

EXECUTIVE 2001
OWNER'S MANUAL QUESTIONNAIRE

Your suggestions are very important to us. We are continuously improving our manuals to help make traveling as enjoyable as possible. We appreciate you taking the time to answer the following questions. When you are finished simply fold the questionnaire and return it to our technical publications department. Please feel free to add an additional page if you desire to.

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

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

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

4. Is there any additional information you would like to see added to the owner's manual?

Additional Comments: _____

Name _____ Model & Year _____

Phone _____ Serial Number _____

Address _____

Is this your first motorhome? Yes / No

EXECUTIVE



FOLD

BUSINESS REPLY MAIL

Monaco Coach Corporation
91320 Coburg Industrial Way
Coburg, OR 97408

Attn: Technical Publications

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SIGNS



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 gray box inside your motorhome.

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

EXECUTIVE

SECTION 1
WARRANTY & INFORMATION

INTRODUCTION

This chapter 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 not fill up sewage holding tank, deplete the water or LP gas supply, or run down the batteries which supply the living area 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 for you to stop occasionally to empty the holding tanks and to replenish your water and LP gas supply.

Many gas stations have installed sanitary dumping stations. Publications are available which list these dumping stations. When you stop for the night your Monaco 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. You are self-contained.

The safety alert symbols mean **CAUTION** or **WARNING** - "Personal Safety Instructions." Read and understand instructions where these symbols are displayed in this manual. Failure to comply with specific instructions may result in personal injury or death. Many instructions are required by National Safety Associations.

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

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

REPORTING SAFETY DEFECTS

If you believe that your motorhome has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Monaco. If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of motorhomes, it may order a recall or remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer or Monaco. To contact NHTSA you may either call the Auto Safety Hot line toll-free at 1-800-424-9393 (or 366-0123 in Washington DC area) or write to:

**NHTSA
400 Seventh Street
US Department of Transportation
Washington, DC 20590**

TAKING DELIVERY *Monaco's 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. Your 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.

Dealer's 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 and 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's
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 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 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.

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.

**WARRANTY
INFORMATION
FILE**

MONACO COACH CORPORATION 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.

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 major issue. Monday and Friday are busy days for most dealers. Therefore, it makes sense to make a mid-week appointment whenever possible. Ask your dealer if additional time is needed for check in and completion of paperwork.

Prepare for the Appointment

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

Prepare a List

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

Be Reasonable With Your Requests

Don't leave a list of 20 items to be serviced and expect to have your motorhome back by five o'clock. If you list a number of items, and you must have your motorhome back by the end of the day, discuss the situation with the service manager and list your 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 can not watch the work being done. Many service area insurance requirements forbid the admission of customers into the service work area.

Inspect the Work Properly

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

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)

Diesel 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

Item

Serial Number

Value

OWNER'S RECORD - INSURANCE

Company _____

Policy Number _____

Agent's Name & Address _____

Business Phone _____

Emergency Phone _____

Renewal Date(s) _____

VENDOR LIST

Air Conditioner
Dometic Corp.
219-463-4858

Alternator
Leece-Neville
800-349-2628

Appliances
Atwood
800-873-4238

Aqua Hot
Vehicle System
800-685-4298

Awnings
Zip-Dee
800-338-2378

Axles-Chassis-Front
Meritor
800-535-5560

Axles-Chassis-Rear
Eaton Corporation
800-328-6687

Bathroom Exhaust Fan
Fan-Tastic Vent
800-395-4045

Batteries
Centenial
800-536-3536

Nationwide Batteries
800-367-1407

Brake-Anti-Lock Brake System
Eaton
800-826-4357

Brake-Chassis
Midland
800-835-0356

**Carbon Monoxide
Detector**
Safe-T-Alert
800-383-0269

**Carbon Monoxide &
Liquified Petroleum Protectors**
MTI Industries, Inc.
800-383-0269

Citizen Band Radio (C.B.)
Cobra
733-889-3087

Closet Carousel
White Home Products
800-200-9272

Engine
Cummins
800-343-7357

Entry Step
Kwikkee
800-736-9961

Faucet
Moen Faucets
800-289-6636

Fire Extinguisher
The Fire Extinguisher Co.
919-563-4911

Generator
Onan
800-888-6626

Heat - Furnace
Suburban Manufacturing
423-775-2131

Hitch Receiver
Reese Products
219-164-7564

Hot Water Heater
Atwood Mobile Products
801-972-4621

Ice Maker
U-Line
800-779-2547

Inverter
Trace Engineering
360-435-8826

Keyless Entry
Crime Stopper
800-998-6880

Leveling Jacks - Air
HWH Corporation
800-494-3213

Leveling Jacks - Hydraulic
RVA
760-746-5732

LP Tank
Brunner
800-753-8625

Microwave
Sharp Electronics Corp.
800-237-4277

Pac Brake
Exhaust Brake
800-663-0096

Power Gear
Slide-Out Motor
800-334-4712

Power Heated Mirrors
Velvac, Inc.
800-783-8871

Refrigerator
Norcold
800-543-1219

Refrigerator - All Electric
Amana
800-334-4712

Tires
Goodyear Tire & Rubber
800-399-2772

Toilet
Microphor
800-358-8280

Sealand
800-321-9886

Transmission
Allison Transmission
800-524-2303

Washer/Dryer
Splendide
800-736-4127

Water Pump
Shurflo
800-762-8094

Windshield Wipers
Diesel Equipment
336-373-8331

**LIMITED
WARRANTY -
EXECUTIVE
MOTORHOME
Model Year 2001**

MONACO COACH CORPORATION LIMITED WARRANTY

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 or commercial 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 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.

Warrantor's Limited Warranty covers defects in the manufacture of your motorhome and defects in materials used to manufacture your motorhome. Also see the section "What the Warranty Does Not Cover" set out below.

What the Warranty Covers

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.

What We Will Do to Correct Problems

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. Normally, any factory defect or damage is detected and corrected at the factory during the inspection process performed by the Warrantor. 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.

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:

How to Get Service

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

In the event the motorhome is inoperative due to malfunction of a warranted part, Warrantor will pay the cost of having the motorhome towed to the nearest authorized repair facility provided you notify Warrantor prior to incurring the towing charges to receive directions to the nearest repair facility.

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

What the Warranty Does Not Cover

This Limited Warranty does not cover: any motorhome sold or registered outside of the United States or Canada; items which are added or changed after the motorhome leaves Warrantor's possession; items that are working as designed but which you are unhappy with because of the design; normal wear and usage, such as fading or discoloration of fabrics, or the effects of condensation inside the motorhome; defacing, scratching, dents and chips on any surface or fabric of the motorhome, not caused by Warrantor; routine maintenance, including by way of example wheel alignments; the automotive chassis and power train, including, by way of example the engine, drivetrain, steering and handling, braking, wheel balance, muffler, tires, tubes, batteries and gauges; appliances and components covered by their own manufacturer's warranty including, by way of example the microwave, refrigerator, ice maker, stove, oven, generator, 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.

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

Legal Remedies

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
ATTENTION: WARRANTY DEPARTMENT
91320 COBURG INDUSTRIAL WAY
COBURG, OREGON 97408
1-877-466-6226**

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 or commercial 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 purposes arises if you have filed a federal or state tax form claiming any business tax benefit related to your ownership of the motorhome.

**ROADMASTER
CHASSIS LIMITED
WARRANTY**

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

**Limitations of
Implied Warranties**

Warrantor's agent but is an independent entity. Warrantor is not responsible for any undertaking, representation or warranty made by any dealer or other person beyond those expressly set forth in this Limited Warranty. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

What the Warranty Covers

Warrantor's Limited Warranty covers defects in the manufacture of 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 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.

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. Normally, any factory defect or damage is detected and corrected at the factory during the inspection process performed by the Warrantor. 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.

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 (1-800-866-6226). The mailing address is:

**P.O. Box 465
Wakarusa, Indiana 46573**

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.

***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.

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

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

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.

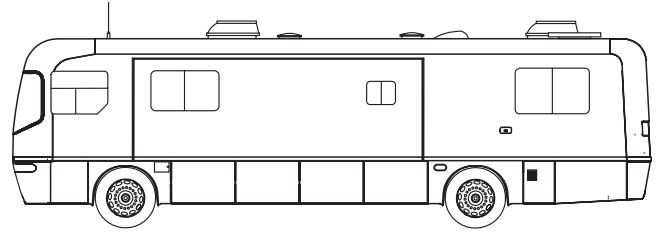
**ROADMASTER CHASSIS DIVISION
MONACO COACH CORPORATION
91320 COBURG INDUSTRIAL WAY
COBURG, OREGON 97408**

EXECUTIVE

SECTION 2
OPERATING & SAFETY

DRIVING SAFETY

There are differences between your motorhome and passenger automobiles. You should always be aware of those differences.



The key for safely operating your motorhome is inspection. Any defect found could result in problems on the road that will cost time and money. There are several states that require your motorhome be inspected prior to registration. A systematic inspection conducted prior to moving your motorhome will ensure nothing is overlooked. This also assists you in becoming familiar with the motorhome. Start by looking at the general condition and the area around your motorhome for hazards to the movement. Look high and low as you walk around your motorhome.

Inspections

General Condition

- The power cord is disconnected and stowed.
- The water hose is disconnected and stowed.
- TV antenna fully retracted resting in the cradle.
- Awnings stowed and locked in place.
- All compartment doors closed and latched.
- All the leveling jacks fully retracted.
- Any obstacles to avoid when driving off.
- Slide room moved inward.
- Wheels and tires inspected.
- No puddles or fluid leaks under the coach.
- No physical damage.
- Check entry door access.

Check the Engine

- Check fluid levels for improper level.
- Check belts and hoses for wear.
- Check wiring for loose and frayed connections.
- Check for fluid leaks on engine or transmission.
- Start engine and listen for noises.

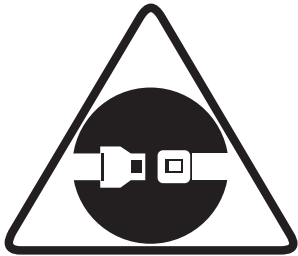
Inside the Coach

- Gauges and controls all operating and functioning properly.
- All windows and vents closed.
- All cabinet doors and drawers closed.
- All interior lights switched OFF.
- All items secured.

Before Starting Out

From the driver's seat perspective you will notice that you are sitting up higher and further to the left than in a passenger automobile. Your perspective of the road will therefore be different. Because of the driver's seat location and the configuration of the motorhome, rely on outside mirrors to line the motorhome up with your lane and to check conditions behind you. The dashboard may contain more gauges and controls than are normally found in passenger automobiles. Become familiar with these devices and how they operate before starting out.

Safety Seat Belts



All occupants must be furnished with and use seat belts while the motorhome is moving. All seats designed to carry passengers, while motorhome is in motion, are equipped with safety seat belts. While the motorhome is in motion, do not occupy beds or any seats that are not equipped with safety belts. Seat belts must only be used on permanently mounted seats. The driver's seat must be locked in the forward facing position while the motorhome is in motion. Do not secure more than one person per each safety belt.

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 place. Seat belt lengths automatically adjust to your size and sitting position. Do not route belts over armrest.



WARNING: Seat 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.

Ready to Leave Checklist

- Drain and flush out the holding tanks. Close the valves and install the cap securely.
- Disconnect the sewer hose, flush with clean water and store it in an outside compartment.
- Fill the fresh water tank. Disconnect and store the fresh water hose.
- Disconnect the shore line and rewind it.
- Disconnect the cable TV and phone hookups and lower the TV antenna.
- Retract any awnings and secure them for transport.
- If applicable, lower the satellite dish.
- Close all roof vents.
- If applicable, retract the leveling jacks to their travel position.
- Check the engine oil, transmission fluid, engine coolant, power steering fluid, windshield washer fluid and tire inflation.
- Secure any loose, heavy or sharp objects in the motorhome or its service compartments.

- Turn off the interior lights, water heater, furnace and water pump.
- Check the LP gas tank gauge to make sure there is LP gas available.
- Check the fuel gauge and lights on the motorhome.
- Fasten bi-fold and pocket doors securely.
- Walk around your motorhome one last time to make sure everything is stored away and outside compartments are closed and locked.
- Visually check front oil bath hubs and fluid level, to insure that there are no leaks.
- Pull forward, clean the site (if necessary) and check for forgotten items.
- Secure and lock the entrance door.

Consider many factors when operating a motorhome. Because a motorhome is longer than the average automobile, the turning radius will be wider; therefore, it is always a good idea to be cautious when turning the motorhome. Keep a close eye on the rear of the motorhome, making sure it will clear potential obstacles. The motorhome is also heavier than an average automobile, with a higher center of gravity. Those factors may make it difficult to change the momentum of your motorhome. Making sharp turns or swerving, especially at high speeds, could result in the loss of control of the motorhome.

Tips for Driving

The safe control speed of the motorhome will vary with road conditions, grade of the road and size of the load. Keep that in mind and drive with the extra caution necessary to avoid situations which might require quick momentum changes. The motorhome will travel safely and comfortably at highway speed limits; however, it will take longer to reach that speed. Always keep in mind when overtaking and passing another vehicle, due to the length of the motorhome, it takes a greater distance and time to pass another vehicle. Allow plenty of time to safely pass another vehicle.

When descending a long hill, drop down into a lower gear. The transmission and engine will help control downhill speed and can lengthen brake life. The distance required to stop the motorhome will be greater than that of an automobile. Even though your motorhome is equipped with brakes designed for the Gross Vehicle Weight Rating (GVWR), we suggest that you practice stopping away from traffic until you become accustomed to your motorhome's stopping distance.

When backing up, have your co-pilot get out of the motorhome and walk to the driver's side rear corner. The co-pilot can watch for any obstacles and give hand signals to you as you back up.

When traveling, make sure any bridges you cross can support the weight of your motorhome. Check the tonnage limit of bridges before crossing them. Signs are normally posted at bridge entrances. Know and observe the laws where you will be traveling as they may vary from state to state.

Emergency Stopping

Always carry road flares or reflective warning signs to display if necessary. Pull off roadway as far as possible for emergency stopping or tire changing. Turn your motorhome hazard warning flashers ON when parked alongside traffic lanes. Set the parking brake.

BACKING UP A MOTORHOME

Whether you are a long time owner of recreational vehicles or just starting out, backing up can be a challenge. Following some simple helpful 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. It 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.

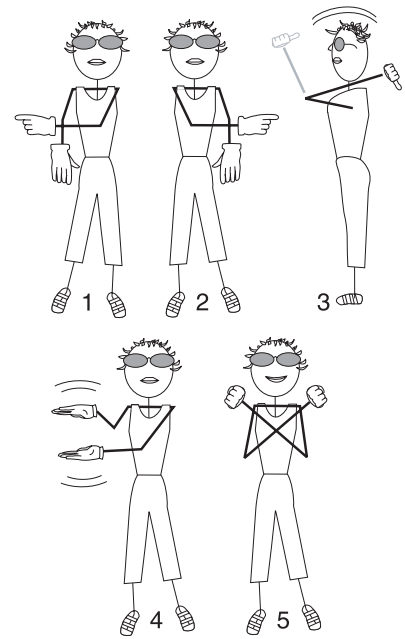
The co-pilot will perform just as important a job as the driver. When guiding the driver, the co-pilot should be located safely at the left rear corner of the motorhome, facing forward, while remaining visible in the driver side mirror at all times. The co-pilot should make a conscious effort to maintain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

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



View from Driver's Mirror.

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. This 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. Try to avoid putting the motorhome and tow vehicle in a backing situation. The only way to back up this combination is to completely disconnect the tow vehicle from motorhome. Trying to back up this combination, even as small as a foot, will result in damage to the motorhome, tow vehicle and towing device.

Backing Up Trailers

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 will set the motorhome and trailer in a position to maneuver the trailer into space. When backing a trailer, the driver may become disoriented with the direction of the steering wheel and the direction of the trailer. A trick here is to move the bottom of the steering wheel 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 driver side mirror, using the five hand signals for guiding.



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

If your 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 driver side mirror. If the site is on the right side, the driver will have to use the passenger 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 your particular criteria, prepare to back in carefully. Have the co-pilot guide you using the five hand signals.

Parking

Put the motorhome gearshift in neutral and set the parking brake. Turn off the ignition switch. Block all four wheels securely. Level the motorhome as directed under "Leveling Jacks." Connect 120/240 AC power.

- 50 Amp service is what the motorhome is equipped with to operate all electrical equipment.
- 30 Amp service motorhomes will be able to operate, but with some limits.

Open the LP-Gas tank valve. Connect the fresh water supply. Connect the waste drain hose to sewer hook-up. If applicable, start the refrigerator, water heater and furnace. Most appliances should be operated on gas at first. Once the motorhome is plugged into shore power, the inverter will go into a 90 minute bulk rate charge. Determine later what appliances will be run on 110/12 Volt power.



NOTE: Chock all the wheels securely if you are leaving the motorhome.

Tips For Dry Camping

For extended dry camping, management of all resources is essential. The motorhome has large batteries, plenty of water and large holding tank capacities. With a little care and forethought it is possible to go a long way with only the wonderful amenities you bring with you.

Conserve water! Your motorhome holds a lot, but it goes down the drain fast. Don't waste water you don't actually use. Use a manual valve on shower head and turn the water off and on as needed while showering. You can reduce water needed for a shower by as much as two-thirds. Don't let water run in sink while you do other things, such as wiping up kitchen or brushing your teeth.

Conserve battery power. Use electricity sparingly. Turn off the inverter when it is not in use. Only turn it on when you need it. However, remember that when the generator is running the inverter will come on automatically.

Charge the batteries when they are half down. At half charge the battery voltage will be 12.2 Volts. You can use a hydrometer for testing. A good rule of thumb is to run the generator for three to four hours daily, which should

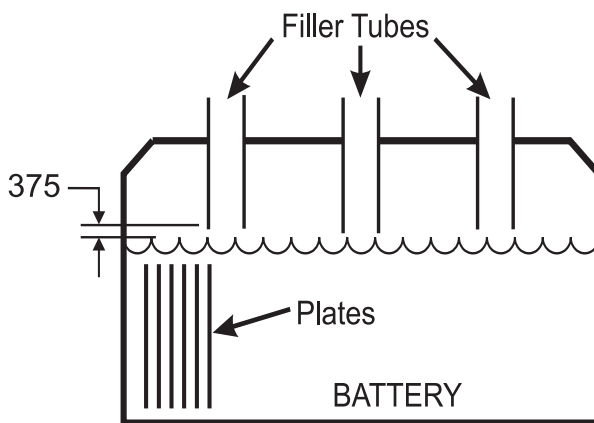
supply enough power. Never try to use batteries until they are completely dead, or when the lights "dim out." Each time the batteries are used at half charge, the ability to recharge up to full capacity is diminished. The damage that occurs is cumulative and will eventually render a battery useless.

If you are in a habit of starting the engine regularly, remember that the alternator output is lower at an idle, and that even at a fast idle it may take as much as an hour to replace what it took to start up the engine. Also, realize that running the engine for a short time may increase moisture contamination in the fuel and oil. It is better to run the engine less often and run it longer, for perhaps an hour. The good news is this can be included in your battery recharge schedule.

Solar panels can greatly increase the time you can operate between battery charges.

Remember that different motorhomes have different equipment and that everyone has different habits and expectations. The above general guidelines should provide a useful starting point for building your own schedule and regimen for extended stays where power and water are not available. You too can become less dependent on hook-ups.

- Make sure to turn all appliances on propane.
- The battery cut off switch will need to be left on.
- Purchase extra solar panels, if desired.
- Understand the inverter operations.
- One continuous duty solenoid is a .7 Amp draw, two solenoids will be a 1.4 Amp draw.
- A 13" TV has a 1.7 Amp draw.
- Rope lights (10 ft) are a 1.3 Amp draw.
- The porch light is a 2.0 Amp draw.
- One fluorescent dual bulb light is a 0.9 Amp draw.



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.

The distilled water level in battery should be 1/8" below the vent tube.

VEHICLE LOADING

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.

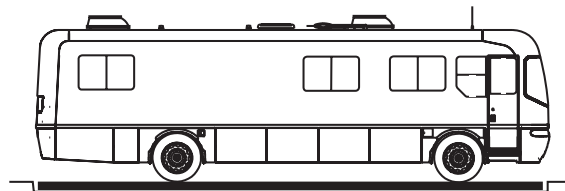
- **Gross Vehicle Weight Rating (GVWR):** GVWR means maximum permissible weight of this motorhome. GVWR is equal to or greater than the sum of UVW plus NCC.
- **Unloaded Vehicle Weight (UVW):** UVW means weight of this motorhome as built at factory with full fuel, engine oil and coolants. UVW does not 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 Combination 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.

MOTORHOME WEIGHT INFORMATION:		CONSULT OWNER'S MANUAL FOR SPECIFIC WEIGHING INSTRUCTIONS AND TOWING GUIDELINES
MODEL		GVWR
UVW	NCC	GCWR
<p>THIS MOTORHOME IS CAPABLE OF CARRYING UP TO _____ GAL.</p> <p>OF FRESH WATER (INCLUDING WATER HEATER) FOR A TOTAL OF _____ LBS.</p> <p>REFERENCE: WEIGHT OF FRESH WATER IS 8.33 LBS/GAL; WEIGHT OF LP-GAS IS 4.5 LBS/GAL (AVERAGE).</p> <p>GVWR GROSS VEHICLE WEIGHT RATING MEANS THE MAXIMUM PERMISSIBLE WEIGHT OF THIS MOTORHOME. THE GVWR IS EQUAL TO OR GREATER THAN THE SUM OF THE UNLOADED VEHICLE WEIGHT PLUS THE NET CARRYING CAPACITY.</p> <p>UVW UNLOADED VEHICLE WEIGHT MEANS THE WEIGHT OF THIS MOTORHOME AS BUILT AT THE FACTORY WITH FULL FUEL, ENGINE OIL AND COOLANTS. THE UVW DOES NOT INCLUDE CARGO, FRESH WATER, LP-GAS, OCCUPANTS OR DEALER INSTALLED ACCESSORIES.</p> <p>NCC NET CARRYING CAPACITY MEANS THE MAXIMUM WEIGHT OF ALL OCCUPANTS INCLUDING THE 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).</p> <p>GCWR GROSS COMBINATION WEIGHT RATING MEANS THE VALUE SPECIFIED BY THE MOTORHOME MANUFACTURER AS THE MAXIMUM ALLOWABLE LOADED WEIGHT OF THIS MOTORHOME WITH ITS TOWED TRAILER OR TOWED VEHICLE.</p>		

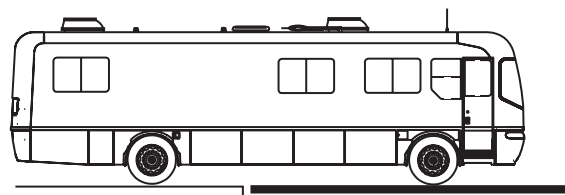
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WEIGHING THE MOTORHOME

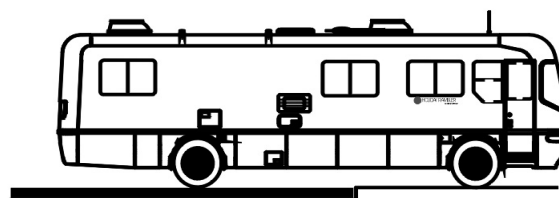
Reading 1 - GAW (Gross Axle Weight) front axle on the scale only (loaded for travel).



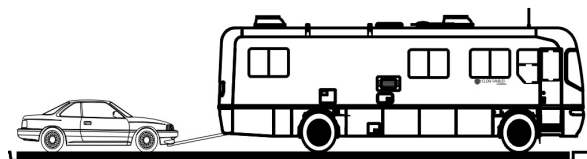
Reading 2 - GVW (Gross Vehicle Weight) entire unit on the scale (loaded for travel).



Reading 3 - GAW (Gross Axle Weight) rear axle on the scale only (loaded for travel).



Reading 4 - GCW (Gross Combined Weight) entire unit on the scale with towed vehicle (loaded for travel).



NOTE: Compare the actual weights to the ratings to ensure you are below maximum ratings.



CAUTION: Consideration should be taken when loading the motorhome. Heavy objects should be kept as low as possible, preferably on the floor. Load weight should also be distributed as evenly as possible to ensure proper weight and balance.

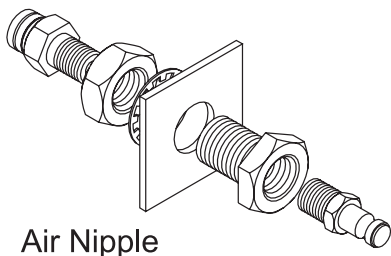
TIRE PRESSURE - Weighing/Inflation

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI).													
TIRE SIZE	PSI	70	75	80	85	90	95	100	105	110	115	120	125
225/70R19.5	Single (S)	2895	3040	3195(E)	3315	3450	3640(F)	3715	3815	3970(G)			
	Dual (D)	2720	2860	3000(E)	3115	3245	3415(F)	3490	3615	3750(G)			
245/70R19.5	Single (S)	3640	3740	3890	4080(F)	4190	4335	4545(G)	4620	4805(H)			
	Dual (D)	3415	3515	3655	3875(F)	3940	4075	4375(G)	4500	4625(H)			
255/70R22.5	Single (S)	3815	4005	4190	4370	4550	4675	4895	5065	5205(G)	5510(H)		
	Dual (D)	3585	3765	3970	4110	4275	4410	4455	4610	4675(G)	5070(H)		
295/75R22.5	Single (S)	4725	4945	5155	5370	5510(F)	5780	5980	6175(G)	6370	6610(H)		
	Dual (D)	4690	4885	5070(F)	5260	5440	5675(G)	5800	6005(H)				
11R22.5	Single (S)				4990	5200	5430(F)	5640	5840	6175(G)	6240	6430	6610(H)
	Dual (D)				4760(F)	4950	5120	5300	5470	5750(G)	5800(H)		

	MAXIMUM LOAD AT INFLATION								LOAD RANGE	TIRE WEIGHT		SPEED RATING (MPH)
TIRE SIZE	Single (S)				Dual (D)					LB	[KG]	
	LBS	PSI	[KG	KPA]	LBS	PSI	[KG	KPA]				
245/70R19.5	4080	85	[1850	590]	3875	85	[1760	590]	F	69	[31]	75
255/70R22.5	5510	115	[2500	790	5070	115	[2300	790]	H	86	[39]	75
11R22.5*	6610	120	[3000	830]	5800	110	[2630	760]	H	132	[60]	75
295/75R22.5	6610	110	[3000	850]	6005	110	[2725	800]	H	115	[52]	75

*G159A - # Imported Tire. All data is tested under the condition of highway speed of 65 mph. 1. Letter in parenthesis denote load range for which **BOLD FACE** loads are maximum. 2. Always use Approved Tire and Rim Combinations for Diameters and Contours. » Current tire for motorhome year model at time of print.

TOWING PROCEDURE



Air Nipple

It is recommended that if a towing company is called make sure they use a stinger (an arm that goes under motorhome and hooks to front cross member).

The towing company may need to locate the air nipple to release the air brakes. The air nipple is located on the roadside next to the generator 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 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 protect transmission.



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. When towing a motorhome equipped with the HWH Air-Leveling System, the ignition MUST be left in the ON position so that air suspension may operate. Damage to the motorhome from a towing company will not be covered by Monaco Coach Corporation.

Make sure the tow truck can safely pull the weight of the motorhome. Give the towing company the weight of your motorhome when you call them. If your motorhome is going to be towed without a stinger, do the following:

Towing Without Stinger

- Wrap chains around both A-arms or the front axle on each side.
- Pass the chains beneath the tow bar below the bumper.
- Position a 6" x 6" piece of lumber between the ends of main frame rails and the tow vehicle transfer plate to maintain clearance to body parts.
- Attach safety chains, which are completely independent of the primary lifting device, to the main frame rails.
- When the motorhome is under tow, allow enough room between the front of the motorhome and the rear of the tow vehicle while turning corners.

- Block wheels securely before attempting this procedure.
- Remove the plug from the center rear brake can. Save plug for reuse.
- 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.

Parking Brake - Disabling Without Air Pressure



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.

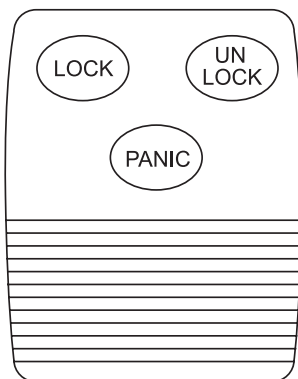
HITCH - Using the Rear Hitch

When using 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. Your safety and satisfaction require proper use. Avoid excessive loads or any other abuse. 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 1,000 pounds. We recommend weighing the motorhome as it will be operated to be certain that there is proper weight distribution. When weighing the motorhome be sure to take the passenger locations into consideration. Total weight of the motorhome and any vehicle towed by it must not exceed the GCWR.



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.

SAFETY - KEYLESS ENTRY SYSTEM



Ford Remote

The entry door can be locked or unlocked using the touch key pad located adjacent to the entry door.

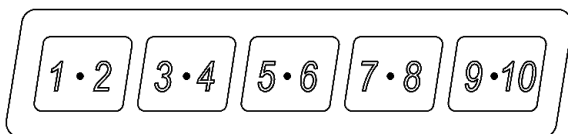
- To **LOCK**, shut the door. Depressing 7/8 and 9/0 simultaneously will lock the entry door.
- To **UNLOCK**, enter your five digit PIN (Personal Identification Number).

To Authorize Remote:



NOTE: These instructions are for motorhomes equipped with “keyless entry” only.

If the remote does not respond, it may need to be authorized. When authorizing a new remote, the entry door must be shut. Turn the ignition key “on/off” five times, with the key remaining in the ignition, in the **ON** position, in the fifth cycle.



Keyless Entry Touch pad

- Depress the lock button. The entry door should lock.
- Depress the unlock button. The door should unlock.
- Repeat procedure twice for each remote to be authorized.
- Turning the key “off/on/off” will exit the remote authorization mode.



NOTE: If the motorhome is factory equipped with an optional security system, the security system remote will lock and unlock the entry door when the system is armed or disarmed.

ENTRY DOOR

The entry door to the motorhome is adjusted at the factory and tested for all operations. The door incorporates three separate seals to eliminate wind noise during travel. This door also uses two separate locks for safety and security.

One locking system is for the door handle and the other is a dead bolt

locking system. The latching system used is the double action catching to ensure secure and safe latching.

There are some adjustments which can be made to help maintain the entry door performance. The top portion of the screen door can be removed and secured to the lower portion for better visibility.



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

- Determine which bolt needs adjustment.
- Using a 5/8 inch box wrench or socket, to loosen the movable 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.
- Slowly, close the entry door while observing the latch and 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 position only.
- With just slight pressure applied to the entry door, the latch should move to the second position. 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.
- Test the operation of the dead bolt lock to ensure proper functions.

ENTRY DOOR - Latch Adjustments

- Since the glass slider is plexi-glass, the slider can be bowed for removal and replacement.
- Replace with new plexi-glass and reverse the procedure.

Screen Door - Changing the Glass

- Loosen the chrome bolts on the hinge side of the screen door: Four on the top and four on the bottom.
- There are slots in the steel hinge to allow up and down movement.
- There are four Allen type screws on the top hinge and four on the bottom hinge to adjust the screen door so it properly fits the entry door. The hinge should fit tightly to the trim of the door when the screen door is latched to the door and the door is open.
- Check to see that the pad on the inside of the door is not sitting on top of the aluminum trim of the door. If it is, it will hold the screen door away from the door and you will not have a proper seal. If the pad is too large, re-size the pad.

Screen Door - Adjusting

SECURITY SYSTEM (Optional)



Security System Remote.

A featured option for the motorhome is a security system. The system can and may be equipped with a Carbine Security System that incorporates automotive, as well as home security features.

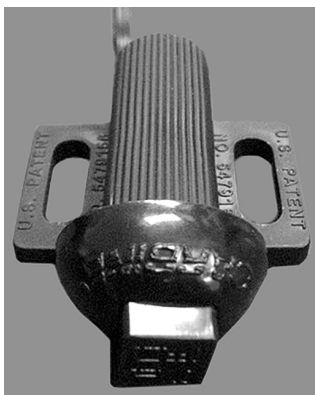
The system is easy to use; however, it is recommended that all manuals related to the system are carefully. The alarm remote transmitter has three buttons: one large and two small. Use the large button to arm/lock and disarm/unlock your unit.

When the system is armed, it will chirp once from the siren and the parking lights will flash once. The headlights will stay on for 20 seconds to light the area. One low chirp and one soft chirp indicates the alarm senses a door is ajar and rearms the system. When the system is armed, there are five different kinds of sensors protecting the motorhome.

1. The compartment doors are protected by pin switches and wireless door sensing devices.
2. There is a shock/impact sensing device in the cab area that will set off the alarm.
3. The glass breakage sensors will set off the alarm if there is significant air pressure change or at the sound of breaking glass.
4. There are two sensors on the windows, located in the bedroom area. If these windows are opened while the alarm is activated, it will set off the alarm system.

If the alarm has been tripped while you are away from the motorhome, the system will notify you in two ways:

1. When the alarm is disarmed. It will sound four chirps from the siren.
2. The LED indicator light will flash two times when the alarm is triggered by an open compartment door, smoke detector, or glass breakage sensor. If the light flashes three times, the alarm was triggered by an open door that is pin switch protected.



Valet Button. Located under dash pad.

To clear the memory on the alarm system, turn the ignition key on, then off. The alarm system can be disabled using the valet button:

1. Turn on the ignition key.
2. Push the button one time.

Your LED indicator will be on solid when the ignition key is on and will blink once every five seconds when the key is off. To return to full alarm mode, turn the key on and push the valet button once. Shut the key off and the system is ready to arm.

A featured option for the motorhome is a security safe. The safe is usually located in the bed deck compartment area. The location may vary with floor plans.

SAFE *(Optional)*

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. Common causes of fires are smoking in bed, leaving children unattended and cleaning with flammable fluids. Please be safety conscious and avoid unnecessary risk.

SMOKE DETECTOR



Smoke Detector



NOTE: 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.

To test the electronics of the alarm, press the test button on the cover of the smoke alarm for a few seconds. The smoke alarm will sound by making a continuous loud beep. To complete the test sequence release the button and the alarm should stop.

How to Test



NOTE: Test the smoke alarm operation after the motorhome has been in storage, before each trip and at least once a week during use.

Vacuum the slots in the cover and sides with a soft brush attachment every month. Your smoke alarm should be cleaned every six months to help keep the unit working efficiently.

Maintenance

The battery should power the smoke alarm for at least one year under normal use. When the battery reaches the end of its normal life, a low battery warning (intermittent beeping) will indicate the need for battery replacement. Some owners may find it practical to replace the battery during the time changes in the spring and fall.

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

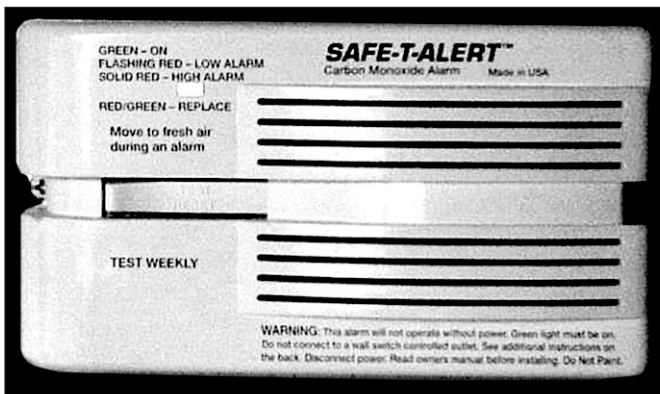
the battery if needed.

- 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 to your dealer. Smoke detectors beyond warranty cannot be economically repaired.

Abnormal air conditions may cause the highly sensitive smoke alarm to give a false alarm. If no fire is apparent, ventilate the room and/or blow fresh air into the motorhome until the alarm stops. Once cleared, the smoke alarm will automatically reset. Dust can lead to excessive sensitivity. Vacuum as needed.

CARBON MONOXIDE DETECTOR



Carbon monoxide detector - located in bedroom curbside, underneath night stand cabinet, secured to outside wall.

Your 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 effected. Your 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.



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 yourself. The indicator light displays a specific color to monitor the conditions as follows:

- **Green** - indicates an “**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 reset by the RESET switch.

When the alarm sounds, you should 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.

When the Alarm Sounds

Test the carbon monoxide detector operation after the motorhome has been in storage, before each trip and at least once a week during use. You can test the alarm by holding the test button in until the alarm sounds. The alarm will stop beeping in about 30 seconds.

Testing the Detector

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 recommended that the carbon monoxide detector should be replaced every 10 years.

Cleaning the Detector

FIRE EXTINGUISHER



To operate: Pull,
Aim, Squeeze, and
Sweep

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!

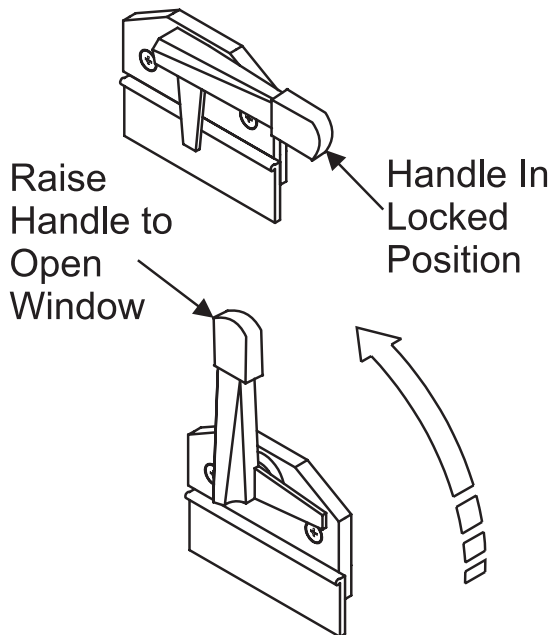
Pull the pin to unlock the extinguisher.

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.

EGRESS EXIT WINDOW



Egress Window Handle

An egress window is really nothing more than a window which 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. From the outside of the motorhome the identification is just as simple. Look for hinges along the top of the window.

The day-to-day window functions are the same as all other windows. The egress window operations occur by lifting the handle and pushing outward on the window. Pulling the window closed and lowering the handles will secure the egress window.

The egress window should be opened at least twice a year. There is a rubber seal which the window tends to stick to when closed. When the window sticks to the rubber seal it can be difficult to open.

Opening the window every six months will reduce the likelihood of the window sticking to the rubber seal, making for ease of operation.

LP-Gas is heavier than air and will settle to the lowest point, which is generally the floor of the motorhome. The LP-Gas detector is sensitive to other fumes such as hair spray, most of which 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 the reset button for 60 seconds, to stop the alert sound.

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

LP-GAS DETECTOR



LP Detector



CAUTION: This detector cannot alarm during the three-minute warm-up cycle.

When power is first applied, the Yellow LED will flash for three minutes while the detector is stabilizing. At the end of that time the LED will turn Green, indicating full operation. If the detector has detected unsafe levels of gas it will immediately go into alarm.

Operation

Simply 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 your detector. The test feature checks the full operation of the detector.

Test



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

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.

Alarm

Procedures to Take During an Alarm

1. Turn off all gas appliances.
2. Extinguish all flames and smoking material. Keep open flames, spark producing devices and smoking material out of the area.
3. Open doors and windows.
4. Evacuate the motorhome.
5. Turn off the propane tank valve.
6. A qualified service technician should determine and repair the source of the leak.



WARNING: When the alarm sounds, open all doors and windows to air out the motorhome and turn gas off at LP tank. Do not reenter motorhome until the alarm stops sounding. If the alarm sounds a second time after gas is turned back on, leave gas off and contact a qualified service technician to find the source and repair the gas leak. **DO NOT ATTEMPT TO RE-ENTER THE MOTORHOME UNTIL THE PROBLEM HAS BEEN CORRECTED.**

Alarm Mute

Press the Test-Mute button when the detector is in alarm.

1. The Red LED will continue to flash and the alarm will beep every 30 seconds until the gas level has dropped to a safe level.
2. The LED will flash Green until the end of the Mute cycle.
3. If dangerous gas levels return before the end of the mute cycle, the alarm will beep four times and return to phase one.
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.

