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<b>LIMITED WARRANTY •</b>	<b>1</b>
<b>LIMITED WARRANTY - ROADMASTER CHASSIS •</b>	<b>5</b>
<b>WARRANTY INFORMATION FILE •</b>	<b>8</b>

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**MONACO COACH CORPORATION®  
MOTORHOME LIMITED WARRANTY**

**LIMITED  
WARRANTY  
- 2002 Diplomat**

**What the Period of Coverage Is:**

If you use your Monaco motorhome only for recreational travel and family camping purposes, the Limited Warranty provided by Monaco Coach Corporation® ("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 comes 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 purchase date or the first 24,000 miles of use, whichever comes 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 Consumer Affairs 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.** 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.

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***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.

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***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.

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 two 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, you must, to the extent permitted by law, notify Warrantor directly in writing of the failure to successfully repair the defect so that Warrantor can become directly involved in performing a successful repair to the identified defect.

## ***How to Get Service***

The Warranty Registration form must be returned to Warrantor promptly upon purchase to assure proper part replacement or repair and to activate your Limited Warranty. For warranty service simply contact one of Warrantor's authorized service centers for an appointment, then deliver your motorhome (at your expense) to the service center. If you need assistance in locating an authorized warranty service facility, contact Warrantor's Warranty Department (1-877-466-6226). The mailing address is:

**Monaco Coach Corporation  
Attention: Warranty Department  
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.

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## ***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, and odometer tampering shall discharge Warrantor from any express or implied warranty obligation to repair any resulting defect.

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***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.

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***Legal Remedies***

**ANY ACTION TO ENFORCE THIS EXPRESS OR ANY IMPLIED WARRANTY SHALL NOT BE COMMENCED MORE THAN ONE (1) YEAR AFTER THE EXPIRATION OF THIS WARRANTY.** Some states do not allow the reduction in the statute of limitations, so the above reduction may not apply to you.

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

**MONACO COACH CORPORATION  
91320 COBURG INDUSTRIAL WAY  
COBURG, OREGON 97408**

### **What the Period of Coverage is:**

If you use the Roadmaster Chassis that your motorhome is mounted upon for only recreational travel and family camping purposes, the Limited Warranty provided by Roadmaster ("Warrantor") covers your Roadmaster Chassis for twenty-four (24) months from the original retail purchase date or the first 24,000 miles of use, whichever occurs first.

If you use the Roadmaster Chassis that your motorhome is mounted upon for any rental, commercial or business purposes whatsoever, the Limited Warranty provided by Warrantor covers your new Roadmaster Chassis for Ninety (90) days from the original retail purchase date of the motorhome or the first 24,000 miles of use, whichever occurs first. A conclusive presumption that the Roadmaster Chassis 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.

## **LIMITED WARRANTY - ROADMASTER CHASSIS**

**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 ROADMASTER CHASSIS COVERED BY THIS LIMITED WARRANTY.** 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. Any dealer selling a motorhome assembled upon a Roadmaster Chassis 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.

### ***Limitations of Implied Warranties***

Warrantor's Limited Warranty covers defects in the manufacture of the Roadmaster Chassis (as defined herein) and defects in materials used to manufacture the Roadmaster Chassis. The term "Roadmaster Chassis" as used herein means only the frame; frame cross members; steering axle, including the axle king pins and bushings; hubs and bearings; brake calipers; rotors, brake backing plates and related parts of the axle; tie rods; drag links; drive shafts, including the U-joints; carrier bearings; and, the axle housing and its internal parts. Also see the section "What the Warranty Does Not Cover" set out below.

### ***What the Warranty Covers***

### ***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 any such defect; and **(2)** you deliver the Roadmaster Chassis 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.

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

Defect and/or damage to the Roadmaster Chassis may occur during manufacture at the factory, during delivery of the motorhome to the selling dealer or on the selling dealer's lot. Normally, any factory 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 Roadmaster Chassis, you must notify your dealer or Warrantor within five days of the date of purchase to have repairs performed to any such defect at no cost to you as provided by this Limited Warranty.

If two 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, you must, to the extent permitted by law, notify Warrantor directly in writing of the failure to successfully repair the defect so that Warrantor can become directly involved in performing a successful repair to the identified defect.

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### ***How to Get Service***

For warranty service simply contact one of Warrantor's authorized service centers for an appointment, then deliver your Roadmaster Chassis (at your expense) to the service center. If you need assistance in locating an authorized warranty service facility, contact Warrantor's Warranty Department (877-466-6226). The mailing address is:

**Monaco Coach Corporation  
Attention: Warranty Department  
91320 Coburg Industrial Way  
Coburg, Oregon 97408**

In the event the Roadmaster Chassis is inoperative due to malfunction of a warranted part, Warrantor shall pay the cost of having the Roadmaster Chassis that the motorhome is mounted upon 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.



This Limited Warranty does not cover: modifications and alterations to the Roadmaster Chassis by others; the motorhome that is mounted upon the Roadmaster Chassis, including by way of example the motorhome manufacturer's design, manufacture, assembly and/or installation of the side walls, roof, windows, flooring, electrical system, plumbing system, LP-Gas system, appliances and slide-outs; items that are working as designed but which you are unhappy with because of the design; normal wear and usage; routine maintenance including by way of example wheel alignments; component parts covered by their own manufacturer's warranty, including by way of example the engine, transmission, tires, tubes, batteries, exhaust system and the emission control systems; and, flaking, peeling, rusting and chips or other defects or damage in or to the frame and frame cross members caused by rocks or other road hazards and the environment including airborne pollutants and salt.

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***What the Warranty  
Does Not Cover***

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, and odometer tampering shall discharge Warrantor from any express or implied warranty obligation to repair any resulting defect.

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***Events Discharging  
Warrantor from  
Obligation Under  
Warranty***

**THE ORIGINAL RETAIL PURCHASER OF THE ROADMASTER CHASSIS AND ANY PERSON TO WHOM THE ROADMASTER CHASSIS IS TRANSFERRED, AND ANY PERSON WHO IS AN INTENDED OR UNINTENDED USER OR BENEFICIARY OF THE ROADMASTER CHASSIS, 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.

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***Disclaimer of  
Consequential &  
Incidental Damages***

**ANY ACTION TO ENFORCE THIS EXPRESS OR ANY IMPLIED WARRANTY SHALL NOT BE COMMENCED MORE THAN ONE (1) YEAR AFTER THE EXPIRATION OF THIS WARRANTY.** Some states do not allow the reduction in the statute of limitations, so the above reduction may not apply to you. **THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.**

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***Legal Remedies***

**ROADMASTER CHASSIS DIVISION  
MONACO COACH CORPORATION  
91320 COBURG INDUSTRIAL WAY  
COBURG, OR 97408**

*DIPLOMAT*

## **WARRANTY INFORMATION FILE**

In addition to this Owner's Manual you will find a Warranty Information File in your unit. This file contains valuable documents about your motorhome systems and equipment. Many of the component manufacturer'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.

### **MONACO 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.

### ***Monaco Coach Corporation***

The foregoing is not a warning. See Monaco Coach Corporation's Limited Warranty or call Monaco Coach Corporation at (877) 466-6226 for warranty information and limitations.



# *Diplomat* **SECTIONS**

**1**

**GENERAL INFORMATION**

**2**

**DRIVING & SAFETY**

**3**

**CARE & MAINTENANCE**

**4**

**APPLIANCES**

**5**

**EQUIPMENT**

**6**

**WATER SYSTEMS**

**7**

**LP-GAS SYSTEMS**

**8**

**ELECTRICAL SYSTEMS - HOUSE**

**9**

**ELECTRICAL SYSTEMS - CHASSIS**

**10**

**CHASSIS INFORMATION**

**INDEX - 309**

## SIGNS

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This sign indicates a NOTE.



This sign indicates a WARNING or a CAUTION with additional information attached.



This sign indicates INSPECTION is required.



This sign indicates ASSEMBLY/INSTALLATION or DISASSEMBLY/REMOVAL is necessary.



This sign indicates the specified part requires OIL/LUBRICATION.



This sign indicates a reference to the Warranty INFORMATION FILE located within the grey box inside the motorhome.

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. Monaco Coach Corporation reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligation.

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# *Diplomat*

## **SECTION 1 GENERAL INFORMATION**

<b>INTRODUCTION • 13</b>
<b>CUSTOMER RELATIONS • 13</b>
<b>REPORTING SAFETY DEFECTS • 14</b>
<b>TAKING DELIVERY • 14</b>
<i>Monaco Coach Responsibilities • 14</i>
<i>Dealer Responsibilities • 14</i>
<i>Customer Responsibilities • 15</i>
<b>SERVICE SUGGESTIONS • 15</b>
<b>OWNER'S RECORD - SERIAL NUMBERS • 17</b>
<b>OWNER'S RECORD - PERSONAL PROPERTY • 18</b>
<b>OWNER'S RECORD - INSURANCE • 19</b>
<b>VENDOR LIST • 20</b>





## INTRODUCTION

This section contains warranty information and knowledge 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.

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 stop occasionally to 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 Monaco Coach 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.

The safety alert symbols of **CAUTION** or **WARNING** are "Personal Safety Instructions." 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.

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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 Affairs 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 RELATIONS

**Monaco Coach Corporation  
Consumer Affairs Department  
91320 Coburg Industrial Way  
Coburg, Oregon 97408**

## **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 Coach. If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of motorhomes, it may order a recall or remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer or Monaco Coach. To contact NHTSA you may 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**

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## **TAKING DELIVERY *Monaco Coach 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.

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## ***Dealer Responsibilities***

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 reads 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.

## ***Customer Responsibilities***

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.

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## **SERVICE SUGGESTIONS**

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.

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### ***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.

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### ***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 Technicians  
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.

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***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.

FOR YOUR OWN REFERENCE

## OWNER'S RECORD - SERIAL NUMBERS



Refer to the Manufacturer's individual Owner's Manuals for serial number locations that are not listed below.

**Motorhome** Serial Number \_\_\_\_\_

**Motorhome** Federal Vehicle Identification Number (VIN) \_\_\_\_\_

**Door Key** Number \_\_\_\_\_

**Range** Model & Serial Number \_\_\_\_\_  
(Located under top burner plate)

**Microwave** Model & Serial Number \_\_\_\_\_  
(Located behind door on case)

**Refrigerator** Model & Serial Number \_\_\_\_\_  
(Located inside refrigerator compartment)

**Generator** Model & Serial Number \_\_\_\_\_  
(Located in outside compartment on generator)

**Roof Air Conditioner** Model & Serial Number \_\_\_\_\_  
(Located under top cover on air conditioner)

FOR YOUR OWN REFERENCE

## OWNER'S RECORD - PERSONAL PROPERTY

[illegible]

FOR YOUR OWN REFERENCE

## OWNER'S RECORD - INSURANCE

Company: \_\_\_\_\_

\_\_\_\_\_

Policy #: \_\_\_\_\_

\_\_\_\_\_

Agent's Name & Address: \_\_\_\_\_

\_\_\_\_\_

Business Phone #: \_\_\_\_\_

\_\_\_\_\_

Emergency Phone #: \_\_\_\_\_

\_\_\_\_\_

Renewal Date(s): \_\_\_\_\_

\_\_\_\_\_

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## VENDOR LIST

### **Air Bags**

Firestone  
317-818-8600  
[www.bridgestone-firestone.com](http://www.bridgestone-firestone.com)

### **Air Conditioner**

Dometic Corp.  
219-463-4858  
[www.dometic.com](http://www.dometic.com)

### **Air Conditioner - Dash**

SCS/Frigette  
800-433-1740  
[www.scsfrigette.com](http://www.scsfrigette.com)

### **Alternator**

Leece-Neville  
800-349-2628  
[www.prestolite.com](http://www.prestolite.com)

### **Awnings**

Carefree  
800-338-2378  
[www.carefreeofcolorado.com](http://www.carefreeofcolorado.com)

### **Axles**

Meritor Corporation  
800-535-5560  
[www.meritorauto.com](http://www.meritorauto.com)

Eaton Corporation  
800-328-6687  
[www.truck.eaton.com](http://www.truck.eaton.com)

### **Batteries**

Interstate  
800-272-6548  
[www.interstatebatteries.com](http://www.interstatebatteries.com)

### **Brake-Anti-Lock Brake System**

Eaton  
800-826-4357  
[www.eaton.com](http://www.eaton.com)

### **Citizen Band Radio (C.B.)**

Cobra  
733-889-3087  
[www.cobraelec.com](http://www.cobraelec.com)

### **Carbon Monoxide Detector**

Safe-T-Alert  
800-383-0269  
[www.safe-t-alert.com](http://www.safe-t-alert.com)

### **Cooktop**

Atwood Mobile Products  
800-873-4328  
[www.atwoodmobile.com](http://www.atwoodmobile.com)

### **Dash Radio**

Kenwood  
800-536-9663  
[www.kenwoodusa.com](http://www.kenwoodusa.com)

### **DVD Player (Optional)**

Sony  
800-222-7669  
[www.sony.com](http://www.sony.com)

### **Energy Management System (Optional)**

Intellitec  
800-251-2408  
[www.intellitecsve.com](http://www.intellitecsve.com)

### **Engine**

Cummins  
800-343-7357  
[www.cummins.com](http://www.cummins.com)

### **Entry Step**

Kwikkee  
800-736-9961  
[www.kwikkee.com](http://www.kwikkee.com)

### **Exhaust Brake**

Pac Brake  
800-663-0096  
[www.pacbrake.com](http://www.pacbrake.com)

**Fan - Bathroom Exhaust**

Fan-Tastic Vent  
800-395-4045  
[www.fantasticvent.com](http://www.fantasticvent.com)

**Filters**

Racor Fluid Filters  
800-344-3286  
[www.parker.com/racor/](http://www.parker.com/racor/)

**Fire Extinguisher**

The Fire Extinguisher Co.  
919-563-4911

**Generator**

Onan  
800-888-6626  
[www.onan.com](http://www.onan.com)

**Heat - Furnace**

Atwood Mobile Products  
800-873-4328  
[www.atwoodmobile.com](http://www.atwoodmobile.com)

**Hitch Receiver**

Reese Products  
219-164-7564  
[www.reeseproducts.com](http://www.reeseproducts.com)

**Hydraulic Filter**

Fleetguard Nelson  
1-800-223-4583  
[www.fleetguard.com](http://www.fleetguard.com)

**Home Theater (Optional)**

Sony  
800-222-7669  
[www.sony.com](http://www.sony.com)

**Inverter**

Heart Interface  
800-446-6180  
[www.heartinterface.com](http://www.heartinterface.com)

**Leveling Jacks - Hydraulic**

RVA  
(760) 746-5732

**Liquefied Petroleum Protectors**

MTI Industries, Inc.  
800-383-0269  
[www.mtiindustries.com](http://www.mtiindustries.com)

**LP Tank**

Manchester Tank  
800-877-8265  
[www.mantank.com](http://www.mantank.com)

**Microwave**

Sharp Electronics Corp.  
800-237-4277  
[www.sharp-usa.com](http://www.sharp-usa.com)

**Outside Mirrors**

Velvac Mirror  
800-783-8871  
[www.velvac.com](http://www.velvac.com)

**Rear Vision System**

Jenson  
800-732-6866  
[www.jensonaudio.com](http://www.jensonaudio.com)

**Refrigerator**

Norcold  
800-543-1219  
[www.norcold.com](http://www.norcold.com)

**Shock Absorbors**

Monroe  
800-880-7580  
[www.tenneco-automotive.com](http://www.tenneco-automotive.com)

**Slide-Out Motor - Bedroom**

Dewald  
219-256-0782

**Slide-Out Motor - Living Room**

Power Gear  
800-334-4712  
[www.powergear.com](http://www.powergear.com)

**Steering Gear**

Sheppard  
717-637-3751  
[www.rhsheppard.com](http://www.rhsheppard.com)

**Steering Wheel (Smart Wheel)**

Vehicle Improvement Products  
847-395-7250  
[www.vipwheels.com](http://www.vipwheels.com)

**Storage Trays (Optional)**

Kwikkee  
800-736-9961  
[www.kwikkee.com](http://www.kwikkee.com)

**Television**

RCA  
877-266-2728  
[www.rca.com](http://www.rca.com)

**Television Antenna**

Winegard  
319-754-0600  
[www.winegard.com](http://www.winegard.com)

**Tires**

Goodyear Tire & Rubber  
800-399-2772  
[www.goodyear.com](http://www.goodyear.com)

**Toilet**

Thetford  
800-521-3032  
[www.thetford.com](http://www.thetford.com)

**Transfer Switch**

Lyght Power Systems  
219-295-0229  
[www.lyghtpower.com](http://www.lyghtpower.com)

**Transmission**

Allison Transmission  
800-524-2303  
[www.allisontransmission.com](http://www.allisontransmission.com)

**VCR**

Quasar  
800-545-2672

**Washer/Dryer (Optional)**

Splendide  
800-736-4127  
[www.splendide.com](http://www.splendide.com)

**Water Filtration**

Everpure  
630-654-4000  
[www.everpure.com/consumer/rv](http://www.everpure.com/consumer/rv)

**Water Heater**

Atwood Mobile Products  
800-873-4328  
[www.atwoodmobile.com](http://www.atwoodmobile.com)

**Water Pump**

Shurflo  
800-762-8094  
[www.shurflo.com](http://www.shurflo.com)

**Wheels**

Accuride  
800-626-7096  
[www.shurflo.com](http://www.shurflo.com)

**Windshield Wipers**

Diesel Equipment  
336-373-8331  
[www accuridecorp.com](http://www accuridecorp.com)



# Diplomat

## SECTION 2 DRIVING & SAFETY

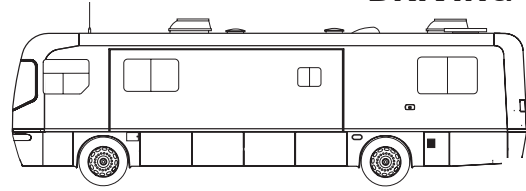
<b>DRIVING SAFETY • 25</b>	<b>STORAGE OF TIRES - Long Term • 57</b>
<i>Inspections • 25</i>	<i>In Case of Flat Tire • 58</i>
<i>Familiarize Yourself • 25</i>	<b>SPECIFICATIONS - DIMENSIONS CHART • 59</b>
<i>Safety Seat Belts • 25</i>	<b>VIEWS - Front • 60</b>
<i>Tips for Driving • 26</i>	<b>VIEWS - Rear • 60</b>
<b>CHECKLIST - PRETRIP PREPARATIONS • 29</b>	<b>VIEWS - Roadside • 61</b>
<b>HITCH - Using the Rear Receiver • 30</b>	<b>VIEWS - Curbside • 61</b>
<i>Tow Plug Connection • 31</i>	<b>SMOKE DETECTOR • 62</b>
<b>REAR VIEW SYSTEM • 31</b>	<i>Operation • 62</i>
<b>BACKING UP A MOTORHOME • 32</b>	<i>How to Test • 62</i>
<b>CHECKLIST - SET-UP PROCEDURES • 35</b>	<i>Maintenance • 63</i>
<b>DRY CAMPING TIPS • 37</b>	<i>Troubleshooting • 63</i>
<b>BREAKING CAMP • 41</b>	<b>LP-GAS DETECTOR • 63</b>
<b>EMERGENCY PROCEDURES - ROADSIDE • 43</b>	<i>Operation • 64</i>
<i>Light - Retractable • 43</i>	<i>Testing • 64</i>
<i>Transmission - Rocking Out • 44</i>	<i>Alarm • 64</i>
<i>Jump Starting • 44</i>	<i>Care • 65</i>
<b>TOWING PROCEDURES • 45</b>	<b>CARBON MONOXIDE DETECTOR • 65</b>
<i>Brake - Disabling Parking Brake • 46</i>	<i>Operation Instructions • 66</i>
<b>TIRES • 46</b>	<i>Alarm • 66</i>
<i>The Importance of Air Pressure • 46</i>	<i>Testing • 66</i>
<i>How Much Air Should I Carry in My Tires? • 47</i>	<i>Cleaning • 66</i>
<i>Tire Pressure Inflation Guideline • 47</i>	<b>FIRE EXTINGUISHER • 67</b>
<b>WEIGHT TERMS • 48</b>	<b>EGRESS EXIT WINDOW • 67</b>
<i>Weight Chart • 50</i>	
<b>WEIGHING THE MOTORHOME • 51</b>	
<b>TIRE CHART • 54</b>	
<i>Inspecting &amp; Pressure • 55</i>	
<i>Tire Rotation • 56</i>	
<i>Blocking When Leveling • 56</i>	





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

## DRIVING SAFETY



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There are significant differences between a passenger automobile and a motorhome. Always be aware of these differences when traveling. The key for safely operating the motorhome is inspection. Any defect found may cause problems on the road that can result in lost time and money. Several states require that the motorhome be inspected prior to registration. Know and observe the laws as they may vary from state to state. A systematic inspection conducted prior to moving the motorhome will ensure nothing is overlooked. An inspection process assists in familiarizing the owner with the motorhome. Prior to moving the motorhome, perform a general inspection by examining the condition and area around 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 further to the left than most vehicles, giving 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

All occupants must be furnished with and use seat belts while the motorhome is moving. Only seats equipped with safety seat belts are designed to carry passengers while motorhome is in motion. While traveling, do not occupy beds or any seats that do not have a safety belt. Seat belts must only be used on permanently mounted seats. 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; it will click when the tab locks into the buckle. Seat belt lengths automatically adjust to the size and sitting position of the person. Do not route belts over armrest.

### Safety Seat Belts



**WARNING: Seats must be pointed in a forward position and seat belts fastened while the motorhome is in motion. Avoid seat rotation while in transit. 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 cause injury or death.**

## ***Tips for Driving***

The motorhome is a complex vehicle and requires an increased level of driving awareness and attention 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 all perimeters of the motorhome: front, sides, rear, roof and undercarriage. Insure the surrounding area is clear of any obstacles. Utilize the driving mirrors to observe traffic and parts of the motorhome: 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 12-15 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. When descending a long hill, use the exhaust or engine brake. The transmission and engine will help control downhill speed and can extend the service life of the brake lining. The distance required to stop the motorhome is greater than an automobile. The brakes are designed for the (GVWR) Gross Vehicle Weight Rating. Practice stopping away from traffic to get the "feel" of 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 driver's rear view 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 clearances are 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 can not 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 about to make the turn; the left rear wheel should touch the centerline of the road and the drivers 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 the motorhome's necessary clearance and space management while negotiating the turn.

### **Left Turns:**

- Do not start the turn until the center of the intersection is reached with the drivers hips. If there are two lanes available, take the right hand lane. A car or driver on the left hand side is easier seen.

### **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 normal conditions should be evaluated promptly.
- Check tire pressure frequently when 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 the road or weather conditions are treacherous find a safe stopping place and wait for conditions to improve.
- Avoid using an engine retarding device 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.

**Refueling:**

- Truck stops are good refueling points for motorhomes.
- For your convenience there is a fuel port located on either side, near the front of the motorhome
- 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 an 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.



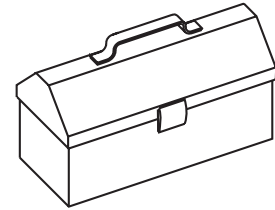
**WARNING: Avoid the risk of fire or explosion. Turn off all pilot lights and appliances before entering a refueling station.**

Before departure several items will need to be prepared. Some suggestions are listed below. Use the lists as general guides when preparing to depart.

## CHECKLIST - PRETRIP PREPARATIONS

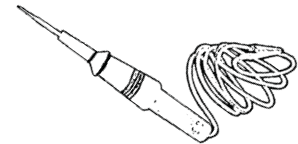
### Items To Carry:

- 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 continuous duty solenoid (if applicable).
- An assortment of spare fuses.
- One link kit for ride height control assembly (air suspension only).
- A spare alternator belt.
- Charge air cooler T-Bolt hose clamp.

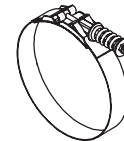


Tool Box

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Test Light



T-Bolt Clamp



Height Control Link

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### Interior:

- Start refrigerator operation the night before departure to get a head start on the cooling process. Pre-cool items prior to loading the refrigerator.

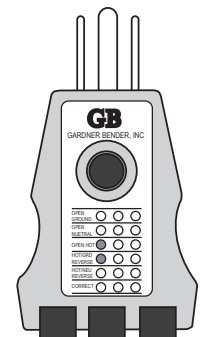


**NOTE: Upon arrival, turn the inverter OFF and switch ice maker operation to LP-Gas or hook the motorhome to shore power.**

- 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.
- Turn interior lighting off.

### 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.



Polarity Tester

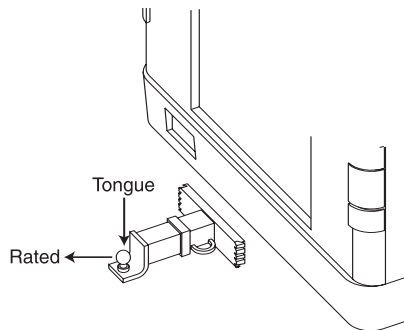
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### Driving Preparations:

- Check operation of all exterior lights, headlamps, taillights, brake and clearance lights.
- Inspect fluid level (if applicable) in oil bath hubs.
- Fill the fresh water tank. Disconnect and store the fresh water hose.
- Check all tire pressures.
- Check both house and chassis battery condition.
- If applicable, program the navigation system.
- Secure all awning locks.
- Check items in storage bays to prevent shifting or damage to items.
- Outside compartment doors should be closed and locked.
- Look around, above and under the motorhome for obstructions.
- Check fuel level gauge. Check all other dash gauges for operation and correct level indications.
- Secure and lock the entry door for travel.

### HITCH - Using the Rear Receiver



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When using the rear hitch remember that the motorhome is intended for towing light loads. The motorhome is designed to be used primarily as a recreational vehicle. Towing will affect durability and economy. Safety and satisfaction require proper receiver use. Avoid excessive loads or other misuse. Do not use the motorhome to tow anything until it has been driven 500 miles (800 kilometers). 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, and any vehicle or trailer towed by it, must not exceed the GCVW.



**WARNING: Any trailer being towed by a motorhome must have adequate brakes. Failure to follow these instructions will create a safety hazard and may result in an accident.**

#### Tow Car or Trailer:

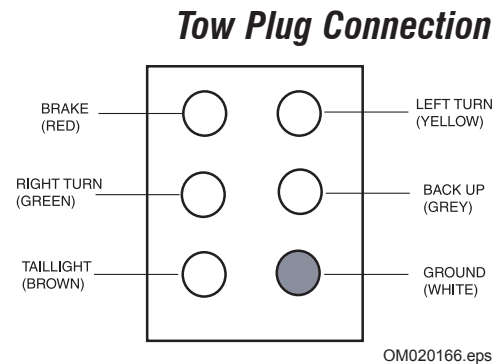
1. Connect tow car or trailer with light harness to motorhome and perform a light check.
2. Connect safety chains.
3. Check the tow car or trailer and the motorhome before starting a trip and at each rest stop.
4. Flat tires on a towed vehicle cannot be detected from the motorhome while driving. A flat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

ENGINE TYPE	RATED CAPACITY	TONGUE WEIGHT
ISC 330	10,000 LBS.	1,000 LBS.

The motorhome is prewired with a trailer wire harness. The harness is located on or near the hitch receiver. Convoluted tubing protects the tow harness wires. Current draw should not exceed ten amps for each designated circuit.



**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.**



The motorhome is 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 driver can see what is behind the motorhome with the ability to listen to a guided 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 to ON will allow continuous operation of the rear vision system when the ignition key is turned ON.

## REAR VIEW SYSTEM



**For more detailed instructions see the manufacturer's manual.**

### Systems Features Overview:

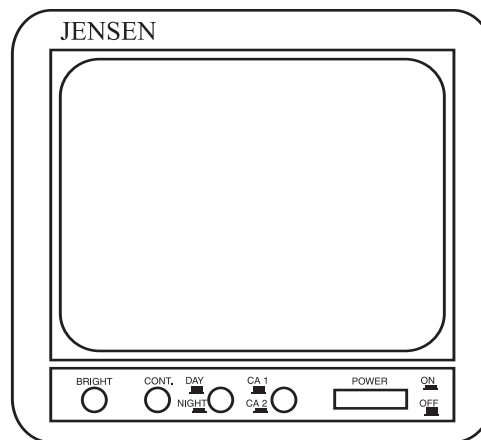
The system is designed to provide the driver with a view of the rear of the motorhome. The field of view is 140° in the diagonal plane, 121° in the horizontal plan and 90° in the vertical plan. Power will be supplied to the system when the ignition key is turned to the Accessory or ON position. The green LED will illuminate. The display on the monitor is controlled by the position of the power switch. When in the ON position the display is present. When placed in the S/B (Standby) position the display is off until the gear shift lever is set to Reverse.

#### Monitor Controls:

- **Power Switch** - The switch in the **ON** (in) position turns on the monitor for viewing. The green **LED** indicator will illuminate. When the switch is **OFF** (out) the monitor is in a standby mode of operation. The green **LED** will remain illuminated when the ignition is **ON**. The monitor will display rear viewing when the transmission is shifted to Reverse.
- **Camera Selector** - This switch should be left in the **CAI** (out) position. **CA2** (in) position is not used in the motorhome.

- **Day/Night** - This switch should be left in the **DAY** (out) position for normal viewing. When set to the **NIGHT** (in) picture brightness is reduced. **NIGHT** should be used for night viewing and driving through tunnels.
- **Bright Control** - Clockwise rotation will increase the picture contrast. Counterclockwise rotation will decrease the picture contrast.
- **Contrast Control** - Clockwise rotation will increase the picture contrast. Counterclockwise rotation will decrease the picture contrast.

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.



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## BACKING UP A MOTORHOME

Whether you are a long time owner of recreational vehicles or just someone 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 it 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 road side mirror. If the site is on the right side, the driver will have to use the curb side 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.

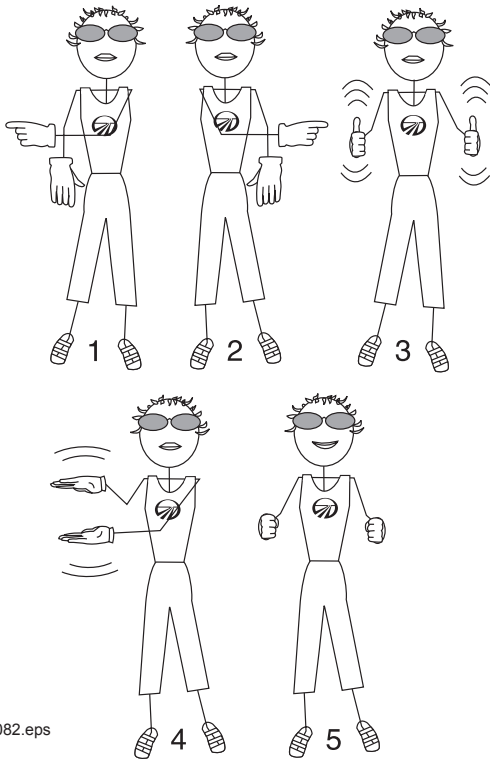
The co-pilot will perform just as important a job as the driver. When guiding the driver, the co-pilot should be located safely at the rear road side corner of the motorhome, facing forward, while remaining visible in the driver side mirror at all times. The co-pilot should make a conscious effort to maintain sight of the driver through the road side 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 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 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:**



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1. Co-pilot uses left hand and arm held horizontal, with forefinger pointing right, to direct rear of motorhome to the right.
2. Co-pilot uses right hand and arm held horizontal, with forefinger pointing left, to direct rear of motorhome to the left.
3. Co-pilot uses both arms and hands parallel with thumbs pointing up and to rear in a waving vertical motion. This signals driver to maintain a straight back direction.
4. Co-pilot holds arm vertically, 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.

### 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 road side mirror, using the five hand signals for guiding.



**CAUTION:** Tow bards 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.

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. This checklist has information on hooking up the utilities and preparing the appliances for use. Specific information on the slide room, awning and leveling system operations discussed in detail in other sections.

## CHECKLIST - SET-UP PROCEDURES

- If applicable, unlock any travel locks which may be securing the slide room awning. Check for lateral clearance before extending the slide-out room.



**NOTE:** To operate the kitchen slide: The ignition must be OFF, the park brake must be set and the bay doors directly under the slide room must be closed.



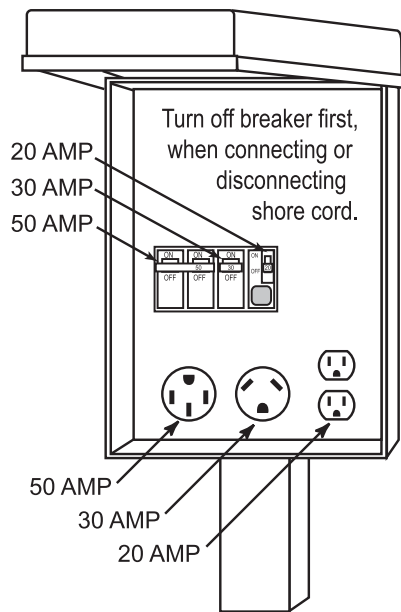
**CAUTION:** Before leveling the motorhome survey the area around and under the motorhome for obstructions which can damage the motorhome or undercarriage components when the air bags are deflated.

- Follow the procedures and guidelines for “Leveling the Motorhome.” If the motorhome is equipped with hydraulic jacks, be certain the parking surface will accommodate the weight placed on the jacks.



**CAUTION:** Hot asphalt may not support the weight that is placed on the hydraulic jack pads. Place thick plywood under the jack pads to help disperse the weight. Never use the leveling system to support the entire weight of the motorhome. Damage from excessive torsional twists can result.

- Open the LP-Gas tank 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.



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- Prepare the shore cord to be plugged in. Uncoil and inspect the cord. Perform any necessary cord maintenance. Install proper electrical adapters if anything other than 50 amp service is provided. Operate electrical appliances in sequence when hooked to a limited shore power service. Turn shore power circuit breaker OFF prior to plugging in the shore cord.



**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!

- If cable service is provided, hook-up a 75 Ohm 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 a potable water hose to the city water connection in the service center. A water pressure regulator is built in. Turn the hand valve so the pointer indicates “city water.”



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

- Hook-up the sewer hose. Sewer drain pipe diameters are generally either three or four inches. Proper sewer hose adapters will ensure against leaks or spillage. With the sewer hose properly connected open the grey water valve (small valve). The black water valve (large valve) remains closed until the tank is full or until time of departure.



**DRY CAMPING  
TIPS**

Dry camping requires fully charged and maintained batteries (corrosion cleaned, terminals tightened, cables checked, etc.). If the battery water needs to be refilled, use only distilled water. Water containing high concentrates of chemicals will ruin the batteries.

Verify the fresh water tank is full and empty the holding tanks. Many dry camping sites have a running waterspout at the site. Do not refill the fresh tanks at the site without first emptying the waste holding tanks as they will be unable to hold the extra waste water.

Equip the motorhome with solar panels. Solar panels are a valuable tool in keeping the batteries charged. The first panel will sustain the parasitic loads. The second panel (and third if available) will charge the battery during the sunlight hours. Keep in mind the solar panels require regular cleaning. Dust, dirt, grime and pollution from the road and air can decrease their efficiency. Clean the solar panels with a spray window cleaner using a soft cloth.

Have a full tank of diesel fuel, gasoline or LP-Gas, depending on what type of fuel the generator requires.

There are plenty of dry camping locations with suitable sites that can accommodate a motorhome. Confirm with the campground host that a particular facility is appropriate. Arrive at the campground during daylight hours so you can properly park the RV and prepare for the night ahead. Getting to the site on the narrow and winding campground roads takes skill and patience to avoid the low hanging limbs and tree trunks lining the path. Have the co-pilot or the campground host assist with maneuvering the motorhome around the curves and bends.

Because hookups are not a concern, take the extra time to ensure proper setup. Make sure there is plenty of room to extend the slide-out room(s). When dumping the air bags and leveling the motorhome, remember that the leveling process will drain some of the battery power.

For units equipped with auto leveling there must be no movement in the coach during the leveling process. Manual leveling will be less critical.

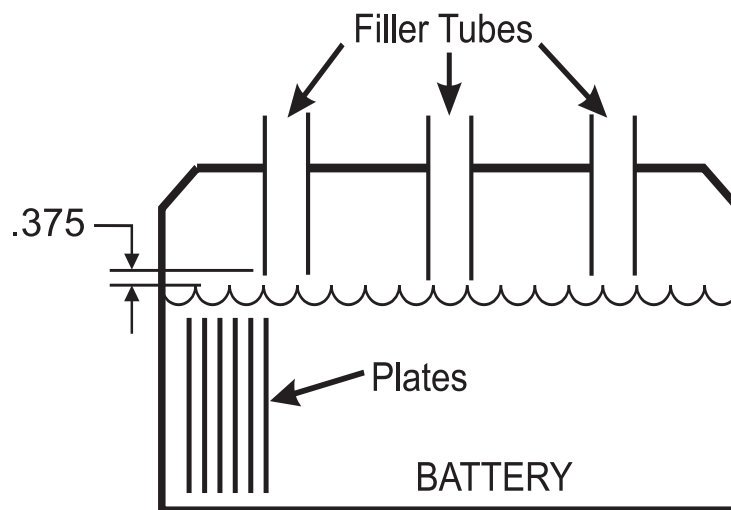
**Setting up for dry camping:**

- Turn the refrigerator off auto and switch over to gas.
- Switch the water heater to LP-Gas and turn it on about an hour before hot water is needed.
- Set the furnace to a desired nighttime temperature and keep it a bit cooler 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, under step light, generator compartment lights, engine compartment lights, etc. If the television is not being used, turn off the 12 Volt booster. One light left on, such as under the front cap near the wipers, can reduce the battery considerably. Do not forget to check the engine block heater in the event it has been plugged into the outlet and is operating a 1,400-watt element when the inverter is on. In a case like that, the batteries will not stay up for even 12 hours.
- Some battery draw has to be left on. Leave the battery kill switch on at the entry door because the eyebrow in the refrigerator (some models) requires 12 Volts to operate. In most motorhomes, even though it is switched to gas, the furnace requires 12 Volts to operate the fan.
- Keep flashlights handy. If some nighttime hours are to be spent outdoors, build a campfire. Illuminate the vicinity around the outside of the motorhome and extinguish the flames before retiring for the night. Many campgrounds place wood or cement barriers between the site space and fire pit. Be sure to illuminate any barriers or obstacles in the pathway to the motorhome.
- A large size flashlight positioned at the front door is perfect for navigating through the coach during the dark of night without having to use the interior lights. If interior lights are needed, remove excess bulbs in the fixtures to conserve on battery usage. Just one bulb in a central location, such as the vanity, will be sufficient.
- During the day it is still important to conserve on energy. Turn on the water pump only when using water; get in the habit of turning the pump off when not in use. While the water pump does not draw an abundance of power, the battery amp hours while dry camping are important and should be conserved.
- If it is too early or too late in the day to run the generator, use the inverter. Remember to turn off the inverter when not in use. When the rest of the campground is up and about, turn on the generator and run it for a couple of hours. The generator may seem loud and intrusive, however, the noise is minimal just a short distance away from the coach. Run the generator during clean up and preparation for the day.
- Check the monitor panel frequently and keep track of the water usage and battery consumption. Routinely check the LP-Gas and remember that more gas is used in cold weather.
- Careful management of water is critical when dry camping. Know the motorhome tank capacities. Picture the amount of liquid it takes

to fill a two-gallon container and visualize that amount each time water. If you are dry camping for a time, limit the shower usage. Turn the water off when soaping down in the shower. If water conservation is a must, take a sponge bath. Conserve water while brushing your teeth or join the tent campers at the outdoor water spigot. Chances are a campground without hookups will not have large comfortable shower rooms or bathrooms. It may only be equipped with a primitive outhouse, however, if it helps to economize on water, use it.

- Do not fill a sink full of water to wash a few dishes. Use disposable dishes whenever possible. Cook dinner over the campfire. However, if cooking over the campfire is not desired, use the microwave. If you choose to use the microwave, do not run the microwave with just battery power and the inverter because battery power will be consumed quickly. Use the generator to operate the microwave. It is healthy for the generator to run under a strong load such as the microwave.
- Allow the generator to power up for five minutes before plugging in a load.
- Plan ahead what is needed from the refrigerator prior to opening it to conserve the battery power. If the weather does not permit eating out at the picnic table (or if no picnic table is available), eat at the dinette table by candlelight. Leave shoes outdoors to avoid having to run the vacuum cleaner. Open the windows during the day instead of running the air conditioner.
- Get back to nature and still enjoy the comforts of the motorhome. With a little imagination, the ways to stretch out available resources while dry camping are endless. Camping without hookups is nothing to fear – it is a challenge to overcome. It will be a pleasant surprise to discover how little of an inconvenience dry camping can be.



Battery State of Charge	Spec. Gravity	Voltage
100%	1.265	12.7
75%	1.225	12.4
50%	1.190	12.2
25%	1.155	12.0
Discharged	1.120	11.9 or Less

NOTE: The distilled water level in battery should be 3/8" below the filler tube.

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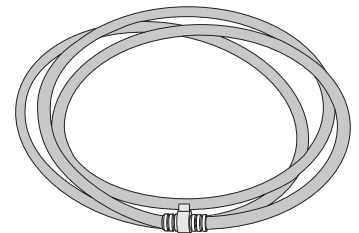
Battery State of Charge vs Voltage/Specific Gravity			
VOLTAGE	SPECIFIC GRAVITY	STATE OF CHARGE	DEPTH OF DISCHARGE
12.66	1.265	100%	0%
12.45	1.225	75%	25%
12.25	1.19	50%	50%
12.05	1.145	25%	75%
11.9	1.1	0%	100%

**BREAKING CAMP**

Listed 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 **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.
- Inspect fluid level in oil bath hubs (if applicable) and check all tire pressures.
- Secure all compartment doors and entry door.
- Inspect tires and wheels.
- Check for fluid leaks under or around the motorhome.



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

**Engine Checklist:**

- Inspect the engine, transmission and the engine compartment for fluid leaks.
- Inspect the area under the motorhome for fluid leaks or puddles.
- Check all fluid levels: oil, antifreeze, transmission, 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.

**Interior Checklist:**

- If applicable, retract leveling jacks allowing the air suspension to obtain proper ride height.
- If applicable, clear the slide room path, clean the floor, move the driver seat forward and make sure the bay doors are shut. Once the slide room is fully retracted secure any slide room awning locks.



**NOTE: To operate the kitchen slide the ignition must be OFF, the park brake must be set and the bay doors under the slide room must be closed.**

- 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 verify 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.
- Carefully pull forward out of the campsite. If necessary, clean the site and check for any forgotten items.
- Secure and lock the entry door for travel.

**EMERGENCY  
PROCEDURES -  
ROADSIDE**

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 Monaco Coach Support (1-877-466-6226) or an emergency service provider.

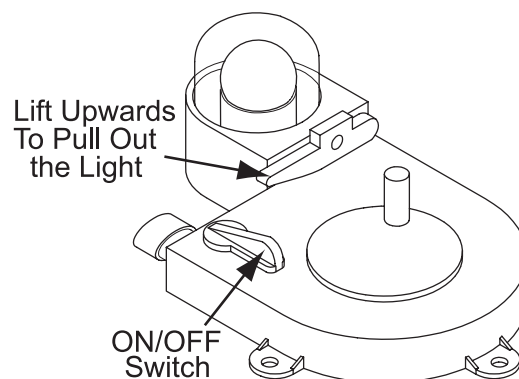
An emergency road kit should include at least three reflective warning signs, road flares, a flashlight, spare automotive fuses and an assortment of hand tools. For added safety a separate fire extinguisher should be considered. The motorhome is equipped with a fire extinguisher located inside next to 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.

The retractable light is located in places of limited lighting for emergency purposes.

**To Use:**

1. Activate light by moving **ON/OFF** switch to the **ON** position.
2. The light is on an 18' retractable reel cord. To operate, lift the lever and pull the light out.
3. The light has a magnetic base attached. Locate a place to attach the light so you can work hands free.
4. To replace bulb push down on clear plastic cover and twist.
5. To rewind, crank the handle in the retract direction. Once it is fully inward you will need to push down on the lock handle to keep the light locked into place.

**Light - Retractable**

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## **Transmission Rocking Out**

It may be possible to rock the motorhome out if it is stuck in snow, mud or deep sand. Shift the selector to **D** (Drive) and apply steady light throttle. Never full throttle as the wheels may spin and bury the motorhome deeper. When the motorhome has moved forward as far it will go, apply and hold the service brakes. Allow the engine to return to idle before selecting the **R** (Reverse). Release the brake and apply light throttle until the motorhome has rocked as far it will go. Again, apply the service brake and allow the engine to return to idle. Repeat this process if the motorhome has moved a greater distance. If the process does not free the motorhome call for towing assistance.



**NOTE: Sudden movements or lurching the motorhome with an open throttle can result in damage to the transmission. Avoid this condition by making shifts only when the throttle is closed and engine is at normal idle.**

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## **Jump Start**

When using jumper cables to start the engine, make sure the cables are connected in parallel. That is positive (+) to positive (+) and negative battery (-) to negative chassis (-). Always connect your positive (+) before the negative (-) and disconnect the negative (-) before the positive (+) to prevent arcing. When using an external electrical source to start the engine shut the disconnect switch to **OFF** position.

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.

In the event of a roadside emergency, contact the nearest Cummins Center or phone **1-800-DIESELS** (800-343-7357) for Cummins Customer Assistance Center.



**WARNING: The gases around the battery can explode if exposed to flames, sparks or lit cigarettes. 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 chassis, away from the battery.**

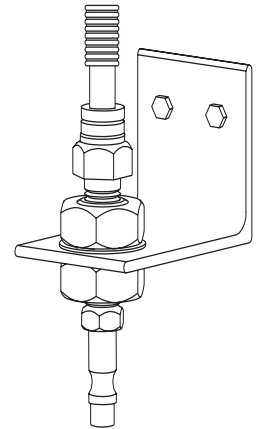


## TOWING PROCEDURES

If a towing company is called for service it is recommended that they use a lowboy/landall type of trailer and if a tow truck is used it needs to have a stinger (an arm that goes under motorhome and hooks to front cross member). Inform the tow company of the weight and length of the motorhome, number of passengers and milepost location.

The towing company may need to locate the air nipple to release the air brakes. The air nipple is located on the roadside in the front run electrical compartment, and should only be used by towing personnel. Generally, if the motorhome ever needs to be towed, use the following instructions:

- Secure any loose or protruding parts if the motorhome is damaged.
- Inspect 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 cause the front tires and suspension to be seriously overloaded, possibly resulting in a tire or front suspension failure. Rear frame extensions are not designed to withstand weight loads imposed by lifting the rear of the motorhome.
- If rear wheels are disabled, place the motorhome on a flat bed trailer or use a heavy duty dolly under the rear wheels and tow from the front of the motorhome.
- The drive shaft must be removed to prevent damage to the transmission.

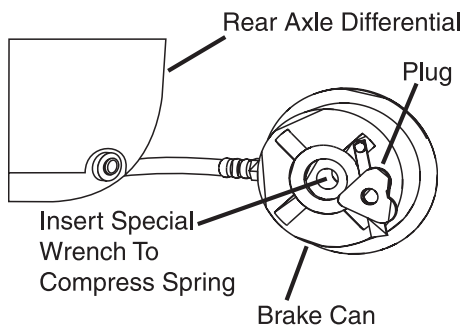


*Air Nipple*  
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**WARNING:** In the event the motorhome requires towing, ensure all precautions are followed. The driveline must be disconnected and the mudflap may need to be removed. Damage to the motorhome from a towing company will not be covered by Monaco Coach Corporation.

## Brake - Disabling Park Brake



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- Block wheels securely before attempting this procedure.
- Remove the plug from the center of rear brake can.
- Remove the caging tool from its holder on the rear brake can and insert it into the hole. Turn the tool clockwise to engage.
- Use a wrench to tighten the nut down, which compresses the internal spring, releasing the brake.
- Repeat for the other side.
- After towing, or when air pressure is again available, loosen the nut and remove the tool. Return the tool to its original location and replace plug.
- Repeat for the other side.



**WARNING: Do not attempt to disassemble brake canisters without special tools and without having studied specific manufacturer's instructions. Canisters contain springs under very high tension. Improper handling could result in component damage or personal injury.**

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## TIRES

The tire designed for the motorhome is a very technical and precisely engineered product. To obtain the maximum wear and best service out of the tires it is helpful to understand the function of a tire. A tire is a “container” that holds air. It is the combination of air and tire casing that supports the motorhome and its contents. In addition, since the tire is the only contact the motorhome has with the road surface, it must provide other functions such as traction for moving, stopping, steering and providing a cushion for the motorhome.

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### The 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.

A tire that is underinflated will build up excessive heat that may go beyond the design limits of the rubber and radial cords. This could result in sudden failure. A tire that is underinflated will also cause poor motorhome handling, rapid and/or irregular tire wear and an increase in rolling resistance which results in a decrease of fuel economy.

Over-inflation will reduce the tire's footprint/contact patch with the road, thus reducing traction, braking capacity and handling of the motorhome. A tire that is over-inflated for the load will have a harsh ride, uneven tire wear and becomes 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.



**WARNING: Improperly inflated tires can affect recreational vehicle handling or may fail suddenly, possibly resulting in loss of vehicle control. Use an accurate tire pressure gauge.**

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 shows weights that can be supported by various air pressures. Utilizing less air pressure means a lesser load can be carried by the tire.

### ***How Much Air Should I Carry in My Tires?***

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. Periodic adjustment to comply with the tire manufacturer's guideline will provide for the optimum ride and handling. A tire inflation chart listing proper inflation for different loading conditions of various size tires is contained in this section of the manual.

### ***Tire Pressure Inflation Guideline***

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

Always inflate tires at a pressure high enough to handle the actual load on the tires. **DO NOT OVERINFLATE 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 federal certification label recommended tire inflation pressure(s). 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.

## WEIGHT TERMS

The **GVWR (Gross Vehicle Weight Rating)** and **GAWR (Gross Axle Weight Rating)** stickers on the motorhome (normally located on the support pillar next to the driver's seat) will show the chassis manufacturer's and/or the RV manufacturer's total vehicle maximum weight ratings 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 for which a single axle is designed. These per axle and total maximum weight ratings could be limited by the tires, wheels, axle and axle bearings, the motorhome frame or other components of the motorhome.

The GAWR sticker is only a guide in knowing the maximum loaded axle weights, and subsequently the correct tire inflation pressure. 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 (if there is room to the sides of the scales) weigh each wheel position of the motorhome. This will give a clear indication of exactly how the weight of the motorhome is distributed. These 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. Load weight must be distributed as evenly as possible. The following is an explanation of commonly used weight abbreviations.

- **Gross Vehicle Weight Rating (GVWR):** GVWR means maximum permissible weight of this motorhome. GVWR is equal to or greater than the sum of UVW plus NCC.
- **Unloaded Vehicle Weight (UVW):** UVW means 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.

- **Net Carrying Capacity (NCC):** NCC means maximum weight of all occupants including driver, personal belongings, food, fresh water, LP-Gas, tools, tongue weight of towed vehicle, dealer installed accessories, etc., that can be carried by this motorhome. (NCC is equal to or less than GVWR minus UVW.)
- **Gross Combined Weight Rating (GCWR):** GCWR means value specified by motorhome manufacturer as maximum allowable loaded weight of this motorhome with its towed trailer or towed vehicle.
- **Gross Axle Weight Rating (GAWR):** GAWR means load-carrying capacity specified by manufacturer of a single axle system, as measured at tire ground interfaces.
- **Gross Combined Axle Weight (GCAW):** GCAW means the sum of the total weight of all axles when added together.

## Weight Chart

MODEL YEAR: 2002

MAKE: MONACO

MODEL: DIPLOMAT

UNIT NO. \_\_\_\_\_

CHASSIS VIN: \_\_\_\_\_

		<u>LBS.</u>	<u>KGS.</u>
<b><u>GVWR</u></b>	(Gross Vehicle Weight Rating) is the maximum permissible weight of this fully loaded motorhome .....	_____	_____
<b><u>UVW</u></b>	(Unloaded Vehicle Weight) is the weight of an exemplar Motorhome as manufactured at the factory with full fuel, engine oil and coolants (*1) .....	_____	_____
<b><u>SCWR</u></b>	(Sleeping Capacity Weight Rating) is the manufacturer's designated number of sleeping positions multiplied by 154 pounds (70 kilograms) .....	_____	_____
<b><u>CCC</u></b>	(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.....	_____	_____
<b><u>GCWR</u></b>	(Gross Combination Weight Rating) is the maximum allowable combined weight of this motorhome and any towed vehicle (*2).	_____	_____

### **CARGO CARRYING CAPACITY (CCC) COMPUTATION**

GVWR .....	_____	_____
minus UVW .....	_____	_____
minus fresh water (*3) weight of gallons @ 8.3 lbs./gal .....	_____	_____
minus LP-Gas weight of gallons@ 4.5 lbs./gal .....	_____	_____
CCC for this motorhome (*4) .....	_____	_____

**CONSULT OWNER MANUAL(S) FOR SPECIFIC WEIGHING INSTRUCTIONS AND TOWING GUIDELINES.**

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 has 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 of other motorhomes of same model year, make and model. Your actual UVW may vary based upon options ordered. Please contact the manufacturer of 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.

**WEIGHING THE  
MOTORHOME**

Improperly inflated tires, or suspension that is incorrectly loaded, can result in poor fuel economy, poor handling and over-stressed chassis components. Vehicle loading affects tire inflation pressure and the load carried by each axle. Motorhome axle configuration and floor plan styles will require different weighing procedures.



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



**CAUTION: If actual weight carried by any tire is below the tire chart weight specification a minimum tire pressure of at least 75 psi. must be maintained. Tire pressure below 75 psi. can overheat and damage the tire casing leading to premature tire failure or blowout.**

#### **Slide-Out Tire Pressure:**

A motorhome equipped with slide-out room(s) will weigh slightly heavier on the road side. The tire inflation pressure of the road side tires determines the inflation pressure for all tire(s) on that axle. This is due to the weight transfer that occurs when cornering. Approximately the same weight load will be transferred to the curb side around left-hand corners.



**NOTE: When weighing a motorhome equipped with a slide-out room, 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.**

#### **Scale:**

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.

To locate 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 will affect the procedure used to determine proper tire inflation pressure and axle loading. The size of some scales will allow the entire motorhome to fit on the scale, which will read the GVW with only one scale recording required. Other scales are designed to weigh only one axle at a time, which may require two or three scale readings to determine the GAW or GVW total. 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.

Slide-out equipped motorhomes will require each wheel position to be weighed. This is referred to as a four corner 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 weigh. A slide-out motorhome will require each tire to be weighed independently. Weighing an axle will net the total weight carried by that axle. 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. When weighing the entire drive axle, divide the total weight by four to determine the approximate weight carried by each tire.

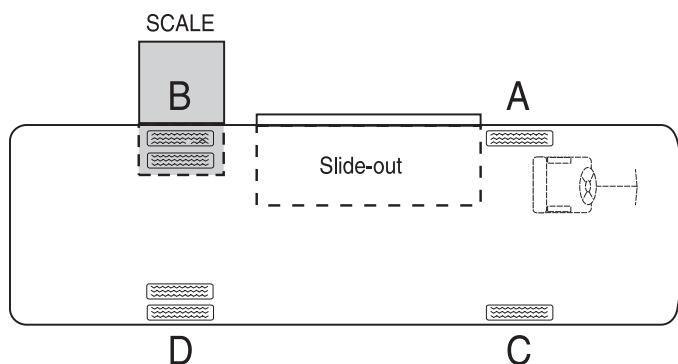
**Example:**

The motorhome must be weighed fully loaded to obtain accurate scale readings and to determine the proper tire pressure.

- Take the rear axle Gross Axle Weight Rating (GAWR) and divide it by two. Record the figure next to scale B & D,  $GAWR \div 2$ .  
Example: If rear axle GAWR is 13,000 lbs.  $GAWR \div 2$  would be 6,500 lbs.
- Weigh the driver's side rear corner (scale B) and record the scale reading next to Gross Axle Weight (GAW) for scale B. Example: Scale B reading is 5,100 lbs.
- Repeat procedure for the rest of the scale readings.
- Add the GAWR from scales B and D and enter the sum next to the final GAWR. Example 13,000.
- Add the GAW from scales B and D and enter this sum next to the final GCAW. Example: 10,000.
- Compare scale readings GCAW against GAWR readings. All figures on line 2 are not to exceed figures on line 1.
- Use tire chart with scale reading to determine correct tire pressure.



**NOTE:** Scale readings and Gross Axle Weight Ratings are fictitious. Actual scale readings and Gross Axle Weight Ratings will vary with model and options.



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**Rear**

<b>Scale B</b>	<u>1. GAWR <math>\div</math> 2 (6,500)</u> <u>2. GAW (5100)</u>
----------------	--

+

=

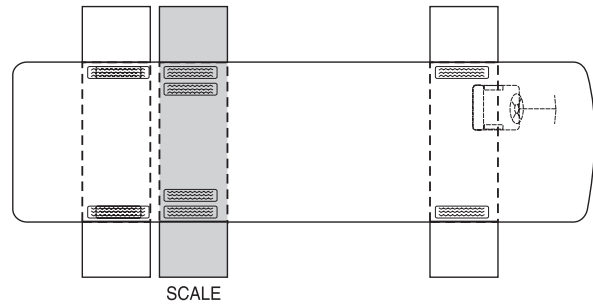
<u>1. GAWR (13,000)</u>
<u>2. GCAW (10,000)</u>

<b>Scale D</b>	<u>1. GAWR <math>\div</math> 2 (6,500)</u> <u>2. GAW (4,900)</u>
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**Weighing a two axle non-slide motorhome.**

- Record the Gross Axle Weight Ratings (GAWR) and the Gross Vehicle Weight Rating (GVWR).
- Weigh and record each wheel position or Total Axle Weight.
- If necessary, adjust the payload so the GAWR is not exceeded. Total combined weights must not exceed the GVWR.
- Using the tire chart, locate the recommended air pressure for the weight carried by each tire. Adjust the tire pressure accordingly.



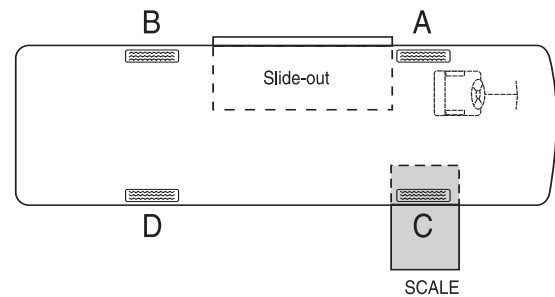
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$$\underline{\text{GAWR (Rear)}} + \underline{\text{GAWR (Front)}} = \underline{\text{GCVW}}$$

$$\underline{\text{GAW (Rear)}} + \underline{\text{GAW (Front)}} = \underline{\text{GCAW}}$$

**Weighing a two axle slide-out motorhome.**

- Slide rooms must be in the retracted position.
- Record the gross axle weight ratings (GAWR) and the Gross Vehicle Weight Rating (GVWR).
- Weigh and record the weight placed on each tire.
- If necessary, adjust the payload so the GAWR is not exceeded. Total combined weights must not exceed the GVWR.
- Using the tire chart, locate the recommended air pressure for the weight carried by each tire. Adjust the tire pressure accordingly.



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$$\begin{array}{rcl} \text{Scale B} & \frac{\text{GAWR} \div 2}{\text{GAW}} & \\ & + & \\ \text{Scale D} & \frac{\text{GAWR} \div 2}{\text{GAW}} & \\ & = & \frac{\text{GAWR}}{\text{GCAW}} \end{array}$$

$$\begin{array}{rcl} \text{Scale A} & \frac{\text{GAWR} \div 2}{\text{GAW}} & \\ & + & \\ \text{Scale C} & \frac{\text{GAWR} \div 2}{\text{GAW}} & \\ & = & \frac{\text{GAWR}}{\text{GCAW}} \end{array}$$

## TIRE CHART

INFLATION PRESSURE - PSI															
TIRE SIZE	MAX Speed Rating (MPH)	Dual (D) Single (S)	65	70	75	80	85	90	95	100	105	110	115	120	125
8R19.5	75	D S	2350 2410	2460 2540	2570 2680	2680 2800	2780 2930	2880 3060	2980 3170	3070 3280	3160 3400	3375(F) 3500(F)			
225/70R19.5	75	D S		2720 2895	2860 3040	3000 3195	3115 3315	3245 3450	3415(F) 3640(F)						
245/70R19.5	75	D S		3415 3640	3515 3740	3655 3890	3875(F) 4080(F)	3940 4190	4075 4335	4375(G) 4545(G)					
265/70R19.5	75	D S				3750 3970	3930 4180	4095 4355	4300 4540	4405 4685	4560 4850	4805 5070	4860 5170	5070(G) 5355(G)	
9R22.5	65	D S	3120 3190	3270 3370	3410 3560	3550 3730	3690 3890	3820 4050	3950(F) 4210	4350	4500(F)				
10R22.5	65	D S	3690 3770	3870 4000	4040 4210	4200 4410	4375 4610	4520 4790	4670 4970	4875(F) 5150(F)	4970 5320	5110 5490	5250(G) 5680(G)		
11R22.5	75	D S				4760 4990	4950 5220	5120 5430	5300 5640	5470 5840	5750(G) 6175(G)	5800(H) 6240	6430	6610(H)	
12R22.5	65	D S				5190 5450	5390 5690	5590 5920	5780 6140	5960 6370	6150 6590	6320 6790	6500 7010	6750(H) 7390(H)	
245/75R22.5	75	D S		3260 3470	3425 3645	3640 3860	3740 3980	3890 4140	4080 4300	4190 4455	4335 4610	4410(G) 4675(G)			
255/70R22.5	75	D S		3585 3815	3765 4005	3970 4190	4110 4370	4275 4550	4410 4675	4455 4895	4610 5065	4675 5205	5070(H) 5510(H)		
265/75R22.5	75	D S			4040 4070	4205 4255	4370 4440	4525 4620	4685 4800	4545(G) 4975	5150	5205(G)			
VV 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 S					4855 5265	5080 5515	5305 5755	5525 60000	5745 6235	5965 6475	6180 6710	6395(H) 6940(H)	
295/75R22.5	75	D S			4690 4725	4885 4945	5070 5155	5260 5370	5440 5510	5675(G) 5780	5800 5980	6005(H) 6175(G)	6370	6610(H)	
295/80R22.5	75	D S				4855 5480	5100 5750	5335 6020	5570 6285	5805 6550	6035 6810	6265 7070	6490 7320	6720 7580	6940(H) 7830(H)
315/80R22.5	75	D S					5840 6415	6070 6670	6395 6940	6540 7190	6770 7440	6940 7610	7210 7920	7610(J) 8270(J)	
285/75R24.5	75	D S			4740 4770	4930 4990	5205 5210	5310 5420	5495 5675	5675(G) 5835	6040	6175(G)			

Monaco Coach Corporation is not the author of this chart and make no representation or warranty concerning the accuracy of the information disclosed by the chart. Monaco Coach Corporation is not responsible for the accuracy of the information disclosed or for any errors within the Tire Inflation Chart.

