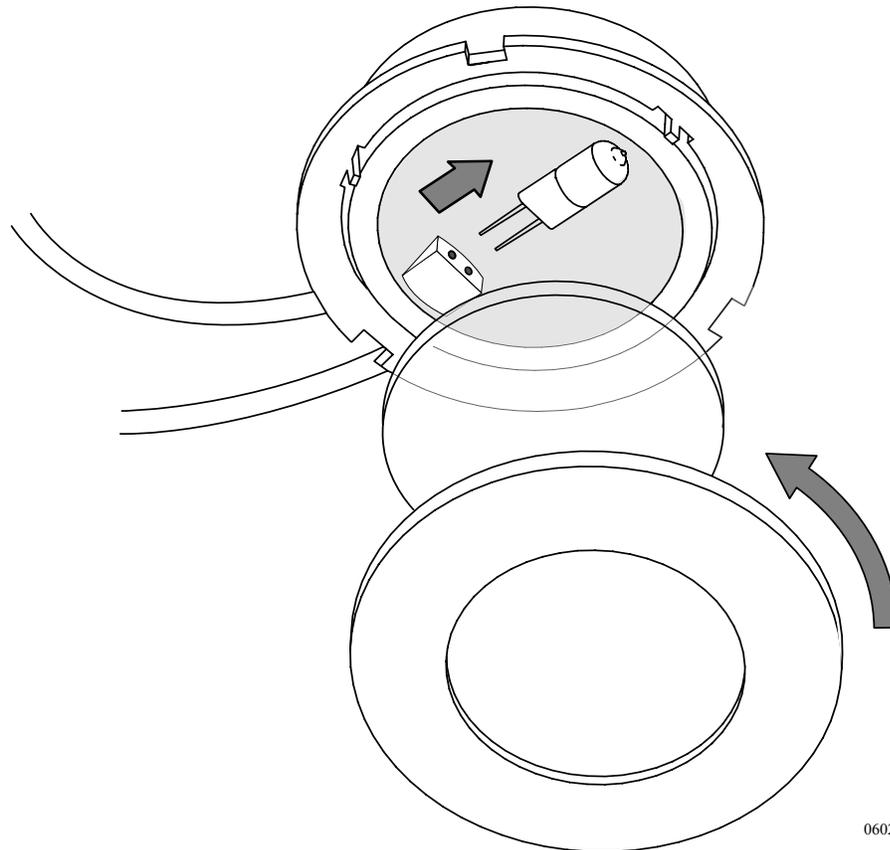
The bulbs inside the halogen lighting are replaceable.

To Replace a Bulb:

1. Remove outer trim ring by rotating outer trim ring counter-clockwise.
2. Remove safety lens by pressing lens towards a retaining tab. Pull lens down and away.
3. Carefully grasp bulb and pull bulb from 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. If the bulb is touched, clean cooled bulb with alcohol.



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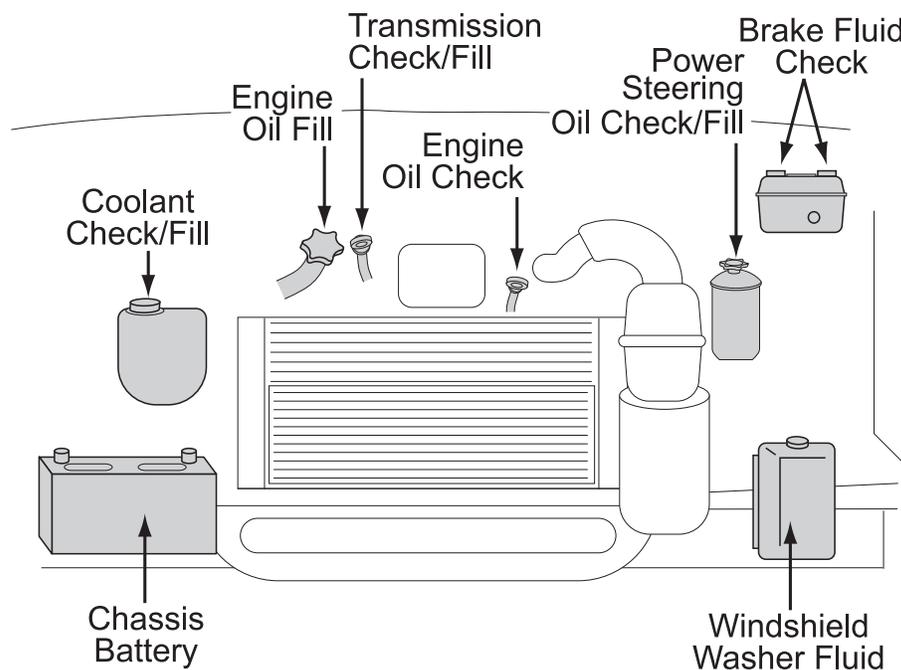