Care of the Detector

1. Vacuum the dust off the detector cover weekly (more frequently in dusty locations), using the soft brush attachment of your vacuum.
2. Do not spray cleaning agents or waxes directly onto the front panel. This action may damage the sensor, causing an alarm or detector malfunction.

BRAKE LIGHT - THIRD

An additional third brake light is standard on all models. This third brake light is recessed in the middle of the rear cap, just above the engine compartment access door. When making checks of the brake lights, this brake light should not be overlooked.



Third Brake Light.

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.
- **Batteries** - Add distilled water and recharge if needed. Disconnect the cables. Remove the batteries and store them in a cool dry place. Check and recharge as needed. Never park the coach where the battery door cannot be opened.
- **Refrigerator** - Clean and leave both doors propped open. Cover the exterior panels and roof vents.
- **Air Conditioner** - Remove the air filters. Clean or replace.
- **Roof** - Keep clear of snow accumulation or damage may occur.

If the motorhome was properly and carefully prepared for storage, taking it out of storage will not be difficult. The following procedure checklist assumes that you stored your motorhome properly. If you did not, and extensive freeze damage or other serious deterioration has occurred, consult a dealer or an authorized service center for advice.

CHECKLIST- OPENING THE MOTORHOME

- 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 vents, ceiling vents and air conditioning covers. Be sure all 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 deterioration.
- Check all chassis fluids levels: engine oil, engine coolant, hydraulic fluid reservoir, transmission oil and rear axle oil.
- Check the charge levels in the batteries. Refill with distilled water only and recharge as necessary. Reinstall the batteries if necessary.
- Be sure the cable ends and terminals are clean and free of corrosion.
- Be sure the engine instruments indicate proper readings. Start the engine,

- allowing it to reach operating temperature.
- Shut the engine down. Check all fluids and fill as necessary.
- While the engine is running, check the operation of headlights, tail-lights, turn signals, back-up lights, license plate light and emergency flasher. Operate the dash air conditioner. If the air conditioner does not work, or unusual sounds occur, have the system checked by a qualified air conditioner technician.
- Drain, flush and sanitize the fresh water system as outlined in the water section (4). Inspect the drain hose for leaks. Replace if necessary.
- Operate all faucets and fixtures in the fresh water system.
- Check for water leaks at all joints and fittings. Repair if necessary.
- Check the 12 Volt circuit breaker and inspect fuses.
- Operate all 12 Volt lights and accessories.
- Install the new batteries in battery operated devices.
- Test the carbon monoxide, LP-Gas and smoke detectors.
- Check the monitor panel operation.
- Inspect the 120 Volt electrical system which includes the power cord, converter, all outlets and exposed wiring. If defects are found, refer to your dealer or an authorized service center.
- Start and run the generator.
- Operate the 120 Volt appliances and air conditioners.
- Inspect the LP-Gas system and check for leaks. If the LP tank shows signs of rust or corrosion, have it inspected by a qualified LP technician.
- Operate each LP-Gas appliance. Observe all burner/pilot flames for proper color and size. In any case, have the LP-Gas regulator adjusted for proper pressure by a qualified technician.
- Inspect and clean the interior.
- Check the sealant around all roof and body seams and windows. Reseal if necessary.
- Lubricate all exterior locks, hinges, and latches.
- 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 you choose, your dealer can double check your preparation and correct any defects or make any necessary adjustments.



Prepare the generator for operation following the instructions in the generator's Owner's Manual.

EXECUTIVE

SECTION 3
APPLIANCES & EQUIPMENT

INTRODUCTION

This section covers operation and care of various appliances and types of equipment found in the motorhome. The motorhome is equipped with a refrigerator, cooktop, microwave, furnace, water heater, air conditioner and dash radio. Many appliances operate on AC or DC current, LP-Gas or a combination of all three. Several optional appliances and equipment will also be discussed. Not all information may be applicable to your motorhome.



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

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 the motorhome is parked close to a gasoline pump it is possible for the fuel vapors to enter an appliance vent and ignite which can result in an explosion or fire. Also, many of the appliances have sources of ignition which operate automatically. It may be appropriate to shut off all circuit breaker and disconnect switches to prevent a source of ignition spark. Do not store flammable liquids such as lighter fluid, gasoline or propane in the outside refrigerator compartment.



WARNING: Operating an LP-Gas appliance with inadequate ventilation or partial blockage of flue can result in carbon monoxide poisoning, which can cause nausea, fainting or death.

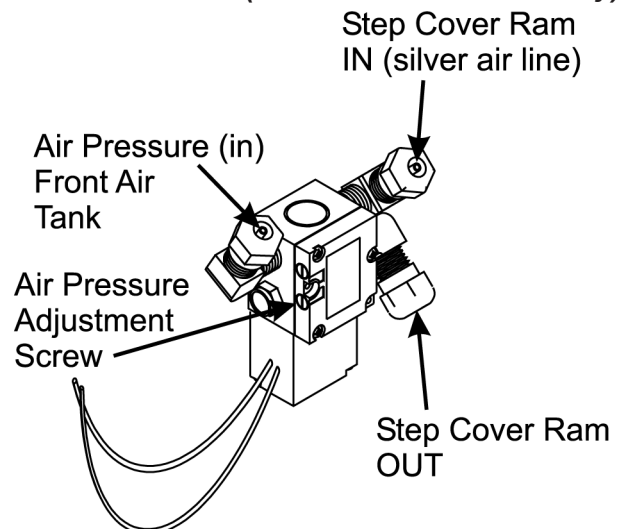


WARNING: LP-Gas is highly flammable and explosive. Turn off all LP-Gas appliances while refueling. Shut off all circuit breaker and disconnect switches to prevent a source of ignition spark.

The front door models are equipped with a sliding Stepwell Cover that is extended and retracted by two switch locations. One switch is located just inside the entry door to the right, next to the passenger seat. The second switch is located on the center control panel marked Step In/Out.

On models equipped with a sliding Stepwell Cover the cover 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

STEPWELL COVER (Front Door Models Only)



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 at approximately 60 pound per square inch (psi).



CAUTION: 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

Locate the step cover MAC Solenoid Valve. Open the generator compartment. The solenoid valve will be located on the frame tower on the curbside.

- Locate the two adjusting screws on the MAC valve.
- Clockwise adjustments on the MAC valve screw decreases the air pressure on the step cover.
- Counterclockwise adjustments on the MAC valve screw will increase the air pressure to the step cover.
- The MAC valve will come from the factory with adjusting screws backed out 3½ turns.
- If it is necessary to adjust the step cover, make sure that an authorized service location performs the adjustment.

ENTRY STEP

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.

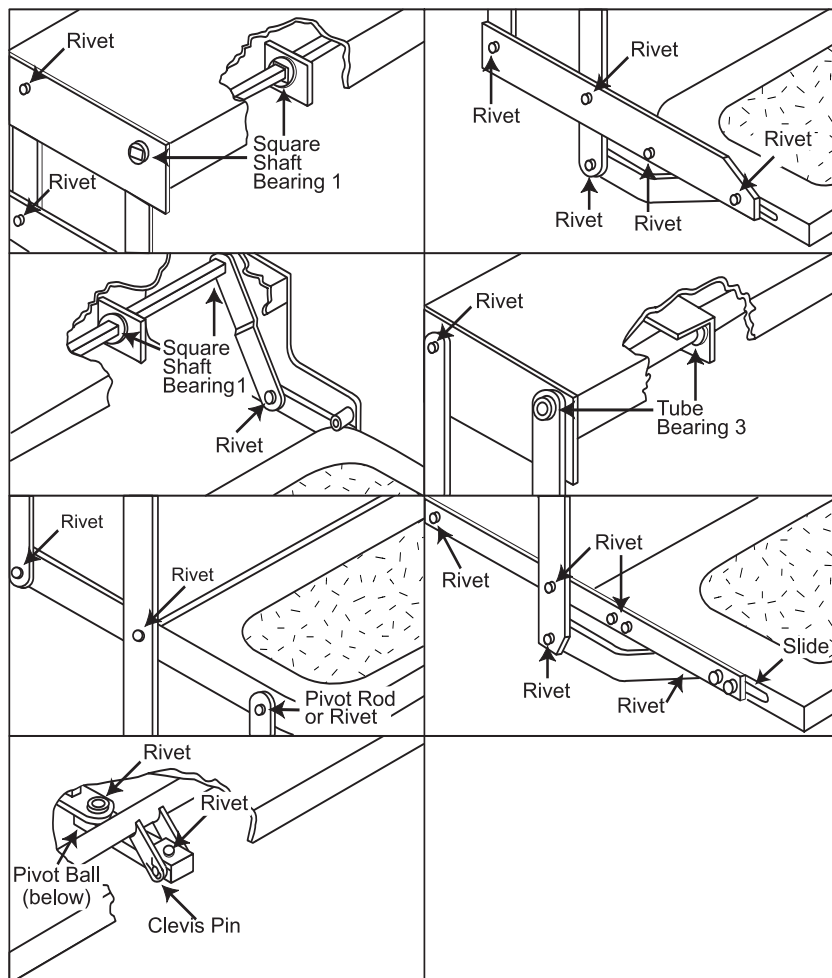
Operation

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.
3. Open the door. The step should extend and lock in the “down” position with the under step light on.
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. Turning off the power with the step retracted will also hold the step in a retracted position.
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.

If the step fails to operate:

- Make sure the step switch is **ON**.
- Check the main power supply for the step. A 20 amp auto reset 12 Volt DC circuit breaker is located on the rear run plate.
- 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 five amp ATO blade fuse is used to illuminate the **STEP OUT** dash warning light. The fuse is located on the front run plate.



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.

Clean all mud, salt and road grime from the step before lubricating. Lubricate all moving parts (bearings, pivot points, slides, clevis pin, and the drive linkage ball) every 30 days with a good quality heat and moisture resistant penetrating grease. *Kwik Lube Spray Grease* is specially formulated to lubricate *Kwikkee Electric Steps* and it is also recommended for lubricating all moving parts. Refer to the picture.

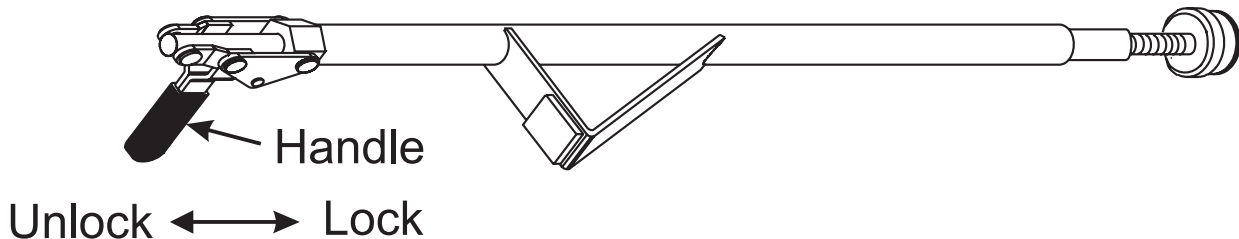



NOTE: Silicone lubricates and WD-40 are not recommended as they have a tendency to evaporate and dry the mating surfaces which leaves them vulnerable to the elements.

SLIDE-OUT ROOM - Extending Room


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.
- The park brake must be applied.
- The storage bay doors under the slide-out must be closed.
- Locate the two locking bar mechanisms on the top of the slide-out room inside the motorhome.
- Move the handles to the unlock position.
- 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 in motion.
- Locate the slide-out room control switch located in the passenger side overhead compartment above the entry door.
- 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.



 **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:** 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 the slide motor from overheating.

 **NOTE:** Slide-out room operation should be performed with a full air suspension system. 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 up.



NOTE: Monaco Coach Corporation is not responsible for the slide LOCK'R left in position before operating the slide. Damage can result if left in position. Remove the LOCK'R.

Follow the procedure for extending the slide-out. Once the slide-out is extended you can lower the awning to cover the window. Unlock the travel lock on the outside awning arms. Using the awning pull rod, extend the awning and secure the pull strap into the hook. When preparing for travel be sure to secure the travel locks.

Awning - Slide Out



Fully extended slide-out and window awning.



Travel lock secured for travel.



Unlocked travel lock.

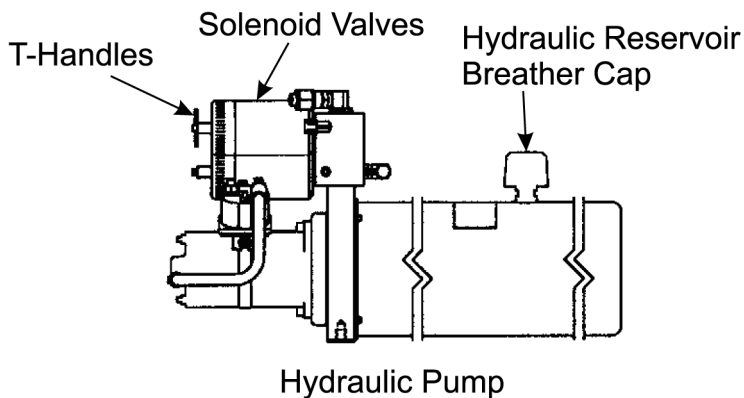
Check that there is sufficient clearance inside the motorhome for the slide-out room. If applicable, clean the floor. Press and hold the switch in the IN position. The slide-out room will move slowly to the IN position. To stop the slide-out room before the room reaches the IN position, release the switch. To continue the room movement, push and hold the switch in. The motor will change tone when the slide-out room is fully extended. Release the switch. After the slide-out room 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.

Slide-Out - Retracting Room



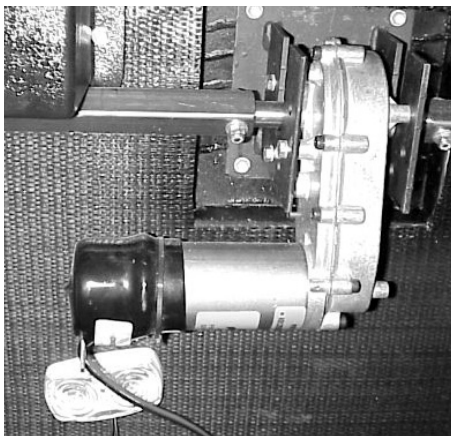
NOTE: Be sure you have sufficient clearance on the inside of the motorhome (drivers seat, etc.) before you retract the slide-out room. If your motorhome has ceramic tile floor, make sure the floor is clean before you retract the slide-out room. Dirt or grit that is trapped under the slide-out room could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

Manual Override

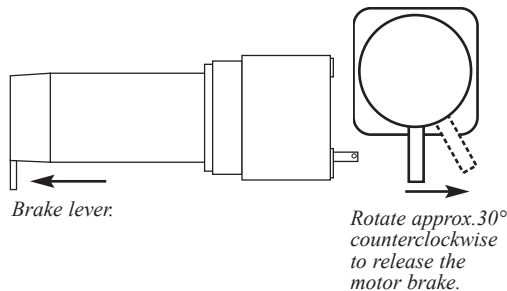


To move the slide-out room manually, retract the motorhome leveling jacks (see “Leveling Jacks”). Locate the Slide Room hydraulic pump on the lower left front frame of the chassis. Turn the T-handles counterclockwise approximately six turns each. The T-handles may turn easily at first, however, they will become difficult to turn as the internal springs are compressed. The room may move slightly as the valves are opened and internal pressure is released. At this point, it will be possible to push the slide-out room back into the travel position.

Manual Override - Bedroom Slide-Out



Location of slide motor lever.



Manually Overriding Your Bedroom Slide-Out

1. Disconnect the battery cables from the battery.
2. Lift up the mattress and base board to gain access to the slide-out mechanism.
3. If the bedroom slide-out motor has a lever on the back side, rotate the lever counterclockwise about 1/8 turn (looking from the rear of the motor). This will release the brake that locks the room in place. If the motor does not have a lever, use a 1/2” wrench to remove the four motor mounting bolts. Remove the motor.
4. Use an appropriate wrench (a 3/4” wrench/ratchet or an adjustable wrench) on the override to move the room in or out. The override is located on the opposite side of the slide-out rail from the motor.
5. Once the room is in, apply pressure to the wrench so that the room is sealed. Return the brake lever to its normal downward position to lock the room in place. Install the transit bar (if so equipped). If the motor does not have a brake lever, apply pressure to the wrench so that the room is sealed and install the transit bar (if so equipped).

If there is no motor lever and no transit bar, the motor must be mounted back onto the slide-out system to hold the room for transport. Because of this, the room may not be sealed from the environment.

6. Take the motorhome to an authorized dealer for service.

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

Preventive Maintenance

- 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.
- When the room is out, visually inspect the inner slide rail assemblies. Check for excess build-up of dirt or other foreign material. Remove any debris that may be present.
- If the system squeaks or makes noises, apply a coat of light weight oil to the drive shaft and roller areas. Remove any excess oil so dirt and debris do not build-up. Do not use grease.



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



NOTE: When leaving your motorhome for more than one day, always retract slide-out to the in position. Unpredictable weather conditions such as high wind and 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.

The refrigerator in a motorhome operates on a different principal than a standard household refrigerator. Knowing these differences should answer questions or solve problems that may arise. A standard household refrigerator uses a refrigerant. The compressor pumps refrigerant vapor into a condenser where the heat from the refrigerant is dissipated 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 type of system is efficient as long as 120 Volt AC is available; however, it does not allow the freedom for

REFRIGERATOR

use as a recreational vehicle is designed to offer. The recreational vehicle 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. It is heated to a gaseous state, which then rises to the top of the cooling unit into a condenser where it forms droplets as it cools. As the vapor condenses it will “extract or absorb” 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. The cooling unit has specific guidelines that need to be followed for proper operation and to insure longevity. The refrigerator should provide years of trouble-free service as long as the guidelines are followed.

Operation Specifics

The motorhome refrigerator operates from either LP-Gas or 120 Volt AC electric. The controls are electronic and require the DCV to be no higher than 15.4 Volt DC, or no lower than 10.5 Volt DC. The AC voltage limits are 132 Volt AC maximum and 108 Volt AC minimum. The refrigerator (from front view) needs to be leveled within three degrees side to side, and six degrees 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 for most people. 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. Operating the refrigerator in an “off level” condition will separate the sodium chromate and crystallize from the heat source. This blocks the recirculation action of the cooling unit, which can cause accumulative and irreparable damage.

The LP side of the refrigerator needs to be serviced yearly depending on use. The LP-Gas pressure should be checked as well. Over time, the BTU rating can change affecting the refrigerator’s performance. Ambient air temperature and humidity can also affect its performance and function. LP-Gas operation at an altitude higher than 5,500 feet lowers the BTU rating, which affects the refrigerator’s performance. If possible, switch mode operation to 120 Volt 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 or in the outside access compartment. This can be an indication of a refrigerant leak. Contact an authorized repair facility.

Tips

- If possible, cool items before putting them into the refrigerator.
- Keep the door shut. Think about what you want 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.
- Open a box of baking soda to absorb food odors. Wipe up any spilled soda.

Refrigerator Controls

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

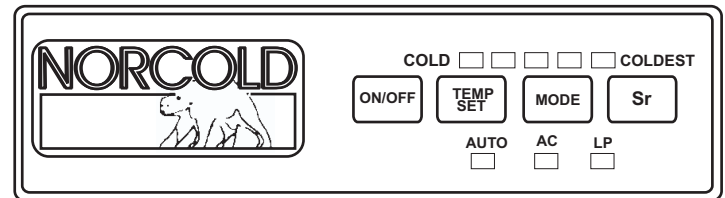


WARNING: Make sure all flames are extinguished and the LP-Gas valve is off before refueling. LP-Gas and gasoline are highly flammable materials which can cause explosion, fire or death. Many states have passed laws regarding having the LP-Gas valve open while traveling. Know the laws for the particular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

Alarm

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

1. DC or AC voltage higher or lower than allowed specifications.
2. Refrigerator is set to AUTO mode and the 120 Volt AC is discontinued.
3. LP-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.



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 owner's manual for the list of codes and their meanings.



NOTE: Keep the interior box temperature at or below 54°. This will help reduce the possibility of food spoilage. Low interior box temperatures cause the refrigerator to work harder, especially in hot and humid climates. Low box temperatures may also add to quicker frost build-up.

Doors

The refrigerator doors are a positive lock style door that closes with a “click.” This prevents accidental opening of the door while traveling. When storing the motorhome, the refrigerator doors have a storage position that locks the doors partially open. Use this feature to help reduce odor from mold and bacteria build-up. A completely closed up refrigerator in storage is a perfect habitat for molds and bacteria to grow. To use the storage feature, open doors approximately 1/2” and slide the latch into the cut-out of the strike plate.

Refrigerator Control Panel

The refrigerator control panel displays the following functions:

ON/OFF - Depress this button to turn the refrigerator on. Depress and hold this button to turn the refrigerator off.

LED Display - This screen is used for fault code display.

MODE - Pressing and holding this button will cycle the refrigerator through the different modes available: **AUTO**, **AC**, and **LP** modes. Release the button when the desired mode is displayed.

TEMP SET - Press and hold the button to select the desired temperature setting. Five settings, from **COLD** to **COLDEST**, are available.

Manual Mode Operations

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.

Auto Mode Operations

This feature will automatically select 120 Volt AC over LP-Gas operation. If 120 Volt AC is available, it will use this source for operation until AC service has been discontinued. Once 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 the button. In **AUTO** mode, AC or LP will remain lit for 10 seconds upon initial start or when mode has changed.

Refrigerator Ice Maker Operations

The ice maker works from 120 Volt 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 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.



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 may damage the ice maker assembly.

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

High Humidity Operation

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.

Cooling Unit Fans

Turn the refrigerator off and remove all the items. Leave the drip tray under the cooling fins. Do not use heating guns, hair dryers 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.

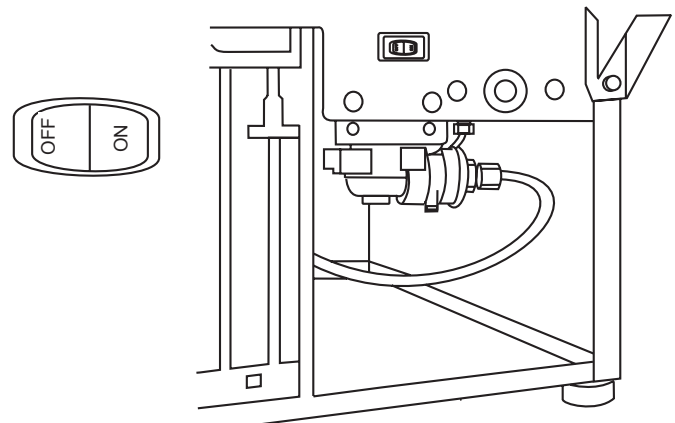
Defrosting

Use only cotton or paper towels. Products such as *FORMULA 409*, *DAWN* and *FANTASTIC* are acceptable cleaners. Do not use scouring pads or abrasive cleanser, as these can damage the interior finish.

Cleaning

The ice maker operates from 120 Volt power, requiring either the generator or the inverter to be ON, or the motorhome must be connected to shore power. Water for the ice maker is supplied by the potable water system and requires the 12 Volt water pump to be on for water pressure or for the motorhome to be connected to city water. The supply valve on the distribution manifold must be on in order for the icemaker to produce ice.

ICE MAKER - STAND ALONE (Optional) Not available on all models.



ON/OFF Switch and supply valve for distribution manifold.

Operation

Find the **ON/OFF** switch that is located on the lower front panel.

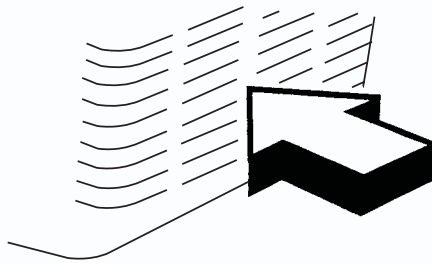


NOTE: When the ice maker is not in use all ice should be removed and the door should be propped open about one (1) inch for ventilation.

If the Ice Maker Fails to Make Ice or Makes Ice Intermittently:

1. Check to see if there is 120 Volt power from the generator, inverter or shore power.
2. Check to see if the water pump is **ON** or if there is city water.
3. Check to see if the water shut-off valve to the ice maker is open.

Care and Cleaning



U-Line Ice Maker front grill.

The interior may be cleaned with mild detergent and warm water. Avoid the use of solvent cleaning agents or abrasives on the interior. These cleaners may transmit taste to the ice cubes and food, or damage and discolor the interior. The exterior may be cleaned with mild detergent and warm water. The front grill should be kept free of dust and lint to permit free air flow to the condenser. The condenser coil, located behind the front grill, should be cleaned three to four times each year. Use a brush or vacuum cleaner to remove dirt, lint and other accumulations from the condenser coil.



The ice maker in the all-electric coach is integrated into the refrigerator. See the Manufacturer's Instructions located in the motorhome's Information File for specific operating instructions.

MICROWAVE OVEN

The microwave oven is operated from 120 Volt AC supplied by either shore power, the generator or the inverter. Microwaves heat food by 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 also thermostatically controlled and will be activated automatically by heat from the cooktop. The microwave offers many different features, some of which 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.

The microwave/convection oven operates from 120 Volt AC supplied by either shore power, the generator or the inverter. 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.



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.



NOTE: Anytime AC power has been discontinued the clock time will be erased.

The microwave operates on 120 Volt AC power, which is supplied from either shore power, the on-board generator or the inverter.

Operation



NOTE: The microwave is for food preparation only. Do not use the microwave to dry clothes, newspapers, 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** will appear 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.

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.

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.

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.

Microwave Cooking

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

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 lockout 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 Settings:

To use 100 percent 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 percent 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 percent 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 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 it does 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. 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. While in this mode, the microwave will use 30 percent power on **HIGH/MIX** and 10 percent power on **LO/MIX**. The convection temperature can be changed from 100 to 450° F. The default convection temperature is 325° F for both **HIGH** and **LO MIX**.

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

CompuRoast or CompuBake:

CompuRoast and CompuBake 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 and enter the food type from list next to the mode used. Enter the food type being cooked by using the number pad. To use CompuBake, press the **START/TOUCH-ON** pad to begin 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.

-
- 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 is not compatible for microwave. Hand-painted china commonly contains traces of metal.
 - To test utensil for microwave compatibility, place the utensil in the microwave with an 8 oz. plastic cup of water. Set the microwave at full power for one minute. Carefully, feel the utensil. It should not be hot. Make sure to check the entire utensil.
 - Cover food with a paper towel or upside-down plate to help keep food spattering 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

Tips

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. Small amounts of foil are acceptable if 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 into 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 oven is plastic and metal. The interior is metal. Do not use scouring pads, harsh or abrasive cleanser, chemical cleaners, or petroleum based thinners. 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, as 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.

COOKTOP

The cooktop utilizes sealed glass cooktop surface burners that spread heat evenly across the bottom of the cookware surface. The cooktop uses an electric ignition system which requires 120 AC to operate, and LP-Gas as a fuel source. The cooktop should be used for cooking purposes only, 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 flame tips indicate a rich fuel mixture, which can leave a black color or carbon on the bottom of a pot or pan.

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

Operation

1. The LP-Gas valve on the LP tank is open.
2. The LP-Gas valve under the cooktop (located next to the regulator) must be open.
3. The control knobs are opened.

Using the Cooktop:

Place the cookware on the burner grate over the desired surface burner first. Open the desired burner valve by applying a downward pressure on the knob and rotating counter clockwise from the **OFF** position. This will allow the flow of LP-Gas through the burner. Rotate the knob to the **LITE** position to activate the igniters. All igniters will click at the same time. The only burner to produce a flame will be the one with the knob in the **LITE** position. Once the burner lights, rotate the knob to the desired cooking setting.

In the unlikely event of a power outage or igniter failure, the cooktop can be lit manually.

Surface Burners:

The surface burners have an independent heat rating. The rating for the burners used are 6,000 BTU's and 12,500 BTU's. The smaller rated burner (left burner) should be used for simmering or smaller quantities of food in small cookware. The larger rated burner (right burner) should be used for deep-frying, large quantities of food and large cookware. The amount of heat produced is controlled at the control panel. The flames at the surface burners should have an even appearance at the burner base. Uneven flames may indicate the need to clean the burners.

Control Knobs:

- **LITE** - Used to activate electric spark to light the burner.
- **HI** - Used to start the cooking process and bring liquids to a boil quickly.
- **MED HI** - Used to hold a boil in liquids.
- **MED** - Used for gravy and large amounts of vegetables.
- **MED LO** - Used to keep food cooking at a reduced heat after starting from higher settings.
- **LO** - Use to keep food warm or simmer.



WARNING: Do not leave burners unattended during cooking.

Surface Grate

The surface grate uses a locator pin which **MUST** be positioned in the burner cap indent hole to keep the grate held in place.



WARNING: Do not leave burner valve(s) open while burner(s) are not lit. LP-Gas is heavier than air and will settle on the floor and “hide” in corners. 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. Open all windows and doors. Do not touch any electrical switches. They may cause a spark which 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.

Tips

- A yellow flame is an indicator of incorrect fuel/air ratio. Lowered BTU output and carbon build up can occur.
- 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.
- Do not allow the tips of the flame to extend beyond pan or pot edge. When this occurs, heat is wasted and possibility of injury increases.
- Cooking time can be reduced if the least amount of liquid is used. The choice of cookware selected can make a big difference.
- Additional information can be found in the “Use and Care Guide” located in the Information File Box

Care & Cleaning

Cleaning the cooktop is quick and easy. Regular cleaning with a soft cloth and a warm detergent solution is generally enough to keep the cooktop clean. Wash, rinse and dry with soft cloths. Clean the cooktop when it is cool. Use a dry cloth or paper towel to clean spatters or spills when the surface is warm, before it gets baked on. Glass cleaner sprayed on a paper towel should be used for the cooktop surface. You do not want to 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 it 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. Remember, the surface is glass and must be given consid-

eration when cleaning. Steel wool and course, 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.

Two comfort controls are used for the HVAC (heating, ventilating and air conditioning) system. One comfort control is located in the living room. The living room comfort control will operate the front roof air conditioner functions and the LP-Gas furnace operation. If the motorhome is equipped with an Aqua Hot, the living room comfort control will operate the dinette and living room heat exchangers.

The other comfort control is located in the bedroom. The bedroom comfort control will operate the rear roof air conditioner and (if equipped) the mid roof air conditioner functions. If the motorhome is equipped with an Aqua Hot, the bedroom comfort control will operate the hallway, bathroom and bedroom heat exchangers. The comfort control uses a liquid crystal display to inform the operator of current mode status.

The different functions of the HVAC system (Off, Fan, Cool, Heat Pump and Furnace) may be selected by repeat depressing of the **MODE** button. The roof air conditioner fan speed is controlled by the **FAN** button. 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 conditioner will use all three blower speeds low, medium or high, when Auto fan is selected in Cool mode. If operating in Heat Pump mode, only low or high blower speeds will be used.

The motorhome is divided into three operating Zones; front, middle and rear. The living room comfort control is Zone One, although this is not displayed. The bedroom comfort control operates the middle area, which is displayed as Zone Two. The bedroom area is considered Zone Three; however, it is displayed as Zone One. Zone selection is made by depressing the **MODE** and **FAN** buttons simultaneously. The temperature for any HVAC function is controlled by depressing the **UP** or **DOWN** buttons.



NOTE: Comfort Control must be turned to ON to operate any HVAC function. There is no mixing modes on the comfort control. You cannot have one zone on Air and another on Furnace.



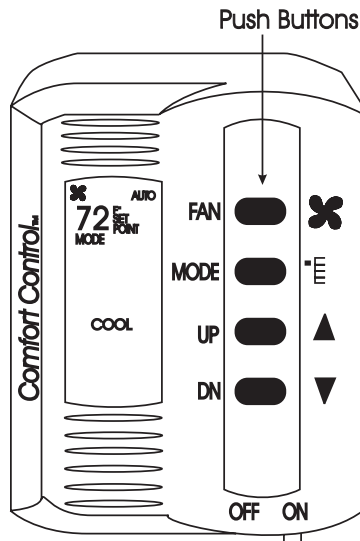
NOTE: The motorhome will not heat or cool faster by selecting a very high or very low temperature setting.

WALL THERMOSTAT

Fan Operation

This mode circulates interior air using the roof air conditioner blower. Depress the **FAN** button to select desired fan speed. The fan speed will control roof air conditioner blower speed in **FAN**, **COOL** or **HEAT PUMP** modes only.

Air Conditioner Operation



Comfort Control in air conditioner mode.

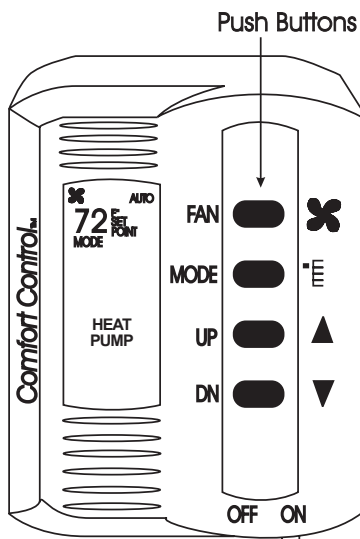
The living room comfort control will operate the front roof air conditioner.

- Depress the **MODE** button repeatedly until **COOL** is displayed.
- Set desired fan speed by depressing the **FAN** button.
- Set desired cooling temperature by depressing the **UP** or **DOWN** buttons.

The bedroom comfort control will operate the rear roof air conditioner and (if equipped) the mid roof air conditioner.

- Depress the **MODE** button repeatedly until Cool is displayed.
- Depressing the **FAN** and **MODE** button simultaneously will alternate between Zone One (rear roof air conditioner) and Zone Two (mid roof air conditioner).
- Set desired fan speed by depressing the **FAN** button.
- Set desired cooling temperature by depressing the **UP** or **DOWN** button.

Heat Pump Operation



Comfort Control in heat pump mode.

The living room comfort control will operate the front roof air conditioner.

- Depress the **MODE** button repeatedly until **HEAT PUMP** is displayed.
- Set desired fan speed by depressing the **FAN** button.
- Set desired heating temperature by depressing the **UP** or **DOWN** buttons.

The bedroom comfort control will operate rear roof air conditioner and mid roof air conditioner (if equipped).

- Depress the **MODE** button repeatedly until Heat Pump is displayed.
- Depressing the **FAN** and **MODE** button simultaneously will alternate between Zone One (rear roof air conditioner) and Zone Two (mid roof air conditioner).
- Set desired fan speed by depressing the **FAN** button.
- Set desired heating temperature by depressing the **UP** or **DOWN** buttons.



NOTE: The roof air conditioner will not operate in Heat Pump mode with ambient temperatures at or below 24° Fahrenheit.

If Heat Pump mode is selected at or below this temperature or if operating in Heat Pump mode and temperature drops to 24° F, the air conditioner will stop Heat Pump operation and Aux Heat will be displayed. The furnace will be selected as the auxiliary heat source and will begin operation. Furnace will remain the primary heat source until ambient temperature rises above 42° F. When ambient temperature is between 24-42° F, a defrost cycle is initiated approximately every 40 minutes of compressor operation. The blower motor will stop for five minutes and Defrost will be displayed. After the defrost cycle the Heat Pump operation will resume.

If the Aux Heat cycle is initiated and the motorhome is equipped with an aqua hot, the Aqua-Hot will need to be turned **ON** by using the switches located in the galley. Living room and dinette heat exchanger blowers will automatically begin operation. Use the bedroom comfort control to select zone one or Zone Two heat exchangers. The Aux Heat mode is automatically selected due to refrigerant characteristics in cold temperatures.

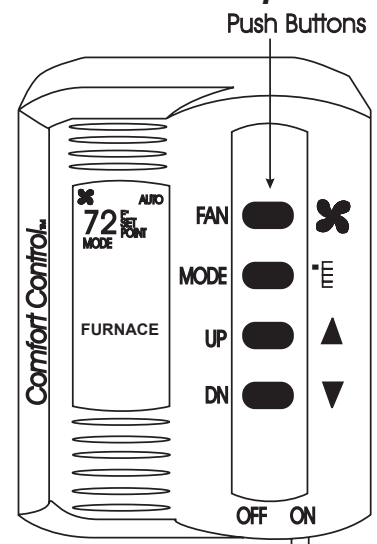
The living room comfort control operates the LP-Gas furnace.

- Depress the **MODE** button repeatedly until furnace is displayed.
- Set desired heat temperature by depressing the **UP** or **DOWN** buttons.



NOTE: Main gas valve on LP tank must be turned ON for gas furnace operation.

Furnace Operation



Comfort Control in furnace mode.

Should the comfort control exhibit unusual symptoms or not respond to commands, it may need to be reset. To reset:

- Depress the **MODE** button. Display backlighting should illuminate.
- Depress **MODE**, **UP** and **DOWN** buttons simultaneously five to ten seconds. The comfort control should return to **MODE OFF**. The factory default settings of 72° F for Cool and 68° F for Heat should be established.

Comfort Control Reset

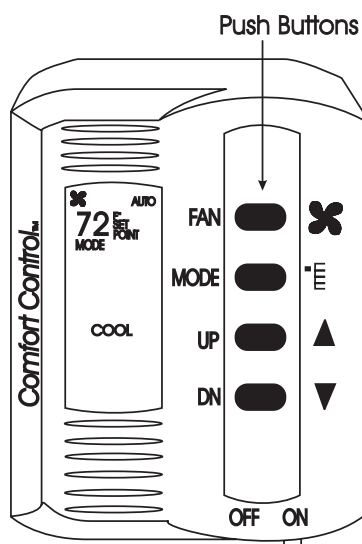
Aqua-Hot Operation (Optional)

The living room and bedroom comfort controls will be used to operate Aqua-Hot heat exchangers. Preheat the Aqua-Hot by selecting desired heat source using switches located in galley. The living room comfort control will operate the dinette and living room heat exchangers. The bedroom comfort control in Zone One setting will operate the bedroom exchanger. The Zone Two setting will operate the hallway and bathroom exchangers. Depressing the **FAN** and **MODE** button simultaneously will alternate between Zone One and Zone Two. Depress the **UP** or **DOWN** button to select the desired temperature.



NOTE: The private bathroom heat exchanger is controlled by the switch in the private bathroom. The bathroom blower motor will cycle on and off with hallway exchanger when the switch is turned on. The private bathroom exchanger is switched due to the amount of convection heat by the exchanger.

AIR CONDITIONER - ROOF



Comfort Control in air conditioner mode.

The motorhome is equipped with two 13,500 BTU roof air conditioners. A third roof mounted air conditioner is installed on all 43 foot models. The roof air conditioners operate from 120 Volts AC only, either by shore power or the generator. Operations are controlled by the 12 Volt DC comfort control. The electronics in the comfort control use a type of telephone 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 LP-Gas furnace operation. The refrigeration process in the roof air is primarily the same as the dash air conditioning or a household type refrigerator. It functions as an enclosed system. The refrigeration process repeats in a cycle. The refrigerant is drawn into the compressor. The high pressure vapor is sent to a condenser where the heat is expelled into the atmosphere. The vapor leaves the condenser as a high pressure liquid. This liquid is forced into a metered capillary tube, and then into the evaporator or low side pressure. The refrigerant changes from liquid form to a vapor as the heat is extracted. The vapor is drawn back into the compressor to start the cycle again. When operating the roof air in the heat pump mode, the refrigerant flow is reversed blowing the heated air into the interior of the motorhome.



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

Heat Pump

The heat pump mode offers heat by using the air conditioner as a heat source. The air conditioning principal is reversed, supplying heated air to the ceiling registers instead of refrigerated air. There are ambient temperature limitations of the heat pump mode.



NOTE: The roof air conditioner will not operate in Heat Pump mode with ambient temperatures at or below 24° Fahrenheit. If the heat pump mode is selected at or below 24° Fahrenheit, or if operating in Heat Pump mode and temperature drops to 24° Fahrenheit, the air conditioner will stop Heat Pump operation and Aux Heat will be displayed. The furnace will be selected as the auxiliary heat source and will begin operation. The furnace will remain the primary heat source until ambient temperature rises above 42° Fahrenheit. When ambient temperature is between 24-42° Fahrenheit, a defrost cycle is initiated approximately every 40 minutes of compressor operation. The blower motor will stop for five minutes and Defrost will be displayed. After the defrost cycle the Heat Pump operation will resume.