Check the tire pressure regularly. If a tire is punctured by a nail or screw, creating a slow leak, it may eventually be spotted if it is a front tire or an outside rear dual. However, if there is a leak on an inside dual the chances of noticing it without an air pressure check are very slim. The vehicle is driven and an inside dual tire has a low air pressure or is flat, very quickly (in most cases a few miles) the outside rear tire (next to the low air pressure tire) will heat up from carrying double the load, leading to failure of the outside dual tire. The motorhome will end up with two flat tires on the same side on the same axle.

The air pressure should be checked every two weeks or at least once a month and before any major trip. The RV tire air pressure should be checked every “drive” morning on both long and short trips (driving a day or less). The tires should be checked before leaving on a trip and again before you start your trip home. If the motorhome is stored for any length of time the air pressure should be checked prior to storage. More importantly, check the tire pressure when it is pulled out of storage. Check the tire pressure when the tires are “cold” and have not been driven for more than one mile. The stated load capacity for a given cold inflation pressure is based on ambient outside temperature. If the tires are checked when they are warm or hot, allow for a slight increase in air pressure and make sure they are within a couple of pounds of each other on the same axle (does not apply to slide-out equipped motorhomes). Never let air out of a hot tire.

To check or maintain the inflation pressure in the tires, use a quality truck tire air gauge which has an angle dual head. This type of gauge will enable a check of the inflation of the inner dual wheel which has the valve stem pointing outward. The outer wheel has the valve stem pointing inward. Nothing should restrict the ability to check the tire’s air pressure daily when traveling in the motorhome. Pressure sealing valve caps should always be used to prevent air from escaping from the valve stem. If there are valve stem extension hoses, confirm they are good quality stainless steel braid reinforced and are securely anchored to the outer wheel.

Optimum tire performance is achieved with proper inflation pressures for the loads being carried. The air pressure of all tires should be checked and corrected prior to travel, or daily if in full time use. Tires of different patterns should not be mixed on the same axle. The difference in tractive force could cause rear end gear fight and mechanical damage to the drive train. Tires of different size or construction must never be mixed on the same axle.

**Higher than recommended pressure can cause:**

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



**WARNING: Improperly inflated tires can affect recreational vehicle handling or may fail suddenly, possibly resulting in loss of vehicle control. Use an accurate tire pressure gauge.**

**Lower than recommended pressure can cause:**

- Tire squeal on turns.
- Rapid and uneven wear on the edges of the tread.
- Tire rim bruises and rupture.
- Tire cord breakage.
- High tire temperatures.
- Reduced handling.
- High fuel consumption.

**Unequal tire pressures on same axle can cause:**

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

## Tire Rotation

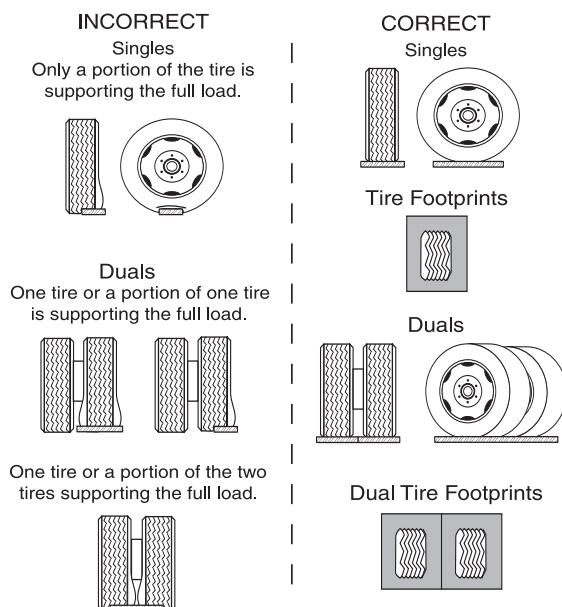
Tire rotation can increase the useful life of the tires by achieving uniform wear on all of the tires. The first tire rotation is the most important. The tire rotation pattern used for the motorhome should be evaluated by the tire manufacturer. Any unusual or unique wear pattern which may have developed should be evaluated before rotation. Misalignment, imbalance or other mechanical problems may exist and will need corrected prior to rotation.

The tire rotation should be performed every 6,000 to 8,000 miles, or at any sign of uneven wear. After a tire rotation, the inflation pressures should be checked and adjusted for the actual loads of the wheel position accordingly.

Tires are covered by the tire manufacturer. Monaco is not responsible for tire wear.

## Blocking When Leveling

### Tire "Support" Methods



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 block. In the case of dual tires, distribute the load evenly on blocks for both tires. If not properly blocked, the steel cables in the sidewall of the tires may be damaged and could lead to premature fatigue of the sidewall.

### Proper Cleaning:

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, RV tires may last longer due to limited annual mileage and exposure.

The motorhome is designed for recreation, not long-term storage. However, unless the vehicle is being used full time storage will be required. Rubber tires age faster when not being used. A cool, dry, sealed garage is the best bet for storage. Many motorhomes are stored outside in the elements. Some storage surfaces may cause tires to age prematurely. When the tire is anticipated to be out of service for a period of three months, the motorhome should be in the long-term storage condition. Ideal conditions include placing the motorhome on blocks to remove all weight from the tires. With this method the inflation pressure can be reduced to 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.

## STORAGE OF TIRES

### -Long Term Storages

- 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.
- The tire inflation pressures should be increased to 25% above the actual load when the tire is placed in the storage condition.
- Move the motorhome every three months to prevent cracking in bulb 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 high ozone areas.

Failure to take these steps can cause early deterioration and shorten the life of the tires.



**NOTE: When the motorhome is stored the tires should be inflated to maximum inflation pressure as indicated on the sidewall of the tire.**

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.

## In Case of Flat Tire

In case 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. Goodyear Tire Company has an emergency number which offers 24 hour assistance. Contact **Goodyear** at **(877) 484-7376**. The old tire should be saved for warranty purposes.

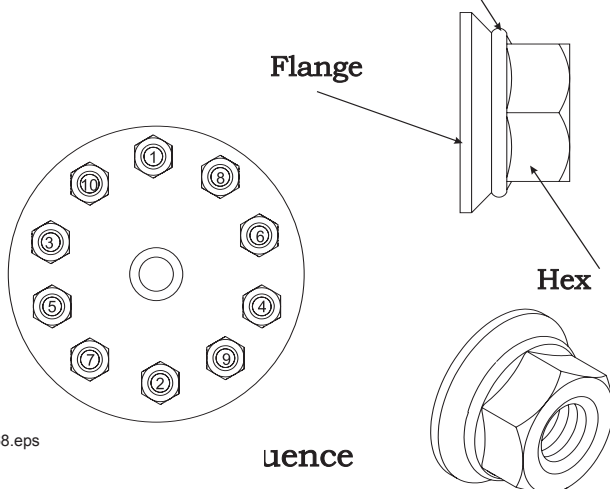
### Hub Piloted Mounting:

- 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 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.
- 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 500 lbs. Over tightening can cause distortion.**

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



### 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 500 ft.lbs in sequence (as shown in the illustration).



**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.**

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**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 fully until all have been seated. Tighten the nuts to 500 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:**

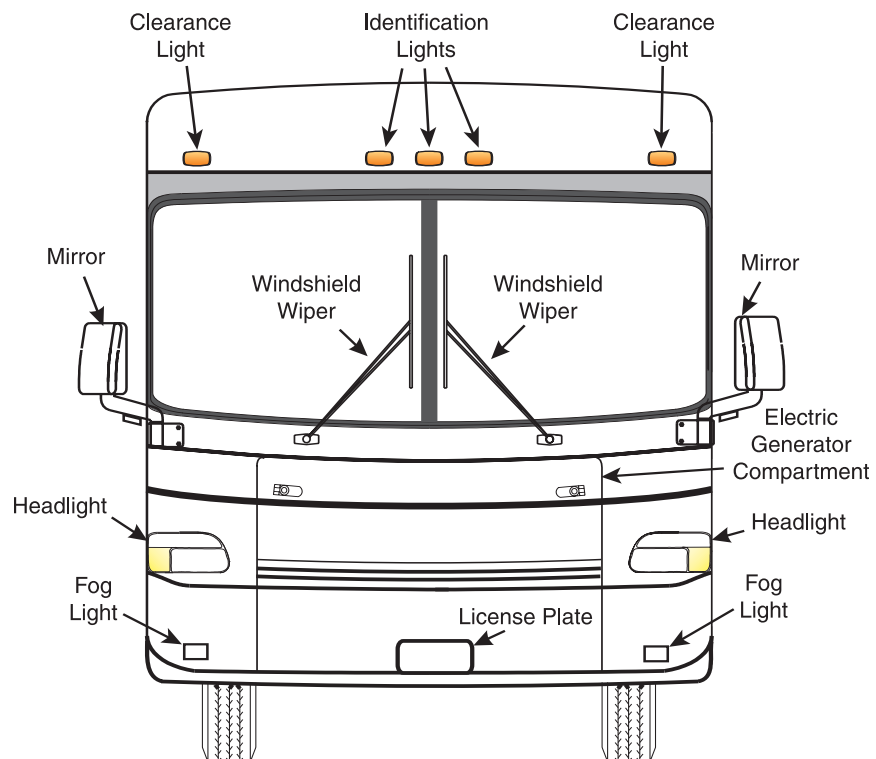
- Tighten the wheel nuts to the recommended lug nut torque. Do not over tighten.
- Maintain the nut torque at the recommended level through planned periodic checks or at 10,000 miles intervals, whichever comes first.
- If air wrenches are used they must be periodically calibrated for the proper torque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

**SPECIFICATIONS - DIMENSIONS CHART**

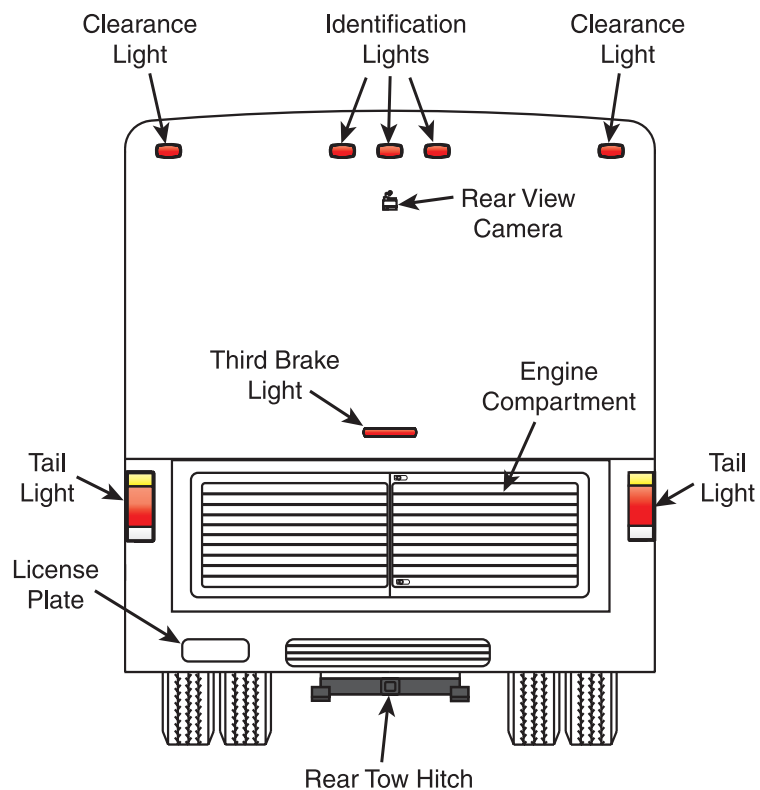
MEASUREMENTS									
MODELS	34PBD	36PBD	38PBD	38PBDD	38PBT	40PBD	40PBDD	40PWD	40PBT
Wheelbase	196"	216"	242"	242"	242"	256"	256"	256"	256"
Overall Length	34'8"	36'4"	38'6"	38'6"	38'6"	39'8"	39'8"	39'8"	39'8"
Overall Height	11'11"	11'11"	11'11"	11'11"	11'11"	11'11"	11'11"	11'11"	11'11"
Interior Height	6'6"	6'6"	6'6"	6'6"	6'6"	6'6"	6'6"	6'6"	6'6"
Interior Width	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"
Exterior Width (100.5" floor)	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"
NOTE: This chart reflects product specifications available at the time of printing. Any floor plans introduced thereafter may not be reflected in the chart. All other information contained throughout the manual will still apply.									



## VIEWS - FRONT

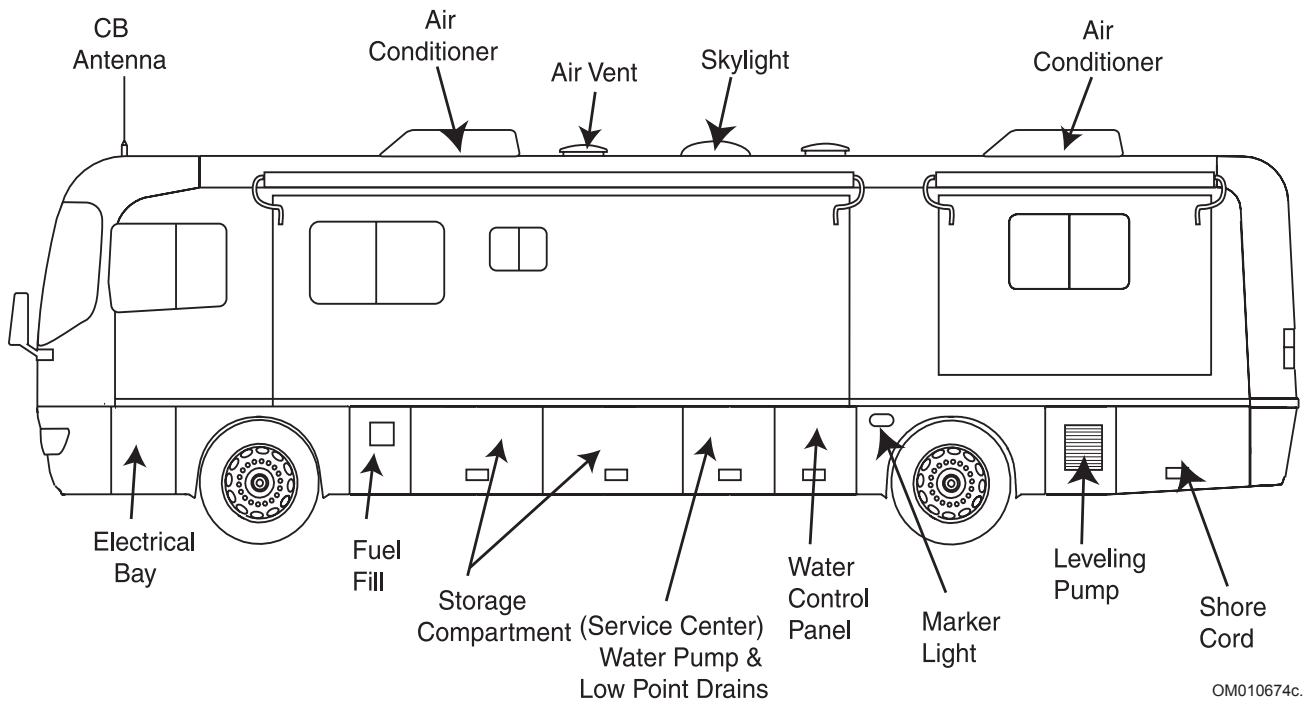


## VIEWS - REAR



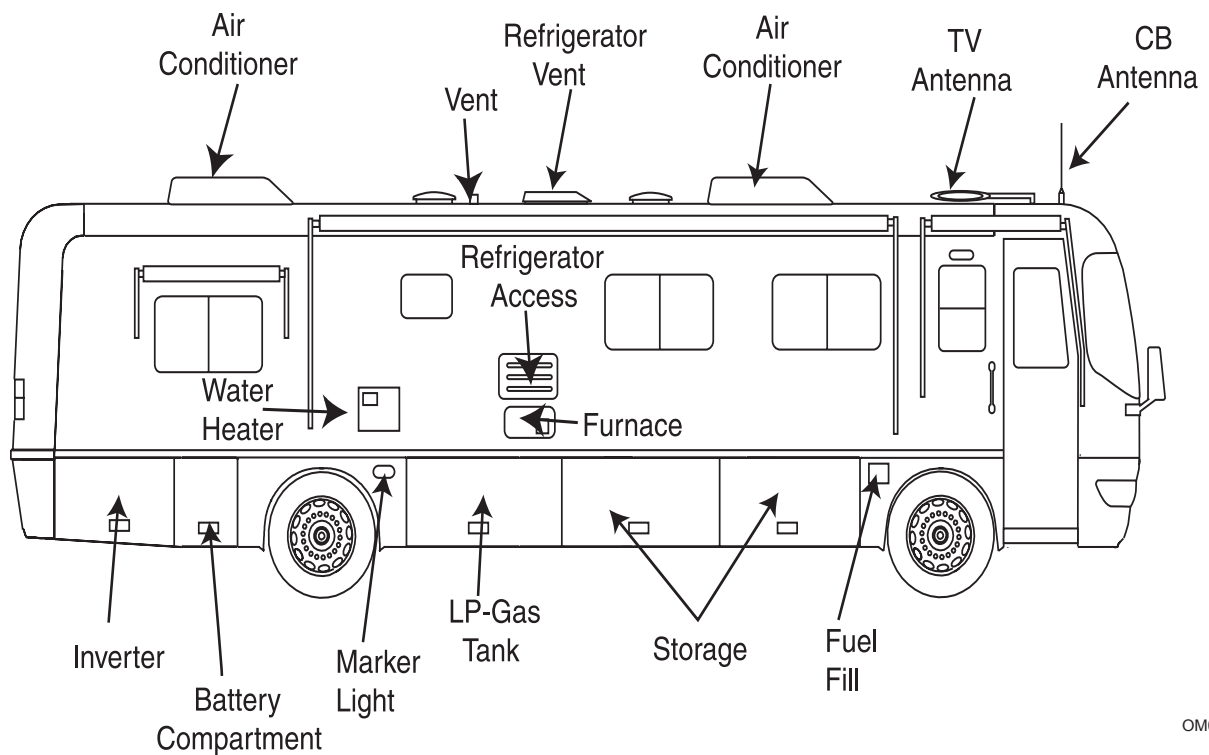


## VIEWS - ROADSIDE



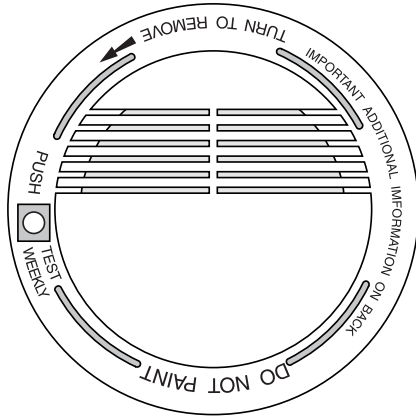
*Locations may vary from model to model. Identify each by their specific views.*

## VIEWS - CURBSIDE



*Locations may vary from model to model. Identify each by their specific views.*

## SMOKE DETECTOR



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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.

### Operation

Once 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. Most carbon zinc batteries average service life is one year. Most alkaline batteries service life is one to two years.

### How to Test

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, are other times when the smoke alarm must be tested. 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.

**Maintenance**

A smoke alarm is designed to be as maintenance free as possible. However there are some simple steps that must be performed 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:

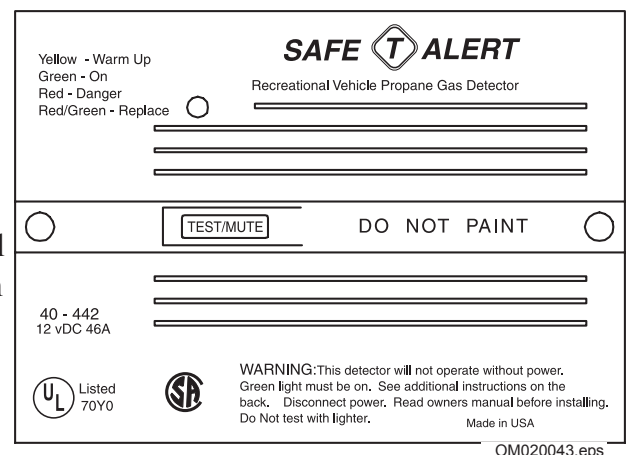
**Troubleshooting**

- 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. Smoke detectors beyond the warranty period cannot be economically repaired.

The LP-Gas detector is provided for safety. It detects 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. When this occurs, press reset button to stop the alert sound for 60 seconds.

The other combustibles which will be detected include alcohol, liquor, deodorants, colognes, perfumes, wine, adhesives, lacquer, kerosene, gasoline, glues, most cleaning agents and propellant of aerosol cans. Most are lighter than air in their vapor state and will only be detected when the motorhome is closed up.

**LP-GAS DETECTOR**

## Operations

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.**

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## Testing

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.



**WARNING: Test the operation of this detector after the motorhome has been in storage, before each trip and at least once per week during use.**

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## Alarm

The **red** LED will flash and the alarm will sound whenever 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 propane tank valve.
3. Determine and repair the source of the leak. Seek professional help if necessary.



**CAUTION: Do Not re-enter until the problem is corrected.**

### 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.

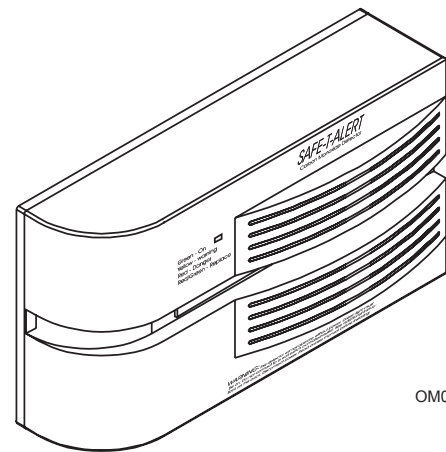
**Fault Alarm:**

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.

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.

**Care**

The motorhome is equipped with a carbon monoxide detector. Carbon monoxide (CO) is a colorless, odorless and tasteless gas. 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. In cases of mild exposure the symptoms may include: a slight headache, nausea, vomiting and fatigue. 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. The CO detector is designed to detect the toxic CO fumes that result from vehicle exhaust and incomplete combustion sources like a furnace, gas stove or water heater. Consequently, it is uncommon for household smoke from cigarettes or normal cooking to cause the alarm to sound.

**CARBON MONOXIDE DETECTOR**

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**NOTE: 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 your hearing.**

## **Operating Instructions**

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. 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 the conditions as follows:

- **Green** - Indicates **ON** or normal condition. The CO detector has power and is sensing air for the presence of CO gas. The alarm horn will not sound.
- **Yellow** - Indicates a “**trouble**” or malfunction condition. The alarm horn will sound and cannot be reset by the **TEST/RESET** button. The CO detector is not working properly and must be immediately replaced or repaired.
- **Red** - Indicates an “**alarm condition**.” The detector has sensed the presence of a hazardous level of carbon monoxide. The alarm horn will sound continuously until the **RESET** switch is reset.

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## **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.

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## **Testing**

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 button in until the alarm sounds. The alarm will stop beeping in about 30 seconds.

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## **Cleaning**

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 it 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.

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

Inspect the fire extinguisher at least once a month. Do so more frequently if the extinguisher is exposed to weather or possible tampering. Do not test the extinguisher by partially discharging, this will cause a loss of pressure.

### Use the **PASS** word!

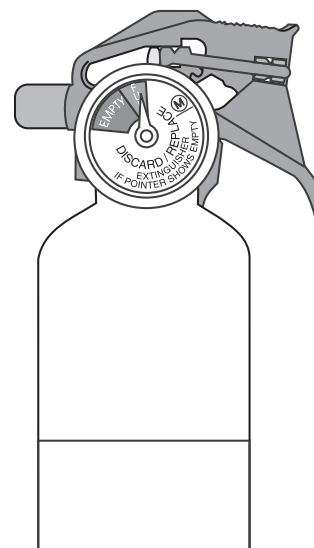
**Pull** the pin to unlock the extinguisher.

**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.

## FIRE EXTINGUISHER

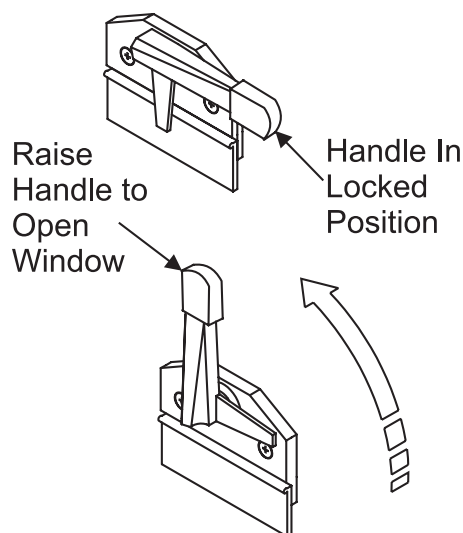


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An egress window is designated for use as an exit in the case of an emergency. Inside the motorhome the egress window is easily identified by the red locking handle. It is also marked as an "EXIT." Outside of the motorhome, the egress window is identified by hinges along the top of the window. The glass slider in the egress window operates the same as all other windows. To open the egress window, lift the red handle and push outward on the window. Pull the window closed and lower the handles to lock the egress window.

The egress window should be opened twice a year to ensure proper operation. Over time, the rubber seal will tend to stick to the egress window. Occasional operation will help prevent the rubber seal from sticking.

## EGRESS EXIT WINDOW



Egress Window Handle

OM020029.eps

**NOTES**



# Diplomat

## **SECTION 3 CARE & MAINTENANCE**

### **EXTERIOR CARE • 71**

*Corrosion • 71*

*Washing • 71*

*Drying • 72*

*Waxing • 72*

*Tire Care • 73*

*Care & Maintenance of Aluminum Wheels • 73*

*Bright Metal • 74*

*Maintenance - Exterior • 74*

*Roof Care & Seal Inspections • 75*

### **INTERIOR CARE • 76**

*Fabrics • 76*

### **FABRIC SPECIFICATIONS CHARTS • 79**

*Care & Cleaning • 79*

*Vinyl • 81*

*Leather • 83*

*Floors - Carpet Cleaning • 84*

*Floor - Tile • 85*

*Shower - Cleaning • 86*

*Ceilings • 86*

*Wall Coverings • 87*

*Countertops • 88*

*Windows • 89*

*Mini-Blinds • 90*

*Day/Night Shades • 90*

**STORAGE - Short Term • 90**

**STORAGE - Long Term • 91**

**CHECKLIST - Winter Storage • 94**

**STORAGE - Removal • 94**



**EXTERIOR CARE**  
**Corrosion**

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: Exercise caution when cleaning the radiator charge air cooler package. Damage to the fins can result when using a high pressure washer or steam cleaner. 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.

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## 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.



**NOTE: 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.

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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.

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- Clean frequently with high pressure water from a hose. The use of mild detergent will speed the cleaning process. Do not use harsh alkalis, alcohol or acidic cleansers. A secondary hand washing with a soft cloth may be required to remove some stubborn road films.
  - When the tires are removed, the entire wheel must be cleaned and inspected. With a wire brush or sandpaper remove dirt, corrosion or any foreign materials from the tire side of the rim. Do not use a wire brush or other abrasive substances to remove dirt and corrosion on the polished surface of the wheel.
  - To maintain the original appearance of the aluminum wheels the following procedures are recommended:

### ***Care & Maintenance of Aluminum Wheels***

1. After installing new wheels (prior to operating your 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 appearance surface on Accu-Forge Wheels, wax the cleaned surface with a high quality car wax.
6. Clean the aluminum wheels as frequently as required to maintain their appearance.

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### **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 any 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.**

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### **Maintenance - Exterior**

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.

Periodic inspections of the fiberglass front and rear caps 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.

**Roof Care &  
Seal Inspections**

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 vehicle unattended with the slide room extended. If the vehicle 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. All joints and seams should be inspected at least twice a year and recaulked 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:****Acryl-R:**

Acryl-R is used on all roof openings such as vents, skylights, any roof mounted antennas and ladder roof mounts. The sealant should be applied only where the equipment bases meet the roof. Clean the old sealant that is lifting before applying with new. Make sure the roof is dry and free of dirt. This product is usually found in a caulking tube. Care should be used when near an edge, as the product will spread out. Masking tape may be used to mask around area to avoid mishaps. The roof air conditioners use a closed cell foam base gasket. No sealants are required. The roof air conditioners should be checked for tightness by the four mounting bolts located in each interior corner of the air conditioner roof opening. Torque specification is 40-50 in/lbs. The base gasket should be compressed to approximately one half inch.

**Clear Silicone Sealant:**

Primarily this product is 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.

**Black Urethane:**

This product is used for sealing the windshields. It was not designed to fill holes or other imperfections. Black urethane comes in a tube and it applies much the same way as silicone does. Clean up using solvents such as paint thinner. Gloves are required as this material is hazardous.

**Acrylic Sealants (geocel 2300):**

This product is 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.

**Spray Foam:**

This product is used as a sealant where a hole has been made for items such as water lines or wires that are coming through a floor opening.

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## **INTERIOR CARE**

### ***Fabrics***

The fabrics have been manufactured with the same quality found in a furniture store. 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. The sofa, pillows, dinette cushions, living area chair, driver/passenger seating and window treatments have been treated with *Scotch Guard* to prevent overall water spots and soiling. Frequently used items will wear accordingly and may require more attention than those items not regularly used.

**Use the following guidelines for cleaning your 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 specific backings 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 an overall cleaning.

**Fabric Cleaning Codes:**

The codes listed below refer to cleaning instructions recommended by the fabric manufacturer for specific fabrics. The “Fabric Specification Charts” (located on the following pages) list specific fabric codes under “Cleaning Code.”

“**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.



**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.**

“**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.

“**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.

**\*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 SPECIFICATION CHART - Care & Cleaning

FABRIC	CONTENT	CLEANING CODE	WHERE USED
<b>CLARET .485</b>			
Philadelphia Harvest	51.8% Acetate, 48.2% Polyester	WS	Sofa, Dinette Cushion, Living Room Lambrequin
49776-0114 0003	100% Cotton	S	Chair, Living Room Pillow, Living Room Lambrequin
Abington Boardeaux	55.5% Acetate, 45.5% Polyester	WS	Free Standing Dinette, Living Room Pillow, Living Room Lambrequin, Bed Room Lambrequin
Bellini 216 Wheat	100% Polyester	WS	Living Room Lambrequin
Avonlea KTF5618-7 Sage	95% Cotton, 5% Linen	WS	Bedspread, Bed Room Pillow, Bed Room Lambrequin
Malindi 008 Current	100% Polyester	S	Bed Room Accent, Bed Room Pillow, Headboard, Bed Room Lambrequin
Pearl Natural	100% Polyester	WS	Windshield
Tumbleweed RVAA New Oyster	Leather		Leather
Tumbleweed New Oyster	Vinyl		Vinyl
<b>OAK GLEN .486</b>			
Lancaster 222-5585	72% Acrylic 18% Polyester	W	Sofa, Dinette Cushion, Living Room Lambrequin
28940 Dewberry Cilantro 28940-A7UU	71% Cotton, 29% Polyester	S	Chair, Living Room Pillow, Living Room Lambrequin
Spiro Glyph U13194 EE Slate	60% Rayon, 40% Polyester	S	Living Room Pillow, Free Standing Dinette
Bellini 216 Wheat	100% Polyester		Living Room Lambrequin
20123 33 Beige	100% Cotton	P	Bedspread, Bed Room Pillow, Bed Room Lambrequin
Krinkle 13 Taupe	100% VisalIntrinsic	*W	Bed Room Accent, Bed Room Pillow, Headboard, Bed Room Lambrequin
Pearl Natural	100% Polyester	WS	Windshield
Tumbleweed RVAA New Oyster	Leather		Leather
Tumbleweed New Oyster	Vinyl		Vinyl

FABRIC	CONTENT	CLEANING CODE	WHERE USED
<b>FLINT .487</b>			
7000-5 097-068*	97% Rayon, 3% Polyester	S	Sofa, Living Room Pillow, Living Room Lambrequin
F-68187-01100002	49% Rayon, 51% Polyester	S	Chair, Living Room Pillow, Dinette Cushion
Spiro Glyph U13194 EE Seagull	60% Rayon, 40% Polyester	S	Living Room Pillow, Bed Room Pillow, Bed Room Lambrequin
Burgess 9190 M028458-006	48% Cotton, 52% Rayon	Dry Clean	Free Standing Dinette, Living Room Lambrequin
Krinkle 13 Taupe	100% Polyester VisalIntrinsic	*W	Living Room Lambrequin
35048 95C0001Sand	50% Cotton, 50% Linen	S	Bedspread, Bedroom Lambrequin
35045 92C0001 Oatmeal	50% Cotton, 50% Linen	S	Bed Room Accent, Bed Room Pillow, Headboard, Bed Room Lambrequin
Pearl Natural	100% Polyester	WS	Windshield
Tumbleweed RVAA Taupe	Leather		Leather
Tumbleweed Taupe	Vinyl		Vinyl
<b>FAIRWAY .488</b>			
F-0109433/0-1130031	16% Polyester, 34% Cotton, 50% Linen	S	Sofa, Living Room Pillow, Dinette Cushion, Living Room Lambrequin
49776-0112-0002	100% Cotton	S	Chair, Living Room Pillow, Living Room Lambrequin
F-30093 01130020	23% Polyester, 28% Cotton, 49% Linen	S	Free Standing Dinette, Living Room Pillow, Bed Room Lambrequin
Sumar/Rembrandt Mocha	52% Cotton, 48% Viscose Rayon	S	Bedspread, Bed Room Pillow, Bed Room Lambrequin
Krinkle 16 Bone	100% Polyester VisalIntrinsic	*W	Bed Room Accent, Bed Room Pillow, Headboard, Living Room & Bed Room Lambrequin
Pearl Natural	100% Polyester		Windshield
Tumbleweed RVAA New Oyster	Leather		Leather
Tumblewood New Oyster	Vinyl		Vinyl

Several areas of the motorhome can be covered in vinyl, such as the dash and items of furniture. 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 they are 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 rinses. Moderate scrubbing with a medium bristle brush will help to loosen soil from the depressions 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.



**CAUTION:** Lacquer solvent will cause immediate irreparable damage to the vinyl. Do not use wax on any vinyl upholstery, as it will cause premature cracking. Dilute chlorine bleach before using. Never use full strength bleach. 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.

**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.



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

**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, as 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.



**NOTE: Vinyl requires periodic cleaning to maintain its appearance and to prevent the buildup of dirt and contaminant's that may permanently stain or reduce the life of the vinyl if left untreated. The frequency of cleaning and procedures used depend upon the amount of use and the environmental conditions in which the vinyl is subjected. Vinyl tears or holes 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.**

**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. Let it 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. Let 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.**

---

**Leather**

**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	SPOT REMOVAL KIT	CALL PROFESSIONAL	PERMANENT CHANGE
<b>SPOTS</b>									
Acid				2		1		3	*
Acne Medication		1		2	5	4	3	6	*
Alcoholic Beverage			1	4	3	2			*
Ammonia				2	1				*
Bleach		1	2					3	*
Blood		1	3		2	4			
Candle Wax	1					2			
Cement & Glue	2	1	3		5	4	6		*
Chalk		1	2						
Charcoal		1	2						
Chewing Gum	1								
Coffee			1	3	2		4	5	*
Cosmetics		2	1	3	6	5	4	7	*
Crayon	1		2	3					
Drain/Toilet Cleaner			2	1	3			4	*
Dye	1		2		4	3	5	6	*
Food			1	4	3	2	5	6	*
Fungicides/Insecticides/Pesticides	1		2	5	4	3	6	*	
Furniture Polish (Water Based)			1	4	3	2	5	6	*
Furniture Polish (Solvent Based)	2	1	3	6	5	4	7	8	*
Furniture Stain	2	1	3	6	5	4	7	8	*
Graphite		1	2						
Grease	1	2	3				4	5	*
Ink	2	1	3	6	5	4	7	8	*
Iodine	1		2	5	4	3	6	7	*
Lipstick	2	1	3	6	5	4	7	8	*
Medicine	2	1	3	6	5	4	7	8	*
Merthiolate			1	4	3	2	5	6	*
Nail Polish	2	1	3				4	5	*
Oil	1		2	4		3		5	*
Paint	2	1	3				4	5	*
Plant Food			1	4	3	2	5	6	*
Rust			2	3	1		4	5	*
Shoe Polish	2	1	3	5		4	6	7	*
Soft Drinks			1	4	3	2	5	6	*
Soot	1		2	3				4	*
Tar	1						2	3	*
Toothpaste			1						
Urine			1		2		3	4	*
Vomit			1	4	3	2	5	6	*

**Spot Removal Procedures:**

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

**Cleaning Solutions:**

**(A) Dry Cleaning Fluid:** A nonflammable spot removal liquid, available in grocery and hardware stores.

**(B) Nail Polish Remover:** Any acetate, which often has a banana fragrance. Do not use if it contains acetone.

**(C) Detergent Solution:** Mix two cups of cold water and 1/8 teaspoon mild liquid detergent (no lanolin, non-bleach).

**(D) Warm Water:** Lukewarm tap water.

**(E) Vinegar Solution:** One cup white vinegar to one cup water.

**(F) Ammonia Solution:** One tablespoon household ammonia to one cup water.



- (G) Spot Removal Kit:** Available from retail carpet stores or professional cleaners.
- (H) Call Professional:** Additional suggestions, special cleaning chemicals or the ability to patch the area might be available.
- (I) Permanent Change:** Due to the nature of the stain, there may be color loss. The carpet has been permanently dyed or the carpet yarns have been permanently damaged.



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

Various types of surfaces that vary in porosity and abrasive finishes are used a motorhome. These surfaces can be very difficult to protect and maintain. Regular maintenance is all it takes to keep the tile in the motorhome looking showroom new. Once the slide-out has been extended, be sure to keep the tile floor clean to prevent dirt from scratching the tiles when retracting the slide-out.

### ***Floor - Tile***



**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 tiles and maintain their luster. If moderate staining occurs, cleaning with a window cleaner such as Windex should do the job. If preferred, use a mild solution of hot water and all-purpose cleaner for tile floors, walls and countertops. Rinse 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. Additionally, never use sealers on unglazed tiles. With the exception of terracotta, which may be oiled or waxed, it won't be necessary to polish or buff the tiles to maintain their 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 can 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 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.

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## **Shower - Cleaning**

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 the 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 the sealant, remove the old sealant using a sharp instrument. Apply a new sealant, which can be found at recreational vehicle supply stores.

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## **Ceilings**

The ceiling of the motorhome can be a variety of materials or fabrics, many of which require little care or maintenance.

### **Vinyl:**

The soft touch padded vinyl ceiling can be cleaned using the procedures discussed in the vinyl article of this section. Generally, a mild soap and water is sufficient for cleaning vinyl.



**NOTE:** Use care not to puncture the padded vinyl.

### **Ozite:**

To clean the ozite ceiling, mix a solution of 8 oz. warm water, 4 oz. white vinegar, 1 oz. bleach and 4 oz. club soda. Spritz on and blot dry. Do not rub or scrub as this may damage the surface.



**NOTE:** Do not oversaturate the Ozite surface as this may damage the ceiling.

### **Hardwood Vinyl & Decorated Paneling:**

Hardwood vinyl and decorated paneling are sensitive and demanding materials. Certain cleaning agents will affect the surface on both printed and unprinted vinyl. Use only a mild, non-abrasive detergent and warm water with a soft cloth or sponge when cleaning to protect the material.

Under no circumstance should bleach, alcohol, oil-based spray cleaners or cleaning agents with solvents, citrus oil or harsh chemicals be used. Other liquid spray cleaners may also cause damage to the material.

**Wall Coverings**

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 Satinesque Wall Covering:**

Any stain should be removed as quickly as possible to minimize any reaction between the staining agent and the 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.

**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 the gum with an ice cube to cool and harden it. 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.

### **Care for the Tower Wall Covering:**

Remove ordinary stains with mild soap and warm water. Sponge it 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.

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## **Countertops**

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

### **Routine Care:**

The motorhome countertops are finished with one type of finish: matte/satin. All solid surface sinks and bowls have the 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 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 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, the 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 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.**

**Water Spots:**

Any glass will develop water spots if the glass is 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 through 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.

---

**Windows**

### **Mini-Blinds**

- To maintain the mini-blinds, on a frequent basis vacuum with the brush attachment or use a dusting tool (available on the market) designed specifically for mini-blinds.
- Wash the mini-blinds with mild soap and water in a tub or hang the blinds on a fence or wall and gently rinse them with a hose.

---

### **Day/Night Shades**

The day/night shades are made of a polyester blended material. Use the following guidelines to care and maintain the day/night shades:

- Vacuum with a brush attachment, or use a dusting tool on a regular basis.
- Use a weak solution of dish soap and water to spot clean the blinds with a slightly damp cloth. Avoid soaking or saturating the shades with water. This will break down the finish of the shade.
- 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 folded up.

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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 LP-Gas valve.
- Remove all articles from refrigerator/freezer and clean thoroughly. Prop doors open to prevent mildew.
- The 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 the battery cut-off switch OFF.
- If applicable, disable auto-genstart feature.
- Batteries should be stored fully charged. Batteries stored in a discharged state will readily freeze.
- If possible, park the motorhome leaving the batteries accessible. A battery may be charged or changed without moving the motorhome.
- If available, leave the motorhome hooked to shore power. Leave the main battery disconnect switches ON.

- Careful placement of a small heat source in the interior will help control moisture. Desiccate filter systems will help remove interior moisture.
- If AC power is not available turn main battery disconnect switches OFF.
- If possible, store the motorhome inside a storage building.
- If stored outside, inspect all seams and seals for possible leakage.
- Store the motorhome with a full fuel tank to help against 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.

---

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.

## **STORAGE** **- Long Term**

There are preventative measures which should be taken and preferable situations to use 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 the battery cut-off switch to the OFF position.
- 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 to 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 outdoors, 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.**

**If AC power is available:**

Shore Power cord should be plugged in. Both main battery disconnect switches will remain ON. The inverter will charge both the house and engine battery banks. A 30 amp shore power service will be more than adequate.



**CAUTION: A 20 amp service using light duty extension cords and the required adapters create serious voltage losses. Line voltage loss and the resistance at each electrical connection is a hazardous combination and should be avoided. Damage to sensitive electronic equipment may result!**

**Type of surface to park and store the motorhome on:**

The type of surface the motorhome is parked upon will have an effect 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 areas still allow moisture to evaporate from the ground, through the gravel and to the underside of the motorhome.
- Storage buildings with concrete floors, or heated storage facilities, greatly reduce the amount of moisture accumulation and protect the motorhome from moisture damage.
- Wet, oily or greasy areas should be avoided. Highly reflective surfaces, such as sand or snow, should also be avoided. Finally, heat absorbent surfaces, such as black asphalt, will cause problems.

**If the motorhome is stored outdoors:**

- The interior should be heated to help prevent mold and mildew growth. Moisture removing desiccate filter systems are available from hardware and RV supply stores. Place the filter system inside the motorhome to reduce 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 prevent moisture from condensing at the top of the tank. Diesel fuel is an organic material which will develop a microbe growth (black slime). Fuel stabilizers may be added to help prevent the microbe growth. Consult the Cummins manual or a Cummins distributor for further detailed information on fuel stabilizers and additives.

**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 lining upon the first few applications, reducing the friction action of the lining.

**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 upon 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 or Aqua Hot motors, heat exchangers and powered roof vents.

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## CHECKLIST - Winter Storage

- **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 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. If applicable, 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** - Diesel fuel tank should be full of fuel.

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## STORAGE - Removal

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.
- With the engine 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 Section**. 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 inspecting 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.
- Ensure the batteries are being charged. 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. Inspect the body for scratches or other damage; touch up or repair as necessary. Flush the underside thoroughly.
- Run through the operational checks for steering, brakes, engine and transmission. Operate the motorhome slowly during these checks to allow sufficient circulation of fluids and resetting of the components.
- If desired, have the dealer or repair center check your preparation to correct any defects or make necessary adjustments.

# Diplomat

## SECTION 4 APPLIANCES

<b>INTRODUCTION • 99</b>	
<b>REFRIGERATOR • 99</b>	
<i>Operation Specifics • 100</i>	
<i>Tips • 100</i>	
<i>Refrigerator Controls • 101</i>	
<i>Inverter Mode Operation • 101</i>	
<i>Alarm • 101</i>	
<i>Doors • 102</i>	
<i>Control Panel - 800 Series • 102</i>	
<i>Manual Mode Operation- 800 Series • 103</i>	
<i>Automatic Mode Operation- 800 Series • 103</i>	
<i>Control Panel - 1200 Series (Opt) • 103</i>	
<i>Manual Mode Operation- 1200 Series • 103</i>	
<i>Automatic Mode Operation- 1200 Series • 104</i>	
<i>Ice Maker Operation (Opt) • 104</i>	
<i>High Humidity Operation • 104</i>	
<i>Cooling Unit Fans (Four Door Models) • 104</i>	
<i>Defrosting the Refrigerator • 104</i>	
<i>Cleaning the Refrigerator • 105</i>	
<b>MICROWAVE/CONVECTION OVEN • 105</b>	
<i>Operation • 108</i>	
<i>Microwave Cooking • 109</i>	
<i>Convection Cooking • 111</i>	
<i>Tips • 112</i>	
<i>Care &amp; Cleaning • 113</i>	
<b>COOKTOP • 113</b>	
<i>Operation • 113</i>	
<i>Lighting Top Burners • 114</i>	
<i>Burner Grate • 114</i>	
<i>Tips • 115</i>	
<i>Cleaning &amp; Maintenance • 115</i>	
<b>OUTSIDE BARBEQUE GRILL (OPT) • 116</b>	
<i>Operations • 116</i>	

<b>WALL THERMOSTAT • 118</b>	
<b>AIR CONDITIONER - ROOF • 119</b>	
<i>Return Air Filters • 120</i>	
<i>Operation • 120</i>	
<b>FURNACE • 121</b>	
<i>Operation • 121</i>	
<i>Using the Furnace • 122</i>	
<i>Tips • 122</i>	
<i>If Furnace Fails to Light • 122</i>	
<b>WATER HEATER • 123</b>	
<i>Before Using the Water Heater • 123</i>	
<i>Burner Compartment • 124</i>	
<i>Water Heater Bypass System • 124</i>	
<i>Pressure - Temperature Relief Valve • 124</i>	
<i>Draining &amp; Storage • 126</i>	
<i>Tips • 126</i>	
<i>Troubleshooting • 126</i>	
<b>WASHER/DRYER PREPARED • 127</b>	
<b>WASHER/DRYER (Opt) • 127</b>	
<i>Operating Instructions • 128</i>	
<i>Cleaning the Drain Screen • 128</i>	
<i>Cleaning the Washer/Dryer • 129</i>	
<i>Winterizing the Washer/Dryer • 129</i>	





## INTRODUCTION

This section covers operation and care of various appliances found in the motorhome. The motorhome is equipped with a refrigerator, cooktop, 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 all three.



**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 manual.**



**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 different type of refrigerant. In a household refrigerator the compressor pumps refrigerant vapor into a condenser where the heat from the refrigerant dissipates and the vapor changes to a liquid. The liquid refrigerant is pumped through a metered orifice or capillary tube at the evaporator. At this time the refrigerant changes from liquid to a vapor. This change cools the evaporator. Air is then blown across the evaporator and into the interior of the refrigerator. This system is efficient as long as 120 Volts AC is available; however, this does not allow the freedom a recreational vehicle is designed to give.

The motorhome refrigerator uses a combination of fluids and gas for refrigeration: ammonia, water, sodium chromate and hydrogen gas. This combination is put into a pressurized cooling unit at approximately 350 psi, is heated to a gaseous state and then rises to the top of the cooling unit into a condenser where it forms droplets as it cools. As the vapor condenses it "extracts or absorbs" heat out from the inside of the refrigerator. Using gravity the droplets return through the absorber coils to the absorber vessel to start the process again. To insure longevity and proper operation of the cooling unit follow the specific instructions for use and care. With the proper care and maintenance the refrigerator should provide years of trouble-free service.

## REFRIGERATOR

## Operation Specifics

The refrigerator operates from either LP-Gas or 120 Volts AC electric. Controls are electronic which require the DC Voltage to be no higher than 15.4 Volts DC or lower than 10.5 Volts DC. The AC voltage limits are 132 Volts AC (Volts Alternating Current) maximum and 108 Volts AC minimum.

The refrigerator (from front view) needs to be leveled within 3° side to side and 6° front to back. Using a torpedo or bulls eye (fence post) level, place the level onto the freezer plate. The level should be within the circle by a half of a bubble. Generally, this is within comfortable living conditions.

The heat source for the cooling unit is supplied by an electric heating element or an LP-Gas flame. The heat source, which is calibrated in BTU's (British Thermal Units), is concentrated to a specific area of the cooling unit. Refrigerator operation in an "off level" condition separates the sodium chromate and crystallizes from the heat source, which blocks the recirculation action of the cooling unit and causes accumulative, irreparable damage.

The LP side of the refrigerator and the LP-Gas pressure need to be serviced yearly, depending on use. Over time the BTU rating can change, which will affect the refrigerator's performance. Ambient air temperature and humidity can also affect its performance and function. The BTU rating lowers when operating LP-Gas at an altitude higher than 5,500 feet. This affects the refrigerator's performance. If possible, switch mode operation to 120 Volts AC electric while at a higher altitude.



**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 the box or in the outside access compartment. This can be an indication of a refrigerant leak. Contact an authorized repair facility.**

---

## Tips

### Tips for Efficient Refrigerator Operations:

- If possible, cool items first before putting them into the refrigerator.
- Keep the doors shut. Decide what is wanted before opening the door.
- Allow the refrigerator 24 hours of operation before actual use to help it get a "head start" with the refrigeration process.
- A box of open baking soda will help absorb food odors. Wipe up any spilled soda.



**NOTE: Keep the interior box temperature at or below 54° F to reduce the possibility of food spoilage. The refrigerator works harder to keep a low box temperature, especially in hot, humid climates. Low box temperature may also add quicker frost build-up.**



**Refrigerator Controls**

The refrigerator controls are DC (direct current) operated through an electronic circuit board. The refrigerator, which operates from heat as described above, gets its heat source two different ways: an electric heating element or a flame from LP-Gas. Mode operation and temperature selection is made by controls on the face of the refrigerator. In order for the refrigerator to operate the house batteries must be charged, the LP-Gas valve on, the water valve on (ice maker option only) and the refrigerator AC cord plugged in (located in outside refrigerator access door). If the controls do not light up, check the house battery charge status or see if the 12 Volt wires are plugged into the refrigerator's circuit board (located outside in the refrigerator access door).

While the motorhome is traveling the ice maker may be operated using the 120 Volt AC electric mode to keep the freezer contents cold. The electrical combination of the engine's alternator and the inverter will supply the power necessary to operate the ice maker on 120 Volts AC. Operating the refrigerator on LP-Gas when refueling can be dangerous. Use the AC electric mode when in travel to avoid this situation. Disable this feature when the engine is turned off. House battery power will be quickly consumed when using the inverter to operate the ice maker on AC electric. At location, hook to shore power, start the generator or switch refrigerator operation to LP-Gas. Turn the inverter off when not in use.

**Inverter Mode Operation****To enable this feature:**

1. Turn the inverter ON.
2. Turn the ice maker ON. Select AC power operation.

**To disable this feature:**

1. Turn the inverter OFF.
2. Hook to shore power, start the generator or switch operation to LP-Gas.



**NOTE: Use this feature only when the engine is running. Failure to disable this feature with the engine off will result in dead house batteries. Hook up to shore power, start the generator or switch refrigerator operation to LP-Gas.**

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

**Alarm**

1. DC or AC voltage is higher or lower than allowed specifications.
2. Refrigerator is set to auto mode and the 120 Volts AC is discontinued.
3. Liquid Petroleum Gas mode fails to light initially or fails to light after a period of operation.
4. Door has been left open longer than two minutes.
5. The circuit board detects a failure resulting in a code being displayed.



**NOTE: If the alarm sounds, note the code in the LED display and turn the refrigerator off to silence the alarm. Refer to the manufacturer's manual for the list of codes and their meanings.**



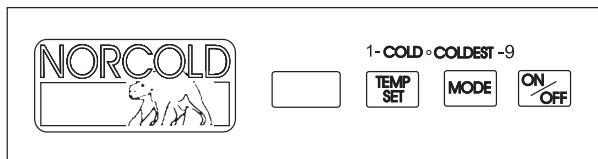
**WARNING:** Make sure all flames are extinguished and the LP-Gas valve is off before refueling. LP-Gas and gasoline are highly flammable which can ignite, resulting in an explosion, fire or death. Many states have passed laws regarding having the LP-Gas valve open while traveling. Know the laws for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

## Doors

The refrigerator doors are positive lock style doors that close with a “click” to prevent accidental door opening while traveling. 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 build-up. A completely closed refrigerator in storage is a perfect habitat for molds and bacteria to grow. To use the storage feature, open doors approximately a half inch and slide the latch into the cut-out of the strike plate.

## Control Panel - 800 Series

The refrigerator control panel is between the freezer compartment and the fresh food compartment. A 12 Volt DC power supply is necessary to maintain the operating control functions of the refrigerator.



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- **ON/OFF Button** - Starts and shuts down the refrigerator.

- If the refrigerator is shut down, push the ON/OFF button to start the refrigerator in auto mode.

- If the refrigerator is operating, push and hold the ON/OFF button for two seconds to shut it down.

- **TEMP SET Button** - Controls temperature adjustments for freezer and fresh food compartment. The temperature adjustment selected does not change if the operation mode of the refrigerator changes.

- Push the **TEMP SET** button and the temperature setting “1-9” appears in the center display.

- Push and hold the **TEMP SET** button and the temperature setting changes.

- Number “9” is the coldest setting.

- **MODE Button** - Controls the operation mode of the refrigerator.

- Push and hold the **MODE** button and each of the four operating modes of the refrigerator flash one at a time in the center display.

- There is one automatic mode of operation and three manual modes of operation.

- Release the **MODE** button when the mode of operation selected appears in the center display.

**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 controls either change to a different energy source or the gas safety valve closes and **F** is displayed. If the gas does not ignite after several attempts consult your dealer or authorized Norcold service center.

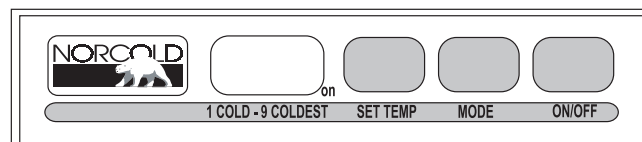
**Manual Mode  
Operation  
- 800 Series**

When the **AUTO** mode is selected the refrigerator automatically selects the most efficient energy source that is available for operation. If a more efficient energy source becomes available the refrigerator controls change from the current energy source to the more efficient energy source. The controls select the energy source in this sequence.

1. When 120 Volts AC is available to the refrigerator “**AU AC**” flashes in the center display. This means that 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 to the refrigerator “**AU LP**” flashes in the center display. This means that the refrigerator is operating on LP-Gas.
3. After the refrigerator is operating, press the **TEMP SET** button and adjust to the desired temperature.

**Automatic Mode  
Operation  
- 800 Series**

- **ON/OFF Button** - Press this button to turn the refrigerator ON. Press and hold this button until the lights are no longer lit to turn the refrigerator OFF.
- **LED Display** - This screen is used for fault code display.
- **MODE Button** - Press and hold this button to cycle the refrigerator through the different modes available: AUTO, AC and LP modes. Release the button when the desired mode is displayed.
- **TEMP SET Button** - Press and hold the button to select the desired temperature setting. Five settings are available, from COLD to COLDEST.

**Control Panel  
- 1200 Series (Optional)**

The Refrigerator Control Panel requires 12 Volt DC to operate.

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This mode will lock the refrigerator into either LP-Gas or electric AC operation. Press and hold the **MODE** button until LP or AC is displayed. Release when the desired function is lit. The Alarm will sound and a code will be displayed if the function selected is interrupted or a failure occurs. Note the code and turn the refrigerator off to silence the alarm. Refer to the manufacturer's manual for a list of codes and their meanings.

**Manual Mode  
Operation  
- 1200 Series**

### **Automatic Mode Operation - 1200 Series**

This feature will automatically select 120 Volts AC over LP-Gas operation. If 120 Volts AC is available it will use this source for operation until AC service has been discontinued. When AC is discontinued the alarm will sound and the refrigerator will automatically switch to LP-Gas operation. If the refrigerator fails to light the alarm will sound and a code will be displayed.

Press and hold the **MODE** button until **AUTO** is displayed, release the button. Press and hold the **TEMP SET** button until desired temperature is displayed, release button. In **AUTO** mode, AC or LP will remain lit for 10 seconds upon initial start or when mode has changed.

---

### **Ice Maker Operation (Optional)**

The ice maker works from 120 Volts AC only. The ice maker will start to function only after the freezer temperature is low enough. City water or the water pump must be on and the valve (located under the refrigerator) for the water supply line to the ice maker must be on. Pulling the metal arm (bail) down will turn the ice maker on. Pushing the arm up will turn the ice maker off.

If the ice maker is in operation while the motorhome is in motion water may spill out of the ice tray. **Raise the ice maker arm to stop ice production while the motorhome is in transit.**



**NOTE: 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 ice maker without water pressure supplied to the refrigerator. This can cause damage to the ice maker assembly.**

---

### **High Humidity Operation**

The refrigerator is equipped with a heating element located in the flapper on the left door (four door model) or in the door (two door model). The heating element is activated when the refrigerator is turned on to any mode to help prevent moisture build-up in high humidity conditions.

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### **Cooling Unit Fans (Four Door Models)**

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

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### **Defrosting the Refrigerator**

Turn the refrigerator off and remove all items. Leave the drip tray under the cooling fins. Do not use heating guns, hair dryer or sharp objects to remove frost build-up as these can damage the interior. Leave all doors open. Defrost time can be shortened using trays of warm water. Wipe off excess water using paper towels or cotton cloth.



**CAUTION: Do not use a hot air blower. Permanent damage could result from warping metal or plastic parts. Do not use a knife, ice pick or any other sharp tool to remove ice from the freezer as they can create a leak in the ammonia system.**

***Cleaning  
the Refrigerator***

Wipe using only cotton or paper towels. Products such as *Formula 409*, *Dawn* and *Fantastik* are acceptable cleaners. Do not use scouring pads or abrasive cleanser as these can damage the interior finish.



**NOTE: Do not use abrasive cleaners, chemicals or scouring pads. They can damage the interior of the refrigerator. “Dawn,” “Fantastik” and “Formula 409” are the brand names of three products recommended for use. Wash the interior with a mild cleaner or a solution of liquid dish detergent and warm water. Rinse with a solution of baking soda and clean water. Dry with a clean cloth.**

The microwave oven is operated 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 or the shorter the cooking time. Inside the microwave is a turntable that rotates when the microwave is operating. This will help heat the food evenly. The turntable can be turned off if a baking dish or other large item is used. The microwave is designed to sit over a range or cooktop. When cooking from the cooktop use the 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/  
CONVECTION OVEN**

The microwave offers many different features. Some include varied cooking times with different power settings: automatic sensor cooking, a kitchen timer, metric to American conversion chart (which includes temperature and weight), on screen programming help, childproof lockout and auto defrost cycles. The screen can display one of three different languages.

After placing the food in a suitable container, open the oven door and put it on the glass tray. The glass tray and roller guide must always be in place during cooking. Ensure the door is firmly closed before use.

**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 abrasives 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. Simply 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.



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

#### **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. Ensure food is in the microwave during operation to absorb the microwave energy. The magnetron, cycling on and off, may be heard for power levels less than 100%.

Condensation is a normal occurrence in microwave cooking. The moisture within foods, and the room humidity, will influence how much moisture condenses in the microwave. Covered foods will not usually produce as much condensation as foods that are not covered.

#### **About Cooking:**

- Food should be arranged with the thickest areas towards the outside of the dish.
- Monitor cooking times. Use the shortest amount of time required for cooking and add time as needed. For popcorn, follow product instructions and carefully monitor for the duration of popping time.
- Cover the food while cooking to prevent splatter and reduce condensation.
- Stir the food from the outside of the dish to the center, once or twice, between cooking.
- Turn food over during cooking to speed cooking times. Large food items should be turned at least once during cooking time.
- Use standing times to prevent overcooking. Covered food will continue to cook after it is removed from the microwave oven.



- Check for indications that the food is thoroughly cooked.
  - Food is steaming throughout, not just around the edges.
  - Poultry thigh joints come apart and move easily.
  - Meat or poultry is not pink in color.
  - Fish is opaque and flakes easily with a fork.
  - Center bottom of the dish is very hot to touch.

FOOD	DO	DO NOT
Eggs, Sausages, Fruits & Vegetables	<ul style="list-style-type: none"> <li>• Puncture egg yolks before cooking to prevent bursting.</li> <li>• Pierce skins of potatoes, apples, squash, hot dogs &amp; sausages to allow steam to escape.</li> </ul>	<ul style="list-style-type: none"> <li>• Cook eggs in shells.</li> <li>• Reheat whole eggs.</li> </ul>
Popcorn	<ul style="list-style-type: none"> <li>• Use specially bagged popcorn for use in the microwave.</li> <li>• Remove popcorn when popping slows to 1 or 2 seconds in between pops. Use the POPCORN setting.</li> </ul>	<ul style="list-style-type: none"> <li>• Pop popcorn in regular brown bags or glass bowls.</li> <li>• Exceed maximum time on popcorn package.</li> </ul>
Baby Food	<ul style="list-style-type: none"> <li>• Transfer baby food to small dish &amp; heat carefully. Stir often. Check temperatures before serving.</li> </ul>	<ul style="list-style-type: none"> <li>• Heat disposable bottles.</li> <li>• Heat rubber nipples.</li> <li>• Heat baby food in original jar.</li> </ul>
General	<ul style="list-style-type: none"> <li>• Cut filled baked goods after heating to release steam.</li> <li>• Stir liquids before and after heating to avoid boiling water.</li> <li>• Use deep bowls for cooking liquids or cereals to avoid boiling out of the containers.</li> </ul>	<ul style="list-style-type: none"> <li>• Heat or cook in closed jars or air-tight containers.</li> <li>• Use for Canning. Cooking and heating may not destroy bacteria.</li> <li>• Deep fat fry.</li> <li>• Dry wood, gourds, herbs or wet paper.</li> </ul>

A meat thermometer is the best way to ensure that the food is cooked. The meat thermometer should be inserted into the thickest part of the meat, away from bone or fat. Most food should range between 160° F to 180° F. Never leave the thermometer in during cooking as it can shatter.