MONARCH SE 2004

UNDER HOOD

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Windshield Washer Reservoir - Fill with windshield washer fluid, not water.

Engine Oil Filler Cap - SAE 5W-20 with API certification recommended for all temperatures.

Automatic Transmission Fluid Dipstick - Check with engine on and at normal temperature; fluid should be within crosshatched area on dipstick, use MOTORCRAFT MERCON® Automatic Transmission Fluid.

Engine Oil Dipstick - Check with engine off and at normal temperatures; oil should be within crosshatched area on dipstick; do not fill above MAX mark.

Engine Coolant Reservoir - Level with COLD FILL RANGE when cold; use 50% Ford Premium/Engine Coolant or equivalent and 50% water.



NOTE: Do not mix different colors of antifreeze.



WARNING: Remove coolant cap only when safe and engine is cool. Use only recommended engine coolant, see Owners Guide for more information.



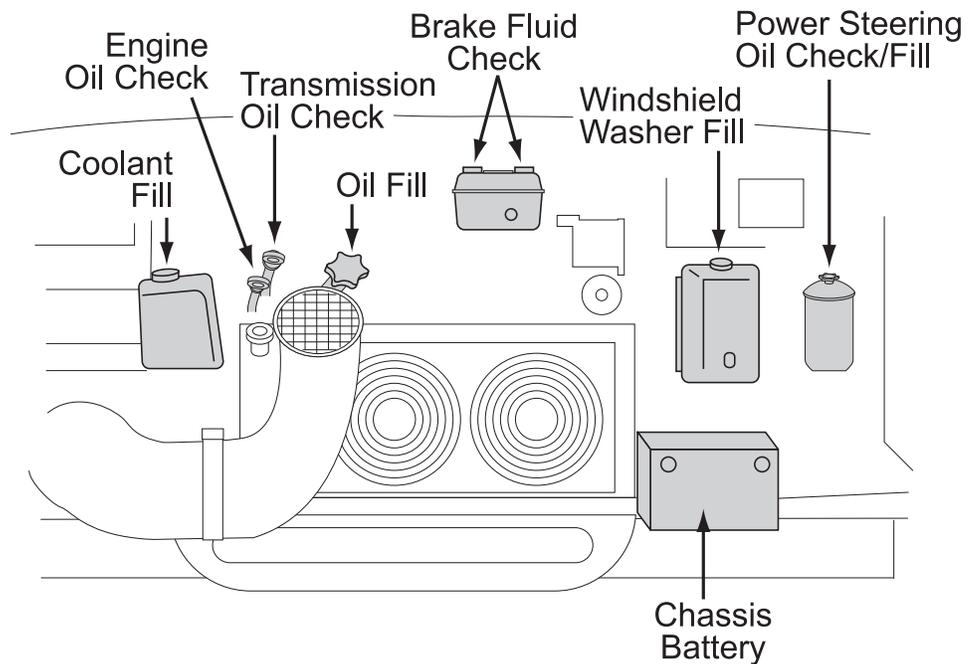
NOTE: If the coolant system runs dry, the Fail Safe Cooling System will shut down half of the cylinders (alternating) and the Service Engine Soon warning light (See Instrument Panel) illuminates. If the temperature rises too high, engine automatically shuts off to help prevent further damage; service cooling system as soon as possible. Cooling fan clutch will increase engine noise when engaged. This is normal.