If the Aux Heat cycle is initiated and the motorhome is equipped with an aqua hot. The aqua hot will need to be turned ON by using the switches located in the galley. Living room and dinette heat exchanger blowers will automatically begin operation. Use the bedroom comfort control to select Zone One or Zone Two heat exchangers. The Aux Heat mode is automatically selected due to refrigerant characteristics in cold temperatures.

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

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

Thermostat Operation In Air Conditioner Mode:

The living room comfort control will operate the front roof air conditioner functions.

- Depress the **MODE** button repeatedly until Cool is displayed.
- Set desired fan speed by depressing the **FAN** button.
- Set desired cooling temperature by depressing the **UP** or **DOWN** buttons.

The Bedroom comfort control will operate the rear roof air conditioner functions and the center roof air conditioner for all 43 foot models.

- Depress the **MODE** button repeatedly until Cool is displayed.
- Depressing the **FAN** and **MODE** button simultaneously will alternate between Zone One and Zone Two. Zone One will control the bedroom roof air conditioner and Zone Two will control the center roof air conditioner.
- Set desired fan speed by depressing the **FAN** button.
- Set desired cooling temperature by depressing the **UP** or **DOWN** buttons.



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

Operation

Heat Pump Operation:

Living room comfort control will operate the front roof air conditioner.

- Depress the **MODE** button repeatedly until Heat Pump is displayed.
- Set desired fan speed by depressing the **FAN** button.
- Set desired heating temperature by depressing the **UP** or **DOWN** buttons.

Bedroom comfort control will operate rear roof air conditioner.

- Depress the **MODE** button repeatedly until Heat Pump is displayed.
- Set desired fan speed by depressing the **FAN** button.
- Set desired heating temperature by depressing the **UP** or **DOWN** buttons.

Return Air Filters

The return air filters should be cleaned frequently. They are located on the motorhome ceiling inside the air intake vent covers. Never run the air conditioner without the return air filters in place. This may plug the evaporator core with dirt and may substantially affect the performance of the air conditioner.

To Clean:

- Remove the vent covers and filters.
- Wash the filters and covers in warm soapy water. Do not use solvents.
- Rinse the filters and cover thoroughly with fresh water and allow them to dry.
- Reinstall the filters and covers.

FURNACE

The furnace and its related components are 12 Volt DC operated. It uses LP-Gas as its 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. A warm air discharge is incorporated to heat the motorhome's holding tanks.

Operation

The furnace operates in the following manner: The wall thermostat sends a signal to the front roof air conditioner circuit board, which closes a relay. Closing a relay sends an electrical signal to the furnace to begin the ignition cycle. There is a small time delay before the blower motor begins. Once the blower motor attains a predetermined speed, it will close the air prover or sail switch. The sail switch, which is now closed, sends the electrical signal through a high temperature protection switch, then to the automatic ignition circuit board. After the thermostat is satisfied, the gas valve closes and extinguishes the burner. The blower motor stops approximately 45 seconds later.

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 motorhome's house batteries are charged.
3. The battery cut-off switch at the entry door is in the **ON** position.



WARNING: IF YOU SMELL GAS extinguish all open flames and turn off the main gas supply. Liquid propane is a highly volatile and extremely dangerous gas. It can explode or cause a fire, which may result in property damage, injury or death. Propane is a “heavy” gas that can “float” 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. Keep all open flames, spark producing devices and smoking material out of the area. Contact a qualified service center and have the problem correctly diagnosed and repaired before resuming operation.



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



NOTE: 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.

- 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.

Using the Furnace



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

- After 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.

Tips

If 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. Make sure the battery cut-off switch at the entry door is 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. Hook-up to shore power and start the generator or main engine to charge the batteries.



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

WATER HEATER

The water heater in the motorhome will heat water using two different methods. The first method is 120 Volt AC, supplied either by shore power or the on board generator. The second method is LP-Gas. The 120 Volt AC uses a heating element like those found in a house style water heater. The 120 Volt AC method is efficient if shore power is available. The LP-Gas incorporates the use of an automatic ignition circuit board operated by 12 Volt DC. The water temperature is controlled by two thermostats. One is for the 120 Volt and the other is for the LP-Gas. The temperature is preset by the water heater manufacturer. Water is pumped into the bottom of the water heater tank where it is heated and discharged out of the top of the tank upon usage. For easy winterization, the water heater is equipped with a temperature and pressure safety relief valve and a bypass valve. The water heater has an aluminum clad tank and an anode is not necessary.



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



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

Before Using the Water Heater

Before 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 is present. The water heater does not need to be operating while this is being done.



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. 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 water heater will operate when the following conditions have been met:

- 120 Volt AC has been supplied either from shore power or the generator.
- The LP-Gas valve on the LP tank is open.
- The battery cut-off switch at the entry door is ON.
- The house batteries are charged.

Operation

- Make sure the LP-Gas is turned on.
- Turn the water heater switch to the the **ON** position. The water heater will make an audible “roar” from the burner when ignited. The indicator light will illuminate briefly then go out when the water heater is lit. The indicator light will glow steady when the ignition cycle has gone into “lock-out.”

Water Heater - Using LP-Gas

- Have either shore power or the generator supplying AC voltage.
- Turn on the water heater switch located under the galley counter.

Water Heater - Using 120 AC

- 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. The water heater element, when in operation, will use approximately 12 amps. It may be necessary to operate appliances in sequence.
- 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. The valves can be purchased from most hardware stores.

Tips



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 - LP-Gas Operations

- 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 monitor panel does not light and the water heater does not light, make sure the battery cut-off switch at the entry door is on, or check for a blown fuse in the house distribution panel.

Troubleshooting - Electric Operations

- If the 120 Volt piloted switch at the galley is lit, but there is no hot water, check the **ON/OFF** switch on the water heater unit.
- If the 120 Volt piloted switch does not light, check the AC source, breaker, shore cord connection or transfer switch.

AQUA-HOT HEATING & HOT WATER SYSTEM (Optional)

The Aqua-Hot heat system is specially designed for use in motorhomes. The Aqua-Hot is an appliance combining a water heater with a furnace. The Aqua-Hot will provide an almost endless supply of hot water and heat the interior of the motorhome. A 50,000 BTU diesel fired burner and a 1,650 watt AC element heats a 50/50 antifreeze solution to approximately 200° Fahrenheit. The antifreeze solution is pumped through heat exchangers located throughout the motorhome. Four pumps are used to circulate the antifreeze solution. Three pumps supply the solution to the interior heat exchangers. The fourth pump circulates the antifreeze solution through the engine. Fresh water is heated when pumped through a coil tube inside the aqua hot.

Aqua-Hot - Use of Chlorine Bleach

Chlorine bleach or other concentrated chlorine bearing chemicals can cause failure, if not properly and thoroughly rinsed, to the Aqua-Hot's Domestic Water Loop (copper tubing). The Aqua-Hot's copper tubing is rated for use with fresh water and winterization solutions only. Periodic flushing with other common household chemicals including bleach will have little or no effect on the product if properly rinsed with the fresh water afterwards. Failure of copper tubing, especially soft or flexible copper, can result if materials other than water or winterization solutions are allowed to reside inside the piping for extended periods as during storage or other periods of non-use. The most common cause for failure is due to an extended exposure to chlorine, solutions containing chlorine (i.e., bleach), or hydrochloric acid.



NOTE: Aqua Hot must be turned ON before using any heat feature.

The diesel burner will consume approximately a ½ gallon of diesel per hour of continuous burner operation. The diesel burner operates on 12 Volt/65 watts. The circulating pumps operate on 12 Volt/12 watts each. The diesel fired burner has a fast recovery rate.

Diesel Burner

To heat the Aqua-Hot from the diesel burner, turn the switch to the **ON** position. The switch will illuminate when it is turned on. Allow 20-30 minutes for the Aqua-Hot to reach operating temperature before operating heat exchangers or using hot water.

The electric element works well if plugged into 50 amp service. If the motorhome is plugged into less than 50 amp service, exercise care so the electric service provided will not be overloaded. Electric operation recovery rate is slower than the diesel burner. When the switch is turned on a relay will send power from the 110 Volt AC panel to the electric element in the Aqua-Hot. Allow two to three hours for the Aqua-Hot to reach operating temperature when operating from the electric element.

Electric Heat Element

The Aqua-Hot antifreeze solution is plumbed with the engine cooling system. This mixing feature allows the Aqua-Hot to heat the antifreeze and circulate the solution by a pump through the engine. The engine preheat feature provides easy engine starting on cool mornings. When traveling, the heated engine coolant may be pumped through the Aqua-Hot system. This will provide hot water and heat the interior using the exchangers.

Engine Heat Exchange System

Turn the diesel switch to the **ON** position. The diesel burner will light. Turn the Engine Preheat to the **ON** position. This activates the engine pump circulating coolant from the Aqua-Hot through the engine.

Engine Preheat

The heat exchangers are small radiators with 12 Volt DC blower motors. Current consumption is approximately .25 watt per large heat exchanger. The small heat exchanger used in a private bath and for the holding tank bay is .10 watt.

Interior Heat Exchangers



NOTE: The HVAC (heating, ventilating, air conditioning) system will not operate correctly when both comfort controls and all zones are not in the same mode. DO NOT set control to display furnace in one zone and cool displayed in another zone.

Furnace Operation

To operate the furnace:

- Select either diesel burner or electric element operation.
- Turn living room comfort control to ON.
- Depress mode button repeatedly until furnace is displayed.
- Select desired temperature setting using the up or down buttons.

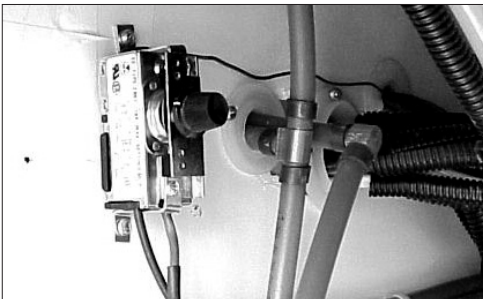
To turn bedroom comfort control to ON:

- Depress mode button repeatedly until furnace is displayed.
- Depressing the **FAN** and **MODE** button simultaneously will alternate between Zones One and Two. Zone One controls hallway and bathroom exchangers. Zone two operates bedroom exchanger.
- Select desired temperature setting using the up or down buttons.



NOTE: The private bathroom room heat exchanger is controlled by the switch in the private bathroom. The bathroom blower motor will cycle on and off with the hallway exchanger when the toilet switch is turned on. The private bathroom exchanger is switched due to the amount of convection heat by the exchanger.

Bay Thermostat



Adjust the Bay Thermostat here.

If you are using your motorhome in cold weather conditions, you will need to locate the bay thermostat next to the Aqua-Hot. This thermostat will control the heat exchanger for holding tank bay heat. Adjust the thermostat to 40-50° F. This will help prevent freezing of the water system.



NOTE: The Aqua-Hot must be turned ON when using the holding tank bay exchanger.

Maintenance Schedule

Monthly:

Check the Aqua-Hot's 50/50 solution of water and antifreeze to ensure its proper level. Do this by visually checking coolant level in Aqua-Hot's expansion tank. This should be checked only when the Aqua-Hot is at operating temperature. Adding solution to expand the tank when the unit is cold will result in a solution overflow when the Aqua-Hot heats to normal operating temperatures.

Annually:

Be sure to have the Aqua-Hot tuned up early. A tune up should consist of a fuel nozzle and fuel filter replacement, as well as a thorough cleaning of the

combustion chamber. This simple tune up will keep the Aqua-Hot running smoothly throughout the year, as well as allow service personnel to inspect for additional wear of other components. Signs that the Aqua-Hot needs servicing are continuous white exhaust smoke or poor ignition start up. When in operation, the Aqua-Hot should have a smooth, high-pitch whine. Loud growls or other noises indicate service is required.



CAUTION: Before cleaning or servicing, disconnect all power supplies.



For more details about the Aqua-Hot system, see the Owner's Information Box.

The filter is on the curb side of motorhome, located behind fuel access door. Remove the two bolts at the bottom of the fuel door and swing the door upwards. The Aqua-Hot fuel filter/water separator is mounted on top of the chassis frame support.

AQUA-HOT DIESEL FILTER/WATER SEPARATOR *Model 120 Series*

Water is heavier than fuel and will settle to the bottom of a fuel bowl, which will make it appear different in color. In high humidity environments, check the collection bowl more than annually. **With the engine off**, open the drain to evacuate contaminant, then close.

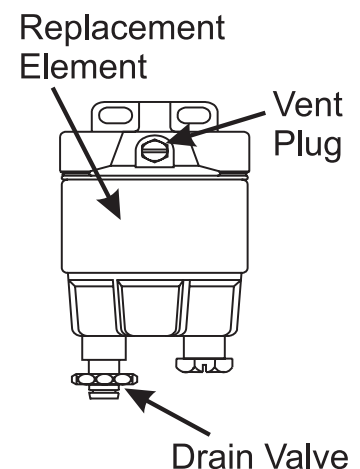
Draining Collection Bowl

The contamination level in the fuels determine the element's replacement frequency. Fuel flow to the Aqua-Hot becomes restricted as the element gradually plugs up with contaminants, resulting in noticeable heating loss and/or hard starting. If this occurs, change the element as soon as possible. As a guideline, change the element every 500 hours, annually or at first indication of heat loss, whichever occurs first. Always carry an extra replacement element as one tankful of contaminated fuel can plug a fuel filter. The Filter Number is: Racor Filter R2TRA000T 10 micron.

Element Replacement

To Replace the Element:

- Drain unit of fuel by opening drain valve.
- Spin bowl/element from head and remove element.
- Coat new seals with motor oil and the install new element.
- Spin bowl/element onto head and tighten firmly by hand.
- Prim spin bowl/element and fill with clean fuel.
- Spin bowl/element onto head and tighten firmly by hand.
- Start Aqua-Hot and check for leaks.



WASHER-DRYER PREPARED

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

1. Color coded water supply lines: red line for hot, blue line for cold.
2. An 1½” waste water drain line with a threaded cap, a 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 above compartment



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

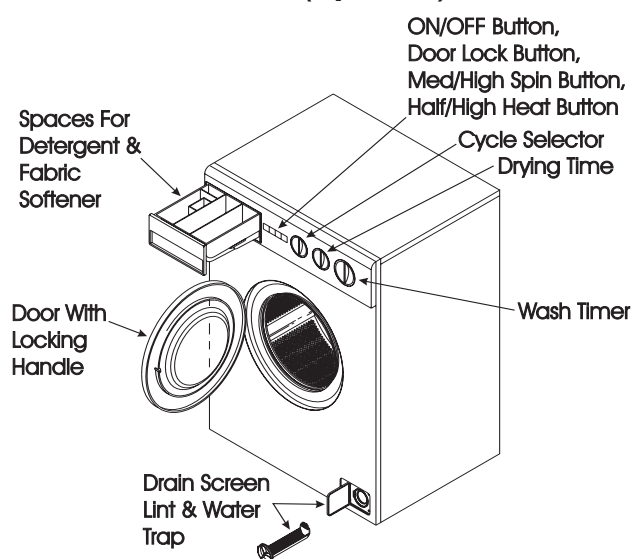


If a washer-dryer is to be installed at a later date, follow all the manufacturer’s installation instructions.

Listed here are further instructions which should be adhered to for safe and reliable operation:

- Do not connect the clothes dryer exhaust duct to any other duct, vent or chimney
- Do not terminate the exhaust duct beneath the motorhome
- Use proper length fasteners 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 air.

WASHER-DRYER (Optional)



This appliance is an automatic washer with a capacity of up to 10 lbs. (4.5Kg) 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 extra spin cycles.

- The Washer-Dryer operates on 120 VAC.
- To operate the Washer-Dryer you will need to be plugged into shore power or have the generator running.
- The Washer-Dryer can be operated while driving down the road. The generator will need to be running and the water pump will need to be on. Make sure the grey tank will have enough room for the rinse cycle.
- The Washer-Dryer water use will be approximately 16 gallons of water per load.

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 your washer. Front load horizontal axis washing machines require less detergent. Soap suds line should not exceed the halfway point of the glass door.

To begin a wash load:

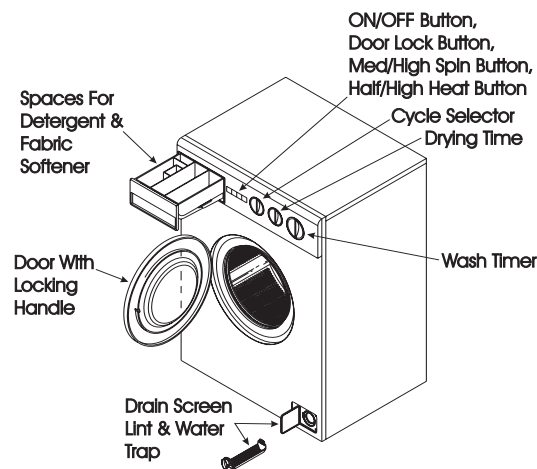
- Sort and pre-treat clothes.
- Add the measured amount of detergent suggested by the package directions (maximum two tablespoons).
- Load the clothes loosely into the washer. Close the washer door.
- Turn the cycle selector knob to the desired temperature setting.
- Decide which washing cycle you wish 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.



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. Keep the area around the exhaust opening and adjacent areas free from the accumulation of lint, dust and dirt.

The removable drain screen which protects the pump from lint and foreign matter needs to be cleaned periodically. How often will depend on the type of clothes that you wash. Cotton articles cause more lint to collect than nylon articles. Under no circumstance should the drain screen be removed while the machine is full of water. To clean the drain screen, open the service door by pressing on the left hand side. Place a cloth or shallow tray under the drain screen housing, as a small quantity of water may run out. You may find it 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.

Cleaning the Drain Screen



Winterizing the Washer-Dryer

To winterize your Washer-Dryer, please follow the instructions below to avoid damage to your unit due to freezing:

1. With the unit off, remove the wash filter to allow the water remaining (in the pump and drain hose) to be evacuated. Replace the filter.
2. Close the inlet shut-off valve located at the manabloc water system. Open the low point drains to drain all the water.

If antifreeze is being used in the system follow these instructions:

1. When putting antifreeze into the water system of your motorhome, set the washer to a warm/warm fill setting and allow water to flow into the unit until the antifreeze is detected.
2. Slowly advance the timer to a rinse cycle and allow the water to flow for 10 seconds. Advance the unit to a spin cycle to remove the majority of the water from the unit.
4. With the unit off, remove the wash filter from the unit. This will allow the water remaining in the pump and drain hose to be evacuated. Replace the filter.
5. Any water remaining in the unit should contain antifreeze and be protected from freezing.



NOTE: When placing the unit back into service, allow the unit to operate for one complete cycle before doing laundry to ensure all antifreeze has been purged from the unit.

Cleaning the Washer-Dryer

As you use the Washer-Dryer, occasionally wipe the exterior of the cabinet 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 granular 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, a thin coat of paste should be applied 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.



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.

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.

The motorhome is equipped with a power television antenna with built in electronics which uses 12 Volt DC to “boost” signal strength. Weak or fuzzy signals 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 waves, like rings from a rock thrown into a still pond. The radiating television signal can bounce back from an object such as a mountain. 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 by lowering the antenna.

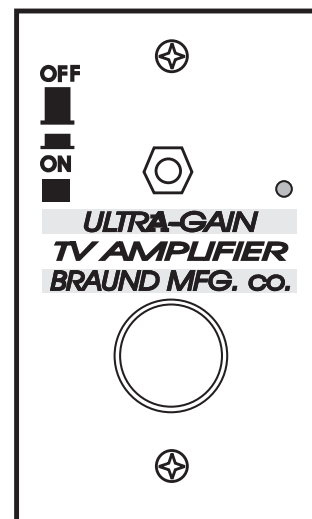
Television Antenna

Antenna Booster Operating Instructions:

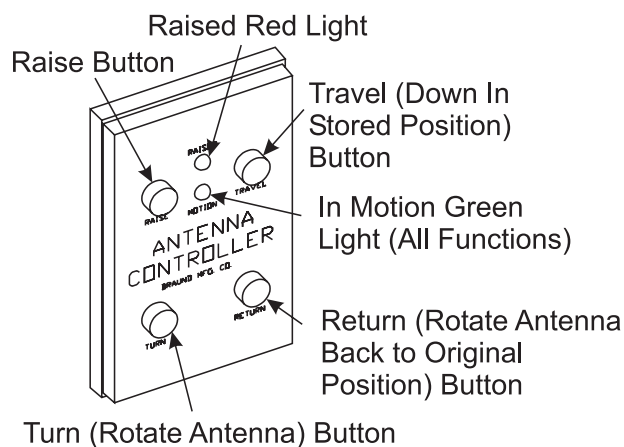
- The antenna booster is located in the cabinet above the driver’s seat, to the left.
- The power supply switch must be on.
- The green light will glow when the amplifier is on.

To Troubleshoot TV Reception With Amplifier Installed:

- Check the domestic battery for correct voltage. The antenna booster gets its power from the domestic fuse block inside the coach.
- Check the fuse from the grey wire.
- If there is no picture or a weak picture, be sure the antenna is working. If it is and the picture is weak, an amplifier may not improve it.
- Check for 12 Volt DC and correct polarity on the input lines. Make sure the coax fitting and center wire-making are making contact at the antenna and the amplifier.
- If there are white roller bars on TV, check that the power to the amplifier is coming from the battery side of the converter.



12 Volt Antenna Booster.



To Raise the Antenna:

Before raising the antenna, visually check for clearance above the motorhome. To raise the antenna press the **RAISE** button. The green light is **ON** when the antenna is in motion. The red light is **ON** when the antenna is raised.



WARNING: Do not raise the TV antenna near overhead electrical wires as contact may cause serious injury or death. Do not move the motorhome when the TV antenna is up. There is a ANT UP warning light on the dash panel. When this light is lit, lower the antenna before moving the motorhome.

To Rotate the Antenna:

Press the **TURN** button to rotate the antenna for improved reception. Press the **RETURN** button to rotate the antenna to the original position for further adjustment. The green light is **ON** when the antenna is in motion.

To Lower the Antenna:

Press the **TRAVEL** button to lower the antenna into the stored position for travel. The green light is **ON** when the antenna is in motion. Do not move the motorhome until the antenna is all the way down.

Video Selector Box

The motorhome is equipped with a video selector box located just above the VCR. The selector box receives video and audio signals from three different sources: the roof mounted antenna, shore cable (auxiliary), or the 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. Example: To watch the front TV (TV1) from the antenna, depress the **ANT** button in the TV1 group. This will direct the signal from the antenna to the front TV.

To Watch the front TV:

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

To Watch the REAR TV:

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

Using the VCR:

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

The dash radio is a tuner, tape player and a compact disc player. It will store twelve preset FM stations and twelve AM stations. Other features include attenuate mode, loudness control, a 12 hour digital indication clock and autoseek tuning. The compact disc player features fast forward, reverse, random track play, repeat and pause. The radio power can be turned off from two different locations. One button is located on the radio face plate and the other is in the bedroom.

RADIO - DASH

- Turn on the house battery cut-off switch located at entry door.
- Turn the radio on by selecting **TUNER**.
- Turn the radio off by selecting “**OFF**”.

Operation

The **TUNER** button is used to select or switch from AM or FM. The numbered buttons are used to store or preset stations. Some other buttons which are used during radio mode include the **BTM/SENS** (Best Tuning Memory/Sensitivity Adjust), **SEEK/AMS** (Automatic Music Sensor), and the **PRESET/DISC** buttons. The **BTM/SENS** will automatically select the strongest band signal and will memorize them in order of frequency. When the **SEEK/AMS** button is pressed, the stations available for storage will be displayed one at a time. You can store the station by selecting one of the numbered buttons for the location. Once all preset selections are full, if another selection is made it will replace the current selection. Pressing the **PRESET/DISC** will present the memorized stations in order.

Changing between tuner and CD mode:

Changing between tuner and CD mode is as simple as inserting a CD. Press the **CD/MD** repeatedly to scroll over until “CD” is displayed. During CD/MD operations the numbered buttons control various functions of the operations.

Volume Control:

Volume is controlled when the sound button is pressed for the desired sound quality and changed using the control dial. The bass can be further enhanced with the four position rotary **D-BASS** selector switch. The effect the **D-BASS** has is that of a subwoofer system which boost the curve of the low frequency signal. The digital functions of the **D-BASS** curve produce a sharper and more powerful bass sound.

Clock Operations:

The clock is displayed when either the radio power button is pressed or the **DSPL** button is pressed. Setting the clock is a simple process, press the **DSPL** for two seconds. The hour display will begin to flash. Rotate the control dial to the desired hour. Next press the **SOUND** button momentarily and the minutes will begin to flash. Again, using the control dial, rotate for the desired minute. When you press the **DSPL** button again the clock will start operating.

Tips

1. If the radio does not function, check the house battery cut-off switch to make sure it is ON.
2. If the radio acts erratic, press the reset button. When the reset button is pressed, all memory functions will be erased.
3. The LCD display may become difficult to read at temperatures at or below 41° Fahrenheit.
4. Use the decoy cover as a theft deterrent when system is not in use.

Remote Control Commander

This controller allows control of the dash radio from the bedroom. There are certain conditions which must be met for this controller to operate properly.

1. The dash radio must be a Sony compatible system.
2. The dash radio must be powered from the dash first.
3. CD and tape must be in the dash system for the respective functions to work.

A Disc Preset with the **CD/MD** changer disc selection is possible. When the tape is selected, the buttons fast forward or rewind the tape in the direction selected.

Controls:

LEVEL controls the volume.

SEEK enables tuning functions.

OFF enables the dash unit to be shut off.

DISPLAY enables the custom file mode or sets the time (depending the dash radio configuration).

MODE restores normal tape play after fast forward or rewind is selected.

SOUND functions the same as the dash radio sound button.

MUTE shuts sound off at the speakers.

SOURCE ON selects the program sources. Any preset radio station can be retrieved during radio operations.

The Precision Navigation compass is a sophisticated multi-sensor compass system which will perform 10 separate programming functions. The compass used is the model V5000TA. The large digital readout makes for quick, easy viewing. The display is both numerical digits and the 16 cardinal points. Cardinal points are **N**, **NNE**, **NE**, **E**, etc.

COMPASS - DASH

Power is present as soon as any button is pressed. You don't need to worry about turning the power off as the unit will shut off automatically after 10 minutes with no motion. Light is present when either the left or right side bar is pressed. Pressing the bar the second time will turn off the backlighting.

Controls & Displays

- **SET BUTTON** changes the trip displays and is used to enter the programming mode.
- **SIDE BAR BUTTONS** illuminate the backlight and turns off the backlight.
- **ARROW LEFT** changes the display data in the lower left box. This box displays a wide variety of information, such as the current temperature, high temperature and low temperature for the inside of the motorhome. All of the altitude information will be displayed in the box when selected, as well.
- **ARROW RIGHT** changes the display data in the lower right box. The box displays the clock or timer. It also displays the current outside temperature, high temperature and the low temperature.
- **Heading box** displays data in one degree increments for the direction.
- **True or Magnetic North** indicates which reference point is in use.
- **Trip icon** is an indication a trip is being stored. Trip1, Trip2 or Trip0 are the valid displays. Trip0 is an indication no data is being stored.
- **Cardinal points** are the 16 directions letter used for navigational reference.

The calibration will not be accurate if the backlight is **ON**. Ensure the backlight is **OFF** before starting the calibration procedure. Also, the calibration procedure should be the last function performed. The procedure is performed on a level surface and should be performed in a low traffic area. An empty parking lot is the desired location. The procedure is as follows:

Calibration

1. Hold the **SET** button to enter the programming mode.
2. Press the **SET** button repeatedly until the "**CAL**" feature is displayed in the lower left box.
3. Press the right arrow to display "**HOLD**". The backlight will momentarily turn **ON** then shut **OFF**. The lower left box will display "**CAL**" and in the upper right of the top display the icon "**TURN TWICE**" will appear.
4. The motorhome must complete two 360° circles within two minutes to

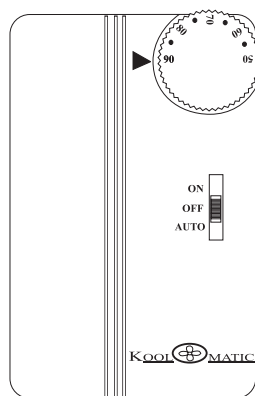
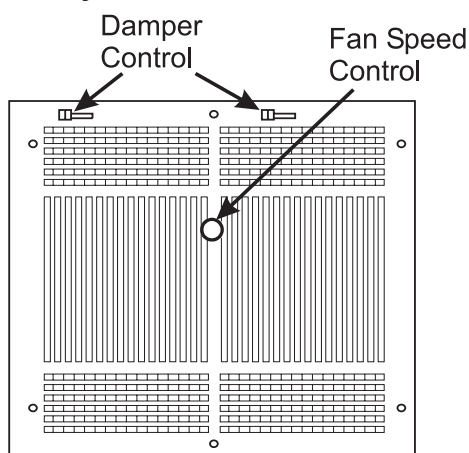
- set the parameters. Then press the right arrow. The size of the circles and the direction of travel is irrelevant.
5. The icon in the upper right should flash “<-ADJUST->” along with “BRAC” on the lower left.
 6. Press the right arrow again to proceed to the next step.
 7. The word “CAL” should be in the lower left box with “TURN TWICE” flashing in the upper right.
 8. Once again make two complete circle in less than two minutes.
 9. Press the **RIGHT** arrow button one last time to complete the calibration procedures.



More detailed information with cautions and warnings can be found in the manufacturer's manual, located in the owner information file box.

GALLEY & BATHROOM FANS

Galley Exhaust Fan



Wall Thermostat.

The exhaust fan is controlled by a wall thermostat and is powered with 12 Volt DC. To operate the fan, remove the ceiling grill cover, open the grill dampers and select one of three fan speeds with the round knob on the grill. Set the thermostat to the **ON** setting for continuous air flow or to **AUTO** and the desired air temperature for the On/Off air flow. To turn the fan off, set the thermostat to the **OFF** setting, close the grill dampers and reinstall the ceiling grill cover.



NOTE: Close the grill dampers before installing the grill cover. Failure to close the damper will result in the cover blowing off while the motorhome is moving.

Bathroom Fan

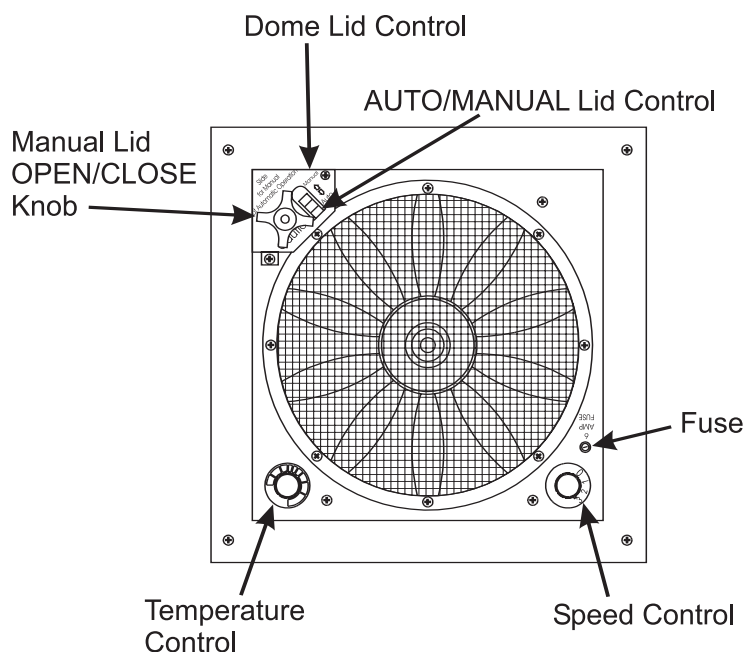
The fan is a three speed fan with a **0** or **OFF** position. The fan has a built in thermostat, with the operating range within 22° F to 123° F. This range of operation is based on the **INSIDE** ambient air temperature. This is the dark blue to dark red dial on the fan unit. The fan lid is electrically controlled during normal operations. It can be manually operated by the crank handle and thumb switch located on the fan. The thumb switch should be snapped back in the **AUTO** position immediately after using the **MANUAL** position. Once the lid opens approximately two inches, the fan motor will operate.

To Operate The Fan:

- Set fan switch to **ON**.
- Select the desired fan speed on the fan:
O = OFF.
1 = LOW.
2 = MEDIUM.
3 = HIGH.



NOTE: If the speed switch is in the “O” position, the fan cover will not operate automatically.



- 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 is another culprit of condensation.
- If the fan fails to operate, check for a blown fuse either in the domestic fuse panel or the 6 amp fuse on the fan.
- Remove the eight screws holding the screen to clean. Use a non-abrasive soap and water to clean. Re-install the screen after cleaning.

Tips

Close all the vents when using your Fantastic Fan Vent. Slightly opened window(s) on the shaded side of the motorhome will afford the most comfortable air flow, especially on hot sunny days. Remember you direct airflow by slightly opening windows. Always close all roof vents and position yourself between the open window and your Fantastic Vent for maximum comfort.



NOTE: Do not leave the fan switch in the active mode while the motorhome is stored or unattended for extended periods of time. High winds other unusual conditions or obstructions may prevent closing. The resulting leakage could cause serious damage.

AWNING Patio

To Extend the Patio Awning:

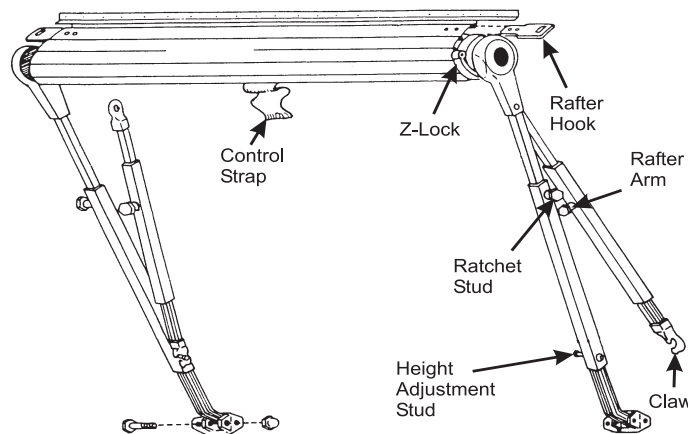
1. Insert the pull rod into the Z-Lock lever and pull down (fig. 1). This releases the awning.
2. Insert the pull rod into the loop of the center control strap and unroll the awning by pulling it toward you (fig. 2). Step under the awning and roll or fold the control strap toward the backside of the roller and tuck it under the restraining strap.
3. Release the rafter arm by pulling outward on the cap of the ratchet stud. Raise the arm upward toward the case (fig. 4).
4. Lock the rafter arm in position by pressing down on the steel main arm bar (fig. 5) until the ratchet stud clicks. At this point the fabric will be taut.
5. Raise the awning to the desired height by releasing the snap stud on the main arm and pushing up and out on the roller assembly (fig. 6).
6. Repeat steps 3-5 for the other end of the awning.



NOTE: Leave the Z-Lock open when the awning is open to avoid damage.

Extended or “CARAVAN” position:

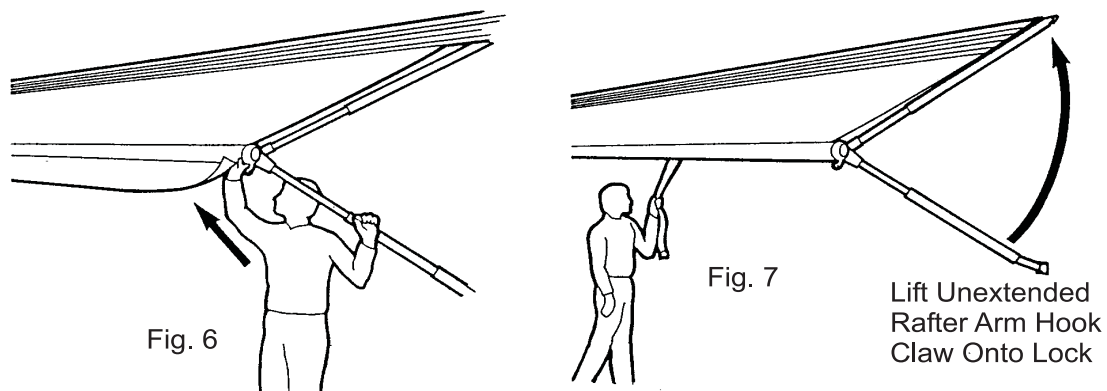
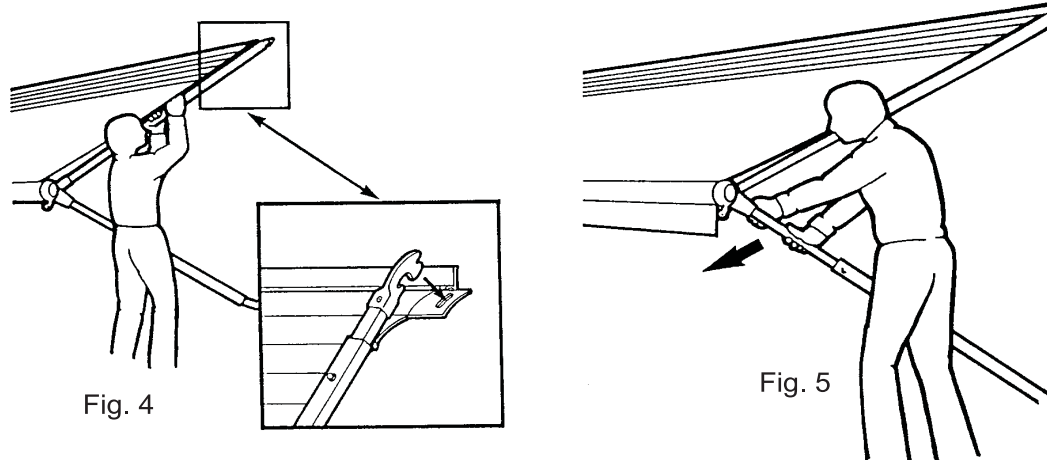
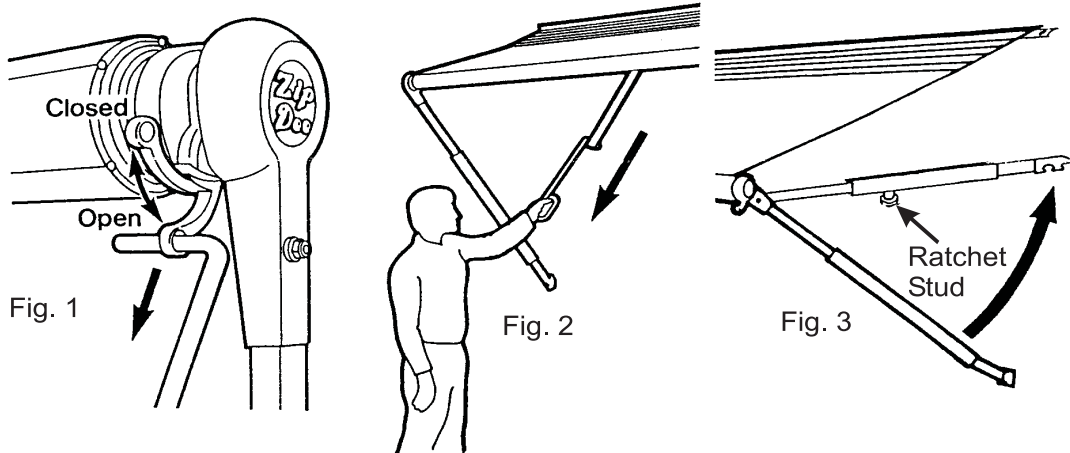
1. Insert the pull rod into the Z-Lock lever and pull down (fig. 1). This releases the awning.
2. Insert the pull rod in the loop of the center control strap and unroll the awning to the desired extension.
3. To prevent billowing, release and raise the rafter arm (fig. 3) and hook the claw of the arm into the slot of the rafter lock (fig. 7). This will require the awning to be extended approximately 4½ feet.
4. Raise the awning to the desired height by following step 5 from above.