#### **Microwave Cooking Safety:**

- Always use pot holder to prevent burns when handling utensils that are in contact with hot food. Enough heat can transfer from food through utensils to cause skin burns.
- Stay near microwave when cooking and check frequently during cooking to prevent overcooking.
- Never use the cavity as a storage area for cookbooks or other items.
- Avoid steam burns by directing steam away from face and hands.

## Operation

The microwave/convection oven operates from 120 Volt AC supplied by shore power. The microwave has a power output of 850 watts and a convection heater output of 1,400 watts. Oven capacity is 1.1 cubic feet.

The microwave/convection oven has the ability to cook food with heat like an electric oven or preheat the oven with heat and cook with microwaves. Other features include the ability to cook with microwaves and convection at the same time, sensor cooking and a built-in broiler. A brief overview of these features may aid in the operation of the microwave/convection oven.



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

### Safety Lock:

The microwave comes with a safety lock feature. This feature prevents the oven from operating accidentally. To use this feature:

- Press the **CUSTOM HELP** pad.
- Press the **1** pad.
- Press the **START/TOUCH-ON** pad.

The oven is now locked. If any button is pressed the word **LOCK** appears on the screen. The fan and hood light is still operational with the Safety Lock feature on. To return the oven to normal operation:

- Press the **CUSTOM HELP** pad.
- Press the **1** pad.
- Press the **START/TOUCH-ON** pad. The oven will resume normal operation.

### 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.**

### Kitchen Timer:

- Press the **KITCHEN TIMER** pad.
- Using the number pads enter minutes and seconds, or 00 if no seconds.
- Press the **START/TOUCH-ON** pad to begin timer. Timer end will be signaled by one long beep.

### Hood Light:

To turn the hood light on or off touch the **LIGHT** button.



**Ventilation Fan:**

Press the **FAN HI/LO** button once for high, twice for low and three times for off.

**Press the STOP/CLEAR pad to:**

- Erase, if you make a mistake during programming.
- Cancel the kitchen timer.
- Stop the oven temporarily during cooking.  
(Press the **START/TOUCH-ON** pad to resume.)
- Return the time of day to the display.
- Cancel a program during cooking (touch the pad twice).

**Turntable On/Off:**

- Press **TURNTABLE ON/OFF** pad to stop or start the turntable.
- Enter the cook time desired minutes and seconds.
- Enter power level desired.
- Press the **START/TOUCH-ON** pad.

**Microwave - Timed Cooking:**

The maximum amount of cooking time is 99 minutes and 99 seconds.

Be sure to enter minutes and seconds. If seconds are not desired enter 00.



**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 cooking in convection mode try to avoid using the inverter as the AC power source due to the high rate of battery consumption.**

Press and hold the **START/TOUCH-ON**. The microwave pad operates at 100% power until the pad is released. This mode can be used for up to three minutes and up to three consecutive cycles.

**Microwave Cooking****One Minute Cook Times:**

Press the **MINUTE PLUS** pad if one minute at full power is desired or to add one minute intervals to cooking time. The **MINUTE PLUS** pad must be pressed within one minute of closing the door, or during selected cooking time.

For safety the **MINUTE PLUS** feature will lock out if there is no microwave activity within one minute of closing the door. Use the **START/TOUCH-ON** pad to reset the one minute safety period.

**Microwave Cooking:**

To use 100% power, enter cook time by pressing the number pads. Press the **START/TOUCH-ON** pad to begin cook time. To use settings lower than

100% power, use the number pads to enter desired cooking time. Press the **POWER LEVEL** pad. Use the number pad to select desired power level. Press the **START/TOUCH-ON** pad to begin cook time.

**Multiple Sequence Cooking:**

If sequential cooking times with varied power levels are desired, press the **POWER LEVEL** pad and select desired power level. Use the number pad to enter cook time for the first interval. Press **POWER LEVEL** pad again, select desired power level, then enter cook time for the next time period. Press the **START/TOUCH-ON** pad to begin sequential cooking. The microwave can hold up to four sequential cook time periods. If full power is desired in any of the time periods, skip the power level step and 100% power is automatically selected.

**Keep Warm:**

Press the **KEEP WARM** pad during cooking time to automatically keep food warm for up to 30 minutes after cooking time has expired. To use this feature after cooking time has expired, or after the food has been removed, place the food back into oven and press the **KEEP WARM** pad.

**Defrosting:**

Defrosting can be done on manual time selection or use the microwave's CompuDefrost.

**Manual Defrost:**

Press the **POWER LEVEL** pad. Select number 3 for defrost power. Enter desired defrost time. Be sure to stir or break food apart at regular intervals.

**CompuDefrost:**

The microwave has automated defrost programs for different foods and weights. Press the **CompuDefrost** pad to enter this mode. Press **CompuDefrost** again to select between ground meat, steak or chicken. Use number pads to enter weight of food being defrosted. Press **START/TOUCH-ON** to begin defrost cycle.

**Sensor Cooking:**

The microwave has electronic sensors that sense moisture or humidity given off by the food during the cooking process. Electronic sensors will be affected if room temperature exceeds 95° F. To adjust the sensor cooking mode to allow for more or less cooking time, press the **SENSOR COOK** pad. Press the **POWER LEVEL** pad once to increase cooking time or twice to decrease cook time.

To use the sensor cooking mode, press the **SENSOR COOK** pad. Select the number or food desired from the library listed adjacent to the **SENSOR COOK** pad. Press the **START/TOUCH-ON** pad to begin sensor cooking.

## Convection Cooking

The interior of the microwave produces heat just as in a regular oven. The convection cooking mode has special options such as a broil mode, the ability to preheat oven by convection and use of microwaves to complete cooking or to preheat.



**NOTE: When using the convection oven feature, leave the turntable in place and do not restrict the rotation. This can damage the microwave.**

### Cooking with Convection:

Press the **CONVEC** pad. Press the numbered pad with the desired cooking temperature. Press the numbered pads for desired cooking time. Press the **START/TOUCH-ON** pad to begin convection cooking.

### Manual Broiling:

The Manual Broiling temperature is automatically preset to 450° F. Only the cooking time can be adjusted.

To use the broiler, press the **BROIL** pad. Enter amount of cooking time. Press the **START/TOUCH-ON** pad to begin preheating the oven. Four beeps will signal the end of the preheat cycle. Food can now be placed into the oven.

### CompuBroil:

The CompuBroil cooking method has programs preset for common foods like hamburgers, steaks, chicken and fish. Temperature and time are preset depending on the food quantity. The amount of cooking time can be adjusted to fit particular needs. The **POWER LEVEL** pad will vary the preset cooking time. **Press once for more time and twice for less time.**

To use the **CompuBroil** feature: Press the **CompuBroil** pad and select the food number from the food library next to the CompuBroil pad. Enter the number of pieces being broiled. Press the **START/TOUCH-ON** pad to begin the preheat cycle. A series of four beeps signal the end of preheat cycle.

### Automatic Mix Cooking:

This method combines both the convection oven and microwave at the same time. The microwave uses 30% power on **HIGH/MIX** and 10% power on **LO/MIX** while in this mode. The convection temperature can be changed from 100° F to 450° F. The default convection temperature is 325° F for both **HIGH/ MIX** and **LO/MIX**.

To use this feature: Select either **HIGH/MIX** or **LOW/MIX** and use the number pads to enter cooking time. Press the **START/TOUCH-ON** pad to begin the mixed cooking cycle.

### **CompuRoast or CompuBake:**

These features can be used for food items ranging from pastries and cakes to roasts, chicken and pork. The temperature is preset for both functions. Only the cook times can be tailored for individual preference by entering into either the **CompuRoast** or the **CompuBake** mode. Press the **POWER LEVEL** pad once for more cooking time and twice for less cooking time.

To use either function: Press the desired pad, enter the food type from list next to the mode used and enter the food type being cooked by using the number pad.

To use **CompuBake**: Press the **START/TOUCH-ON** pad to begin the preheat cycle.

To use **CompuRoast**: Enter the weight of item using the number pads. Press the **START/TOUCH-ON** pad to begin the preheat cycle. Four beeps will signal the end of the preheat cycle and the oven is now ready.

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### **Tips**

- Check the type of cookware being used to see if it is microwave or oven safe depending on the type of cooking being done.
- Gold paint or glaze may contain a trace amount of gold which is electrically conductive and not compatible for microwave. Hand-painted china commonly contains traces of metal.
- 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 paper towel or upside-down plate to help keep food splattering to a minimum. Place a paper towel on the turntable to keep clean-up at a minimum. Use paper towels with microwave use only.
- Clean 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.
- Some food wrappers may be foil lined. Check the wrapping carefully before cooking 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 the microwave was plugged in to verify AC power is present. If the test item works, contact an appliance repair facility to have the microwave checked.

**Care & Cleaning**

The exterior of the microwave is plastic and metal. The interior is metal. Do not use scouring pads, harsh or abrasive cleanser, 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.

**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 once 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. They may darken the filter material.
- Agitate the filter. Use a scrub brush to remove caked on grease.
- Rinse the filter thoroughly and shake it dry. Place the filter back into the opening, tip it upward and slide it to the end of the opening. Lock it in place. Be careful not to kink or warp the filter upon installation.

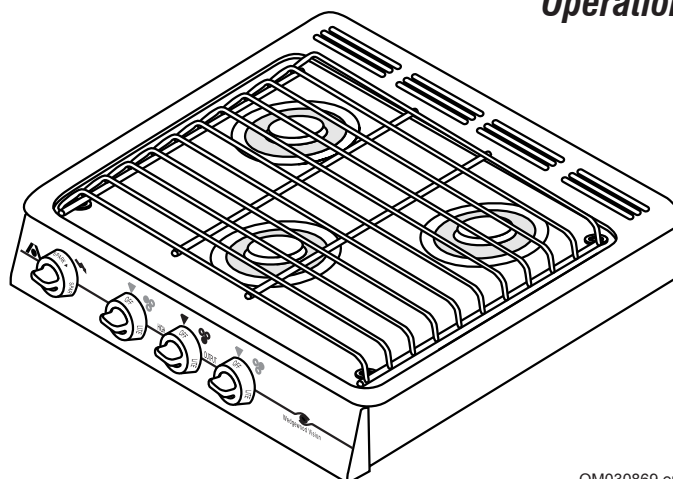
The cooktop uses LP-Gas only as a fuel source. The burners use a piezo type igniter. The cooktop should be used for cooking purposes only and not as a heating source. When the burner valve is opened the fuel source flows through the valve into the mixture tube. The fuel passes by a hole or venturi in 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.

**COOKTOP**

**The cooktop will operate when the following conditions have been met:**

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

To use the cooktop open the desired burner valve and rotate the igniter knob, clockwise, at the left hand side of the stove.

**Operation**

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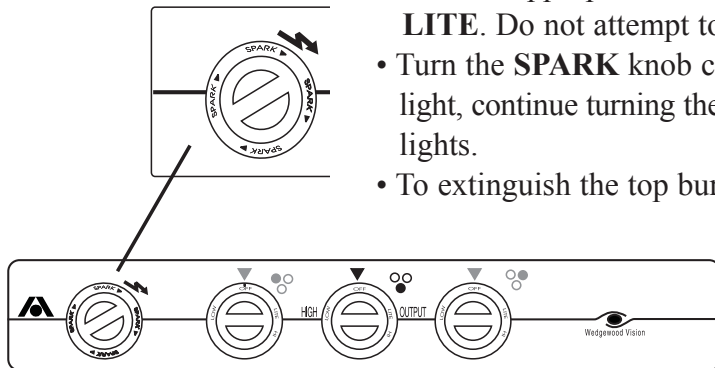
Before cooking on the range top the cover must be in full upright and folded position. Push the cover toward the outside wall to prevent it from falling onto the range top during cooking.

- Never close the cover while the burners are in use.
- Do not use the cover as a griddle.
- The oven may be used with the cover down.
- The bi-fold cover must always be closed when the motorhome is in transit.



**WARNING: Do not the heat motorhome interior with the range or oven. Gas combustion consumes oxygen inside the motorhome.**

### Lighting Top Burners



- Turn the appropriate burner knob counterclockwise to **ON** or **LITE**. Do not attempt to light more than one burner at a time.
- Turn the **SPARK** knob clockwise one click. If the burner fails to light, continue turning the **SPARK** knob clockwise until the burner lights.
- To extinguish the top burner flame turn the appropriate burner knob clockwise to **OFF**.

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**WARNING: Top cover must be open when the cooking surface is in operation. Do not cover the oven vent openings while the oven is in operation.**

### 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 down onto the countertop next to the cooktop. Lift the cooktop cover up by the front corners, just high enough to clear the top of the burners. Pull the cooktop cover toward the front of the cooktop and lift it away. Place the cooktop cover upside down onto the towel. Squeeze both of the grate spring clips to remove the grate from cooktop cover.



**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.**

**Tips**

1. A yellow flame is an indication of incorrect fuel/air ratio. Lowered BTU output and carbon build up can occur.
2. When cooking at an altitude above 5,000 feet the flame may change appearance and the flame BTU output will be lowered. 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. Pre-heat the oven for 10 minutes prior to use.

**Cleaning & Maintenance**

- 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 your 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 is a type of glass fused on steel at a very high temperature. It 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 and maintenance of the porcelain, call “*Hopes Cultured Marble Polish*” at 800-325-4026.



## OUTSIDE BARBECUE GRILLE (OPTIONAL)

Grill attaches to the curbside of motorhome using its own bracket system. Grill uses the “on board” LP-Gas source. LP-Gas is supplied to the grill using a flexible hose and a quick disconnect fitting. Clean and inspect hose before each use. If there is evidence of abrasion, wear, cuts or leaks the hose must be replaced prior to grill being put into operation. When grill is not in use, place it into the supplied carrying case and store it in an outside storage compartment.



**NOTE:** This grill is to be used outdoors only and should not be used in a building, garage, or any other enclosed area. When the grill is not in use, the gas supply must be turned off at the quick disconnect fitting.



**WARNING:** If you smell gas, extinguish all open flames and turn off the main gas supply. Turn off quick disconnect fitting valve and open grill lid. Contact a qualified service center to have the problem correctly diagnosed and repaired before resuming grill operation.

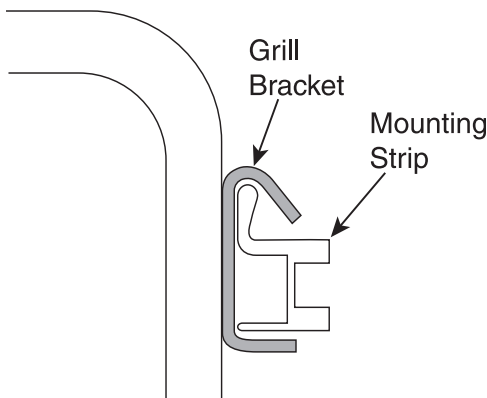


**WARNING:** Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this grill. An LP-Gas cylinder shall not be stored in the vicinity of this grill.

## Operations

Locate grill, mounting bracket, flame spreader and wire grate. If applicable separate grill from mounting bracket. Make sure flame spreader and wire grate are installed on grill properly.

### TOP



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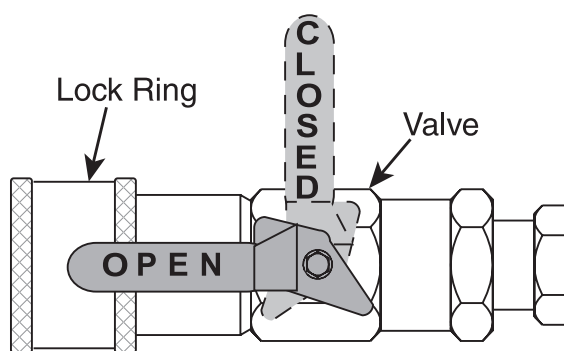
### Attach Grill to Curbside of Motorhome:

- Hold the grill bracket at a 45-degree angle and drop bracket over the mounting strip on the curbside of motorhome. Bracket should be centered on strip and locked securely in place.
- Pick up grill and place valve side first into the grill bracket. When installed the valve assembly will be under the rail of the grill bracket.



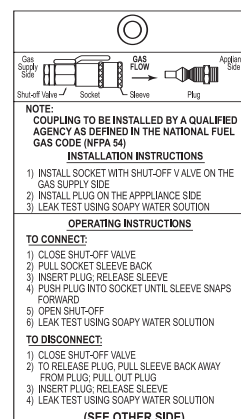
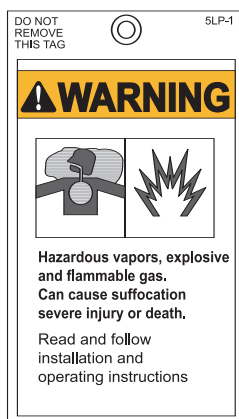
### Hook Up LP-Gas Supply:

- Pull hose from storage compartment.
- Make sure grill LP-Gas control valve is in CLOSED position.
- Snap female disconnect from hose end onto male fitting on grill. This is done by drawing back the spring loaded lock ring, on female disconnect, then pushing disconnect over the mating male fitting until the ring snaps back into place.
- After disconnect is properly attached, OPEN valve located on female disconnect.



**Female Disconnect**

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- Check for gas leaks on hose or grill, use a solution of 1 part liquid dish detergent to 10 parts water. Agitate solution until bubbles form, then apply to all fittings and the inlet to grill control valve. If a leak is detected, turn gas off at main LP tank and contact a qualified service center for repairs.

### Lighting the Grill:

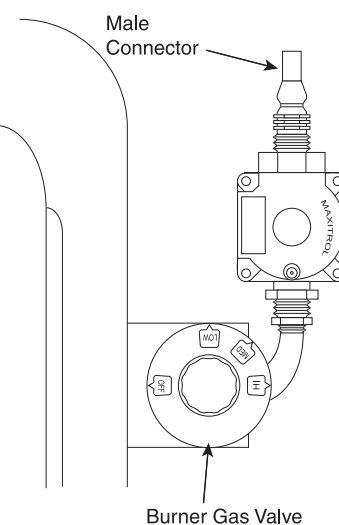
- Raise the lid of grill before lighting.
- Locate lighting hole on the bottom of grill. Hold a lighted hand held trigger type butane lighter under the lighting hole and turn burner gas valve to HI position. Burner should light within 5 seconds. Flame will be visible through the narrow slot in flame spreader. Adjust burner to desired temperature.



**WARNING: If burner does not light, turn burner control off. Wait five (5) minutes for gas to clear before trying to light burner again.**



**WARNING: Keep grill area clear and free from combustible material, gasoline and other flammable vapors and liquids. Do not obstruct the flow of combustion and ventilator air around grill.**



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## WALL THERMOSTAT

The comfort control operates the HVAC (heating, ventilating and air conditioning) system. A small wall-mounted thermostat located in the living room, the comfort control operates all the roof air conditioners functions as well as the LP-Gas furnace operations. The comfort control uses a liquid crystal display to inform the operator of its current program status.

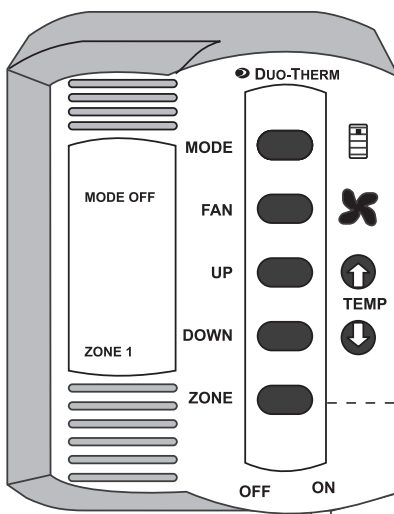
There are six different functions of the HVAC system: **OFF**, **FAN**, **COOL**, **HEAT PUMP**, **AUX. HEAT** and **FURNACE**. The repeated pressing of the **MODE** button makes these selections. The **FAN** button controls the roof air conditioner fan speed. Three speeds are available: low, medium and high. Fan speed control applies to the roof air conditioner's blower speed only. Selecting the fan speed **AUTO** adjusts the fan speed automatically, depending on temperature set point and actual temperature in a selected zone. The roof air conditioners will use all three blower speeds (low, medium or high) in the **COOL** mode when selecting **AUTO** fan when selecting **AUTO** fan if operating in **HEAT PUMP** mode, only low or high blower speeds are available. There are separate operating zones for the motorhome designated **Zone 1** and **Zone 2**. Pressing the zone button toggles the zone selection. The selected zone number flashes while the other remains steady. Pressing the **UP** or **DOWN** buttons controls the temperature range for any HVAC function.



**NOTE: The Comfort Control must be ON to operate any function of the HVAC system. The Comfort Control must be in the same mode for all zones to function properly. One zone cannot be on COOL while the other zone uses FURNACE. DO NOT attempt to mix the modes for separate zones. Heating or cooling the motorhome will not be any faster by selecting a very high or very low temperature setting.**

### Comfort Control Reset:

Should the comfort control exhibit unusual symptoms or not respond to commands, it may require a reset. The reset establishes factory defaults.



### To reset:

- The Battery Cut-off switch must be on.
- Press and hold **MODE** and **ZONE** buttons simultaneously while switching the **ON/OFF** switch to ON.
- Five to ten seconds after switching the comfort control ON. The letters "FF" appear. Release the **MODE** and **ZONE** buttons. The comfort control backlighting will remain illuminated. The factory default settings of 72° F for **COOL** and 68° F for **FURNACE** are then established.
- Select the **MODE** to confirm factory default. Set desired setting in the comfort control using normal programming procedures.

**AIR CONDITIONER  
- ROOF**

The motorhome is equipped with two independent 13,500 BTU roof air conditioners. The roof air conditioners operate from 120 Volts AC only, either from shore power or from the on-board generator. Operations are controlled by the 12 Volt DC comfort control. The electronics in the comfort control use a telephone type patch cord to send a low voltage signal to the roof air conditioner's circuit board. The circuit board controls the desired roof air functions and/or LP-Gas furnace operations. The refrigerant operation principal of the roof air conditioner is the same as the dash air conditioner or a household type refrigerator. The function is that of an enclosed system. The compressor draws refrigerant into it. A high-pressure vapor is then 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 then changes from liquid form to vapor as heat extracts. The vapor then draws back into the compressor to start the cycle again. When operating the roof air conditioners in heat pump mode, the principals of air conditioning reverse. The refrigerant flow reverses, blowing heated air into the interior of the motorhome.



**NOTE: The air conditioning system will freeze the moisture in the air depending on the humidity content. Under high humidity conditions it is recommended to set the blower fan speed to High.**



**NOTE: There are ambient temperature limitations of the Heat Pump mode. The roof air conditioner will not operate in Heat Pump mode with ambient temperatures at or below 30° F.**

**Aux. Heat Mode:**

When selecting the **HEAT PUMP** mode, or if operating in **HEAT PUMP** mode and ambient temperatures are approximately 30° F, the air conditioner will stop the Heat Pump operation and begin Aux. Heat operations. Automatic selection of an auxiliary heat (the furnace) becomes the primary heat source and furnace operations begin. The **AUX. HEAT** mode is due to refrigerant characteristics in cold temperatures. The furnace remains the primary heat source until ambient temperatures rise above 42° F. When ambient temperatures are between 30-42° F., the Defrost cycle initiates approximately every 40 minutes of compressor operation. The blower motor will stop for five minutes and the comfort control displays **DEFROST**. After the defrost cycle Heat Pump operation will resume.

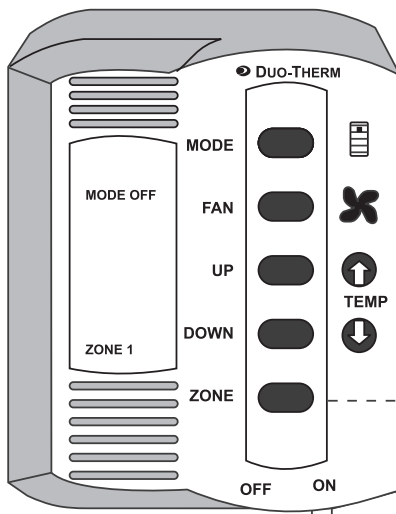
## Return Air Filters

Clean the return air filters frequently and for the environment for which they operate. The return air filters are inside the air intake vent covers located on the motorhome ceiling. Never operate the air conditioner without the return air filters in place. This may plug the evaporator core with dirt and substantially affect the performance of the air conditioner.

### To Clean:

- Remove the vent cover and filter.
- Wash the filter and cover in warm soapy water. Do not use solvents.
- Rinse the filter and cover thoroughly with fresh water. Allow to dry.
- Reinstall the filter and cover.

## Operation



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The roof air conditioners operate from the comfort control only under the following conditions:

- 120 Volts AC is supplied from either shore power or the generator.
- The battery cut-off switch is in the ON position and house batteries are charged.
- The **ON/OFF** switch is ON at the comfort control.

### Zone Selection:

The desired zone selection is the first step in utilizing the comfort control. Press the **ZONE** button to select Zone 1 or 2 for programming purposes. The zone currently in programming will flash while the other zone display is constant.

### Fan Operation:

This mode circulates the interior air by using the roof air conditioners blower. The fan speed will control the roof air conditioners blower speed in the following modes: Fan, Cool or Heat Pump.

- Press the mode button repeatedly until FAN is displayed.
- Press the FAN button to select the desired fan speed.

### Air Conditioner Operation:

The living room comfort control operates the roof air conditioner functions.

- Select the desired zone by pressing the **ZONE** button.
- Press the **MODE** button repeatedly until **COOL** is displayed.
- Set desired fan speed by pressing the **FAN** button.
- Set desired cooling temperature by pressing the **UP** or **DOWN** buttons.



**NOTE: The compressor will engage approximately two minutes after blower motor activation. This prevents accidental compressor activation against high pressure.**

**Heat Pump Operation:**

The living room comfort control operates the roof air conditioners.

- Select the desired Zone by pressing the **ZONE** button.
- Press the **MODE** button repeatedly until **HEAT PUMP** is displayed.
- Set desired fan speed by pressing the **FAN** button.
- Set desired heating temperature by pressing the **UP** or **DOWN** buttons.

The furnace and its related components are 12 Volt DC operated, using LP-Gas as the fuel source. Electronic circuitry (automatic ignition) is used to ignite the burner. The furnace uses outside air for the burner combustion and exhaust is expelled through the outside vent. Inside air is drawn into the furnace and blown across the internal heat exchanger. Heated air is then discharged through ducted hoses which can be run throughout the motorhome.

**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.



**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.**

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. Once the blower motor attains a predetermined speed it will close the sail switch. The sail switch, which is now closed, sends the electrical signal through a high temperature protection switch, then to the automatic ignition circuit board. After the thermostat is satisfied, the gas valve closes and extinguishes the burner. The blower motor stops approximately two or three minutes after cool down.

**Operation**

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

1. The LP-Gas valve on the LP tank is open and the LP-Gas valve at the furnace is on.
2. The house batteries in the motorhome are fully charged.



**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.

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### ***Using the Furnace***

- Slide the **ON/OFF** switch to the **ON** position.
- Select the **FURNACE** mode on the Comfort Control using the **MODE** button.
- Select the **AUTO** speed with the **FAN** button.
- Select the desired temperature with the arrow up and down buttons.

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### ***Tips***

- After storage 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.
- It is advisable to use the furnace to heat the inside of the motorhome during transit. Outside temperature can vary to extreme cold. The dash heater may not provide adequate heat to the interior.



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

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

If the furnace fails to light make sure the LP-Gas supply valves are open and the LP-Gas switch is turned on. The furnace will not light if the blower motor is not spinning to its specified speed. This may be due to a low house battery charge condition.

#### **To Charge the House Batteries:**

- 1.) Hook-up to shore power.
- 2.) Start the generator.
- 3.) Start the main engine to charge the batteries.



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



## WATER HEATER

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.



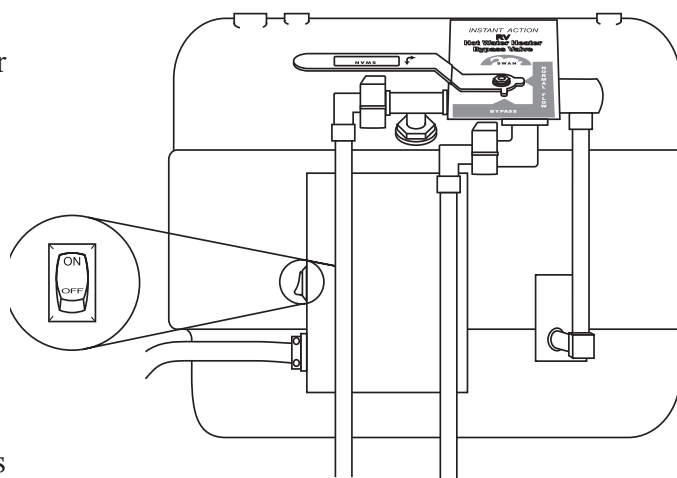
**NOTE:** The automatic ignition circuit board will make three attempts to light the burner. If the burner does not light by the third attempt, the ignition circuit board will go into "lock-out." Cycling the on/off switch will reset the ignition board.



**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.

Prior to using the water heater, purge all trapped air from the water system. To purge the air and pressurize the system, fill the fresh water tank by using the on board water pump or hooking up to city water. Check the tank for any obvious water leaks. Once the system is pressurized, turn the hot and cold valves on for each water faucet, one at a time, inside and outside of the motorhome. Run each faucet until a steady stream of water with no air bubbles or air pockets are present. The water heater does not need to be operating while in this process. Locate the water heater bypass valve on the back of the water heater; select the "Normal Flow" position. While at the back of the water heater ensure the small **ON/OFF** switch position is set ON.

### *Before Using the Water Heater*



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## Burner Compartment

Periodically check the service compartment and screen in the door on the outside of the motorhome to ensure no foreign material has accumulated which will prevent the flow of combustion and ventilating air.

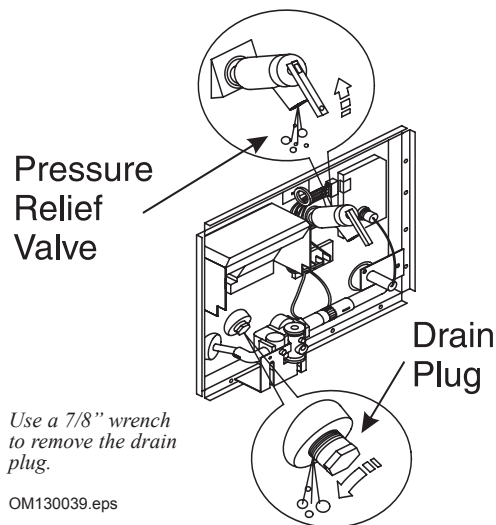
## Water Heater ByPass System

The water heater bypass is a valve located on the back of the water heater. By turning the valve to **BYPASS** position, water diverts away from entering the water heater. The water heater should be in the **BYPASS** position when winterizing. Bypassing the water heater will keep antifreeze out of the water heater, if antifreeze is used for winterization.

For water heater operation turn the valve so that the handle points to **NORMAL FLOW**.

## Pressure - Temperature Relief Valve

The water heater is equipped with a Pressure-Temperature relief valve. The water heater may discharge at 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 within the heater reaches 210° F (98.8° C), or if the water heater pressure reaches 150 psi. This can be related to the fact the motorhome utilizes a closed system. A discharge is a normal occurrence 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, utilize the following procedures to replace the air.



**CAUTION: Ensure the water heater tank is cool prior to checking the valve.**

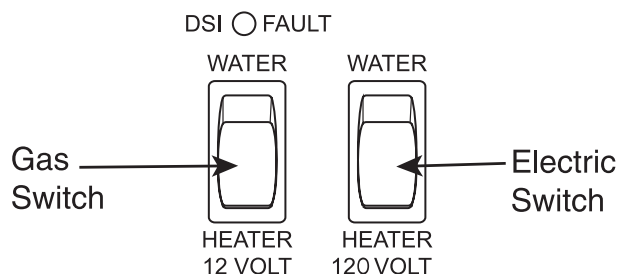
1. Turn OFF the water heater.
2. Shut OFF the incoming water supply.
3. Open the closest hot water line of the motorhome.
4. Pull the handle of the relief valve until the flow of water stops.
5. Allow the relief valve to snap shut, close the hot faucet and turn on the water supply.
6. Turn ON the water heater.

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



**The water heater operates under the following conditions:**

- There is 120 Volt AC supplied from either shore power or the generator.
- Both the manual and electronic valve LP tank valves are open.
- The battery cut-off switch at the entry door is ON.
- The house batteries are fully charged.

**LP-Gas Operations:**

- Open and turn on the LP-Gas valves.
- Turn the water heater switch (located on the hall panel) to the ON position. The water heater will make an audible "roar" from the burner when ignited. The small indicator light will illuminate briefly then go out once the water heater ignites. The indicator light will glow steady when the ignition cycle has gone into "lock-out."

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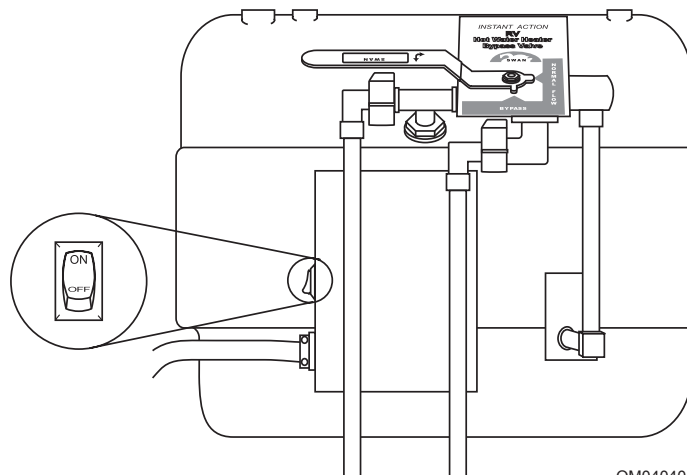
**NOTE: It is not recommended to operate the water heater on LP-Gas while the motorhome is in transit.**



**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 that can ignite. Evacuate the motorhome and shut off the LP valve. Contact a qualified service center to have the problem correctly diagnosed and repaired before resuming operation.

**The 120 Volt AC Operations:**

- Have either shore power or the generator supplying AC voltage.
- Turn on the water heater switch located on the hall panel.
- Locate the small **ON/OFF** switch at the back of the water heater and switch to ON.
- The heating process occurs at a quicker rate with both LP-Gas and 120 Volt AC operations activated.



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## **Draining & Storage**

If the motorhome is to be stored for a long period of time, or during the winter months, the water heater must be drained to prevent damage from freezing. Refer to "Winterizing" for instructions. Be sure to refill the water heater with water before resuming operation.

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## **Tips**

- Turn off water heater when not in use to conserve LP-Gas.
- The water heater tank capacity is ten gallons. When running the shower, conserve the heated water by shutting the shower water off when not in immediate use.
- Use caution when adapted to 30-amp shore service. When the water heater element is in operation it will use approximately 12 amps. Appliances may need to be operated in sequence to avoid tripping a breaker.
- The temperature and pressure (T & P) safety relief valve on the outside of the water heater is set to open at 210° F or 150 psi. When water temperature and pressure reach these settings the valve may drip until the pressure has dropped. Avoid opening the T & P valve manually as it may continue to leak. Most hardware stores carry the valves.



**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.**

---

## **Troubleshooting**

- If water heater fails to light check the outside burner tube for obstructions. Spiders may make nests in the burner tube.
- If the indicator light on the hall panel does not light, and the water heater does not light, verify the battery cut-off switch at the entry door is on or check for a blown fuse in the house distribution panel.
- If the switch at the panel is on, but there is no hot water, check the **ON/OFF** switch located on the back of the water heater.
- If the 120 Volt piloted switch does not light check the AC source, breaker, shore cord connection or transfer switch.

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:

## WASHER/DRYER PREPARED

1. Color coded water supply lines. A red line for hot; a blue line for cold.
2. An 1½ in. 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 receptacle located in the compartment.



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

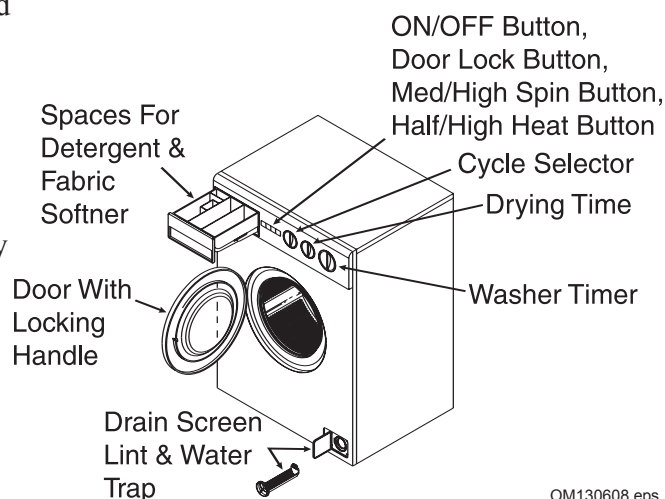
If a washer/dryer is to be installed at a later date be sure to follow all the manufacturer installation instructions. Listed here are further instructions which should be adhered to for safe and reliable operation:

- Do not connect the clothes dryer exhaust duct to any other duct, vent or chimney.
- Do not terminate the exhaust duct beneath the motorhome.
- Be sure to 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 10 lbs. (4.5 Kg.) of dry clothing. It is front loading with an extra large door opening for easier access. It has five wash cycles, in addition to extra rinse and spin cycles.

- The washer/dryer operates on 120 Volt AC.
- To operate the washer/dryer you will need to be plugged into shore power.
- The washer/dryer water use will be approximately 16 gallons of water.

## WASHER/DRYER (Optional)



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## Operating Instructions

Before using the washer for the first time wipe the inside and outside with a damp cloth to remove any travel dust that has accumulated. We recommend operating a rinse cycle to rinse out the washer.

### To begin a wash load:

- Sort and pre-treat clothes (specific directions under sorting).
- 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 cycle selector knob to the desired temperature setting.
- Decide which washing cycle you wish to use. Turn the timer knob clockwise to the desired wash setting.
- Select High or Medium spin (only for regular washing).
- Press the push button ON.
- After the cycle is complete, wait two minutes for the door lock to release before attempting to open the door.



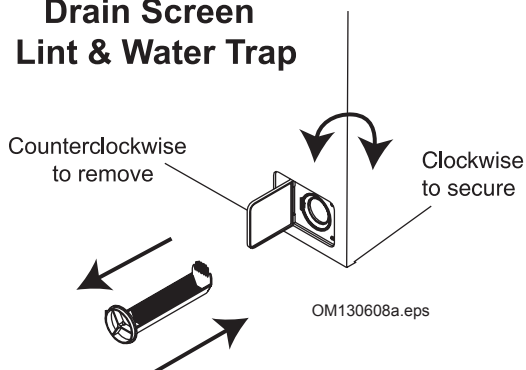
**CAUTION:** Open a window or vent while operating the dryer. It is dangerous to create negative air pressure inside the motorhome while operating fuel burning appliances.



**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. Clean the lint screen if applicable (located on the back of the washer in the top left corner) after each use and keep the area around the exhaust opening and adjacent areas free from the accumulation of lint, dust and dirt.

## Cleaning the Drain Screen

### Drain Screen Lint & Water Trap



The removable drain screen, which protects the pump from lint and foreign matter, needs to be cleaned periodically. The frequency in which it is cleaned depends upon the type of clothes that are washed. Cotton articles produce more lint than nylon articles. Under no circumstance should the drain screen be removed while the machine is full of water. To clean the drain screen (on an empty machine) open the service door by pressing on the left hand side. Place a cloth or shallow tray under the drain screen housing to catch any remaining water that may drip out. It may be helpful to first set the machine to spin then remove the drain screen. This procedure reduces the amount of water released. Turn the drain screen counterclockwise and pull the drain screen out. Clean the screen to remove any dirt and lint. To replace the screen, slide it back into the housing and turn it clockwise to secure. Close the service door.



**NOTE: Check for water leaks before using the washer after removing and replacing the drain screen.**

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. Clean the interior with one cup of chlorine bleach mixed with two cups of liquid detergent. Run the washer through a complete cycle using the 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 which is immediately next to the door window. This will protect the door finish from laundry spills and discoloration.

### ***Cleaning the Washer/Dryer***



**NOTE: Should the washer/dryer need removal for service, care should be taken as the washer/dryer weighs approximately 185 lbs. Proper accommodations should be made to avoid risk of injury.**

**To winterize your washer/dryer follow the instructions below to avoid damage to your unit due to freezing:**

1. Run the washer/dryer in a spin cycle to remove the majority of the water from the washer/dryer.
2. Close the hot and cold water supply valves on the inlet hoses. Remove the hoses from the valves and allow them to drain. Leave hoses disconnected during storage.
3. Unplug the power cord and remove the drain screen to allow the water remaining in the pump and drain hose to be evacuated. Reinstall the drain screen.
4. Wipe the inside of the washer with a dry cloth.

### ***Winterizing the Washer/Dryer***

**To place Washer/Dryer back into service:**

1. Plug power cord into receptacle.
2. Make sure the drain screen is securely in place.
3. Connect the two inlet water supply hoses to the water supply valves. Red line for hot water and blue line for cold water.
4. Open water supply valves and operate washer/dryer for one complete cycle and check for water leaks.

**NOTES**

# Diplomat

## SECTION 5 EQUIPMENT

<b>INTRODUCTION • 133</b>	<b>EXTERIOR ENTERTAINMENT</b>
<b>ENTRY STEP • 133</b>	<b>CENTER • 149</b>
<i>Operation • 133</i>	<b>CITIZEN BAND RADIO - PREWIRE • 152</b>
<i>Tips • 134</i>	<b>FANS • 152</b>
<b>STEPWELL COVER • 134</b>	<i>Galley Fan • 152</i>
<i>Adjustments • 134</i>	<b>EXHAUST FAN • 153</b>
<b>ENTRY DOOR • 135</b>	<b>BATHROOM FAN • 154</b>
<i>Latch Adjustment • 135</i>	<b>DOOR - SLIDING • 155</b>
<i>Screen Door - Removing Screen • 136</i>	<b>SUPER SLIDE (Opt) • 155</b>
<i>Screen Door - Changing the Glass • 136</i>	<b>FRONT DOOR AWNING (Opt) • 155</b>
<b>SLIDE-OUT OPERATION • 136</b>	<i>Window Awning (Opt) • 156</i>
<i>Extending Main Room • 136</i>	<i>Automatic Patio Awning (Opt) • 160</i>
<i>Retracting Main Room • 137</i>	<i>Slide-Out Extendable Awning • 162</i>
<i>Manual Override - Main Slide-out • 138</i>	<b>SLIDE-OUT COVER AWNING • 162</b>
<i>Extending Bedroom • 139</i>	<i>Care &amp; Maintenance • 163</i>
<i>Retracting Bedroom • 140</i>	<b>SUNVISORS (OPT) • 163</b>
<i>Manual Override - Bedroom Slide-out • 140</i>	<b>SOFA BED CONVERSION • 164</b>
<i>Preventive Maintenance • 141</i>	<i>Sofa to Sleeper • 164</i>
<b>SLIDE LOCK • 142</b>	<i>Sleeper to Sofa • 164</i>
<b>ENTERTAINMENT CENTER - HOME • 142</b>	<b>SOFA HIDE-A-BED CONVERSION • 164</b>
<i>Front Television Lock-Out • 142</i>	<i>Sofa to Sleeper • 164</i>
<i>Television Antenna • 143</i>	<i>Sleeper to Sofa • 164</i>
<i>Hook-ups - TV Cable, Computer &amp; Telephone • 144</i>	<b>ELECTRIC SOFA BED</b>
<i>VCR &amp; Bedroom Television • 144</i>	<b>CONVERSION (Opt) • 165</b>
<i>Video Selector Box • 145</i>	<i>Sofa to Sleeper • 165</i>
<i>Satellite System Prewire - DSS • 146</i>	<i>Sleeper to Sofa • 165</i>
<i>Home Theatre Stereo System DVD</i>	<b>DINETTE BED CONVERSION (Opt) • 165</b>
<i>Player (Opt) • 147</i>	<b>EXTEND FIXED DINETTE • 166</b>
<i>Radio - Dash • 148</i>	<b>STORAGE - UNDER BED • 166</b>
<i>Hiding the Control Panel • 148</i>	
<i>Operating the Control Panel • 148</i>	





## INTRODUCTION

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.



**Detailed information with CAUTION or WARNING instructions for the various electronics, 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 to the left, just inside the entry door, is the step switch. Keep step clear by removing all mud, salt and road grime.

## 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 under step light off. Close the door and turn on the ignition switch. The step will retract for travel. To hold the entry step in the retracted position proceed with the following:
  - Turn the engine ignition switch off.
  - Wait 15 seconds and then turn the power step switch from off to on, then back off again. The step will stay retracted until the step switch is turned ON, or the ignition switch is turned on.

The retracted position is useful for high curbs or on boat ferries.

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.

## 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 12 Volt DC 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.
- A 7 ½ amp ATO blade fuse is used to illuminate the **STEP OUT** dash warning light. The fuse is located on the front run box.



**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.**

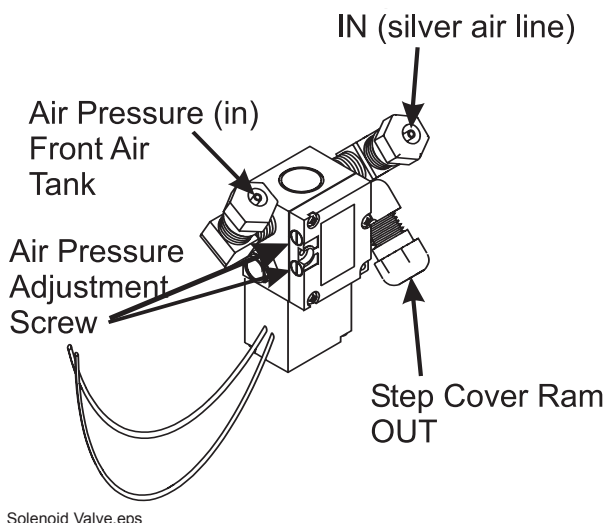
## STEPWELL COVER

The motorhome is equipped with a sliding stepwell cover that is extended and retracted by the use of a dual action air cylinder. The air cylinder is controlled by an electrically operated air valve. The air solenoid, known as a “MAC” valve, receives air pressure from the front air tank. The “MAC” valve will direct the air pressure to either side of the dual action air cylinder, moving the stepwell cover in or out. The stepwell cover will not operate without sufficient air pressure (approximately 60 psi).



**CAUTION: The stepwell cover is under air pressure. When operating the stepwell cover be sure there are no pets, shoes or other obstructions in the stepwell area. Do not operate the stepwell cover while standing in the stepwell area.**

## Adjustments



The “MAC” air valve is located in the front of the motorhome, behind the generator door mounted to the frame. The easiest way to identify the location is have someone operate the stepwell cover with the generator door open and listen for the release of air.

The “MAC” air valve has two adjustment screws. The adjustment screws regulate the air flow to either side of the air cylinder. Adjusting the screws will affect the speed in which the air cylinder moves in or out. Clockwise adjustment on the screw will decrease air flow. Counterclockwise adjustment on the screw will increase the air flow. For proper stepwell cover adjustment it is recommended that adjustments be performed by a qualified service person.



**WARNING:** When adjusting the stepwell cover clear the stepwell area of obstructions, pets or persons. Do not adjust the stepwell cover while stepwell area is occupied.

The entry door is adjusted at the factory and tested for all operations. The door incorporates three separate seals to eliminate wind noise during travel. The door uses two separate locks for safety and security. One locking system is the door handle and the other is a dead bolt. The door handle incorporates a primary and secondary latching system. This is used to ensure secure and safe latching. There are adjustments which can be made to help maintain entry door performance.

## **ENTRY DOOR** ***Latch Adjustment***

### **Adjusting the Entry Door Latch:**

- Determine which bolt needs adjustment.
- Slowly close the entry door observing the latch and strike bolt alignment. Do not attempt to latch if the alignment is off. If the alignment is correct, allow the latch to catch in the first (primary) position only.
- The latch should move to the second position with just slight pressure applied to the entry door. Upper and lower latches should be evenly timed. 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. An excessive amount of pressure indicates the bolts are set too far back.
- With a 5/8" inch box wrench or socket, loosen the movable strike bolt. Make all adjustments in small increments. Tighten the bolt firmly after making adjustments. The bolts should have slight up and down movement for vibration control in travel.
- Test the operation of the dead bolt lock to ensure proper functions.
- Silicone should be applied weekly to the entry door rubber gaskets to prevent squeaking while the motorhome is traveling. Use a one inch sponge paint brush, sprayed with silicone, for easy application.



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

## Screen Door - Removing Screen

### Removable Screen

The top half of the screen door is removable. This allows clear viewing through the entry door glass while traveling.

- To remove the top half of the screen door for travel rotate clips and remove screen.
- To store the screen for travel use the clips provided on the bottom half of the screen door.

## Screen Door - Changing the Glass

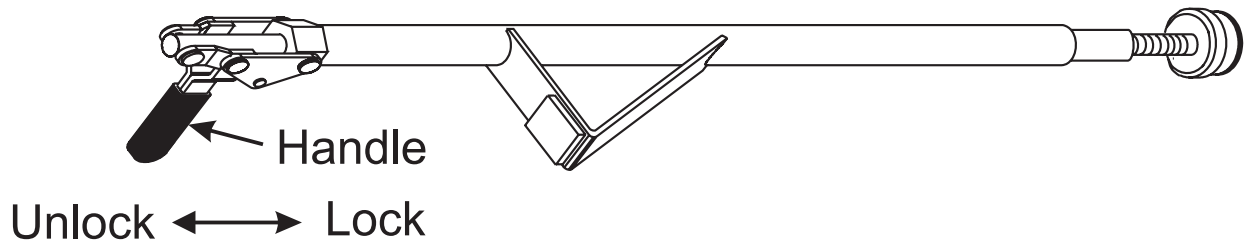
### Changing the Glass in the Screen Door:

- The screen slider is plexi-glas, the slider can be bowed for removal and replacement.
- Replace with new plexi-glas and reverse the procedure.

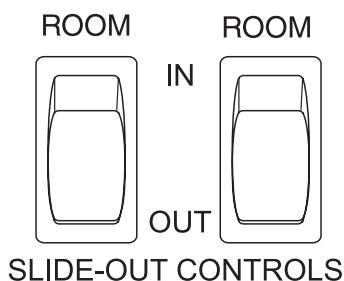
## SLIDE-OUT OPERATION - Extending Main Rooms

### To Extend the Slide-Out Room:

- Move the driver seat forward before activating the slide-out room.
- Confirm that there is at least five feet of clearance outside the motorhome for the slide-out room to extend.
- Ensure the ignition key is in the OFF position.
- Apply the park brake.
- The storage bay doors under the slide-out must be closed.



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- Locate the slide-out room control switch located in the immediate area.
- Press and hold the slide-out room switch in the OUT position. The slide-out room will slowly move to the OUT position. To continue the room movement push and hold the switch in.
- Release the slide-out switch when the room is fully extended (a change in motor sound indicates extension). The slide-out drive motor will not stop automatically, the switch must be released.
- Level the motorhome with the leveling system.



**NOTE: Perform the slide-out room operation with the air suspension system full. Extensive damage could occur to the slide room and awning when extending the slide room in snow, sleet, ice or freezing rain conditions. In**

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such conditions, if the slide-out room is already extended, clear the awning and ensure free movement prior to operating the slide room.



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



**WARNING:** Move the drivers seat forward before activating the slide-out room. Ensure there is five or more feet of clear space outside the slide box prior to extending the slide room. The outside area must be clear of any obstructions which may hinder the movement of the slide room. Ensure there is sufficient clearance inside the motorhome. Never move the motorhome with the slide-out extended.



**CAUTION:** Remove the LOCK'R bar before moving the slide-out room. Damage can result if it is left in position. The manufacturer is not responsible for damage resulting from operating the slide-out room with the LOCK'R left in position.

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#### To Retract the Slide-Out Room:

- Check for sufficient clearance inside the motorhome before retracting the slide-out room.
- Clean the floor, if applicable, to ensure there is no dirt or grit that could result in floor damage during slide-out retraction.
- Retract the leveling system prior to operating the slide-out.
- Inspect the exterior of the slide-out to ensure all bay doors are closed and there are no sags in the awning.
- Prior to retracting the slide-out room, start the motorhome to allow the air bags to fully inflate.
- Turn the ignition switch OFF. The slide room will not operate with the engine running.
- The motorhome should be on the air bag suspension prior to retracting the slide-out room.
- Press and hold the switch in the IN position. The slide-out room will move slowly in. To stop the slide-out room before the room reaches the IN position, release the switch. To continue the room movement, push and hold the switch in. The motor will change tone when the slide-out room is fully extended.

***Retracting  
Main Room***

- After the slide-out is all the way retracted, locate the two removable locking bar mechanisms. Place the bar mechanisms between the wall and the top edge of the slide-out room. The Lock'R has a built in spring to preset the tension. Move the handle to lock the position.



**NOTE:** Be sure you have sufficient clearance on the inside of the motorhome (driver seat, etc.) before you retract the slide-out room. If your motorhome has ceramic tile floor ensure the floor is clean before you retract the slide-out room. Dirt or grit that is trapped under the slide-out room can scratch the floor surface. Never move the motorhome without having the slide-out room retracted.

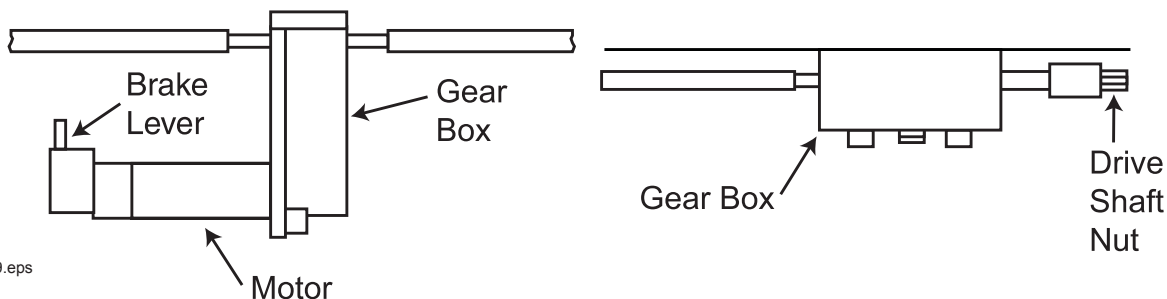
### Manual Override Main Slide-Out

To move the slide-out room manually retract the motorhome leveling jacks (see “Leveling Jacks”).

1. Open outside storage compartment doors underneath slide-out room.
2. Remove plastic covers, if applicable, from top of compartments to gain access to drive shaft and drive mechanisms.
3. To move the slide-out room, move the lever on the motor counter-clockwise to release motor brake and turn the end of the shaft next to the gear box using a 7/8” wrench.
4. Once the room is in apply pressure to the wrench so that the room is sealed. Return the brake lever to its normal position to lock the room in place. Install the transit bar.
5. Take the motorhome to an authorized dealer for service.



**NOTE:** The slide-out room is heavy and may require several persons to push it into the retracted position. Once the slide-out room is in the fully retracted position, return the brake lever to the lock position to hold the room in place.



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#### Before operation of the slide-out system:

- The path for the room to move is clear.
- The battery is fully charged and hooked up to the electrical system.
- All storage compartment doors under the slide-out are closed.
- The slide locks are removed.



**WARNING:** Confirm there is five or more feet of clear space outside of the motorhome before moving the slide-out room to the OUT position. Check that all cabinet doors are securely closed before extending or retracting the rooms.

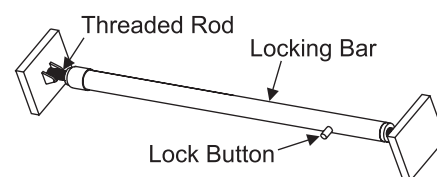


**CAUTION:** Do not operate the slide-out room when the battery has been removed from the motorhome. Use with the converter only may damage the slide-out electrical components. Continuous operation of the slide-out room can drain the battery and damage the slide-out motor from overheating. Never move the motorhome without having the slide-out room retracted.

### To Extend the Bedroom Slide:

1. Locate the two locking bar mechanisms on top of the slide-out room inside the motorhome. Push in on the lock button to release the bar mechanisms and remove the bars from between the wall and the top of the slide-out room. Store the bars for reuse before the motorhome is moved. The slide lock may double as a towel bar or extra closet rod.
2. Locate the slide-out control switch located in the immediate area.
3. Press and hold the slide-out room switch in the OUT position. The slide-out room will move slowly to the OUT position. The drive motor will **not** stop automatically. To stop the slide-out room before reaching the OUT position, release the switch. To continue room movement, push and hold the switch in.
4. Release the switch, which will lock the room into position.

### Extending Bedroom



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



**CAUTION:** Remove the slide lock bars before moving the slide-out room. Damage can result if it is left in position. The manufacturer is not responsible for damage resulting from operating the slide-out room with the slide lock bars left in position.



**NOTE:** Do not leave the slide-out in the extended position during severe weather. Conditions such as high winds or heavy rain may cause damage to an extended slide-out.





**NOTE:** Perform the slide-out room operation with the air suspension system full. Extensive damage could occur to the slide room and awning when extending the slide room in snow, sleet, ice or freezing rain conditions. In such conditions, if the slide-out room is already extended, clear the awning and ensure free movement prior to operating the slide room.

---

## ***Retracting Bedroom***

### **To Retract the Bedroom Slide:**

1. Ensure there is sufficient clearance inside motorhome for the slide-out room.
2. If applicable, clean the floor.
3. Remove any debris from the top of the slide-out room.
4. Press and hold switch to the **IN** position. To stop the slide-out room before it fully retracts, release the switch. To continue the room movement, push and hold the switch in.
5. When the room is fully retracted, release the switch. The room will lock into position.
6. After the slide-out room is retracted, place the two turnbuckle locking bar mechanisms between the wall and top edge of the slide-out room and lock it into place.

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## ***Manual Override Bedroom Slide-Out***

The bedroom slide-out system can be retracted in the event of a power loss.

### **If the room does not move when the switch is pressed:**

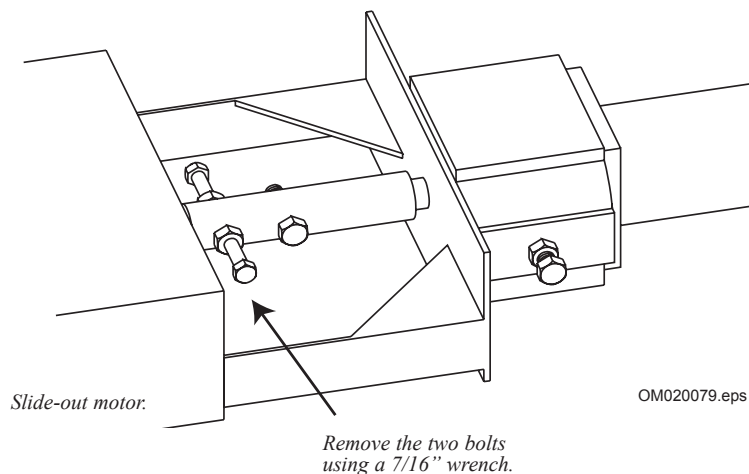
- The house battery cut-off switch must be on.
- Check if the battery is fully charged and connected.
- Make sure the transit bars are removed.



**WARNING:** Do not work on the slide-out system unless the battery is disconnected. Make sure the floor is clean before retracting the slide-out room. Dirt or grit that gets trapped under the slide-out can cause damage to the floor.



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



### Manual Override for Bedroom Slide-out:

1. Lift up the mattress to gain access to the slide-out cover board and mechanism.
2. Disconnect the battery power from the slide-out motor.
3. The slide-out motor has a shaft with two bolts. Use an appropriate wrench (a 7/16" wrench/ratchet or an adjustable wrench) to remove the bolts. The bolts will need to be stored in a safe place to be installed after repairs have been completed.
4. The slide-out then can be pushed back in by a single person. Once the slide room has been manually retracted, install the locking bars to prevent the room from creeping.
5. Take the motorhome to an authorized dealer for service.

The slide-out system has been designed to require very little maintenance. To ensure the long life of the slide-out system read and follow these simple procedures:

- The roof of the slide-out should be checked for debris such as pine needles, dirt, leaves, sticks, etc. If the slide-out has been out for a period of time, 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.
- Visually inspect the wipe seal when the room is out. The seal should be clean and free of dirt or other foreign material. Keep the seal dry. Inspect seal for tears and rips.
- In the event the slide room leaks, fully retract it. Tape the exterior opening closed with duct tape until repairs to the motorhome can be completed.

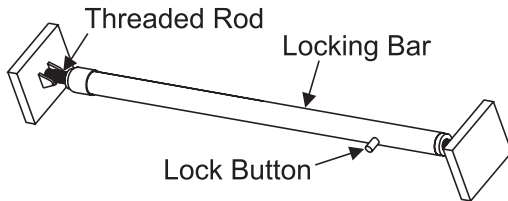
**Preventive  
Maintenance**



**NOTE: Do not use any petroleum based products on the slide seal. Petroleum based products can damage the paint and will cause premature aging of the rubber seal.**

## SLIDELOCK

The slide lock can be useful for other functions in the unit. It does not have to be stored when the slide room is extended. Some useful functions include a towel bar in the shower to dry wet clothing or an extra closet rod.



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**If the slide bar is used for other functions follow a few simple guidelines:**

- Ensure the slide lock is straight as possible.
- Adjust the dimension nearest to the opening size. **DO NOT GO LARGER.**
- The feet can be adjusted until they are  $\frac{1}{4}$ " shorter than the opening.
- The foot on the brass bolt has  $4\frac{1}{2}$ " of adjustment. Foot on the silver bolt has  $1\frac{1}{2}$ " of adjustment.
- Ensure slide lock is tightly in place before use. Use caution when tightening if used on areas not reinforced.

### Tip:

The silver bolt should face the outside wall, and then a clockwise rotation will increase tension.