Brake Fluid Reservoir - Clean filler cap before removing. Check the chassis manufacturer owner's manual for correct fluid type, either DOT 3 or DOT 4, or check the brake fluid reservoir for information stamped in the cap. Use only new fluid from a sealed container.



NOTE: Use only the recommended fluid as specified by the OEM (Original Equipment Manufacturer) manual.

Workhorse Chassis



Power Steering Fluid - Check with engine OFF and cold; fluid level on dipstick should be between arrows in FULL/COLD range.

Battery - See ELECTRICAL SYSTEMS.

Windshield Washer Reservoir - Fill with windshield washer fluid, not water.

Engine Oil Filter Cap - SAE 5W-30 with API certification recommended for all temperatures.

Automatic Transmission Fluid Dipstick - Check with engine on and at normal temperature; fluid should be within crosshatched area on dipstick, use DEXRON® - III Automatic Transmission Fluid.

Engine Oil Dipstick - Check with engine off and at normal temperatures; oil should be within crosshatched area on dipstick; do not fill above MAX mark.

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 antifreeze colors.



WARNING: Remove coolant cap only when safe and engine is cool. Use only recommended engine coolant, see Owners Guide for more information.



NOTE: Use only the recommended fluid as specified by the OEM (Original Equipment Manufacturer) manual.



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.

Brake Fluid Reservoir - Clean filter 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.

Battery - See ELECTRICAL SYSTEMS

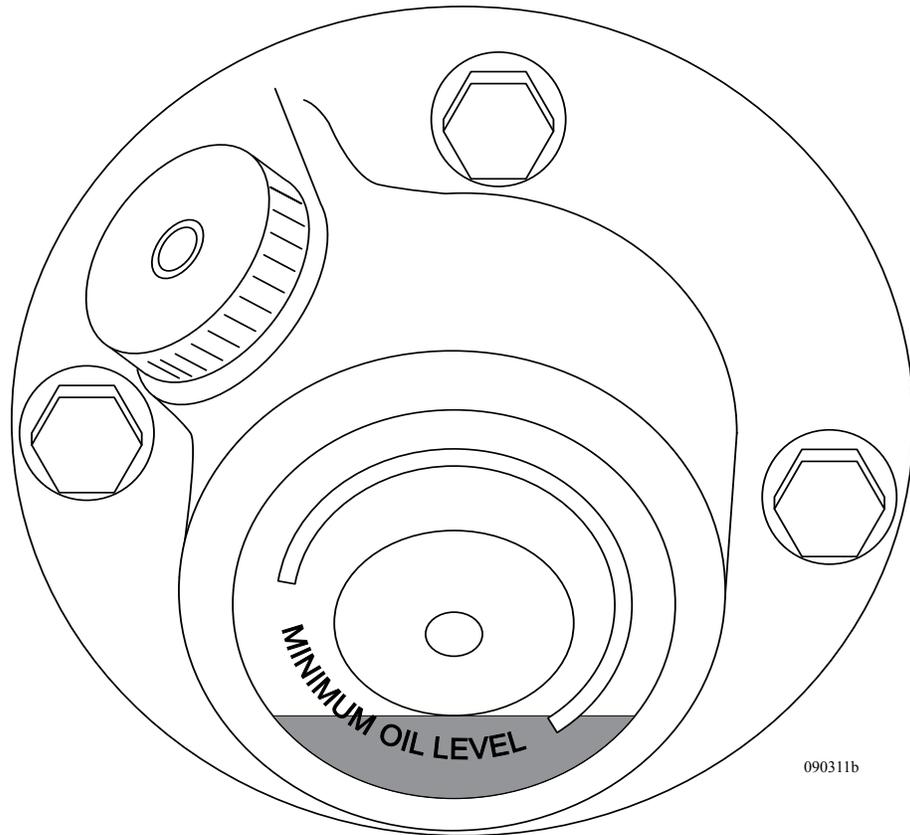
**FRONT AXLE -
WORKHORSE
Oil Filled Bearings**

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:

- 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. For more information, contact a Westport service representative.