To Retract the Patio Awning:

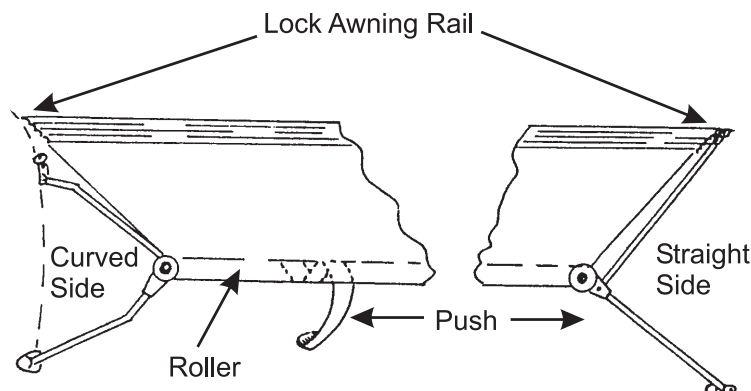
1. Release the ratchet stud of the main arm and lower the awning to its bottom most position.
2. Release the ratchet stud of the rafter arm and lift the claw out of the rafter hook.
3. Place the claw casting on the protruding height adjustment stud. To lock

- the assembly in a travel position, push the other tube downward until the ratchet stud snaps closed. Repeat steps 1-3 for the other end of the awning.
4. Face the awning and hold the end of the control strap firmly in one hand. Push the roller briskly upward with a rolling motion until you feel the spring take over. Control the speed of closure by holding the control strap until all but six inches of fabric has rolled up. Release the strap and let the awning roll up freely. This extra force will help tighten the fabric around the roller to insure a tight, neat appearance.
 5. Lock the awning in place by flipping the Z-Lock lever into the closed position using the pull rod.

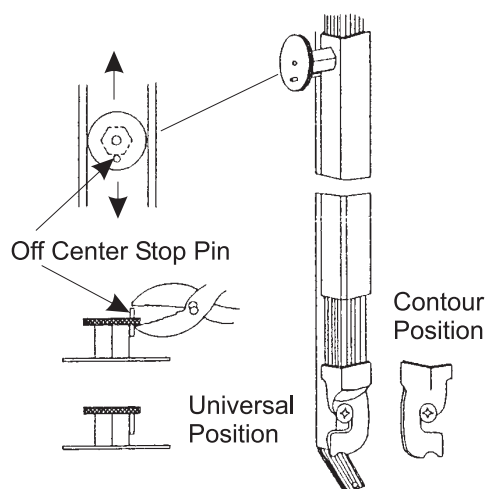


If the Awning Rolls Up Uneven:

Observe if the roll up is even and in line with the clamps. If not, unroll the awning and give the roller a slight push toward the direction it should open. If you wish to have the awning roll-up more in either direction, spiral the pull strap in that direction.



NOTE : The strap must be spiraled around the roller. This prevents a loose roll and bunching up of the fabric.



Rafter Arm Operation:

For proper rafter arm operation the ratchet stud must be correctly installed. The ratchet stud screws into the tube using a 7/16" wrench and the flat side of the stud should face the end of the rafter tube. The off center pin can be pushed up or down using pliers so the cap (and the pin that's attached to it) can be repositioned. On the contour style hardware the ratchet stud should release easily from the counter sunk stop hole at the top of the bar when opening the awning.



NOTE: The claw opening should face away from the motorhome on the Universal Style hardware and toward the motorhome on the Contour Style hardware.

Awning Care & Maintenance

Fabric Care:

The durable fabric of your Zip Dee awning is made of acrylic fibers which cannot rot or mildew. Should you have to retract the awning when the fabric is wet, it should be extended at the first opportunity to finish air drying.

The acrylic fiber of our awning is a synthetic and cannot support mildew or other plant growth. However, mildew can find a home on any pollen, grain,

dust, plant spores or other airborne plant materials that can accumulate on the awning. If mildew forms on any of these elements it can leave a stain which can be unsightly and difficult to remove, even though it will not weaken the fabric itself. To minimize the chance of staining, keep your awning as clean and dry as possible by hosing it down frequently between seasonal washings.

Any fabric can be punctured or torn by sharp edges that scrape or rub against it. If this kind of contact occurs, be sure to install a Zip Dee door roller at the top outer corner of the door to prevent awning damage. Rollers are inexpensive and will not be noticed on the door.

Washing:

On a monthly basis, loosen hardened dirt and dust with a dry, medium bristle brush. Thoroughly rinse both the top and bottom with a hose. Wash both sides of the awning with solution while scrubbing with an awning brush. This process can be made easier with the use of awning maintenance products. Saturate the fabric and leave the solution on for 15-20 minutes. Keep the fabric saturated by reapplying the solution as needed. Rinse thoroughly. Repeat if necessary until most of the stains disappear.

Water Leaks:

If leaking occurs after washing, it usually results from insufficient rinsing. If water drips through the needle holes in the stitching, you can use a commercial seam sealer available in canvas and trailer supply stores. You may also apply paraffin wax to the top of the seams. However, 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” below for information on the awning settings for proper water drainage. Sometimes soap or chemical residue, from active agents such as in insect fogs or sprays, can “wet” the fabric so that it appears unable to repel water. Rinse the fabric thoroughly and test for water repellency after it dries. If leakage continues after repeated washing and thorough rinsing, please contact the awning vendor concerning further maintenance.

Storm Precautions:

Because there is no warranty for damage caused by acts of nature, steps should be taken to prevent damage from occurring due to wind, rain or storm.

If you are leaving or retiring for the night, close the awning. This takes only a few seconds (less time than closing your window) and gives you the best protection. If for some reason you can't close the awning, lower both ends as far as you can. This will create a sufficient slope for water run-off. If you are remaining with the awning, you may lower one end to sufficiently divert water.

Water weighs nine pounds per gallon and the awning was not made to hold the 500 to 700 pounds that could accumulate from wet weather. Since it only

takes a few minutes to be completely safe, don't subject your awning and your motorhome to needless strain.

Hardware and Mechanism Maintenance:

Although your Zip Dee awning requires less maintenance than any other awning, a little care will keep the metal parts in top shape. The rafter arm assemblies, main arm tubes, and awning case are anodized aluminum and the castings are high-strength aluminum alloys. To keep these parts new looking they should be cleaned once a year with a good quality, non-abrasive chrome or aluminum polish. The main arm bar and all the fasteners and stress bearing shafts are stainless steel. These need to be cleaned occasionally to remove the accumulated grime that might hinder operation.

At the End of Each Season:

- Tighten any loose bolts or screws (replace missing parts with factory authorized replacements only).
 - Clean accessible hardware with a non-abrasive cleaner.
 - Use a silicone lubricant on the 1/2" round shafts that protrude from each end of the roller.
 - Extend all telescoping arms as far as possible to wipe off accumulated sand and dirt that can clog and scratch the protective aluminum finish.
- No lubrication is required on those parts.

AUTOMATIC AWNING SYSTEM (Optional)

Girard Lateral Arm Awning incorporates the very latest in technology and design. Box awning offers total protection in all weather and features the following advanced features:

- Convenient push button operation and an optional remote control for state of the art convenience.
- Retractable arms have twin cables for increased fabric tension and longer life. Angle of arm is adjustable from 5 degrees to 35 degrees for maximum comfort.
- All profiles are made from aluminum, which is then powder coated to give maximum protection for both housing and mechanical parts.
- 100% acrylic fabric is weather proof, permeable to air and resistant to mildew, rotting and fading.
- Motorized operation, which includes a manual/crank override.
- Wind sensor and/or optional remote control.

Motorized Operation:

Motorized operation is simple in itself. Motor (110 Volt) is housed in roller tube where it is protected from view and elements. To extend the awning all the

way, push the bottom button momentarily. The awning will extend until it reaches the full extend position. Pressing the top button will retract the awning. The awning can be stopped in either direction, at any point, using the center stop button.



CAUTION: The motor is not designed for continuous use. In the event that the motor is used to excess, it will automatically shut off and be inoperative until internal breaker cools down and resets. The run time is four to five minutes per hour. Reset time will be 30 minutes to one hour depending on the outside temperature.

The awning will then extend to its full projection. To retract the awning, put the switch in the **UP** position. There is no need to hold the switch once it has been activated. To stop the awning at any point in its projection or retraction, move the switch to the center position. The switch should be left in the center position at all times when the awning is stationary. The motor used in the Girard uses 300 watts and draws approximately three amps of power.

Manual Operation:

To manually operate the awning, use the telescoping crank handle supplied and follow the instructions in Manufacturer's manual.

Wind Sensor:

The awning is fitted with a wind sensor which is designed to retract automatically in the event of high winds, as long as it has 110 Volt power supply and wind has unrestricted access to wind sensor cup on roof of motorhome. Push the bottom button to extend the awning and the top button to retract it. The awning can be stopped at any point by pushing the center button marked **STOP**.

The wind sensor dominates and will override any push button commands in the event of excessive winds. In the event that the wind sensor is activated, the awning will close completely. The awning will not re-open automatically. It must be opened by using the extend button once again. This feature is intended to prevent the awning from extending or retracting excessively, further preventing possible overheating of the motor.

Care and Cleaning of Acrylic Fabric:

The acrylic fabric should be cleaned regularly before substances such as dirt, leaves, etc., are allowed to accumulate on, and become embedded in, the fabric. The fabric can be cleaned without being removed from the awning. Simply brush off any loose dirt, leaves, etc. Hose down and clean with a cloth and mild soap. **DO NOT USE DETERGENTS**. Allow to air dry, preferably on a warm sunny day. Should you have to retract the awning when the fabric is wet, it should be extended at the first opportunity to finish air drying.

Tips

- Avoid leaving the awning partially extended during rainy conditions. The awning is at the strongest setting when the awning is fully extended.
- If the wind sensor retracts the awning, it is recommend leaving it in until the winds subsides.

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.

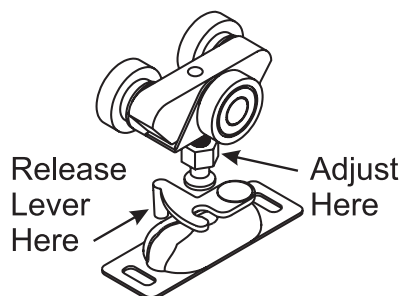
DINETTE BED CONVERSION (Optional)

- 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.



WARNING: Do not occupy the booth dinette or dining chairs while vehicle is in motion. They are not equipped with occupant restraint systems.

DOOR - SLIDING



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 latch. You will need to release one on each end of the door. The pocket door rollers should be lubed with just a drip of oil once a year to help increase the life of the rollers and improve the sliding of the door.

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. To access the engine compartment, press down on the button in each latch, open the engine hatch and secure the latch with the hook provided.

STORAGE - UNDER BED & ENGINE ACCESS



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.

Tie down the chairs securely so that it is not possible to sit in any chairs.

DINETTE CHAIRS - SECURING FOR TRAVEL



WARNING: Do not occupy any of these dinette chairs while the motorhome is in motion. The chairs are not equipped with occupant restraint systems. In addition, the chairs must be stored in an enclosed area or secured with tie down straps, prior to setting the motorhome into motion, to avoid the risk of personal injury to motorhome occupants, resulting from a crash or sudden stop.

The Kwikkee Super Slide is an option that is available for use in the storage compartment bays of your motorhome. This will allow you to slide your payload outward to gain easier access.

SUPER SLIDE (Optional)

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



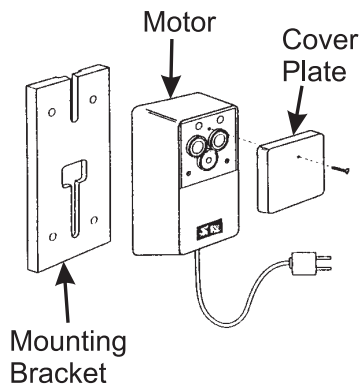
WARNING: The motorhome must be level when sliding the drawer out of the bay compartment. The drawer can slide out abruptly and cause bodily harm when the motorhome is not level.

- Depress and hold the rocker switch on either side. The motor will move the draperies until the switch is released.
- Releasing the switch will cause the motor to stop.
- The receptacle is powered by shore power, the generator and when dry camping, just the inverter.

PRIVACY DRAPERY - ELECTRIC (Optional) Operation

Your controller is designed for normal use. If run excessively, such as every few minutes, the self contained thermoswitch will shut-off the motor for several minutes. Functionally, the thermoswitch prolongs the life of the product and prevents inadvertent or accidental abuse of the mechanism.

Internal Thermoswitch Shut-Off



NOTE: If the cord stretches after use, the consumer may adjust the motor on the wall bracket.

Replacing Driver Tire:

A simple procedure is use with removal and replacement of the drive tire. First, cut the old tire off using care not to cut the plastic drive roller. Remove the old tire. Wipe the roller with a dry cloth to remove any dirt or residue. Finally, snap the new tire in place.

POWERVISOR

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

NAVIGATION SYSTEM (Optional) Global Positioning System (GPS)

The navigation system can be a very powerful tool in daily traffic. The automatic route planning and guidance enables you to concentrate more on the increase of traffic and ever changing road conditions. The need for the masses of road map laying around and time consuming route planning is a thing of the past. Simply enter your destination prior to starting out, and the visual and audio guidance will assist you. This all can be accomplished in part from the Global Positioning System (GPS). The GPS is comprised of 24 satellites 13,000 miles above.

Signals from only four of these satellites will enable a sufficient, accurate position. The accuracy is between 20 to 40 feet with eight satellites maximum reception.

Remote Control:

A small, hand held, remote control will control the navigation system. The control requires two AA batteries. The batteries will have to be replaced when the system does not respond to a key input or the battery icon illuminates in the status line. When any key is pressed on the remote control, the keypad will illuminate. After five seconds of inactivation, the keypad will automatically shut off.

- **ALT-R** = Plan an alternative route
- **REP** = Repeat current audible guidance advice.
- **UP arrow** = Cursor key up, selects options.
- **LEFT arrow** = Cursor key left, selects options.
- **RIGHT arrow** = Cursor key right, selects options.

- **DOWN arrow** = Cursor key down, selects options.
- **OK** = Enter or OK confirms a selection.
- **(Minus) -** = Decreases the volume of the guidance system.
- **(Plus) +** = Increases the volume of the guidance system.
- **MENU** = Displays main menu.
- **MAP** = Enter or exit the route map.

The system is wired to operate in conjunction with the domestic power. The battery cut-off switch must be ON. When the system is powered ON, a safety notification for the system will appear. Read and accept this notification with the **OK** key. Once the **OK** key is pressed the main menu will appear. The **STAND-BY** in the main menu will enable you to switch off the display. You will still have audible guidance advice. Any key on the remote, when pressed, will switch the display back on.

The main menu offers various options and other menus for use with the system. You need only press the arrow keys to highlight your desired option. Confirm all selections with the **OK** key.



NOTE: Information entered into the navigation system should only be done when the motorhome is at a safe stop point. Attempting to operate the system while driving can distract your attention from the road and possibly cause an accident. Remember, it is more important to keep your eyes on the road and your hands on the wheel.

Keeping Updated:

The highways are changing constantly, a 100 % correspondence of the digital map and reality cannot be achieved under all circumstances. Additional maps, new maps or possible problems with the current maps is as simple as contacting Navigation Technologies 1- (888) NAV-MAPS.



Consult the owners manual in your information box for more detailed information.

The dash radio and rear vision system can be operated with the remote keypad or by the corresponding buttons on the display unit. The unit is wired into the domestic batteries and will require the battery cut-off switch to be ON.

***Dash Radio &
Rear Vision System
(Optional)***

Remote Control:

- **MODE** button will switch power on and allow the mode of operation to be selected. This is also used to access the menu control screens.
- **F** button is used during radio station selection and presetting.
- **ATT** (Attenuator) button will decrease the volume level about 1/10 the previous level.

- **CLOCK** button will allow programming the 12 hour built in clock.
- **D.M** button is used for direct memory function.
- **BGV** button is used for the Background Visual functions.

Radio Operation:

- The domestic battery cut-off switch must be in the **ON** position.
- Push the open button once and the unit will slide outward.
- Manually tip the unit screen upward and rotate it to fit your needs.
- Start with the mode switch in the **OFF** position.
- Push the mode switch once more and you will be in the **FM** mode.
- Navigate the dash radio through the remote control.



NOTE: DO NOT attempt to program the radio while driving.

Monitor Operation:

- Push the mode switch once again, and you will have selected **VTR 1**.
VTR 1 is the back-up monitor. The back-up monitor will come on when the transmission is in reverse.
- With the stereo, you can use the remote control and select BGV. The back-up monitor will work. The radio screen will go off in a few seconds but the stereo will still play.
- Push the mode switch once again and you will have **VTR 2**.
- Locate one of the seven discs for your area.
- Using the remote control, select enter. You should see the main menu.
- If you are using the mapping system you will see a picture of the earth and a satellite in the upper right hand corner. If the satellite turns red you have less than the three satellites needed.

Eight Disc CD Changer

Push **EXT** on the face of the radio, the screen should say CD changer. This will activate the eight disc CD changer located in the overhead cabinet. When closing the screen tip it downward and just tap the face of the screen, it will beep and close in four seconds.

Tips:

- The volume can be individually adjusted for each mode of operation.
- The back up camera will be connected to the **VTR1** display.
- The navigation system will be connected to the **VTR2** display.



For detailed information consult the Owner's Manual in the coach's Information File.



NOTE: This system will use a separate receiver and CD disc player in the bedroom. This unit will be an in-wall 12 Volt DC system.

To operate the Bedroom Radio:

- Press the power button to turn the unit on.
- Select the desired mode of operation.
- Select the desired volume level.
- Tune the radio to a desired station. Clockwise will rotate up the frequency band and counterclockwise will search the lower frequency bands.
- The three band Graphic Equalizer will allow the tone to be optimized for individual preference.

**Bedroom
Receiver/CD Changer**

The Trip Tek system is fairly simplistic in design. The system is compromised of a keypad, a computer and will utilize the rear vision monitor for display. The key pad has five function keys each with a single function. The system is virtually maintenance free.

**TRIP TEK
(Optional)**

- The **VIEW** enables the display on the rear vision monitor.
- The **SCREEN** will enable or disable the display from the rear vision system.
- The **REST** will zero out the screen for TODAY and new information to be inputted.
- The Arrow **UP** will scroll the numbers to be inputted.
- The Arrow **DOWN** will scroll the numbers down to be inputted.

Key Pad**Today Screen will provide daily information:**

- **Miles to Go** displays the remainder of miles to the scheduled destination.
- **Time to Go** displays the approximate time to the scheduled destination based upon miles to go and MPH Average.
- **Miles Traveled** displays the miles traveled since last screen reset.
- **Fuel Range** displays approximate miles available with the remaining fuel based upon MPG Average and Gal in Tank. This will be less when other fuel equipment is used.
- **MPG Average** displays the average fuel consumption per gallon since last screen reset.
- **MPG Current** displays current fuel consumption per gallon.

Screen Displays**Leg Screen will provide information from fill to fill:**

- **MPG Average** displays the average fuel consumption per gallon since last reset.
- **Time Traveled** displays the time traveled since last screen reset.
- **Miles Traveled** displays the miles traveled since last screen reset.
- **Gallons Used** displays the gallons of fuel used by the engine since the last screen reset.
- **MPG Average** displays the average fuel consumption per gallon since last screen reset.
- **Gal in Tank** displays approximate gallons of fuel in the tank.

Trip Screen displays long term data for a complete trip or longer:

- **MPG Average** displays the average fuel consumption per gallon since last screen reset.
- **HR Traveled** displays the hours traveled since the last screen reset.
- **Mi Traveled** displays the miles traveled since last screen reset.
- **Gallons Used** displays the gallons of fuel used by the engine since the last screen reset.
- **MPG Average** displays the average fuel consumption per gallon since last screen reset.

Coach Data Screen displays information for the motorhome and engine performance:

- **MPG Average** displays the average miles per gallon for the life of the motorhome.
- **Odometer** displays the total distance travel for the life of the motorhome.
- **Eng Load** displays the percentage of the engine load.
- **Eng Temp** displays the coolant temperature.
- **Manifold** displays the intake manifold temperature.
- **Road SPD** display the current speed of the motorhome. This indication is NOT intended to replace the motorhome's speedometer.

**ENTERTAINMENT
CENTER - HOME
(Update)
Video Selector Box -
Powered**

The video selector box is simplistic in operations. The video selector box does require an 120 Volt AC power source to function. When the power requirement is met, the red LED will be illuminated.

There are three separate control areas of the video selector box. The front television and the optional storage bay television (if offered) are controlled with the **TV VIEWING** pushbuttons. The pushbuttons represent the control source that is desired for use.

- **“Ant”** is the Roof Television Antenna which will use the VCR tuner for channel selection.
- **“Aux 1”** is the SATELLITE RECEIVER (Optional).
- **“Aux 2”** is the DVD (Optional) the VCR channel selection must be on channel 3.
- **“Cable”** is the Shore Cable coax feed which will use the VCR tuner for channel selection.
- **“VCR”** is the VCR which will use the VCR tuner for channel selection.



NOTE: Everything that plays on the front TV also plays to the bay TV (Optional) at the same time.

These same pushbuttons are located in the **REMOTE TV VIEWING** section. These are for use with the Bedroom television.

The section labeled **VCR RECORDING** is used to select the program source which will be recorded with the VCR.

- “**Ant**” is the Roof Television Antenna which will use the VCR tuner for channel selection.
- “**Aux 1**” is the SATELLITE RECEIVER (Optional).
- “**Aux 2**” is the DVD (Optional) the VCR channel selection must be on channel 3.
- **CABLE** is the Shore Cable coax feed which will use the VCR tuner for channel selection.

To Watch the Television - Front (Roof Antenna or Shore Cable):

1. For the **Roof Antenna** - Raise the roof antenna and turn on the TV Amplifier. The green light will come on. For the **Shore Cable** - Connect shore coax cable to coach service bay.
2. Go to the Video Selector under **TV VIEWING**. Push either the “**Ant**” button or the **CABLE** button.
3. Turn on the Front TV and select the desired TV channel.
4. From the “Bose” Control Center or its remote, push the **VIDEO** button. Select one of three surround speaker buttons from remote and adjust volume as desired.

To Watch the Television - Bedroom:

1. See “1” Above
2. See “2” Above, except use buttons under **REMOTE TV VIEWING**.
3. Turn on bedroom TV and select the desired TV channel.
4. Adjust Sound Level at the TV or from the TV remote.

To Watch a VCR Tape - Front Television:

1. Go to the Video Selector. Under **TV VIEWING** push the **VCR** button.
2. Turn on the Front TV and select channel 3.
3. Turn on the VCR and insert a tape. The tape will start to play on its own.
4. From the “Bose” control center or its remote, push the **TAPE** Button. Select one of the three surround speaker buttons from remote and adjust the volume as required.

To Watch a VCR Tape - Bedroom Television:

1. Go to the Video Selector. Under **REMOTE TV VIEWING** push the **VCR** button.
2. Turn on the VCR and insert a tape. The tape will start to play on its own.
3. Turn on Bedroom TV and select channel 3.
4. Adjust sound level at the TV or from the TV remote.

To Watch a DVD - Front Television:

1. Go to the Video Selector. Under **TV VIEWING** push the “Aux 2” Button.
2. Turn on TV and Select Channel 3.
3. Turn on DVD player and insert a disc, it will start playing on its own.
4. From the “Bose” Control Center or its remote, push the **AUX** button. Select one of the three surround speaker button from remote and adjust volume as desired.

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, which is usually copper, and the ground, which is woven or braided aluminum. There is insulating material that separates the two conductors known as the die-electric. The ground and center conductor is 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.

Hook-Ups

Cable TV and Telephone:

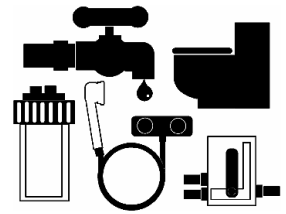
The motorhome is equipped with cable TV and telephone hook-ups, located in the electrical service center. For convenience, there are auxiliary outlets located at the co-pilot seat and in the second bay passenger side outside. These connections are set up so that a TV, phone or laptop computer can be used. The two auxiliary TV outlets are fed by the coax, which also goes to the rear TV. When using these outlets, follow the instructions given in the video selector box section.

EXECUTIVE

CHAPTER 4
WATER & LP-GAS SYSTEMS

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. Several optional water equipment will also be discussed, so not all information may be applicable to your 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.

WATER SYSTEM General Information



It is hard to imagine how much water you use everyday when you are at home. Newcomers to self contained motorhomes soon discover that water does not last very long unless consumption is drastically reduced. For instance, you can use less water for showering if you wet down, turn off water while soaping, then turn on water to rinse. This way a good shower uses a gallon or less of water. There is plenty of water to meet your needs once you adjust your habits.

Fresh Water System

The fresh water system consists of fresh water tank, water pump, pressure equalizer tank, Manabloc Plumbing Manifold, gravity fill connection, water filters and a city/fresh water connection.

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.

Tank Measurement

To measure level of a tank simply push button on display panel corresponding to tank you wish to measure. Lights on panel will turn on in sequence indicating level of tank.

Calibration

Your monitoring panel comes to you factory calibrated for accuracy and should not need adjusted. If system does not read accurately recalibration may be necessary. To recalibrate tanks, proceed as follows:

Fill tanks to be calibrated.

- To fill the fresh use normal tank filling procedures and observe the tank overflow located on curbside of motorhome. When water starts to come out overflow pipe, shut water supply off.
- To fill the black tank for calibration water can be poured into the toilet until you can see the water level at the base of the flooring.

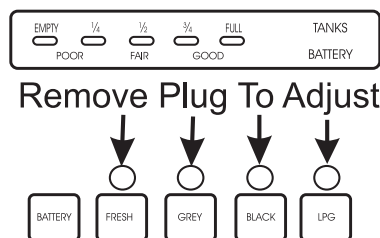
MONITOR PANEL Measurement & Calibration



Monitor Panel.



Monitor Adjustment Tool.



Test Points on Monitor Panel

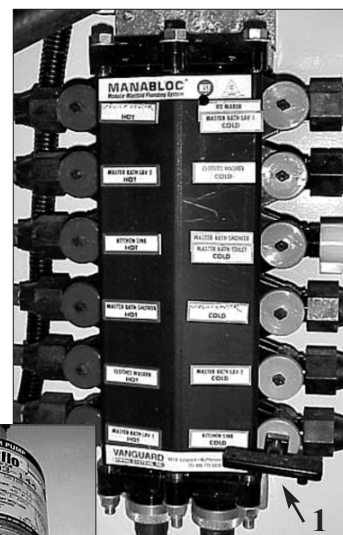
- To fill the grey tank for calibration, water can be poured in the shower drain until the water level begins to fill the shower base.
- Remove the plugs to access the adjustments. Insert the adjustment tool for the desired tank. Simultaneously push button for the desired tank and rotate the adjustment slowly counterclockwise until the light indication is decreasing. Gently rotate the adjustment back clockwise until the light indication is at full.
- Repeat procedure as necessary for remaining tanks.
- When the tanks are dumped, verify the calibration of the tanks. They should read empty.



NOTE: If your domestic batteries are not at full state of charge your reading will not be accurate.

MANABLOC PLUMBING MANIFOLD

Each water supply feed has its own distribution line which runs from manifold. Water flows in abundance with no fittings behind walls to restrict flow. Hot water can be delivered more rapidly, and each water supply line can be shut off individually.



WATER PUMP

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 pressure equalizer tank relieves the water pump from cycling when a small amount of water is used. The water pump is located in a storage compartment of the motorhome.

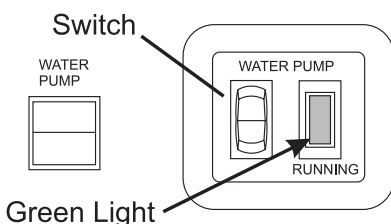


Water Pump.

1. Manabloc tee handle, each water line can be turned off.



WARNING: Before leaving your 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 Monaco Coach Corporation.



Water Pump Switch.

To operate the water pump, push on switch and watch for the green light to stay on. The remote switches are located in the bathroom, on the control panel next to the entrance door 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 shower.
- Turn the water pump on and wait for the water lines and the hot water tank to fill.
- Close each faucet when it delivers a steady stream of water (cold water faucets first).

Vibration induced by road conditions can cause the plumbing or pump hardware to loosen. Check for system components that are loose. Many symptoms can be resolved by simply tightening the hardware. Check the following items along with other particulars of your system.

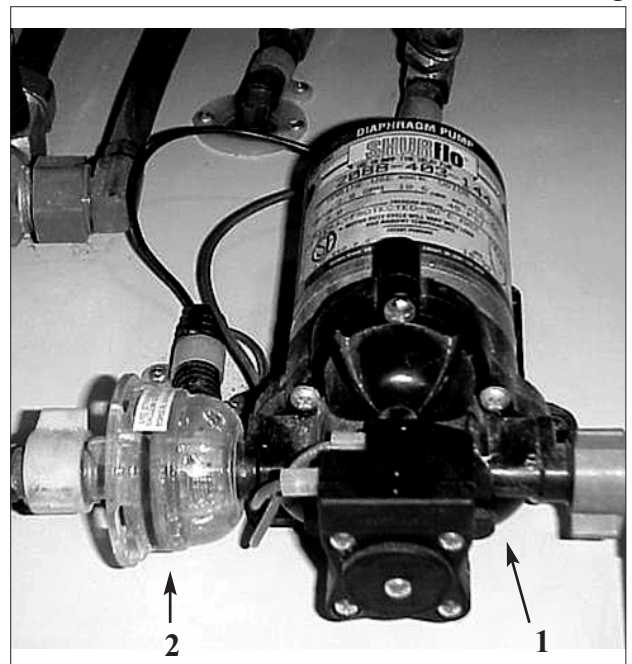
The water pump will not start/blows the circuit:

- Check the electrical connections, fuse or 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 good ground.
- 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.

Troubleshooting



1. Water Pump. 2. Water Screen - clean bi-monthly.

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

- 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?

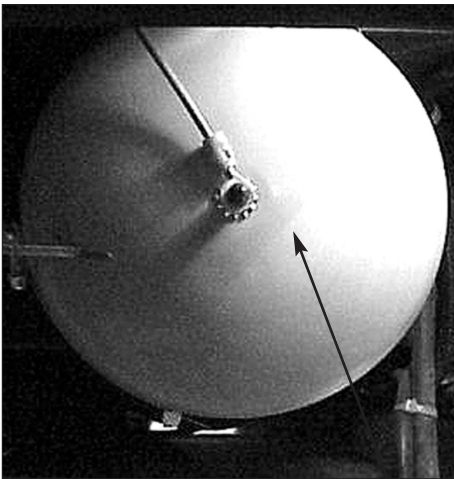
The water pump is noisy or rough in operation:

- 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.

PRESSURE ACCUMULATOR TANK



Remove tank valve cap to check air pressure.

The pressure accumulator tank is mounted in the water bay near the water pump. The accumulator tank will need to have maintenance checks completed bi-monthly. The accumulator features:

1. Smooth flow from the faucets.
2. Reduced water pump cycling.
3. A precharged air cushion.
4. Elimination of pulsations and water hammer.
5. Pressure of water at faucets.

The accumulator tank has a tire valve for checking the air pressure in the tank. The precharged pressure must not exceed the water pump cut-in pressure, the pressure at which the pump restarts. The shur flow water pump has a cut-in pressure at 25 psi. Air pressure in the accumulator tank should be set at 18 to 22 psi, and should not exceed 25 psi. To check the air pressure in the accumulator tank, ensure the water pump is off and water pressure is relieved. You can open a faucet to relieve the water pressure or open the fill water fill valve to relieve the pressure. Using a tire air pressure gauge, one which reads low air pressure, Check the accumulator tank pressure bi-monthly. In the event you need to add air pressure to the accumulator tank, a manual pump is recommended. Compressed air flow can overcharge the tank too quickly causing the tank to rupture.

WATER - CITY HOOK-UP

- Connect the hose to city/fresh water hook-up located in service center on the roadside of motorhome.
- The city water valve must remain in closed position.
- Turn on the water supply.
- The water pump can either be in OFF position or in ON position. It will not affect the water pump to leave it on.
- City/fresh water connection has a built in pressure regulator and one way check valve that protects motorhome to 45 lbs.



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. Your motorhome comes with a pressure regulator.

- Connect the hose to city/fresh water hook-up located in the service center on the roadside of the motorhome.
- The city water valve must be in the OPEN position.
- Turn on the water supply.
- The water pump should be in the OFF position.
- The fresh water tank has an overflow located on the curbside of the motorhome. When the water starts to come out the overflow pipe, shut water supply off as soon as possible.

WATER TANK - FRESH WATER FILL

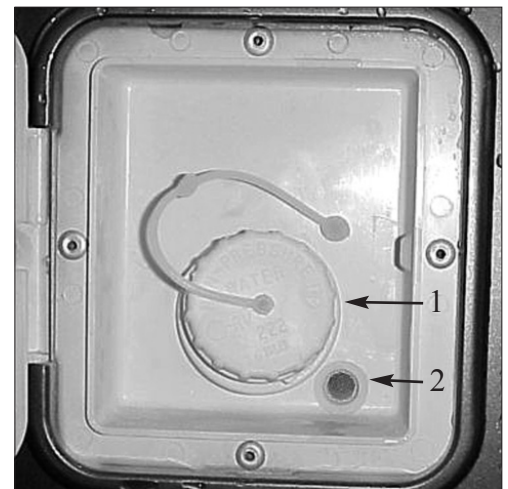


NOTE: When connecting the motorhome to fresh water be sure to use a hose manufactured and labeled for potable water to ensure that the hose will not flavor the water.

The purpose of the gravity fill is to be able to introduce fluids directly into the storage tank. This is very useful for the dry camper, which can pack and pour bottled water directly in the hold tank. Being able to add antifreeze for winterization is made simpler with a gravity fill. You will also find disinfecting the water system can be made simpler.

1. Locate the fresh water gravity tank fill.
2. Unscrew the cap, taking care to keep it clean.
3. Connect the water hose marked potable water to the water source.
4. The water hose can stick down inside the gravity fill tube.
5. Turn on the water source, listen to the water rushing inside the fresh water tank.
6. The fresh water tank is full when water starts coming out of the gravity fill neck.

WATER TANK - (FRESH) GRAVITY FILL



1. Gravity Fill Opening.
2. Vent Opening.

Water System - Disinfecting Fresh Water

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

You should disinfect the water system:

- If your motorhome is new.
- If your 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 into the fresh water tank. When finished, secure the gravity feed cap.



CAUTION: Do not use vinegar to disinfect water system on units using Aqua-Hot Heating Systems. Vinegar will deteriorate copper tubing.

Use following procedure to disinfect water system:

- Remove the filter elements from the filters and reassemble the filters without the elements (see "Filter").
- 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. This concentration will act as a quick-kill dosage for harmful bacteria, viruses and slime-forming organisms. Concentrations higher than 50 ppm may damage the water lines and/or tanks.
- 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. Install new water filters. Flush with fresh water repeatedly, if necessary, until no chlorine bleach taste or smell is left in the water system.

**Aqua-Hot
Maintenance**

Chlorine bleach or other concentrated chlorine bearing chemicals can cause failure, if not properly and thoroughly rinsed, to the Aqua-Hot's Domestic Water Loop (copper tubing). The Aqua-Hot's copper tubing is rated for use with fresh water and winterization solutions only. Periodic flushing with other common household chemicals, including bleach, will have little or no effect on the product if properly rinsed with the fresh water afterwards. Failure of copper tubing, especially soft or flexible copper, can result if materials other than water or winterization solutions are allowed to reside inside the piping for extended periods as during storage or other periods of non-use. The most common cause for failure is due to an extended exposure to chlorine, solutions containing chlorine (i.e., bleach), or hydrochloric acid.

The water is electrically heated to a brewing/cooking hot 190° F (88° C) by a compact tank that mounts under the sink. A thermostat maintains the water at this approximate temperature. When you turn the tap, cold water enters the bottom of the tank and forces hot water out of the faucet. The system is vented so the tank is not pressurized.

Operation

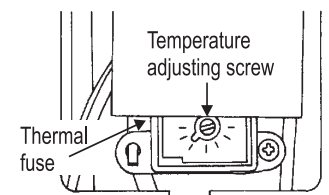
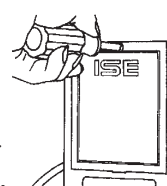
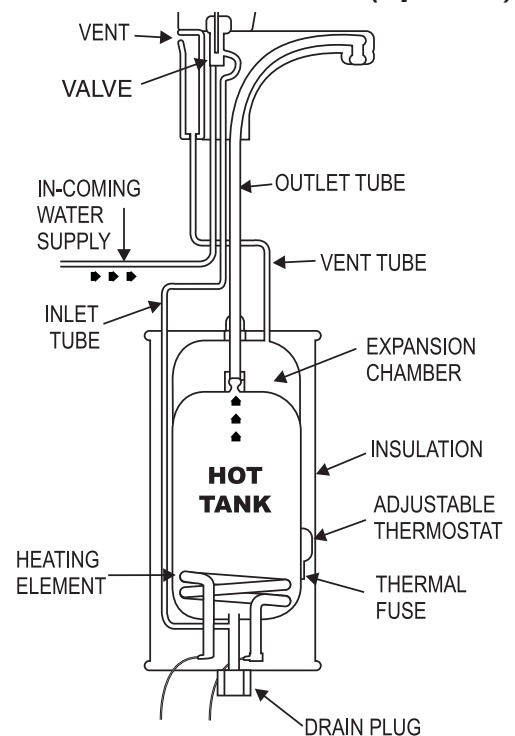
Turn the insta-hot switch, located in the galley, to the ON position. It will take 10 to 15 minutes for water to reach 190° F (88° C) in temperature. Steam or hot water may come out of the faucet without turning it on. After 10 to 15 minutes turn on the faucet for about 20 seconds to bleed off any steam until the hot water is dispersed. Allow the water in the tank to reheat. Repeat this step one or two times. When hot water with no steam is dispensed, turn the faucet on to use hot water. To shut off the system, turn the galley switch to the OFF position.

Temperature Adjustment

If the steam cannot be stopped, or the water boils, adjust temperature as follows:

- Turn the galley switch off and unplug the power cord.
- Remove the screw and access cover.
- Insert a screwdriver in the slot of the thermostat adjusting screw and turn clockwise a 1/2 notch to increase the water temperature, or counterclockwise a 1/2 notch to decrease the water temperature.
- Reinstall the access cover, reconnect the electric power and turn on the galley switch.
- Draw three or four cups of water and allow unit to reheat.
- Repeat the procedure until desired temperature is reached.

DO NOT ALLOW THE WATER TO BOIL.

**WATER -
HOT WATER DISPENSER
(Optional)**

Cleaning Hot Water Dispenser

Use only mild cleaners to clean the dispenser spout and plastic components. Use of cleaning agents containing acids, alkalies and organic solvents will result in the deterioration of plastic components.



WARNING: Use care when operating this unit. Do not allow children to operate this unit. The tank is a non-pressure tank, **DO NOT** modify this system. **DO NOT** close the vent tube or connect other types of faucets or valves to the tank. Use only the faucet supplied. **DO NOT** allow the water to boil. The water and steam dispensed can instantly cause scalds or boils. To minimize the possibility of fire, **DO NOT** store flammable items such as rags, paper or aerosol cans near the tank. **DO NOT** store or use gasoline or other flammable vapors and liquids in the vicinity of this unit. **DO NOT** remove or alter the thermal safety fuse. If the thermal fuse is open contact your authorized service center. To prevent electrical shock, turn the power switch **OFF** and disconnect the power cord before removing the access cover to adjust or service the thermostat.

SOAP DISPENSER - LIQUID

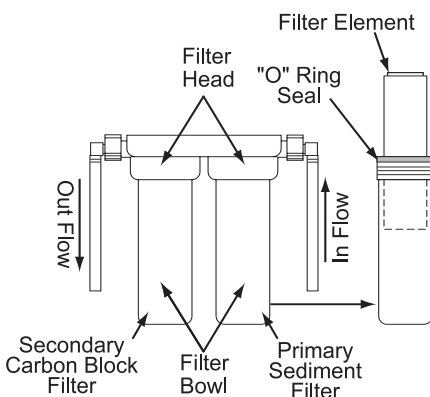


Liquid Soap Dispenser

The liquid soap/lotion dispenser is designed to provide the highest quality and performance standards. This unit is virtually maintenance free with only a few replaceable parts. The pump will easily dispense all types of liquid soaps or lotions. The liner of the bottle will not corrode ensuring no discoloration of soaps or lotions. Proper care of your soap/lotion dispenser will give you years of trouble free service. The bottle can be filled easily from above the counter with either a soap or lotion. The finish is extremely durable, but it can be damaged by harsh abrasive cleansers or polishes. Cleaning is as simple as wiping gently with a damp cloth and blotting dry with a soft towel.