**CAUTION: Do not work on the slide-out system unless the battery is disconnected.**



**NOTE: Do not leave the slide-out in the extended position during severe weather. Conditions such as high winds or heavy rain may cause damage to an extended slide-out.**



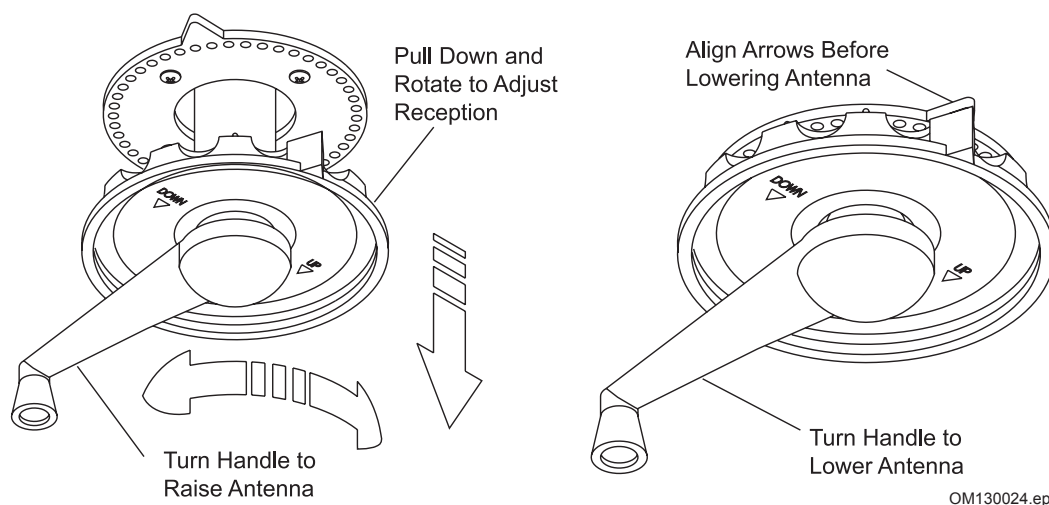
**NOTE: It is not recommended to extend the slide room in snow, sleet, ice or freezing rain. There may be extensive damage resulting from the awning freezing. In the event the slide-out room is extended in snow, sleet, ice or freezing rain conditions, it is recommended you clear the awning and ensure free movement prior to retracting the slide room.**

## ENTERTAINMENT CENTER - HOME Front Television Lock-Out

The motorhome is equipped with a remote control color television located above the pilot seat. The outlet for front TV is controlled by the ignition switch so that the front TV can only be viewed while the vehicle is at rest. The TV operates from 120 Volt AC power only, which 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 lighting being used.

**Television Antenna**

The television antenna is a manual crank up style antenna with built in electronics which use 12 Volts DC to “boost” signal strength. Signals that are weak or fuzzy can be amplified by turning on the boost switch in the passenger front overhead cabinet. 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, 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.



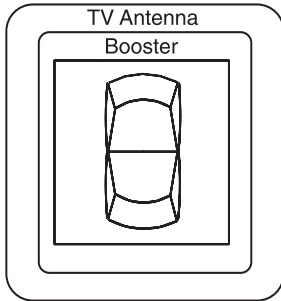
**NOTE:** Do not move the motorhome with antenna in the raised position, it can be damaged by tree limbs or wires.

**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 gear or worm breakage may result.



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#### **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.

#### **Boost Operation:**

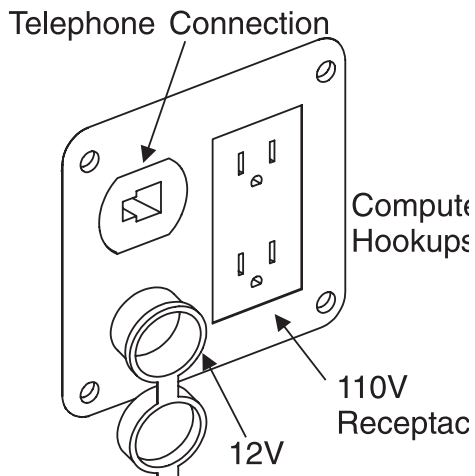
To boost the antenna signal to the TV or VCR, use the boost switch. Turn this switch to the ON position. Turn the boost switch off when not in use.

- The switch is located on the left side of the VCR.

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### **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 phone or laptop computer to be used.



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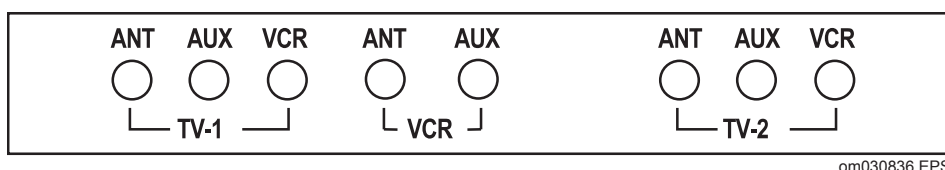
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### **VCR & Bedroom Television**

The VCR and bedroom television operate from only 120 Volts AC, which can be provided by shore power, the generator or the inverter. Use the instructions given in the video selector box section to use these components.

**Video Selector Box**

The motorhome may be equipped with a video selector box located in the overhead cabinet. The selector box receives video and audio signals from three different sources: the roof mounted antenna, shore cable (auxiliary) or the optional VCR. The video selector box directs the signals to either the front or rear TV, and directs the signal from shore cable or the roof mounted antenna to the VCR. The selector box switches are divided into three groups: **TV1** (front TV), **TV2** (rear TV) and the **VCR**. Both the **TV1** and **TV2** button groups perform the same functions. For example: To watch the front TV (**TV1**) from the antenna, press the **ANT** button in the **TV1** group. This will direct the signal from the antenna to the front TV.

**To Watch the front TV:**

- Using the antenna, press the **ANT** button in the the **TV1** group.
- Using the shore cable, press the **AUXILIARY** button in the **TV1** group.
- Using the VCR, turn the TV to channel 3 and press the **VCR** button in the **TV1** group.

**To Watch the REAR TV:**

- Using the antenna, press the **ANT** button in the **TV2** group.
- Using the shore cable, press the **AUXILIARY** button in the **TV2** group.
- Using the VCR, turn the TV to channel 3 and press the **VCR** button in the **TV2** group.



**NOTE:** When watching TV by using the VCR (such as playing a tape) make sure the TV is tuned to channel 3.

**Using the VCR:**

- With the antenna, press the **ANT** button in the **VCR** group.
- With the shore cable, press the **AUXILIARY** button in the **VCR** group.

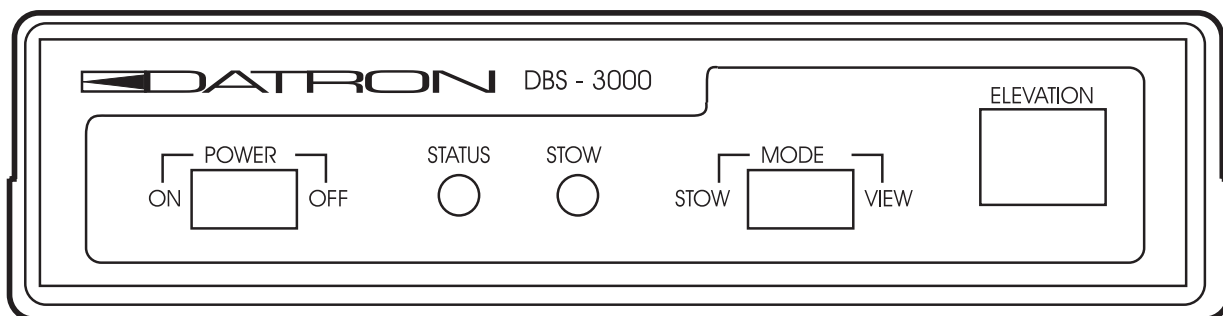
**Tips:**

1. If the picture is weak and the antenna boost is working, try moving the motorhome a few feet forward or backwards.
2. If it is weak or has no picture, check the video selector box to make sure the proper mode button has been selected.
3. If the signal is still weak it may be a shorted or open coax. The coax cable is made up of two conductors: A center conductor, (usually copper) and the ground (woven or braided aluminum). There is insulating material that separates the two conductors known as the die-electric. The ground and center conductor are to remain separate from one another. When installing a metal end onto the coax cable, use care so that none of the woven ground strands come in contact with the center conductor. A continuity tester is used to test for a suspected bad coax wire run. Unscrew both ends of the suspected bad coax run, and use the continuity tester to check between the center conductor and outside threaded ring. If continuity is present, the coax is shorted. To test for an open connection of a particular coax run, touch each end of the coax's ground or center conductor using the tester leads. Continuity should be present. For proper operation there should be continuity from one end to the other of both the ground and center conductor. No continuity should be between the ground and center conductor. Though damage does not usually occur from a shorted or open coax cable, picture quality is compromised.

**Satellite System  
Prewire - DSS**

The motorhome may have been prewired for a roof mount DSS system. The prewire will consist of a 3/4" flexible conduit, which will run from the front overhead to a spot marked on the roof. A telephone hook-up will also be provided for Pay Per View accessibility.

The satellite system programming is offered by Direct Satellite Services. The dish raise or stow function is controlled by the Antenna Control Unit. Turning the Antenna Control Unit (ACU) ON will automatically turn on the satellite receiver.



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**DSS Satellite System requires both AC & DC power sources to operate:**

- 12 Volt DC, house battery cut off switch must be ON.
- 120 Volt AC, hooked to shore power, start the generator or turn on the inverter.

**To View:**

- Set the satellite dish elevation angle.
- Turn the ACU ON, then select VIEW. The satellite dish will raise. Allow 30 seconds for the dish to acquire satellite. If the dish elevation angle is unknown, two methods of determining the dish elevation angle may be used.

**To Set Angle:**

Satellite receiver must be ON. Using the DSS remote, press the MENU button. Use cursor to select ANTENNA. Push down on cursor ball to enter. Select ANTENNA LOCATION; depress cursor ball to enter. Select either ZIP CODE or LONGITUDE and LATITUDE settings to determine correct dish elevation setting for the viewing region. Enter elevation angle on ACU. Press EXIT to return to standard viewing.

- Using the VCR remote, turn the VCR ON. Press the VCR button. Press the INPUT button, L or LINE will be displayed on the VCR.
- Using the video selector box, press the VCR button in the TV1 group. If viewing the bedroom TV, press the VCR button in the TV2 group.
- Turn desired TV ON and select Channel 3.

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The Digital Video Disc Player is located in a compartment above the driver's seat. It is wired through and connected only at the front television set. To view a DVD simply turn the TV on, select channel 3 and insert DVD into the player. The DVD player and television set are wired with a Dolby surround sound system to enhance your viewing pleasure. There are several speakers located throughout the cockpit and living room areas. The DVD player operates from 120 Volt AC powered from the house electrical system.

***Home Theatre  
Stereo System  
DVD Player  
(Optional)***



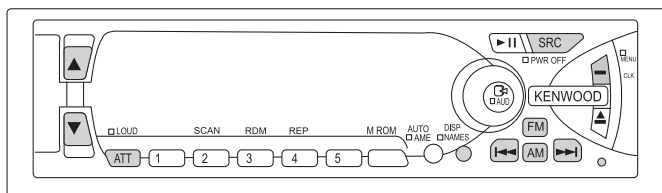
**For more detailed information and operating instructions refer to the manufacturer's manual.**

## RADIO - DASH

The dash radio controls the multi-functions for the dash audio. There are many features associated with the dash radio. The front panel conceals the single CD player and rotates over to give the appearance of a blank faceplate that provides protection from theft. Along with the radio, a 10 disc CD changer may be installed as an option. The tuner will hold up to thirty eight pre-set FM stations and sixteen AM stations. Turn the radio power OFF at the dash or in the bedroom.



**NOTE: Turning the bedroom radio switch OFF will override the two dash switches.**



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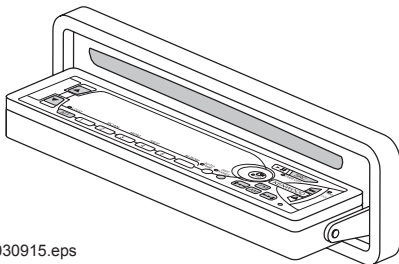
### Operation:

Prior to utilizing the dash radio, comply with all of the following required conditions.

- Turn ON the House Battery Disconnect switch.
- Turn ON the House battery cut-off switch, located at entry door.
- Turn ON the radio power switch at the dash panel.
- To turn radio on, push the **SRC/POWER OFF** button.
- To turn radio off, push and hold the **SCR/POWER OFF** button for at least one second.
- Radio has a security code function and is displayed when radio is turned on. "CODE ON" indicates code has been registered. To enter your personal security code refer to the manufacturer's owner's manual.

## Hiding The Control Panel

- Press the release button and slide open the faceplate.
- Push upward the back of the control panel and reverse the panel.



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**NOTE: The panel cannot be reversed when the faceplate is not attached.**

## Operating the Control Panel

- Press the upper side of the faceplate. The faceplate will open.
- Push the button of the control panel and close the faceplate.



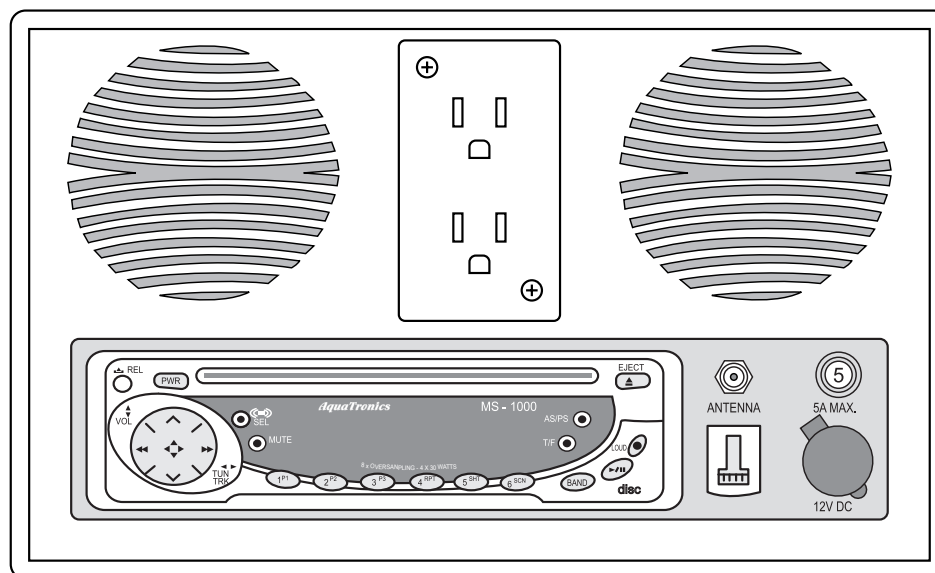
**Additional and detailed information for the dash radio functions and operations can be found in the Owner's Information File Box.**



## EXTERIOR ENTERTAINMENT CENTER

The 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 12V DC, 120V AC and Antenna receptacles. The locking cover should be closed and locked when the entertainment center is not in use.



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### 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 memories which can be easily recalled. To set any of the 3 audio memories, 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 2 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 2 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 2 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 6 stations pre-set into the memories of that band. The unit will stop at each pre-set station for 5 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 2 seconds will activate the Auto-Store Tuning feature which will automatically scan the band and enter up to 6 strong stations into the 6 pre-set memories.
- **STATION PRE-SET MEMORIES** - To set any of the 6 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 2 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 5 pre-sets on that band and for the other 4 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 DELECTOR (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.

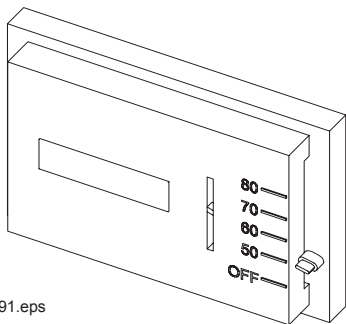
- **FRONT PANEL RELEASE BUTTON** - This button is used to release the mechanism that holds the front panel to the chassis. To detach the front panel, press the button so that the left side of the panel is released. Grasp the released side and pull it off the chassis. To re-attach the panel, position 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.

## CITIZEN BAND RADIO - PREWIRE

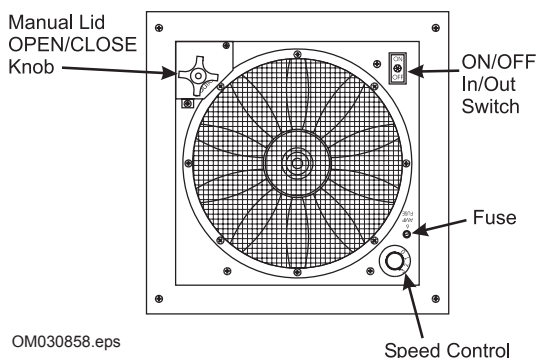
A two-pin connector labeled Citizens Band Radio is located behind the dash panel. It is taped along with the CB Antenna coax, which is routed to the roof mounted base. The red wire is at 12 Volt DC and is fused at two amps through the front distribution panel. The white wire is connected to the chassis frame.

## FAN Galley Fan (Optional)

The exhaust fan is a three-speed, thematically controlled fan with a zero or off position on the fan. The exhaust fan requires the presence of 12 Volt DC to operate. The fan will either pull in air or extract air from the motorhome depending on how the IN/OUT switch was set. The IN/OUT switch controls the direction of the fan rotation. There are three 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.



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### To Operate the Fan:

- The Battery cut-off switch needs to be set ON.
- The wall-mounted thermostat is set for a desired temperature setting. The fan blades activate once the dome opens past approximately two inches. The dome will not cycle down and up as interior temperature decreases and increases.
- The dome manually opens and closes using the knurled knob.
- Select the desired fan direction to IN/OUT.
- Select the desired fan speed on the Speed Control dial:
  - Zero = OFF.
  - One = LOW.
  - Two = MEDIUM.
  - Three = HIGH.



**NOTE: Let fan come to a complete stop before changing fan direction.**



**NOTE: If the speed switch is in the "0" position the fan operates only as a vent.**

- 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.



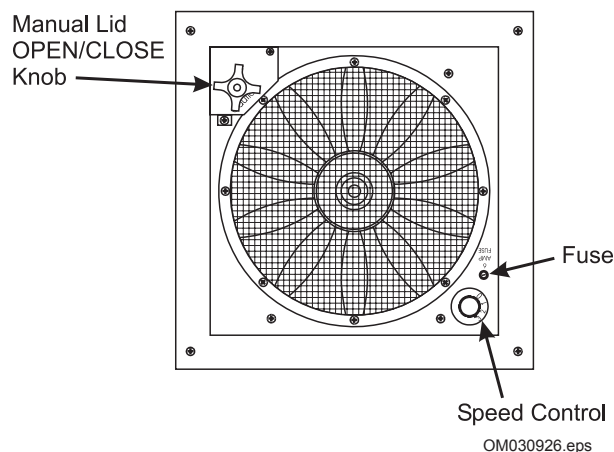
**NOTE: Do not leave the vent cover open while the motorhome is stored or unattended for extended periods. High winds other unusual conditions or obstructions may prevent closing. The resulting leakage could cause serious damage.**

The exhaust fan is a three-speed controlled fan with a zero or off position on the fan. The exhaust fan requires the presence of 12 Volt DC to operate. The fan will extract air from the motorhome. There are two 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.

#### To operate the fan :

- The battery cutoff switch needs to be set ON.
- The fan blades activates once the dome opens past approximately two inches.
- The dome manually opens and closes using the knurled knob.

## FAN EXHAUST



- Select the desired fan speed on the Speed Control dial:  
Zero = OFF  
One = LOW  
Two = Medium  
Three = High



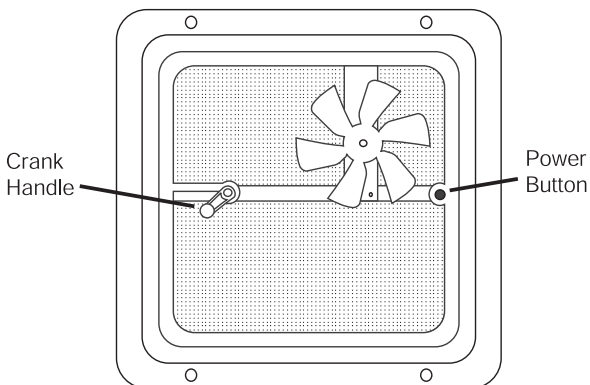
**NOTE: If the speed switch is in the “0” position the fan operates only as a vent.**

- 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 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 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.**

## BATHROOM FAN



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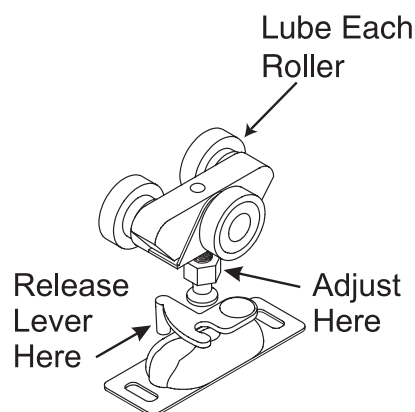
The motorhome is equipped with roof air vents which are manually operated. The vent is open or closed by simply turning the crank handle in the desired direction. The fan, which is for ventilation only as it will not help cool the motorhome, can be operated by pushing the small power button. The vent 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.

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.



**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.**



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The Kwikkee Super Slide is an option that is available for use in the storage compartment bays of your motorhome. This allows for the pay load to slide outward for easier access.

- The motorhome must be level before opening.
- There are two latch releases: lift and hold up to release one, pull outward while pulling on the super slide to release the other.
- The maximum weight capacity is 1,000 lbs. Never exceed this amount.



**WARNING: The motorhome must be level when sliding the drawer out of the bay compartment. The drawer can slide out abruptly and cause bodily harm when the motorhome is not level.**

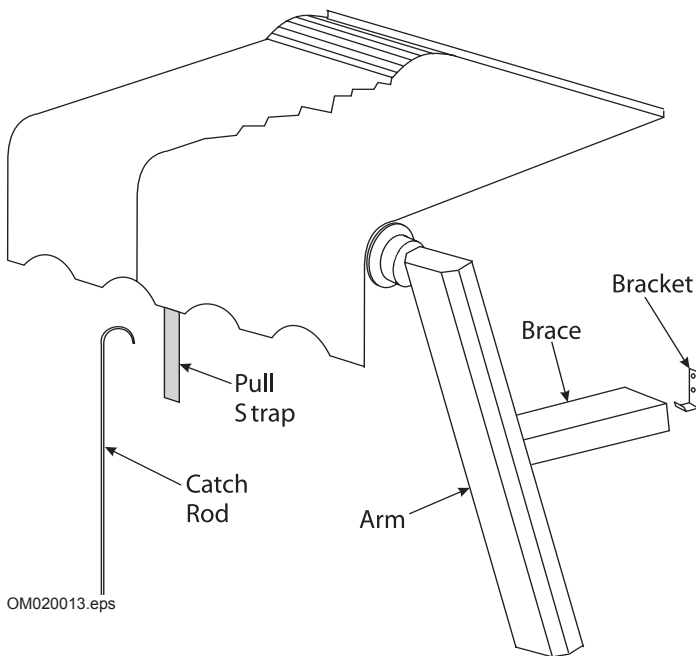
## **SUPER SLIDE (OPTIONAL)**

### **To Extend The Awning**

- Pull down the awning lock into the lower position. Lock is located midway up on the front arm.
- Hook the pull strap loop with awning pull rod.
- Pull strap until awning is at full extension. With free hand, level out brace arms.
- Mate the slot of inner arm with hook on side of motorhome. Repeat procedure for other arm.
- Release strap slowly ensuring inner arms are secure. Slide the strap to rear of awning roll tube and tie to rear arm.

## **AWNINGS Front Door (Optional)**





- Loosen locking knobs for both arms and extend arms so that canvas will clear door in the open position.

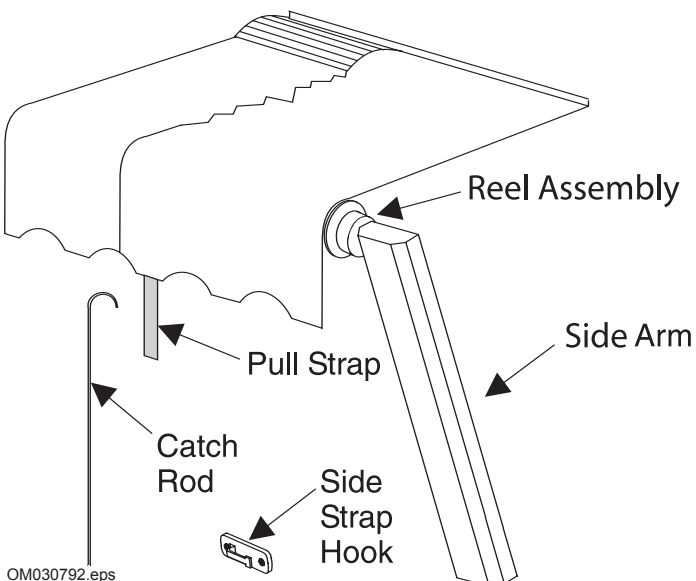
#### To Retract Awning

- Loosen locking knobs for both arms. Lower arms to stop bolts. Tighten knobs.
- Untie the pull strap with a firm grip until tension is off the inner arms. Fold brace into main arms.
- Carefully allow material to wind onto awning roll tube while holding strap in neutral position. This will allow material to roll up evenly.
- Awning end caps should be against the rubber bumpers. If one end cap is off, pull down on awning pull strap while holding strap slightly to opposite side, allowing awning to roll back up into position.
- Lock awning in position by raising lock up all the way.



**CAUTION:** When the awning is at full extension do not allow the awning to snap back into the retracted position. Personal injury or damage to the awning or motorhome may occur.

#### Window Awning (Optional)



#### To Extend 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 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.

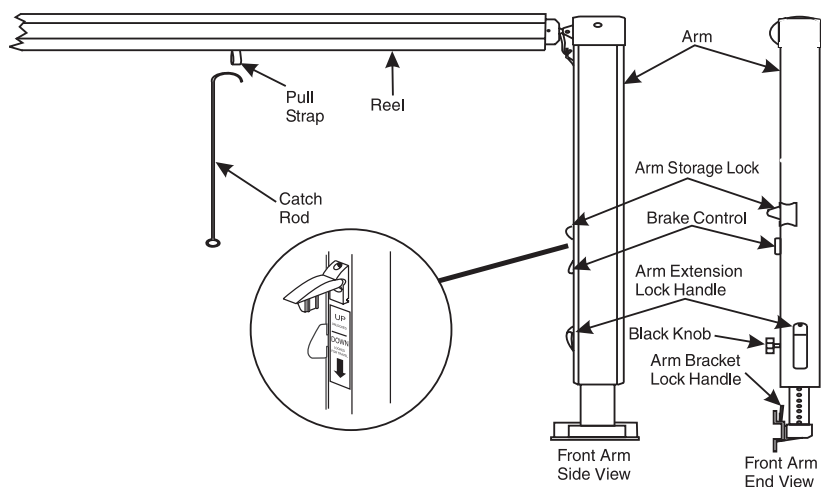


**Awning - Patio****To Unlock the Awning:**

1. Loosen the black locking knobs.
2. Lift the arm storage locks located on each upper arm to the unlock position.
3. Slide the brake control, located on the front arm only, to the full up (unlock) position.

**To Extend the Patio Awning:**

1. Hook the loop of the center pull strap with the pull wand and draw the awning away from the motorhome to the desired extension. Slide the center pull strap to one end of the awning and store it.
2. Slide the inner rafters to the top of each arm and push outward to the tension canopy. Tighten the black locking knobs.
3. Raise the arm extension lock handles and slide the awning upward. Lower the lock handles and move the awning arm upward or downward to lock the detent into the hole. First, raise the lock handles on the main side. Next, raise the lock handles to the entry door. Go to the other awning arm and do the same. Make sure the awning is straight.

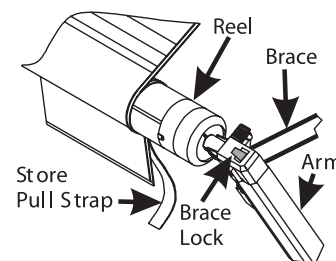


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**To Retract The Patio Awning:**

Retract the arms and lower the awning until the arms rest on the lower stop bolts and lock into position. Loosen the two black locking knobs. Release the locking tab on the end of the awning leg. Slide the pull strap to the center of the awning while holding on to the strap. Allow the awning to roll up to the stored position.

- Snap the arm storage locks into the down position and tighten the black locking knobs.
- Verify that the brake control is in the locked or closed position.

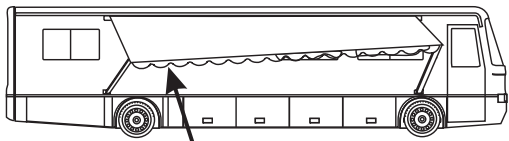


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**CAUTION:** When the awning is at full extension do not allow the awning to snap back into the retracted position. Personal injury or damage to the awning or motorhome may occur.

### Rain Release Setting



One arm lower than the other arm

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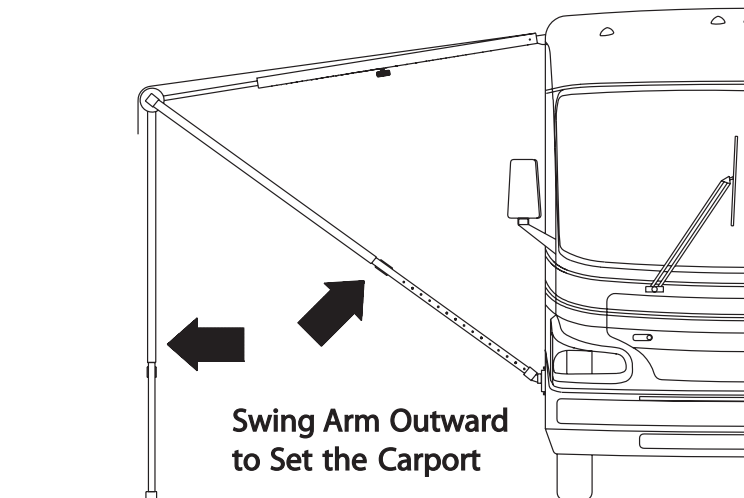
### Rain Release Setting:

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.

### Using The Carport Feature:

To safely use the carport feature:

1. Extend the braces and lock them into the end of the side arms. Tighten the black knobs.
2. Extend the awning as described under "To Extend Awning."
3. 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.
4. Raise the rear arm extension lock handle all the way up to the unlocked position. Extend the arm to position the awning at the desired height and lower the lock handle to lock the arms in place.
5. Drive the stakes through the bottom holes in the arm.
6. Repeat instructions 1 through 5 for the front arm extension lock handle.



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**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 storage locks are down and in the locked position.
4. The brake control is in the full down (locked) position, and no red warning is showing.

5. The bottom of the front and rear arms are latched properly into the bottom brackets.
6. The catch rod is stored away.

**Care 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. Wash both sides of the awning using a quality vinyl cleaner solution and an awning brush. (Washing the awning can be made easier with use of awning maintenance products.) Saturate the fabric with the cleaning solution and leave it on for 15-20 minutes. If necessary, reapply the solution to keep the 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 “Storm Precautions” for information on the awning settings for proper 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 Awning Magic concerning further maintenance.

**Storm Precautions:**

The warranty does not cover damage caused by acts of God; 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. It takes only a few minutes and it gives the best protection for the awning. If closing the awning is not possible at the time, lower both ends of it as far as possible to 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.



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

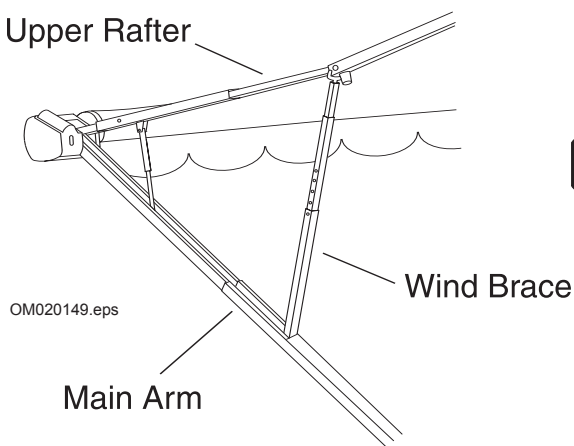
### **Automatic Patio Awning (Optional)**

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.

#### **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.
- Depress 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 and store for future use.
- 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.
- Depress 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:**

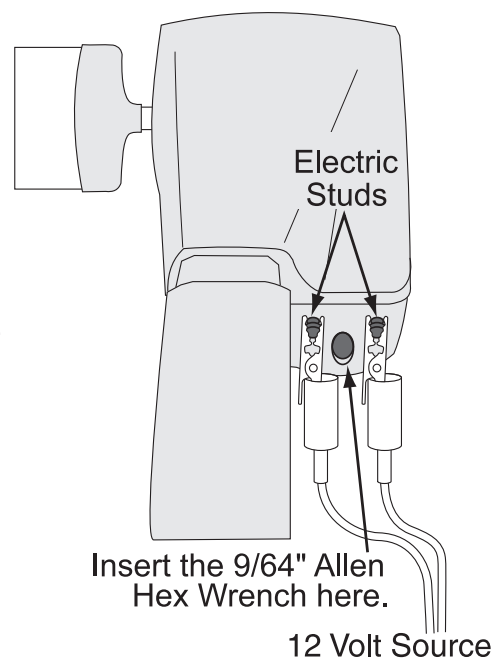
If the awning fails to retract or extend:

- 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.

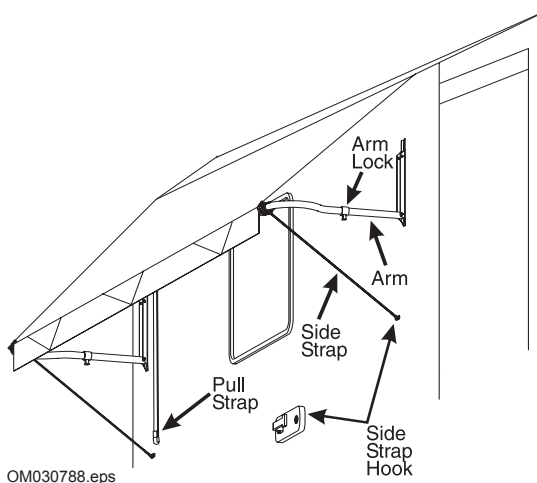


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**CAUTION:** When using an alternate method to operate the awning use extreme care to keep appendages, hair or loose clothing away from exposed rotating hardware.

## Slide-out Extendable Awning

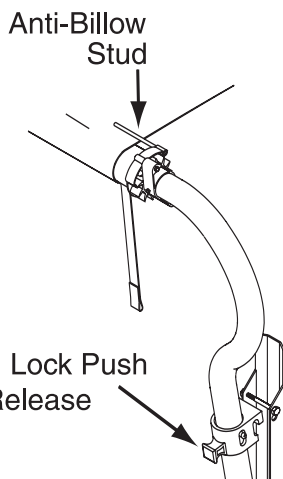


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Slide-out awning will automatically roll out with the slide room when it is extended.

When the slide room is extended, the awning can be rolled out completely as a window awning. The slide-out awning has two devices to help prevent the awning from “billowing” while traveling. The first device is a pair of anti-billow studs, which are located above each end of the awning roller tube. If the awning catches wind and begins to billow, the awning metal wrap will contact the anti-billow stud levering downward and engage with a plastic gear preventing further unraveling of the awning material.

The second device uses two metal wind deflectors which are positioned just below the awning. This helps prevent side winds from scooping under the awning and unwinding the awning.



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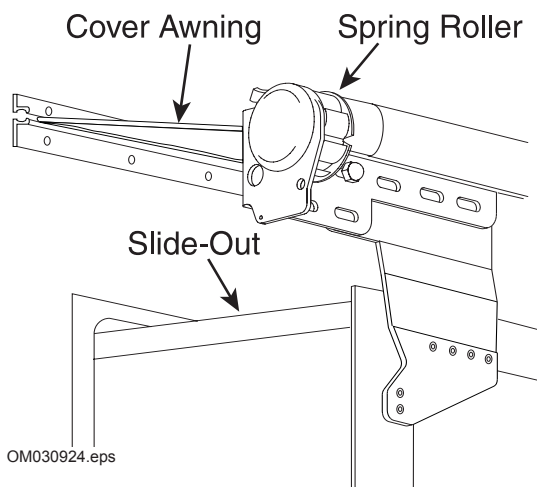


**CAUTION:** The slide room and slide-out awning should be retracted during heavy winds or rain. Rain can be driven up under the slide-out awning and into the motorhome. The slide-out awning should be retracted in high wind conditions as damage can occur to the awning or motorhome



**NOTE:** At least five feet of clearance is needed between the side of the motorhome and any objects, such as trees or fences, to allow the slide room and slide-out awning to be fully extended.

## SLIDE-OUT COVER AWNING



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The slide-out cover awning is automatic so 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. Spring loaded roller mounts with special brackets are attached to the slide-out itself.

### To Extend:

- Extend slide-out room to its full extension.
- The slide-out cover will automatically unroll attaining full coverage when slide-out achieves maximum extension.



**NOTE: Room must extend straight (equal at both ends) in order for the fabric to tighten up when fully extended.**

#### To Retract:

- Retract slide-out room to the complete closed position.
- The slide-out cover will automatically roll up to the travel position when the slide-out is completely closed. As slide-out room retracts, ensure that the cover is rolling up evenly.

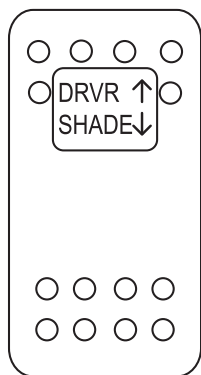
Mildew will not form on the awning material itself, but may form on the dust allowed to accumulate on the canopy. A quality vinyl cleaner such as Awning Magic will keep your awning looking new. Once cleaned make sure the awning is rinsed thoroughly and is dried before storing. **DO NOT USE BLEACH.**

Periodically check all fasteners to make sure they remain tight. If fasteners become loose, see that they are adequately retightened.

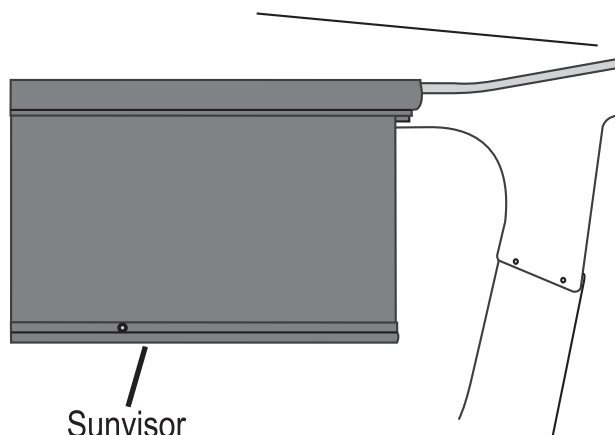
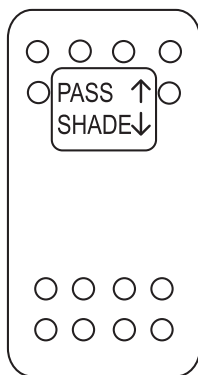
#### Care and Maintenance

To extend the sunvisor press and hold the lower portion of the control switch until the desired location is obtained. Once the desired point is obtained the sunvisor will remain in that position until changed. Retracting the sunvisor is the same as extending, except the upper portion of the switch is used. Cleaning the sunvisor should be done using a soft clean brush to remove dust.

#### SUNVISORS (OPTIONAL)



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## **SOFA BED CONVERSION**

The sofa will convert easily into a bed. The sofa comes equipped with safety belts and these should be used if occupied during travel.

---

### ***Sofa to Sleeper***

- Raise the sofa seat base until seat base and backrest form a “V” shape by lifting up from the center of sofa just below the seat cushions.
- Push down on seat base until the seat base and backrest are flat.
- Fold seat belts out of the way.

---

### ***Sleeper to Sofa***

- Lift the seat base up until seat and back rest are in a “V” shape.
- Push down on seat base.
- Position the seat belts for use.

---

## **SOFA HIDE-A-BED CONVERSION**

The sofa hide-a-bed will convert easily into a bed. Clear the area of obstruction and debris. The sofa comes equipped with safety belts and these should be used if occupied during travel.

---

### ***Sofa to Sleeper***

- Remove the three seat cushions to access the hide-a-bed. The seat cushion should be stored safely until the bed is converted back to a sofa.
- Release the lock on the right side of metal bar, grasp the front metal bar and lift up pulling out on the bar slightly until the leg of the bed is firmly resting on the floor.
- Fold seat belts out of the way.
- When the legs of the bed are firmly on the floor there will be another lifting bar exposed to complete the conversion process.
- Grasping and opening the lifting bar will open the bed fully. The bed is now ready for linen.

---

### ***Sleeper to Sofa***

- Remove all bedding from the hide-a-bed.
- Grasp the foot of the hide-a-bed in the center using the metal lifting bar.
- Fold over the bottom portion of the bed that will form the seat.
- Lift the front portion of the lifting bar to raise and lower the hide-a-bed back into the sofa base.
- Position the seat belts for use.
- Replace the seat cushions.



The sofa will convert easily into a bed. Clear the area of obstruction. The sofa comes equipped with safety belts and these should be used if occupied during travel.

## **ELECTRIC SOFA BED CONVERSION (Optional)**

- Unlock latch at bottom center of sofa and pull bed extension frame out all the way.
- Lift bed extension cushion up and pull out all the way to lock into extension frame.
- Push switch on sofa arm to position back and bottom cushions flat against the bed extension cushion.

### ***Sofa to Sleeper***

- Push switch on sofa arm so that back and bottom cushions are in the sofa position.
- Push in and down on the bed extension cushion to place cushion in stored position on frame.
- Push bed extension frame under sofa into locked position.
- Position the seat belts for use.

### ***Sleeper to Sofa***

#### **The booth dinette easily converts into a bed:**

- Lift seat cushions to an angled vertical position.
- With a firm grip, lift front edge of the table approximately six inches and 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.

## **DINETTE BED CONVERSION (Optional)**



**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.**

## TO EXTEND FIXED DINETTE

- To extend and add table top leaf unlock and slide table top all the way out against stop.
- Lift leaf from storage compartment and place it on rails.
- Slide top and leaf against wall.
- Reverse procedure to store table top leaf.

---

## STORAGE - UNDER BED

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.



**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.**

# Diplomat

## SECTION 6 WATER SYSTEMS

INTRODUCTION •	169
MONITOR PANEL - Measurement •	169
WATER TANK - FRESH FILL •	170
WATER TANK - FRESH GRAVITY FILL •	170
WATER - CITY HOOK-UP •	171
WATER PUMP •	171
Water Pump - Troubleshooting •	172
WATER FILTER (OPT) •	173
WATER SYSTEM - Troubleshooting •	174
WATER SYSTEM - Disinfecting Fresh Water •	174
TANK CAPACITIES - Chart •	175
WASTE WATER SYSTEMS •	175
Waste Drains & Sewage Tanks •	175
What Not to Put in Waste Holding Tanks •	175
Proper Waste Disposal •	175
Connecting to Available Sewer Hook-Up •	176
TOILET •	176
Operating Instructions •	176
Trouble Shooting •	177
Cleaning •	177
Maintenance •	177
Drain Traps & Auto Vents •	178
Draining the Waste Holding Tanks •	178
What to Put into the Holding Tanks - Black Tank •	180
What to Put into the Holding Tanks - Grey Water •	180
COLD WEATHER USE •	181
Bay Heater Operation •	182
Cold Weather Package (Opt) •	182
STORAGE - COLD WEATHER •	183
WINTERIZING - Using Air Pressure •	183
WINTERIZING - Fresh Water System Using Nontoxic Antifreeze •	184



## INTRODUCTION

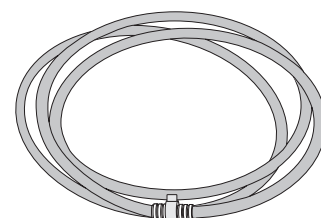
This section contains information and knowledge for the operation and care of the various water system equipment found in the motorhome. The motorhome is equipped with two separate water systems. Optional water equipment will also be discussed, so not all information may be applicable to the motorhome. 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 every-day. 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 gallon or less of water. There is plenty of water to meet personal needs once you modify some habits.

### Fresh Water System:

The fresh water system consists of fresh water tank, water pump, gravity fill connection, water filter and a city/fresh water connection.

Use the 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.



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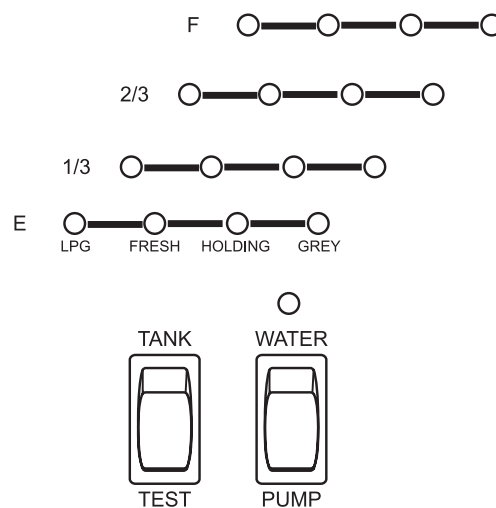
### Waste Water System:

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

The motorhome is equipped with a monitor panel to aide in managing the storage tanks. The monitor panel will be located in the hall area. The switch marked **test** is a momentary switch which requires being held down while testing the level of the storage tanks. Read the scale for the desired storage tank which is to be monitored. Each scale uses colored lights along with a corresponding scale reading. The lights and scales indications are as follows:

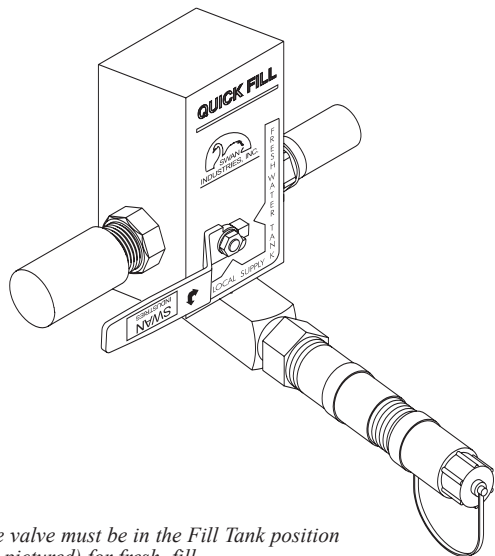
- Green lamps indicate good or normal ranges.
- Amber lamps indicate fair or partial ranges.
- Red lamps indicate full or empty ranges (depending on the scale) which are in the critical range.

## MONITOR PANEL Measurement



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## WATER TANK - FRESH FILL

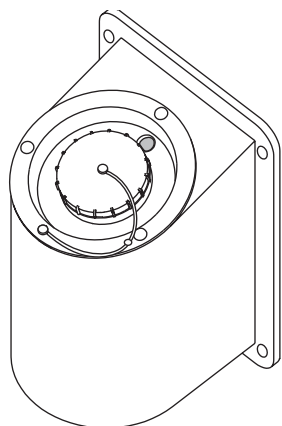


The valve must be in the Fill Tank position (as pictured) for fresh fill.

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1. Confirm that the fresh water tank drain valve, located on roadside in the service center, is in the closed position.
2. Connect the hose labeled for potable water to the water source. The water hose from the source to the motorhome sometimes will not have a pressure regulator inline. On a hot day the hose may expand and burst from water pressure within the water hose.
3. Remove white plug in the end of the pressure regulator.
4. Connect the water hose to the City water inlet.
5. The valve should be in the Fresh Water Tank position.
6. Turn on the water at the water source. The water should be audible as the fresh water tank fills.
7. Locate the monitor panel. Locate the switch marked test. The switch is a momentary switch that requires the switch to be held in position while testing the level in the fresh water tank. Read the scale as the fresh water tank is filling. When the 2/3 tank light illuminates it should not take much longer to finish filling the tank. Do not leave coach unattended while filling the fresh water tank. The light marked "F" should start to blink as a warning that the fresh water tank is almost full. Return to the service center. When the fresh water tank is full water will come out an overflow vent above the gravity fill cap.
8. Turn off water supply as quick as possible.
9. Return handle to "local supply."

## WATER TANK - FRESH GRAVITY FILL



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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.

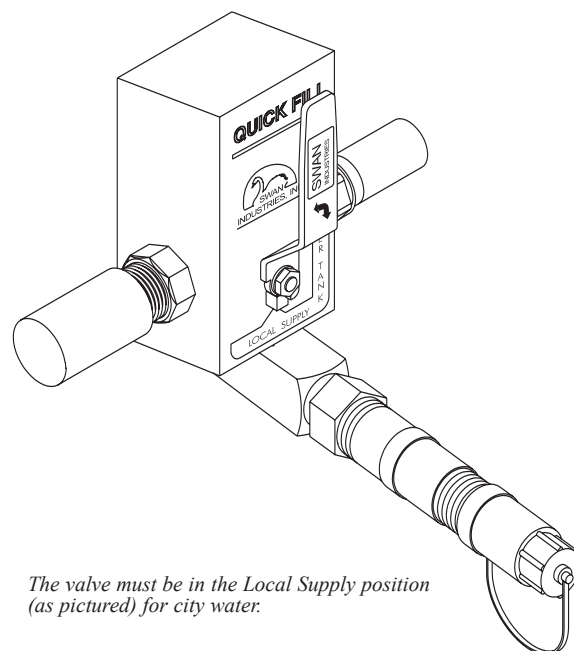


**NOTE: When filling tank do not leave hose unattended.**

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

1. Remove white plug in the end of the water inlet.
2. Connect water hose to the city water inlet.
3. Knife valve handle should be in the position.
4. Turn on water at water source.
5. The water pump can either be in the OFF position or in the ON position. It will not affect the water pump to leave it on.
6. The fresh water connection has a built in pressure regulator and a one way check valve that protects the motorhome to 45 lbs.
7. Open each faucet, one at a time, to rid any trapped air inside the pipes.

## WATER - CITY HOOK-UP



*The valve must be in the Local Supply position (as pictured) for city water.*

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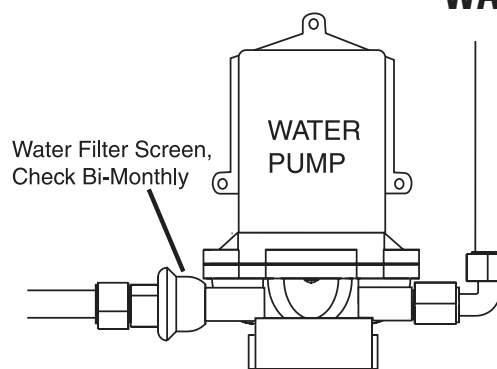


**CAUTION:** Some water sources develop high water pressure, particularly in mountainous regions. High water pressure is anything over 55 psi (pounds per square inch). Excessive water pressure may cause leaks in water lines and/or damage the water heater.

The water pump is used to pressurize the fresh water system when it is not connected to city water. The water pump is totally automatic and self-priming, operating on demand as water is used.

The water pump is located in a storage compartment of the motorhome.

## WATER PUMP



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**WARNING:** Before leaving the coach 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 responsibility of the owner and not the manufacturer.

To operate the water pump, push the switch on the monitor panel to ON. The light indicates the water pump is on. The remote switches are located in the hall and on the outside water control panel.

Do not allow the pump to run when the fresh water supply tank is empty. Continued operation with a dry tank may open an electrical circuit and/or damage the water pump.

**To start pump after unhooking city water supply or first time use proceed as follows:**

- Fill the fresh water tank.
- Open all valves and faucets except the drain valves. This includes hot and cold water valves, all faucets and the shower.
- 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).

---

**Water Pump -  
Troubleshooting**

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 simply tightening the hardware. Check the following items along with other particulars of the system.

**The water pump will not start/blows the circuit:**

- Check the electrical connections, fuse, breaker, main switch and ground connection.
- Is the motor hot? The thermal breaker may have triggered. It will reset when cool.
- Is the voltage present at the switch? Bypass the pressure switch.
- Does the pump operate?
- Check the charging system for correct voltage and check the pump for the proper ground connection.
- Look 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.



**The water pump will not shut-off/runs when the faucet is closed:**

- Make sure 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:**

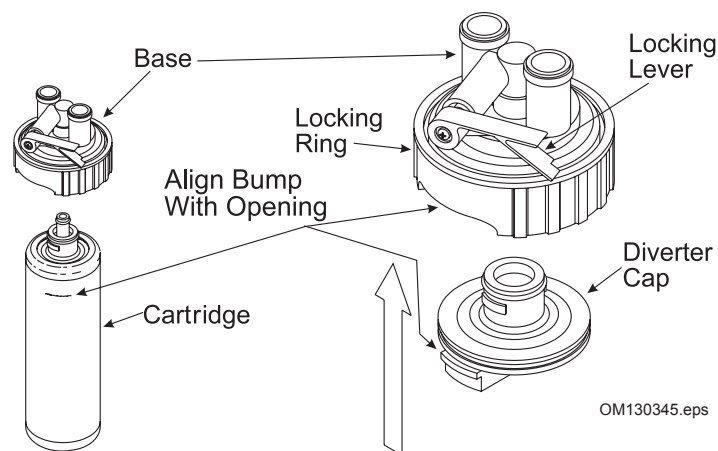
- Check for plumbing which may have vibrated loose.
- Does the mounting surface multiply noise (flexible)?
- Check for mounting feet that are loose or compressed too tight.
- Look for loose pump head to motor screws (three long screws).
- Is the motor with the pump head removed? Is noise coming from the motor or pump head?

**The water pump is rapid cycling:**

- Look for restrictive plumbing/flow restrictors in the faucets or shower heads.

The water filter is located under the galley sink. It may have been installed without the cartridge placed in the unit. The unit's ADC Cartridge can easily be installed by following the instructions on the cartridge wrapper. A fresh replacement cartridge is needed when the flow of water from the faucet is restricted. The life of the filter will vary depending on the condition of the unfiltered water and the quantity used.

Each time water passes through the water filter, dirt particles are trapped and held in the tiny pores of the micro-pure coating on the filtering element within the cartridge. As the cartridge actively removes the impurities from the water its microscopic pores fill up and the amount of water flowing from the cartridge gradually lessens. When the flow of water from the water filter becomes too slow for convenience it should be serviced. If the cartridge is not changed, the flow will eventually stop entirely. Even if the cartridge does not indicate its need to be changed, change it at least once a year for reliable performance from the purification system.

**WATER FILTER (OPTIONAL)**

## **WATER SYSTEM - Troubleshooting**

Water system problems and leaks usually fall into two categories: system problems and problems caused by improper use or lack of attention. These problems usually stem from improper winterization, 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. Be sure the tank drain valves are closed. If the system continues to leak take the motorhome to an authorized dealer for service.

---

## **WATER SYSTEM - Disinfecting Fresh Water**

Disinfecting the water system with chlorine bleach (superchlorination) protects you and your family from bacteriological or viral contamination 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.



**NOTE: An independently operated water pump with garden hose connections and a container to hold prepared solution may be desired to perform this task. The gravity fill may also be used to perform the task. Remove cap off the gravity fill. Add the solution to the fresh water tank. When finished, secure the gravity feed cap.**

### **Use following procedure to disinfect water system:**

- Prepare a chlorine bleach solution using 1 gallon water and 1/4 cup of chlorine bleach. Use 1 gallon of solution for every 15 gallons of tank capacity. Example: Add 2-2/3 gallons solution to a 40 gallon tank. Add 4-2/3 gallons solution to a 70 gallon tank. Add 6-2/3 gallons to 100 gallon tank. This mixture puts a 50 ppm (parts per million) residual in the water system, and acts as a quick-kill dosage for harmful bacteria, viruses and slime-forming organisms. Concentrations higher than 50 ppm may damage the water lines and/or tanks.
- Drain the fresh water tank. Close the drain and pump the solution (if desired) into the fresh water tank using an independently operated pump and a garden hose connected to City Water Hook-Up on the water control panel. It can be poured into the fresh tank using the gravity fill and a funnel. Open each faucet, in turn, and run the water until you smell a distinct chlorine bleach odor. Do not forget the hot water, tub and shower faucets.
- Allow the system to stand for four hours.
- Drain the system and flush with fresh water. The drain is located in the outside water control compartment. Flush with fresh water repeatedly, until the water system no longer smells or tastes like chlorine bleach.

## TANK CAPACITIES - CHART

MODELS	MEASUREMENTS								
	34PBD	36PBD	38PBD	38PBDD	38PBT	40PBD	40PBDD	40PWD	40PBT
Water Heater	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.
Grey Tank	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.
Black Tank	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.
Fresh Tank	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.
Fuel Tank	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.
LP Tank*	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.

\*Actual filled LP-Gas Tank Capacities is 80% of listing due to safety shut-off required on tank.

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.

The waste drainage system is designed to provide adequate and safe storage and/or discharge of waste materials. All materials used in the fabrication and installation of the system are tested by a nationally recognized testing laboratory. The entire fabricated waste system is factory tested in accordance with American National Standards Code A119.2. The drainage system uses ABS plastic piping and fittings for its connection to the sinks, shower, toilet and holding tanks which provide for the proper drainage to an outside termination. The motorhome should be reasonably level for optimum operation of the systems. Two separate waste water systems are in the motorhome: one for waste water (grey water) and one for sewage waste (black water). Each has its own storage tank and control valve. Both systems empty through a sewer drain hose. When the motorhome is traveling, both holding tanks should be empty or less than half full.

### WASTE WATER SYSTEM - Waste Drains & Sewage Tanks

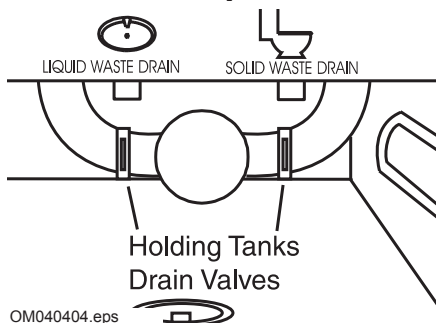
- Do not use strong or full strength detergents to deodorize and disinfect. Use odor control chemicals made especially for holding tanks.
- Do not put automotive antifreeze, ammonia, alcohol or acetone in holding tanks. Some chemicals will dissolve plastic.
- Do not put large table scraps in the tanks. They could get 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. White toilet paper dissolves faster than colored papers.

### What Not to Put in Waste Holding Tanks

## 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 publications. Some major oil companies offer dump facilities at selected stations. Plan ahead to avoid inconveniences in proper and legal disposal of holding tank wastes.

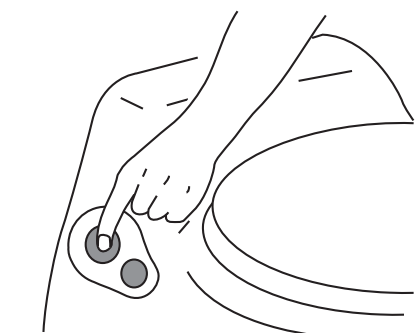
## Connecting to Available Sewer Hook-Up



When parking in an area with sewer hook-up available, the waste holding grey tank gate valve can remain open once connected to the sewer hook-up. The sewage holding black tank valve must be closed at all times except when dumping. One thing to consider prior to dumping the holding tanks is to allow enough fluid to accumulate in the grey tank before dumping. Dump the black tank first so the grey tank fluid may be used to flush the sewer hose.

For ease of operation use a spray silicone once a month on the slide valves.

## TOILET - Operating Instructions



The toilet operates from either the fresh water tank or city water supply. The water pump must be turned on or the city water connected. The toilet flushes directly into a sewage holding tank (black water).

- To add water to the toilet, press and hold the small button until the desired water level is reached. Generally, more water is required only when flushing solids.
- To flush the toilet, push the large button once.
- Pressing both buttons twice, simultaneously, opens the flush valve to access the holding tank to add chemicals. Pressing the flush button again will close the valve.

In the event the 12-Volt DC is lost at the toilet, the valve can be manually opened using the override knob located in the back

of the toilet. Early model toilets require the use of a wrench to operate the valve. Newer models will have a thumbwheel.

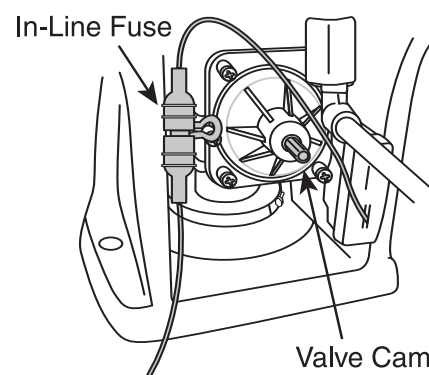
### Wiring:

- The toilet is wired to a 10 Amp Fuse in the house distribution panel.
- The toilet has a 4 Amp 3 Ag “slow-blow” in-line fuse located in the back of the toilet.

### Leaks:

- Back of toilet: check water supply line connection.
- Between closet flange and toilet: Check screws for tightness. 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 remove the water supply line and check flow rate. The flow rate should be at least ten quarts (9.5 liters) per minute.
- Bowl will not hold water: Check for foreign material in valve blade groove in the flush drain.

## Troubleshooting



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The toilet should be cleaned regularly for maximum sanitation and operational efficiency. Clean the toilet bowl with a mild bathroom cleaner. Do not use chlorine or caustic chemicals, such as drain opening types, as they will damage the seals.

Clean out the system by flushing several gallons of fresh water through with one cup of liquid laundry detergent. Add odor control deodorant, in the amount specified for your holding tank capacity, after cleaning and every few days during use.

## Cleaning

To find leaks, check behind or under toilet. Take four or five sheets of toilet tissue and wipe all the seams and water line connections. Start at the top of the unit and work downward. When the tissue comes in contact with leaking water it will immediately change texture.