Recommended Interval Change:

- 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:

- Standard 90 wt. API GL-5. Lubricant temperature must never exceed 250°F (+121°C).

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.

FORD	
6.8L V10 ENGINE	
Air Filter	FA-1634
Fuel Filter	FG986B
Oil Filter	FL-820-S
Spark Plugs	AWSF22E
Radiator Cap	1W13-8101AA
Battery	BXT-65-750

WORKHORSE	
8.1L V8 AS FUEL INJECTION	
Air Filter	A1236C
Fuel Filter	GF481
Oil Filter	PF454
PCV Valve	EV-233
Spark Plugs	TJ14R-P15
Radiator Cap	RC33
Battery	AC DELCO 1812

COMMON PARTS

TIRE CHARTS

Use the tire chart to locate the recommended air pressure for the weight carried by each tire. A quality truck tire gauge with an angle dual head is recommended. Adjust the tire pressure accordingly.

Michelin

235/80R22.5 G (2) XRV

PSI		70	75	80	85	90	95
lbs per position	S	--	3593	3815	4035	4278	4543
	D	--	3395	3594	3814	4035	4278
kg. per position	S	--	1629	1730	1830	1940	2060
	D	--	1540	1630	1730	1830	1940

1 Kilogram = 2.2 lbs.

245/70R19.5 LRF - XRV

PSI		70	75	80	85	90	95
lbs per position	S	3440	3540	3640	3740	3890	4080
	D	6430	6630	6830	7030	7310	7720
kg. per position	S	1560	1605	1651	1697	1764	1850
	D	2916	3007	3098	3189	3316	3500

Goodyear

TIRE SIZE	MAX Speed Rating (MPH)	Dual (D) Single (S)	Inflation Pressure PSI							
			65	70	75	80	85	90	95	100
245/70R19.5	75	D S								
				3415 3640	3515 3740	3655 3890	3875(F) 4080 (F)	3940 4190	4075 4335	4375 (G) 4545 (G)

SPECIFICATIONS CHARTS

Weights Ford	30PDD	32PBD	34SBD	34PBD	34PDT	36PED	36WDD	36DBD	37PCD	37PCT
Gross Vehicle Weight Rating	20,500	20,500	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000
Gross Combined Weight Rating	25,500	25,500	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000
Front Gross Axle Weight Rating	7,000	7,000	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Rear Gross Axle Weight Rating	13,500	13,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500

Weights Workhorse	30PDD	32PBD	34SBD	34PBD	34PDT	36PED	36WDD	36DBD	37PCD	37PCT
Gross Vehicle Weight Rating	18,000	20,700	22,000	22,000	22,000	22,000	22,000	22,000	22,000	N/A
Gross Combined Weight Rating	22,000	25,700	26,000	26,000	26,000	26,000	26,000	26,000	26,000	N/A
Front Gross Axle Weight Rating	6,000	7,500	8,000	8,000	8,000	8,000	8,000	8,000	8,000	N/A
Rear Gross Axle Weight Rating	12,000	13,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500	N/A

Measurements	30PDD	32PBD	34SBD	34PBD	34PDT	36PED	36WDD	36DBD	37PCD	37PCT
Wheelbase	190"	208"	228"	228"	228"	238"	238"	238"	242"	242"
Overall Length	30' 8"	32' 7"	34' 10"	34' 10"	36' 6"	36' 6"	36' 6"	36' 6"	37' 0"	37' 0"
Overall Height, Including A/C, Ford	11' 8"	11' 8"	11' 8"	11' 8"	11' 9"	11' 8"	11' 8"	11' 8"	11' 9"	11' 9"
Overall Height, Including A/C, Workhorse	11' 8"	11' 8"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"	12' 0"
Interior Height (Under Electr-Maj)	6' 6"	6' 6"	6' 6"	6' 6"	6' 6"	6' 6"	6' 6"	6' 6"	6' 6"	6' 6"
Interior Width	94 1/2"	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"
Exterior Width	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"

Tank Capacities	30PDD	32PBD	34SBD	34PBD	34PDT	36PED	36WDD	36DBD	37PCD	37PCT
Water Heater	10 gal									
Grey Tank	42 gal	42 gal	40 gal	42 gal	42 gal	54 gal	54 gal	42/39 gal	45 gal	45 gal
Black Tank	42 gal	45 gal	45 gal	42/39 gal	54 gal	54 gal				
Fresh Tank	**T 45	WH 60	60 gal	55 gal	60 gal					
LP Tank	24 Gal									

* Capacities in Gallons

**F=Ford WH=WorkHorse



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.