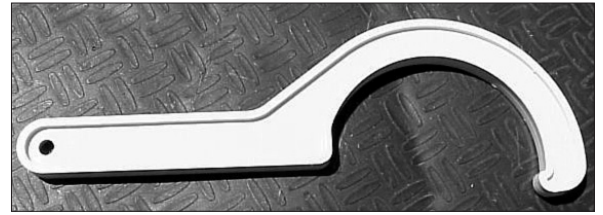
WATER FILTERS

A 2-stage filtration system if used and consists of the following filters:



- **First Stage 5 Micron Sediment Filter:** For reduction of suspended solids, dirt and rust down to 5 microns in size. Life expectancy varies with incoming water condition. Recommended change of six months to one year depending on incoming water quality and use.
- **Second Stage 56 Cubic Inch Granular Activated Carbon Filter:** Improves water quality by reducing volatile organic chemicals, chlorine, tastes and odors. Capacity of 1,500 gallons. Recommended change of six months to one year depending on incoming water quality and use.

You need to remove the filter elements and reassemble the filter assemblies, without the elements, before you disinfect the water system with a chlorine bleach solution. To change the filter elements, use the following procedure.



Water Filter Removal Wrench.

To Remove

- Turn off the water supply and the water pump, then open the faucet to bleed off pressure.
- Unscrew the filter bowl from the filter head.
- Remove the old element and empty any remaining water in the bowl.

To Install

- Place the elements in the bowls.
- Screw the bowls onto the filter heads, hand tight.
- Turn on the water pump or city water.
- Open the outside faucet and purge air from the filter assembly.
- Check for leaks.

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 winterizing, poor maintenance, road vibration and campsite water pressure variations. Check all plumbing connections for leaks at least once a year. If the water pump runs when a faucet is not open, check for a water leak. Be sure the tank drain valves are closed. If the system continues to leak, take your motorhome to an authorized dealer for service.

WATER SYSTEM - Troubleshooting

Cold Weather Use:

A motorhome is not designed for extended use in below freezing (32° F/0° C) weather; however, you may not experience any problems as long as the temperature does not drop too low. Interior water lines, fixtures, water storage tanks and pumps are normally protected from moderate freezing temperatures, as long as the furnace is operating. Exposed drains may freeze quickly. If in doubt about what temperatures the motorhome will tolerate, winterize with a potable antifreeze.

Cold Weather Use

Storage:

If you are storing the motorhome where freezing temperatures may be experienced, you will need to drain the domestic fresh water loop completely of water. When draining the domestic fresh water system start off by draining the fresh water tank. This is accomplished by simply opening the point drain lever for the fresh tank and allowing the water to drain.



NOTE: Ice makers, water filters, water purifiers, water heaters, washers and the Aqua Hot all use domestic water and should be drained and stored in accordance with the manufacturer's recommendation for winterization.

How you decide to store your motorhome and protect the water lines is up to you. You can elect to have the lines air blown to remove standing water or fill the lines using an approved FDA RV antifreeze. Either way all interior and exterior faucets will need to be opened and closed, one at a time, to be checked. All low point drains should be opened and holding tanks emptied.

WINTERIZING - Fresh Water System Using Nontoxic Antifreeze

If you choose to fill the water lines with antifreeze, you will need 10 gallons of FDA RV winterizing antifreeze.

1. Open all low point drains and drain valves to drain the fresh water tank, water heater tank, holding tanks and fresh water lines.
2. Close all faucets, drain valves and low point drains.
3. Pour the antifreeze into the fresh water tank using the gravity feed opening.
4. Turn ON the system water pump and operate each faucet individually until a small amount of antifreeze is present.
5. Close off the faucets.
6. Open the shower faucets and toilet valves to allow a small amount of antifreeze to run into the holding tanks.
7. Use a soft cloth to wipe out the sinks and shower to protect surfaces from antifreeze stains.
8. Exterior faucet should be opened and closed using the same procedures as the interior faucets.
9. If the motorhome is equipped with an ice maker, remove the 3/4 inch fitting and flush antifreeze through the water line.
10. Disconnect the power supply line affecting water pump operation.

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.



WARNING: You should 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 your authorized selling dealer.

**WINTERIZING -
Using Air Pressure**

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

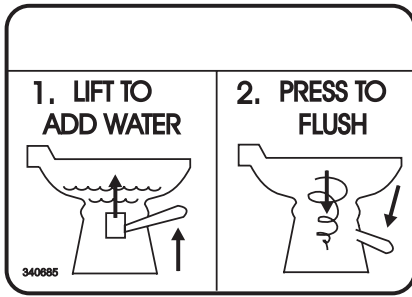
1. Remove the water filter elements from the filters and reassemble the filters without the elements (see “Water Filter”).
2. Drain the fresh water tank by opening the valve located in the outside water control service compartment of the motorhome.
3. Open the water heater and the low-point drains. Turn knobs to open the drains. Opening the low point drains clears the water out of the hot and cold water lines. Leave the low-point valves open until you are ready to use your motorhome again.
4. 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, then turn the pump off.
5. After the water lines are 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. 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. You will need 1 gallon of RV antifreeze to protect various water drain lines in your 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 3-1/2 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 have released the flush pedal. Use a soft cloth to wipe out the sinks and shower after you pour in the antifreeze to protect the surfaces from stains.
10. Leave the low-point drains open until you are ready to use your motorhome 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 you.

SEALAND TOILET

Operating Instructions



The toilet operates from either 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 before using, lift the flush lever until the desired water level is reached. Generally, more water is required only when flushing solids.
- To flush the toilet, push the lever all the way down until the sewage leaves the toilet. The water flow pressure vary at different locations; therefore, holding the flush lever down for five to eight seconds may be required. We recommend 2-gpm flow for proper rim and bowl wash.
- To operate the remote mounted hose sprayer, push down the lever and hold it. Release the flush lever by allowing it to snap back, which permits positive sealing around the flush ball. A small amount of water should remain in bowl.



NOTE: Holding flush lever down longer than necessary results in excessive water usage.

Cleaning

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

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

Maintenance

To find leaks, check behind or under toilet. Take four or five sheets of toilet tissue and wipe all the seams and waterline 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.

WASTE WATER SYSTEMS

Waste Drain & Sewage Tanks

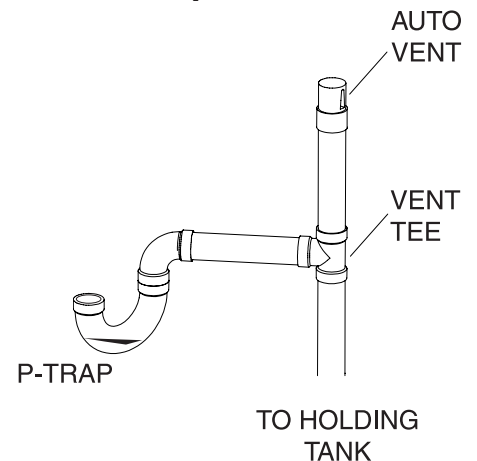
The waste drainage system was designed to provide adequate and safe storage and/or discharge of waste materials. All materials used in fabrication and installation of system is tested by a nationally recognized testing laboratory. The entire fabricated waste system is factory tested in accordance with American National Standards Code A119.2. The drainage system uses ABS plastic piping and fittings connected to sinks, shower, toilet and holding tanks and provides for their drainage to an outside termination. The motorhome should be reasonably level for optimum operation of the systems. There are two separate waste water systems, one for waste water (grey

water) and one for sewage waste (black water). Each has its own storage tank, control valve and both empty through a sewer drain hose. When traveling, it is recommend both holding tanks be empty or less than half full.

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.

Drain Traps and Auto Vents



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.

The sewage tank stores toilet drain waste only. Before using the toilet you need to treat the sewage holding tank with water that is mixed with an odor controlling chemical. These chemicals are readily available at any RV 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 your 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 holding tank is dumped, repeat the chemical mixing.

Sewage Holding Tank - Black Tank



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.

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.

Waste Holding Tank - Grey Water

Prior to dumping the the waste holding tanks, be sure there is enough liquid in holding tanks to provide a smooth flow through 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 1/2 full or weekly to prevent stagnation and overfilling.



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. Illegal dumping along the roadside by a minority of recreational vehicle users has resulted in tough laws, and has unfairly labeled all camping vehicle trailers as unwelcome in some areas.

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 and you will find few inconveniences in proper and legal disposal of holding tank wastes.

Connecting to Available Sewer Hook-Up

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

What Not to Put in Waste Holding 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.

Before you start to dump your waste tanks, take a few minutes to exercise the drain pipe. Grasp both sides of the drain pipe firmly and swivel the pipe up and down. This will exercise the O-rings. When the drain pipe is pointed up, turn the drain end cap counterclockwise and remove it from the drain pipe. This will prevent any residual spill from running out.

Dumping the Waste Holding Tanks

To dump your waste holding tanks:

- Unscrew the bottom access hole plug from the service compartment. Feed the adapter end of the drain hose up through the hole and install the hose adapter on the drain pipe.
- Attach the other end of the drain hose to the sewer connection at the dump station.
- Rotate the drain pipe downward to maximize flow.
- Drain the sewage tank first by pulling the large T-handle gate valve out on the water connection panel. The sound of water rushing through the hose is audible.
- Flush the sewage tank. Connect the water supply hose to the SEWAGE TANK FLUSH connection on the water connection panel. **This water supply hose should not be the same hose used to connect the city/fresh water hook-up.** Ensure the T-handle gate valve remains open when flushing the sewage tank. Turn the water on and flush the system for approximately two minutes. Again, water running through the drain hose should be audible.
- Turn the water off and disconnect the water supply hose when finished flushing the system.
- After you have drained and flushed the sewage tank, drain the waste water tank by pulling the T-handle out on the water connection panel.
- Flush the waste holding tanks with fresh water before closing the gate valves. The waste water tank is flushed by pouring two gallons of water down a sink drain.
- Run the toilet water to flush the sewage tank.
- Push both T-handles in and install the end cap (required in some states) when in transit to prevent leakage.
- Flush the drain hose with either the water supply hose or the exterior faucet sprayer, and secure in travel location.



WARNING: When using the black tank flush, do not leave the motorhome unattended or flooding may occur. Turn off the water supply to the black tank flush when finished.

LP-GAS SYSTEM



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 which are capable to operate on LP-Gas. Some items discussed may not be applicable to your 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.

All components for your motorhome LP-Gas systems are approved for use in camping 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 your motorhome contains liquid petroleum gas under high pressure. As 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. Never attempt to reset regulator yourself. Have your dealer or an authorized service person make adjustments.

In higher elevations or extreme cold weather (10° F/-21° C or lower) you may experience a shortage of LP-Gas. You can adjust to this by not running more than one component at a time, such as turning off furnace while using the range. If you are going to be in higher elevations or cold climates for a long period of time an authorized service person can adjust your LP-Gas regulator for these conditions.

We recommend that you have the LP-Gas system checked by an authorized dealer at least once a year, and thereafter every extended trip. Although manufacturer and dealer both test carefully for leakage, travel vibrations could loosen fittings.

Leaks can be easily found by applying leak detector solution at connections. If leak detector solution is not available a soapy water solution made with dish soap can be used. Tightening fittings usually stops any leaks. If not, shut off main gas valve at tank and see your authorized dealer for repairs immediately. Hand tighten tank valves only, do not use a wrench or pliers as over tightening may damage valve seats and cause them to leak. If you develop a leak, which is an easily identified odor, smells like rotten eggs (sulfur), never light a match or have an open flame where you suspect leaking 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.
- Open windows and doors.
- Evacuate the motorhome.
- 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.

Each gallon of LP-Gas produces approximately 92,000 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.

LP-Gas Consumption

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

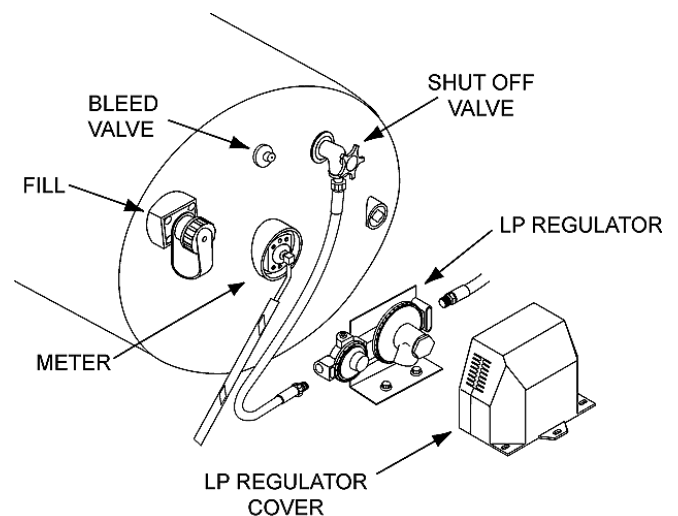
Woodall's Campground and Trailer Guide and other publications list refueling stations. Many travel parks sell LP-Gas. Shut off the pilot lights, appliances and igniters before filling the LP-Gas tank to prevent a fire or explosion. Have a trained service person fill the LP-Gas tank.

The LP-Gas tank fill and bleed valves are located in the LP-Gas tank access outside compartment. Caution the service technician, if your 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 during the refueling of the motorhome and filling the LP-Gas tank to prevent a fire or explosion.

LP-GAS TANK

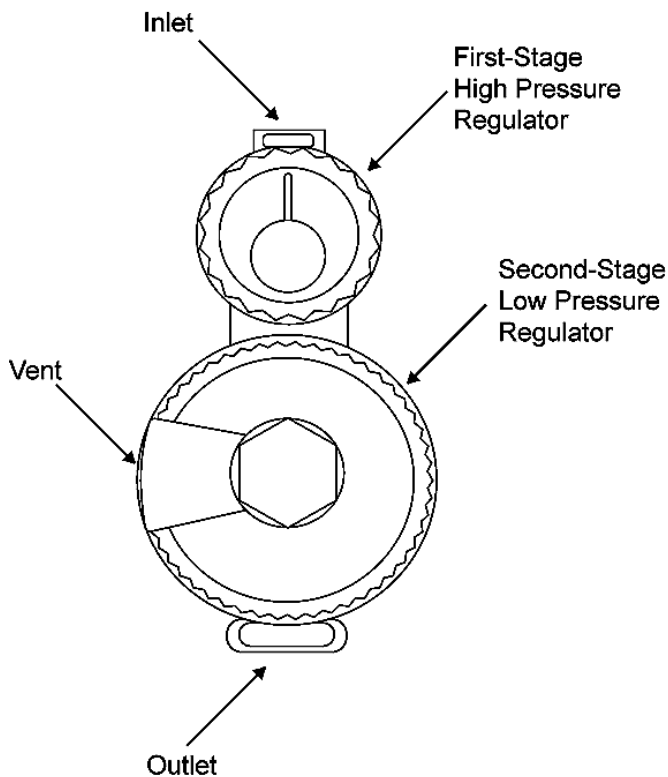


LP-Gas Tank

LP-Gas exists in both the liquid and vapor state with 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. You will notice the gauge at the tank, when full, will only read 3/4. Your 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. Do not store empty LP-Gas tanks. Keep open flame and spark producing materials away from the LP-Gas area. If this warning is ignored, a fire or explosion could result. Shut off all appliances and LP-Gas tank valves (located on side of LP-Gas tank underneath the motorhome) when the motorhome is in storage.

LP REGULATOR



LP-Gas 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. Simply put, the first stage regulator reduces the full tank pressure down to a range of 10-13 psig. The second stage further reduces the pressure down to an outlet pressure of 0.4 psig (11 inches of column water). The regulator is equipped with a vent so that it can breathe. This means that if pressure in the LP tank is too high the regulator will allow gas to escape through the vent until pressure returns to a normal range. 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 you notice any corrosion, contact a qualified LP-Gas service technician. The regulator is mounted so that the vent faces downward. If the vent becomes clogged you can clean it with a toothbrush.

Under normal atmospheric conditions a 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.

Things you can do to prevent this freeze up are:

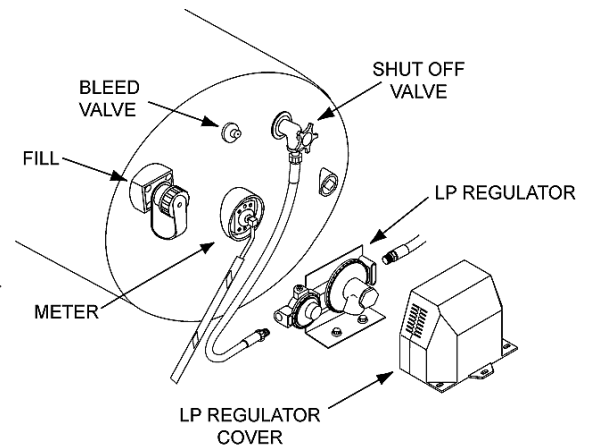
1. Ensure the LP tank is totally free of moisture prior to filling.
2. Ensure the tank is not overfilled.
3. Keep the valve closed when the tank is empty.
4. A LP-Gas dealer will need to purge the tank if freeze up occurs.
5. Have the LP-Gas dealer inject methyl alcohol in the tank.



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 REENTER THE MOTORHOME UNTIL THE PROBLEM HAS BEEN CORRECTED!

LP TANK - Operating & Monitoring

- Manually open the main shutoff valve located on the roadside of the LP tank.
- Turn off the manual valve on the LP tank when the motorhome is 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.



Shutoff Valve.

Monitor Panel Measurement & Calibration

Tank Measurement - To measure level of a tank simply push button on display panel corresponding to tank you wish to measure. Lights on panel will turn on in sequence indicating level of tank.

Calibration - The monitoring panel comes factory calibrated for accuracy and should not need to be adjusted. If system does not read accurately recalibration may be necessary.



LP Tank Gauge



Adjustment Point

To recalibrate LP tank gauge proceed as follows:



NOTE: Fill LP tank prior to calibration.

Using adjustment tool, simultaneously push button for tank and rotate adjustment point. Turn counterclockwise until the light indication is decreasing, then gently, rotate the adjustment back clockwise until the light indication is at full.

LP-GAS DETECTOR



LP Detector.

Liquid Propane Gas is heavier than air and will settle to the lowest point, which is generally the floor of your motorhome. The LP-Gas detector is also sensitive to other fumes such as hair spray, most of which 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 the 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 all cleaning agents and aerosol can propellant. Most are lighter than air in their vapor state and will only be detected when the motorhome is closed up.

Operation

When the power is first applied the Yellow LED will flash for three minutes while the detector is stabilizing. At the end of that time the LED will turn Green indicating full operation. If the detector has detected unsafe levels of gas it will immediately go into alarm.



CAUTION: This detector cannot alarm during the three-minute warm-up cycle.

Testing

Simply 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 your detector. The test feature checks the full operation of the detector.

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.

1. Turn off all gas appliances.
2. Extinguish all flames and smoking material.
3. Open doors and windows.
4. Evacuate the motorhome.
5. Turn off the propane tank valve.
6. Keep open flames, spark producing devices and smoking material out of the area.
7. A qualified service technician may be needed to determine and repair the source of the leak.



WARNING: When the alarm sounds, open all doors and windows to air out the motorhome and turn gas off at LP tank. DO NOT RE-ENTER MOTORHOME UNTIL THE ALARM STOPS SOUNDING. If the alarm sounds a second time after gas is turned back on, leave gas off and contact a qualified service technician to find the source and repair the gas leak.



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.

Press the Test-Mute button when the detector is in alarm.

Alarm Mute

1. The Red LED will continue to flash and the alarm will beep every 30 seconds, until the gas level has dropped to a safe level.
2. The LED will flash Green until the end of the Mute cycle.
3. If dangerous gas levels return before the end of the mute cycle, the alarm will beep four times and return to Phase 1.
4. After two minutes the detector will return to normal operation (solid Green) or resound the alarm if dangerous levels of gas remain in the area.

1. Vacuum the dust off the detector cover weekly, (more frequently in dusty locations) using the soft brush attachment of your 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 of
the Detector**

NOTES

EXECUTIVE

**SECTION 5
ELECTRICAL SYSTEMS**

ELECTRICAL SYSTEMS 120/240 AC

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 power requirement for the motorhome is 50 AMP 120/240 Volt AC single phase. If 50 amp shore power service is available, connect the motorhome to the 50 amp shore power source using the supplied shore power cord. One end of the shore power cord plugs into the 50 amp shore power source and the other plugs into the motorhome receptacle. The motorhome 50 amp shore power receptacle is located on the left side of the motorhome in the utility center.

Shore Power Requirements


One end of the cable master will be wired directly to the transfer switch. Once you locate the power cord reel you will notice a power switch labeled **IN** and **OUT**. This switch operates the 12 Volt DC motor.

Shore Power Connection:

Connect to motorhome first, then shore power.

Shore Power Disconnect:

Disconnect from shore power first, then motorhome.

 **WARNING: Failure to connect shore power in this sequence presents a significant shock hazard. Follow this sequence exactly. This also applies to disconnecting from shore power.**

 **WARNING: Before plugging unit into shore power, starting the generator or using the inverter, make sure all the appliances are off.**

When only a short section of the shore power cable is frequently used the cable may coil sharper than normal, causing kinking of the cable. To relieve this condition, routinely lay the cable out completely and stretch it on the ground. It is very important to make sure the cable remains clean. Dust and dirt on the cable may cause the system not to retract. Allow the cable master to retract the cable into the the motorhome.

At least once a year, check all AC and DC wiring connections to be sure they are secure and free of corrosion. Check the neoprene covers on the in-limit switch and the power switch to be sure they are free of cracks or fracture.

POWER CORD REEL (Optional)



Power Cable Reel



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.

Generator

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's 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. While using the generator, care will have to be taken when operating appliances and outlets so as not to overload the generator. The generator is fueled from the main fuel tank.

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.

Transfer Switch



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 into 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.



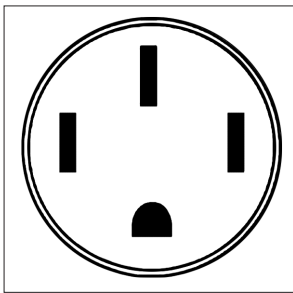
WARNING: Keep fingers away from metal contacts of shore plug end. Avoid standing water. Serious electrical shock and personal injury can occur. To avoid the risk of an electrical shock, turn the circuit breaker off for the shore power outlet before making shore power connection.

Getting Started

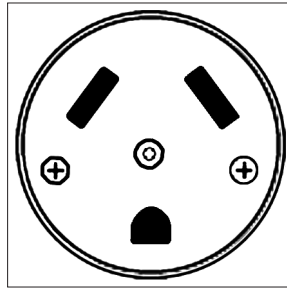
If 50 amp shore power service is available, all that is necessary is to connect the motorhome to the 50 amp shore power service using the supplied shore power cord. The cord is located in the compartment on the driver's side of the motorhome. After connecting the unit to shore power, wait approximately one minute for the inverter to "stabilize" charging of the batteries before starting air conditioners or other large AC loads. In many instances 50 amp shore service is not available. Proper electrical adapters must be used to connect the supplied shore power cord to the shore service available. When connecting to anything other than 50 amp shore service, use caution not to overload the supplied shore service breaker. Appliances and outlet loads will have to be operated in sequence, rather than all at the same time.



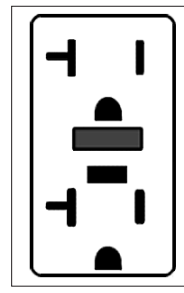
NOTE: Below are the three types of shore power outlets most commonly used.



50 AMP Outlet.



30 AMP Outlet.



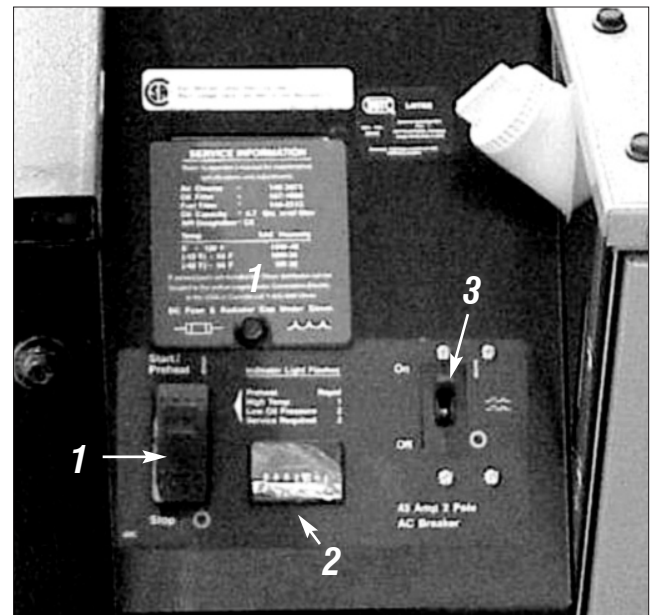
20 AMP Outlet.

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 shifter panel.
- The generator control panel, located on the generator.

Generator control panel:

1. Start/Stop Switch.
2. Hour Meter.
3. Output Breaker.

GENERATOR

Generator Control Panel

Prestart Checks

Prior to the first start of the day, preform 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 owner'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, underneath, or inside the motorhome or any nearby vehicles. Operate the generator only when safe dispersion of exhaust can be assured. Monitor the outside conditions to be sure that the exhaust continues to disperse safely.



WARNING: When parking 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 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 three percent 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 beside “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 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.

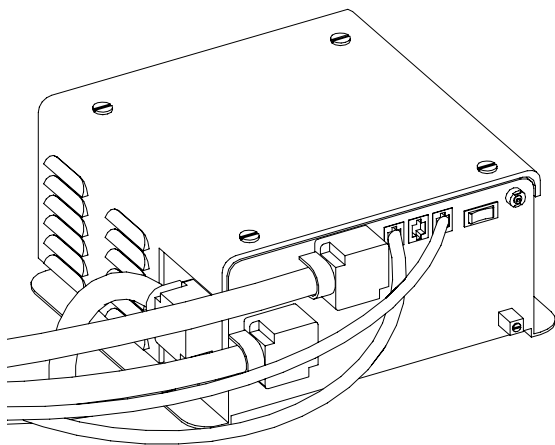


NOTE: An appliance or load may have a short if it causes a circuit breaker to trip after reconnection. DO NOT continue to reset breaker. Have the problem corrected before resuming operation.

Generator Exercise

If use of the generator is infrequent, “exercise” the generator once a month by operating it at approximately half the maximum rated output for two hours. This “exercise” will help promote better starting, more reliable operation and longer engine life. This procedure drives off moisture, relubricates 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.

INVERTER/CONVERTER



Inverter

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. To turn the inverter on or off, momentarily depress the inverter **ON/OFF** button on the RC7 remote. 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.

The inverter is programmable with many features. The RC7 remote control is used to change or add features and set variable parameters. Inverter remote may also be used to start and stop the generator.

Some of the features available are:

- Automatic generator start.
- Fully adjustable battery charge rates.
- Adjustable fuel gauge cut-out.
- Adjustable charging curves for different battery types.
- Adjustable power sharing.
- Meters Menu.

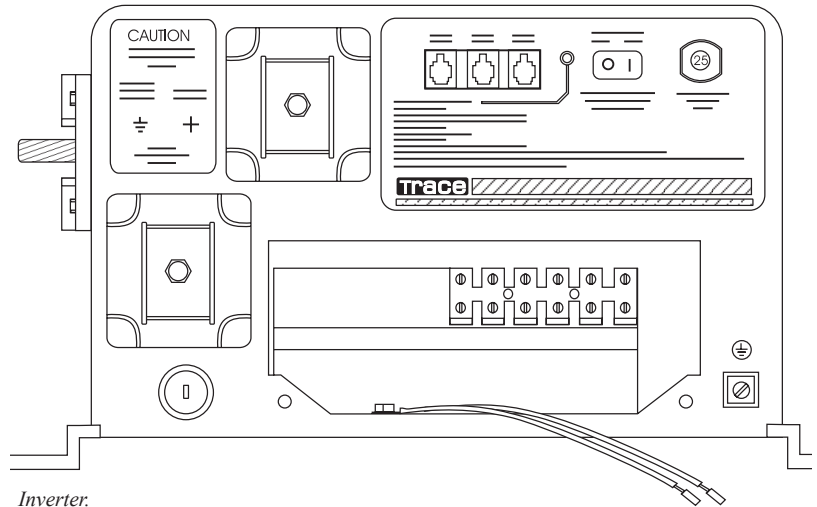
RC7 GS Remote

The remote control liquid crystal display (LCD) and light emitting diode (LED) lights are used for operation status conditions. The led lights give inverter status, charge status, battery condition and error indications at a glance. The LCD screen displays charging cycle status, various meter readings, automatic generator operation status, programming field and error messages. The inverter **ON/OFF** button turns the inverter on or off. This button can be used to start or stop the generator. The up or down arrows are used to scroll up or down through the operations field or meters field. The up arrow is used to toggle between operations and meter fields. Depressing the up and down arrows simultaneously accesses the programming field. The settings button is used to set or scroll through a particular set-up field.



NOTE: The main switch on the inverter is to remain ON.

The inverter can be set-up for stand-by power operation. If AC input is discontinued to the motorhome, the inverter will automatically provide AC power. When external AC power is resumed, the inverter will return to “stand-by” mode. The stand-by mode is activated by momentarily depressing the “on/off” inverter remote button while the motorhome is plugged into shore power or operating from the generator. Stand-by mode is indicated by the inverter status light blinking. Battery charging is not affected by stand-by operation.



Stand-by Operation



NOTE: Remember to disable this function when not in use. It may run down the house batteries.

Whether hooked to shore power or operating from the generator, the internal battery charger of the inverter will automatically charge the batteries when AC power is supplied to the input terminals of the inverter. The time it takes to charge the batteries to a full state of charge varies greatly. It can take several hours or even days, depending on the inverter set-up parameters and actual state of charge of the batteries. The inverter uses a three stage charging cycle. The first stage is “bulk” charge. The “bulk” charge will bring the DC voltage up high, initially between 14.2-14.5 volts, depending on conditions. The bulk charge cycle is a timed event which the inverter manufacturer has programmed. The second stage is the “absorb” cycle. The battery voltage in this cycle is approximately 14.0 volts. The length of the absorb cycle will vary with state of charge of the batteries. The final stage is the “float” charge cycle. Approximately 80 percent of the charging has been completed at this time. The float charge voltage is generally around 13.3-13.7 volts. The last 20 percent of the charge cycle of the batteries typically takes the most amount of time.

The charging cycle is repeated each time AC power is discontinued and reconnected. Continuous bulk charging may boil the batteries from a constant higher than normal DC voltage.



NOTE: The inverter will charge the batteries with AC power applied regardless of remote status.

Battery Charging with the Inverter

Battery Temperature Sensor (BTS)



Battery Temperature Sensor.

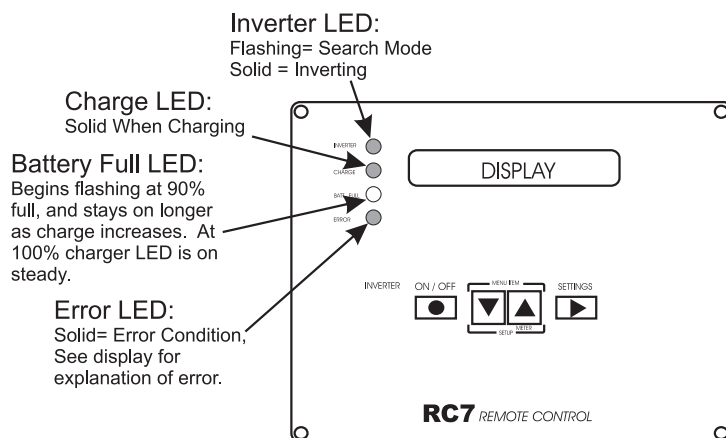
The inverter uses a battery temperature sensor to adjust charge voltage. When the battery temperature rises the BTS will send this information, registering as counts, to the inverter to decrease charge voltage. Voltage compensation with temperature variation is necessary to keep charge voltage at optimum figures. The BTS should be adhered to a house battery. If the BTS is unplugged, the inverter default setting of 77° is used as the charge temperature reference point.

Pass-through AC Power

Incorporated in the inverter is a double pole “pass-through” relay which trips when AC power is supplied to the input terminals. This will transfer AC power through the inverter to a sub panel supplying AC power to outlets and appliances. When AC power is supplied to the inverter, the internal battery charger will “ramp up” battery charging voltage. A 20 second time delay allows charge stabilization before pass through AC power is supplied to the sub panel.

Operating Display

This field is a general overview of system status. This is the primary screen of the RC7 remote. This field area includes:



- **Waiting for AC:** System inactive waiting for AC power to be supplied.
- **Inverting:** Unit is inverting.
- **Charging Cycle Status:** Bulk, Absorb or Float mode.
- **Battery State of Charge:** Based on the Fuel Gauge Cutout setting. It may be displayed in percentages or as a fuel gauge.
- **Time Left To Run:** This evaluates the battery reserve capacity at current operating load. It is based on the Fuel Gauge Cutout and Battery Bank Capacity settings.
- **Time Left To Charge:** Estimated time left to charge batteries to full state of charge. This is based on Fuel Gauge Cutout and Battery Bank Capacity settings with current battery voltage.
- **Generator Start/Stop:** Use inverter ON/OFF button to remotely start generator or to override automatic generator start feature for manual operation. This feature is available for use without altering automatic generator start programming.

This is an alternate field of main system status. To access the various meters available, depress the **UP** arrow button and hold for five seconds. The RC7 remote will beep. Release the button. The Avg Shunt Amps will be displayed. This field area includes:

Avg Shunt Amps:

This measures the DC current either charging or discharging. Most of the house DC current usage is monitored by the inverter.

Battery Voltage:

This monitors the house battery voltage.

Inv/Chg Current:

This measures the total pass through AC current usage.

Inverter Output VAC:

This monitors the AC output voltage while the unit is inverting.

AC Input Amps:

The inverter uses a double pole pass through relay. This measures current consumption through the Hot 1 terminal.

Battery Temperature:

This monitors counts of the battery temperature sensor (BTS). Counts are measured impulses which the inverter uses to calculate the battery case temperature. The charging voltage is adjusted to optimum values.

Xformer Temp:

This monitors the transformer temperature which is measured in counts. Higher count readings are registering lower temperatures.

FET Temp:

This monitors the Field Effect Transistor temperature which is measured in counts.

Est Batt Cap:

This estimates the battery bank capacity in amp hours (Ahrs). Charging and discharging on a cyclic basis will give an approximate indication of the battery capacity in amp hours. Observe the reading and multiply by eight to obtain an approximate reserve capacity. This figure is only approximate and will change with cyclic use.

Programming the RC7

To enter programming mode:

Discontinue the AC supply (shore power or generator), then turn inverter main switch to **OFF**. This shutdown procedure allows new information to be permanently saved. Program changes made out of this sequence will leave new changes in volatile memory. The previous settings will be re-established when the main battery disconnects are turned to **OFF**, then back to **ON**.

Depress and hold the Set-Up buttons (up and down arrows) for five seconds. The RC7 remote will beep. Release the buttons. The programming mode has been entered when the Search Sense is displayed.

- Use the Menu buttons (up and down arrows) to scroll through available field settings.
- Use the Settings button (arrow pointing to right) to scroll through available settings for selected field.

To exit the programming mode momentarily:

- Depress the Set-up buttons (up and down arrows).
- Allow 20 seconds for changes to be accepted by the inverter.
- Turn the inverter main switch back to **ON**. The inverter is now ready to use. “**Waiting for AC**” will be displayed, or if changes were made with AC applied, one of the three states of charge will be displayed.

Adjustable Field Settings

Search Sense:

The inverter will search for an AC load. Example: While inverting, AC loads of various amperages may be applied. These loads may range from a few watts to several amps. Search Sense is the cut-in point which the inverter will exit the “sleep mode” and start inverting at a standard output voltage. The Defeat setting allows the inverter to be at a constant standard output voltage. When changing the Search Sense value, AC loads must be evaluated for proper inverter operation.

Auto LBCO:

The Automatic Low Battery Cut-off may be turned on or off. These settings allow the inverter to use available DC voltage to a set value while inverting. Turning the LBCO **ON** stops the inverter when the battery voltage drops to 10.5 Volts DC. Turning the LBCO **OFF** stops the inverter when the battery voltage drops to 8.5 Volts DC. This leaves the batteries discharged, but not completely dead.

Battery Capacity:

The battery bank capacity is adjustable in Ahrs (amp hours). These settings change charging curves and the length of time of the charging cycles. The range is from 125 Ahrs to 1,000 Ahrs. Select the closest Amp Hour rating for the house battery bank capacity. The auto setting will “learn” the battery bank size by user characteristics. Example: Discharging and recharging the batteries on a

cyclic basis. The inverter takes several charging cycles to “learn” an individual battery bank size. When main battery disconnects have been tuned off, “learning” curve is erased.

Battery Type:

Many types of batteries, with different chemical compositions, are available. Different chemical types require different charging characteristics at different voltages. Selection of available battery types are:

- AGM(absorb glass matte)
- Gel Cell
- Liquid Lead Acid

Charge Rate:

Charge rate is adjustable from 10 to 100 percent. This feature may be used in many different ways. Selecting a lower percentage charge rate lowers the inverter AC battery charger’s current consumption. It will take longer to charge batteries but will leave user a few extra AC amps when operating from a limited power source.

Shore Power Amps:

This is a load shedding feature of the battery charger in the inverter. Example: Shore Power Amps set to 30 amps will decrease the AC current available for the internal battery charger’s use, as pass through AC current value approaches 30 amps. Lowering shore power amps will limit the available AC current for the internal battery charger’s use. This is adjustable from 5 to 30 amps, in 5 amp increments.

RC7 Setup:

This option allows the user to select the desired screen display. The Last Key will leave the menu active with the last status viewed on the display. The Rolling Display will continue to scroll through the active menu status display. The Power Saver allows the display to “sleep” after viewing the status. Touch any key to “awaken” the RC7 remote, then press the desired key.

LCD Contrast:

This changes the display screen contrast. Six settings are available. Lighter contrast settings may leave the screen difficult to see in a bright atmosphere.

External Shunt:

The inverter monitors both AC and DC current values, whether charging or discharging (figures are approximate), by using internal shunts. A shunt monitors partial current consumption, allowing the majority of current to pass on heavier conductors. Single inverter systems use their internal shunt to monitor system values; therefore, External Shunt None should be selected. Dual inverter systems may use the shunt of the other inverter to monitor the entire system

values; therefore, the “External Shunt Other Inverter” should be selected when not using the shunt of that inverter.

Fuel Gauge Cutout:

Battery chemistries and types have different static voltage readings at different states of charge. The battery voltage may be used to determine an approximate state of charge for that battery type and chemistry. The Fuel Gauge Cutout voltage is a reference point to determine a battery with no reserve capacity amp hours remaining. Changing the value of the Fuel Gauge Cutout will affect the fuel meter, automatic generator start and stop points if set by SOC (state of charge) and time left to run or charge. The Fuel Gauge will read 0 when preset and the Fuel Gauge Cutout voltage reaches the 50 percent SOC battery voltage.



NOTE: The remaining field items are used to program the Automatic Generator Start parameters.

Automatic Generator Start

The house batteries operate most of the interior lighting and most appliances. As the house battery power is consumed the reserve battery capacity diminishes. The inverter can be programmed to automatically start and stop the generator to keep up with the drain on the house batteries. All field reference points are house battery indications or conditions. A wide field of parameters may be chosen for the generator start and stop points. These points may be put in three categories:

1. House battery voltage.
2. State of charge (SOC). The Fuel Gauge Cut-out affects SOC.
3. Absorb or Float point of the charge cycle.

Example: The inverter can be programmed to start the generator when house battery voltage falls to 11.4 Volts. As the battery voltage rises, the inverter can be programmed to stop battery charging when house battery condition obtains a percentage of state of charge (SOC). When selecting the field reference points, make sure that the start and stop points are spread apart. It is possible to set parameters too close, causing short cycling of the generator. The menu will display the status of the generator while pending generator start. The generator must be operating correctly for proper automatic generator operation.