## Maintenance



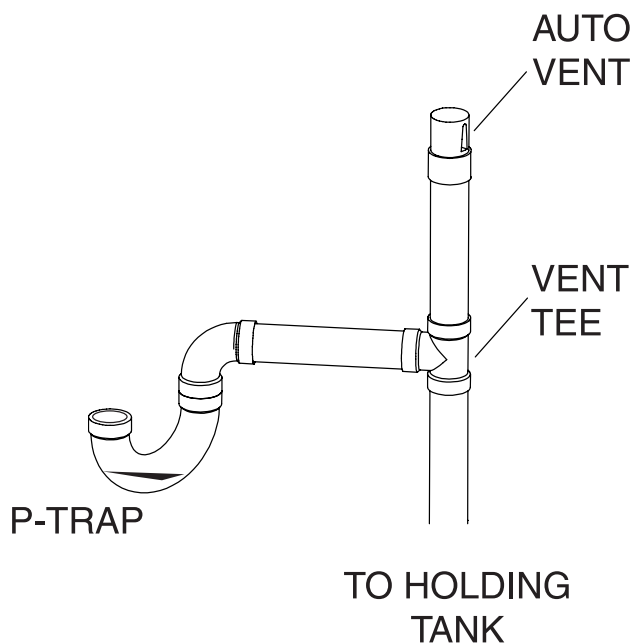
**NOTE: If the motorhome is in storage for six months it is a good idea to spray silicone on the toilet valve and work it back and forth. Perform this maintenance monthly (silicone will evaporate in about 30 days).**

**Leaks:**

- **Back of toilet** – Check water supply line connection.
- **Between closet flange and toilet** – Check screws for tightness. 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 two to three seconds. If problem persists remove the water supply line and check flow rate. The flow rate should be at least ten quarts (9.5 liters) per minute.
- **Bowl will not hold water** – Check for foreign material in valve blade groove in the flush drain.

---

**Drain Traps & Auto Vents**



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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 for the most part 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 water in the drain without creating vacuum pressure in the lines.

The auto vent, if stuck in the open position, can allow grey odors to enter the motorhome. These auto vents also double as “clean outs” in the event you have to snake out a line.



**NOTE: Most chemical mixtures for holding tank odor control are poisonous. Follow the product manufacturer's directions and warnings when using any holding tank additive.**

---

**Draining the Waste Holding Tanks**

When parked in an area with a sewer hook up, “exercise” the drain pipe before hooking up the sewer hose. Swivel the pipe up and down by firmly grasping both sides of the sewer drain pipe hose connection. This will exercise the O-rings. Leave the drain pipe pointing up to prevent any residual material from running out.

**Attaching the Sewer Hose:**

- Turn the drain end cap counterclockwise and remove it from the drain pipe.
- Unscrew the hose access deck plate from the bottom of the water service compartment. Feed the adapter end of the drain hose up through the hole and install the hose adapter onto the drain pipe.
- Rotate the drain pipe downward for maximum flow.
- Straighten and secure hose to avoid recoil. Attach the end of the hose to the sewer connection at the dump station.



**NOTE: Ensure sewer hose connections and hose clamps are secure before use.**

The grey water holding tank valve (small valve) remains open when connected to the sewer hook-up. The black water holding tank valve (large valve) remains closed at all times except when dumping the sewage tank. When preparing to dump the black water holding tank, first close the grey water tank valve. Allow the grey water tank fluid to accumulate until the tank is at least half full or fill by running cold water through the sink and shower drains. Do not overfill the grey water holding tank.

To aid in the removal of solids, it is best to dump the black tank when it is at least 50% full. If it is necessary to dump the black tank when the level is below 50%, add water by using the sewage tank flush system until a 50% ratio is achieved.

- With the black valve closed use the sewage tank flush system to increase the holding tank level.
- Use the monitor panel to prevent the tank from being overfilled when adding water using the sewage tank flush system. Closely watch the tank level by observing the appropriate tank gauge.
- The sewage tank flush system should never be operated while unattended.

**Dumping the Waste Holding Tanks:**

- With the grey water valve closed, open the black water valve to drain the tank.
- Flush the sewage tank. Connect a separate non-potable water supply hose with pressure regulator to the sewage tank flush connection on the water service panel. For sanitary reasons, be sure not use the potable city water hose for this procedure. The large gate valve remains open throughout the flushing cycle. Turn the water on and flush the black water system for approximately two minutes. Ensure water is flowing freely through the sewer hose.
- When finished flushing the system, turn the water off and close the black water valve.



- Open the grey water valve.
- Run two gallons of water down a sink drain to flush the waste water tank.
- If applicable, close the grey water valve for transit.
- Disconnect and flush the drain hose with either the non-potable water supply hose or the exterior faucet. Secure the sewer hose in the travel location. Disconnect and stow the non-potable hose.
- Install the end cap (required by law in some states) and deck plate when in transit to prevent leakage. Swivel sewer drain pipe up.



**NOTE:** Periodically lubricate the O-ring on the sewer hose adapter with silicone spray. Use care when connecting the hose adapter to the drain pipe in cold weather.



**WARNING:** When using the black tank flush do not leave the motorhome unattended or flooding may occur. The sewage tank flush system should be used each time the black water holding tank is dumped. Failure to routinely use the sewage flush system will result in a clogged spray nozzle. Turn off the water supply to the black tank flush when finished.

---

### ***What to Put into the Holding Tanks - Black Tank***

The black water sewage tank stores toilet drain waste only. Before using the toilet, treat the sewage holding tank with water that is mixed with an odor control chemical. These chemicals are readily available at any recreational vehicle supply store.

The chemicals are poured into the holding tank through the toilet. Mix the chemicals with approximately one gallon of water. Be careful not to spill the chemical on hands, clothing or carpet as it can cause permanent stain.

Extremely hot weather areas may require adjusted amounts of chemical to help with odor control. Each time the holding tank is dumped repeat the chemical mixing procedure.



**CAUTION:** Do not use any products that contain petroleum or ammonia in place of an RV odor controlling chemical. Petroleum and ammonia will damage the ABS plastic holding tanks and seals.

---

### ***What to Put into the Holding Tanks - Grey Tank***

The waste tank stores sinks, shower and clothes washer drain water. No chemical is required in this holding tank; however, keep in mind this is a waste holding tank and can produce odors. A reduced mixture of chemicals may be used for odor control.

Prior to dumping the waste holding tanks, be sure there is enough liquid in the holding tanks to provide a smooth flow through the valve drain pipe and drain hose. When sufficient liquid is in the tank a swirling action will result that should take accumulated solid wastes along with the waste liquid when the tank



is dumped. The tanks should be emptied when they reach ½ full, or weekly, to prevent stagnation and overfilling.

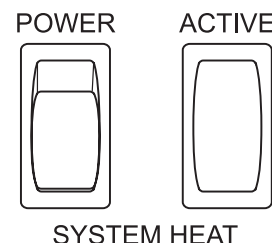
The motorhome is not designed for extended use in below freezing (32° F/0° C) weather. With that said, the manufacturer is not stating that it cannot be done, but merely stating the motorhome was not designed for use in extended below freezing temperatures. There are precautionary measures that can be 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 furnace heat does not provide heat to these components. An optional Cold Weather Package is offered that provides limited protection to the water system below the floor.

The **SYSTEM HEAT** switch has a dual purpose when the system heat switch is in the **ON** position. First, it allows current to pass to a small "snap disc." The snap disc is a thermostat that operates in the range of 40 to 56° F. When the snap disc is in the **CLOSED** position, power is passed to both the heat mat and the bay heater. The heating status can be monitored inside the motorhome using the lighted switch. When temperatures lower to the operating range of the snap disc and the snap disc closes, the switch will illuminate.

## COLD WEATHER USE



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**WARNING: The battery disconnect switches must be turned off if the motorhome is left for an extended period of time (2hrs). The battery cut-off switch does not control the bay heater and heat mats circuitry.**

The dump valves and water pump by design will receive limited cold temperature protection as long as the 12 Volt electric bay heater is operating. Make sure the 12 Volt heater is turned **ON** and the thermostat on the bay heater is set to a desired setting so that when the snap disc closes the bay heater will operate.



**NOTE: The bay heat system will quickly drain the motorhome batteries when not connected to shore power or operating from the generator. Only use the bay heat functions when hooked to shore power or operating from the generator. The Bay heater is not intended to heat the entire bay.**

Exposed drains and water lines may freeze quickly in below freezing temperatures. If, by the way of prior experience, there are doubts as to what temperatures the motorhome's water system will tolerate, and the water system will not be used, winterize the water system using potable antifreeze. When the tanks are dumped, additional potable antifreeze will need to be added to the storage tanks.

## Bay Heater Operation

The 12 Volt Bay heater is standard equipment that is fairly simplistic by design. Both the **SYSTEM HEAT** switch and the power switch on 12 Volt Bay Heater need to be set to the **ON** position. However, this alone does not provide power to the 12 Volt Bay Heater. The thermostat or "snap disc" will close at approximately 40° F. + or - 6° F., allowing bay heat operation. When the temperature rises above 56° F. + or - 6° F., the snap disc will open, turning the bay heat off.

When either switch is in the **OFF** position or the snap disc is in the **OPEN** position, power will not be provided to energize the 12 Volt heater.

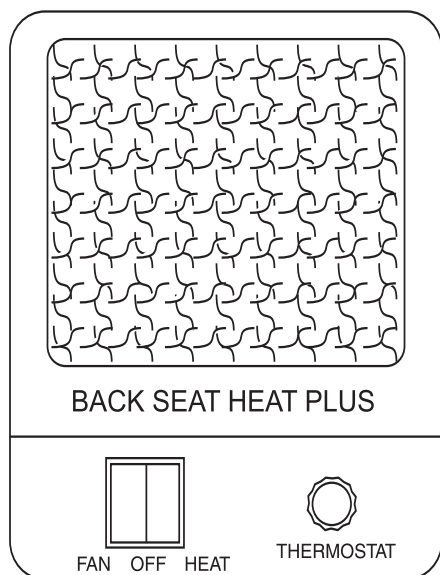
### Two Controls of the 12 Volt Heater:

#### 1. Function Select Switch:

- Left Position: Fan only on.
- Middle Position: Heater off.
- Right Position: Both fan and heater on.

#### 2. Thermostat:

- Rotate right or clockwise to increase temperature setting.
- Rotate left or counterclockwise to reduce temperature setting.



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**NOTE:** When the bay heat remote switch is activated, the bay heater will begin operation at approximately 40° F. The remote switch will illuminate only while the heater is operating. Current draw is approximately 25 amps. Be sure the motorhome is plugged into shore power to prevent house battery discharge.

## Cold Weather Package (Optional)

The factory can install an optional cold weather package that consists of one 12 Volt electric heating pad attached to each waste holding tank. Additionally, 12 Volt electric heating pads will be added to the fresh water storage tank, if the Cold Weather Package was ordered as an option. The same **SYSTEMS HEAT** switch that powers the 12 Volt bay heater controls all of the 12 Volt electric heating pads. The electric heating pad operation is controlled by an internal thermostat designed to turn on at 44° F. and off at 64° F. When outside ambient temperatures approach 44° F. the 12 Volt electric pads should be turned ON.



**CAUTION:** It is the owner's responsibility to make sure there is liquid in the fresh water and waste storage tanks prior to using the bay heat system. Damage to the heat pads or holding tanks may occur if the tanks are empty.



**CAUTION:** Turn OFF power to pads when dumping the holding tanks, plugging motorhome into shore power and when starting the electric generator to prevent damage to the pad thermostat. This also applies to winterizing the motorhome.

**STORAGE -  
COLD WEATHER**

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.**

The method chosen to winterize the motorhome and water lines is up to the motorhome owner. The lines can be air blown to remove standing water or the lines can be filled with an approved FDA RV antifreeze. Either way, all interior and exterior faucets need to be opened and closed, one at a time, to be checked. All low point drains should be opened and the holding tanks emptied.

To use air pressure to winterize the motorhome you will need access to an air compressor and an adapter to connect the air line to the water system. Adapters can be found at any RV supply store. When hooked to the water lines the pressure should not exceed 40 psi. Higher pressure can damage the lines.

**WINTERIZING -  
Using Air Pressure**

1. Remove water filter cartridge and replace filter with diverter cap (see WATER FILTER). Diverter cap comes with motorhome and will be stored inside. With diverter cap installed it creates a bypass in water lines.
2. Drain the fresh water tank and lines by opening the tank drain valve and the low point drain valves located in the outside water control service compartment of the motorhome.
3. Let all the water drain. Turn the pump on and allow it to run so that all the water is cleared out of the pump and lines. Turn the pump off.
4. Remove water heater drain plug and open pressure release valve located in the outside water heater access compartment.
5. After the water is drained, hook an air hose to the city water connection located on the water control panel in the outside service compartment. Blow out the water lines until no further water can be seen coming out of the drain lines. Do not exceed 40 psi in the water lines and faucets.
6. Move water heater bypass valve to BYPASS setting located next to water heater. Replace the water heater drain plug and close the pressure release valve. Open all faucets (including the outside spigot) one at a time while the air is on, to clear water from the faucet supply lines. Do not forget to drain your shower.

7. While the air is on, hold the spray nozzle (located right next to the toilet) open until the water has quit running. Hold the toilet flush pedal or handle down until the water has stopped running.
8. Unhook the air hose and close the city water connection.
9. Use 1 gallon of RV antifreeze 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, with some of the antifreeze going into grey tank to protect the drain valve. While holding down the flush pedal, pour another 3½ pints into the toilet, letting the antifreeze run into the black tank to protect the valve located there. Pour the last pint of antifreeze into the toilet after you releasing the flush pedal. Use a soft cloth to wipe out the sinks and shower (after the antifreeze is poured in) to protect the surfaces from stains.
10. Leave the low-point drains open until the motorhome is used again.



**WARNING: When draining the low water drain lines and the water heater be sure the water is not hot. Hot water from the lines can burn or injure skin.**

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## **WINTERIZING - Fresh Water System Using Nontoxic Antifreeze**

If filling the water lines with antifreeze is preferred, use 5 gallons of FDA RV winterizing antifreeze.

1. Remove water filter cartridge and replace filter with diverter cap (see WATER FILTER). Diverter cap comes with motor home and will be stored inside. With diverter cap installed it will create a bypass in water lines.
2. Drain the fresh water tank and lines by opening the tank drain valve and the low point drain valves located in the outside water control service compartment of the motorhome.
3. Let all the water drain. Turn the pump on and allow it to run so that all the water is cleared out of the pump and lines. Turn the pump off.
4. Remove water heater drain plug and open pressure release valve located in the outside water heater access compartment.
5. After the water is drained, move water heater bypass valve to BYPASS setting located next to water heater. Replace the water heater drain plug and close the pressure release valve.
6. Close the fresh water tank drain valve and the low point drain valves.
7. Close the water tank shut-off valve and open the winterization connection valve.
8. Install a hose to the winterize connection and drop the other end of hose into the anti-freeze container.
9. Turn ON the system water pump and operate each faucet individually until a small amount of antifreeze is present.
10. Close the faucets.

11. Open the shower faucets and toilet valves to allow a small amount of antifreeze to run into the holding tanks.
12. Use a soft cloth to wipe out the sinks and shower to protect surface from antifreeze stains.
13. Exterior faucet should be opened and closed using the same procedures as the interior faucets.
14. If the motorhome is equipped with an ice maker, remove the  $\frac{3}{4}$  inch fitting and flush antifreeze through the water line.
15. Turn water pump off.
16. Disconnect the power supply line affecting water pump operation.

### De-winterization:

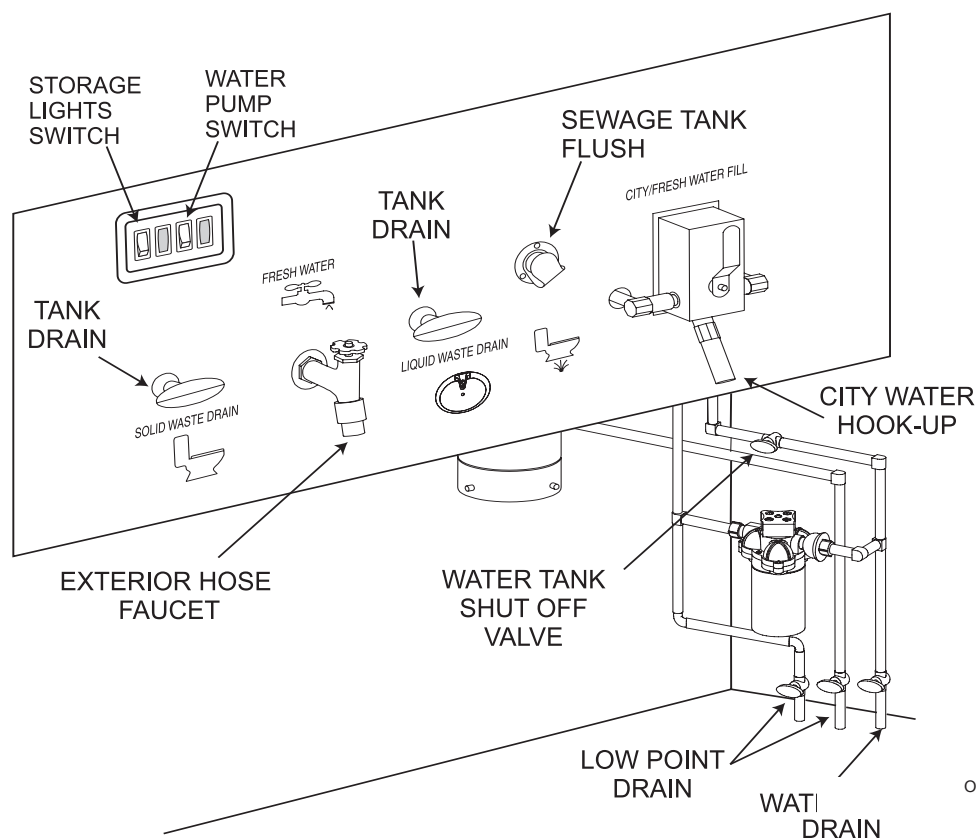
For de-winterization, drain off the fresh tank and fill the fresh tank with water. Reconnect the power supply line for the water pump. Operate all faucets, one at a time, until clear water is present. Install new water filter and fill water heater with water.



**WARNING:** Use only non-toxic RV antifreeze that is specifically made for potable water systems. Automotive antifreeze, if ingested, can cause blindness, deafness or death.



**WARNING:** It is recommended that this procedure be done by a qualified RV service technician familiar with motorhomes, such as the authorized selling dealer.



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**NOTES**



**SECTION 7  
LP-GAS SYSTEMS**

<b>LP-GAS SYSTEM • 189</b>
<b>LP-GAS DETECTOR • 190</b>
<i>Operation • 190</i>
<i>Testing • 190</i>
<i>Alarm • 191</i>
<i>Care of the Detector • 191</i>
<b>MONITOR PANEL • 192</b>
<i>Measurement • 192</i>
<i>Tank Capacity • 192</i>
<b>CHECKLIST - LP-GAS EMERGENCY PROCEDURES • 192</b>
<b>LP-GAS TANK • 193</b>
<i>Operation • 193</i>
<i>LP-Gas Tank Filling • 193</i>
<b>LP-GAS FUNDAMENTALS • 195</b>
<b>LP-GAS REGULATOR • 196</b>
<b>LP-GAS CONSUMPTION • 197</b>
<b>LP-GAS DISTRIBUTION LINES • 197</b>
<b>LP-GAS SAFETY TIPS • 197</b>







This section contains information and knowledge 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 are capable to operate 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 which 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.

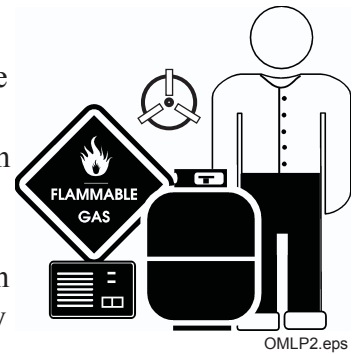
Component lighting problems are commonly caused by an improperly adjusted gas regulator. Do not attempt to reset the regulator. Adjustments need to be made by a dealer or an authorized service person.

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 main gas valve at the tank. Immediately see a 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.

## LP-GAS SYSTEM



**WARNING: LP-Gas is highly volatile and extremely explosive. Do not use matches or a flame to test for leaks. Use only approved LP-Gas leak testing solution for leak detection. Unapproved solutions can damage copper tubing and brass fittings. Never attempt to adjust LP-Gas regulators. Only qualified personnel should perform any maintenance or repair to the LP-Gas system.**

## LP-GAS DETECTOR

The LP-Gas detector is provided for safety. The gas detector detects both LP-Gas and Methane Gas. Liquefied Petroleum Gas (LP-Gas) is heavier than air and 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 LP-Gas detector is also sensitive to fumes such as hairspray, most of which contain butane as a propellant. Butane, like propane, is heavier than air and will settle to the floor level where it will be detected. When this occurs, press the reset button to stop alert sound for 60 seconds and allow the air to clear.

The other detectable vapors include alcohol, liquor, deodorants, colognes, perfumes, wine, adhesives, lacquer, kerosene, gasoline, glues, most of all cleaning agents and propellant of aerosol cans. Most are lighter than air in their vapor state and will only be detected when the motorhome is closed up.



## 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 detector senses unsafe levels of gas it will immediately sound an alarm. The gas detector operates on 12 Volts, with a current draw less than 1/10th of one amp.



**CAUTION: The detector will not alarm during the three minute warm up cycle.**

## Testing

Press the **TEST** switch any time during the warm up cycle or while in normal operation. The LED should flash **red** and the alarm should sound. Release the switch. This is the only way you should test the detector. The test feature checks full operation of the detector.



**WARNING: Test the operation of this detector after the motorhome has been in storage, before each trip and at least once per week during use.**

**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 **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 the motorhome, leaving all doors and windows open.
2. Turn off the propane tank valve.
3. Determine and repair the source of the leak. Contact a qualified service professional if additional repairs are necessary or if the source of the leak cannot be determined.



**WARNING: If the alarm sounds and there is no immediate danger open all doors and windows to air out the motorhome. Exit the motorhome and turn off the gas at the LP tank. Do Not re-enter the motorhome until the alarm stops sounding. If the alarm sounds again after the gas is turned back on, turn the gas off. Leave the gas off and contact a qualified service technician to find and repair the leak. Do not re-enter the motorhome until the problem is corrected.**

**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 concentration of LP-Gas has dispersed 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.

**Fault Alarm:**

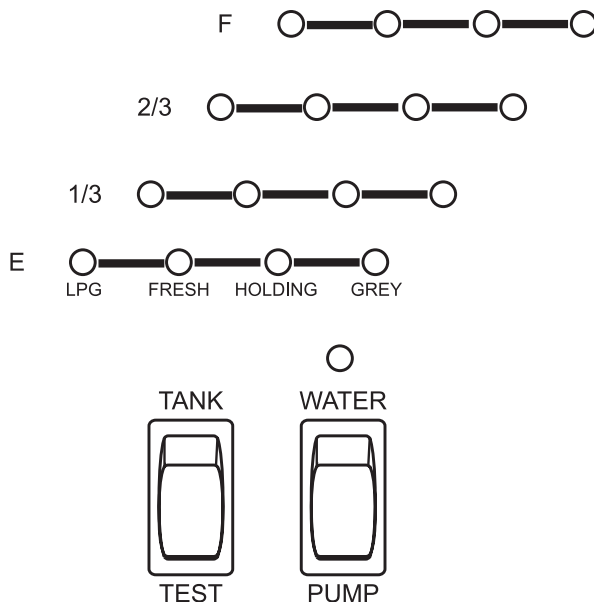
Should the microprocessor sense a fault in the gas detector, a fault alarm will sound twice every 15 seconds. The LED will alternately flash **red** to **green** and the **MUTE** switch will not respond to any command. The gas detector must be repaired or replaced.

**Care of  
the Detector**

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 - Measurement

Tank Measurement - To measure level of a tank simply push button on display panel located in hall area, corresponding to tank you wish to measure. Lights on panel will turn on in sequence indicating level of tank.



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## Tank Capacity

MODELS	MEASUREMENTS								
	34PBD	36PBD	38PBD	38PBDD	38PBT	40PBD	40PBDD	40PWD	40PBT
Water Heater	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.
Grey Tank	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.
Black Tank	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.
Fresh Tank	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.
Fuel Tank	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.
LP Tank*	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.

\*Actual filled LP-Gas Tank Capacities in 80% of listing due to safety shut-off required on tank.

This chart reflects product specifications available at the time of printing. Any floor plans introduced thereafter may not be reflected in the chart. All other information contained throughout the manual will still apply.

## CHECKLIST - LP-GAS EMERGENCY PROCEDURES

If you smell gas (a rotten egg or sulfur smell) at any time, perform the following steps immediately:

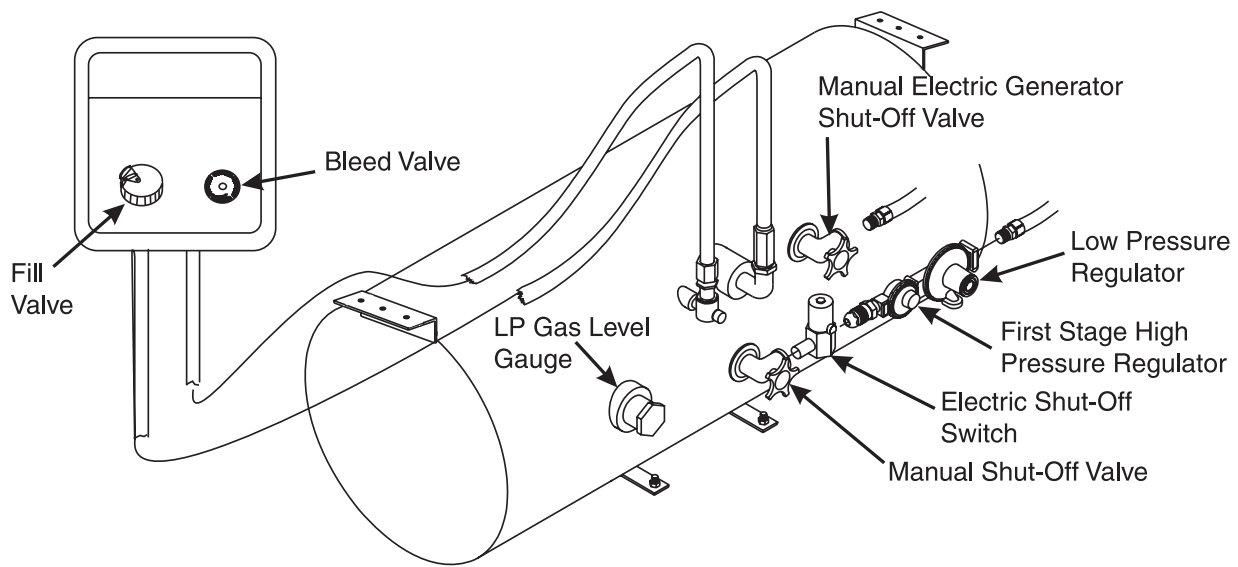
- Shut off gas appliances.
- Manually turn off the main gas supply at the tank.
- Do not attempt to operate any electric switch as this can produce a spark and ignite the gas.
- Open windows and doors.
- Evacuate the motorhome. Stay clear of the immediate surrounding area.
- Keep open flames, spark producing 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 you or cause death.**

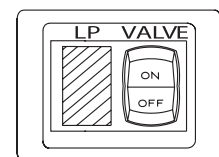
## LP-GAS TANK - Operation

- Manually open the main shut-off valve located on the LP-Gas tank.
- Turn off the manual valve on the LP-Gas tank when the motorhome is in between trips.
- Hand tighten the manual valve. Do not use a wrench or pliers to close the valve.
- The manual valve is designed to be closed by hand, over tightening may permanently damage the valve seat.



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The LP-Gas electric shutoff switch is located in the LP tank compartment on the curbside of the motorhome. The **red** light is illuminated when the switch is **ON**.



Outside Electric Switch

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*Woodall's Campground and Trailer Guide* and other publications list refueling stations. Many travel parks sell LP-Gas. Shut off the pilot lights, appliances and igniters before filling the LP-Gas tank 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 LP-Gas tank access outside compartment. Caution the service technician, if the tank is new and being filled for the first time, to purge any air from the tank before filling. 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 vent pressure. When this happens you may detect a strong rotten egg odor near the tank and/or hear a hissing noise.



**WARNING: Turn off all pilot lights and appliances while filling the LP-Gas tank to prevent a fire or explosion.**

## LP-Gas Tank Filling

LP-Gas exists in both the liquid and vapor state 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 pressure relief device. The purpose of the relief valve is to release gas or liquid caused by overpressurization. The gauge at the tank, when full, will only read 3/4. The monitor panel is adjusted to indicate **FULL** at this point.

If you are storing portable LP-Gas tanks (do not transport or store LP-Gas tanks, gasoline or other flammable liquids inside the motorhome) that are not connected to an LP-Gas system. Install an approved plug in the tank outlet holes to prevent leaks.



**WARNING: 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 LP-Gas tank valve (located on side of 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 300 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 which consume large amounts of LP-Gas, such as the water heater or furnace, will need to be operated in sequence in extremely cold environments.**

# 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

## 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.

**The above capacities allow for 20% vapor space on each cylinder.**

*Data taken from the National Fire Prevention Association (NFPA). Pamphlet #58-1998.*

### 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



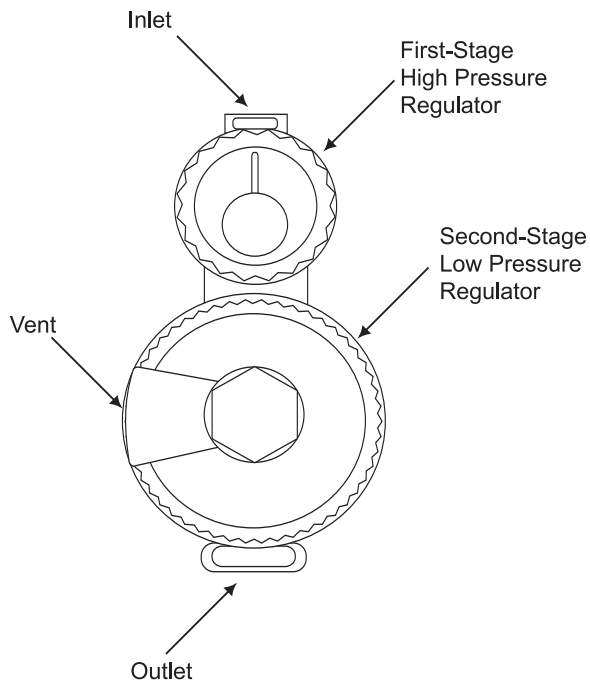
**NOTE: The information is not a complete guide for the use of LP-Gas tanks or appliances. In cold climates keep fuel levels above 50% in order to keep vaporization of LP-Gas at the highest level.**

### 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 effects pressure of LP-Gas. Internal tank pressure can exceed 200 psi.
- Tanks or valves contain pressure relief valves. The relief valve opens at 125% above tank rating.
- LP-Gas stops vaporizing at -44° F.
- Standard LP-Gas operating pressure is 11" of Water Column or approximately 6 1/4 ounces per square inch.
- An inch of Water Column is a measurement of applied pressure to one side of a U-Tube 1/2 filled with water at sea level. The amount of pressure required to raise the water level 11", represents 11" of Water Column.



## LP-GAS REGULATOR



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*A typical two-stage regulator.*

The regulator is the heart of an LP-Gas system. The LP-Gas in the tank is under high pressure. The regulator reduces the pressure of gas so that it is safe to use with various appliances. The regulator on the motorhome is a two-stage regulator. The first stage regulator reduces the full tank pressure down to a range of 10-13 psig (pounds per square inch gauge). The second stage further reduces the pressure down to an outlet pressure of 0.4 psig (11 inches of water column). The regulator is equipped with a vent that allows it to breathe. It is important to keep the vent clean and clear of obstructions or corrosion. If the vent becomes clogged, pressure from LP tank could cause a failure of the components. If there is any corrosion, contact a qualified LP-Gas service technician. The regulator is mounted so that the vent faces downward. If the vent becomes clogged clean it with a toothbrush.

Under normal atmospheric conditions an LP regulator will not freeze, nor will the LP-Gas. The gas passing through the regulator will expand and cool creating moisture in the gas. This moisture will turn to ice which can build up and partially or totally block the orifice. The possibilities of freeze up is 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.
4. If a freeze up occurs, have an LP-Gas distributor purge the tank.
5. Have the LP-Gas distributor inject methyl alcohol in the tank.



**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 attempt to enter the motorhome until the problem has been corrected!



## 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.



**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.**

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. We recommend gas distribution work be performed by an authorized dealer or an authorized service technician. When removing or servicing any gas appliance, manually close the main 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. If you suspect a gas leak, get the system inspected and repaired by a qualified service technician as soon as possible.

## LP-GAS DISTRIBUTION LINES

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](http://www.npga.org).

## LP-GAS SAFETY TIPS

### **LP-Gas Tanks and Cylinders:**

Tanks are built to American Society of Mechanical Engineers (AMSE) 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 (AMSE) 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 and the Propane Furnace:**

- 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 incomplete combustion (yellow flame instead of a blue flame or soot is present) call a service technician immediately. Improper combustion can cause carbon monoxide buildup, which is potentially fatal!

NOTES

# Diplomat

<b>INTRODUCTION • 203</b>
<i>Shore Power • 203</i>
<i>Generator • 203</i>
<i>Inverter/Converter • 204</i>
<b>BATTERY DISCONNECT - HOUSE • 204</b>
<b>BATTERY CUT-OFF SWITCH • 204</b>
<b>SHORE POWER HOOK-UP • 205</b>
<b>TRANSFER SWITCH • 206</b>
<b>GENERATOR - 120 AC (LP) • 207</b>
<b>GENERATOR - 120 AC (DIESEL/OPT.) • 207</b>
<i>Prestart Checks • 208</i>
<i>Starting the Generator • 208</i>
<i>Stopping the Generator • 208</i>
<i>Powering the Equipment • 209</i>
<i>Resetting the Circuit Breaker • 209</i>
<b>INVERTER/CONVERTER • 210</b>
<i>Troubleshooting Chart • 211</i>
<i>Remote Control • 212</i>
<i>Set Up Mode • 213</i>
<i>Low Power • 214</i>
<i>Equalizing Charge Mode • 214</i>
<i>Equalizing Procedure • 214</i>
<i>Battery State LED • 215</i>

<b>SECTION 8</b>
<b>ELECTRICAL SYSTEMS - HOUSE</b>
<b>DISTRIBUTION PANEL - HOUSE 110 • 216</b>
<i>Energy Management System - 50 Amp (Opt) • 218</i>
<b>DISTRIBUTION PANEL - HOUSE 12 VOLT • 220</b>
<i>Fuses • 221</i>
<i>Tools of the Trade • 221</i>
<i>Know When to Say No • 221</i>
<b>BATTERY - HOW IT WORKS • 222</b>
<i>Starting Battery • 223</i>
<i>Deep Cycle Battery • 223</i>
<i>Battery Maintenance • 223</i>
<i>Testing the Battery • 224</i>
<i>Reasons Why Batteries Fail • 225</i>
<i>Battery Voltage &amp; Current • 227</i>
<i>Battery Charge Time &amp; Consumption Rate • 228</i>
<i>Battery Specifications • 230</i>
<b>BULB USAGE • 231</b>



## INTRODUCTION

The motorhome 120/240 Volt AC system can be operated from three different power sources. **Shore power** is the most efficient and should be used whenever possible. The **on board generator** has a limited amount of 120 Volts AC output power. This can be used when shore power is unavailable. The **inverter/converter** supplies silent AC power by the use of the motorhome's house batteries. This source has limited AC power output and should be used sparingly.

The motorhome 120 Volt AC circuit breaker panel is supplied with power from two different sources: **50 amp shore power cord or the on board generator**. The selection of the power source being used is done automatically by the use of an automatic electrical switching device known as a transfer switch.

The motorhome is equipped with a shore power cord. The electrical cord connects the motorhome to outside electrical services. Shore power service is the most efficient source of electrical power and should be used as the primary source. The end of the shore power cord is 50 AMP 220 Volt. Many facilities are equipped with this power service. When this type of power service is not available, electrical adapters will be required to allow a proper and safe connection to the electrical service supply.

### ***Shore Power***



**NOTE: In many instances 50 amp shore service is not available and care will have to be used when operating the appliances and using the outlets so as not to overload the shore power service being used.**

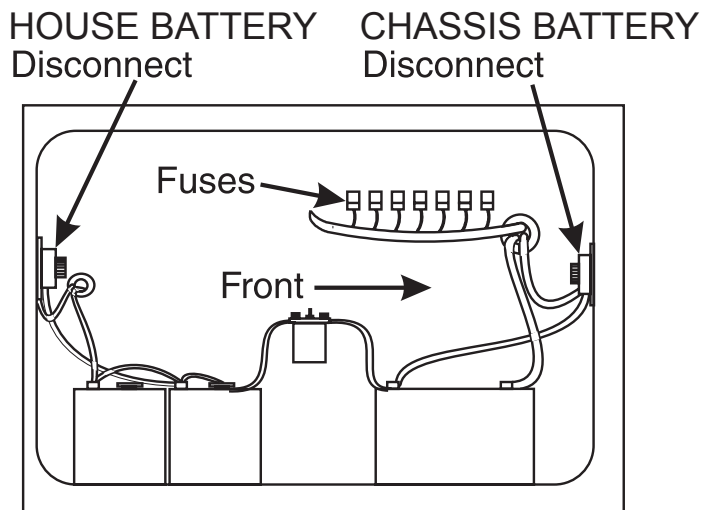
The generator can be selected for use when AC shore power is not available. The motorhome's on board generator has limited 120 Volt AC power output capabilities. The generator maximum amount of output power is specified in watts, which is calculated at an elevation of 500 feet above sea level. The figure will decrease with a higher altitude. Temperature also affects total maximum output. Fuel consumption is based upon a percentage of AC electrical load applied to the generator. When using the generator, care will have to be taken when operating appliances and outlets so as not to overload the generator.

### ***Generator***

## Inverter/Converter

The inverter/converter can be used for silent AC power if shore power is not available, and using the generator is not going to be selected as a secondary power source option. This device has limited AC power output, measured in watts. It operates only selected appliances and outlets. The inverter/converter is two components in one. Its first function is as an auxiliary 120 Volt AC power source that uses 12 Volt DC house battery power to invert to 120 Volts AC. The second function of the inverter/converter is to use 120 Volts AC power, supplied from either shore power or the generator, and convert it to 12 Volts DC power to recharge the batteries.

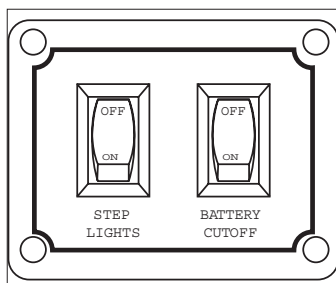
## BATTERY DISCONNECT - HOUSE



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The main battery disconnects are located in the rear passenger side battery compartment. In the compartment are a pair of battery disconnects: One for the chassis batteries and the other for the house batteries. Turn off the batteries anytime the motorhome is going to be stored and not in use. If possible, leave the motorhome plugged into an AC source with the battery disconnects on. This will help prevent the batteries from going dead. Use of the battery cut-off switch at the entry door will not turn off all DC electrical items. There are small “parasitic” loads that are present on both the house and chassis batteries. Some are federal mandate items, such as the LP detector. If the motorhome will not be used, or will be stored for more than 48 hours, it is recommended to turn the batteries off.

## BATTERY CUT-OFF SWITCH



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The battery cut-off switch is located inside and next to the entry door. This switch controls the 12 Volt DC power to the domestic fuse panels. When the switch is ON power is supplied to all interior DC lighting and DC operated appliances. Some appliances will require both DC and AC power to operate, such as the roof air conditioner. This switch is helpful when dry camping and can be used to conserve house battery power. Refrigerator and inverter operation are unaffected by the operation of this switch. When turned off, this switch will not stop all parasitic loads and therefore is not a substitute for the main battery disconnect switch.

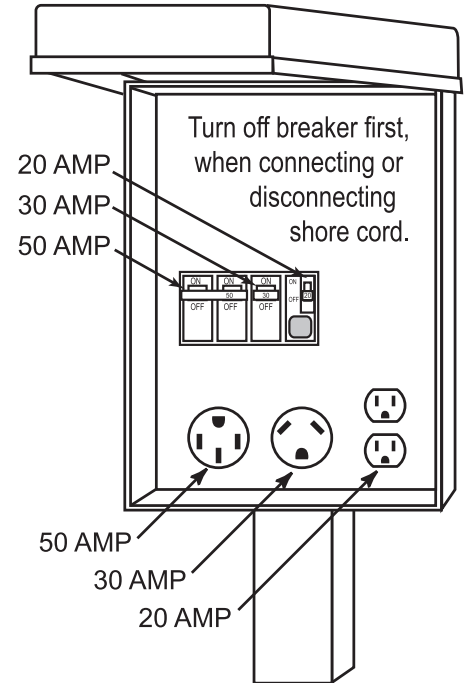


The power requirement for the motorhome is 50 AMP 120/240 Volt AC single phase. The shore cord is located in the roadside compartment. If 50-amp shore power service is available, all that is necessary is to connect the supplied shore power cord. If 50-amp service is not available, electrical adapters will be required.

## SHORE POWER HOOK-UP

Plugging in the shore cord:

- Unscrew or open the deck plate then feed the cord through the opening.
- If 50-amp service is not available, install the proper electrical adapters to the cord.
- Always turn the shore power breaker off before connecting or disconnecting the shore cord. This will prevent an accidental shock and flashing of contacts.
- When the connection is made, turn the breaker on. The transfer switch should make an audible click.
- Go inside the motorhome to check any available AC Volt gauges to ensure proper voltage.



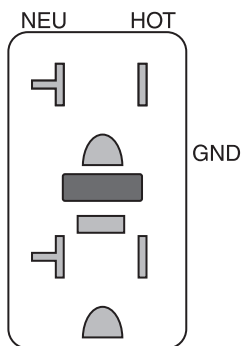
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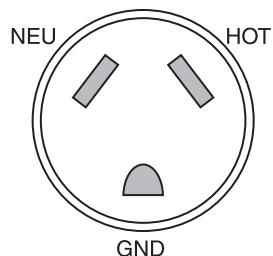
**CAUTION:** Avoid the risk of electrical shock or component damage by disconnecting from shore power during electrical storm activity. Use the inverter or start the generator if AC power is needed.



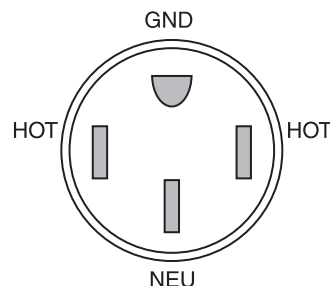
**NOTE:** Shown are the three types of shore power outlets most commonly used.



15-20 AMP  
120 VOLT



30 AMP  
120 VOLT



50 AMP  
220 VOLT

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## TRANSFER SWITCH

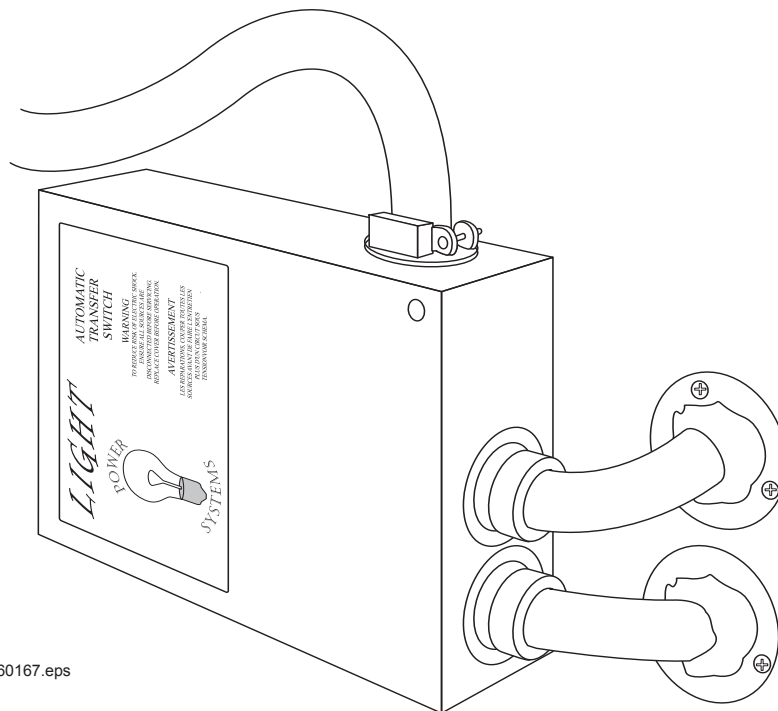
The transfer switch automatically transfers power from the shore cord, through the transfer switch and to the 110 Volt AC breaker panel. When the generator is used the transfer switch has a time delay built into it. This allows the generator time to warm up before an AC load is applied to it. The transfer switch will automatically select the generator over shore power, even though shore power is hooked up.



**NOTE:** To prevent damage to the transfer switch do not have appliances on or AC loads plugged in outlets when hooking up to shore power or starting generator. The transfer switch will begin to disengage between 85-90 Volts AC. Operation at this voltage may damage transfer switch, appliances or other items plugged into outlets.



**WARNING:** Keep fingers away from metal contacts of shore plug end. Avoid standing water. Serious electrical shock and personal injury can occur. To avoid the risk of an electrical shock turn the circuit breaker off for the shore power outlet before making shore power connection.



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Standard Generator for the motorhome is a 6.5 kW LP generator. This generator will provide 6500 watts of power. This power is 120 AC Volts at 60-Hertz Frequency with 54.2 amps of current.

## GENERATOR - 120 AC (LP)

The generator is located in the front compartment of the motorhome. The generator can be started from the following locations:

- The generator remote switch, located on the dash.
- The generator control panel, located on the generator.

**Fuel:** Use clean, fresh HD-5 grade liquefied petroleum gas (LPG) or equivalent product consisting of at least 90 percent propane. Commercial liquefied petroleum gas fuels may contain more than 2.5 percent butane which can result in poor fuel vaporization and poor engine starting in low ambient temperatures (below 32° F (0° C)). Satisfactory performance on low-pressure LPG models requires that the LPG vapor is supplied at a pressure within the range indicated in Specifications.



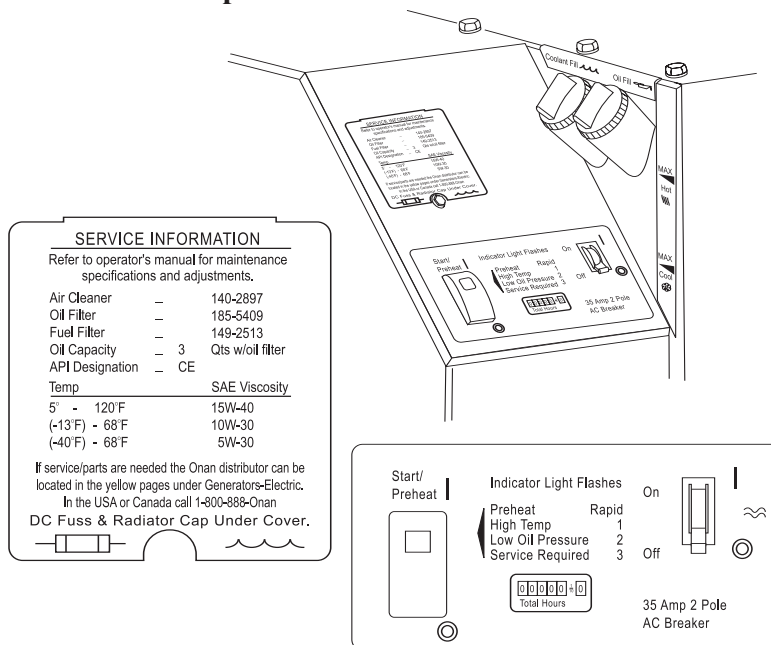
**Warning: High LPG supply pressure can cause gas leaks that can lead to fire and severe personal injury or death. Only trained and experienced personnel should adjust the LPG supply pressure.**

The generator is located in the front compartment of the motorhome. The generator can be started from the following locations:

## GENERATOR - 120 AC (DIESEL/OPTIONAL)

- The generator remote switch, located on the dash.
- The generator control panel, located on the generator.

### Generator control panel:



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## Prestart Checks

Prior to the first start of the day perform a general inspection including oil and coolant levels. Keep a maintenance log on number of hours in operation since the last service. Perform any service or maintenance that may be due.

- People and animals must be clear of hazards of electrical shock and moving parts.
- Appliances and other large AC electrical loads are off.

---

## Starting the Generator

Push and hold control switch in **START** position until the generator starts. Release switch. On diesel models the control switch may flash up to 15 seconds, indicating engine preheat.



**NOTE:** Diesel models may require priming. Hold control switch in **OFF** position for one minute. Repeat if necessary. The diesel generator fuel pick-up tube is cut to approximately 1/4 tank so as not to run the main engine out of fuel.



**WARNING:** Excessive cranking can overheat and damage the starter motor. Do not crank for more than 30 seconds at any one time. Wait at least two minutes before resuming. If the generator fails to start refer to the manufacturer's manual.



**WARNING:** When the motorhome is parked, position the dash air conditioner vent control in the **OFF** position to prevent outside air 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 or inside the motorhome, or around 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 near high grass be sure that the hot exhaust does not come into contact with the grass, it could be a fire hazard.

---

## Stopping the Generator

Turn off the appliances and disconnect other AC loads being used. Allow the generator to run unloaded for at least one minute before shutdown. This will allow the engine to cool. Push and hold the control switch in the **STOP** position until the generator stops. Release the switch.



**NOTE:** Diesel models require only a momentary stop signal.

**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,” either the generator will shut down or the circuit breaker will trip. If power consumption, in total, exceeds the generator power output compensation for temperature and elevation it may be necessary to operate some appliances in sequence, rather than all at the same time.



**NOTE: The generator may shut down when it is loaded nearly to full power and an air conditioner (or other large motor load) cycles on. For a brief moment during start up an electric motor can draw up to three times the rated power. For this reason it may be necessary to operate some appliances in sequence when air conditioners or other large motor loads are on.**

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: 7,500 watt generator @ 5,000 ft. = 6,375 watts net. Temperature also affects maximum output watts. For example: @ 120° a 7,500 watt generator produces 6,000 watts net.



**REFERENCE: The diesel generator may shut down for other reasons besides “overloads.” A blink code may appear on the control switch. Refer to the manufacturer’s manual to obtain an explanation of the codes.**

If a circuit breaker trips in the main AC breaker panel, or on the generator control panel, there may be a short circuit or too much load.

**Resetting the Circuit Breaker**

**NOTE: The generator will continue to run after a circuit breaker trips.**

If a circuit breaker trips, disconnect or turn off as many loads as possible. To reset the circuit breaker switch, move the circuit breaker to **OFF**, then switch to **ON** to reconnect the circuit. If the circuit breaker immediately re-trips the electrical distribution system has a short or the circuit breaker is faulty. Call a qualified electrician. If the circuit breaker does not re-trip reconnect a combination of loads that will not overload the generator or cause the circuit breaker to trip again. Remember to compensate for elevation and temperature changes when reconnecting loads.



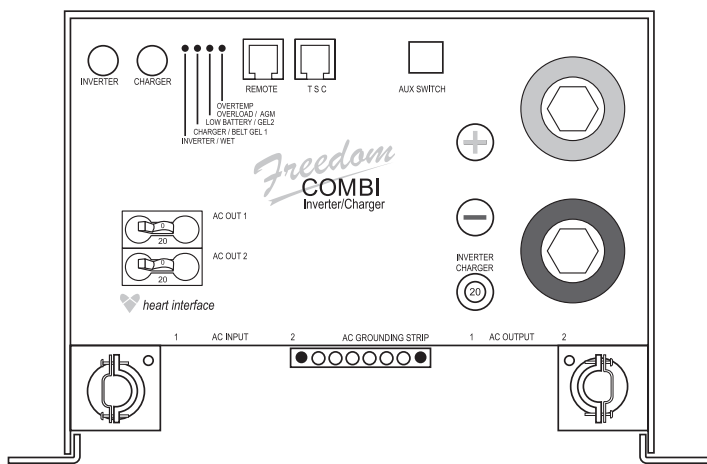
**NOTE: An appliance or load may have a short if it causes a circuit breaker to trip after reconnection. DO NOT continue to reset breaker. Have a problem corrected before resuming operation.**

If use of the generator is infrequent, “exercise” the generator once a month by operating it at approximately half the maximum rated output for two hours. This “exercise” will help promote better starting, more reliable operation and longer engine life. This procedure drives off moisture, lubricates the internal engine parts and replaces the old stale fuel with a fresh supply. It also promotes removing the 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.**

## INVERTER/CONVERTER



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Use the inverter when shore power is not available and the generator is not going to be used as the secondary AC power source option. This will supply silent AC power to most receptacles, the television and microwave. It is important to remember that use of the inverter will greatly increase house battery power consumption. Turn off the inverter when not in use to conserve house battery power. One circuit breaker is used to protect the microwave and the other one protects the refrigerator and bathroom (GFI).



**NOTE: The switch on the inverter unit is to remain in the ON position.**

### To turn inverter on:

- At the inverter turn ON the inverter/converter power switch. The INVERT push-button switch is located on the front of the unit and has two functions:
- Turn the inverter ON.OFF and reset after a fault condition. Pressing the INVERT switch turns the inverter ON. The green INVERT LED will be ON when the inverter is inverting. When the inverter is ON, pressing the INVERT switch turns the inverter off.
- At the remote control panel in the hall area, press the INVERT switch on the remote panel.

**Troubleshooting - Inverter/Converter**

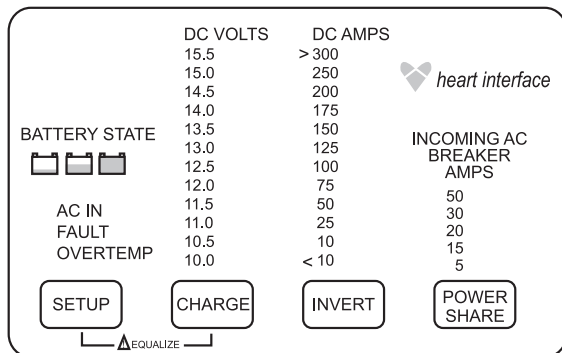
<b>TROUBLESHOOTING LED STATUS</b>					
LED Status					
INVERT	CHARGE	LOW BATTERY	OVERTEMP OVERLOAD	Operation Status	Notes
Solid Green	Blinking Green	OFF	OFF	Inverting. Charger ready but no external AC available.	Normal.
Blinking Green	Solid Green	OFF	OFF	Inverter is in standby. Battery is being charged.	Normal, charging current limited if AC load exceeds Power Sharing setting.
Blinking Green	OFF	OFF	OFF	Converter is in standby. Charger manually turned off.	If AC power is removed and reapplied, the charger will automatically turn ON
OFF	Solid Green	OFF	OFF	Inverter OFF. Charging	Reset the Inverter by pushing INVERT button. LED should blink.
Solid Green	Blinking Green	Solid Red	*	Inverting. Charger ready but no external AC Available. Battery Voltage Warning: $10V < VDC < 15V$	Warning. Battery voltage less than 10 or more than 15 volts.
Solid Green	Blinking Green	*	Solid Red	Inverting. Charger ready but no external AC available. Over-temperature Warning.	Warning. Inverter shutdown.
OFF	Blinking Green	Slow Blinking Red	*	Battery Voltage shutdown: $10V < VDC < 15V$	Inverter Shutdown. Operation will resume when battery reaches 13.5 volts.
OFF	Blinking Green	*	Slow Blinking Red	Charger ready but no external AC power available. Charger over-temperature Shutdown	Operation will automatically resume after unit has cooled down.
OFF	Blinking Green	*	Fast Blinking Red	Inverter Overload Shutdown	Reduce AC load. Manually restart the system.
OFF	Blinking Green	Fast Blinking Red	Fast Blinking Red	Backfeed Shutdown. Incorrect AC wiring.	Correct AC in wiring before use. Manually restart the system.
OFF	Blinking Green	Fast Blinking Red	OFF	Battery Ripple	Warning.



## Inverter/Converter Remote Control

When power is first applied to the remote, there is a delay of up to 4 seconds, while the remote and the Inverter/Charger establish communications.

The Remote shows AC In (status) DC VOLTS, DC AMPS (charger or inverter current) and INCOMING AC BREAKER AMPS setting plus CHARGE, INVERT and BATTERY STATE. The display is updated once per second.



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The remote comes ON automatically when Inverter/Charger is connected to a charged battery or external AC power. The following buttons are used:

**SETUP:** Blinking indicates SETUP mode. SETUP explained “SET UP MODE”.

**CHARGE:** When the CHARGE LED is On (Solid Green), the Battery Charger is ON and charging. When the LED is OFF, the charger is OFF. Charging automatically begins when external AC power is detected.

**OPERATING TIP:** Leaving the charger ON helps to assure a full battery.

**INVERT:** When the INVERT LED is On (solid green), the Freedom Inverter is inverting (making AC power from the DC battery source). When the INVERT LED is OFF, the inverter is OFF. When external AC power is present (AC IN LED ON) and the INVERT LED is blinking green, the inverter is in standby, waiting for external AC power to be removed to begin inverting. When there is no external AC power, a blinking green LED indicates the inverter is in the Idle Mode. Idle mode is explained in detail in the “SETUP MODE”.

**OPERATING TIP:** To avoid the risk of discharging your batteries if external power fails, leave the inverter OFF when leaving motorhome unattended.

**POWER SHARE:** Before you plug in to an external AC source, note the breaker size. Press POWER SHARE until the appropriate plug into a 30 Ampere external AC power source, press POWER SHARE until the 30 Amp “INCOMING AC BREAKER” LED is ON.

**OPERATING TIP:** If the breaker trips, reduce this setting. Setting the POWER SHARE feature to a lower setting may limit charger output causing the batteries to require more time to become fully charged.

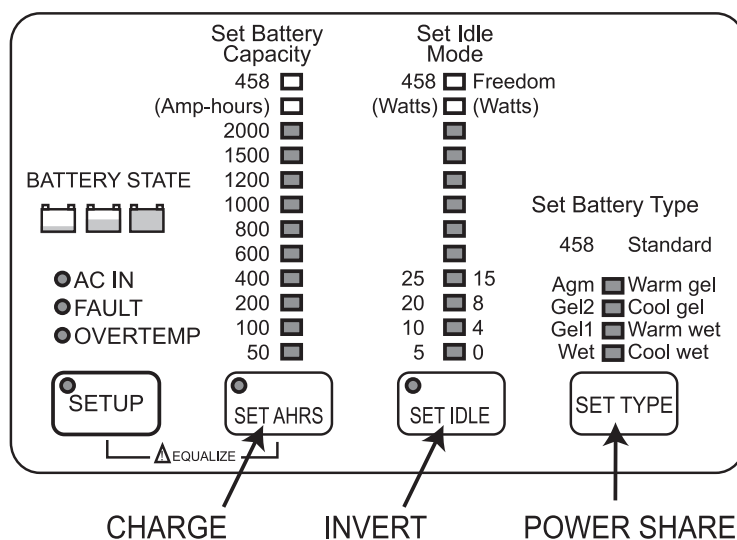


**POWER SHARE** - Limits the amount of external AC current used by the charger. If the total AC load is larger than AC power available, the external AC circuit breakers may trip. Select a lower **POWER SHARE** setting to reduce AC power consumption by the charger, thus reducing the total AC load.

Enter the **SETUP** mode by pressing and holding **SETUP** for 5 seconds until the **LED** blinks. The Remote automatically exits from the **SETUP** mode. Use Remote buttons, **SET AHRS**, **SET IDLE** or **SET TYPE** to select **SETUP** features.

## Set Up Mode

**OPERATING TIP:** Battery type and battery capacity are the most critical setup settings.



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**SET AHRS (Battery Capacity (Amp-Hours))** - Using **CHARGE**, set the Amp-Hour rating of the battery bank. This information is used to determine the charge parameters for the battery. Default setting varies:

1500-2000W: 400 Amp-Hours

**SET IDLE (Idle Load (Watts))** - Using **INVERT**, select idle setting. If present inverter loads are less than the selected value, the inverter will remain in **IDLE MODE**. Idle mode prevents unnecessary power drain on the battery when no AC loads are in use. When an AC load is turned ON and the load draw exceeds the idle value, the unit begins full power inverting. When the appliance is turned OFF, the inverter returns automatically to **IDLE MODE**. A setting of "0" disables **IDLE MODE**.

Default: 10 Watts.

SET TYPE (Battery Type) - This setting is important. Using POWER SHARE, set the Battery Type. The charger uses this information to set charging values for the 3 stage automatic charger. Be sure to set the correct type.

Default: Wet Cell.

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### **Low Power Mode**

When no external AC power is available, the remote panel LED's can be turned OFF to conserve battery power. Turning off the INVERT function (with external AC absent) activates the low power mode.

In this mode, if one of the front panel keys is pressed, the display will become active. Press **SETUP**, **CHARGE**, or **POWER SHARE** and the unit will display data for a short period of time, then return to the Low Power Mode. If **INVERT** is pressed, the selected function is activated and Low Power Mode is cancelled.

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### **Equalizing Charge Mode**

The Remote has a special charging mode that improves the condition of batteries. Equalizing helps maintain battery capacity and extends life by deliberately overcharging batteries for a short period of time. Do not equalize gel cell batteries.

**OPERATING TIP:** How often should batteries be equalized? It is recommended that after 30 deep cycles or once a year the batteries should be equalized. Check with the battery manufacturer for specific battery requirements.

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### **Equalizing Procedure**

**EQUALIZE** mode must be started manually. To begin equalizing, enter **SETUP** mode, then hold both **SETUP** and **CHARGE** until the **BATTERY STATE LEDs** start blinking.

Equalizing should only be engaged after the batteries have been fully charged by the normal battery charging cycle. The equalizing charge cycle lasts approximately 8 hours. The equalize charge cycle can be terminated at any time by interrupting the external AC power to the charger or by pressing the **CHARGE**. The unit will return to normal display and operation after the completion of the equalize cycle.

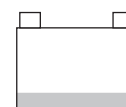


**CAUTION:** Equalizing may cause DC system voltage to exceed 16 volts. Be sure to disconnect any equipment not rated for this voltage. Equalizing causes the battery to release hydrogen from your battery and may reach explosive concentrations in a closed environment. Make sure the battery area is well ventilated. Do not smoke or operate spark causing devices in the vicinity of batteries being equalized.

The **BATTERY STATE LED's** indicate the approximate state of the battery bank. It is based on the battery voltage sampled over a period of time under the present load conditions. The battery state does not represent the actual Amp-hour capacity remaining in the battery.

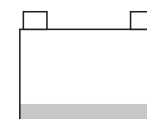
### **Battery State LED's**

**Lowest State:** Voltage is low. Charging is recommended. In charge mode, indicates charge.



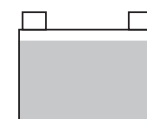
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**Middle State:** Battery is in normal range. In charge mode, indicates acceptance.



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**Highest State:** Battery voltage is at its highest and the battery is charged. In charge mode, indicates float.



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**NOTE:** Depending on battery size and condition, loads connected to the battery may affect the battery voltage and the **BATTERY STATE** display. In charge mode **BATTERY STATE** LEDs also indicate charger states.