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 based upon fabrication and installation of the tanks.

**ENGINE
SPECIFICATIONS**

FORD	
Engine Type	Ford V10 Gas Fuel Injection
Engine Size	6.8L V10
Cubic Inch Displacement	415
Tire Size	245/70RX19.5F
Fuel Tank (Approx 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	225/70R/19.5F or 245/70RX19.5F
Fuel Tank (Approx Gal)	60/75
Alternator (Amp)	145
Rear Axle Ratio	4.63:1/4.88:1

METRIC/U.S. CONVERSION CHART

U.S. Customary to Metric			Metric to U.S. Customary			
Measurement	Multiplied By	Equals/Measurement	Multiplied By	Equals		
<u>Length</u>						
inches (in)	25.4	millimeters (mm)	0.03937	inches (in)		
inches (in)	2.54	centimeters (cm)	0.3937	inches (in)		
feet (ft)	0.3048	meters (m)	3.281	feet (ft)		
yards (yd)	0.9144	meters (m)	1.094	yards (yd)		
miles (mi)	1.609	kilometers (km)	0.6215	miles (mi)		
<u>Area</u>						
square inches (in ²)	645.16	square millimeters (mm ²)	0.00155	square inches (in ²)		
square inches (in ²)	6.452	square centimeters (cm ²)	0.15	square inches (in ²)		
square feet (ft ²)	0.0929	square meters (m ²)	10.764	square feet (ft ²)		
<u>Volume</u>						
cubic inches (in ³)	16387.0	cubic millimeters (mm ³)	0.000061	cubic inches (in ³)		
cubic inches (in ³)	16.387	cubic centimeters (cm ³)	0.06102	cubic inches (in ³)		
cubic inches (in ³)	0.01639	liters (L)	61.024	cubic inches (in ³)		
fluid ounces (fl oz)	29.54	milliliters (mL)	0.03381	fluid ounces (fl oz)		
pints (pt)	0.47318	liters (L)	2.1134	pints (pt)		
quarts (qt)	0.94635	liters (L)	1.0567	quarts (qt)		
gallons (gal)	3.7854	liters (L)	0.2642	gallons (gal)		
cubic feet (ft ³)	28.317	liters (L)	0.03531	cubic feet (ft ³)		
cubic feet (ft ³)	0.02832	cubic meters (m ³)	35.315	cubic feet (ft ³)		
<u>Weight/Force</u>						
ounces (av) (oz)	28.35	grams (g)	0.03527	ounces (av) (oz)		
pounds (av) (lb)	0.454	kilograms (kg)	2.205	pounds (av) (lb)		
U.S. tons (t)	907.18	kilograms (kg)	0.001102	U.S. tons (t)		
U.S. tons (t)	0.90718	metric tons (t)	1.1023	U.S. tons (t)		
<u>Torque/Work Force</u>						
inch-pounds (lbf.in)	11.298	Newton-centimeters (N.cm)	0.08851	inch-pounds (lbf.in)		
foot-pounds (lbf.ft)	1.3558	Newton-meters (N.m)	0.7376	foot-pounds (lbf.ft)		
<u>Pressure/Vacuum</u>						
inches of mercury (inHg)	3.37685	kiloPascals (kPa)	0.29613	inches of mercury (inHg)		
pounds per square inch (psi)	6.895	kiloPascals (kPa)	0.14503	pounds per square inch (psi)		
Measurement	Subtract	Divide By	Equals/Measurement	Multiply By	Add	Equals
<u>Temperature</u>						
degrees Fahrenheit (°F)	32	1.8	degrees Celsius (°C)	1.8	32	degrees Fahrenheit (°F)

metric convr chart w caps.eps

MAINTENANCE RECORD

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												
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