NOTE: If the generator is started manually from any remote switch other than the RC7 GS remote, while automatic generator start feature is enabled, the generator will shut down due to field parameter settings.

To override the automatic generator operation so that the generator may be used manually, use the RC7 GS remote Inverter button to start or stop the gen-

erator. This is done using the **UP** or **DOWN** arrows until Generator Start/Stop: Press (on/off) is displayed. The display will inform the user of the generator's status. The generator will need to be manually stopped.

To enable the automatic generator operation, the programming mode must be entered. Before any field reference points can be established, the clock must first be set. The clock set field is the last item in the programming menu.

Clock Set:

The clock is a 24 hour clock. If the display reads 00:01, it is 12:01 a.m. If the clock reads 13:00, it is 1:00 p.m. The hours and minutes will flash, alternating every eight seconds. Use the Settings button to advance hours or minutes. The clock time will be erased whenever the main battery disconnects are turned off.

Generator Start:

Selecting a state of charge (SOC) generator start point is affected by the Fuel Gauge Cutout voltage setting. SOC start points are between 40-60 percent, or the generator may be programmed to start at a specified voltage. The manual start disables the automatic start.

Generator Stop:

Selecting a state of charge generator stop point is affected by the Fuel Gauge Cutout voltage setting. SOC stop points are between 90-99 percent, or the generator may be programmed to stop at the Absorb or Float point of charge cycle. The manual off disables the automatic stop.

Begin Generator Quiet Time or End Generator Quiet Time:

The automatic generator start feature may be programmed to operate only at certain times in the 24 hour clock period. Example: The user wants the automatic generator to start operation at 10:00 a.m. and stop operation at 7:00 p.m.

End Generator Quiet Time:

This is the time which the automatic generator operation is to begin. Using the example above, the 24 hour clock would be set to 10.00 hrs.

Begin Generator Quiet Time:

This is the time which the automatic generator operation is set to stop. Using the previous example as a reference, the 24 clock would be set to 19:00 hrs.



NOTE: If the generator was started from the automatic start program and has not reached the automatic stop set point when quiet time begins, the generator will stop. Gen Quiet Falt will be displayed.

Select Generator:

The inverter has the capability to operate more than one generator

manufacturer type. The selections are:

- Onan Quiet Diesel (Type used in Monaco Coach).
- Power Tech, two and three wire.
- Other 30-80 (reserved for future).

To disable the automatic generator operation, use one of the following three methods:

- Set Generator Start and Generator Stop points back to manual **ON/OFF** positions.
- Set **BEGIN AND END QUIET TIMES** to same hour.
- Switch the house and chassis main battery disconnects off to erase the clock time.

Re-booting the Inverter

The remote is used to program or turn on or off the inverter. The RC7 and RC7 GS remote is a display only. All the programming information is retained in the inverter. If the inverter exhibits unusual symptoms or behavior such as not responding to commands or displaying erroneous error conditions, “re-booting” the inverter may alleviate these symptoms.

To re-boot the inverter:

1. Remove AC power from the inverter by disconnecting shore power and/or shutting the generator off.
2. Turn the main switch on the inverter to the **OFF** position.
3. Switch house and chassis main battery disconnects to the **OFF** position.
4. Wait 30 seconds, this allows time for capacitors to discharge.
5. Switch house and chassis main battery disconnects to the **ON** position.
6. Turn the main switch on the inverter to the **ON** position.
7. Plug shore power cord in and/or start generator.

GROUND FAULT CIRCUIT INTERRUPTER BREAKERS & OUTLETS


A ground fault circuit interrupter (GFCI) can be found in two different types of applications. One type is incorporated in a breaker used in the 120 Volt AC breaker panels, the other is incorporated in an outlet.


The GFCI, whether it is a breaker or an outlet, offers two types of protection. One type of protection is from over-current or shorts, plus protection for people against hazardous ground faults currents which can result in loss of life. Ground faults are currents which flow from the “HOT” or power terminal through a person to the ground. An example of this would be of a person touching a faulty appliance while standing on or in contact with an electrical ground such as a water fixture, bath tub or the earth. Proper installation of this device offers protection against this type of shock. The cause of this type of shock may


be faulty insulation, wet wiring from inside an appliance or any device or equipment plugged in or wired to that circuit. The “ground fault” portion of the outlet or breaker uses sensitive electronics inside the outlet or breaker to detect a ground fault problem. The way it works is the electronics monitor the normal current flow, which we think of as the power flowing to the “hot” or black wire through the load (eg. a light bulb or an appliance) and coming back on the “neutral” or white wire. If just a small amount of the current comes back on the safety ground wire, the electronics will “trip” the breaker or outlet and stop the flow of electricity. The amount of current it takes to trip the device from a ground fault varies slightly from the different outlet or breaker manufacturers (approximately 30 mils or less). Electrical shocks resulting from ground faults can be felt, but such a shock is considerably reduced compared to one without the ground fault protection. People with heart conditions or other conditions that make them susceptible to shocks can still be seriously injured. A GFCI outlet or breaker will not protect you against normal current flow. An example of this would be if a person touched both metal prongs of an extension cord or appliance while plugging it in.



GFCI Outlet

 **WARNING: If a breaker or outlet trips continually DO NOT continue to reset breaker or outlet until the problem has been identified and corrected.**

 **NOTE: The ground fault outlet or breaker should be tested once a month to insure it is working properly. Use the “TEST” button on the outlet or breaker. It should trip with an audible “click”. The breaker or outlet will not trip if no AC power is present to the device. If power is present and the device will not “trip,” replace it before using that circuit.**

 **NOTE: One mil is equal to 1/1000 of one amp.**

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.

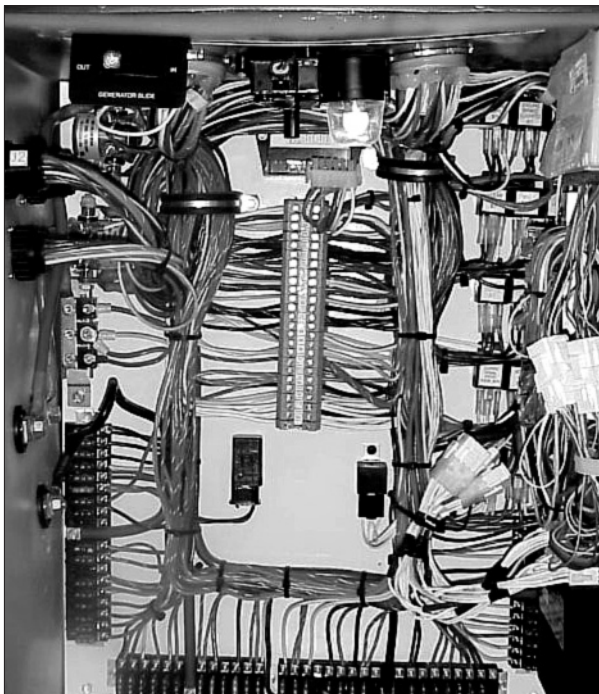
TWELVE VOLT DC SYSTEM

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 interconnections. For an 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.

How Does It Work

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, tail lights, 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.

Chassis Distribution Panel - Front Run



Front Electrical Panel.

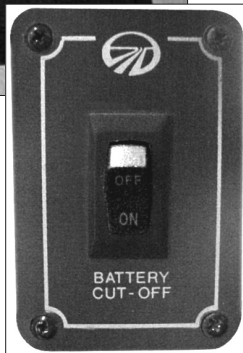
The front electrical panel is located on the roadside, ahead of the front wheel. It contains the fuses, self resetting supply circuit breakers, solenoids, and relays.

The automotive fuses and emergency flashers are located in the front electrical panel. The fuses are the standard plug-in type (AGC). 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.

House Distribution Panel & Battery Cut-Off



Fuse Panel Label



Battery Cut-Off Switch.

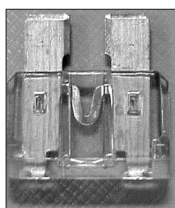
The 12 Volt house contains fuses (located in the bedroom overhead cabinet) that protect the electrical circuits. These fuses are the standard automotive type. When a fuse is “blown,” the wire in middle of the plastic case will be burnt. A broken, bad or “blown” fuse must be replaced with a fuse of the same rating and type. Use of a fuse with a different rating or type will defeat the circuit protection provided by that fuse and could result in damage to the motorhome’s electrical system.

The main disconnect switch is located inside the entry door. It is installed to allow 12 Volt power from the domestic distribution panel to be cut off at one location for dry camping and storage. This is not the battery disconnect switch, but it will turn off the power to the inside house 12 Volt DC bedroom fuse panel. If the interior lights do not work, and the wall thermostat is not working, first check the 12 Volt battery cut-off switch.

FUSES

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

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.

Testing Equipment

One of the most widely used tools used 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.

Know the Limits

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 yourself working on it for a whole day and wishing 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?

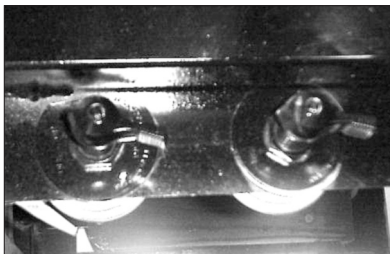


NOTE: Check all related fuses before assuming you have encountered an electrical problem or situation. Spare fuses should be kept on hand, and can be purchased from an auto parts stores. A fuse description label is on the distribution panel cover.



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.

Main Battery Disconnects



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 like the LP-Gas detector. If the motorhome is not going to be used or is stored for more than 48 hours, it is recommended to turn the batteries off.

The operation of the battery is based on a chemical reaction. The battery is comprised of lead plates 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 preform(reserve capacity). Batteries left in a discharged condition will also readily freeze. This can crack the case allowing the solution to spill, it can also warp the plates. The acid acts like an “antifreeze” for the battery. This is why batteries should not be left or stored in a “discharged” condition.

BATTERY - 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 follow to ensure that your batteries are well maintained.

Battery Types

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 Amperes” 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).

Starting Battery

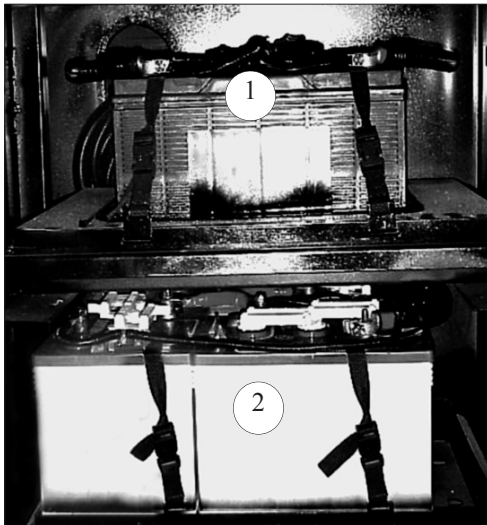
Deep Cycle Battery

This is the type of battery that is best suited for use with 12 volt operated lights, appliances and inverters. Deep cycle batteries are designed to have the majority of their capacity used before being recharged. 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 much voltage, how long the voltage is being applied to charge the batteries 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



The Chassis Battery (1) and the Domestic Batteries (2), located within the Battery Storage Compartment.

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 1/8" 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 area when done. 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. Batteries may explode resulting in fire, personal injury, property damage or death.

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 (sulfuric acid to water ratio). 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 percent water to 36 percent acid (fully charged battery). Hydrometer's 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 "ball park" figure. 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.

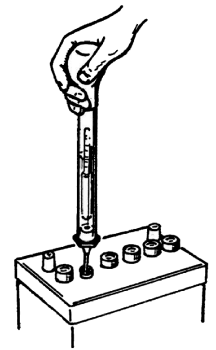
Chart readings are taken at 80° Fahrenheit. Temperature affects the hydrometer readings. The higher the electrolyte temperature, the higher the specific gravity reading. The lower the temperature, the lower the specific gravity reading will be. Add or subtract four points for each 10° variance from the 80° Fahrenheit 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 fully charged, charge that battery to see if the low cell will come up. At the same time, do not over charge the "healthy" cells.

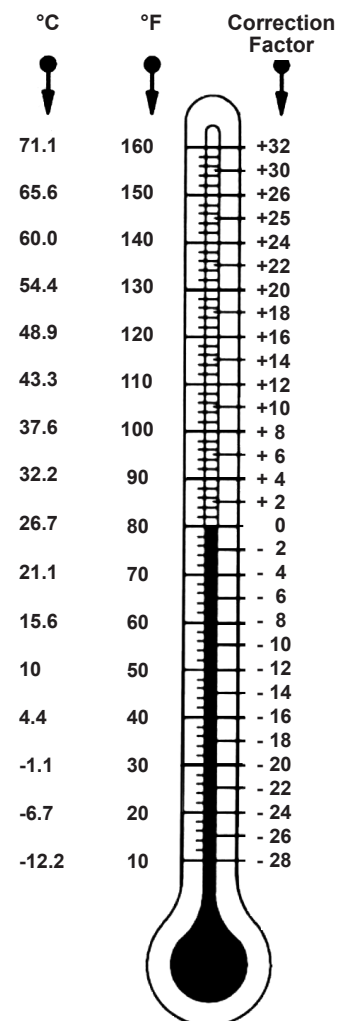
If the low cell does not come up after charging, this battery can damage the rest of the battery bank and should be replaced. An accurate digital volt meter + - .5% will also give an indicator of the battery's state of charge.

Another test that can be performed is to put the battery(s) under a specified load for a predetermined length of time for that particular battery's rating. This machine is usually an adjustable carbon pile that can vary the load applied to the battery(s) while monitoring voltage to see if they will perform to the specific rated capacities

Testing the Battery



Hydrometer (Cylinder Type).



Temperature Correction Chart.



NOTE: See 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 battery electrolyte is splashed in 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.

Seven Reasons Why Batteries Fail

1. Physical Condition:

Active material flakes off the plates and falls to the bottom of the cell. This is normal, but sediment accumulates under the plates and can short out a cell. The plate separators fail to insulate positive and negative plates in a cell and the cell becomes shorted, ruining the battery.

2. Insufficient Electrolyte:

This allows exposed portions of the plates to sulfate rapidly. This reduces the battery's ability to accept a charge, and the battery capacity is reduced. Accelerated erosion of the lower portions of the plates occur from higher than normal acid content due to water loss. Only the water evaporates, not the acid. The battery also has a higher internal resistance when low on water. Add only distilled water. Fill each cell to the bottom of the vent well when the battery is warm. Filling a very cold battery with water to the bottom of the vent well will cause overspill when the battery warms up and the plates expand. A Battery Formula For Failure: the battery has a higher internal resistance when low on water, therefore: *high resistance = more heat = shorter battery life!*

3. Sulfation:

When a battery is allowed to remain discharged too long the accumulated lead sulfate in the plate material solidifies and cannot reenter the electrolyte. Sulfate in plates is not able to reconstitute the electrolyte to a higher specific gravity, or to restore the plate material to a more active composition.

4. Overheating:

A battery operated, when the electrolyte temperature reaches 125° F, increases the chemical reaction. 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 doesn't freeze as easily. Never attempt to recharge a frozen battery. Warm it up first.

6. Corrosion:

Corrosion from spilled or splashed electrolyte form deposits that can conduct electricity and cause battery drain. Clean off all corrosion, especially around the battery terminals and on the top cover 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: Anytime you add more than one or two ounces per-cell per-thousand miles driven, check the motorhome charging system for overcharging. Prolonged overcharging generates excessive heat inside the battery, which buckles the plates and destroys the battery. It is a fact that over 50% of battery failures are caused by overcharging.

Why does the voltage on a discharged battery measure the same as a fully charged battery, until the loads are applied? The simple answer to this might go as follows: A battery creates electrical power by converting energy from a chemical reaction into electrical energy. As this reaction slows down, the battery voltage will drop. In a lead acid battery the electrolyte conductivity (how well electrical current can flow through it) changes. The same current may be available but the rate of the reaction decreases, causing a voltage drop.

Another way of looking at this is to use the analogy of a water pump (a battery is an electric pump). The pressure in PSI (pounds per square inch) that a pump delivers is like a battery's voltage. The volume of water in GPM (gallons per minute) is like the electrical current. Let's 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. Once 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.

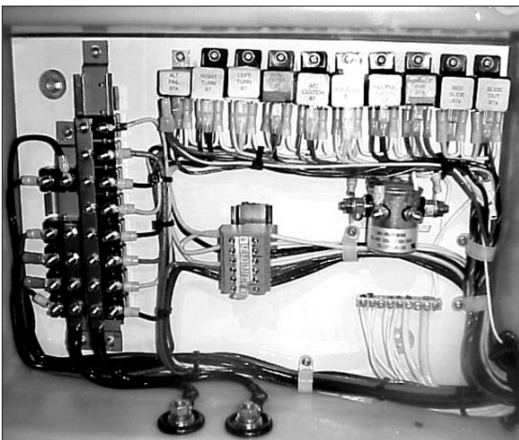
Battery Voltage & Current

If the load is then 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 taken away from the pump by closing the valve on the outflow, even with low pressure in the tank the pump will eventually pump up to 12 PSI. It will just take it longer to get there. When the valve is opened the pump will sustain 12 PSI for a brief period, but since the tank is no longer feeding the pump as fast as needed the pressure will eventually drop. This analogy can be restated by replacing the pump with a battery, pressure with voltage, volume with amps, outflow valve with a switch, water with electricity and the water tank with the battery electrolyte.

The level of the tank, could be thought of as the rate of the reaction taking place 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 spent electrolyte will be capable of producing close to the rated voltage, but only after a period of time has elapsed for enough reactions to take place to bring the voltage back up. Hopefully this scenario will help make clear why a battery measured at rest can show close to its rated voltage but will not run a load.

ENGINE COMPARTMENT 12 VOLT ELECTRICAL PANELS



Low Current.

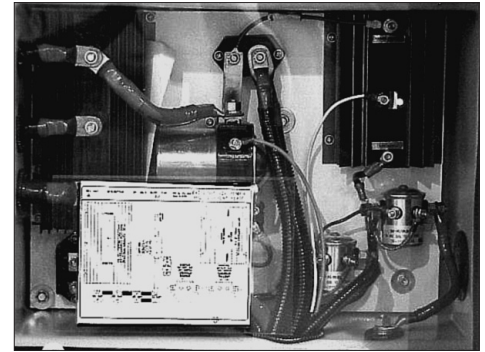
The electrical panel has been separated in two separate panels.

The low current plate located on the left rear has:

1. The starter solenoid.
2. The LP and CO fuses-water tight fuse holders.
3. The auto re-set circuits breakers.
4. The various relays.

The high current plate located on the right side has:

1. The battery maintainer.
2. The house disconnects solenoids.
3. The battery isolator, battery boost solenoid and various amperage automatic reset circuit breakers.

*High Current.*

All Executive models come pre-wired to accept this optional solar battery charging system. The system consists of one 90 watt solar panel with mounts, a combiner box (that allows you to easily expand the system), and a charge controller that can handle up to four 90 watt solar panels.

SOLAR PANEL SYSTEM/90 WATT (OPTIONAL)

The Solar Panel:

The Solar Panel is a Solec 90 watt panel that is capable of delivering about 5 amps of charge per hour, per panel, in full sunlight (usually between 9:30 a.m. and 2:30 p.m.). Extensive testing by Monaco has shown that one 90 watt solar panel delivers enough power to offset normal day to day drain on batteries, caused by various parasitic electrical loads. These parasitic loads are usually associated with transmission memories, alarm systems, natural self-discharge of batteries and other like items. This means that the first 90 watt solar panel is only intended to cover these parasitic loads. Adding a second, third or fourth solar panel (depending upon needs and electrical consumption), can replace what is draw out of the batteries from the operation of lights, water pumps, inverters etc., while dry-camping.



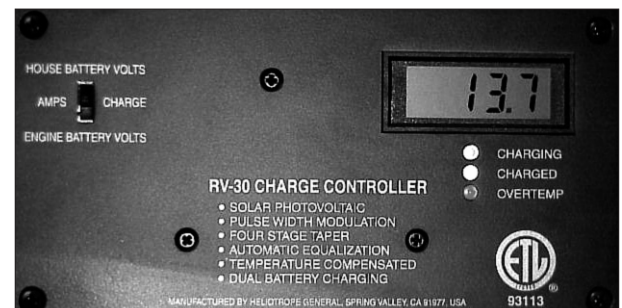
WARNING: The Solar Panel needs to be cleaned monthly. The Solar Panel may need to be cleaned more frequently if weather conditions permit.

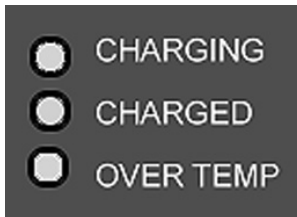
The Combiner Box:

The Combiner Box is located on the side of the refrigerator vent on the roof. It has four standard 1/2" knock outs to allow you to add any extra solar panels you may desire to meet your dry-camping needs.

The Charge Controller:

The Charge Controller was built specifically to meet the needs of Monaco motorhomes. The faceplate has a digital readout that will display one of three readings by means of a slider switch: House Battery Voltage, Amps Charge or Engine Battery Voltage.

*RV-30 Charge Controller*



Indicator Lights.

There are also three indicator lights for at a glance status: Charging (which means the system is actively charging), Charged (which means the batteries have reached 14.2 volts) and Over Temp (which means that the circuit board has reached a high temperature and has been turned off until it cools down, then it will turn back on automatically).

The faceplate of the controller is used as a heat sink for the electronics attached to it, and will become warm to the touch especially when it is processing higher amperage. This is normal and there is no reason to be concerned. Automatic thermal shutdown (indicated by the Overtemp light) will be activated if it gets too warm.

Charge Controller Features

The RV-30 Charge Controller has many unique features which are listed and described below:

- 1. Battery Charging** - The above mentioned parasitic loads affect both the House and Engine batteries. The controller automatically charges both the House and Engine batteries at the same time to deal with this issue.
- 2. Pulse Width Modulation** - This charging strategy has been found by the Sandi National Laboratories to maintain the highest state of charge with the least amount of battery water consumption. In effect, it delivers all the available charging amperage until the batteries reach 14.2 Volts (this stage is called bulk charging) and then it begins to taper off amperage (absorption stage) until it is reduced to all that is needed to simply hold the battery at 14.2 volts (Float Stage).
- 3. Temperature Compensation** - The gassing threshold of the batteries is reached at around 14.1 to 14.4 Volts at room temperature (25° C). If the temperature of the batteries is hotter than 25° C, the gassing threshold is reached at a lower voltage. If the temperature of the batteries is colder than 25° C, the gassing threshold is reached at a higher voltage. This feature protects your batteries from excess water loss and/or plate sulfation by automatically compensating for these temperature changes and adjusting the charging voltage accordingly.
- 4. Automatic Equalization** - This feature is activated once per day to extend the life of your batteries by allowing the weaker cells a chance to catch up with the stronger cells. This assures that all cells will be at an equal state of charge. The first time domestic batteries reach 14.2 Volts during the day, a delay timer is activated that allows a short duration period (20 to 30 minutes) at a slightly higher voltage (14.5 to 14.7 Volts) and then falls back to the 14.2 Volt setting for the remainder of the day.

Care of Solar Panels

A critical part of maintaining the solar electric battery charging system is to keep your panels clean. The amount of power which a panel will produce is directly related to the intensity of sunlight which reaches it. A dirty panel will allow less light to reach the panel resulting in less power produced. A single layer of dust or road grime can reduce the power output by 15 to 25 percent. Leaves and debris which can cover two or three of the 36 individual cells can reduce output power by 50 to 75 percent.

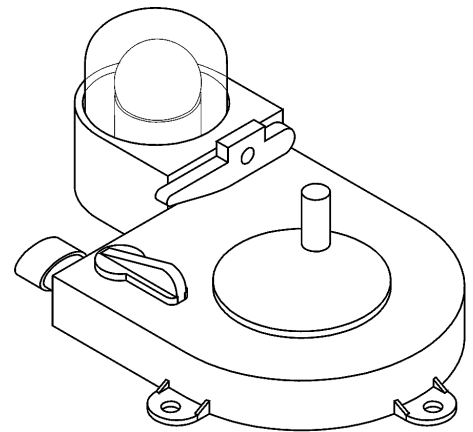
Use of the basic maintenance tips, regular inspections and regular cleaning will assure you of maximum charging from your solar electric system. A non-abrasive cleaner and paper towels are recommended. Depending on where you are would impact on how frequently you should clean them. One to two times a month is preferred.

Tips to follow

1. Look out your windshield. If you can see a film on them, or the view is obscured, chances are your panels should be cleaned.
2. On a bright sunny day the charging amps should be 3.5 to 5 amp for each panel.
3. When high winds blow dust and debris around frequently, take a look at your panels.

1. Activate the light by moving the **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 the bulb, push down on the 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.

RETRACTABLE REEL LIGHT

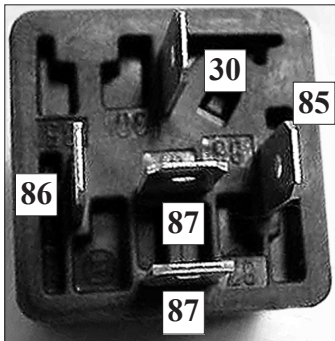


Your coach uses different relays to operate different equipment. If for some reason you have experienced a problem and you think a relay needs to be replaced, carefully record the location of each wire and its color.

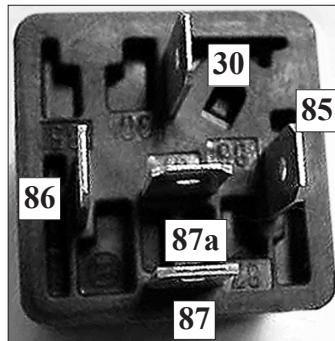
BOSCH RELAYS

The Bosch relays may look the same, but they are completely different. Look at the side of the relay to determine whether you need an **87** relay or an **87a** relay. These relays can be easily mixed, and your problem may snowball if you change the wrong one. These two relays can be wired many different ways to operate different functions. Turn the relay over and look at the post. Each post is numbered. It is important to note these differences listed:

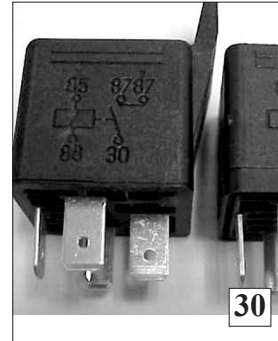
1. Some 30 post, is the incoming fuse and/or breaker power. Some relay use the 30 post as a pathway, some use it for ground. The 30 post can be used many different ways.
2. The 85 post is one side of the coil, tripped different ways.
3. The 86 post is one side of the coil, tripped different ways.
4. The 87 post is dead until the relay is tripped. Both posts are common into 30 post.
5. Using an 87a relay, the 30 post and the 87a post are common. When the coil is tripped the 87a becomes a dead post and is common to go out the 87 post on the outside of the relay.



87-87 Relay.



87a Relay.



Bosch Relay.

TOW-PLUG CONNECTIONS

Wires for the tow connection are located in the engine compartment. To locate the wires open the engine compartment door and look down. The tow connection wires rest above the tow hitch in a bundle of wires that are loomed.

The tow connection wires are coded as follows:

1. Brown, 12 gauge - taillights.
2. White, 12 gauge - ground.
3. Black, 14 gauge - right turn signal.
4. Yellow, 14 gauge - left turn signal.
5. Black w/white stripe, 14 gauge - brake light.

When hooking up the tow plug connection you should strip the wires 3/8", twist and place under the clip and secure the screw. Confirm that there are no loose strands of wire which could short against the case or other terminals.

NUHEAT FLOOR HEATING SYSTEM (Optional)

NuHeat is heat matting permanently installed under the tile, carpet and wood flooring. Everyone knows heat rises, which make the radiant concept easier to understand. Radiant heat is the transfer of heat from a warmer surface to a colder surface. Forms of radiant heating have been around for years and are still in use for numerous applications. The easiest explanation of radiant heat can be described by the waves or the image of puddles of water on the highway from a distance.

The NuHeat system, like all heating systems, incorporates a temperature control panel and a sensor probe. A unique feature is the Ground Fault Circuit Interrupter which is added for safety. The mats, which are custom designed for the motorhome, can easily be added to for larger areas of coverage. A single mat will generate 12 watts of heat per linear square foot. Since the NuHeat system uses radiant heat, there is no draft from a motor at start-up or blowing dust and no ducting odor. The mat is so thin (1/8 inch thick) there is no lost storage space and a minimal weight difference.

- Arrow up will move the temperature up to a higher setting.
- Arrow down will move the temperature down to a lower setting.
- Sun/Day will store and recall a preset comfort level or an economic setting.
- Moon/Night will store and recall a preset comfort level or an economic setting.

The following indicators are located under the face plate for the control panel (the faceplate will need to be removed):

- Test GFCI will be for periodic testing.
- Lamp indicates status of the periodic test.
- Reset restores normal operation after periodic testing.

Control Panel



NuHeat Control Panel with face off.

The NuHeat Ground Fault Circuit Interrupter should be tested monthly. The test procedure is nothing more than inserting a paperclip into the small opening labeled Test GFCI to press the test button. The line will open and turn on the Lamp indicator. You can be assured the circuit is functioning properly. If the test fails, shut off the breaker for the heating system and contact a qualified service technician immediately.

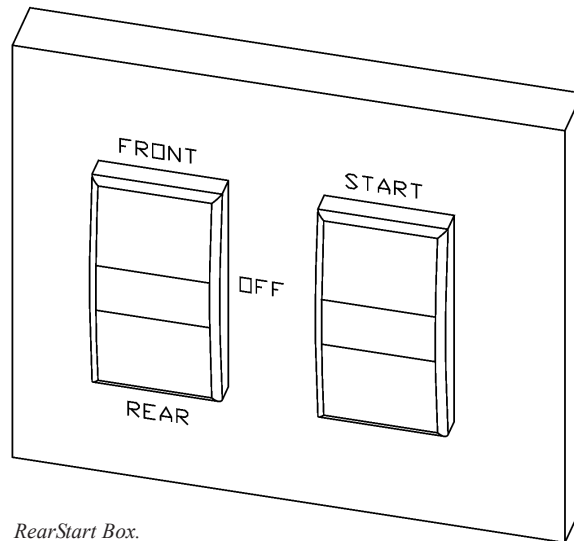
Testing

The Rear Start Box is located in the rear engine compartment, on the curb-side. It allows the service technicians easy access to the engine controls while servicing the motorhome. The ignition switch must be in the **ON** position, in the front, to start and stop the engine from the rear start box.

REAR START BOX

To Start From the Rear:

- Turn ignition key to ON.
- Move rocker switch to REAR.
- Ensure everything is clear of rotating parts.
- Press the switch to START.
- Moving switch to the center OFF position will turn engine OFF.
- Return switch to FRONT for normal operation.

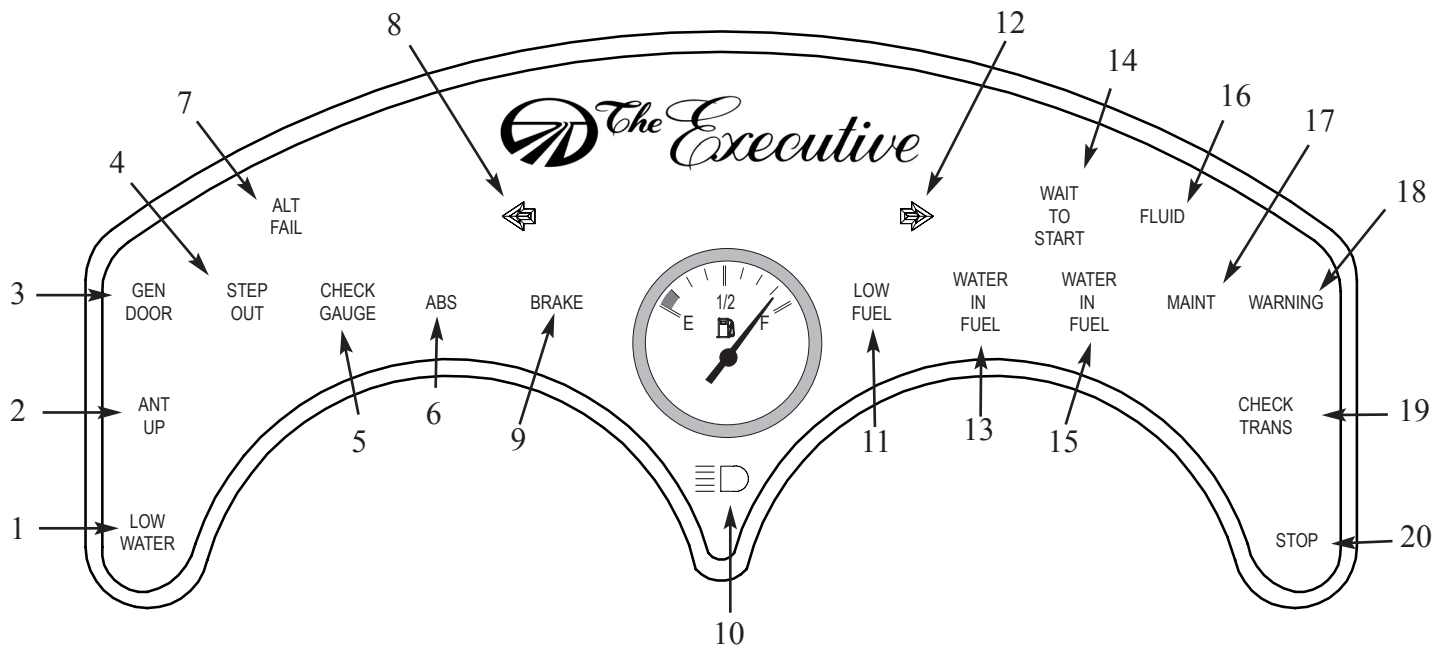


RearStart Box.

Remember to return the switch to FRONT run after use. If the motorhome will not start from the front, you can always try to start it from the rear start box.



CAUTION: When checking the engine compartment this switch should be placed in the rear start position. This will prevent accidental starting of the engine from the cab area.

DASH LAMP INDICATORS**1. Low Water:**

Indicates coolant level in the overflow tank is below acceptable level.

2. Ant Up:

Indicates TV antenna is not resting flat in the storage cradle.

3. Gen Door:

Indicates the generator door is open.

4. Step out:

Alerts the driver to possible problem with the entry step. Usually the step is in the extended position.

5. Check Gauge:

Alerts the driver to a problem which can be seen on the dash gauges.

6. ABS:

Indicates ABS possible fault in the ABS Brake system. Also indicates faults codes for service technicians.

7. Alt Fail:

Indicates a failure within the alternator charging system.

8. Left Arrow:

Indicates left turn indicator circuits active.

9. Brake:

Indicates parking/emergency Brake is applied.

10. Headlight Beam:

Indicates high beams when illuminated.

11. Low Fuel:

Indicates fuel level is becoming low.

12. Right Arrow - Audible Turn Indicators:

Indicates right turn indicator circuits active.

13. Water in Fuel:

This is a negative tripped light used only with the ISC Engine. Indicates water has been detected in fuel.

14. Wait to Start:

This monitors the air intake heater at start. This is only used with the ISC engine.

15. Water in Fuel:

This is a positive tripped light used only with the ISM engine.

16. Fluid:

Indicates out of range condition exists within the engine protection circuits. Stop coach, check all fluid levels.

17. Maint:

Indicates out of range condition exists within the engine protection circuits. Stop coach, check all fluid levels.

18. Warning:

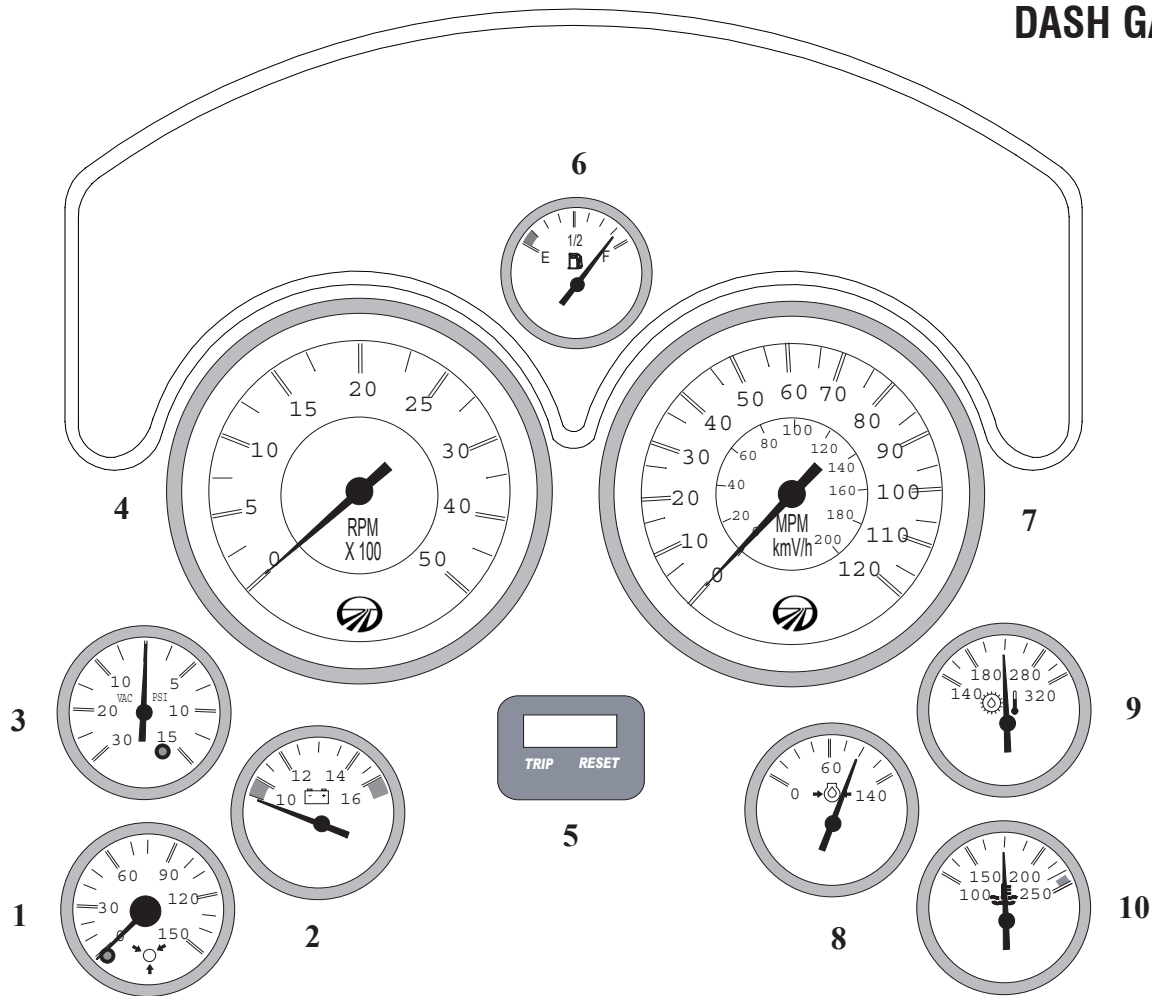
Indicates out of range condition exists within the engine protection circuits. Stop coach, check all fluid levels.

19. Check Trans:

Alerts 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, your system needs to be checked immediately.

20. Stop:

Alerts 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.

DASH GAUGES**1. Air Pressure:**

This indicates the air pressure in the front and rear air brake system. The normal air system operating pressure is 90 to 120 psi. These pressures are preset at the factory. If problems occur with either system maintaining sufficient pressure, contact your dealer immediately.



NOTE: It is not safe to drive a motorhome with low air pressure. Damage could occur to the suspension and drive line.

2. Voltmeter:

This gauge 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 Volts. With the engine operating, and not a heavy load, the battery charging voltage is about 14.0 Volts. Battery readings of less than 10.5, or more than 15 Volts, usually indicate 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:

Odometer/trip meter is located in dash, this records mileage driven as well as keeps track of mileage on a trip. To operate trip meter push button labeled "trip" which changes odometer mileage reading to trip mileage reading. Reset button sets trip mileage back to zero.

6. Fuel:

Fuel gauge will register approximate fuel level in tank, when ignition switch is in run position.