The **FAULT LED** indicates a possible error has been detected and the Inverter/Charger has shut down to protect itself and the electrical system. The source of the error must be corrected before restarting the inverter or charger functions. However, an **OVERTEMP** error will reset automatically, and operation will resume, when the unit has cooled sufficiently.

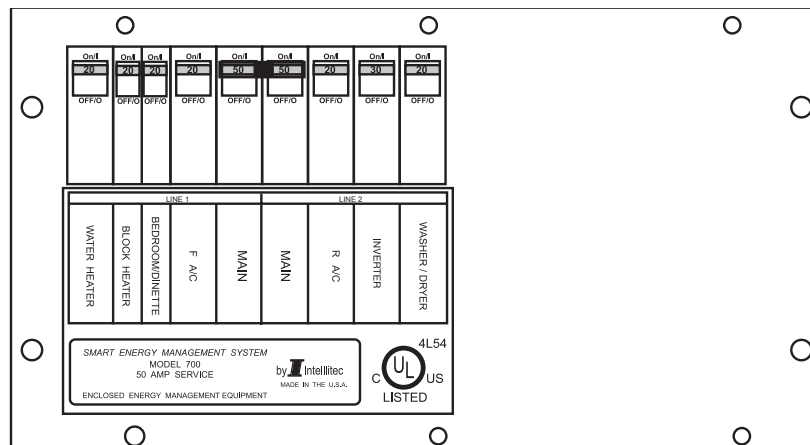
LED Indication	Fault LED	Error Detected	Possible Solution
OVERTEMP On	OFF	Over temperature shutdown.	Increase air circulation and allow to cool.
BATTERY STATE Empty Blinking	ON	Low Battery Shutdown. (too low to continue inverting)	Charge Batteries.
Battery STATE Empty On	ON	Battery Overload. (excessive ripple voltage during charge)	Select lowest power share setting. Turn OFF DC loads - Restart Charger.
15.5 VDC Blinking (31.0 VDC in 24V System)	ON	High battery shutdown.	Check other charging sources connected to the battery.
AC IN blinking	ON	AC Backfeed. (external AC power detected at inverter output)	Disconnect incoming AC power and correct wiring.
INVERT blinking	ON	Inverter overload (too much AC load on inverter)	Reduce AC load on inverter. Reset by pressing INVERT OFF and On.
CHARGE blinking	ON	Charge overload. (Battery voltage too low to charge)	Check batteries. Turn OFF all DC loads. Restart charger.



**NOTE: For error conditions not shown above, disconnect Remote Control Panel for 30 seconds, verify that phone cable is plugged in at remote and inverter/charger and verify that batteries are above 10VDC. If condition persists, disconnect incoming AC power from Inverter Charger and remove positive battery lead for 30 seconds.**

## DISTRIBUTION PANEL HOUSE 110 - AC Panel

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 to the individual branch circuit breakers. The panel label describes the breaker layout and the item, outlet or appliance to which they pertain. Labels vary from model to model.



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**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, the generator is not running and the inverter is in the OFF position. Certain testing procedures can require the AC power to be on. Only qualified 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 1,370 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.**

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### **Energy Management System - 50 Amp (Optional)**

The Energy Management System is easily identified by the remote display panel located in the inside overhead compartment next to the entrance door.

The 50 Amp Smart EMS consists of two elements: the display panel and the bedroom distribution panel. The display panel is mounted in the inside overhead compartment next to the entrance door. 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, is the 50 Amp breaker that acts as the 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. It determines 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, it controls the operation of six possible loads as indicated on 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 their use. If the available power source is 120 Volt AC - 30 Amp shore power it 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 generator 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. As it turns the loads off it calculates 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, it calculates the amount of current that was removed and places this value, which is the value of that load, in memory. The system continues to turn off loads until the total current falls below the service limit 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 it will turn 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.**

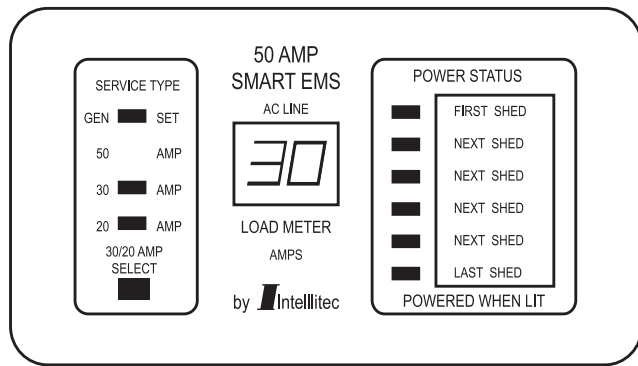
### **Three Hour Averaging:**

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 three 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 three 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.



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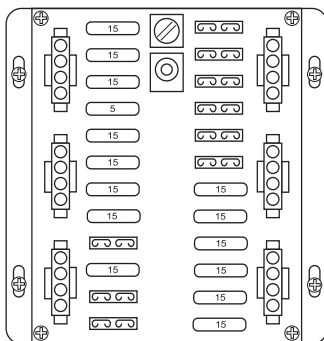
### Display Panel:

The display panel is located in the inside overhead compartment next to the entrance door and connects to the distribution panel located in the bedroom. Six power status LEDs indicate power is applied to those loads. These LEDs 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 LEDs indicate the source for 120/240 Volt AC power. Three of these sources are automatically detected and indicated by the EMS: Generator 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.

## DISTRIBUTION PANEL - HOUSE 12 VOLT



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The 12 Volt house distribution panel 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.

AMPERAGE	COLOR	CIRCUIT
15	BLU	BATH LTS/VNT
15	YEL	DIN/PRCH/R O/H
15	GRN	BEDROOM LTS
15	VIO	VENTS, L O/H
15	RED	CEILING LTS
15	GRY	FRNC, A/C 12V
15	GRY	POWER AWNING
15	RED/T	MONITOR PANEL
15	BLK	SLIDE-OUT
5	GRY	RADIO
15	RED	CMPTR TBLE (OPT)
15	BRN	PWR COMMODOE
15	GRN	BEDROOM S/O
15	RED	TRIPLE S/O
15	VIO/BLK	EXT RADIO



## Fuses

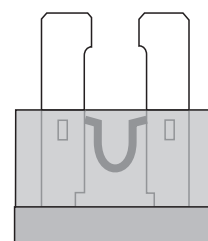
The 12 Volt fuses, located in this distribution panel, service the interior house lighting, ventilation fans, monitor panel, furnace and water heater. Should a fuse blow it will be evident by the broken metal strip located in the center of the fuse. Replacement fuses should be of the same amperage. If a higher rated fuse is installed it can damage the wiring. Fuse current set points follow much of the same electrical principle as the 120 Volt AC breakers. Using 12 Volt DC as the electromotive force can make it more susceptible to outside influences, such as corrosion from weathering or oxidation.

The large variety of applications this voltage can be used in makes it a diet staple for most of the recreational vehicle and automotive industries. The danger from shocks with this voltage is minimized, but can still occur. A good example is when a magnetic field is generated, then collapses when the power supply is cut. The result is a discharge that can reach tens of thousands of volts for a short time period. Care should be used when working with this voltage as current values can be quite high, like in the case of a battery cables.

Shorting a battery cable to ground with a battery at a reasonable state of charge can result in a fire or serious personal injury from a burn.

AMPERAGE	COLOR
1	BLACK
2	GRAY
3	VIOLET
4	PINK
5	GOLD
7.5	BROWN
10	RED
15	BLUE
20	YELLOW
25	CLEAR
30	GREEN

Amperage Chart



ATO Fuse

om060086.EPS

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.

## Tools of the Trade

Should it become necessary to use testing tools take certain precautions and consider three things. First, recognize when the problem is beyond your skill level. Nothing will create more mayhem than being armed with tools and going in an unknown direction. Good intentions have led to major problems. The second item to keep in mind 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. How many times have you said to yourself, "Oh this will only take a few minutes," only to find it is taking an entire day and you wished you had not touched it? 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 an 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.

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## **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 “sulphate.” 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.

**Starting Battery**

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 Battery**

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 periodically 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.



**NOTE: Tap water contains minerals which can alter battery chemistry and ruin the battery. Use only distilled water when refilling the battery.**

**Battery Maintenance**

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.

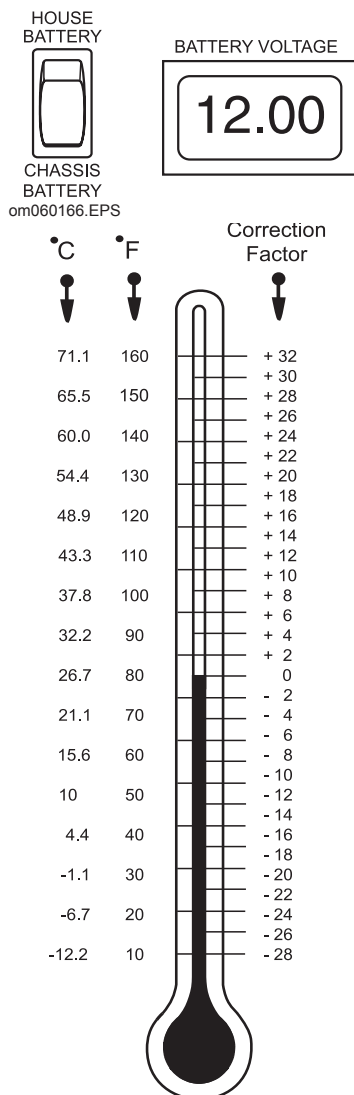
After checking the battery's electrolyte levels it is also a good idea to check the battery connections for tightness and corrosion. If any corrosion is found disconnect the cables (make sure to mark their locations) and carefully clean them with a mild solution of baking soda and water. There are also 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 anticorrosion 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 hydrogen gas while being charged. This is highly explosive. Do not smoke around batteries. Extinguish all flames in the area. The hydrogen gas may explode resulting in fire, personal injury, property damage or death.**

## Testing the Battery



Temperature Correction Chart

om030815.EPS

There are several ways in which a battery can be tested and monitored. The motorhome uses a monitor panel, located in the hall area, which shows the status of the house and chassis batteries at a quick glance. Pressing and holding the test button, the power level will be displayed on the battery scale. The illustration shown explains in more detail the scale and indications.

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. Many styles are available, from types with cylinder graduation (shown here) to types with floating balls. Hydrometers can be purchased from most auto parts stores. 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.

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  $\pm .5\%$  will also give an indicator of the battery’s state of charge.

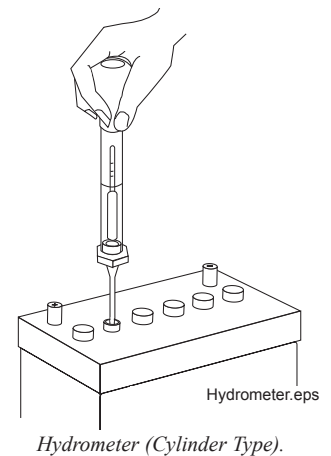
Another test that can be performed is to place a specific load on the battery for a predetermined length of time equal to that particular battery’s rating. This machine is usually an adjustable carbon pile that can vary the load being applied to the battery(s) while monitoring voltage to see if they will perform to their specific rated capacities.



**NOTE:** See the chart for temperature compensation. Liquid levels should be even between the cells of the battery being tested as it will affect the accuracy of the test.



**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.



### 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.

## Reasons Why Batteries Fail

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 sulphate will crystallize. Charging the battery does not move the crystallized lead sulphate 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 over-charging.**

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.

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

## ***Battery Voltage & Current***

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 will be 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. Hopefully, this explanation will clarify 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 5Amps 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 five amps to ten 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**

CHASSIS	AH (20 HR)	CCA	RC (25A) MINUTES
Chassis 12 Volt Chassis 31P-MHD (2 each)	240	950	450
6 Volt Domestic U2200 (4 each)	450*	**	447

*\*Total battery bank capacity. \*\*Battery connections are made in a Series/Parallel connection. Domestic batteries are not treated in Cold Cranking Amps (CCA).*

Battery State of Charge vs Voltage/Specific Gravity			
VOLTAGE	SPECIFIC GRAVITY	STATE OF CHARGE	DEPTH OF DISCHARGE
12.66	1.265	100%	0%
12.45	1.225	75%	25%
12.25	1.190	50%	50%
12.05	1.145	25%	75%
11.9	1.100	0%	100%

CUMMINS	ENGINE COLD	CRANKING	AMPS REQUIREMENTS
ISB	1100	CCA	12 VOLTS
ISC	1250	CCA	12 VOLTS
ISL	1500	CCA	12 VOLTS
ISM	1800	CCA	12 VOLTS
N14	1800	CCA	12 VOLTS

**BULB USAGE**

INTERIOR BULB CHART	
LOCATION	BULB NUMBER
CEILING LIGHT (lg. Fluorescent)	FI5T8 - C/W
CEILING LIGHT (sm. Fluorescent)	F8T5 - C/W
DINETTE LIGHT	1141
WALL LAMP	1076
VANITY LIGHT	9019
MAP LIGHT	100312V150
CLOSET/BAY LIGHT (Incandescent)	1141

**NOTES**

# Diplomat

## SECTION 9 ELECTRICAL SYSTEMS - CHASSIS

**INTRODUCTION • 235**

**BATTERY DISCONNECT - CHASSIS • 235**

**BATTERY CHASSIS • 236**

*Battery Specifications - Chassis • 237*

**DASH • 238**

*Gauges • 240*

*Parking Brake • 242*

*Leveling Controls • 242*

*Switches (at left) • 243*

*Shift Selector - Transmission Shifter • 246*

*Monitor • 247*

*Switches (Dash) • 247*

*Air Conditioner & Heater Controls • 249*

*Radio • 256*

*Switches (at right) • 256*

**STEERING COLUMN • 257**

*Tilt & Telescope • 257*

*Hazard Flasher • 257*

**DIAGNOSTIC PLUG LOCATION**

**FUSES & CIRCUITS - CHASSIS • 258**

*Distribution Panel - Front • 258*

**ALTERNATOR • 260**

*Check Out Procedure • 261*



## INTRODUCTION

A majority of the lighting and appliances are designed to operate from 12 Volt DC (direct current) power. This is why the batteries play such an important role in the function of the motorhome. There are exceptions with appliances such as the microwave or television; however, indirectly they still operate from 12 Volt DC power, as they can be operated from the inverter. The chassis functions (engine, transmission, dash air, etc.) are also 12 Volt DC.

With the all technological advancements taking place in the past several years manufacturers have now incorporated electronics into these systems. It is important to keep the 12 Volt system(s) in good working order. These systems, with their incorporated electronics, are voltage sensitive. Some items can be damaged if the DC voltage is not maintained within the designed specifications.

There are two separate 12 Volt systems. One is the chassis system; the other is the house system. These two systems, for the most part, are separate from one another. The house system does not operate engine functions; as the engine system does not operate house functions. However, within the two systems there are some inner connections. For example: While the motorhome is driven the alternator on the engine will charge the house batteries. Likewise, while the motorhome is plugged into shore power, or the generator is running, the engine battery(s) are being charged. Each system will supply 12 Volt DC power to the 12 Volt distribution panels. The 12 Volt panel that services a majority of the chassis system functions is located outside by the driver's front wheel. The other panel, located in the bedroom, services the house interior functions such as the interior lighting and appliances. You should become familiar with these panels and the items they operate.

The two different systems, engine and house, have their own set(s) of battery(s). The engine battery supplies 12 Volt DC power to the front distribution panel located in an outside compartment by the driver's side front wheel. This panel contains mostly engine system fuses and wiring such as headlights, taillight, dashboard functions, gauges, etc. The house battery(s) supplies 12 Volt DC power to the distribution panel located in the bedroom. This panel contains fuses for the house, interior lighting and appliances, such as the furnace and water heater.

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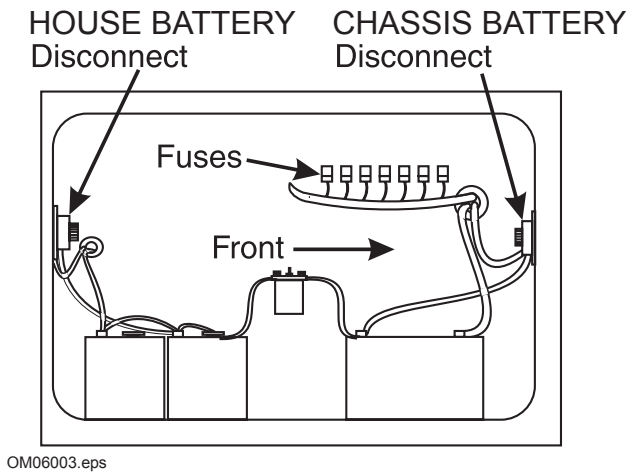
The main battery disconnect for the chassis battery turns the DC power on or off to the front electrical bay. Most chassis and engine functions are interrupted when the battery disconnect is turned off. Some electronic items require a constant power source for memory retention such as the dash and CB radios. Some electronic components of the engine and transmission require a constant power source. Turn the main battery disconnect switch off when the motorhome is going to be stored, or when performing electrical maintenance. If possible, leave the motorhome plugged into an AC source with the battery

## **BATTERY DISCONNECT - CHASSIS**

disconnect switch on. This will help prevent the possibility of dead batteries. If an AC source is not available, and the motorhome is not going to be used or is stored more than 48 hours, it is recommended to turn the battery disconnect switch off.



**WARNING:** When the frame or other welding is involved for motorhome repair, or modification, the following precautions are required to protect electronic components in the motorhome chassis:



1. Disconnect the (+) positive and (-) negative battery connection and any electronic control ground wires connected to the frame or chassis.
2. Cover electronic control components and wiring to protect from hot sparks.
3. Disconnect the wiring harness connectors at the transmission electronic control unit. Open bed storage compartment, open engine access door. The ECU is located above the transmission.
4. Do not connect welding cables to electronic control components.
5. The welding ground cable should be attached no more than two feet from the part to be welded.

## BATTERY - CHASSIS

The chassis battery operates only chassis and engine functions. The chassis battery is a crank type battery, producing the high amperage needed to start the engine. Engine starters initially require a large amount of current to crank an engine. Initial starter amperage draw exceeds 1200 amps. The type of application in which the engine battery is used differs from the house battery application. The engine battery state of charge remains consistent. Maintenance is still required with an engine battery. Regular electrolyte level checks and hydrometer readings should be performed. High electrolyte consumption, or inconsistent hydrometer cell readings, may indicate a charging system problem. Perform a charging system and current draw check if the battery is exhibiting abnormal hydrometer readings.



**NOTE:** Replacement batteries should have the same cold cranking amp (CCA) rating.



**Battery Specifications - Chassis**

<b>CHASSIS</b>	<b>AH (20HR)</b>	<b>CCA</b>	<b>RC (25A) MINUTES</b>
Chassis 12 Volt Chassis 31P-MHD (2 each)	240	950	450
6 Volt Domestic U2200 (4 each)	450*	**	447

\*Total battery bank capacity. \*\*Battery connections are made in a Series/Parallel connection. Domestic batteries are not rated in Cold Cranking Amps (CCA).

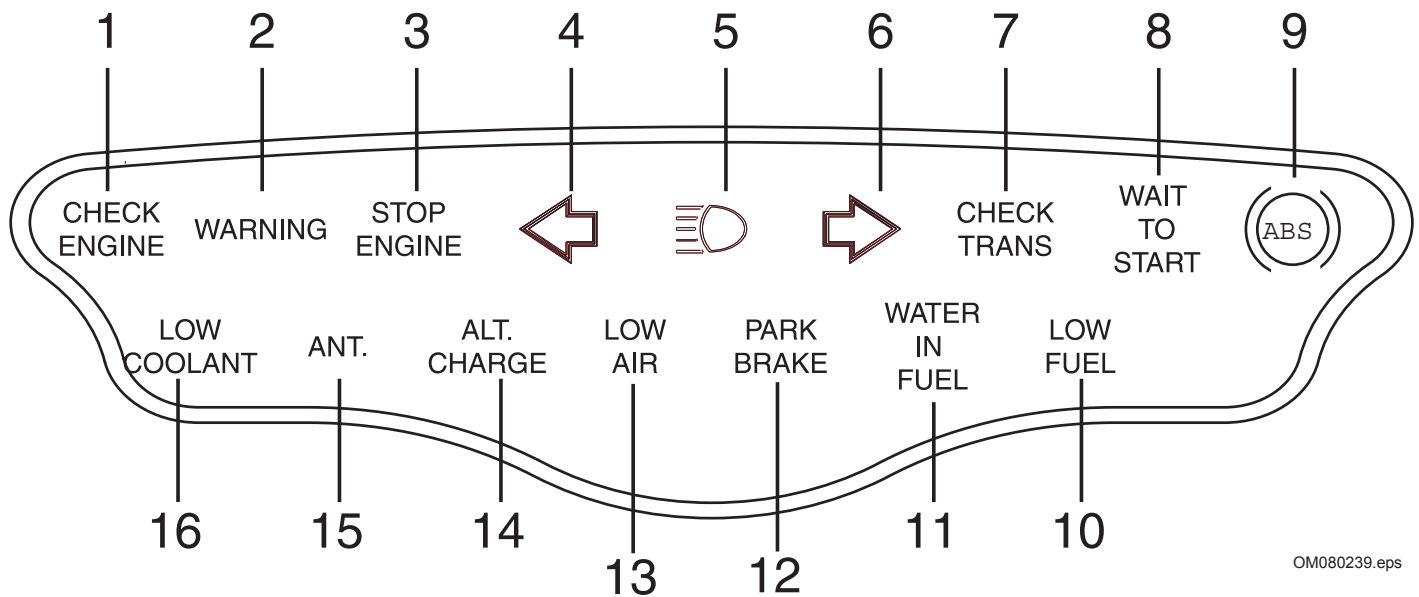
<b>Approximate Hours at Ampere Load</b>					
	<b>5 AMPS</b>	<b>10 AMPS</b>	<b>15 AMPS</b>	<b>20 AMPS</b>	<b>25 AMPS</b>
U2200	55	22	12.5	9.1	7

<b>Battery State of Charge vs Voltage/Specific Gravity</b>			
<b>VOLTAGE</b>	<b>SPECIFIC GRAVITY</b>	<b>STATE OF CHARGE</b>	<b>DEPTH OF DISCHARGE</b>
12.66	1.265	100%	0%
12.45	1.225	75%	25%
12.25	1.19	50%	50%
12.05	1.145	25%	75%
11.9	1.1	0%	100%

<b>CUMMINS ENGINE COLD CRANKING AMPS REQUIREMENTS</b>			
<b>ISB</b>	<b>1100</b>	<b>CCA</b>	<b>12 VOLTS</b>
<b>ISC</b>	<b>1250</b>	<b>CCA</b>	<b>12 VOLTS</b>
<b>ISL</b>	<b>1500</b>	<b>CCA</b>	<b>12 VOLTS</b>
<b>ISM</b>	<b>1800</b>	<b>CCA</b>	<b>12 VOLTS</b>
<b>N14</b>	<b>1800</b>	<b>CCA</b>	<b>12 VOLTS</b>

CCA Rating are at 0° F. These are the minimum requirements.

## DASH - Indicator Lamps



### 1. Check Engine:

Indicates a problem with the engine.

### 2. Warning:

Indicates out of range condition exists within the engine protection circuits. Stop coach, check all fluid levels.

### 3. Stop Engine:

Alerts driver of severe out of range condition within the engine protection circuits. Pull over and stop as soon as possible. Shut-off engine to avoid engine damage.

### 4. Left Arrow - Audible Turn Indicators:

Indicates left turn indicator circuits active. Audible indicator cancels when the brake is applied.

### 5. Headlight Beam:

Indicates high beams when illuminated.

### 6. Right Arrow - Audible Turn Indicators:

Indicates right turn indicator circuits active. Audible indicator cancels when the brake is applied.

**7. Check Trans:**

Alerts driver of problems related to the Allison Transmission. The light should momentarily illuminate when the ignition is switched ON. When starting the lamp will extinguish indicating the circuits are working properly. If the lamp fails to illuminate or remains on, the transmission needs to be checked immediately. Contact the nearest Allison dealer.

**8. Wait to Start:**

Monitors the air intake heater at engine start up. This is only used with the ISC engine.

**9. ABS:**

Indicates ABS possible fault in the ABS Brake system. Also indicates fault codes for service technicians.

**10. Low Fuel:**

Indicates fuel level is becoming low.

**11. Water in Fuel:**

This is a negative tripped light used only with the ISC Engine. Indicates water has been detected in fuel.

**12. Park Brake:**

Indicates parking/emergency brake is applied.

**13. Low Air:**

Indicates air tank pressures are out of operating range. Check air pressure.

**14. Alt Charge:**

Indicates a failure within the alternator charging system.

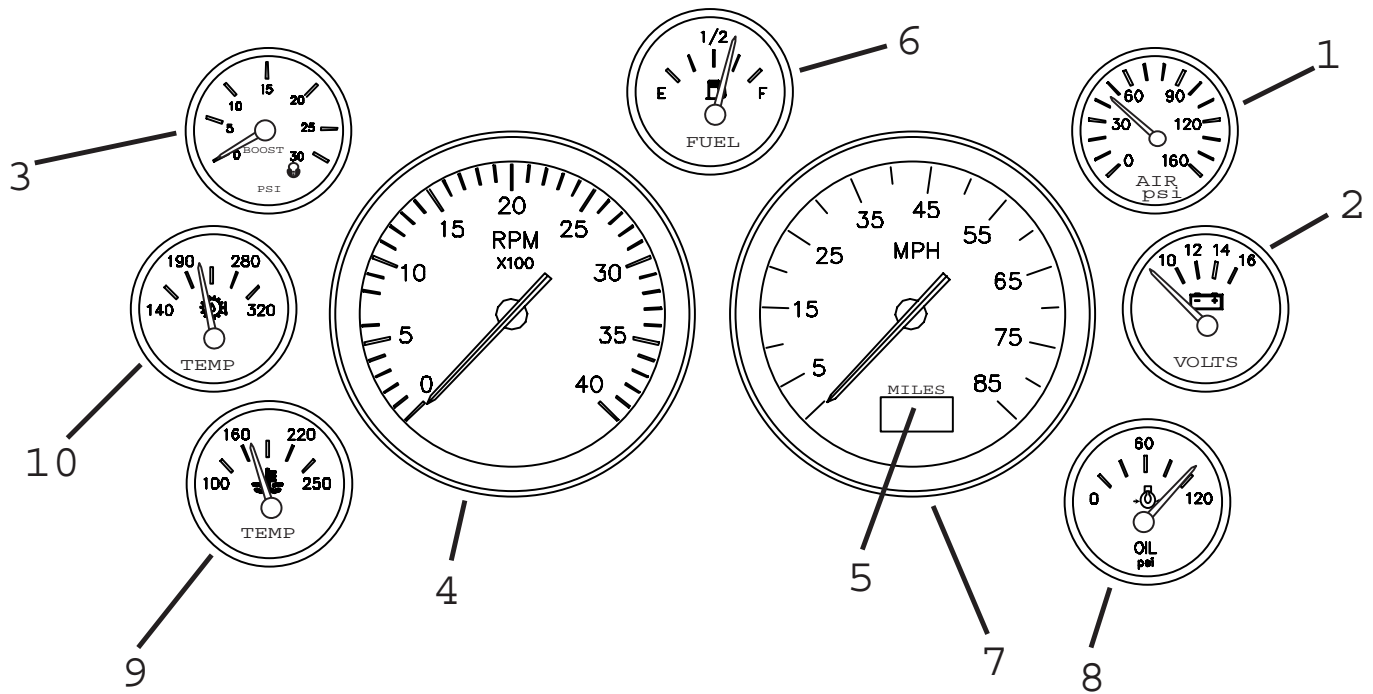
**15. ANT:**

Indicates TV antenna is raised. Lower antenna before moving coach.

**16. LOW COOLANT:**

Indicates coolant level in the overflow tank is below acceptable level.

## Gauges



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### 1. Air Pressure Gauge:

Indicates air system pressures. The normal air system operating pressures are 90 to 120 psi. These air pressures are preset at the factory. If a problem occurs with air system not maintaining normal operating pressure it is an indication of a malfunction in the air system. Use caution and stop the motorhome in a safe area. Contact your service center immediately.



**NOTE: It is not safe to drive the motorhome with low air pressure. Damage can occur to the suspension and drive line. The operation of the air brake system is also affected.**

### 2. Voltmeter:

Shows the charge condition in the chassis battery. The normal voltage with the ignition switch ON and the engine OFF varies between 12.0 and 13.0 volts. With the engine operating without a heavy load the battery charging voltage is about 14.0 Volts. Battery readings of less than 10.5, or more than 15.0 Volts, usually indicates a battery or electrical system problem.

### 3. Turbo Boost:

Indicates boost pressure produced by engine turbocharger.

### 4. Tachometer:

Displays engine speed in revolutions per minute (RPM). Tachometer reads output pulse of alternator. If tachometer quits, or indicates irratically, have alternator checked immediately.

### 5.Odometer/Trip Meter:

Records mileage driven and keeps track of mileage on a particular trip. To operate trip meter push button to change odometer mileage reading to trip mileage reading. Reset buttons sets trip mileage back to zero.

### 6. Fuel:

Registers 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 diesel Generator uses fuel from main tank and will affect fuel mileage figures. Diesel Generators will not operate below 1/4 tank to insure there is enough fuel to run main engine.**

### 7. Speedometer:

Indicates the speed of the motorhome. The gauge indicates MPH and KPH.

### 8. Oil Pressure:

Indicates pressure of oil and not the amount of oil in system. Please refer to manufacturer's instructions for specific pressure recommendations.

### 9. Coolant Temp:

Under average conditions the gauge will read between 180°F and 205°F. Monitor this gauge frequently when CLIMBING HILLS, TOWING OR IN HIGH AMBIENT TEMPERATURES. If the gauge shows that an over heating condition exists (the needle moving above the 212° area) IMMEDIATE ACTION should be taken.

Overheating may be a result of any of the following conditions:

- Low coolant level.
- Hydraulic fan motor failure.
- Mechanical failure of hoses or belts.
- Blocking of charge air cooler fins.
- Climbing a long hill on a hot day.
- Towing a heavy trailer.
- Idling for long periods of time.

### 10. Trans Temp:

Shows temperature of transmission fluid. Normal transmission operating temperature is 160-250°F. The maximum transmission to cooler oil temperature is 300°F. Do not let the transmission temperature exceed 275° F. If excessive temperature is indicated stop motorhome and shift to neutral. Accelerate engine to 1200-1500RPM and allow temperatures to return to normal.



**NOTE: Layouts will vary with difference in models or options.**

## Parking Brake



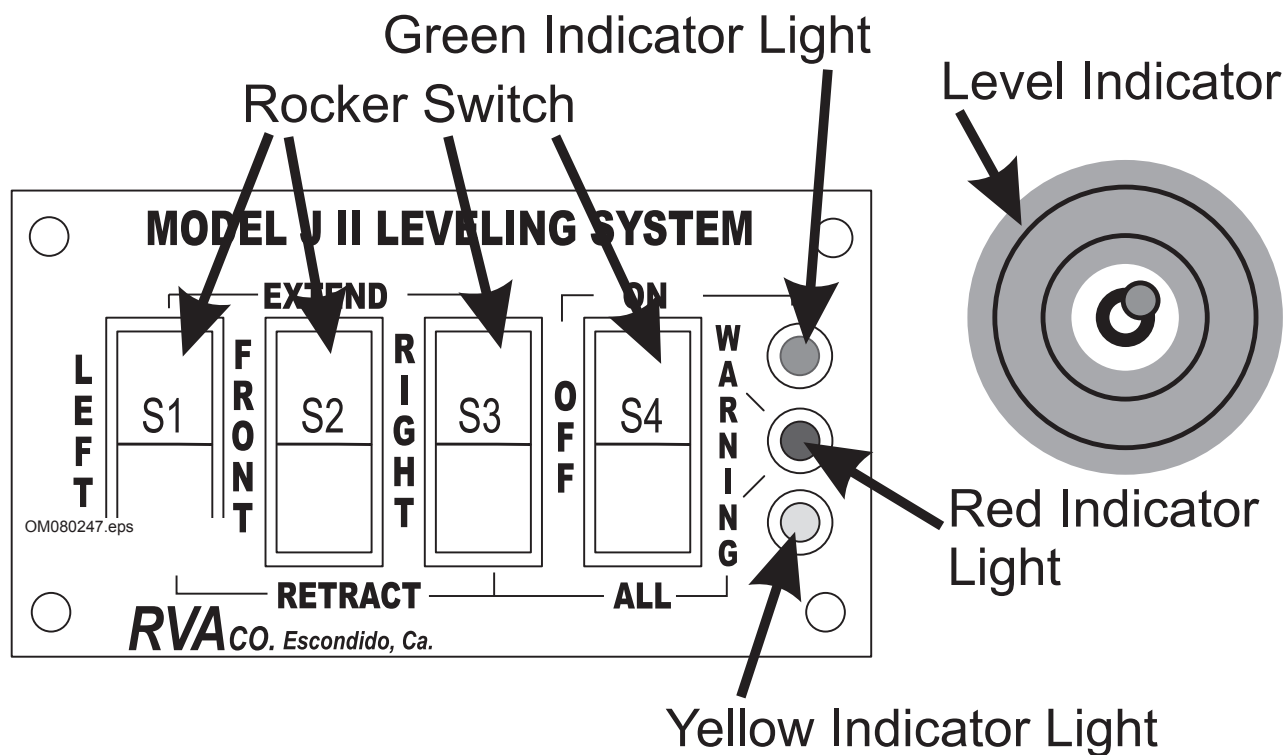
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**WARNING:** If the air tank is not dumped, there is the possibility of an accidental release of the parking brake. Traveling with small children and/or pets may require a small block to be fabricated to prevent accidental release. The block should be placed under the knob and rested on the dash panel. A wooden clothes pin clamped at the base of the shaft will work.

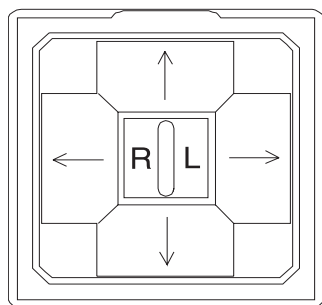
## Leveling Controls

The hydraulic leveling system is manually operated from the control panel. A feature of the control panel is a multiple warning system with flashing lights. The system alerts the driver of any leveling jacks which are in the down position.

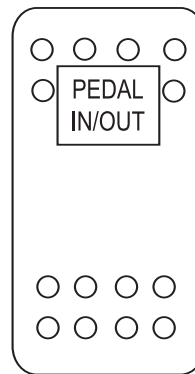
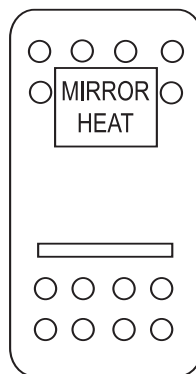


**Mirror Adjust:****Switches (at left)**

To adjust the rear view 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. The outside mirrors have been placed so that they can be easily adjusted with the Allen wrench. After taking delivery of the new motorhome it will be necessary to sit in the driver's seat and adjust the mirrors to driver's needs. Both the driver and the passenger mirrors should be adjusted.



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**MIRROR HEATER:**

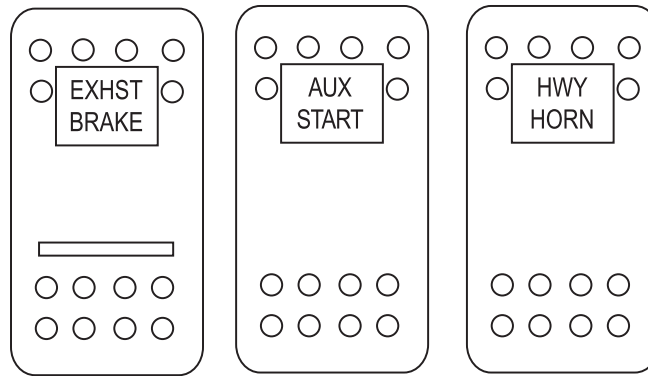
This switch turns on the heaters in outside rear view mirrors. The mirror heaters should be used when defogging or deicing is needed. To use the mirror heat, press the switch to the ON position.



**NOTE: Mirror heat should not be left on unless continuous fogging conditions occur.**

**PEDAL IN/OUT:**

Use the Pedal In/Out switch to adjust the brake and throttle pedal to be either closer or farther away. The switch moves the pedals inward or outward approximately three inches. If it is necessary to move the pedals inward, push the same switch in the opposite direction. When the pedal comes to the end of the traveling distance there will be a different sound in the noise of the motor. Stop by releasing the switch. Do not continue moving the pedals. Damage to the motor and or fuse may result if operation of the switch continues after reaching the fullest extend or retract position.



### EXHAUST BRAKE:

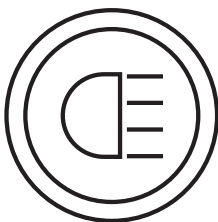
Exhaust brakes are auxiliary braking devices for slowing down the motorhome. For flat dry road conditions apply exhaust brakes until reduced speed is reached. Exhaust brakes are effective for speed control in town and on local routes. Use the exhaust brakes to slow down when you are preparing to exit onto an off ramp, approaching traffic lights or approaching stopped or slow traffic. Using exhaust brakes at low RPM may cause engine stalling. Exhaust brakes are not a substitute for service brakes. Do not neglect service brake maintenance.

### AUX START:

In the event the motorhome chassis battery has been drained and cannot start the engine, this switch momentarily "jumps" the auxiliary battery to the motorhome domestic battery to assist in starting the engine.

### HWY HORN:

Energizes the circuitry needed for the Air Horns. This should only be used on the highway and open areas.



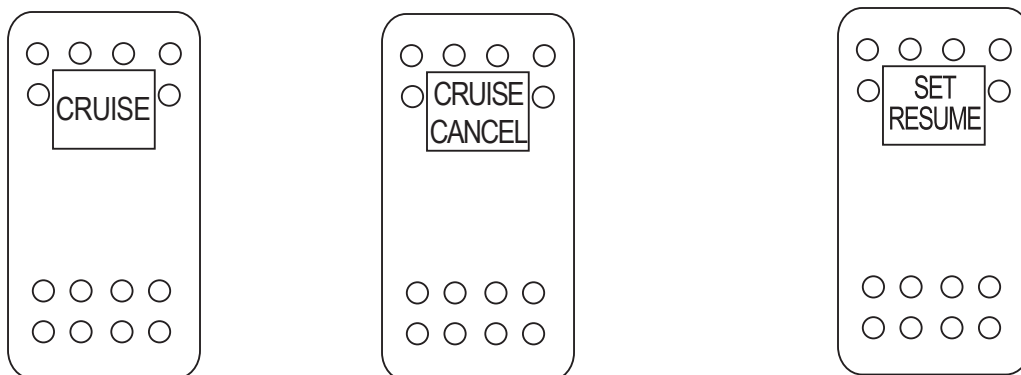
Light Switch

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### HEADLIGHT:

Pull one click to operate the parking lights. Pull two clicks to operate the headlights. Rotating the headlight switch clockwise will dim the dash lights. Counterclockwise rotation will illuminate the map light in the overhead compartment.





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### CRUISE:

Turns cruise ON or OFF.

### CRUISE CANCEL:

Signals the cruise system to disengage without losing the current speed memory setting.

### SET/RESUME

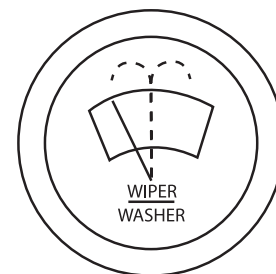
- Cruise SET - Actuates the Cruise Set function of the engine controller.
- Cruise RES - Actuates the Cruise Resume function of the engine controller.



**WARNING: To take control of the motorhome do not use cruise control in heavy traffic or on roads that are winding, slippery or unpaved. Do not shift the transmission into “N” (Neutral) with the cruise control on as high engine RMP run up will occur until the cruise control is turned off.**

### WIPER/WASHER:

Wiper operations are controlled when rotating knob to the right. When the knob is rotated from OFF to DELAY, the wiper will turn on and time delay between wipes (ranging from 45 seconds to 2 seconds) will occur. The amount of delay time changes as knob is rotated. A continuous low or high speed can be obtained by rotating the knob to the appropriate position. The wipers will be turned OFF with the switch in the OFF position.

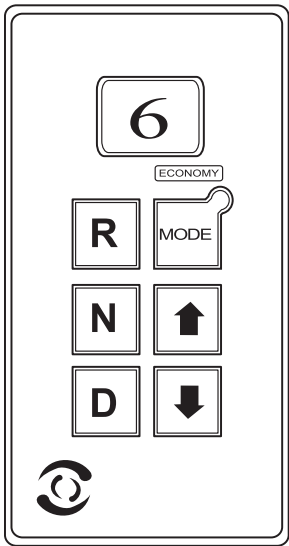


When the end of the knob is pushed in water fluid will be dispensed from the system and the wipers will turn on momentarily.

### Wiper Control

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## Shift Selector - Transmission Shifter



Transmission Key Pad

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### Transmission Key Pad:

The function of each position of the keypad push-button shifter is as follows:

- Select the REVERSE gear by pressing **R**.
- Select NEUTRAL by pressing **N**. The area around the **N** button is a raised ridge so the driver can orient hand to the push buttons by touch, without looking at the display.
- Select DRIVE range by pressing **D**. The highest forward gear appears on the **SELECT** display and the transmission will shift to the starting gear.
- The UPSHIFT and DOWNSHIFT **arrow** buttons are used to select a higher (if not in **D**) or lower (if not in **1**) forward range. These buttons are not functional in NEUTRAL or REVERSE. One press changes the range selected by one range. If the button is held continuously the selected range will continue to change up or down until the button is released or until the highest/lowest possible range of gears is selected.
- The fluid level of the transmission can also be checked from the shift selector keypad. Press the up and down arrow button simultaneously while the motorhome is at a rest position. This activates the diagnostic circuitry of the transmission. To exit the diagnostics press **N**.



**NOTE: The oil level sensor method of checking the fluid level compensates for transmission fluid temperature between 60° C - 104° C (140° F - 220° F). Any temperature below 60° C (140° F), or above 104° C (220° F) will result in an Invalid for Display condition.**

- The **MODE** button will enable the secondary shift point to be selected. The transmission shift point used will be 200 rpm lower. It is further used by a service technician to access diagnostic codes when troubleshooting. The diagnostic circuitry must be enabled to display the codes.

### To Enter Economy Mode:

Press the **MODE** button. The LED will illuminate.

### To Exit Economy Mode:

Press the **MODE** button. The LED will extinguish.

- When the Auxiliary Braking device is used, the display will change to default reading of two or three. This default is pre-selected at the factory and can only be reprogrammed by an authorized Allison Service center. The transmission is not in second or third gear. This is only the reference for the rpm shifts points to optimize the braking capacity.



**CAUTION: Do not use the economy mode in heavy stop and go traffic or mountainous terrains. While in economy mode using heavy throttle applications with frequent shifting will raise transmission fluid temperature. Exit economy mode until road conditions improve.**

**Monitor**

**Back Up Monitor:** Used with the back up camera and will display the rear view of the motorhome.

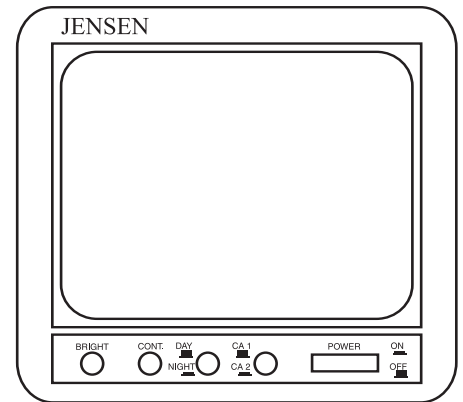
**Power Switch:** At **ON** (in) position, turns on the monitor for viewing. The **green** LED indicator illuminates. When the switch is **OFF** (out), the monitor is in a **STANDBY** mode of operation. The **green** LED remains illuminated when the ignition is on. The monitor displays rear viewing when the transmission is shifted to **REVERSE**.

**Camera Selector:** Should be left in the **CA1** (out) position. **CA2** (in) position is not used in the motorhome.

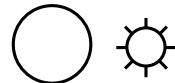
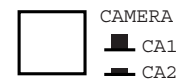
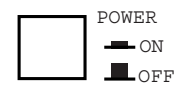
**Day/Night Switch:** Should be left in the **DAY** (out) position for normal viewing. When set in **NIGHT** (in), picture brightness is reduced. **NIGHT** should be used for night viewing and driving through tunnels.

**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.



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**FOG LIGHTS:** Turns fog lights ON and OFF for better visibility. The fog lights will operate with the Low Beam of the headlights.

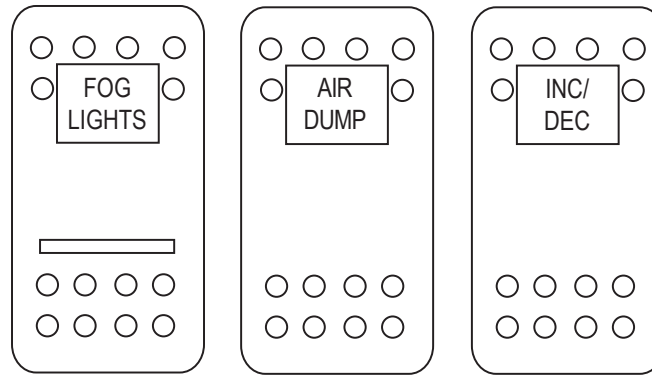
**Switches (Dash)**

**AIR DUMP:** Will manually dump air from the air bags. May be an aid in leveling the motorhome. Releasing the air from air bags will give the leveler more range of travel for leveling.



**NOTE:** Never drive the motorhome with the air bags deflated. This may damage the motorhome.

**INC/DEC:** Will increase and decrease the engine idle in 25 rpm increments. There are limits to the idle speed, about 700 to 875 rpm.

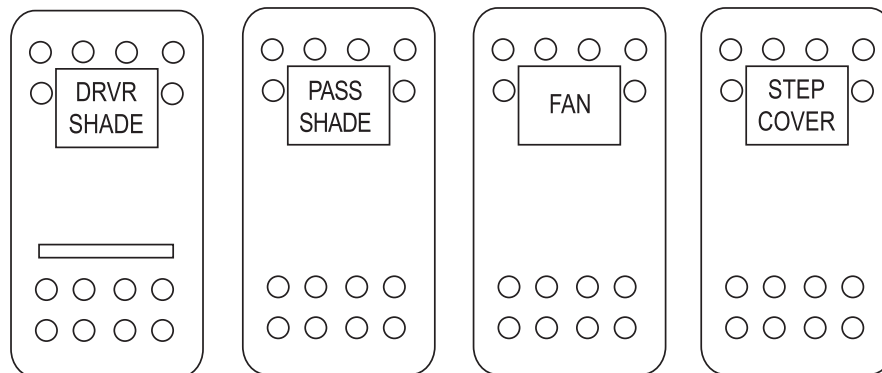


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**ENG DIAG:** Checks engine functions.

**RADIO:** Applies power to the dash radio. This will allow the radio to be turned ON and OFF independent of the main radio switch.

**GEN START:** Starts and stops the generator from the dash area.



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**LH SHADE:** Operates the power sun visor located on driver's side.

**RH SHADE:** Operates the power sun visor located on passenger side.

**FAN:** Operates the optional dash fans.

**STEP COVER:** The motorhome is equipped with a sliding stepwell cover that is extended and retracted by use of a dual action air cylinder. An electrically operated air valve controls the air cylinder. The air solenoid, known as a

"MAC" valve, receives air pressure from the front air tank. The "MAC" valve will direct the air pressure to either side of the dual action air cylinder, moving the stepwell cover in or out. The stepwell cover will not operate without sufficient air pressure (approx. 60 psi).



**WARNING: Stepwell cover is under air pressure. When operating the stepwell cover be sure there are no pets, shoes or other obstructions in the stepwell area. Do not operate the stepwell cover while standing in the stepwell area.**

**Dash AC and Heater Control:** The system is designed to only provide heating, cooling and defrost capabilities for the pilot/co-pilot area. The system is not capable of heating or cooling the entire motorhome.

### ***Air Conditioner & Heater Controls***

**Blower Operation:** The blower is selected automatically when the desired feature is selected with the "select switch." The system is shut off by placing the mode control switch in the "OFF" position.

**A/C Operation:** The A/C dash system will operate in all modes except VENT, FLOOR and OFF. The A/C and MAX positions engage the A/C compressor. When the switch is positioned in the A/C mode fresh air is drawn through the front air intake of the unit through the A/C coil. In the MAX position a damper door closes off the fresh air, while another door opens to permit only air from inside the coach to be used. When maximum cold air is desired this position should be selected. Also use this position when you do not wish to introduce outside air into the coach.

**Air Distribution Switch (Mode Control):** Used to direct air where it is needed to maximize the comfort of the motorhome.

**MAX A/C** - Recirculated air is drawn from the passenger area and discharged through the dash louvers.

**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 and defrost louvers.

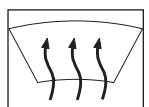
**OFF** - The blower motor does not operate. The fresh air inlet door will close, minimizing outside air infiltration into the motorhome.

**MAX  
A/C**

**A/C**



**OFF**

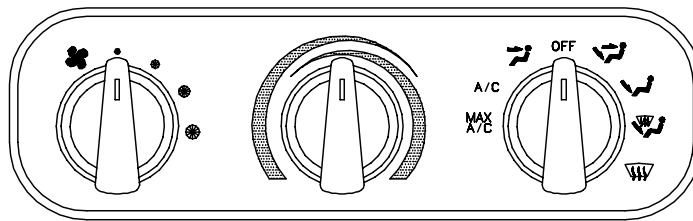


**BI-LEVEL** - Fresh air is drawn in and discharged through the dash, floor and defrost louvers.

**FLOOR** - Fresh air is drawn in and discharged through the floor louvers. A small amount of air is used to defrost the windshield.

**MIX** - Fresh air is drawn in and discharged through the floor and defrost louvers. The A/C system operates to dehumidify the discharged air.

**DEFROST** - Fresh air is drawn in and discharged through the defrost louvers. The A/C system operates to dehumidify the discharged air.



*Blower Speed Control*

*Temperature Control*

*Mode Control Switch*

**Temperature Control Switch:** Controls an electric water valve regulating the amount of engine coolant passing through the heating and cooling coils in the system. Rotating to the red area provides warmer air; rotating to the blue area provides cooler air.

**Blower Control Switch:** Controls the speed of the blower motor, which is one of the best and most effective ways of controlling the temperature. The switch provides four speeds in all modes except OFF.

**Operating tips and hints:** Air intake and discharge temperatures are greatly affected by ambient temperatures 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 operations the discharged air temperature should be approximately 30° F cooler than the fresh or recirculated air entering the AC system.

**Winter Use:**

- De-ice the windshield using the DEFROST mode.
- Air will heat up faster with a slower blower speed until normal operating temperature ranges are reached.

**Summer Use:**

- Close all windows and vents to hot, humid outside air.
- **MAX A/C** and **HI** blower will provide quick cool down.
- Use a lower blower speed to produce cooler air.

**Troubleshooting:** 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 motorhome compressed air tank must have adequate pressure to operate the vacuum generator or damper doors will not function. Also, the dash **A/C/Heat** unit must be switched **ON** to provide electric current to the relays, vacuum switches, etc. The dash A/C and heater system should be used monthly to keep the compressor lubricated.

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 leaking.
7. Drive belt loose or broken.
8. Compressor Clutch inoperative, will not engage.
9. Expansion Valve faulty or frozen.
10. Thermostat control faulty.

11. Mode control switch faulty.
12. Compressor faulty.
13. Loss of refrigerant.

**Reduced cooling:**

1. Coolant valve not operating correctly.
2. Air passages obstructed.
3. Loose or worn drive belt.
4. Check blower and select switch.
5. Thermostat control valve faulty.
6. Expansion valve faulty.
7. Compressor 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 ignition switch is "ON."
5. Check blower and select switch.
6. Motor shaft seized.
7. Blower wheel out of alignment.

**Damper Doors Do Not Operate:**

1. Does motorhome air tank have pressure?
2. Check vacuum generator is being powered and producing vacuum.
3. Check vacuum line entering 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 mode switch.
6. Check wiring.
7. Check for pinched vacuum line leading to the vacuum motor operating 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.

#### **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.

TEMP F/ PSIG		TEMP F/ PSIG		TEMP F/ PSIG	
16	15.69	60	57.47	112	151.30
18	17.04	65	64.10	114	156.10
20	18.43	70	71.19	116	161.10
22	19.73	75	78.75	118	166.10
24	21.35	80	86.80	120	171.30
26	22.88	85	95.40	122	176.60
28	24.47	90	104.40	124	182.00
30	26.10	91	106.30	126	187.50
32	27.79	92	108.20	128	193.10
34	29.52	93	110.20	130	198.90
36	31.32	94	112.10	135	213.70
38	33.17	95	114.10	140	229.40
40	35.07	100	124.30	145	245.80
42	37.03	102	128.50	150	263.00
44	39.05	104	132.90	155	281.00
45	40.09	106	137.30	160	300.10
50	45.48	108	141.90	165	320.00
55	51.27	110	146.50	170	340.80

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.



**NOTE: All systems are charged at the factory with 4.0 lbs of R134A.**

**R-134a Refrigerant:**

R134a 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 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: Monaco models with a center dial temperature control use a potentiometer at the control head for input of desired temperature. 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 control to that of the feedback for the stepper motor of 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. Fix or 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:

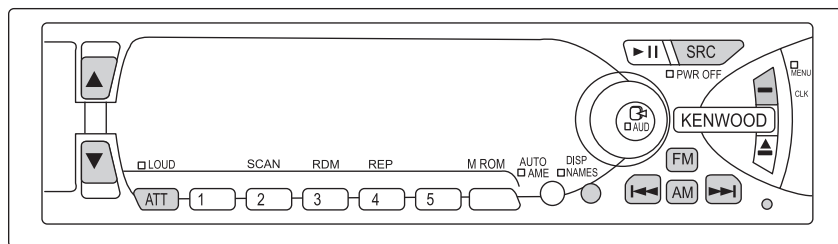
The vacuum generator is important to the operation of the dash heating and A/C systems. This provides the vacuum to open and close the vacuum switches. When the vacuum generator is operating it creates 15 inches of vacuum and is passed to a reservoir ball. Most dash heater and A/C systems will only require 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.

### Radio

The dash radio configuration may be a variety of electronic components. Some components that can make up the dash radio include a CD player, AM/FM tuner, Multi-Disc Changer, Cassette player and/or monitor. These can be individual components or a combination of components.

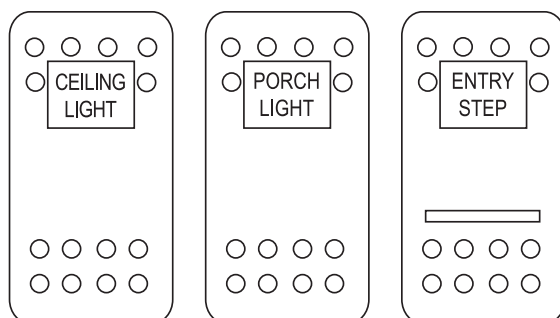


**For further information, consult that specific Manufacturer's Owner's Manual, located within the Owner's Information packet within the "Grey Box".**



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### Switches (at right)



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### Ceiling Light:

Illuminates the front ceiling light from the Entry area.

### Porch Light:

Turns ON and OFF the outside Porch Light.

### Entry Step:

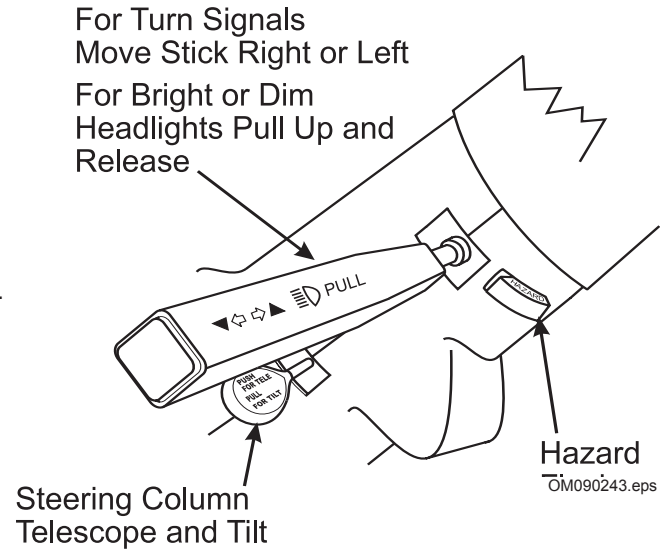
Provide power to operate the Entry Step through magnetic switches.

Tilt and telescope steering wheel control lever is located on the steering column.

- To tilt the steering wheel pull the lever up. Tilt the steering wheel where you want it. Release the lever and it will lock the steering wheel in the new position.
- To telescope the steering wheel push and hold the lever down. Push down or pull up on the steering wheel until the wheel is where you want it. Release the lever and the steering wheel will lock in the new position.

Turn indicator and headlight high/low dimmer control lever is located on the steering column:

- Pushing the lever forward will activate the right turn indicator circuits when the ignition is on.
- Pulling the lever down will activate the left turn indicator circuits when the ignition is on.
- Pulling the lever up will select high/low beam circuits when the head lights are ON.



The flasher button is located on the steering column.

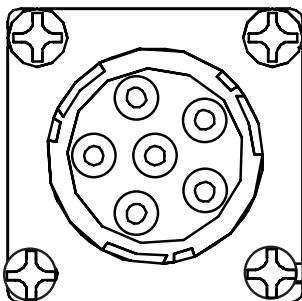
### Hazard Flasher

- Pull out on flasher button to turn four way flasher on.
- Push button inward to shut off flasher.

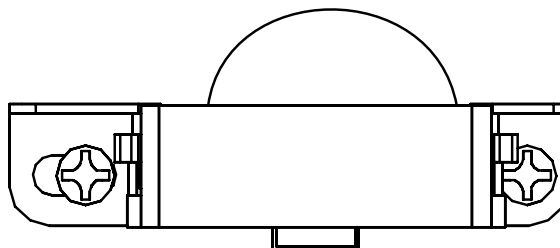
Cummins & Allison diagnostic plugs are located in the roadside electrical bay just in front of the front wheel.

### DIAGNOSTIC PLUG LOCATION

## Engine



## TRANS

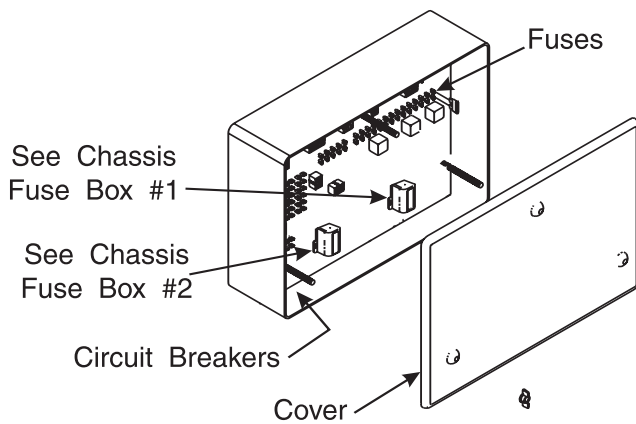


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## FUSES & CIRCUITS - CHASSIS Distribution Panel - Front

The front electrical panel is located on the roadside, ahead of the front wheel. It contains the fuses, self resetting supply circuit breakers, solenoid and relays.

The automotive fuses and emergency flashers are located in the front electrical panel. The fuses are the standard plug-in type (ATO). When a fuse “BLOWS,” the wire in middle of the plastic case will be broken. A bad or blown fuse must be replaced with a fuse of the same rating and type. Using a fuse of a different type rating will defeat the circuit protection provided by the fuse, which could result in damage to the motorhome’s electrical system. If a fuse has been replaced and it “BLOWS” repeatedly, that may be an indication that a fault exists or an electronic component has failed. It is recommended that the motorhome be taken to a qualified RV technician before any future use to diagnose and repair the problem. Circuits are identified on the fuse label located on the inside of the electrical compartment door.