NOTE: Fuel mileage varies with driving style and road conditions. Always average more than one tankful to obtain a more accurate figure. Optional diesel Generator and Aqua-Hot system both use fuel from main tank, and will affect fuel mileage figures. Diesel Generators and Aqua-Hot 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 guage indicates MPH and KPH. Located on right side of instrument cluster.

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 overheating condition exists (the needle moving above the 212° F 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 1200-1500 RPM and allow temperature to return to normal.



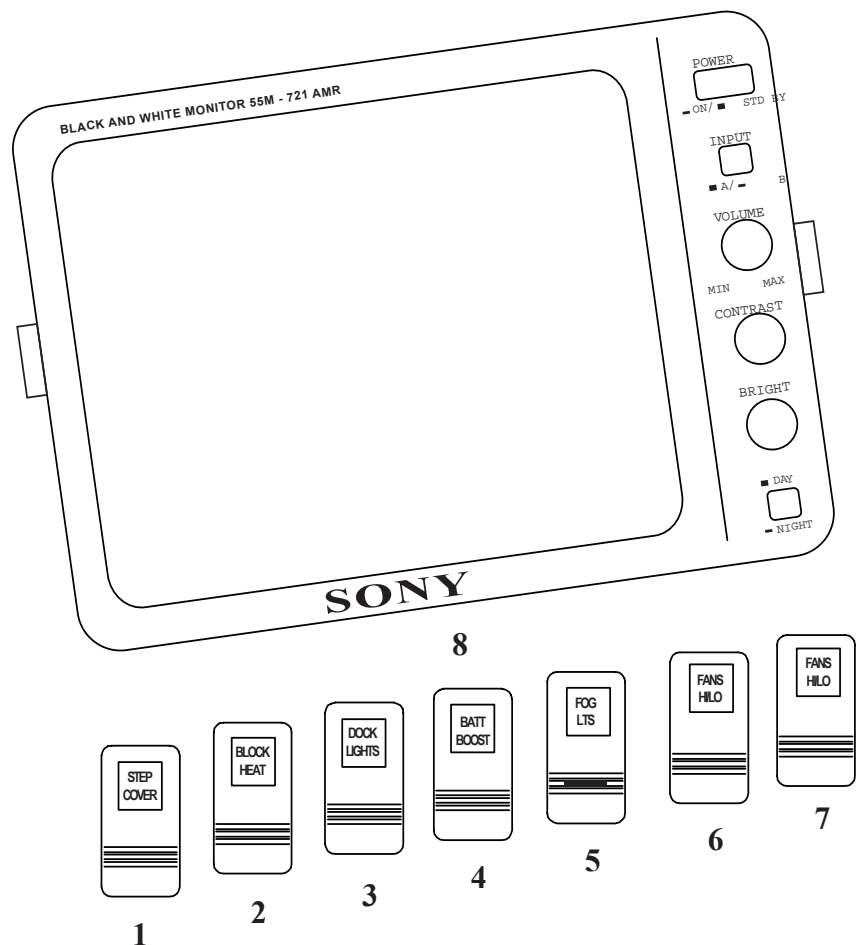
NOTE: Layouts will vary with difference in models

DASH SWITCHES**1. Step Cover:**

The front door models are equipped with a sliding Step-Well Cover that is extended and retracted by two switch locations. One switch is located just inside the entry door to the right, next to the passenger seat. The second switch is located on the left portion of the dash panel marked "Step in/out".

2. Block Heat:

The length of time that the block heater must be on to be effective depends on the length of time that the engine has been shut down and what the ambient air temperature is. For Example: If the engine has been shut down overnight in sub freezing temperatures, the block heater may need to be on for a minimum of two to three hours. With lower ambient temperatures and longer shutdown periods, time required to heat the block increases substantially.



3. Dock LTS:

Operates the side docking lights to increase visibility parking or backing.

4. Batt Boost:

The Battery Boost switch is used in the event the motorhome chassis battery has been drained or is at a low charge level where the engine cannot start. This switch momentarily “jumps” the house battery to the motorhome domestic battery to assist in starting the engine. The boost switch used in conjunction with engine starting procedures should not be held for more than 30 seconds. This time period is long enough to prevent the boost solenoid from over heating. The system works this way: A ground wire comes off the front firewall to the battery boost switch; When the battery boost switch is activated by pressing you will be sending a ground signal to the rear of the coach through the 12 gauge orange wire to the 1,000 amp solenoid. You should hear a loud clicking noise as the solenoid is being activated. If the boost solenoid is inactive, locate the molex plug and start the troubleshooting process by removing the cover on the dash. It may be necessary to remove the wire from the battery boost solenoid and perform a continuity check from the front to the rear of the motorhome.

5. Fog LTS:

Operates the fog lights with the ignition key on and the headlights in the low beam position. The fog lights will go off when the headlights are switched to high beam.

6. Fans HI/LO:

Operates the driver’s two speed dash fan for use with windshield defrosting and cooling.

7. Fans HI/LO:

Operates the passenger’s two speed dash fan for use with windshield defrosting and cooling.

8. Back up Monitor:

Used with the back up camera and will display the rear view of the motorhome.



NOTE: Layouts will vary with difference in models.

1. Dimmer Control:

Adjusts the brightness of the dash back lighting.

2. Headlight:

Pull one click to operate the parking lights. Pull two clicks to operate the headlights. When the headlight switch is rotated fully counterclockwise, a ground signal is applied to the map light circuitry for the driver map light.

3. Ignition Switch:

Counterclockwise rotation of the key will enable the accessory circuits. Clockwise rotation of the key will enable the ignition circuits.

4. Trip Tek Keypad:

Enables functions of the Trip Tek system.

5. Dash Heater and A/C Control:

Used to control the dash heater and A/C system.

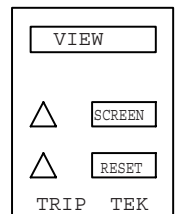
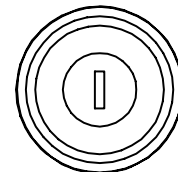
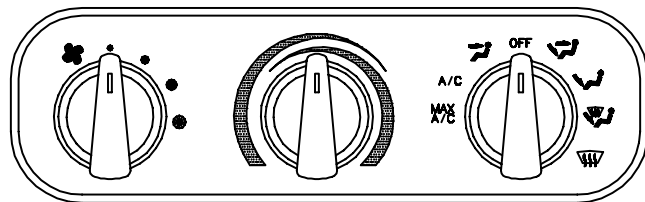
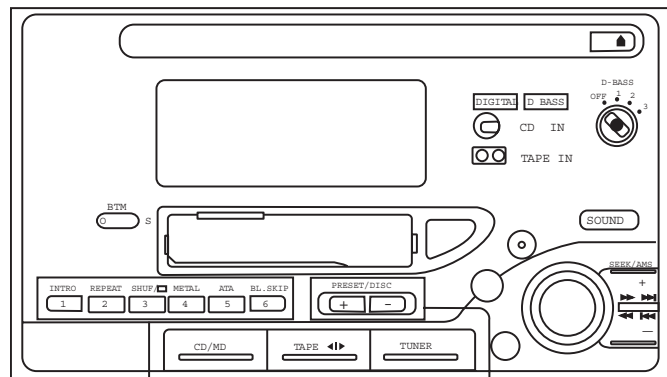
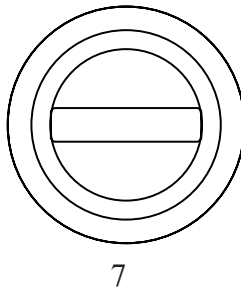
6. Dash Radio:

Enables the dash radio circuits.

7. Daytime Headlight System/CSA Standard:

AL-1A is a reduced intensity low beam system, which operates low beam headlights at 80% of their normal operating voltage to prolong the bulb life. The module features a DRL indicator output, a park-brake hold-off feature, and a high beam/ tail light shut-off circuit which prevents the low beams from being operated when the master light switch is on. AL-1A is a completely solid state, utilizing no moving parts such as relays, etc. Once two conditions have been met, the Daytime Headlight System will activate:

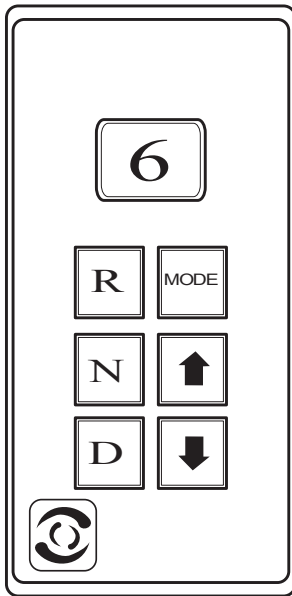
1. Ignition Key on.
2. Park brake released.



NOTE: Layouts will vary with difference in models

Transmission Key Pad:

The function of each position of the keypad push-button shifter is as follows:



Transmission Key Pad.

- 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 will appear 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. The up and down arrow button will need to be pressed simultaneously when the motorhome is at a rest position. This activates the diagnostic circuitry of the transmission. Exiting the diagnostics is accomplished by pressing **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 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 the codes.

1. Gen ON/OFF:

Starts and stops generator from the dash area.

2. Gen IN/OUT:

Operates hydraulic slide out for generator access.



NOTE: The Generator IN/OUT switch is deleted on motorhomes with an acrylic front protective mask.

3. Brake HI/LO (On the ISM engine only):

High setting activates engine brake on six cylinders. Low setting activates engine brake on three cylinders.

4. Engine Heat:

The engine preheat loop is an integral part of the Aqua-Hot heating system. When the Aqua-Hot is at normal operating temperatures (between 175°-195° F) and engine preheat is desired, follow these simple procedures:

- Turn Aqua-Hot switch on.
- Turn the engine heat switch **ON**.

This activates the engine preheat circulation pump. Circulating the engine's coolant through the engine preheat loop will adequately warm the engine to operate for easy starting.

- Allow approximately 1 to 2 hours (longer for colder, ambient temperatures) of engine preheating run time. The pump can be operated overnight if desired.
- Turn the engine heat switch OFF, when engine preheating is not desired.

5. Supplemental Heat:

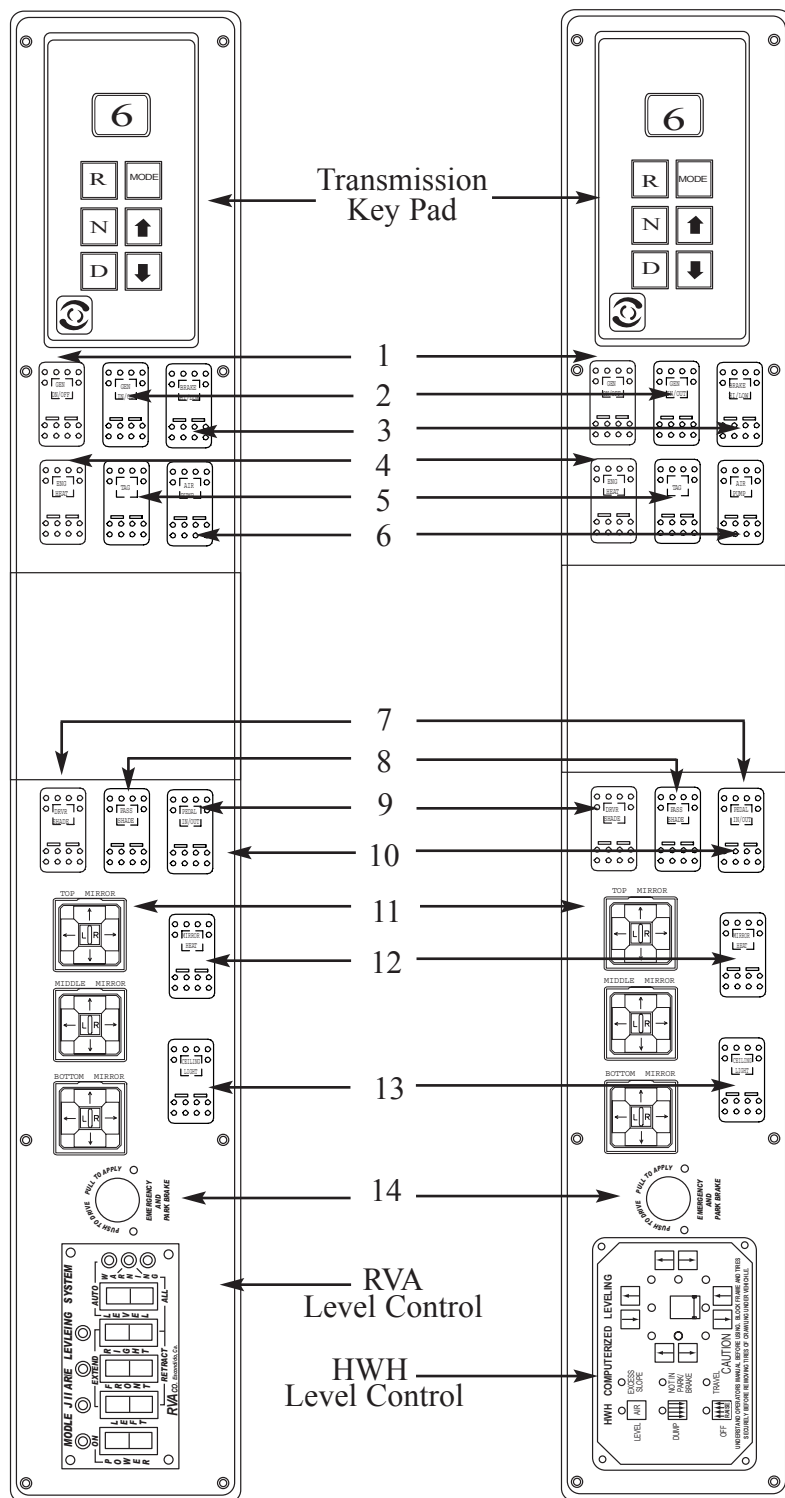
Aqua-Hot's engine preheating system acts as a supplemental heating source, in addition to the diesel burner and electric heating element. While traveling, the engine's heated coolant will automatically pass through engine preheat loop transferring heat into the Aqua-Hot's heat tank. This feature reduces total operating hours of the diesel heater.

6. Tag Axle:

Switch raises and lowers tag axle. When headlight switch is off, switch light is not illuminated. In certain situations tag axle may require to be in up position.

- Under five MPH. Severe maneuvering with motorhome under five MPH.

SHIFTER CONTROL PANELS - Hydraulic & Air



Air Level Dash Panel.

Hydraulic Level Dash Panel.

When using tag axle switch, just a couple of things to keep in mind.

- Tag axle down when switch is not lighted.
- Tag axle in up position, when switch is lighted.
- Tag axle switch will illuminate when tag axle is raised or headlights are on.



NOTE: DO NOT drive the motorhome over five MPH with the tag axle raised. Monaco Coach Corporation will not be held responsible for any damage that may occur from driving with the tag axle raised.

7. Air Dump (Hydraulic leveling only):

To manually dump air from air bags to aid in leveling motorhome, releasing air from air bags will give levelers more range of travel for leveling.



NOTE: Never drive the motorhome with the air bags deflated. This could damage the motorhome.

8. Drvr Shade:

Operates the power sun visor located drivers side.

9. Pass Shade:

Operates the power sun visor located passengers side.

10. Pedal In/Out:

After sitting in the drivers seat and making adjustments to the mirrors and steering wheel, you may want to adjust the brake and throttle pedal to be either closer or farther away. Locate switch on the left hand shifter panel marked Pedal Adjusts. By operating the switch one way, the pedals will move outward about three inches. If you need to move the pedals inward, just push the same switch in the opposite direction. When the pedals come to the end of their traveling distance you will hear a different sound in the noise of the motor. Stop by releasing the switch. Do not try to continue moving the pedals. Damage to the motor and or fuses may result if operation of the switch continues after reaching the fullest extend or retract position.

11. Mirror Control (top):

This switch adjusts the top mirror of 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.

Mirror Control (middle):

This switch adjust the middle mirror of 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.

Mirror Control (bottom):

This switch adjust the bottom mirror of 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.

12. Mirr Heat:

This switch turns on the heaters in outside rear view mirrors. The mirror heaters should be used when defogging or deicing is needed. Mirror heat should not be left in the **ON** position unless continuous fogging conditions occur.

Your outside mirrors have been placed so they can be easily adjusted with an Allen wrench. After taking delivery of your new motorhome it will be necessary to sit in the drivers seat and have the mirrors adjusted to fit your style. Make sure you can see out of both the driver and the passenger side mirrors, before heading out on the road.

The mirrors have a triple head action to allow you to operate any one of the three switches located next to you in the cockpit area. Using your left hand you can make the adjustments to your mirrors with little effort. When using the mirror heat switch, just turn the switch to the on position. Do not leave the mirror heat switch on when unnecessary.

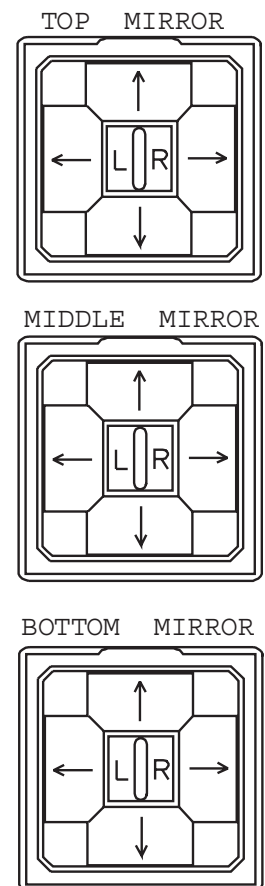
Top Mirror = convex glass.

Middle Mirror = flat glass.

Bottom Mirror = convex glass.

Mirror Care and Cleaning:

When washing your motorhome with hot water and soap, you will be also washing the outside chrome mirrors. After you have completed washing the motorhome you will need to clean the outside mirrors with a good quality glass cleaner. **DO NOT** use anything abrasive on the mirror and the outside chrome of the mirror.



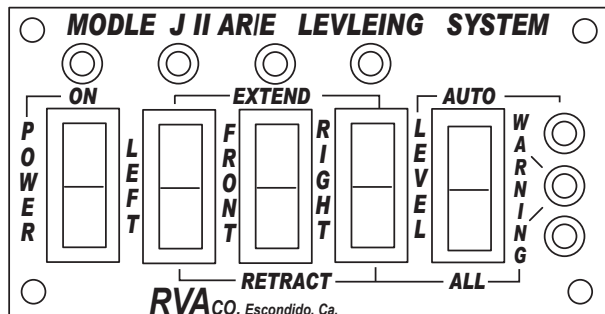
Mirror Control Switches.

13. Ceiling Lights:

The ceiling light switch will control the front ceiling light above the driver head.

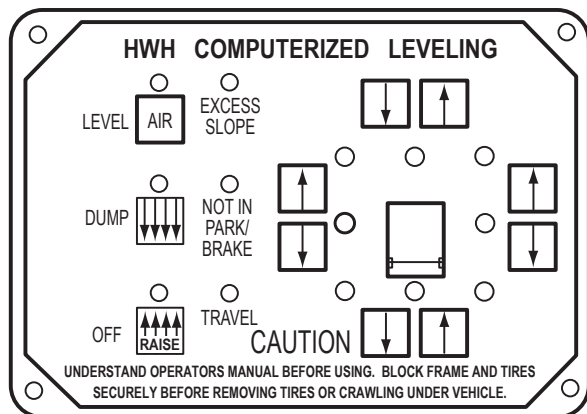
14. Emergency & Park Brake:

The park brake system is activated when the push-pull control knob is pulled. When the knob is pushed, the brake is released. Prior to driving, allow time for the air compressor to build up sufficient air to shut off the air warning lamp and buzzer.



RVA Control (Hydraulic Systems):

The three point hydraulic leveling system is operated from the control module. You can manually or automatically level the motorhome. The control features a multiple warning system with flashing lights and a bong alarm to alert you of the jack down position



HWH Control (Air Systems):

A touch panel, computer controlled, four point air leveling system is optional on all models of the Executive. The keypad will control the operation of the air leveling system. Models which are equipped with the air leveling system must remember the ignition has to be ON for the suspension to operate.

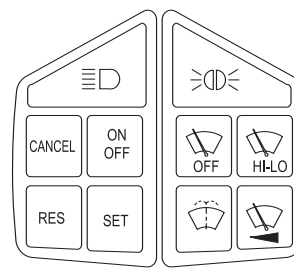
Instructions For Removing Turn light Lens:

Using a small flat blade screwdriver, pry the lens up from the base. Pull out the light bulb and insert the new light bulb. Snap lens back into place. DO NOT remove the turn light body from the arm.

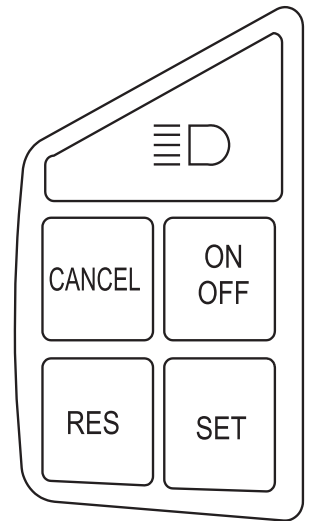
The motorhome is equipped with a smart wheel, the “**HIGH IDLE**” feature can increase the idle with this procedure.

1. Cruise control off, to raise the idle push the resume switch, you can raise the idle in 25 rpm increments by pushing the switch seven different times.
2. To lower the idle use the set button on the smart wheel. Again push downward to lower the idle.
3. Cruise control switch on, push inward on the set button and the rpm will raise all at one time to 1,500 rpms.

STEERING COLUMN & SMART WHEEL



Smart Wheel Cruise Control.



Horn:

The horn bar on the steering wheel will send the appropriate signal to cause horn output to be activated while the switch is pressed.

Headlamp Flash:

If the headlamps are turned on, pressing the switch will cause them to go off while the switch is pressed. In a like manner, if the headlamps are turned off, pressing the switch will cause them to go on while the switch is pressed.

Marker Lamp Flash:

If the marker lamps are turned on, pressing the switch will cause them to go off while the switch is pressed. If marker lamps are off, pressing this switch will cause them to temporarily illuminate.

Cruise Functions:

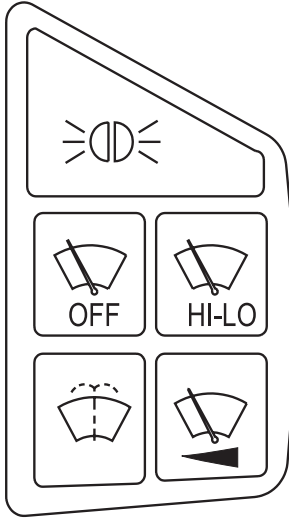
- **Cruise ON/OFF** - The operation of this switch cycles the Cruise system ON and OFF.
- **Cruise SET** - The operation of this switch actuates the Cruise Set function of the engine controller.
- **Cruise RES** - The operation of this switch actuates the Cruise Resume function of the engine controller.
- **Cruise CANCEL** - The operation of this switch signals the cruise system to disengage without losing the current speed memory setting.



WARNING: To take control of your 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 RPM run up will occur until the cruise control is turned off.

Smart Wheel - Operation

Wiper Functions



Smart Wheel Wiper Controls.

Wiper Wash:

The operation of this switch activates the wash pump relay when the switch is pressed. In addition, if none of the latching wiper functions (Wiper LO/HI or Variable) had been previously selected, the Low Speed Wiper will be activated for a period of approximately three wiper cycles after the switch is released. If any of the latching wiper functions (Wiper LO/HI or Variable) had been previously selected, the wipers will continue to run in the selected mode after the wash switch is released.

Wiper LO/HI:

The operation of this switch initially causes the Low Speed Wiper functions to activate. If the switch is pressed again the High-Speed Wiper will be activated. Subsequent presses of this switch will cause alternate operation of the wipers in the low or high-speed mode.

Wiper Variable:

The operation of this switch initially causes the Low Speed Wiper function to activate for one wipe. If the switch is pressed again within approximately 30 seconds, the Low Speed Wiper function will be activated again and will repeat at an interval determined by the time between the last two operations of the switch. Additional switch operations will shorten the cycle. Activation of any wiper mode cancels the variable mode. The effect for the driver is thus: In light rain or mist conditions the driver presses the switch once when windshield first needs clearing. When the windshield again requires clearing, the driver presses button again-setting the time period between subsequent wipes to that required by the current conditions.

Wiper OFF:

The operation of this switch causes all operation of wipers to be canceled. Turning off the ignition also resets this mode. Pull headlight switch to ON then back to off to cancel automatic headlight operation.



NOTE: Headlights will come on when any wiper mode is selected.

Tilt & Telescope

Tilt and telescope steering wheel control lever is located on the steering column.

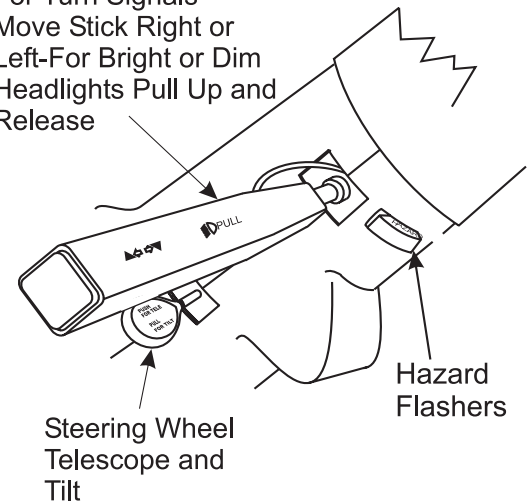
- To tilt the steering wheel, pull the lever up. Tilt the steering wheel where you want it. Release the lever and it will lock the steering wheel in the new position.
- To telescope the steering wheel, push and hold the lever down. Push down or pull up on the steering wheel until the wheel is where you 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.

Turn Indicator Lever/Headlight Dimmer

For Turn Signals
Move Stick Right or
Left-For Bright or Dim
Headlights Pull Up and
Release



The flasher button is located on the steering column.

Hazard Flasher

- To turn four way flasher on, pull out on flasher button.
- To shut off flasher, push button inwards.

NOTES

EXECUTIVE

SECTION 6
UNIT CARE & MAINTENANCE

EXTERIOR CARE
Corrosion

The most common cause of corrosion to the motorhome is the accumulation of road salts and dirt, combine these with moisture and you have a recipe for possible early component failure. Combine this recipe with salt air and fog from being near the ocean and the corrosion process is greatly accelerated. This road wash material generally accumulates on the undercarriage, around wheel openings and the radiator charge air cooler package. Periodically these areas need to be cleaned to help prevent early component failure due to corrosion. If you drive in areas where road salts are used, the motorhome should be washed. 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 affective way of cleaning off the underside and inside wheel openings. When washing try to remove all road debris and mud that has accumulated. Material left behind can exaggerate 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 1800 psi. Avoid using high pressure steam cleaners on the exterior paint surfaces. Remove all spattered washing debris from the exterior paint surfaces as soon as possible.

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. These products may scratch the clear coat or 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, scratching 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 rear of the motorhome. If there is excessive build up, use running water over a brush, wiping in one direction. This helps to 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, 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 the shade 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.

Washing

Drying

Drying chamois cloths come in natural and synthetic materials. Either type is acceptable as long as the surface is clean. Soak the chamois in clean water until all chamois material has absorbed water. Wring excess water from chamois. Start at the top and work towards the bottom. Use a downward “S” pattern to remove water from the surface and wring out the chamois as needed. Using a chamois cloth to remove the rinse water is not necessary, but the effort can be worthwhile.

Waxing

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

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

In the past, Monaco Coach Corporation has recommended the use of wax, advocating that it be done twice a year; spring and fall. This recommendation has not changed. Many types of protective barriers are available today that may be applied to the clear coat: Glazes, Waxes, Polishes, Rubbing Compounds or combinations thereof.



NOTE: When selecting a product for use follow the product manufacturer’s recommended application instructions.

Product Types

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.

Rubbing Compounds:

These types of products are generally applied by using a buffer. This type of job should be left to professionals as undesirable reactions can happen quickly. 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 product on a “small test spot” in an inconspicuous area. This will help if an undesired reaction is seen. Observe test area from different angles checking for hazing or swirl marks. If an abnormal finish or reaction is seen, discontinue product use and consult the product manufacturer. If the product is a paste, do not allow dried paste to be baked on by the sun. Remove paste shortly after drying. Clean and dry 100 percent cotton cloths, or cotton baby diapers, are best suited for dried paste removal. Turn the cloth often. Use a separate clean cloth to buff. Surface should feel “slick” when passing cloth lightly over. Avoid repeated wax applications which cause wax 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 is a big item, with a large surface area. Washing and waxing is not going to be done in one afternoon. Pick sections to do and admire the section that is complete. If the task seems formidable, have an automotive detailer perform the task.

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 wheels. Do not use rubbing compounds.

Exterior Bright Metal



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.

The motorhome is subjected to a great deal of outside influences which are not always under your control. While the coach is parked it is exposed to extreme temperatures, humidity, ultraviolet light, acid rain and other organic environmental problems. While in operation the coach is subjected to twisting and flexing, going in and out of driveways, bouncing through potholes and winding through mountain roads.

Exterior Maintenance

Periodic inspections of the fiberglass exterior 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 quite 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.

Seal Inspections

Periodic resealing of the joints and seams is necessary to prevent the entrance of moisture into the motorhome. There can not be enough emphasis placed on this issue. Great amounts of damage from a water leak can occur very quickly. Never leave the vehicle unattended with the slide room in the out position. If the vehicle is to be stored outside over the winter months, a bi-monthly full interior inspection for water leaks should be made. Extensive sealing has been done at the factory, however the twisting and flexing that occurs when traveling may have compromised a seal or seam. All joints and seams should be inspected at least twice a year and recalked as necessary. Special attention should be directed toward the roof air conditioning seals, ceiling and plumbing vents, skylights, roof mounted antennas, windows, door moldings, 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: Products may contain hazardous materials which require special handling. Read labels carefully. Follow all product manufacturer's safety requirements.

Sealant Types

Acryl-R:

This product is used on all roof openings such as vents and skylights, any roof mounted antennas, ladder roof mounts with the exception of the roof air conditioners. Sealant should be applied only where the equipment bases meet the roof. Clean old sealant that is lifting before applying with new. Make sure 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 product will spread out. Masking tape may be used to mask around area to avoid mishaps.

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

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 Moldings, Latches and around bases of items surface mounted such as clearance lights.

Old peeling sealant should be removed. Avoid using metal utensils as this will scratch the painted surface. Use nylon sticks or equivalent. Avoid using lacquer thinners or ketone based solvents as these can damage the painted surfaces. Be sure surface is clean and dry before application. Cut tube at an angle with smallest usable opening. Avoid a heavy bead as a little goes a long way. Use finger at a 45 degree angle on beaded surface to smooth out product. Do not moisten finger, use a dispos-

able latex glove. Keep rags or paper towels handy for clean up. Use care when applying silicone. Plan ahead before starting a bead, looking 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 in the same way as silicone does. Clean up involves 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 to seal where a hole has been made for items such as water lines or wires are coming through a floor opening.

Black Seam Tape:

This is a sticky tape which comes on a roll. Black seam tape is used on the front and rear roof seams, as well as on the roof to the sidewall corners of the slide out room.

Cut away old lifting tape. Surface should be clean and dry before a new application is made. This may be done in sections as needed.

Care and Maintenance of the Force Shield:

1. The purpose of the Force Shield is to protect the front of the coach from impact debris by taking the majority of scratches, scuffs, and nicks itself, rather than the painted surface of the coach. Owners should not be alarmed to see these occurrences on the Force Shield. If desired, replacement shields can be purchased from Carefree of Colorado and mounted on the original hardware.
2. Always abide by the placards warning you not to activate the generator slide without undoing the appropriate fasteners.
3. When removing and reattaching the Force Shield for routine coach maintenance, cleaning, etc., do not over tighten the screws holding the Force Shield to the coach. Only tighten until snug.
4. Use only mild soap and warm water to clean the Force Shield. Do not use any type of abrasive alcohol, ammonia, or petroleum based cleaners.



WARNING: Remove the 16 fasteners from the Force Shield before operating the generator slide-out.

**FRONT
PROTECTIVE
MASK
(Optional)**

INTERIOR CARE

The fabrics have been manufactured with the same quality you would expect to find in a furniture store. If abused, the fabric will be damaged. Special care is needed when your motorhome is exposed to a very humid climate for an extended period of time. Cover upholstery and make sure window coverings are down to protect from any sun damage. Protect the fabric from any unnecessary exposure to moisture. 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. Soiling may occur more frequently and items will probably need more attention than your furniture at home. 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 your 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.

Leather

Spots & Spills:

Absorb excess liquid immediately with a clean cloth or sponge. Use water only if necessary. Do not use a cleaning product. If water is used, clean the entire area where the spot occurred. An example would be the entire seat cushion, or the entire arm. 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 try the cleaning method in a hidden area first to convince yourself of the results.

Mini-Blinds

- To maintain them on a frequent basis, vacuum with the brush attachment.
- There are dusting tools available in the market place designed specifically for mini-blinds.
- To wash them, mild soap and water is best. This can be done in a tub, or the blinds can be hung on a fence or wall and rinsed with a hose.

The Solid Surface was created for a lifetime of easy care. Just follow the simple guidelines listed here to keep your surfaces looking good.

Solid Surface Care & Maintenance

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 you feel 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, 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 solid surface. Always run cold water into Solid Surface sinks when pouring boiling water into sinks.

Vinyl

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



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

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 *Fantastic*.

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.

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 them 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.



WARNING: Powdered cleaners containing abrasives, steel wool and industrial strength cleaners are not recommended for Morbern vinyl. Any lacquer solvent will cause immediate irreparable damage to the vinyl. Wax should never be used on any vinyl upholstery, as it will cause premature embrittlement and 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 scrape 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 it 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.

Wallpaper

Time is very important when removing substances that are solvent based or contain color. Fidelity and Jolie brands do not use abrasive cleaners containing chlorine bleach or solvents. Always begin with a mild detergent or soap and warm water. Clean with a soft sponge. Rinse and wipe it dry. This should remove normal dirt.

Satinesque Wall Coverings

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 first 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 it 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, then rinse with clean water.

Remove ordinary stains with mild soap and warm water. Sponge it on. Rinse well and dry with a soft cloth.

***Tower Wall
Covering***

Special cleaning problems: To remove ball point pen, blood, lipstick, etc., use a sponge or soft bristle brush and *Formula 409*, *Fantastic* 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.

Water Spots:

Windows

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. It is 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

You can reduce or eliminate interior moisture condensation during cold weather by taking the following steps:

- Partially open the roof vents and windows so that outside air can circulate into the interior. Increase the ventilation when larger 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 prevent the possibility of ice formations.

CARPET CLEANING

Spot Removal Procedures

- Act quickly when anything is dropped or spilled. Remove spots before they dry.
- Blot liquids with a clean, white absorbent cloth or paper towel.
- For semi-solids, scoop up with a rounded spoon.
- For solids, break up and vacuum out as much as possible.
- Pretest the spot removal agent in an inconspicuous area to make certain it will not damage the carpet or its 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.

Use the solution specified in order from 1-6 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
SPOTS									
Acid				2		1		3	*
Acne Medication		1		2	5	4	3	6	*
Alcoholic Beverage			1	4	3	2			*
Ammonia				2	1				*
Bleach		1	2					3	*
Blood		1	3		2	4			
Candle Wax	1					2			
Cement & Glue	2	1	3		5	4	6		*
Chalk		1	2						
Charcoal		1	2						
Chewing Gum	1								
Coffee			1	3	2		4	5	*
Cosmetics		2	1	3	6	5	4	7	*
Crayon	1		2	3					
Drain/Toilet Cleaner			2	1	3			4	*
Dye	1		2		4	3	5	6	*
Food			1	4	3	2	5	6	*
Fungicides/Insecticides/Pesticides	1		2	5	4	3	6	*	
Furniture Polish (Water Based)			1	4	3	2	5	6	*
Furniture Polish (Solvent Based)	2	1	3	6	5	4	7	8	*
Furniture Stain	2	1	3	6	5	4	7	8	*
Graphite		1	2						
Grease	1	2	3				4	5	*
Ink	2	1	3	6	5	4	7	8	*
Iodine	1		2	5	4	3	6	7	*
Lipstick	2	1	3	6	5	4	7	8	*
Medicine	2	1	3	6	5	4	7	8	*
Merthiolate			1	4	3	2	5	6	*
Nail Polish	2	1	3				4	5	*
Oil	1		2	4		3		5	*
Paint	2	1	3				4	5	*
Plant Food			1	4	3	2	5	6	*
Rust			2	3	1		4	5	*
Shoe Polish	2	1	3	5		4	6	7	*
Soft Drinks			1	4	3	2	5	6	*
Soot	1		2	3				4	*
Tar	1						2	3	*
Toothpaste			1						
Urine			1		2		3	4	*
Vomit			1	4	3	2	5	6	*

Cleaning Chart.

- 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, then 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.

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

Tile Floor

Regular maintenance is all it takes to keep the tile in your motorhome looking showroom new. When using your slide out, be sure to clean the tile floor when the slide out is extended to prevent dirt from scratching your tiles when the slide out is retracted.

Cleaning Tile:

Clean tiles with a damp sponge mop or cloth to maintain their luster. If moderate staining occurs, cleaning with a window cleaner such as *Windex* should do the job. If you prefer, you can use a mild solution of hot water and all purpose cleaner for tile floors, walls and countertops. Rinse with clear water and be sure to 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.

If the grout requires cleaning, scrub with a plastic brush. Do not use steel wool as small particles may remain and produce unsightly stains. Powdered cleaners should not be used on unglazed tile floors. Undissolved powder will dull the surface. In addition, sealers are not recommended on unglazed tiles. With the exception of terracotta, which may be oiled or waxed, you won't need to polish or buff the tiles to maintain their finish.

Cleaning Shower:

Showers are susceptible to hot water and 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 you should spray the shower with household chlorine bleach and allow it to stand for five minutes. Weekly cleaning of glass shower doors with window cleaner should maintain the shine. If you have water build up, and cannot remove spots from the glass, rubbing lightly with a razor blade will remove the deposits.

To prevent excessive moisture and a continual growth of mildew, use the shower only with adequate ventilation. The sealer in a regularly used shower should be replaced once a year. To accomplish this, use a sharp instrument to remove the old sealant. Apply a new sealant, which can be found at an RV supply store.



NOTE: Before using any solution to clean your tile, be sure to check the manufacturer's warning label to insure the product's safety. If you have any doubt, test the solution in an inconspicuous place.

**Fabric
Cleaning Codes**

“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.