Front Distribution Panel

### Circuit Breakers And Fuses

#### House:

1. Slide-Out Room - 15 amp Circuit Breaker
2. LP/CO Detector - 3 amp Fuse
3. Power Seat (Driver) - 15 amp Circuit Breaker
4. Power Seat (Passenger) - 15 amp Circuit Breaker
5. Storage Lights - 15 amp Fuse
6. Service Lights/LP SOL - 15 amp Fuse
7. Auxiliary Start/TV AMP 7.5 amp Fuse
8. Reserved
9. Map Lights - 7.5 amp Fuse
10. C.B. Radio - 2 amp Fuse
11. Service Light/Aux Power Jack - 15 amp Fuse
12. Dash Fans - 15 amp Fuse

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**Chassis:**

- 13. Step Switch - 7.5 amp Fuse
- 14. Step Motor - 25 amp Fuse
- 15. Reserved
- 16. Roof Horns - 15 amp Fuse
- 17. Sunvisors - 5 amp Fuse
- 18. Step Slide - 15 amp Fuse
- 19. Reserved

**Accessories:**

- 20. Rear Vision - 5 amp Fuse
- 21. Leveling Jacks - 15 amp Fuse
- 22. Air Dumps - 15 amp Fuse
- 23. Auxiliary Lights - 15 amp Fuse
- 24. Spot Light - 15 amp Fuse

**Ignition:**

- 25. Air Conditioner - 20 amp Fuse
- 26. Jack/Antenna Warning Lights - 5 amp Fuse
- 27. TV IGN Relay - 7.5 amp Fuse
- 28. Slide-Out - IGN Relay - 7.5 amp Fuse
- 29. Mirror Heater - 15 amp Fuse
- 30. Mirror Control - 1 amp Fuse
- 31. Reserved
- 32. Reserved
- 33. Step/ISO/Vac Sense - 7.5 amp Fuse

**Marker (Chassis):**

- 34. Marker Lights - 7.5 amp Fuse

**Circuit Breakers:**

- Refrigerator 2-Way/3-Way 5/30A
- Interior Fuse Panel 50A

**Monaco 1 Chassis Assignments:**

**FUSES, Left - Right - Down:**

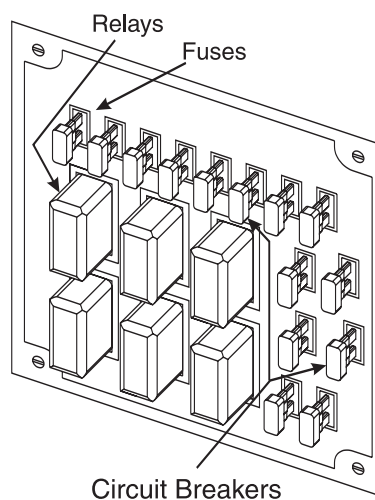
- Marker Lights - 20A
- Right Rear Turn - 15A
- Left Rear Turn - 15A
- Horn - 20A
- Marker/Headlight Switch - 15A
- Key Switch Feed - 10A
- DRL - 25A
- Reserved
- ABS BAT - 20A
- Reserved
- ACC - 10A
- Panel - 10A

**CIRCUIT BREAKERS**

- Clutch Condenser - 20A
- Wiper - 10A

**RELAYS Left Top - Right Bottom:**

- Marker Lights
- Left Rear Turn
- ACC
- Right Rear Turn
- Horn
- Clutch/Condenser



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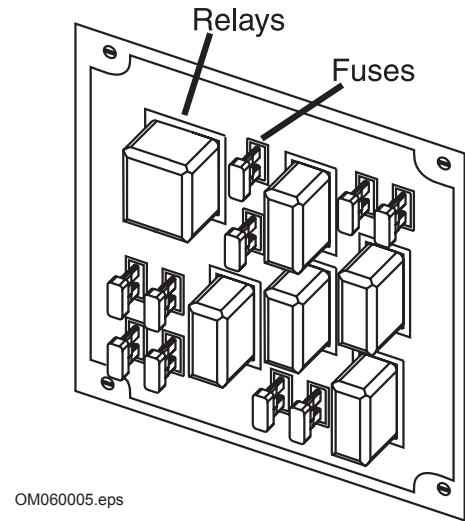


**Monaco 2 Chassis Assignments:**  
**FUSES, Left Top - Right Bottom:**

Park Bell - 10A  
Brake Lights - 20A  
Head Lights - 25A  
Hazard Flasher - 20A  
Park Bell - 10A  
Exhaust Brake - 20A  
Air Dryer - 15A  
Turn Flasher - 20A  
Back-Up Lights - 15A  
ABS IGN - 5A  
Dash IGN - 10A  
Eng/Trn IGN - 5A

**RELAYS Left Top - Right Bottom:**

Ignition  
Park Bell 1  
Park Bell 2  
Exhaust Brake 2  
Exhaust Brake 1  
Brake Lamps



---

## ALTERNATOR

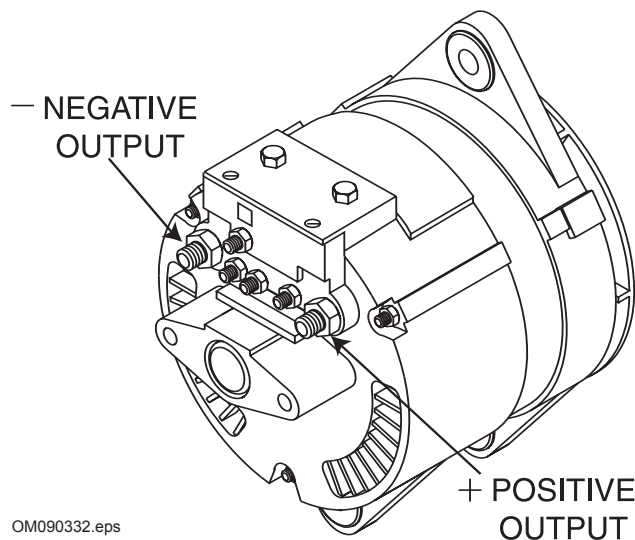
The Leece-Neville alternator with integral rectifier and regulator and remote voltage sensor is designed for reliable high output at all RPMs. This alternator offers high output over a broad range of operating speeds. The 4800JB delivers the same reliable, heavy duty performance all Leece-Neville alternators are known for. The 4800JB features an integral regulator and rectifier for compact installations. Always keep a close eye on the voltmeter in the dash area.

The alternator should replace the ampere-hours taken from the battery at start. The amount of charge given to a battery is dependent on engine run time. This allows maintaining a 75% level with enough energy to power the electrical systems. Driving the motorhome for a short distance, or short periods of time, may prevent the battery from reaching above 75% level.



**Check Out Procedure**

- Check all wiring for burnt or loose electrical connections. Repair as needed.
- Check all grounds and electrical connections to ensure they are clean and tight.
  - a. Alternator ground to chassis frame.
  - b. Motor block ground to chassis frame.
  - c. Chassis battery ground to chassis frame.
  - d. Alternator positive output to isolator center terminal.
- Inspect the alternator for damage. A broken fan blade can damage an alternator or make it out of balance.
- Check belt, pulley and fan for wear. Replace as needed.
- Never attempt to disconnect the battery or battery wire from the alternator with the engine running. This can cause damage to the alternator or the regulator.
- The pulley for the alternator should be torqued to 80 foot pounds.
- Chassis battery voltage with the engine OFF should range from 12.2 to 12.7 VDC.
- Chassis battery voltage with the engine at idle should range 13.5 to 14.2 vdc.
- The output of the alternator range is 13.6 to 15.4 vdc. Connect a volt meter to the (B+) terminal of the alternator and chassis ground. Idle the engine up to 1200 rpm.
- Connect a clamp-on amp-meter, if available, to the positive battery cable to verify the battery state/rate of charge.



Remember the alternator is not a battery charger. It is designed to maintain the proper operating voltage level for the motorhome. A battery with a low charge, or a dead battery, may cause damage to the alternator.

**NOTES**

# Diplomat

## SECTION 10 CHASSIS INFORMATION

<b>INTRODUCTION</b> • 265	<b>ENGINE SHUTDOWN - Extended</b> • 287
<b>AIR SUPPLY SYSTEM</b> • 266	<b>COOLANT</b> • 287
<b>AIR GOVERNOR</b> • 266	<i>Coolant - Additive (SCA)</i> • 288
<b>AIR DRYER</b> • 266	<i>Coolant Hoses</i> • 289
<i>Air Dryer Operation</i> • 267	<i>Coolant System - Thawing</i> • 289
<i>Air Dryer Cycle</i> • 267	<b>BRAKE - AUXILARY</b> • 290
<i>Importance of the Air Dryer</i> • 267	<b>BRAKE - EXHAUST</b> • 290
<i>Desiccant-Type Air Dryer</i> • 267	<i>Exhaust Brake Maintenance</i> • 290
<i>Desiccant Cartridge</i> • 268	<b>TRANSMISSION</b> • 291
<b>AIR STORAGE TANKS</b> • 269	<i>Shift Selector</i> • 292
<b>AIR COUPLER - UNIVERSAL</b> • 269	<i>Transmission - Check Light</i> • 292
<b>AIR SYSTEM - CHARGING (External)</b> • 270	<i>Transmission - Periodic Inspections</i> • 293
<b>RIDE HEIGHT VALVES - Adjusting</b> • 270	<b>TRANSMISSION LUBRICATING FLUID</b> • 295
<i>Checking Ride Height</i> • 271	<i>Transmission Fluid Level - Cold Check</i> • 296
<b>SUSPENSION AIR RIDE BAGS</b> • 271	<i>Transmission Fluid Level - Hot Check</i> • 297
<i>Checklist - Air Bag Inspections</i> • 272	<b>FUEL SYSTEM</b> • 297
<b>BRAKE SYSTEMS - AIR BRAKES</b> • 273	<b>FUEL TANK</b> • 298
<b>BRAKE - PARK &amp; EMERGENCY SYSTEMS</b> • 274	<b>FUEL/WATER SEPARATOR</b> • 298
<b>BRAKE ADJUSTMENT/SLACK ADJUSTER</b> • 275	<b>FUEL SENDING UNIT</b> • 298
<b>ABS SYSTEM (Anti-lock Brakes)</b> • 275	<i>Fuel Lines &amp; Hoses</i> • 299
<b>BRAKE SYSTEMS - BACK UP</b> • 277	<b>HYDRAULIC SYSTEM (ISC)</b> • 300
<b>ALIGNMENT SPECIFICATIONS</b> • 278	<i>Hydraulic Reservoir</i> • 300
<b>SHOCK ABSORBERS</b> • 280	<i>Hydraulic Filter</i> • 301
<b>LEVELING SYSTEM - Hydraulic Leveling</b> • 280	<b>STEERING GEAR</b> • 302
<i>Manual Leveling System</i> • 281	<b>AIR FILTER MINDER</b> • 302
<i>Retracting Leveling Jacks</i> • 282	<b>AIR FILTER - CHANGING</b> • 302
<i>Manual Retract Valves</i> • 282	<b>DRIVE AXLE LUBRICANT</b> • 303
<i>Maintenance</i> • 282	<b>DRIVELINE</b> • 303
<b>ENGINE - GENERAL INFORMATION</b> • 283	<b>LUBRICATION CHART</b> • 304
<b>ISC ENGINE</b> • 283	<b>FRONT OF COACH</b> • 304
<b>STARTING PROCEDURE (ISC Normal)</b> • 284	<b>REAR OF COACH</b> • 305
<b>STARTING PROCEDURE - COLD WEATHER</b> • 284	<b>PARTS - COMMON SOLENOIDS &amp; SENDERS</b> • 306
<b>OIL RECOMMENDATIONS (ENGINE)</b> • 284	<b>CHART - FILTERS &amp; BELTS</b> • 308
<i>Oil Recommendation - Cold Weather</i> • 286	<b>CHART - SPECIFICATIONS</b> • 308
<b>ENGINE SHUTDOWN</b> • 287	<b>CHART - METRIC CONVERSION</b> • 310
	<b>MAINTENANCE LOG</b> • 311



## INTRODUCTION

This section contains information on various components of the motorhome chassis. Following the guidelines and procedures will assist in understanding and operating the motorhome. Complete instructions for various components can be located in the product manufacturer's operator manual included in the Owner's Information File box.



**WARNING: When frame or other welding is involved for motorhome repair or modification, the following precautions are required to protect the electric components in the motorhome chassis.**

- 1. Disconnect the (+) positive and (-) negative battery connection, and any electronic control ground wires connected to the frame or chassis.**
- 2. Cover electronic control components and wiring to protect from hot sparks.**
- 3. Disconnect the wiring harness connectors at the transmission electronic control unit.**
- 4. Do not connect welding cables to electronic control components.**
- 5. The welding ground cable should be attached no more than two feet from the part to be welded.**

The Roadmaster Raised Rail chassis has been designed to provide exceptional balance, handling and braking characteristics. Increased storage space and the highest GVWR are a few benefits from this chassis. The Roadmaster Raised Rail chassis design offers unsurpassed ease of maintenance and service. The rear engine chassis, or "Pusher", is an engine and frame unit featuring a C-Channel main frame rail design and all tubular steel frame design, providing greater structural integrity and more uniform stress distribution. This integral design offers strength, stability and durability in the motorhome.

Incorporated in the Roadmaster chassis is the exclusive air glide suspension system using eight outboard mounted air bags and shock absorbers. This type of suspension system is a tuneable system. The Roadmaster's exclusive cushion air glide suspension consists of front and rear axles with leading and trailing arms in a parallel four-link arrangement. A panhard bar is provided for each axle to control side motion. Each axle is mounted to a wide platform H-frame that carries the coach body on eight outboard mounted air bags (4 front and 4 rear). Each of the eight air bags is coupled with a gas/oil shock absorber. The suspension control arms are attached to the frame through bushings, which require no lubrication. The suspension ride height is preset and will maintain the proper ride height automatically, regardless of the load. The design and set up is intended to provide the smoothest ride, best handling and trouble free service while delivering top notch drivability. The chassis can also incorporate a hitch receiver that offers the ability to tow either a vehicle or trailer. A hydraulic leveling system can be further incorporated in the construction of the frame.

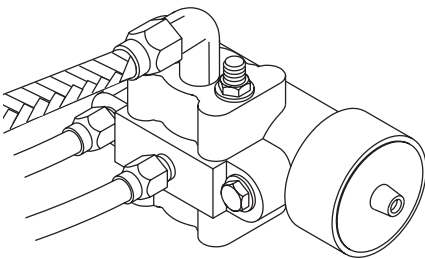
## AIR SUPPLY SYSTEM

The air compressing system on the motorhome is comprised of several items: an air compressor, air governor, air dryer, a front air tank and a rear air tank. The compressed air system operates several items, some of which include brakes, suspension, air horns, air gauge and stepwell cover. The air system is charged by a gear driven air compressor mounted on the engine. As engine speed increases, compressed air output increases. When the air is compressed, heat is generated. Heat dissipates as the air is discharged from the compressor. Moisture condenses in the compressed air as it cools. The moisture laden air then enters an air dryer where the air is filtered. The filtered air charges the front air tank. The front air tank is divided in two halves: a wet side and a dry side. The compressed air enters the wet side before entering the dry side. A discharge line from the dry side of the front air tank charges the rear air tank. The discharge lines use inline check valves to prevent back flow of compressed air.

The pneumatically operated items are divided into two categories: brakes and accessory air. Brakes have full use of supplied air pressure. Accessory air items, such as air horns or stepwell covers, receive air through pressure protection valves (PPV). The PPV will not allow compressed air flow until approximately 60 psi. In the event of an air system problem, the pressure protection valve will leave a reserve air charge for braking. Pressure protection valves are installed for safety.

---

## AIR GOVERNOR



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The air governor is located in the engine compartment and performs two functions: regulating the air compressor to cut-in and cut-out keeping the air system in the specified operating range of 105-120 psi, and sending an air “purge” signal to the Air Dryer.

Cut-in pressure of approximately 105 psi is factory preset from the governor manufacturer and is not adjustable. Cut-out pressure is calibrated to 120 psi. When cut-out pressure is reached, the governor will send an air purge signal to the Air Dryer. This opens the purge port of the Air Dryer, expelling moisture. The purge action of the Air Dryer is identified by the short release of air at the rear of the motorhome.

---

## AIR DRYER

The air dryer is located in the roadside compartment behind the rear wheel. The air dryer removes moisture from the compressed air system. This is important because if air contains moisture it can freeze and prevent operation of brakes or other pneumatic operated items.

The air dryer has three functions: cooling, filtering and drying the air going through the motorhome's air system. If an excessive amount of water is present when performing the monthly air tank drain service it may be an indication that the filter for the air dryer needs to be changed.

During system pressure build-up compressed air passes into the air dryer where the filter system removes contaminants and passes the air into the drying stage. Initially, moisture that condenses out collects in the base of the dryer. Moisture-laden air passes through the desiccant bed in the air dryer cartridge and is dried. When the compressor unloads, the water is expelled and the dry air flows back through the dryer, drying the desiccant for the next cycle.

## ***Air Dryer Operation***

The governor turns the compressor on when supply tank pressure drops below cut-in pressure. Compressed air passes into the air dryer at the inlet port:

- Moisture-laden air and contaminants pass through the desiccant.
- Moisture is retained by the desiccant. Moisture also collects in the base of the dryer.

## ***Air Dryer Cycle***

When the compressor unloads the purge valve opens. The governor turns the compressor off when the system reaches cutout pressure (approximately 120 psi).

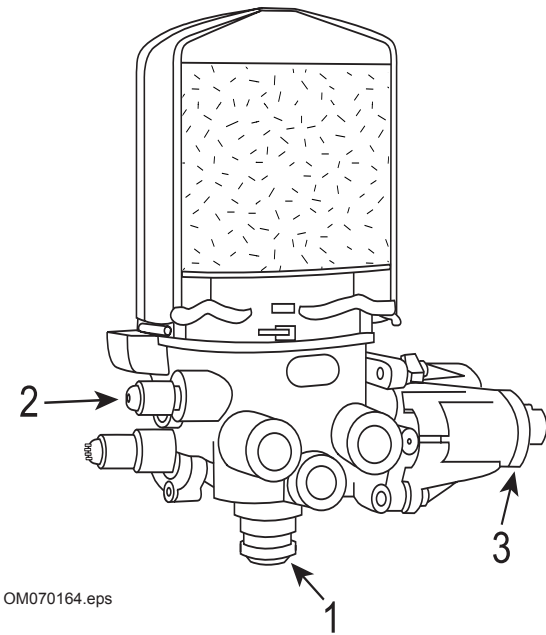
- The dryer purges and expels water collected in the dryer base.
- When the regeneration valve opens, the dry system air flows back through the dryer. A small charge of air from the front tank backflows through the filter. The backflow dries the desiccant, preparing it for the next cycle.

- 
1. When air is compressed the compressor takes in water vapor with the air, compresses the water vapor and puts it into the system as liquid water.
  2. Liquid water that accumulates in air lines can damage seals and valves and wash away lubricants.
  3. In cold weather water can freeze, block air lines and damage air system components.

## ***Importance of the Air Dryer***

- 
1. Warm, humid air from the compressor condenses into either liquid water or water vapor before entering the air dryer.
  2. A desiccant-type air dryer protects the motorhome air brake system by drying moisture-laden air before it passes through the air reservoirs and into the brake system.
  3. Water collects in the base of the dryer when warm air condenses into water before it enters the dryer, or inside of the dryer before the water reaches the desiccant.
  4. The desiccant material then removes additional water vapor, further drying the air.
  5. During the regeneration phase, the regeneration valve and pressure-controlled check valve remove water from the desiccant bed with a backflow of dried, expanded system air.

## ***Desiccant-Type Air Dryer***



### Air Dryer Components:

- 1. Purge Valve:** A valve located on the bottom of the air dryer base that remains open during a compressor unload cycle. The purge valve allows collected moisture, condensation and contamination to be expelled from the air dryer during a purge cycle.
- 2. Pressure Relief Valve:** A valve that protects the air dryer from over-pressurization.
- 3. Regeneration Valve:** The valve that controls regeneration of the desiccant. The regeneration valve allows air from the supply and secondary tanks to bypass the outlet check valve. The air expands and backflushes moisture off the desiccant through the dryer's purge valve.

In extreme cold, make sure the air dryer heater is in good working order. The heater in the air dryer is a 100-watt heater controlled by ignition power and turned off when the ignition is switched off. Thermostat operating range is on below 45° F and off when the temp is above 86° F. The fuse is located in the front electric bay outside, beneath the driver window.



**WARNING: Remove all pressure from the air system before disconnecting any component, including the desiccant cartridge. Pressurized air can cause serious personal injury.**

### Desiccant Cartridge



1. Replacement kit contains one cartridge and one O-ring.
2. Loosen and remove the old cartridge. Use strap wrench, if necessary.
3. Remove and discard the O-ring from the dryer base.
4. Inspect and clean the seal seat. Repair any minor damage.

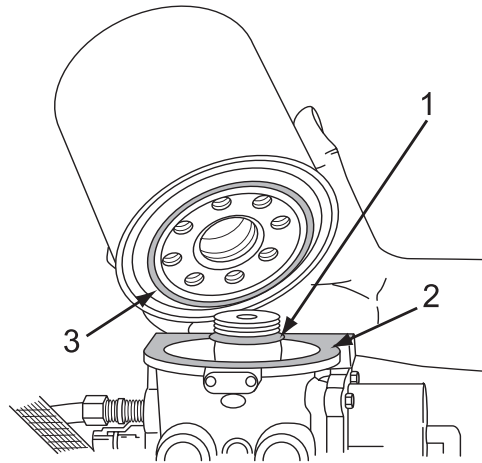


**NOTE: If the seats are damaged so badly that a tight seal cannot be maintained, replace the air dryer.**

5. Lubricate the O-Ring on the stem with a thin layer of grease.
6. Lubricate the cartridge seal with a thin layer of grease.
7. Thread the replacement cartridge onto the base until the seal touches the base. Tighten the cartridge **ONE** additional turn. **DO NOT OVERTIGHTEN.**



REPLACEMENT REQUIREMENTS		
Components	When to replace	Why
Desiccant Cartridge	Every two to three years. When compressor is replaced. Water in supply tank.	Preventive maintenance. Contaminated cartridge. Saturated or contaminated cartridge, high duty cycle (wrong application of air dryer).



- 1. O - Ring
- 2. Seal Seat
- 3. Seal

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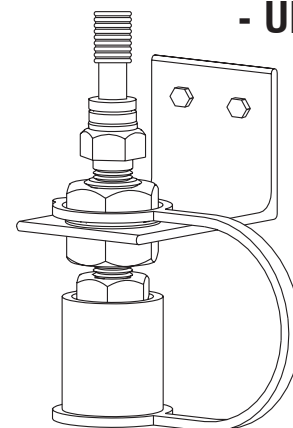
The front and rear air tanks should be manually drained once a month, or more, depending on operating conditions where humidity is high. The front air tank has a drain valve for both the wet and dry side. The rear air tank only has one drain valve. Open the drain valves until all air is purged from tanks, allowing five extra minutes for moisture to be expelled. Remember to close the tank drain valves. Both air tanks have a pressure relief valve which is set to release at approximately 130 psi.

## AIR STORAGE TANKS

A remote air supply coupler is provided for convenience. It is located in the roadside electrical compartment. This universal female fitting will accept several types of 1/4" ID male air fittings, including type C automotive. This auxiliary air fitting may be used to inflate tires, air mattresses or other pneumatic items.

### To use this feature:

- Remove the plastic protective dust cap.
- Using a firm grip, insert the air fitting into auxiliary air supply. The locking collar is spring loaded and will lock automatically when the fitting is properly inserted.



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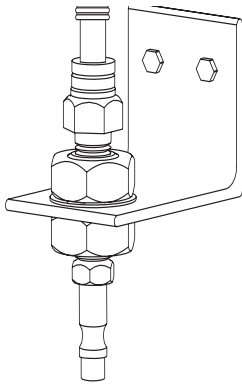
**To remove fitting:**

- With a firm grip hold the air hose near the fitting to prevent recoil.
- Slide the locking collar back to release fitting. The collar will lock into the open position when fully retracted.
- Replace the protective dust cap when finished.

This fitting is not designed to charge the air system on the motorhome. The air supply for the auxiliary air fitting is charged from the front air tank through a pressure protection valve. Due to the small air pressure restriction of the pressure protection valve, maximum supply pressure is approximately 95 psi with air system on the motorhome charged to 120 psi.

---

**AIR SYSTEM -  
CHARGING (External)**



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The air system on the motorhome can be charged from an external air supply source, which is located in the front electrical bay. Caution should be used when charging the air system from this fitting. The air supplied from an external source may contain moisture. Compressed air introduced into the air system on the motorhome from this fitting is not filtered by the air dryer. The auxiliary air charge fitting will charge the front and rear air tanks. A shut-off valve is installed to prevent air from escaping.



**CAUTION: The external air supply source should be regulated to charge the air system on the motorhome no higher than 120 psi. Damage to the air system or pneumatically operated items may occur.**

---

**RIDE HEIGHT  
VALVES -  
Adjusting**

The ride height valves inflate or deflate the air bags keeping the motorhome at proper suspension height throughout the load range. Three ride height control valves are used on the motorhome. Two are used on the rear drive axle, which control rear suspension height and left or right tilt of the motorhome. Only one valve is used to control front axle suspension height.

The ride height control valves are mounted to the main frame of the motorhome just above the axles. Each valve has a linkage rod connected the axle. The valves make small air adjustments to the air springs while traveling. The amount of system air used depends on the type of road surface and driving styles.

Should it become necessary to check the suspension ride height, start with having the air system fully charged and the suspension at a normal height. The motorhome must be on a flat level surface.

Suspension height distance is measured from the top of the H-Frame to the bottom of the Main Frame Rail. Specified distances may vary plus or minus 1/4". Small offset adjustments to the rear valves may be necessary to

compensate for slight tilt. For example: Adjusting curbside rear height control valve up will pivot roadside front corner down.



**NOTE: Driveline angle is affected by the suspension ride height. Improper driveline angle can damage suspension or shorten the life of universal joints. Shock absorbers and air springs are in travel centers at proper ride height.**

#### To adjust suspension ride height begin with:

- Motorhome on flat level surface.
- Air system fully charged.
- Suspension at normalized ride height.

Start with front control valve. Loosen the adjusting locknut at the eccentric slot on the valve. Move the plastic arm up to raise suspension height, this will inflate air springs. Move the plastic arm down to lower suspension height, this will deflate air springs. Make adjustments in small increments.

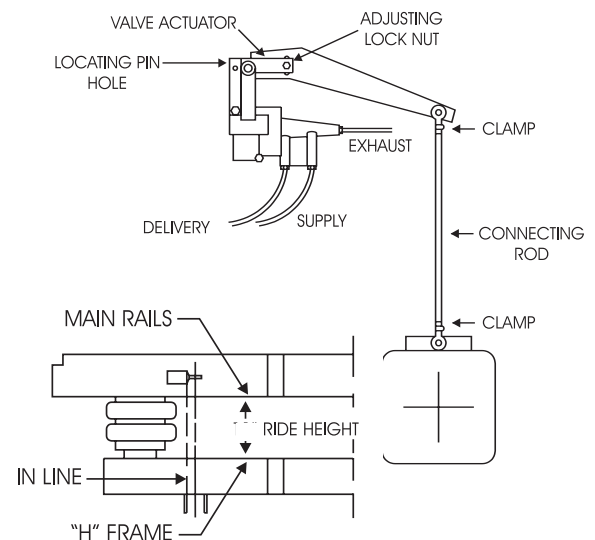
When the desired height is obtained, insert a 1/8" or 7/64" inch twist drill bit into the plastic arm and valve body. This will center the travel of internal piston. Tighten adjusting locknut between 60-80 in/lbs. Check adjustments made by using Air Dump switch to deflate air springs. Start the engine and allow the air system to become fully charged. Allow suspension to adjust and come to a neutral setting. Re-check suspension height measurement.

Follow same procedure for rear control valves. Re-check front suspension height when adjustments are made to rear height control valves.



**NOTE: Do not modify length of the linkage rods. Make necessary adjustments using eccentric slot on ride height control valve.**

#### Checking Ride Height

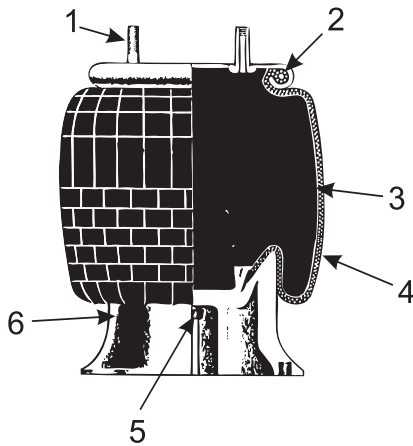


**Measurement for the Diplomat:  
Front = 9 ½ in., Rear = 11 ½ in.**

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Air ride springs are available in single, double and triple convolution types plus reversible sleeve models for virtually every conceivable heavy-duty vehicle suspension application.

#### SUSPENSION AIR RIDE BAGS



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1. **STUD:** Manufactured as a permanent part of bead plate assembly for maximum strength and durability. Used to attach spring to the vehicle's suspension.
2. **BEAD PLATE:** Crimped onto bellows at the factory for a durable design and maximum quality control. Allows 100% leak proof testing prior to shipment.
3. **BELLOWS:** "Air bag" includes four plies of material: an inner layer, two plies of cord-reinforced fabric and an outer cover. Natural rubber construction provides functional properties up to - 65° F.
4. **BUMPERS:** A solid rubber or engineered plastic device designed to prevent significant damage to the vehicle or its suspension in event of a sudden loss of air pressure in spring.
5. **PISTON:** Provides a lower mounting arrangement for air spring. Controls characteristics of spring under changing pressure loads.
6. **PISTON BOLT:** Attaches piston to bellows. Sometimes extended as a means of attaching spring to vehicle suspension.

### Checklist - Air Bag Inspections

Listed below are items that can be checked when the motorhome is in for periodic maintenance.



**NOTE: Never attempt to service the air suspension on a motorhome with the air bags inflated.**

- Inspect the O.D. of the air springs. Check for signs of irregular wear or heat cracking.
- Inspect the air lines to make sure contact doesn't exist between the air line and the O.D. of the air springs. Air lines can rub a hole in an air spring very quickly.
- Check to see that there is sufficient clearance around the complete circumference of the air spring while at its maximum diameter.
- Inspect the O.D. of piston for buildup of foreign materials. (On a reversible sleeve style air spring, the piston is the bottom component of the air spring.)
- The correct ride height should be maintained. All motorhomes with air springs have a specified ride height established by the manufacturer. This height should be maintained within ¼ in. This dimension can be checked with the vehicle loaded or empty.
- The leveling valves (or height control valves) play a large part in ensuring that the total air spring system works as required. Clean, inspect and replace if necessary.

- Make sure to check shock absorbers for leaking hydraulic oil and worn or broken end connectors. If a broken shock is found, replace it immediately. The shock absorber will normally limit the rebound of an air spring and keep it from overextending.
- Check the tightness of all mounting hardware (nuts and bolts). If loose, tighten. Do not over-tighten.

### **Cleaning:**

The approved cleaning method is to use soap and water, methyl alcohol, ethyl alcohol and isopropyl alcohol. Unapproved cleaning methods include all organic solvents, open flames, abrasives and direct pressurized steam cleaning.

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The motorhome is equipped with air brakes using much the same system as over the road trucks. This type of braking system is efficient. Proper maintenance and lubrication is the key to keeping the brake system in proper working order. The brake system on the motorhome is designed to accommodate the weight of the vehicle and towing loads. This system differs from a conventional automotive hydraulic braking system and should be treated differently.

When operating a vehicle equipped with air brakes consideration needs to be given to stopping distances and air system pressures. The heavier the vehicle, the greater the kinetic energy. The motorhome requires longer stopping distances. Each brake application uses air from the air system. Give attention to the air gauge as well as the surroundings. Engine speed is directly proportional to how fast the air system is replenished. Prepare for downhill grades. Grades are generally posted in percentages. It may be necessary to select a lower gear. Make use of the engine or exhaust brake. When making brake applications use individual short applications down long hills rather than “riding” the brakes. This will extend the life of the brake linings. Avoid overheating the brakes. Hot brakes have less stopping power. When maneuvering the motorhome around in small areas, or backing into spaces, several individual brake applications might be made. Watch the air gauge. Plan ahead when parking to make it easier on yourself. When preparing to back into a space swing the motorhome so it is aligned with the parking slot before backing up.

The air braking system on the motorhome is equipped with several safety features unlike that of automotive hydraulic braking systems. One safety feature is a low air pressure warning system. Should a low air condition arise while the vehicle is under operation a warning buzzer will sound and a dash warning light will illuminate alerting the operator of the situation. This warning occurs at approximately 60-65 psi (pounds per square inch).

## **BRAKE SYSTEMS - AIR BRAKES**

A simple mechanical explanation of what occurs when a brake application is made is as follows: The air system supplies air to the foot brake, this is called a treadle valve. Pushing down on the treadle valve supplies an air charge signal to a brake chamber. This sealed chamber consists of a spring and air bladder. The air charge signal pushes on the bladder which extends a threaded rod connected to the automatic slack adjuster. The slack adjuster rotates the S-cam expanding the shoes against the drum. Air disc brakes follow much the same principal, with the exception of the S-cams.

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## **BRAKE - PARK & EMERGENCY SYSTEMS**

The park and emergency brake systems are combined and apply to the rear drive axle only. These are called spring brakes. When the park brake is applied, air is released from the rear brake chambers allowing the large spring in each rear brake chamber to manually push against the automatic slack adjuster. This rotates the S-cam applying the brake shoes against the drum. The air system must be charged approximately above 35 psi so the park brake will remain released. Pushing down on the park brake handle charges the rear brake chambers with air pressure, overriding the emergency brake springs and releasing the brakes. In the event of air loss, while the vehicle is under operation, the park brake will automatically apply (this occurs at approximately 30 psi) acting as an automatic emergency brake system.

When preparing to depart, allow the air system to achieve full air pressure. This is indicated by the air gauge needles. Listen for the air dryer to purge, indicating full air pressure has been obtained and air dryer is functioning. Look and listen for any abnormalities. Abnormal air pressure readings by either needle of the air gauge should alert the operator. Have the air system checked to avoid an untimely failure.

Should a failure occur in the air system, preventing the air pressure from building, it may become necessary to “cage” the spring brakes. This is an emergency procedure only. Caging the rear air brake chambers manually overrides the spring brakes and allows the vehicle to move. This procedure does not affect normal service braking. The brake disabling procedure is located in Section 2.



**NOTE:** When the park brake is released the Park illumination lamp will remain lit until air system pressure is above 65 psi.



**WARNING:** If the air tank is not dumped there is the possibility of an accidental release of the parking brake. Traveling with small children and/or pets may require a small block to be fabricated to prevent accidental release. The block should be placed under the knob and rested on the dash panel. A wooden clothes pin, clasped at the base of the shaft, will work.



**BRAKE  
ADJUSTMENT/  
SLACK ADJUSTER**

The motorhome is equipped with automatic slack adjusters. As brake linings wear, the slack adjusters will automatically ratchet on the return stroke as needed. This ratchet action will keep the brake linings at proper adjustment. Brake adjustment should not be necessary. Indications of a vehicle needing a possible brake adjustment may be noticed by the park brake not holding on a hill or gradual loss of braking power. Automatic slack adjusters and the connecting S-camshaft require periodic lubrication.



**NOTE: Replacement parts should be of the same original equipment size and type. Mixing brake components may result in unequal braking action. Brake adjustments are part of normal maintenance of the motorhome. Brake adjustments are not covered by the manufacturer.**



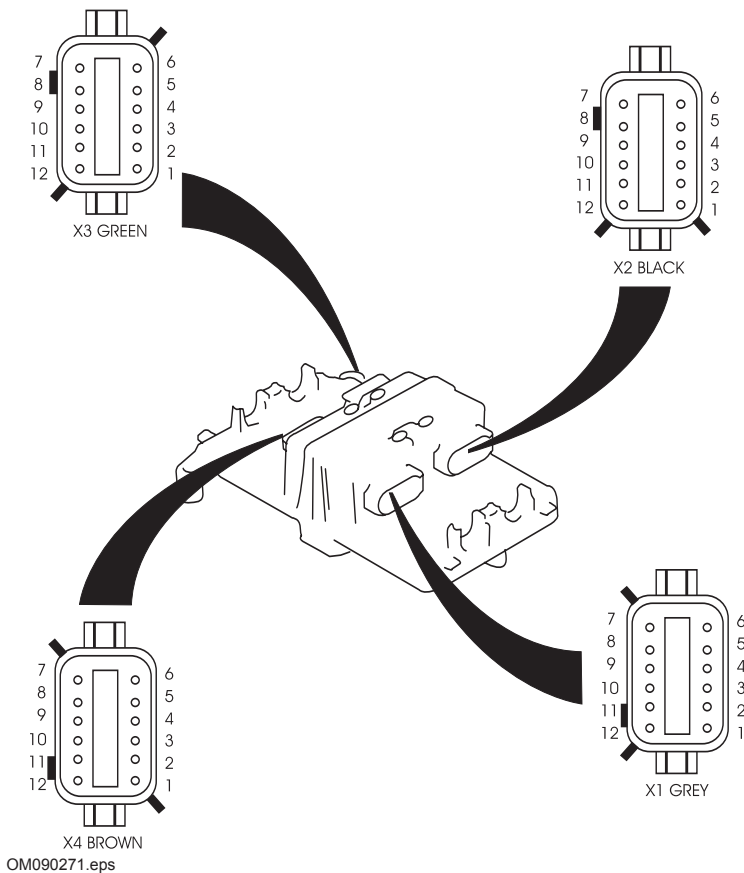
**WARNING: Brake lining may contain asbestos material and should only be serviced by qualified service technicians who are trained in the appropriate precautionary procedures. If any loss of braking effectiveness, or abnormal braking indications are noticed, the brakes and slack adjusters should be inspected by a qualified brake technician.**

The motorhome is equipped with an anti-lock braking system (ABS). The ABS system monitors wheel rotation speeds by using a 100 tooth magnetic tone ring mounted to the hub. Revolving with the wheel, the magnetic tone ring is polarized giving positive and negative pulsations. A stationary sensor is mounted adjacent to the tone ring monitoring the magnetic pulses. The pulses are monitored by the ABS electronic control unit (ECU).

The ECU monitors all available wheel sensors at the rate of 100 times per second. The ECU controls Pressure Modulator Valves. Pressure Modulator Valves have two electric over air solenoids, a hold solenoid and a release solenoid. The modulator valves are open under normal braking, allowing a straight through air signal from the treadle valve to the brake chamber. Should a wheel lose traction under a braking application, the ECU will energize the hold solenoid of the Pressure Modulator Valve to interrupt the air signal from the treadle valve to the brake chamber, while the release solenoid vents the existing air signal to the atmosphere allowing the skidding tire to regain traction. Skidding tires have less tractive efficiency. It is possible, under certain conditions, to have the wheel(s) skid with a normal functioning ABS system.

The ABS itself does not apply additional braking power. The purpose of the ABS is limiting brake torque to prevent wheel locking that results in the loss of lateral stability and increased stopping distances. Cautious driving practices and maintaining adequate safe distances when following vehicles is the key to safe vehicle operation.

**ABS SYSTEM  
(Anti-lock Brakes)**



### ABS Component Function:

- Speed sensors and tone rings on each wheel monitor wheel rotation.
- Each speed sensor communicates wheel rotation pulses to the Electronic Control Unit.
- ECU receives the speed sensor inputs, interprets the signal pulses, calculates speed and acceleration rates of each wheel.
- Based on the speed sensor input, the ECU detects impending wheel lock and operates the ABS Modulator Valves required for proper control. The Modulator Valves can be operated in the air, release or hold modes to regulate air pressure to the brake chambers.
- The braking force is applied at a level which minimizes the stopping distances while maintaining as much lateral stability as possible.

### ABS Warning Light:

The ABS will perform a diagnostic indicator lamp check and self diagnostic test each time the ignition is switched to the on position. The ABS dash indicator light will illuminate momentarily (2.2 seconds) verifying the self check test. If the ABS indicator light remains on, or illuminates while the motorhome is being operated, there is a fault in the antilock brake system only. This fault will not affect normal service braking. The motorhome will need to go to a service center to repair the problem.

### ABS Blink Code:

The ABS dash indicator light can be used to obtain system faults by displaying a blink code.

#### To a retrieve blink code(s):

- Turn ignition key to the ON position.
- Using Systems Diagnostic Center located left of steering column below dash board, depress and hold test button for three seconds. Indicator light will illuminate while test button is depressed.
- After releasing test button, indicator lamp will turn off and blink code will be displayed: 1-1 will indicate no system faults.



**BRAKE SYSTEMS  
- BACK-UP**

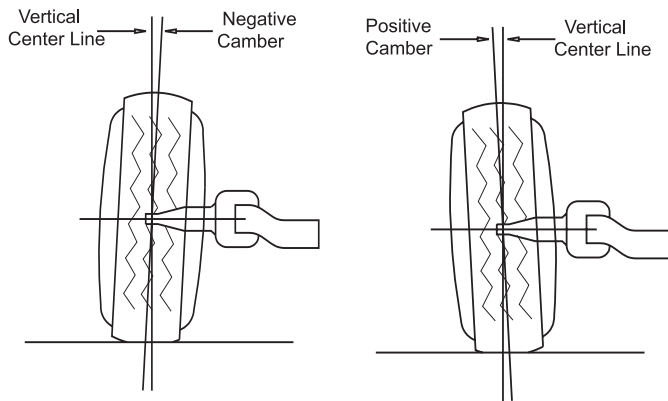
The motorhome air braking system is equipped with several back-up safety systems and warning alarms in the event of an air system failure. Refinements to air braking systems have been instituted with safety as top priority. For example: Should the air compressor fail to charge the air system, and the low air gauge readings go undetected, a low air pressure warning buzzer will sound and the low air pressure dash warning indicator lamp will illuminate. These warning indicators occur at approximately 65 psi. This will alert the operator of an impending situation. If the motorhome is allowed continued operation, the pneumatic emergency spring brake relay valve installed in the air system senses the low air pressure condition. The emergency spring brake relay valve will release the air charge from the spring brake air chambers on the rear drive axle. In this case the park brakes will automatically apply at approximately 30 psi. This safety back-up system acts as an automatic emergency brake system.

Another back up safety is the air system separation of the front and rear brakes, implemented by using two air tanks. One tank is located in the front and the other is located in the rear. This separation allows the front air tank to operate the front brakes, the rear tank operates the rear drive axle brakes and tag axle brakes if equipped with a tag axle. This tank division gives reassurance in the event of one tank having a failure of an accessory air item allowing the compressed air to escape. Accessory air items are other pneumatically operated items such as the air horn, step well cover, vacuum generator, etc. The accessory air items operate only when air tank pressures exceed 65 psi. This is done with pressure protection valves. Should an accessory air item fail, the pressure protection valve (PPV) will reserve remaining air pressure of 65 psi for braking. This will leave the motorhome with one air tank fully charged for a safety back up.

For a situation in which all compressed air has escaped from the rear air tank, a pneumatic back-up safety valve is installed. This is the safety inversion valve. The inversion valve senses the absence of rear air tank pressure. In this case the inversion valve will allow the operator to make a modulated spring brake application, made in conjunction with the emergency spring brake relay valve. The inversion valve allows the front air tank pressure to recharge the rear brake chambers after the modulated spring brake application has been made. This back-up system allows use of all the brakes, allowing the operator to bring the vehicle to a safe stop. In the event of all compressed air charge escaping from the front air tank, the operator will still have full use of the rear brakes.

## ALIGNMENT SPECIFICATIONS

The correct wheel alignment promotes longer tire wear and ease of handling while minimizing the strain on the steering system and the axle components.



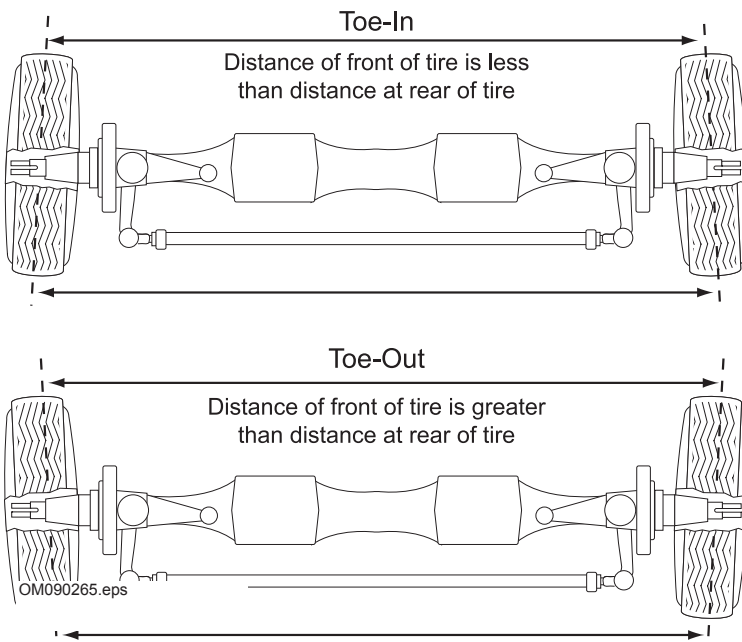
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### Camber:

Camber, as shown, is vertical tilt of wheel as viewed from the front of the vehicle. This is machined into the axle when manufactured and is not adjustable.

- “Positive” camber is an outward tilt of the wheel at the top.
- “Negative” camber is an inward tilt of the wheel at the top.

FRONT OF MOTORHOME  
(Top View of Axle)



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### Toe Setting:

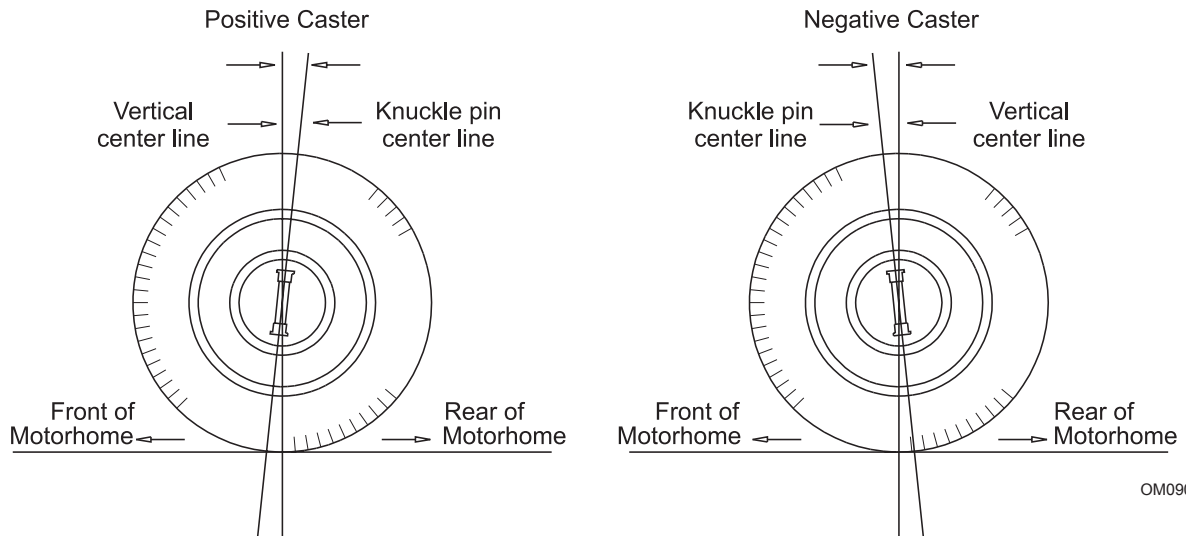
The toe setting represents different distances between the front and rear of the tires (measured at the vertical centerline of the tires).

Toe-in occurs when the tire front distance is less than the tire rear distance.

Toe-out occurs when the tire front distance is greater than the tire rear distance.

Wheels are generally set with initial toe-in. As the vehicle operates tires tend toward a toe-out condition. By starting with an initial toe-in setting, a desirable “near zero toe-in” can be achieved when the vehicle is in motion.

Incorrect toe settings, where toed-in or toed-out, can have a significant effect on tire wear. The toe setting is adjusted by lengthening or shortening the cross tube.



### Caster Adjustments:

Caster is the fore and aft tilt (toward the front or rear of the motorhome) of the steering kingpin as viewed from the side of the motorhome.

“Positive” caster is the tilt of the top end of the kingpin toward the rear of the motorhome.

“Negative” caster is the tilt of the top end of the kingpin toward the front of the motorhome.

A caster angle more positive than specified may result in excessive steering effort and/or shimmy. An angle less positive may result in vehicle wander or poor steering return to center. The caster angle is determined by the installed position of the steer axle.

		SPEC.	TOL.
<b>LEFT FRONT</b>	<b>CAMBER</b>	<b>0.00°</b>	<b>0.40°</b>
	<b>CASTER</b>	<b>6.00°</b>	<b>0.50°</b>
	<b>TOE</b>	<b>0.03°</b>	<b>0.12°</b>
<b>RIGHT FRONT</b>	<b>CAMBER</b>	<b>-0.25°</b>	<b>0.40°</b>
	<b>CASTER</b>	<b>6.00°</b>	<b>0.50°</b>
	<b>TOE</b>	<b>0.03°</b>	<b>0.12°</b>

## SHOCK ABSORBERS



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*Normal shock absorber  
appearance after a long  
service period.*

The shock absorber by definition is a hydraulic device used to dampen suspension/body movement. The road surface irregularities or roughness is compensated for by the shock absorber. The Roadmaster raised rail chassis incorporates a "Gas Magnum" shock in the design of the exclusive, air glide suspension system. This shock absorber is a telescopic, monotubed unit filled with nitrogen gas and hydraulic oil. The result of the mixture is uninterrupted damping for the smallest of wheel deflection.

By design, a self-lubricating seal is used which will allow approximately 10% of the total oil capacity to pass onto the piston rod. The gradual process of oil loss does not affect the performance of the shock absorber during the service life. This process will be evident after a long period of service, by an oil film on the body of the shock absorber. The appearance of a coating or film on the body or rod is called "Misting" and is completely normal. It is an indication that the shock is functioning normally.

The road holding, handling, balance and braking characteristics all can be contributed to the shock absorber. A visual check or inspection is recommended for obvious damage. The key check will be driving; any noticeable changes in the ride of the motorhome, a lean in the motorhome or excessive bouncing may be caused by a worn shock. The operating conditions for which the shock absorber must endure will determine the life span.

## LEVELING SYSTEM *Hydraulic Leveling*

The three point leveling system features a multiple warning system with flashing lights and a bong alarm to alert you of the jack position. The system also features a remote control location from the driver seat. The torsion stress is significantly reduced during proper operating procedures. Damage resulting from improper procedures can range from windshield damage to entry doors jamming.

The model 22.5A J-II leveling system pump is located curbside front with easy access from the generator door. The valve assembly manifold is mounted on the the pump motor, providing easy access to the manual retract valves. The system is designed to be self bleeding in the event any component of the hydraulics has been removed or repaired. Fully extend and retract each jack twice. The remote rocker switches will operate with a minimum of 7.5 Volt DC. Optimum requirements for operating the system are voltages above 9.6 Volt DC.



**NOTE: The leveling system jacks are not designed for use in changing tires. This can cause problems with the suspension system, frame alignment and/or cause damage to the windshield.**

**Manual Leveling System**

When manually operating the leveling system, always lower the front jack first. The front jack acts as a pivot point for the chassis and reduces torsion stress on the body of the motorhome.



**NOTE: In the event the front of the motorhome is high and does not require elevating, it will be necessary to raise front of motorhome a minimum of ½ inch to allow jacks to act as a pivot point.**

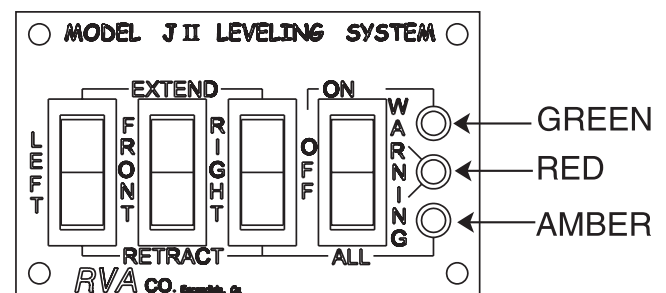
The leveling system was designed to reduce site selection problems. If possible, park the motorhome with the front facing downhill. If the ground is soft, place a wooden 2 x 8 board under the foot of each jack pad to prevent sinking.

The front jack will be the pivot point for the chassis and is always lowered first. This reduces the torsion stress on the body of the motorhome. The Bong alarm will activate when any jack is extended more than 2" to 6" from fully retracted position and will indicate low fluid level for the pump motor. The Bong alarm may momentarily activate when driving over rough roads, or negotiating curves and corners. Usually this indicates low fluid level.

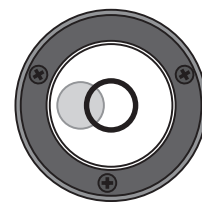


**NOTE: Air will not automatically dump from air bags when leveling cycle begins. To expedite the air dumping, a manual air bag release switch is located on the dash panel.**

- Place the gear selector in PARK.
- Apply the parking brake.
- Turn the ignition switch to the ON position.
- Switch the main jack control power switch ON.
- To extend a particular jack, push the appropriate rocker switch to extend position and hold it until the desired extension is reached.
- To retract a particular jack, simply push the rocker switch to the retract position and hold until the desired retraction is reached.
- Turn off the switch labeled POWER on the jack control panel.
- Turn off the ignition switch.



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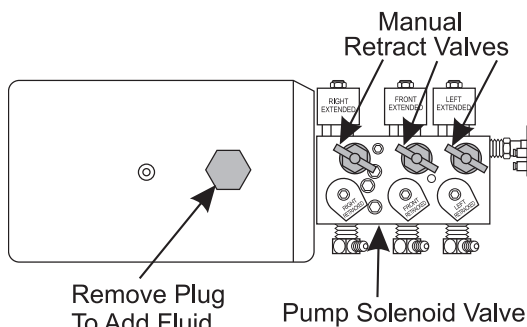
## Retracting Leveling Jacks

- Ensure the gear selector is in PARK.
- Ensure the parking brake is applied.
- Turn the ignition switch to the ON position.
- For manual control of the system, switch the control panel power switch ON.
- To retract a particular jack, simply push the rocker switch to the retract.
- All jacks may be retracted by selecting the ALL position on the power switch.



**NOTE: Do not move the motorhome until the jacks are fully retracted. A visual check of the jacks is recommended to ensure full retraction. Do not rely solely on the lights and alarms.**

## Manual Retract Valves



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In the event of mechanical or electrical failure that would prevent the leveling jacks from being automatically retracted, the motorhome is equipped with manual emergency retract valves. These valves are located inside the roadside compartment behind the rear wheel. The manual system will release fluid under pressure in each jack and allow fluid to return to the reservoir. The jacks will then retract.

To operate the manual system, turn all three valves counterclockwise until they stop. Once the jacks are fully retracted, rotate all the valves fully clockwise. In the event one of the jacks is not holding pressure, check to make sure all valves are fully closed.

## Maintenance

Occasionally, while the jacks are fully extended, wipe dirt from the jack rod. This will help lengthen the life of the jacks. This can vary from the amount and type of usage of the jacks. Dexron III will serve as a solvent as well as a lubricant. Occasional oil or grease on the extended jack ram is normal and aids in the lubrication of the ram. It helps to learn the sound of the normal pumping and gurgling sounds of the pump when it is low on fluid.

### Adding Fluid:

1. Use **Dexron III** automatic transmission fluid.
2. Extend any jack six inches from the full retracted position. All other jacks should be fully retracted.
3. Unscrew the reservoir cap from the top of the pump.
4. Turn the ignition switch to the **ON** position. Turn the rocker switch to **ON**. Open the window so the bong alarm is audible from outside the motorhome. Slowly fill the reservoir with fluid until the bong alarm stops sounding.
5. Replace the reservoir cap.
6. Turn the ignition switch and the remote panel **OFF**.

## ENGINE - GENERAL INFORMATION

The diesel engine operates differently from the conventional gasoline engine. Gasoline engines control engine speed using a butterfly throttle plate controlling air/fuel mixture inlet flow. As the throttle plate opens, vacuum created by the piston velocity draws the metered fuel/air charge into the combustion chamber, then ignites from a controlled electric ignition source. Closing the throttle plate limits the fuel/air supply, slowing engine speed, increasing intake manifold vacuum.

The diesel engine in the motorhome controls engine speed by varying fuel supply only. No throttle plates are used. An exhaust driven turbine system (turbocharger) compresses the fresh air supply into the engine. The fuel is injected under pressure into the combustion chamber. Ignition of fuel/air charge occurs from heat generated by rapid high compression. The turbo boost gauge registers amount of intake manifold compression measured in lbs./in<sup>2</sup>. Therefore, no intake manifold vacuum exists.

Diesel engine RPM (revolutions per minute) operating speeds are generally much lower than that of the gasoline engine. Peak torque and horsepower output values occur at much lower engine speeds. Idle speeds between the two engine types are similar, however maximum engine speeds are quite different. The gasoline engine generally is not regulated to a maximum engine speed. The maximum engine speed on a diesel engine is controlled by an engine speed governor set by the engine manufacturer.



**WARNING: Do not operate a diesel engine where there are or can be combustible vapors. Vapors can be drawn through air intake system and cause engine acceleration and over-speeding, resulting in fire, explosion and extensive property damage. Numerous safety devices are available, such as air intake shut-off devices, to minimize risk of over-speeding where an engine (due to its application) might operate in a combustible environment, such as fuel spills or gas leaks. Equipment owner and operator is responsible for safe operation of engine. Consult your engine authorized repair location for future information.**

The maintenance guidelines found in the Cummins Operation & Maintenance manual is recommended for the engine. When followed, it will help with a longer life, better performance and more cost efficient operations. A good maintenance schedule begins with a daily awareness of the engine and its various systems.

The engine is equipped with an intake manifold grid heater. The grid heater helps engine starting in cold weather. Intake manifold air temperature is monitored by the Electronic Control Module on the engine. If intake manifold temperature is below specified level (approximately 40° F.) manifold grid heater will be activated. Grid heater activation is indicated by the **WAIT TO START** indicator lamp.



**WARNING: Use of ether starting fluids may cause an explosion upon grid heater activation.**

## ISC ENGINE



## STARTING PROCEDURE (ISC Normal)

With throttle in idle position, turn ignition to the ON position allowing WAIT TO START lamp to extinguish. Turn key to the start position. When the engine is started the grid heater will again energize for a time period determined by the intake air temperature and the fuel temperature. Allow engine to idle with no load for three to five minutes. The engine coolant temperature should be up to normal operating range (140° F/60 ° C to 212° F/100° C) before operating engine under full throttle.



**NOTE: It is not recommended to idle the engine for long periods of time. This will simply waste fuel and annoy neighbors. Consistent periods of long idle may cause damage to the engine.**

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## STARTING PROCEDURE - COLD WEATHER

The engine block heater may need to be plugged in two to three hours prior to starting. The engine block heater is rated at 1,500 watts, 110 Volts AC and requires the motorhome be plugged into shore power or have the generator running. It is not necessary to leave the block heater plugged in for long periods of time. The block heater requires about 13 amps to operate.

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## OIL RECOMMENDATIONS (Engine)

The maintenance guidelines found in the Cummins Operation & Maintenance Manual is recommended for the engine. When followed it will help with a longer life, better performance and more cost efficient operations. A good maintenance schedule begins with a daily awareness of the engine and its various systems.

A high grade 15W-40 multiviscosity heavy duty lubricating oil meeting Cummins Engineering Specification CES 20071 or CES 20076, American Petroleum Institute (API) specification CH-4 which can be used as an alternative to CES 20071 is recommended. Lubricating oils meeting API CG-4 specifications may be used at a reduced drain interval. The engine uses Pennzoil 15W-40 heavy duty engine lubricating oil that meets Cummins specifications. A critical factor in maintaining engine performance and durability is the use of high grade multigrade lubricating oil and strict adherence to the maintenance service intervals.

A straight weight or monograde lubricating oil is not recommended. Shortened drain intervals may be required as determined by a close monitoring of the lubricating oil condition by means of a oil sampling program. The use of oil analysis to extend drain interval is not recommended. There are numerous variables which is the basis of the recommendation.



Synthetic oils API category III specifications are recommended for extreme cold temperatures only.

Low viscosity oils used for winter operations will aid in starting. Synthetic oils or oil with adequate low temperature properties used for Arctic operations, where the engine cannot be kept warm when shut down, will aid in starting.

The use of synthetic oils should not be used to extend drain intervals. Extended oil change intervals can decrease engine life and possibly affect the engine warranty.

Oil additives should not be used unless the oil supplier or oil manufacturer has been consulted and provided positive evidence or data establishing satisfactory performance in the engine.

### **Function of Engine Oil:**

If a lubricating oil is to work in an engine it must be capable to perform various functions. Lubrication of the moving parts is the primary function. The lubricating oil should be able to form a film between metal surfaces preventing metal to metal contact and reducing friction. When you have a metal to metal contact, friction heat is generated. Welding of the part can occur and metal transfer will result in scuffing or seizing. The film of oil contacting the surfaces will provide cushioning and shock dampening as well.

Cleaning is another function. The oil should perform as a cleaner in the engine by flushing contaminants from critical components. These contaminants should be removed in the filtration system or during the course of an oil change. Oil will provide a protective barrier to prevent corrosion of non-ferrous metals.

Internal components of the engine require cooling. The primary coolant system cannot provide this cooling. Oil will transfer heat by contacting the various components then transferring to the primary cooling system at the oil cooler. The uneven surfaces are filled to react as a combustion seal within the cylinder liner and other internal components.

### **Synthetic Engine Oil:**

In extreme environments where ambient temperatures can be as low as -45° C (-50° F) a petroleum based oil will not perform satisfactorily in diesel engines. Synthetic oils were developed for these type applications. These synthetic oils are blend from ether and/or hydrocarbon based oils. These base oils are produced by chemically reacting lower molecular weight materials to manufacture lubricants of desired properties. All synthetic based oils must meet the API category III classifications and SAE viscosity grades. Synthetic oils and petroleum based oils should never be mixed.

### **Viscosity:**

Viscosity is simply a measure of resistance of molecule layers moving relative to an adjacent layer. All fluid viscosity are affected by temperature. A multigrade lubricating oil tends to be less sensitive to temperature changes due to formulation. Lubricating oils are generally selected for use with viscosities appropriate for the expected operating temperature. The correct selection of a lubricating oil of correct viscosity is critical for optimum performance. Some effects of incorrect viscosity when the oil is too thick range from difficulty in starting, to increasing fuel consumption and reducing power output. When the oil is too thin, oil consumption is increased as well as wear from the metal to metal contact. This will also increase engine noise.

Low temperature viscosity specifications are identified by a “W” (winter). High temperature viscosity that meets the 100° C (212° F) requirements have no suffix. When a lubricating oil meets both high and low temperature requirements they are classified as multi-viscosity or multigrade.

### **Routine Maintenance Recommendations:**

1. Check oil level daily.
2. Replace oil filter at every oil drain interval.
3. Cummins Engine Company, Inc. recommends the use of high quality, API (American Petroleum Institute) licensed CH-4 or CES20071, 15W-40, multiviscosity oil or premium oil.
4. The recommended oil drain interval is defined by the API oil performance classification and the engine duty cycle. Refer to the Cummins Operation & Maintenance Manual for complete details.

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### ***Oil Recommendations - Cold Weather***

It is possible to operate diesel engines in extremely cold environments. The engine should be properly prepared and maintained. The correct lubricants, fuels and coolant **MUST** be used for the cold weather range for which the motorhome is being operated. Cold weather operation can be defined in two categories: **Winter** and **Arctic**.

**WINTER (32° to -25° F) (0° to -32° C):** Use a 50% antifreeze to 50% water coolant mixture, use multi-viscosity oil meeting Cummins specifications and fuel to have maximum cloud pour points 10° F (6° C) lower than the ambient temperature in which the motorhome operates.

**ARCTIC (-25° to -65° F) (-32° to -52° C):** Use a 60% antifreeze to 40% water coolant mixture. Use oil meeting Cummins specifications and fuel to have maximum cloud pour points 10° F (6° C) lower than the ambient temperature in which the motorhome operates.



**Refer to the Operations & Maintenance Manual for more detailed information.**

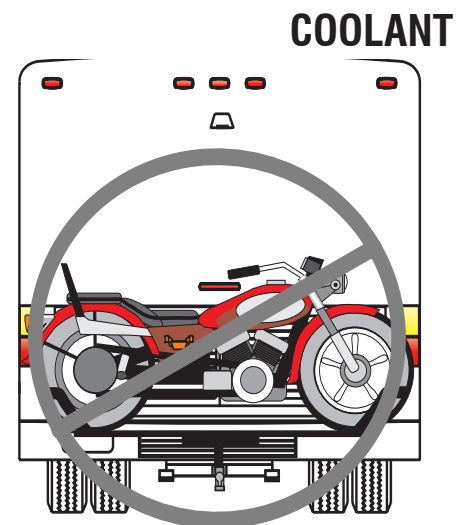
General guidelines for shutting the engine down are fairly simplistic. Allow the engine to idle three to five minutes after a full load operation. This allows adequate cool down of pistons, cylinders, bearings and turbocharger components. Under normal driving conditions, exiting the highway is generally lighter engine operation and the need for the three to five minutes is not necessary.

## ENGINE SHUTDOWN

When the motorhome has been sitting for extended periods, 30 days or more, verify all the fluid levels are correct. Follow the normal starting procedures. If the oil pressure gauge does not register within 15 seconds, shut off the engine immediately to avoid damage. Consult the Cummins Operation & Maintenance Manual for guidelines on troubleshooting low oil pressure, or contact a qualified service technician. Allow the engine to idle for three to five minutes before operating under a load.

## ENGINE SHUTDOWN -Extended

A fully formulated antifreeze or coolant containing a precharge of Supplemental Coolant Additives (SCA) is recommended. The use of either will significantly simplify coolant system maintenance. The difference between a fully formatted antifreeze and a fully formatted coolant is the percentage of water. Both contain balance amounts of antifreeze, SCA, buffering compounds and a percentage of good clean quality water. The antifreeze or coolant must meet ethylene glycol or propylene glycol recommendations. A good clean quality water in a 50/50 ratio (40 to 60% working range) mixed with fully formatted antifreeze will provide protection from -34° F to 228° F. The 50/50 mix ratio must be premixed prior to being put in the system. Placing antifreeze and water in the cooling system is not recommended. Consult the Cummins Operation & Maintenance Manual for more details.



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**NOTE:** An over concentration of antifreeze, or the use of high silicate antifreeze, can cause damage to the coolant system and engine. Antifreeze is essential in every climate.



**WARNING:** The ISC engine is equipped with an intake air heater. Use of ether starting fluids can cause an explosion!



**NOTE:** Any item on the back of the motorhome which blocks the grill opening or changes the air flow may cause an overheating condition under some circumstances.

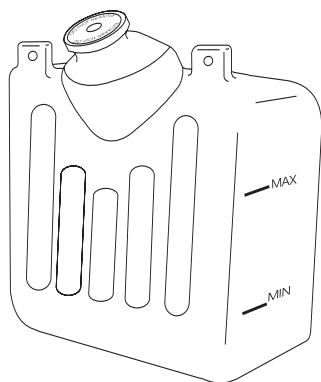
The coolant fluid freeze point should be checked with every oil change interval at 15,000 miles, 500 hours or six months, whichever comes first. Also change the coolant filter at the same interval unless SCA concentration is over three units. The coolant should be drained and flushed at 6,000 hours or two years of service, whichever comes first.

### Engine Coolant Reservoir:

A “see-through” plastic reservoir, similar to the familiar windshield washer jar, is connected to the radiator by a hose. As the motorhome is driven, coolant is heated and expands. A portion of fluid displaced by this expansion flows from the radiator into the reservoir tank. When the engine is stopped, and coolant cools and contracts, displaced coolant is drawn back in the radiator by a vacuum. Thus, the radiator is kept filled with coolant to the desired level at all times resulting in increased cooling efficiency. The coolant level should be at or above the appropriate mark on the reservoir tank when the system is cold.



**CAUTION: To avoid scalding hot steam or coolant from being released from the engine cooling system, never remove the radiator cap while the engine is running or hot. Failure to follow this warning may result in damage to the engine’s cooling system and possibly cause severe personal injury.**



The coolant capacity, when changing the antifreeze, is approximately 11½ gallons.

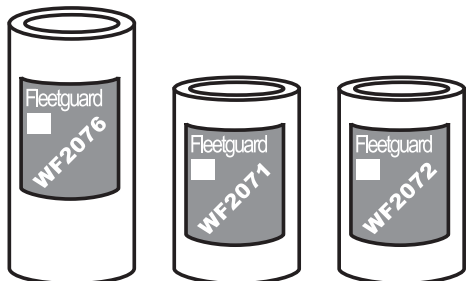
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- Check the coolant level daily or when refueling.
- Drain and flush the coolant system every 60,000 miles or two years, and refill with a heavy-duty coolant (50/50 mix of water and anti-freeze).
- If the coolant is below the MIN mark, the low coolant alarm will sound and the low coolant light will appear on the dash. You will need to stop and check for coolant loss before driving.
- The coolant level to remain between the MAX and MIN level in the reservoir.

### Routine Maintenance Recommendations:

1. Check the SCA concentration level every 15,000 miles/6 months.
2. Change the coolant filter every 15,000 miles/6 months.
3. Drain and flush the system every 240,000 miles/2 years, and refill with a heavy-duty coolant (50/50 mix of water and antifreeze).
4. Always use antifreeze. In addition to freeze protection, antifreeze is essential for overheat and corrosion protection.
5. The supplemental coolant additive (SCA) is required.
6. Freeze point should be measured every 15,000 mile/6 months.

### Coolant - Additive (SCA)



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Fully formulated products contain SCA and are required to protect the cooling system from fouling, solder blooming and general corrosion. The cooling filter is required to protect the coolant system from abrasive materials, debris and precipitated coolant additives.

Supplement coolant additives, or equivalent, are used to prevent liner pitting, corrosion and scale deposits in the cooling system. Use the correct Fleetguard coolant filter to maintain the recommended SCA concentration in the system. Maintain the correct concentration by changing the service filter at each oil drain interval.

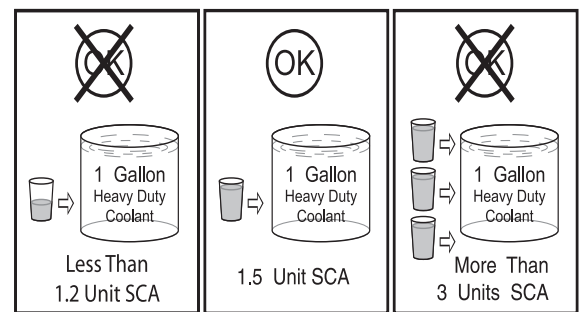


**NOTE: The correct filter is determined by the total cooling system capacity and oil drain interval. Refer to the Coolant Capacity Specifications in this section.**



**CAUTION: Insufficient concentration of the coolant additives will result in liner pitting and engine failure. The SCA concentration must not fall below 1.2 units or exceed 3 units per gallon of cooling system capacity.**

Use the correct Fleetguard coolant filter to maintain the recommended SCA concentration in the system. Maintain the correct concentration by changing the service coolant filter at each oil drain interval. The oil pressure gauge, temperature gauge, warning lamps and other safety lamps should be checked daily to ensure proper operations.



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**NOTE: The correct filter is determined by the total cooling system capacity. If you have any questions refer to the Cummins manual.**



**NOTE: The engine does not require a “break-in” procedure.**

Rotten, swollen and worn hoses, as well as loose connections, are frequent causes of coolant system problems. Overheating can be caused by an collapsed hose or a clog caused by rubber shedding from a rotten hose. Replace any hose found to be cracked, swollen or damaged. Connections should be inspected periodically and hose clamps tightened.

## Coolant Hoses

If the coolant system becomes frozen solid, place the motorhome in a warm area until the ice is completely thawed. At this point the motorhome must be towed. If the engine is operated when the cooling system is frozen it will result in engine overheating due to insufficient coolant.

Once thawed, check engine, radiator and related components for damage caused by expansion of frozen coolant.

If the engine is overheated, never pour cold coolant into a hot engine. The sudden change in temperature may crack the cylinder head or block. If the engine is hot, fill slowly to prevent rapid cooling and distortion of engine castings.

## Coolant System - Thawing

## **BRAKE - AUXILIARY**

Auxiliary braking devices are designed to supplement a standard wheel braking system. These devices are not designed to bring the motorhome to a complete stop; however, they can assist in controlling the speed of the motorhome. Proper use of the auxiliary braking device can save on costly service brake repairs.

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## **BRAKE - EXHAUST**

The exhaust retarder is an auxiliary braking device which is attached directly to the engine turbocharger. The exhaust brake is operated by either a dash switch or a foot operated switch. The dash mounted switch will operate the exhaust brake when dash switch is **ON** and the throttle is **RELEASED**. If the motorhome has a foot operated exhaust brake switch it will not disengage the cruise control. Application of the service brake is required to disengage the cruise control. When the exhaust brake is activated a flapper inside the exhaust brake moves and restricts the flow of exhaust gases and causes an increase of exhaust pressure within the engine.

The increased back pressure quickly slows the engine speed, resulting in powerful engine braking action. When the exhaust brake is activated, the amount of engine braking power developed is related to engine speed (RPM). When a exhaust brake application is made, the engine braking effect increases with higher engine RPM. When the exhaust brake is activated going down a hill, the exhaust brake will help control road speed or slow down the motorhome's road speed until the Allison Transmission automatically downshifts to the next lower gear. Downshifting automatically occurs from high gear down through second gear. Certain road conditions and engine speeds may require the transmission be manually down shifted in order to generate adequate engine RPM and increase the engine brake effect.

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## **Exhaust Brake Maintenance**

The Exhaust Brake system, used routinely at normal exhaust operating temperatures, is virtually maintenance free. Some contributing causes which can result in failures with the exhaust brake include moisture, dirt, carbon and improper usage.

Starting the engine and idling for short periods of time is not recommended. Moisture is created within the engine and the exhaust system during cold startups. When normal operating temperatures are not obtained, moisture may get trapped in the valve housing resulting in rust, leading to insufficient operation of the exhaust brake.

Some problems you may encounter with the exhaust brake include, but are not limited to, will not activate or deactivate, intermittent on/off operations or actuates with the switch off. These are commonly related to electrical symptoms. Slow operations or delays in operations, as well as limited performance, are mechanical symptoms. Refer these problems to your dealer for diagnosis.



## TRANSMISSION - Shift Selector

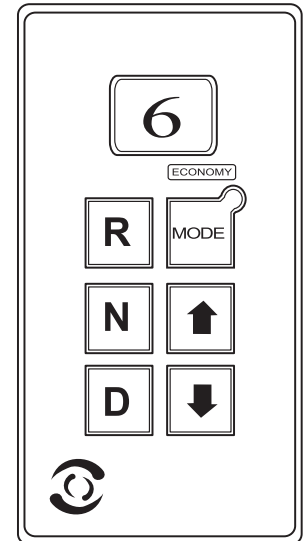
The Allison World transmission incorporates the World Transmission Electronic Control (WTEC) system. The system is comprised of five major components connected by a wiring harness: the electronic control unit (ECU), engine throttle position sensor, three speed sensors, remote shift selector (keypad) and the control module. The ECU processes information received from the throttle position sensor, speed sensor, pressure switch and shift selector to activate solenoids on the control module in the transmission. The solenoids control oncoming and off going clutch pressure to provide closed loop shift control. This is accomplished by matching RPM during a shift to an established desired profile within the ECU.

The system is monitored within the first 30 seconds of each engine start. This is referred to as “autodetect.” Autodetect searches for presence of data inputs or transmission components. The autodetect enables the ECU functional or diagnostic response to the items which are detected.

Another feature of the transmission is the ability to “learn” or “adapt.” The electronic control system optimizes shift quality by using “Adaptive Shifting.” A wide variety in shifting under varied conditions will be required before optimizing the shift quality. Generally, five typical shifts of a shift type is needed for shift calibration.

The range selection is accomplished via the remote pushbutton selector. The selector is simplistic in appearance. The controls are **R**, **N**, **D**, arrow **UP**, arrow **DOWN**, **MODE** buttons and a digital display window. Under normal operations the “**D**” button is pressed and the digital display shows the highest forward range attainable for the shift selection in use. The digital display window will also indicate codes for abnormal conditions, and can even be a useful troubleshooting aid. When the ignition is turned ON, the display should be visible. This display indicates the presence of neutral start command. If this display indication is not visible, there is no power to the selector and may indicate electrical problems with the batteries.

- Digital display window enables information requested to be easily read.
- Select the **REVERSE** gear by pressing “**R**”.
- Select **NEUTRAL** by pressing “**N**”. The area around the “**N**” button is a raised ridge so the driver can orient his hand to the push buttons by touch, without looking at the display.
- Select **DRIVE** range by pressing “**D**”. The highest forward gear appears on the **SELECT** display and the transmission will shift to the starting gear.



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- The **UPSHIFT** and **DOWNSHIFT** arrow buttons are used to select a higher (if not in “**D**”) or lower (if not in “**1**”) forward range. These buttons are not functional in **NEUTRAL** or **REVERSE**. One press changes the range selected by one range. If the button is held continuously, the selected range will continue to change up or down until the button is released or until the highest/lowest possible range of gears is selected.
- The **MODE** button enables a secondary shift point to be selected. This is commonly referred to as “Economy.” It is further used by the service technician to access diagnostic codes when troubleshooting. The diagnostic circuitry must be enabled to display.
- When the Auxiliary Braking device is used, the display changes to a default reading of two or three. This default is pre-selected at the factory and can only be reprogrammed by an authorized Allison Service Center. The transmission is not in second or third gear. This is only the reference for the RPM shift points to optimize the braking capacity.

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## Transmission - Check Light

The electronic control system is programmed to inform the operator of a problem with the transmission system and automatically take action to protect the operator, motorhome and transmission. When the Electronic Control Unit (ECU) detects a **DO NOT SHIFT** (DNS) condition the ECU restricts shifting, turns the **CHECK TRANS** light on the instrument panel and registers a diagnostic code.



**NOTE: For some problems, diagnostic codes may be registered without the ECU activating the CHECK TRANS light. An Allison Transmission authorized service outlet should be consulted whenever there is a transmission related concern. They have the equipment to check for diagnostic codes and to correct problems which arise.**

Each time the engine is started the **CHECK TRANS** will light, then turn off after a few seconds. This momentary lighting is to show that the status light circuits are working properly. If the **CHECK TRANS** light does not illuminate during start up, or if the light remains on after start up, the system should be checked immediately.

Continued illumination of the **CHECK TRANS** light during vehicle operation (other than start up) indicates that the ECU has signaled a diagnostic code. Illumination of the **CHECK TRANS** light is accompanied by a flashing display from the shift selector. The shift selector display will show actual range attained and the transmission will not respond to shift selector requests.



Indications from the shift selector are provided to inform the operator that the transmission is not performing as designed and is operating with reduced capabilities. Before turning the ignition off, the transmission may be operated for a short time in the selected range in order to “limp home” for service assistance. Service should be performed immediately in order to minimize potential for damage to the transmission.

When the **CHECK TRANS** light comes on, and the ignition switch is turned off, the transmission will remain in **N** (Neutral) until the condition causing the **CHECK TRANS** light is corrected. Generally, while the **CHECK TRANS** light is on, upshifts and downshifts will be restricted and direction changes will not occur. Lever and push-button shift selectors do not respond to any operator shift request while the **CHECK TRANS** light is illuminated. The lockup clutch is disengaged when transmission shifting is restricted, or during any critical transmission malfunction.

### **Diagnostic Codes:**

The diagnostic codes are numerical representations of malfunctions in the transmission operations. Each code is a two digit main code and a two digit sub code. The codes, when detected, are logged in the ECU memory. These codes will fall in two classes: active and inactive. Active codes are codes currently effecting the ECU process. Inactive codes are retained but may not effect the ECU process. The diagnostic mode must be entered. A maximum of five codes, **D1** to **D5**, may be listed at one time. The highest priority code will be listed in **D1**. The **MODE** button will enable selection of sequential codes.

- Enable Diagnostic Code Selection Display.
- Stop the motorhome at a safe location.
- Apply the parking brake.
- Simultaneously press the **UP** and **DOWN** arrows twice to enter the stored codes. The first time the arrows are pressed will indicate the oil level sensor information.
- The codes will display one digit at a time.
- The mode button is pressed to scroll through the codes.
- Any code obtained should be noted and reported to an Allison Service Center for evaluation and possible repair.
- Inactive codes can be cleared by holding the **MODE** button for approximately three seconds. Some codes are self clearing while others will require service or ignition cycles to clear.

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The Allison MH Series requires minimum maintenance. Careful attention to the fluid level and the connections for the electronic and hydraulic circuits is very important.

***Transmission  
- Periodic  
Inspections***

For easier inspection the transmission should be kept clean. Make periodic checks for loose bolts and leaking fluid lines. Check the condition of the electrical harnesses regularly. Check the engine cooling system occasionally for evidence of transmission fluid which would indicate a faulty oil cooler. Report any abnormal condition to an Allison dealer.

#### **Prevent Major Problems:**

Help the WTEC III control system oversee the operation of the transmission. Minor problems can be kept from becoming major problems if an Allison Transmission distributor or dealer is notified when one of these conditions occur:

1. The shifting feels odd.
2. The transmission leaks fluid.
3. There are unusual transmission-related sounds (changes in sound caused by normal engine thermostatic fan cycling, while climbing a long grade with a heavy load, have been mistaken for transmission-related sounds).
4. The **CHECK TRANS** light comes on frequently.

#### **The Importance of Proper Fluid Levels:**

The transmission fluid cools, lubricates and transmits hydraulic power. Proper fluid levels must be maintained at all times. If the fluid level is too low, the converter and clutches do not receive an adequate supply of fluid. If the fluid level is too high, the fluid can aerate. Aerated fluid can cause the transmission to shift erratically or overheat.

The MH Series oil level sensor (OLS) allows the operator to obtain an indication of sensor fluid level from the keypad shift selector. Frequently check for the presence of oil level diagnostics in the transmission. If the OLS has not been detected, troubleshooting of the OLS circuit is required. This will have to be performed by an Allison Service Center. After the OLS circuit is repaired, ensure that reset of the “autodetect” or manual selection of the OLS function, using the Pro-Link, has been accomplished.

#### **Fluid Level Check with the Keypad:**

- Park the motorhome on a level surface, place the transmission in “N” and set parking brake.
- The transmission should be at normal operating temperature.
- The motorhome should be stationary for approximately two minutes to ensure fluid is stabilized.
- Simultaneously press the arrow up and arrow down buttons one time.

- The delayed fluid level check will display in the digital display window. The display will be one character at a time. The “o,L” represents oil level check mode. This will be followed with fluid level indication readings. The “o,K” indicates a correct fluid level. Reading between the OLS and the dipstick may not agree because the OLS compensates for fluid temperatures. Abnormal indications of the OLS will be “Lo” representing a low fluid level, “HI” for a high fluid level or “oL” for invalid information and system problems. All indications will be followed by numeric values. The “Lo” and “HI” followed by the numeric value represents the quarts of fluid required for the system. The invalid code numbers represent specific symptoms.

#### Common Oil Level Fault Codes:

- 0,5 settling time too short.
- 5,0 speed RPM too low.
- 5,9 speed RPM too high.
- 7,0 sump temperature too low.
- 7,9 sump temperature too high.
- 9,5 OLS FAILURE.



**NOTE: Exit the fluid level display by pressing any range button on the keypad.**



**NOTE: To correctly check the transmission fluid level using the dipstick, the transmission fluid must be at operating temperature. The oil level sensor method of checking the fluid level compensates for transmission fluid temperature between 60° C - 104° C (140° F - 220° F). Any temperature below 60° C (140° F), or above 104° C (220° F), will result in an Invalid for Display condition.**

Any fluid meeting Dexron-III specifications are acceptable for use in the transmission. Transmission performance, reliability and durability are important influences in the type of fluids used. Change the fluid internal filters after the first 8,000 km (5,000 miles). The dipstick/oil fill is located between the engine and transmission underneath the engine access door in the bedroom. Change the transmission fluid and internal filters every 40,000 km (25,000 miles) or 18 months, whichever occurs first.

#### Fluid and Internal Filters Change Interval Recommendations:

The fluid and internal filters may require changing earlier depending on the severity of operating conditions. The fluid must also be changed whenever there is evidence of dirt or high temperature conditions as indicated by discoloration, strong odor or fluid analysis. Local conditions, severity of operation or duty cycle will dictate more or less frequent service intervals.

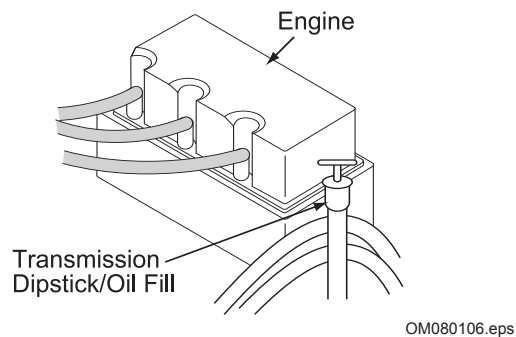
**TRANSMISSION  
LUBRICATING  
FLUID**

## Transmission Fluid Levels - Cold Check

### Cold Check - Manual Check Procedures:

The concept of a cold check is to determine adequate fluid level for safe operation until hot check can be performed.

- Park the motorhome on a level surface using the service brakes.
- The engine is operated at a low idle. Put the transmission in **N** (Neutral).
- Apply the parking brake and chock the wheels to prevent the motorhome from moving.
- Allow the engine to run at idle (500-800 rpm) for one minute.
- Apply the service brakes and shift to **D** (Drive), then to **N** (Neutral) and next to **R** (Reverse) to fill the system. Finally shift to **N** (Neutral) and release the service brakes. Allow the engine to continue to run at idle (500-800 rpm).
- Remove the dipstick and wipe clean. Reinsert the dipstick fully into the tube and remove to check fluid level. Repeat this to verify the reading if needed.
- Safe operating level is anywhere within the **COLD CHECK** band on the dipstick. The fluid level is sufficient enough to operate until a **HOT CHECK** can be run.
- If the level is not within this band, add or drain the fluid as necessary to bring the level to the middle of the **COLD CHECK** band.
- Perform the **HOT CHECK** the first opportunity after reaching normal operating temperatures (160° - 200° F/71° - 93° C).



Transmission Oil Level Dipstick.



**CAUTION: Low or high fluid level can cause overheating and irregular shift patterns. These conditions can damage the transmission if not corrected.**

**Transmission Fluid  
Levels - Hot Check**

- The fluid level rises as the temperature increases. The fluid must be hot to ensure an accurate check.
- Be sure the fluid has reached normal operating temperature (160° - 200° F/71° - 93° C). If a transmission temperature gauge is not present, check the fluid level when the engine water temperature gauge has stabilized and the transmission has been operated under the load for at least one hour.
- Park the motorhome on a level surface and shift to **N** (Neutral). Apply the parking brake and allow the engine to idle (500-800 rpm).
- After wiping the dipstick clean, check the fluid level. Safe operating level is anywhere within the **HOT RUN** band on the dipstick.
- The width of the **HOT RUN** band is approximately one quart of fluid at normal temperature range.
- If the level is not within this band, add or drain the fluid as necessary to bring the level within the **HOT RUN** band.
- Be sure that the fluid level checks are consistent. Check the level more than once. If the readings are not consistent check to be sure that the transmission breather is clean and not clogged. If the readings are still not consistent, contact the nearest Allison distributor or dealer.

Low sulphur #2 diesel fuel or #1 and #2 commercial winter blend diesel fuels are the most common commercially available and recommended for use. The Cummins Engine Company Inc. recommends the use ASTM #2D fuel. The use of #2 diesel fuel will result in optimum engine performance.

**FUEL  
SYSTEM**

**WARNING: Do not mix gasohol with diesel fuel. This mixture can cause an explosion.**



**NOTE: Due to the precise tolerances of diesel injection systems, it is extremely important that fuel be kept clean and free of dirt or water. Dirt or water in the system can cause severe damage to both the fuel pump and the fuel injector. Fuel additives for lubricity are not recommended. There are numerous diesel fuel additives to help remove moisture from fuel, prevent microbe growth and to prevent freeze-up during cold weather. Any fuel additives product should show supporting data for performance and benefits. Engine failures caused by incorrect fuel are not covered under warranty.**

## FUEL TANK

The diesel fuel tank is made of a 12 gauge aluminumized steel. The capacity of the tank is 100 gallons. The engine pickup tube is cut at a 45° angle to allow optimum flow to the engine.

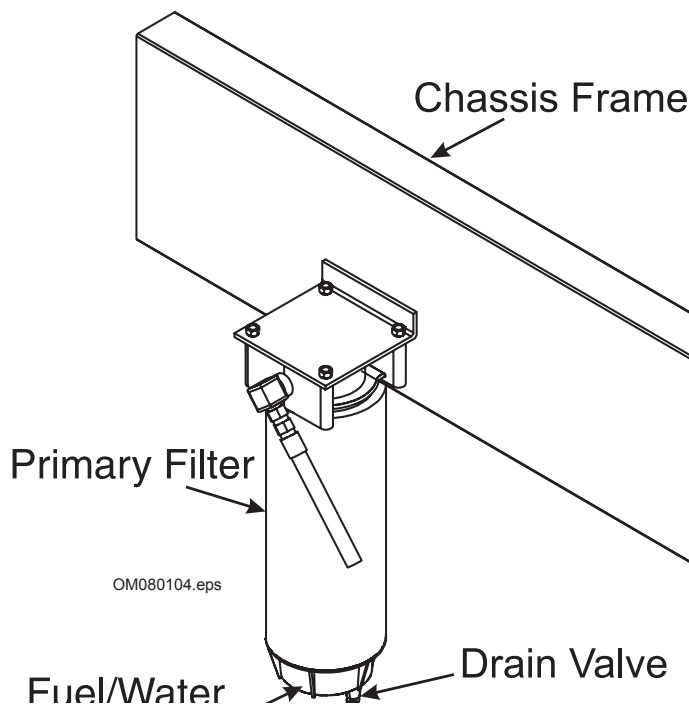


**NOTE: If the coach has been stored for any length of time you should check the vent for blockage. It is not uncommon for insects to plug the vent tube. If the tank appears to be pressurized the vent tube may be blocked. To inspect the vent tube check on the roadside of the fuel tank, near the bottom. Always store the motorhome with a full fuel tank.**

### Routine Maintenance Recommendations:

1. Change the fuel filter at every oil change interval.
2. Change the fuel-water separator filter every 12-18 months or every 25,000 miles.

## FUEL/WATER SEPARATOR



Fuel/Water separator is located in the roadside compartment behind rear wheel. If the **WATER IN FUEL** light is illuminated, the fuel filter will need to be drained. Shut off the engine and open the drain valve. Turn the valve counterclockwise approximately 1½ to 2 turns until draining occurs. Drain the fuel/water separator of water and sediment until clear fuel is visible. Turn the valve clockwise to close the drain valve.

In the event the engine runs out of fuel, the lift pump on the fuel pump will run for approximately one minute with the ignition ON. The ignition may have to be turned on and off several times before attempting a start. If unable to restart, contact the nearest Cummins Center or phone **1-800-343-7357** for Cummins Customer Assistance Center.

## FUEL SENDING UNIT

The Centroid fuel sender has no moving parts. It works by measuring capacitance, an electrical property, between its inner and outer tubes in the tank. The more fuel between the tubes, the higher the reading. Electronics in the hockey-puck head of the sender convert the capacitance to current to drive the fuel gauge.

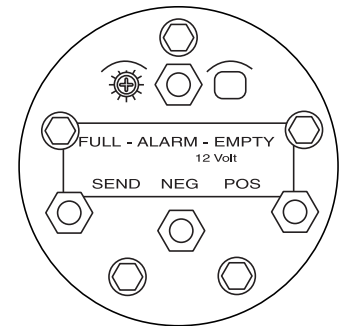
**Connections: The Centroid sender has four connections:**

- **Positive and Negative:** Battery voltage to run the electronics in the sender head.
- **Send:** Connects to the Send terminal of the gauge on the dash.
- **Alarm:** Makes a connection internally to the Negative terminal when the low alarm fuel level is reached (when gauge is reading about 1/8 tank). This turns on the alarm light on the dash. It is not adjustable.

**Adjustments: The Centroid sender has two adjustments:**

- **Empty:** Adjusts for length of sender. It has been set at the factory and covered with a sealant. It should not be changed.
- **Full Adjustment:** The full adjustment can be used to correct for slight differences between fuel meters. During installation, it has been calibrated for your meter and should not need readjustment.

The correct adjustment technique, with a full tank of fuel, is to start with the full adjustment screw completely clockwise. This should cause the reading to be above full. Then adjust slowly counterclockwise until the full mark is reached. The intent is to always adjust downscale rather than upscale.



Fuel Sending Unit.

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**Troubleshooting:**

- Electronic output:** The sender has a transistorized output. This prevents an ohmmeter from getting a correct reading of its output resistance.
- Fuel Only:** The sender will not work correctly in conducting fluids such as water (it will read above full all the time in water). One possibility is that when there is a constant above-full reading there may be water in the bottom of the fuel tank.
- Contact Centroid:** Probably 90% of the return Centroid tests work okay on the bench. If you have incorrect readings contact Centroid (telephone: 800-423-3574 or, preferably, fax: 904-423-3709) with the symptoms. A short, "fill in the blanks" troubleshooting test is provided, appropriate to the sender. It is easier to find the problem that way than after the sender has been removed from the system, since the problem is not necessarily with the sender.

Make a visual check for fuel leaks at all engine-mounted fuel lines and connections and at the fuel tank suction and return lines. Leaks in this area may best be detected by checking for accumulation of fuel under the tank. Engine performance and auxiliary equipment is dependent upon the ability of flexible hoses to transfer lubricating oil, air, coolant and fuel oil. Diligent maintenance of hoses is an important step in ensuring efficient, economical and safe operation of engine and related equipment.

**Fuel Lines & Hoses**



Check hoses daily as part of the pre-start-up inspection. Examine hoses for leaks. Check all fittings, clamps and ties carefully. Make sure that the hoses are not touching shafts, coupling and heated surfaces, including exhaust manifolds, sharp edges or other obviously hazardous areas. Since all machinery vibrates and moves to a certain extent, clamps and ties can fatigue with age. To ensure continued proper support, inspect fasteners frequently and tighten or replace them as necessary.

Engine oil levels above the dipstick full mark or a decrease in lube oil consumption may indicate internal fuel leaks into the crankcase. Check oil level frequently for fuel contamination.

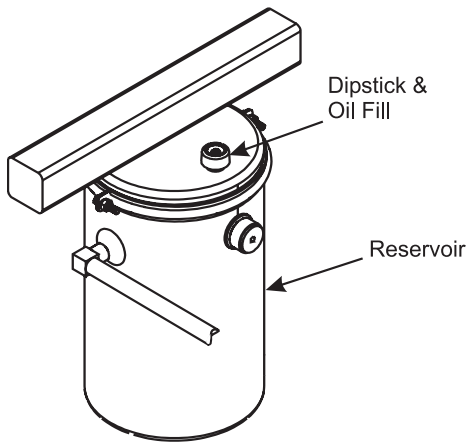
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## HYDRAULIC SYSTEM (ISC)

On a walk around and pre-check of the motorhome, look for oil leaks under the coach and around hose fittings. If a hose connection appears to be leaking, clean the filter and the surrounding area. If the seepage continues, have the problem corrected to prevent an untimely failure.

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### Hydraulic Reservoir



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The power steering reservoir with internal filter is located in rear engine compartment. The hydraulic filter assembly is located inside the reservoir. It is rated at ten micron\*. The reservoir is filled with *Dexron III* Automatic Transmission Fluid from the factory.

**Filter assembly: Nelson 910048A**  
**Element number: 83213D (ten micron)**

**\*One micron is one millionth of one meter.**

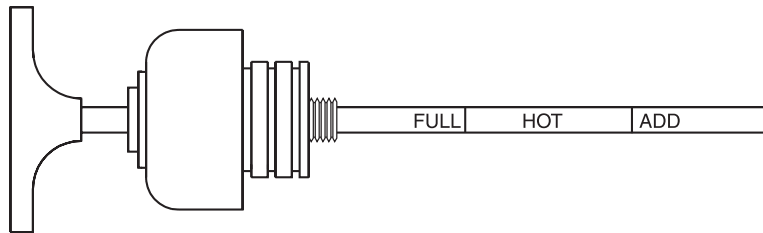
The primary function of the power steering reservoir is to keep the steering system free of contamination and to dissipate excessive heat that builds during extreme operating conditions.

Check the oil level in the reservoir every 6,000 miles or three months. The oil dipstick fill is located on top of the reservoir in the rear compartment. The oil level should be kept between the full and add marks on the dipstick. If adding of fluid is required, use only *Dexron III* Automatic Transmission Fluid.



### Checking the Fluid Level:

1. Start the engine and allow it to reach normal operating temperature.
2. While the engine is at idle, turn the steering wheel left and right several times.
3. Shut the engine off.
4. The easy grip handle is rotated counterclockwise to remove the dipstick.
5. Check the fluid level on the "**HOT**" side of the dipstick. It should be in the area of "**HOT**" on the dipstick. This is the normal range for the dipstick. Do not exceed the full mark.
6. If the fluid level is low, add fluid in small amounts continuously checking the level until the "**FULL**" mark is reached.
7. Insert the easy grip handle back in the reservoir and rotate clockwise until securely fastened.



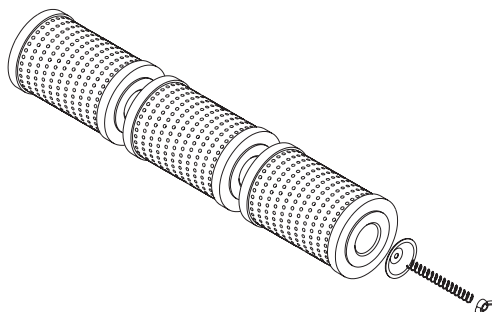
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Change the hydraulic oil filter every 15,000 miles, or once a year for cellulose element. A synthetic media filter is available, which will extend the interval to once every five years.

### Hydraulic Filter

#### Changing the hydraulic oil filter:

1. Using a 15/16 inch wrench, loosen the center cover bolt.
2. Remove the bolt and cover plate to access the spring and filter.
3. Remove the spring and washer to remove the filter assembly.
4. After replacing the filter assembly, reverse the process to re-assemble the reservoir.
5. When attaching the cover plate in the rubber cover seal, check for any damage.



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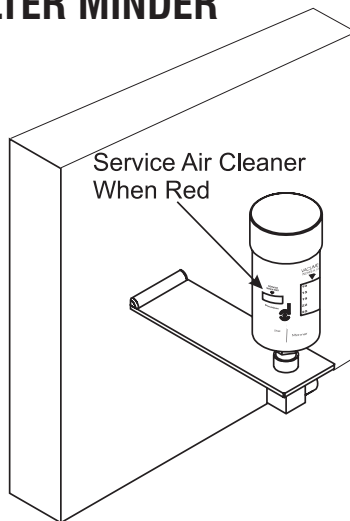
## STEERING GEAR

The M-100 series Sheppard steering gear requires no maintenance. Power steering is provided by using hydraulic pressure to assist rotating the output shaft of the steering gear.

Located at the end of the input shaft of the steering gear is poppet valve and worm drive. The poppet valve directs the hydraulic fluid pressure to a type of spool. There are worm drive threads in the center of the spool. When in the center position, pressurized hydraulic fluid bypasses the spool. When a turn is made, the poppet valve shifts to one direction or the other, directing the hydraulic pressure to one side of the spool depending on turning direction. The hydraulic fluid is then cooled before returning to the reservoir.

Inspect for signs of leakage when performing fluid level checks. Changing the hydraulic filter at regular intervals will help ensure trouble free operation.

## AIR FILTER MINDER



om080105.eps

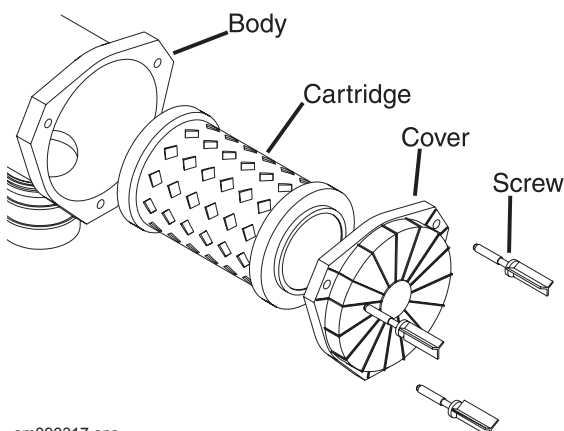
Located in the engine compartment.

The air filter minder is a precision overflow restriction gauge designed to take the guesswork out of air cleaner replacement.

The air filter minder is located in the engine rear compartment. Its operation is simple and virtually foolproof. As dirt captured by filter cartridge slowly builds up the system pressure drop increases and is indicated by the filter minder on an easy to read scale. The indicator locks up at the point of maximum restriction so readings can be taken with or without the engine running.

When the desired change-out point is reached, the air filter should be replaced and the service indicator is easily reset by pushing the button at the bottom of the minder.

## AIR FILTER - CHANGING



om090317.eps

To replace air cleaner remove three screws and cover from air cleaner body. Remove air cleaner cartridge and discard. Install new air cleaner cartridge and secure with cover and three screws.



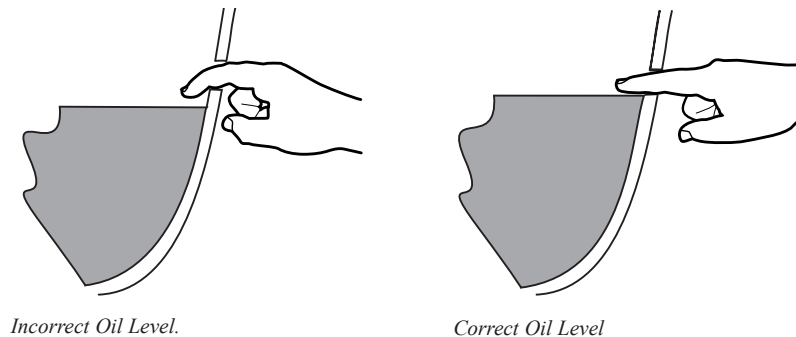
**WARNING: Do not start the engine with the air cleaner removed and do not remove it while the engine is running.**

**DRIVE AXLE  
LUBRICANT****Proper Drive Axle Lubricant Level:**

- Regular inspection of the drive axle lube levels is an essential maintenance procedure.
- The lubricant should be level with bottom of the hole.
- Important: The lube level close enough to the hole to be seen or touched is not sufficient. The lube must be level with the hole.
- The differential is filled with API GL-5 or MT-1 type gear lubricant, Pennzoil Gear Plus Super-EW 75w-90.



**NOTE: When checking the lube level also check the housing breathers. Clean the breathers if dirty or replace them if damaged.**



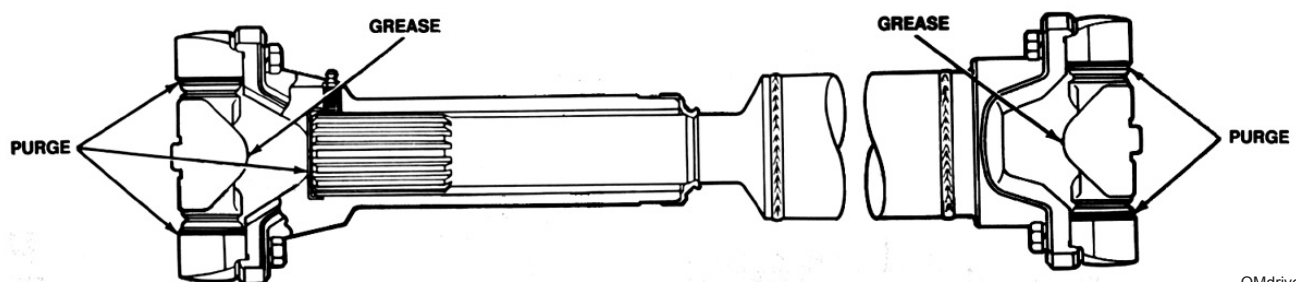
OM09064.EPS

**Greasing the Driveline Universal Joint:****DRIVELINE**

1. Check the driveline for looseness. If loose, service as necessary.
2. Apply the specified grease at the grease fitting on the universal joint. Apply grease until the new grease purges from all the seals.
3. If the new grease does not purge at the seals loosen the bearing cap bolts and regrease until all four caps purge. If the new grease still does not purge replace the universal joint.

**Greasing the Driveline Slip Yoke and Splines:**

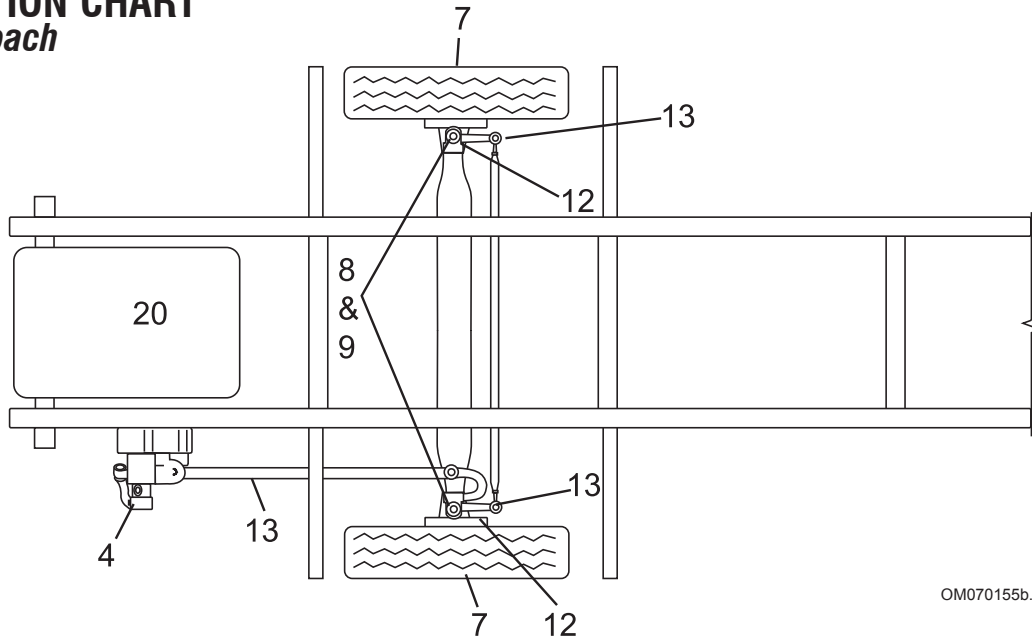
1. Check the driveline for looseness. If loose, service the driveline as necessary.
2. Cover the air hole so that grease can flow easily to the seal. Apply the specified grease at the grease fitting on the slip yoke. Apply grease until new grease purges from the air hole in the end of the slip yoke. Greasing Intervals-10,000 miles or annually.



OMdrive line.eps

## LUBRICATION CHART

### Front of Coach



OM070155b.eps

### Lubrication Chart:

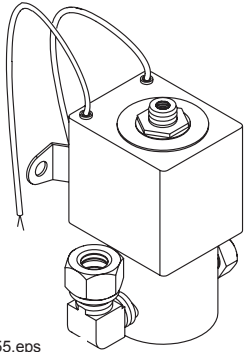
Service must be performed every twelve (12) months, regardless of actual mileage, to protect seals, bearings and gaskets from drying out and failing. The motorhome must be started and driven for at least 20 miles bimonthly.

1	Engine Oil Fill/Dip Stick	Keep To Full Mark	Check Daily	EO
2	Engine Oil Filter	Replace At Oil Change	Refer to Cummins	OP
3	Transmission	Refer To Service Manual	Check Daily	TF
4	Steering Shaft (Inside Coach)	3 Fittings	30,000 or Annually	CL-4
5	Drive. Shaft U-Joints	2 Fittings	10,000 or Annually	CL
6	Drive Shaft Slip Joint	1 Fitting	10,000 or Annually	CL
7	Wheel Bearings	Repack	30,000 or Annually	HT
8	Brake Cam Shaft	One Fitting Each Wheel	30,000 or Annually	CL
9	Brake Adjuster	One Fitting Each Wheel	30,000 or Annually	CL
10	Battery Terminals	Apply Coating	10,000 or Annually	P
11	Rear Axle Differential	To Filler Plug	250,000 or Every 3 Years	MP
12	King Pins & Knuckles	2 Fitting Each End	30,000 or Annually	CL
13	Drag Link/Tie Rod	4 Fittings	30,000 or Annually	CL
14	Hydraulic Fluid Reservoir	Keep To Full Mark	Check Daily	TF
15	Hydraulic Fluid Filter (if applicable)	Replace	15,000 or Annually	TF
16	Fuel Filter (Primary)	Replace	At oil change	FF
17	Engine Coolant Capacity	Replace	Every 2 Years	AF
18	Leveler Reservoir	Replace	Every 36 Months	TF
19	Generator Set	Refer To Service Manual	Refer to Onan	EO
20	Coolant Filter	Replace	At oil change	OP
21	Fuel Filter (Secondary)	Replace	At oil change	FF
22	Air Cleaner	Replace	When Indicated by Restrictor	OP
23	Air Cleaner Restrictor	Check Daily	When Red Replace Air Cleaner	OP
24	Air Dryer Filter	Replace	Check Monthly	OP



CL-4	U-Joints located inside the coach under the steering cover
EO	Engine oil as recommended by engine manufacturer
OP	Refer to operators manual
MP	AP GL-5 or MT-1 type gear lubricant - Penzoil Gear Plus SUPER-ew 75w-90, Synthetic
HT	High temperature bearing grease
CL-4	Chassis lubricant should be a high quality noncorrosive multipurpose lithium soap pressure gun lubricant that is water resistant and designed to withstand extremely high operating temperatures
P	Petroleum jelly, or a commercial battery terminal corrosion inhibitor
AF	Consult Cummins Owners manual for antifreeze type
TF	Transmission fluid. Use Dexron III transmission fluid only
FF	Fuel Filter

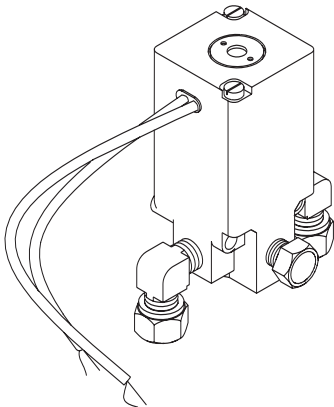
## PARTS - COMMON SOLENOIDS & SENDERS



OM090255.eps

### Rear Bag Dump Solenoid:

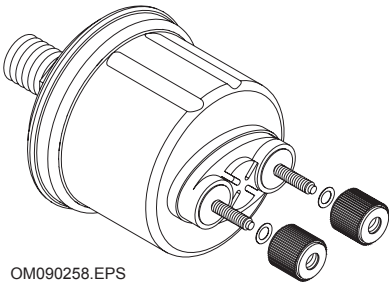
- Used on hydraulic level and air level systems.
- Dumps air in air bags on hydraulic level units and is used to dump air from tag axle on air level units.
- Located in the engine compartment on the roadside, attached to frame below alternator.
- Type- Allen Air 36BXA-HB



OM090254.eps

### Front Bag Dump or Tag Axle Solenoids:

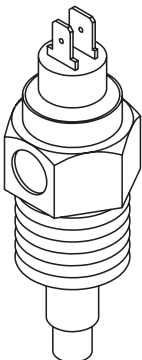
- Used on hydraulic level and tag axle units.
- Dumps air in front air bags and is used to raise or lower tag axle.
- Located in the generator compartment on the curbside.
- Type- MAC 225B-601BAAA



OM090258.EPS

### Oil pressure Sending Unit:

- One post is used for the oil pressure gauge and one post is for the warning light.
- Type- VDO 360 0238NDO 0-100 Ohm



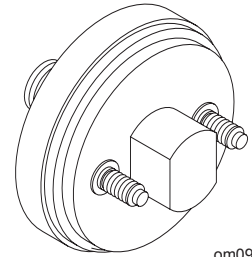
om090259.EPS

### Water Temperature Sending Unit:

- One post is used for the water temperature gauge and one post is used for the warning light.
- Type- VDO 323 0998

**Low Air Switch:**

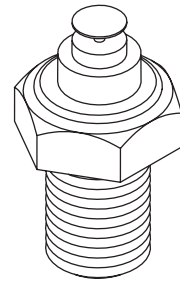
- 1/8-27 NPT thread.
- Normally closed until approximately 65 psi.
- Located behind dash panel.
- Type- Merritor Wabco 89404 16062



om090253.EPS

**Transmission Sending Unit:**

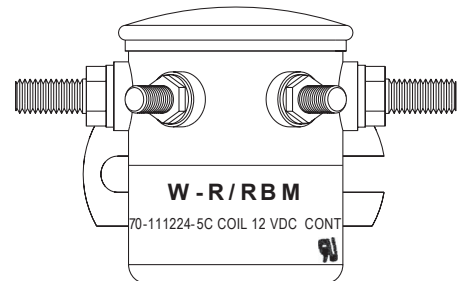
- Located on the bottom of the tailshaft housing, between hoses.
- Type- VDO 323 0868



om090260.EPS

**House Disconnect and Starter Solenoid:**

- Solenoid interfaces start signal to Cummins starter.
- Solenoid interrupts DC power to the house fuse panel.
- Four post solenoid with isolated coil.
- Located in high and low current plates.
- MP # 8206



om090313.EPS

## CHART - FILTERS & BELTS

FILTER & BELT	MANUFACTURER	ISC330
Coolant Filter	Fleetguard	WF2071
Oil Filter	Fleetguard	LF 3000
Fuel Filer Primary	Raycor	S 3201 T
Fuel Filter Secondary	Fleetguard	FS 1022
Hydraulic Filter	Parker	INHC 5710
Alternator Belt	Dayco	3911581
AC Belt	Dayco	17475
Air Filter	Donaldson	EBA09-2037



**NOTE:** Filter and belt numbers were correct at the time of printing. Verify the numbers at time of removal. The manufacturer will not be responsible for incorrect filter or belt usage. Please refer to the engine manufacturer's operating instructions for specific maintenance information.

## CHART - SPECIFICATIONS

SPECIFICATIONS									
MODELS	34PBD	36PBD	38PBD	38PBDD	38PBT	40PBD	40PBDD	40PWD	40PBT
GVWR	31,000 lbs.	31,000 lbs.	31,000 lbs.	31,000 lbs.	31,000 lbs.	31,000 lbs.	31,000 lbs.	31,000 lbs.	31,000 lbs.
GCWR	41,000 lbs.	41,000 lbs.	41,000 lbs.	41,000 lbs.	41,000 lbs.	41,000 lbs.	41,000 lbs.	41,000 lbs.	41,000 lbs.
GAWR (Front)	11,000 lbs.	11,000 lbs.	11,000 lbs.	11,000 lbs.	11,000 lbs.	11,000 lbs.	11,000 lbs.	11,000 lbs.	11,000 lbs.
GAWR (Rear)	20,000 lbs.	20,000 lbs.	20,000 lbs.	20,000 lbs.	20,000 lbs.	20,000 lbs.	20,000 lbs.	20,000 lbs.	20,000 lbs.

*These charts reflect 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.*

MEASUREMENTS									
MODELS	34PBD	36PBD	38PBD	38PBDD	38PBT	40PBD	40PBDD	40PWD	40PBT
Wheelbase	196"	216"	242"	242"	242"	256"	256"	256"	256"
Overall Length	34'8"	36'4"	38'6"	38'6"	38'6"	39'8"	39'8"	39'8"	39'8"
Overall Height	12'0"	12'0"	12'0"	12'0"	12'0"	12'0"	12'0"	12'0"	12'0"
Interior Height	6'6"	6'6"	6'6"	6'6"	6'6"	6'6"	6'6"	6'6"	6'6"
Interior Width	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"	94.5"
Exterior Width (100.5" floor)	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"	100.5"

*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.*



<b>ENGINE SPECIFICATIONS CUMMINS ENGINE - I.S.C. 330</b>	
Engine Size/Cummins	8.3 Liter
Allison Transmission	MH 3000
Torque (LBS. - ft. Max. Net at 1,400 RPM) - 330	950
Torque (LBS. - ft. Max. Net at 1,400 RPM) - 350	1050
Cubic Inch Displacement - 330 HP	504.5
Cubic Inch Displacement - 350 HP	505.5
Alternator/Leece Neville	160 amp
Rear Axle Ratio	4.30:1
Tire Size/Goodyear	275/7022.5

<b>SPECIFICATIONS</b>									
<b>MODELS</b>	<b>34PBD</b>	<b>36PBD</b>	<b>38PBD</b>	<b>38PBDD</b>	<b>38PBT</b>	<b>40PBD</b>	<b>40PBDD</b>	<b>40PWD</b>	<b>40PBT</b>
Water Heater	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.	10 gal.
Grey Tank	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.
Black Tank	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.	39 gal.
Fresh Tank	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.
Fuel Tank	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.	100 gal.
LP Tank*	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.	38 gal.

*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.*

## CHART - METRIC CONVERSION

U.S. Customary to Metric			Metric to US Customary			
Measurement	Multiplied By	Equals/Measurement	Multiplied By	Equals		
<b><u>Length</u></b>						
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	kilometers (km)	1.094	yards (yd)		
miles (mi)	1.609		0.6215	miles (mi)		
<b><u>Area</u></b>						
square inches (in <sup>2</sup> )	645.16	square millimeters (m <sup>2</sup> )	0.00155	square inches (in <sup>2</sup> )		
square inches (in <sup>2</sup> )	6.452	square centimeters (cm <sup>2</sup> )	0.15	square inches (in <sup>2</sup> )		
square feet (ft <sup>2</sup> )	0.0929	square meters (m <sup>2</sup> )	10.764	square feet (ft <sup>2</sup> )		
<b><u>Volume</u></b>						
cubic inches (in <sup>3</sup> )	16387	cubic millimeters (mm <sup>3</sup> )	0.000061	cubic inches (in <sup>3</sup> )		
cubic inches (in <sup>3</sup> )	16.387	cubic centimeters (cm <sup>3</sup> )	0.06102	cubic inches (in <sup>3</sup> )		
cubic inches (in <sup>3</sup> )	0.01639	liters (l)	61.024	cubic inches (in <sup>3</sup> )		
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 <sup>3</sup> )	28.317	liters (L)	0.03531	cubic feet (ft <sup>3</sup> )		
cubic feet (ft <sup>3</sup> )	0.02832	cubic meters (m <sup>3</sup> )	35.315	cubic feet (ft <sup>3</sup> )		
<b><u>Weight/Force</u></b>						
ounce (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)		
<b><u>Torque/Work Force</u></b>						
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)		
<b><u>Pressure/Vacuum</u></b>						
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
<b><u>Temperature</u></b>						
degrees Fahrenheit (°F)	32	1.8	degrees Celsius (°C)	1.8	32	degrees Fahrenheit (°F)

# MAINTENANCE LOG

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, you should retain all maintenance receipts. Your owner information portfolio is a convenient storage place.

[illegible]

## MAINTENANCE LOG

[illegible]

# *Diplomat*

**GLOSSARY OF TERMS • 315**

**INDEX • 319**

**SURVEY • 323**



## **GLOSSARY OF TERMS**

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

**Air Compressor** - A device that pumps air to and builds air pressure in an air system.

**Air Dryer** - A device that cools, filters and dries the air delivered by an air compressor.

**Air Governor** - A device that controls the operation of the air compressor by constantly monitoring air pressure in the supply tank of the air system. The air governor initiates the unload cycle when the cut-out pressure is reached. The air governor also controls the air dryer by sending an air signal ( at the beginning of the compressor unload cycle ) to the control port of the air dryer, initiating the purge cycle. When this air signal is removed by the governor ( at the beginning of the compressor load cycle) the purge valve closes and the drying cycle begins.

**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 12V 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 available for hook-up when you are at campgrounds. It is called city water because water is pulled water from a central source (like in a city) and not the fresh water tank.

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

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

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

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

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

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

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

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

**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.

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

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

**Dump Station** - Sites to drain waste (grey) and sewage (black) tanks. In most states it is illegal to drain your tanks anywhere except at dump stations.

**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** - 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.

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

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

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

**Road Side** - This refers to the side of the motorhome which faces the road when it is parked. Often called the off-door 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.

**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.

## — A —

ABS System .....	275
Air Conditioner - Roof .....	115
Air Coupler - Universal.....	269
Air Dryer.....	266
Air Filter - Changing.....	302
Air Filter Minder.....	302
Air Governor.....	266
Air Storage Tanks.....	269
Air Supply System.....	266
Air System - Charging (External).....	270
Alignment Specifications.....	278
Alternator.....	260
Aqua Hot (Optional).....	119
Awnings.....	155

## — B —

Backing Up A Motorhome.....	32
Bathroom Fan.....	151
Battery Cut-off Switch.....	196
Battery - Chassis.....	236
Battery Disconnect - Chassis.....	235
Battery Disconnect - House.....	196
Battery - How It Works.....	214
Brake - Auxilary.....	290
Brake - Exhaust.....	290
Brake Adjustment/Slack Adjuster.....	275
Brake - Park & Emergency Systems.....	274
Brake Systems - Anti-Lock.....	265
Brake Systems - Air Brakes.....	273
Brake System - Backup.....	277
Breaking Camp.....	40
Bulb Usage.....	222

## — C —

Carbon Monoxide Detector.....	65
Chart - Filters & Belts.....	308
Chart - Specifications.....	308
Chart - Tank Capacities.....	167
Chart - Tire.....	52
Chart - Metric Conversion.....	310
Checklist - LP-Gas Emergency Procedures..	192
Checklist - Pretrip Preparations.....	29
Checklist - Set-up Procedures.....	35
Checklist - Winter Storage.....	94
Citizen Band Radio - Prewire.....	152
Cold Weather Use.....	181
Cooktop.....	113
Coolant.....	287
Customer Relations.....	13

## — D —

Dash .....	238
Diagnostic Plug Locations.....	258
Dinette Bed Conversion (Optional).....	165
Distribution Panel - House 110.....	216
Distribution Panel - House 12 Volt.....	220
Door - Sliding.....	155
Drive Axle Lubricant.....	303
Driveline.....	303
Driving Safety.....	25
Dry Camping Tips.....	37

## — E —

Egress Exit Window.....	67
Emergency Procedures - Roadside.....	43
Electric Sofa Bed Conversion (Opt).....	165
Engine - General Information.....	283
Engine Shutdown.....	287
Engine Shutdown - Extended.....	287
Entertainment Center - Home.....	42
Entry Door.....	135
Entry Step.....	133
Exterior Care.....	71

## — F, G —

Fabric Specifications Chart.....	79
Fans .....	152
Fire Extinguisher.....	67
Front Door Awning (Opt).....	155
Fuel Sending Unit.....	298
Fuel System.....	297
Fuel Tank.....	298
Fuel/Water Separator.....	298
Furnace.....	117
Fuses & Circuits - Chassis.....	248
Generator 120 AC (LP).....	199
Generator 120 AC Diesel (Optional).....	199
Glossary of Terms.....	305

## — H, I —

Hitch.....	30
Hydraulic Systems (ISC).....	300
Interior Care.....	76
Inverter/Converter.....	210
ISC Engine.....	283

## — J, K, L —

Leveling System - Hydraulic Leveling.....	280
Limited Warranty.....	1
Limited Warranty Roadmaster Chassis.....	5
LP-Gas Consumption.....	197
LP-Gas Distribution Lines.....	197
LP-Gas Fundamentals.....	195
LP-Gas Regulator.....	196
LP-Gas Safety Tips.....	197
LP-Gas System.....	189
LP-Gas Tank.....	193
Lubrication Chart.....	304

## — M, N, O —

Maintenance Log.....	311
Microwave/Convection Oven.....	103
Monitor Panel.....	192
Oil Recommendations (Engine).....	284
Outside Barbeque Grill (Opt).....	116
Owner's Record - Insurance.....	19
Owner's Record - Personal Property.....	18
Owner's Record - Serial Numbers.....	17

## — P, Q, R —

Parts - Common Solenoids & Senders.....	306
Radio - Dash.....	148
Rear of Coach.....	295
Rear View System.....	31
Refrigerator.....	99
Reporting Safety Defects.....	14
Ride Height Valves.....	270

## — S —

Service Suggestions.....	15
Shock Absorbers.....	280
Shore Power Hook-Up.....	205
Slide Lock.....	142
Slide-Out (Over Awning).....	162
Slide-Out Operation.....	136
Smoke Detector.....	62
Sofa Bed Conversion.....	164
Sofa Hide-A-Bed Conversion.....	164
Specifications - Dimensions Chart.....	59
Starting Procedure (ISC Normal).....	284
Starting Procedure - Cold Weather.....	284
Steering Column.....	257
Steering Gear.....	302
Stepwell Cover (Front Door Model).....	134
Storage - Cold Weather.....	183
Storage - Long Term.....	91
Storage - Short Term.....	90
Storage Removal.....	94
Storage - Under Bed.....	166
Sunvisor.....	163
Super Slide (Optional).....	155
Suspension - Air Ride Bags.....	271

## — T, U —

Taking Delivery.....	14
Tank Capacities - Chart.....	175
Tire Chart.....	54
Tires.....	46
Toilet.....	176
Towing Procedures.....	45
Transfer Switch.....	206
Transmission.....	291
Transmission Lubricating Fluid.....	295

## — V, W, X, Y, Z —

Vendor List.....	20
Views - Curbside & Roadside.....	61
Views - Front & Rear.....	60
Wall Thermostat.....	118
Warranty Information File.....	8
Washer/Dryer (Optional).....	127
Washer/Dryer Prepared.....	127
Waste Water System.....	175
Water - City Hook-Up.....	171
Water Filter.....	173
Water Heater.....	123
Water Pump.....	171
Water System - Disinfecting Fresh Water.....	174
Water System - Troubleshooting.....	174
Water Tank - Fresh Fill.....	170
Water Tank - Fresh Gravity Fill.....	170
Weighing the Motorhome.....	51
Weight Terms.....	48
Winterizing - Fresh Water System.....	184
Winterizing - Using Air Pressure.....	183

## **TECHNICAL PUBLICATIONS**

**Manager** Vance Buell  
**Editing** Technical Publications

### **\* OREGON OPERATIONS**

#### **Technical Writers**

William Birch  
Robert Buckholtz

#### **Creative**

**Layout Design** Dawn Davis, Kelly Stroble  
**Cover Design** Kelly Stroble  
**Technical Illustrator** Judie Pressler

#### **Printing**

Holiday Graphics

### **\* INDIANA OPERATIONS**

#### **Technical Writer**

Fran Weisenstein

#### **Creative**

**Layout Design** Penny Eddinger  
**Technical Illustrator** Judie Pressler

## **VIDEO PRODUCTIONS**

Dean Mitchell

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

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**NAME:** \_\_\_\_\_ **PHONE:** (\_\_\_\_) \_\_\_\_\_

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**SERIAL #** \_\_\_\_\_

CUT ALONG  
DOTTED LINE



FOLD

FOLD



CUT ALONG  
DOTTED LINE