***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 NO 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.

FABRIC SPECIFICATIONS

FABRIC	CONTENT	CLEANING CODE	WHERE USED
CROWN ROYAL .294			
550135 000-074	56% Rayon 29% Polyester 15% Acrylic	S	Chair, LR Pillow #1, LR Valance Welt
550136 000-017	71% Rayon 29% Polyester	S	FSD, LR Pillows #1, Dinette Cushion, LR Valance
98003 93 Pebble	53% Cotton 47% Fiscosc	Dry Clean Only	Bedspread, BR Valance Swag
Cypress Stone	70% Rayon 25% Acetate 5% Polyester	Dry Clean Only	Windshield
Gramley 0642	72% Rayon 28% Cotton	S	Sofa, Painted Pillow #2
Khan 7105-9195/529	74% Rayon 24% Polyester 2% Silk	SW	BR Pillow #1
Malindi 005 Blueberry	100% Polyester	*S	BR Pillow #2, Headboard, BR Valance Legs
Microsan Chateau 214	50% Cotton 50% Polyester	SW	LR Valance, LR Slide, BR Slide
BRONZE .295			
20121 33 Pebble	100% Cotton	Dry Clean Only	Bedspread, BR Valance Swag
67777/322	71% Rayon 29% Polyester	S	Sofa, Painted Pillow #2
Cypress Stone	70% Rayon 25% Acetate 5% Polyester	Dry Clean Only	Windshield Privacy Drape
Jingo 12	60% Viscose (Rayon) 40% Polyester	S	LR Pillow #1
Kyoto 12	60% Viscose (Rayon) 40% Polyester	S	FSD, LR Pillows #1, Dinette Cushions
Microsan Coconut 7	50% Cotton 50% Polyester	Dry Clean Only	LR Valance, LR Slide, BR Slide
Monroe Putty	69% Cotton 31% Polyester	S	BR Pillow #1 & #2, BR Valance Legs
Shogun 12	60% Viscose (Rayon) 40% Polyester	S	Chair, LR Pillow #1, LR Valance
Tic Tac 92118	86% Cotton 14% Rayon	S	All Pillow Welts, LR Valance Welts

FABRIC	CONTENT	CLEANING CODE	WHERE USED
COLONIAL BLUE .296			
20103 90 Pearl	53% Cotton 47% Fiscosc	Dry Clean Only	Bedsread, BR Valance Swag
Cypress Stone	70% Rayon 25% Acetate 5% Polyester	Dry Clean Only	Windshield Privacy Drape
Emir - FRL Denim	100% Cotton	S	BR Pillow #1
Inner Galaxy 5901	64% Cotton 36% Polyester	S	Sofa, Painted Pillow #2
Microsan Coconut 7	50% Cotton 50% Polyester	Dry Clean Only	LR Valance, LR Slide, BR Slide
Orissa - FRL Denim	100% Cotton	S	BR Pillow #1 & #2, BR Valance Legs
PTU 691/5	52% Cotton 48% Rayon	S	LR Pillows #1, Dinette Chairs
Pyrenees Cobalt	42% Rayon 32% Cotton 26% Polyester	S	LR Pillow #1, Dinette Cushions, LR Valance
Savvy Marine	56% Polyester 44% Rayon	S	Chair, Welt, LR Valance
CARIBBEAN SEA .297			
Caribbean Winds 701	72% Cotton 28% Polyester	S	FSD, Chair, LR Pillows #1, LR Valance, Din. Cushion
Cypress Stone	70% Rayon 25% Acetate 5% Polyester	Dry Clean Only	Windshield Privacy Drape
Karma 04 Stone	100% Polyester	*S	Bedsread, BR Valance Swag
Macho Tide	100% Polyester	*S	BR Pillow #1 & #2, BR Valance Legs
Microsan Drizzle 215	50% Cotton 50% Polyester	SW	LR Valance, LR Slide, BR Slide
Newman 3533	56% Rayon 44% Cotton	S	Sofa, Painted Pillow #2

* See instructions for "Machine Washing 100% Polyester" under *Fabric Cleaning Codes*.

LR = Living Room

BR = Bedroom

FSD = Free Standing Dinette

VINYL	WHERE USED	CLEANING
CROWN ROYAL .294		Follow cleaning instructions for <i>Vinyl</i> under INTERIOR CARE.
Ambassador M-29 Purple Grey Vinyl Brunswick New Oyster Vinyl	Pilot & Co-Pilot Seat Welt Pilot Seat, Recliner	
BRONZE .295		
Allante Cream Vinyl Brunswick New Oyster Vinyl	Pilot & Co-Pilot Seat Welt Pilot Seat, Recliner	
COLONIAL BLUE .296		
Ambassador M-432 Imperial Blue Vinyl Brunswick New Oyster Vinyl	Pilot & Co-Pilot Seat Welt Pilot Seat, Recliner	
CARIBBEAN SEA .297		Follow cleaning instructions for <i>Leather</i> under INTERIOR CARE.
Ambassador M-28 Aqua Grey Vinyl Brunswick Pearl Vinyl	Pilot & Co-Pilot Seat Welt Pilot Seat, Recliner	
LEATHER	WHERE USED	
CROWN ROYAL .294		
Bruns. RVAA Oyster CAJ-7963	All Leather	
BRONZE .295		
Bruns. RVAA Oyster CAJ-7963	All Leather	
COLONIAL BLUE .296		
Bruns. RVAA Oyster CAJ-7963	All Leather	
CARIBBEAN SEA .297		
Bruns. RVAA Pearl CAJ-8008	All Leather	

**WINTERIZING
Air Pressure**

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

To Use Air Pressure:

1. Remove the water filter elements from the filters and reassemble the filters without the elements.
2. Drain the fresh water tank by opening the valve located in the outside water control service compartment of the motorhome.
3. Open the water heater and low-point drains. Turn the knobs to open the drains. Opening the low point drains clears the water out of the hot and cold water lines. Leave the low-point valves open until you are ready to use your motorhome again.
4. 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, then turn the pump off.
5. After you have drained the water lines, 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 more water can be seen coming out of the drain lines. Do not exceed 40 psi in the water lines and faucets.
6. Open all faucets (including the outside spigot) one at a time, while the air is on, to clear the water from the faucet supply lines. Also, 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. You will need 1 gallon of RV antifreeze to protect various water lines in your 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 gray tank to protect the drain valve. While holding down flush pedal, pour another 3-1/2 pints into the toilet, letting antifreeze run into the black tank to protect the valve. While holding down flush pedal, pour another 3-1/2 pints into the toilet, letting antifreeze run into the black tank to protect the valve. While holding down flush pedal, pour another 3-1/2 pints into the toilet, letting antifreeze run into the black tank to protect the valve located there. Pour the last pint of antifreeze into the toilet after you have released the flush pedal. Use a soft cloth to wipe out the sinks and shower after you pour in the antifreeze to protect the surfaces from stains.
10. If you do not chose to fill the water lines with nontoxic (potable) winterizing antifreeze, leave the low-point drains open until you are ready to use your motorhome again.



WARNING: When draining the low water drain lines and water heater, be sure water is not hot. Hot water from the lines can burn you.

Winterizing Using Nontoxic Antifreeze

If you choose to fill the water lines with antifreeze, you will need an independently operated water pump with garden hose connections and a container to hold 10 gallons of nontoxic (potable) winterizing antifreeze.

- Close all faucets, drain valves and low point drains.
- Pump the antifreeze into the fresh water tank using an independently operated water pump.
- Turn ON the system water pump and open each inside faucet and shower valves until a small amount of antifreeze runs into the holding tanks and close the faucets.
- Use a soft cloth to wipe out the sinks and shower to protect surfaces from antifreeze stains.
- Flush the stool and hold the spray nozzle to allow a small amount of antifreeze to run into the holding tank.
- Open and close the exterior hose faucet to fill the lines with antifreeze.



WARNING: You should use only nontoxic RV antifreeze that is specifically made for potable water systems. Automotive antifreeze, if ingested, can cause blindness, deafness or death. It is recommended that this procedure be done by a qualified RV service technician familiar with motorhomes, such as your authorized selling dealer.



NOTE: There are several appliances and options which use domestic fresh water. An ice maker, water filters, water purifiers, water heater, washer and Aqua-Hot which use domestic water should be drained and stored in accordance with manufacturer's recommendation for winterization.

Winterizing an Ice Maker

When storing or using your motorhome for winter, drain the water line to the refrigerator's water valve line from the water valve to the ice maker, and the ice maker itself. This will prevent water from freezing in an ice maker, its water line, or its water valve. Ice formation in these components can result in unnecessary repair expenses for the refrigerator owner.

To Drain the Ice Maker

- Move the ice maker's shut-off arm to the UP (off) position.
- Turn off the refrigerator water supply at the motorhome manual shut-off valve.
- Loosen and disconnect the inlet fitting (the water supply line) from the water valve. Drain the water from the supply line.

- Loosen and disconnect the outlet fitting (the line from the water valve to the ice maker) from the water valve. Drain the water from the line.
- Reconnect the inlet fitting to the water valve.
- Leave the water supply “OFF” until the outside temperatures are above freezing (32° F/0° C).
- Dry the ice maker cavity with a clean dry cloth.

To winterize your washer-dryer, follow the instructions below to avoid damage to your motorhome due to freezing:

Winterizing the Washer-Dryer

- With the washer-dryer turned off, remove the washer filter. This will allow the water remaining in the pump and drain hose to be evacuated. Replace the filter.
- Close the inlet shut-off valves (provided by the installer) and disconnect the inlet hoses.

If antifreeze is being used in the system, follow these instructions:

- When putting the antifreeze into the water system of your motorhome, set the washer to a warm/warm fill setting and allow the water to flow into the washer until the antifreeze is detected.
- Slowly advance the timer to a rinse cycle and allow the water to flow for ten seconds.
- Advance the unit to a spin cycle to remove the majority of the water from the washer.
- With the washer-dryer turned off, remove the washer filter. This will allow the water remaining in the pump and drain hose to be evacuated. Replace the filter.
- If you elect, you may close the inlet shut-off valves (provided by the installer) and disconnect the inlet hoses.
- Any water remaining in the unit should contain antifreeze and be protected from freezing.



NOTE: When placing the unit back into service, allow the unit to operate for one complete cycle before doing laundry to ensure all antifreeze has been purged from unit.

CHECKLIST - WINTER STORAGE

- Plumbing Lines - Drain and protect by filling with approved RV antifreeze.
- Fresh Water Tank - Drain.
- Water Filters - Remove and discard filters.
- 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.
- Batteries - Add distilled water and recharge if needed. Disconnect the cables. Remove the batteries and store them in a cool dry place. Check and recharge as needed.
- Refrigerator - Clean and leave both doors propped open. Cover the exterior panels and roof vents.
- Air Conditioner - Remove the air filters and clean or replace.
- Roof - Keep clear of snow accumulation or damage may occur.

CHECKLIST - OPENING THE MOTORHOME

If the motorhome was properly and carefully prepared for storage, taking it out of storage will not be difficult. The following procedure checklist assumes that you stored your motorhome properly. If you didn't, and extensive freeze damage or other serious deterioration has occurred, consult your 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 vents, ceiling vents and air conditioning covers. Be sure all 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 deterioration.
- Check all chassis fluids levels: engine oil, engine coolant, hydraulic fluid reservoir, transmission oil, rear axle oil and tag axle.
- Check the charge levels in the batteries. Refill with distilled water only and recharge as necessary. Reinstall the batteries if necessary.
- Be sure the cable ends and terminals are clean and free of corrosion.
- Check the charge levels in the batteries. Refill with distilled water only and recharge as necessary. Reinstall the batteries if necessary.
- Be sure the engine instruments indicate proper readings. Start the engine and allow it to reach operating temperature. Shut the engine down. Check all fluids and fill as necessary.
- When the engine is running, check the operation of headlights, taillights, turn signals, back-up lights, license plate light and emergency flashers. Operate the

motorhome air conditioner. If the air conditioner does not work, or unusual sounds occur, have the system checked by a qualified air conditioner technician.

- Drain, flush, and sanitize the fresh water system as outlined in the Water Section (4).
- Inspect the drain hose for leaks. Replace if necessary.
- Install the new water filters.
- Operate all faucets and fixtures in the fresh water system.
- Check for water leaks at all joints and fittings. Repair if necessary.
- Check the 12 Volt circuit breakers and inspect fuses.
- Operate all 12 Volt lights and accessories.
- Install the new batteries in battery operated devices.
- Test the carbon monoxide, LP-Gas and smoke detectors.
- Check the monitor panel operation.
- Inspect the 120 Volt electrical system which includes the power cord, converter, all outlets and exposed wiring. If defects are found, refer to your dealer or an authorized service center.



Prepare the generator for operation following the instructions in the Generator's Manual.

- Start and run the generator.
- Operate the 120 Volt appliances and air conditioners.
- Inspect the LP-Gas system and check for leaks. If the LP tank shows signs of rust or corrosion, have it inspected by a qualified LP technician.
- Operate each LP-Gas appliance. Observe all burner/pilot flames for proper color and size. In any case, have the LP-Gas regulator adjusted for proper pressure by a qualified technician.
- Inspect and clean the interior.
- Check the sealant around all roof and body seams and windows. Reseal if necessary.
- Lubricate all exterior locks, hinges and latches.
- 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.
- The air pressure in your water accumulator tank should be 20 psi. Your motorhome should now be ready for a new traveling season.
- If you choose, your dealer can double check your preparation and correct any defects or make any necessary adjustments.

NOTES

EXECUTIVE

SECTION 7 CHASSIS INFORMATION

INTRODUCTION

This chapter contains knowledge and information on various components of your motorhome chassis. Following the guidelines and procedures will help you to understand and operate your motorhome. Complete instructions for various components can be located in the operators manual included in the Owners Information File box.



WARNING: When frame or other welding is involved for motorhome repair or modification. The following precautions are required to protect 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 welder ground cable should be attached no more than 2 feet from the part be welded.**

The Executive's Roadmaster chassis has been designed to provide exceptional balance, handling and braking characteristics. The Roadmaster rear engine chassis is an engine and frame unit featuring a semi-monocoque tubular all steel frame design, providing greater structural integrity and more uniform stress distribution. Incorporated in the Roadmaster chassis is the exclusive air glide suspension system using eight outboard mounted air bags and shock absorbers. Tag axle models will also incorporate two inboard mounted air bags and shock absorbers. 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 will also incorporate a three point hydraulic leveling system or air leveling system. The Roadmaster chassis design offers unsurpassed ease of maintenance and service.

The towing system incorporated in the construction of the frame is rated at 10,000 lbs towing and 1,000 lbs tongue weight.

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 which 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 Bilstein gas 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.

AIR SUPPLY SYSTEM

The air compressing system on the motorhome is comprised of several items. An air compressor, air governor, an air dryer and air storage tanks. The air storage tank are mounted front and rear in the chassis. The compressed air system operates several items. Some of which include brakes, suspension, air horns, air gauge and step well 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 air is compressed, heat is generated. The heat dissipates as the air is discharged from the compressor. Moisture then 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 then charges the front air tank. The front air tank is divided in two halves: wet side and a dry side. The compressed air enters the wet side, before entering into 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 step well covers receive air through pressure protection valves (PPV). The ppv will not allow compressed air flow until approximately 60 psi. The pressure protection valves are installed for safety. In the event of an air system problem, the reserve air capacity will allow the operator to bring the motorhome to stop safely. The air system is monitored by a low pressure air switch connected to a lamp indication on the dash area and warning buzzer in the pilots area.

Air Governor

The air governor is located in the engine compartment. The air governor performs two functions. It regulates the air compressor to cut-in and cut-out, keeping the air system in the specified air pressure range of 105-120 psi. The air governor also sends 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 the 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 release of air at the rear of the motorhome as cut-out pressure is obtained.

Air Dryer

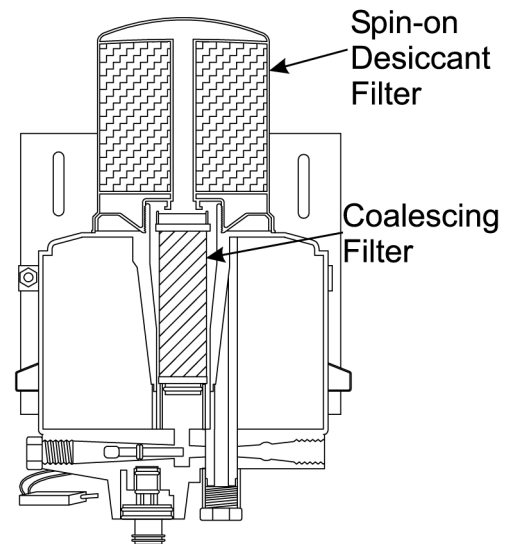
Because your motorhome is equipped with air brakes, it is also equipped with an air dryer. The air dryer is located underneath the motorhome on the curbside next to the transmission. The air dryer removes moisture from air that operates air brakes. This is important, because if air contains moisture it can freeze and prevent operation of brakes. The air dryer has 3 functions: It cools, filters and dries the air going through the motorhome’s systems. If moisture is present, the filter in the air dryer may need to be changed.

However, the following conditions can also cause water accumulation and should be considered before replacing the filter:

- An outside air source has been used to charge the system. This air did not pass through the drying bed.
- In the area where a 30° range of temperature occurs in one day, small amounts of water can accumulate due to condensation. Under these conditions, moisture is normal and should not be considered a problem.

There are 2 filters in the air dryer that will need to be periodically checked and changed if necessary. First is the spin-on desiccant filter, and the second is the replaceable coalescing filter. Depending on how often vehicle is driven, the filters will need to be checked every 6 months to 1 year.

Remove the coalescing filter to determine the amount of contamination. If the filter looks black, the filters need to be changed. If it is gray or white the filters are fine. Whenever you need to change the filters, make sure you change both filters, coalescing and desiccant, at same time. To remove the filters, first unscrew the desiccant filter and remove it. Then reach in and remove the coalescing filter.



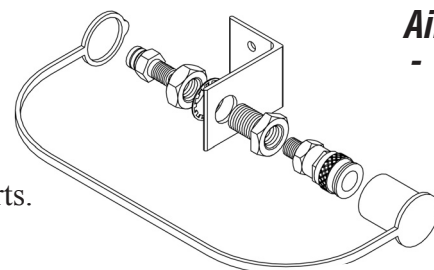
The air storage tanks are equipped with a pop valve and manual drain valves. The front air tank is divided in two halves: wet side and a dry side. The compressed air enters the wet side before entering into the dry side. A discharge line from the dry side of the front air tank charges the rear air tank. A manual drain is located on the both sides of the front storage tank. The pop valve is located on the WET side. The pop valve is designed to release pressure in the tank when the pressure exceeds 130 psi. The air tank should be drained every 90 days. The rear tank has only one manual drain. The air tank should be left open using the manual drain until all air has escaped. An additional five minutes will permit the moisture to escape. The air tank will provide air to the air bags, height control valves, parking brake and step slide cover.

Air Storage Tanks



NOTE: Color coded air lines can help identify air system malfunctions.

Located on the roadside, open the propane tank bay door. Secured to the frame you will locate the universal air coupler, used for the remote air hose. Push-to-connect the air hose used for checking air pressure in the tires and miscellaneous parts. It will be necessary to remove the dust cap first.



***Air Coupler
- Universal***

BRAKE SYSTEMS

Air Brakes

The motorhome is equipped with air brakes using much the same system as over the road trucks. This type of braking system is very efficient. Proper maintenance and lubrication is the key to keeping your 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 conventional automotive hydraulic braking system and should be treated differently. When operating a vehicle equipped with air brakes, considerations need to be given to stopping distances and air system pressures. These need to be heeded. 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 applications down long hills rather than “riding” the brakes. This will extend the life of your brake linings. Avoid overheating the brakes, as 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 safety features unlike that of automotive hydraulic braking systems. For example, should a low air condition arise while the vehicle is under operation, warning buzzer will sound and a warning light will illuminate alerting the operator of an impending situation. This warning occurs at approximately 65 psi(pounds per square inch). A simple 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.

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. Possible indications of a vehicle needing a 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 S-camshaft they are connected to require periodic lubrication.



NOTE: Replacement parts should be made 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. This is not covered under the Monaco Warranty.



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.



NOTE: Lubricate brake-actuating components inside the caliper two to four times during the life of the lining, or every six months.

***Lubricate
the Caliper***

1. Turn the adjusting nut on the slack adjuster to move the inboard lining against the rotor.
2. Plug the pressure relief valve by holding a finger over the poppet.



NOTE: On calipers with grease fittings in the caliper and the camshaft cap, first apply grease to the caliper fitting, then apply grease to the camshaft fitting.

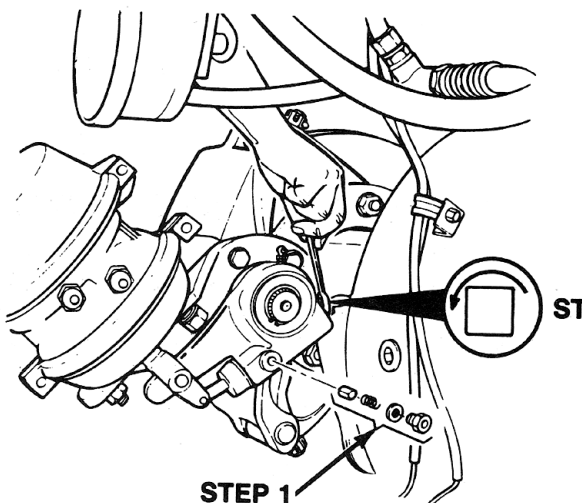
3. Apply grease through the grease fitting in the caliper until grease flows out of the seal at the camshaft cap.
4. Remove the pressure relief valve from the caliper. Turn the slack adjuster adjusting nut in the opposite direction to fully retract the caliper piston and force excess grease through the pressure relief hole.
5. Clean excess grease from the outside of the caliper with a rag.
6. Install the pressure relief valve.
7. Adjust the brake. Refer to a qualified technician.
8. Install or re-engage the pawl on the automatic slack adjuster.



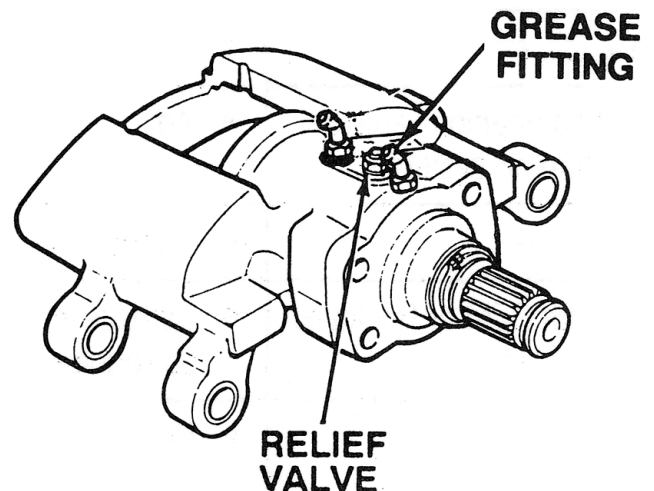
CAUTION: You must force excess grease from the caliper. Brakes can drag due to excessive grease in the caliper, which will reduce the brake lining life.



NOTE: Refer to the chart on p. 81 for grease specifications.



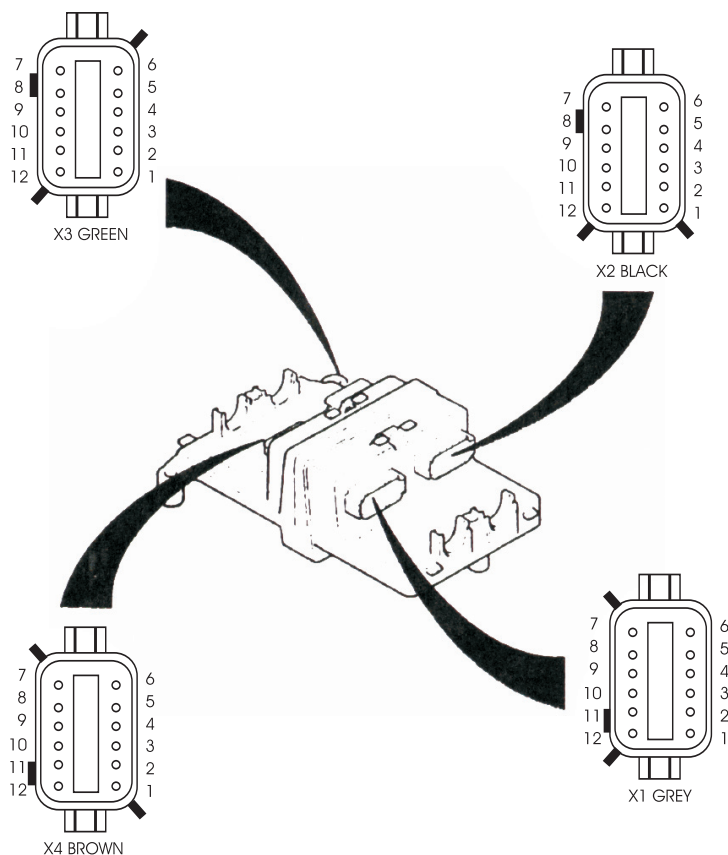
MANUFACTURED AFTER 1991



ABS System (Anti-lock Brakes)

The motorhome is equipped with an anti-lock braking system. This 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 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, it is indicating 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 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, then blink code will be displayed:
- 1-1 will indicate no system faults.

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. This allows 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. With the air system charged above 35 psi, this is approximately the point at which the park brake will remain released. Pushing down on the park brake handle charges the rear brake chambers with air pressure. This overrides the emergency brake springs 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. This acts 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 not allowing the air pressure to build, 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 allowing the vehicle to move. This procedure does not affect normal service braking.

Park & Emergency Brake System



NOTE: Park illumination lamp may remain lit even when park brake is released. System air pressure must be above 65 psi to cancel park lamp.

Auxiliary Braking

Auxiliary braking devices are devices designed to supplement your standard wheel braking system. The devices are not designed to stop the motorhome completely. The proper use of an auxiliary braking device can save in costly service brake repairs. The braking devices will assist in controlling the motorhome speed.

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 start-ups. 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 your 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. You should refer these problems to your dealer for diagnosis.

Pac Brake Operation (ISC Engine)

Pac Brake exhaust retard is such an auxiliary braking device.

Attached directly to engine turbocharger, Pac Brake is activated when dash switch is "ON" and throttle is "RELEASED." While driving with cruise control on, it will require tapping service brakes to disengage cruise control. Pac Brake foot switch will not disengage cruise control. A valve inside brake then moves to restrict flow of exhaust gases, causing an increase of back pressure within engine.

Increased back pressure quickly slows down engine, resulting in powerful braking performance. Amount of braking power you will develop when Pac Brake is on is relevant to engine speed (RPM). Higher RPM will have more retarding power. Certain conditions may require down shifting to generate adequate RPM for maximum retarding.

A Pac Brake wired to electronically controlled transmission will usually provide converter lockup in gears 2 through 6, meaning brake will activate automatically when throttle is released. Once on, brake will control existing road speed and/or slow sufficiently so Allison Transmission will automatically downshift, if necessary, to calibration pre-select mode.

**Engine braking
System (ISM Engine)**

The “Jake” brake is an engine brake not to be confused with the exhaust brake.

Engine brakes are devices that use the energy of engine compression to provide vehicle retardation. Engine brakes provide the maximum retarding power at rated speed; therefore, gear selection is important. The “World” Allison transmission will automatically select the best downshift gear upon actuation of the foot switch for the Jake Brake.

The engine brakes convert the engine to an energy absorbing device to reduce the motorhome speed. This is accomplished by a hydraulic circuit that opens the exhaust valves near the end of the compression stroke. The amount of braking power available in a given engine series varies. Braking power depends on turbocharger boost pressure, engine speed, compression ratio, injector timing and when the brakes open the exhaust valves.

Engine brake controls with the fuel system consist of the following:

1. A two-position selector switch.
2. An ON/OFF switch, which is the foot switch.
3. A throttle sensor.

Other switches for cruise control which affect engine brake operations are:

1. Cruise control ON/OFF and SET/RESUME switches (if the Engine Brakes in Cruise Control feature is turned “OFF”).
2. Service brake air pressure switch (if pedal activated engine braking is enabled).

The two-position selector switch, located on the driver’s left console, allows you to select the retarding power of one or two brakes.

“LOW” activates the engine brake on three cylinders.

“HI” activates the engine brake on six cylinders.

The engine ECM then electronically enables or disables the engine brakes.

NOTE: Engine brakes cannot be enabled:

1. When cruise control is active and if the engine brakes in cruise control feature is turned OFF.
2. When engine speed goes below 850 rpm.
3. When an electronic fault code is active. The throttle sensor is part of the accelerator pedal assembly located in the cab, and will deactivate the engine brakes when depressed. The service brake pressure switch is attached to the service brake air supply line. Applying the service brakes while in cruise control will disengage the cruise and enable the engine brakes. If the pedal activated engine brake feature is enabled, the service brake pedal must be tapped before the engine brakes will be activated. The Jake Brake can be used continuously down a hill, or

a long freeway off ramp. The engine braking system will allow the engine temperature to drop while going downhill.



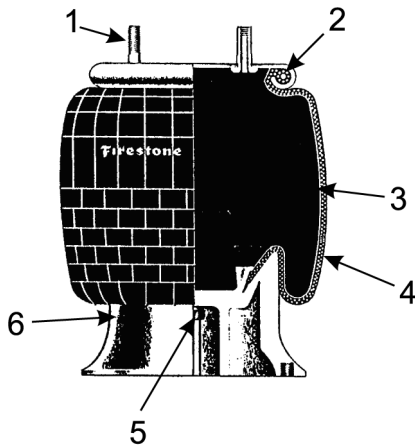
NOTE: Idle the engine 3 to 5 minutes at approximately 1000 rpm to warm the engine before activating the engine brakes. Do not operate the engine brakes until the engine oil temperature is above 30 degrees C (86 degrees F).



WARNING: The engine brakes (Jake Brake) are designed to assist the motorhome service brakes when slowing the motorhome to a stop. Remember, service brakes will be required to bring the motorhome to a stop.

SUSPENSION AIR RIDE

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.



1. STUD. Manufactured as a permanent part of bead plate assembly for maximum strength and durability. Used to attach spring to vehicle's suspension.

2. BEAD PLATE. Crimped onto bellows at 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 to -65F.

4. BUMPERS. A solid rubber or engineered plastic device designed to prevent significant damage to vehicle or 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 -
PREVENTATIVE
MAINTENANCE**

Listed below are items that can be checked when motorhome is in for periodic maintenance.



Note: Never attempt to service air suspension on a motorhome with air bags inflated.

- Inspect O.D. of air springs. Check for signs of irregular wear or heat cracking.
- Inspect air lines to make sure contact doesn't exist between air line and O.D. of air springs. Air lines can rub a hole in an air spring very quickly.
- Check to see that there is sufficient clearance around complete circumference of air spring while at its maximum diameter.
- Inspect O.D. of piston for buildup of foreign materials. (On a reversible sleeve style air spring, piston is bottom component of air spring.)
- Correct ride height should be maintained. All motorhomes with air springs have a specified ride height established by manufacturer. This height should be maintained within 1/4". This dimension can be checked with vehicle loaded or empty.
- Leveling valves (or height control valves) play a large part in ensuring that total air spring system works as required. Clean, inspect and replace if necessary.
- Make sure you have proper shock absorbers and check for leaking hydraulic oil and worn or broken end connectors. If a broken shock is found, replace it immediately. Shock absorber will normally limit rebound of an air spring and keep it from overextending.
- Check tightness of all mounting hardware (nuts and bolts). If loose, tighten. Do not over-tighten.

Approved cleaning method is to use soap and water, methyl alcohol, ethyl alcohol and isopropyl alcohol. Non-approved cleaning method includes all organic solvents, open flames, abrasives and direct pressurized steam cleaning.



WARNING: Do not drive the motorhome with air bags deflated. Driveline angle does change and damage to the motorhome may occur.

RIDE HEIGHT VALVES -Adjustment

The ride height valves inflate or deflate the air bags keeping the motorhome at proper suspension height throughout the load range. There are three ride height control valves used on the motorhome. Two are used on the rear drive axle, these 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. Amount of system air used depends on the type of roadway surface and driving styles.

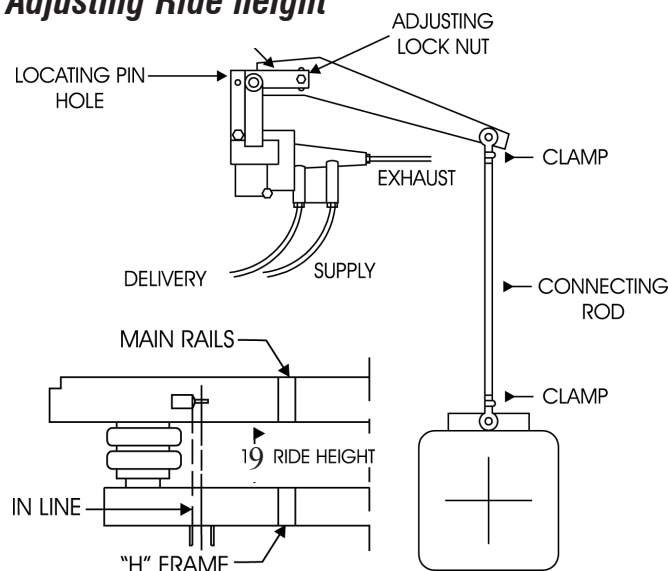
Ride Height - Checking

Should it become necessary to check suspension ride height start with air system fully charged and suspension at normal height. 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 adjustments to the rear valves may be necessary to compensate for slight tilt. 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 life of universal joints. Shock absorbers and air springs are in travel centers at proper ride height.

Adjusting Ride height



To adjust suspension ride height begin with:

- Motorhome on flat level surface.
- Air system fully charged.
- Suspension at normalized ride height.

Begin 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 small increment adjustments. When desired height is obtained, insert a 1/8" or 7/64" inch twist drill bit into the plastic arm and valve body. This will central 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 engine to allow 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 the 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.

**ENGINE
GENERAL**

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 ignited 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./in². 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 shutoff 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 O & M 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 Series Engine

Engine Starting Procedure (ISC NORMAL)

With throttle in idle position, turn ignition to the ON position allowing WAIT TO START lamp to extinguish, then 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 3-5 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.

ISM Series Engine

The maintenance guidelines found in the Cummins O & M 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 it's 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. Monaco Coach Corporation 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 can not 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 effect 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.

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 and Maintenance Manual for complete details.

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

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.

The diesel fuel tank is made of 160 thousands aluminum. The capacity of the tank is 150 gallons. A smaller sump tank inside contains approximately 20 gallons of reserve fuel. This sump tank utilizes a unique check valve that allows fuel to enter, but will not escape. The engine pickup tube is cut at a 45 degree angle to allow good flow to the engine.

Diesel Fuel Tank

NOTE: If your 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.

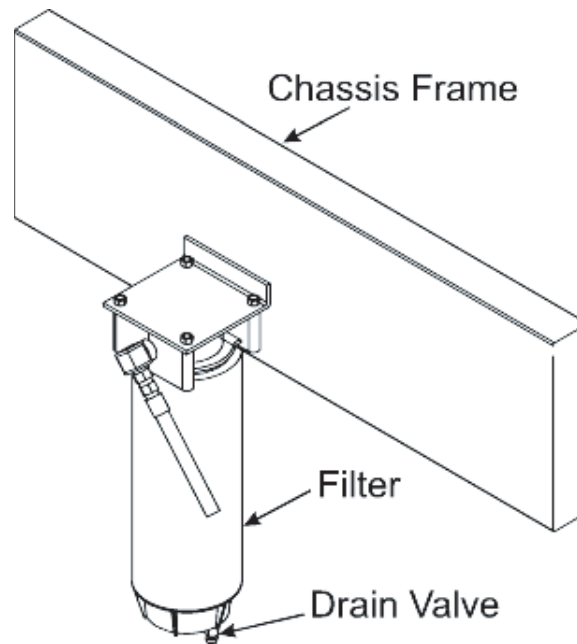
Routine Maintenance Recommendations:

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.

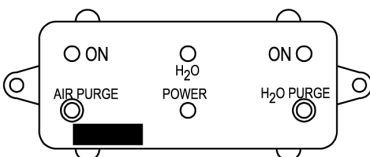
Fuel/Water Separator (ISC Engine)

Fuel/Water separator is located in rear engine compartment on left and right of frame. If “water in fuel” light is illuminated, fuel filter will need to be drained. Shut off engine and open drain valve. Turn valve counterclockwise approximately 1-1/2 to 2 turns until draining occurs. Drain fuel/water separator of water and sediment until clear fuel is visible. Turn valve clockwise to close drain valve.

In the event the ISC engine runs out of fuel, the lift pump on the fuel pump will run for approximately 1 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-DIESELS for Cummins Customer Assistance Center.



Fuel/Water Separator (ISM Engine)



Operation/Restart After Running Out Of Fuel

- Turn the ignition switch to the ON position.
- The green power light on the control panel should illuminate.
- Remove the cap from the Schrader air valve and press and release the “AIR PURGE” switch on control panel. The yellow “AIR PURGE” lamp will illuminate. Depress and hold the Schrader air valve open to release the excess air from the system. The electronics will maintain the pump operation for 50-60 seconds. Recycle the pump and when the fuel is observed from the Schrader valve, release (so the fuel no longer leaks from it).
- The internal pump will continue to run, pressurizing the fuel system while forcing fuel through the fuel lines.
- It may require recycling the “AIR PURGE” about 6 times before pulling enough fuel from the tank to filter.



NOTE: The engine may run rough for a few minutes while the remaining air, if any, is forced through the fuel system.

- If the water in fuel light is illuminated on the dash, follow the same procedure using the H2O button on the control panel. It may be necessary to change the fuel filter.



NOTE: Always carry an extra Racor element as one tank full of excessively contaminated diesel fuel can plug a filter.

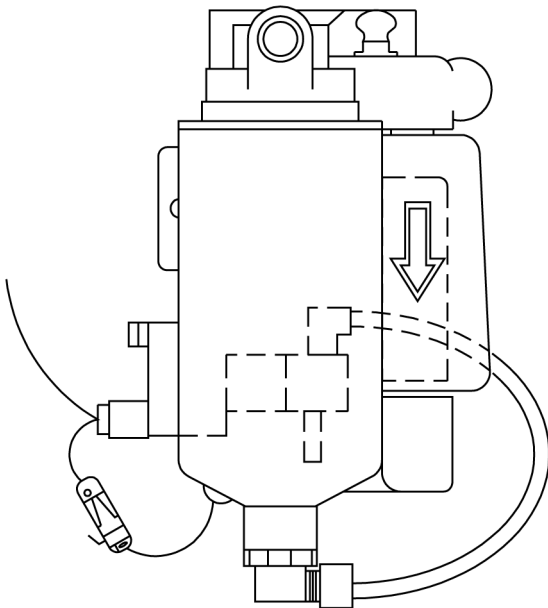
Servicing Reusable Pre-Filter

- Remove the thumb bolt, washer and top block. Remove the pre-filter and o-rings.
- Clean the pre-filter in a solvent bath or with compressed air as necessary. Remember to wear safety goggles.
- Inspect the O-rings for cuts or damage. Replace if needed, otherwise lube with motor oil or clean the fuel and replace.
- Install the pre-filter back into the bottom block (the pre-filter arrow points down), and replace the top block making sure the O-rings are properly seated.
- Replace the thumb bolt and tighten by hand. Using pliers, turn the bolt 3/4 of one turn firmly to seat the O-ring seals.



NOTE: Over tightening may result in damage to the unit.

- Activate the “AIR PURGE” switch, start and operate the engine at high idle for about 3 minutes.



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 4 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 2 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.



Troubleshooting

- A. Electronic output. The sender has a transistorized output. This prevents an ohmmeter from getting a correct reading of its output resistance.
- B. 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 when you have a constant above-full reading is that you have water at the bottom of the fuel tank.
- C. Contact Centroid: Probably 90% of the returns Centroid tests work okay on the bench. If you have incorrect readings, when possible contact Centroid (tel 800-423-3574, or preferable fax 904-423-3709) with your symptoms. You will be provided with a short “fill in the blanks” troubleshooting test appropriate to your 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.

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 of coolant must meet ethylene glycol or propylene glycol recommendations. A good clean quality water in a 50/50 ratio (40 to 60 percent 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 O&M manual for more details.

COOLANT

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.

The coolant fluid freeze point should be checked with every oil change interval at 15,000 miles, 500 hours or 6 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 6000 hour or 3 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 radia-

tor 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.



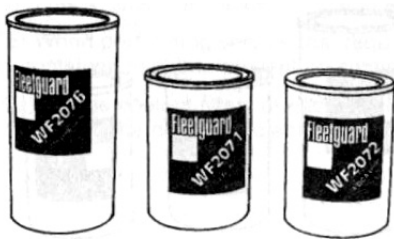
The coolant capacity, when changing the antifreeze, is approximately 11½ gallons.

- 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/3 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 requires with the ISM.
6. Freeze point should be measured every 15,000 mile/6 months

Engine - Supplemental Coolant Additive



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.



NOTE: The correct filter is determined by the total cooling system capacity and oil drain interval. If you have any questions refer to the Cummins owner's manual.



NOTE: The engine does not require a "break-in" procedure.

The oil pressure gauge, temperature gauge, warning lamps and other safety lamps should be checked daily to ensure proper operations.



When the ignition switch is placed in the ON position, there are several diagnostic test performed at once. The engine may be started without any delay. Turn the ignition to the START position. No pressure is required on the throttle.

Engine Procedure (ISM Normal)



CAUTION: Do not engage the starting sequence for more than 30 seconds. Wait 2 minutes between each attempt to start.

If, after three attempts, the engine has not started, check the fuel supply system. An absence of blue or white smoke during cranking indicates no fuel is being delivered.

When the engine is started, adequate oil pressure must be obtained within 15 seconds after starting. If the oil pressure gauge does not register and the check engine lamp does not extinguish, shut off the engine immediately to avoid damage. Confirm correct oil level in the pan or contact a qualified service technician.

Allow the engine to idle for 3 to 5 minutes before operating under a load. Increase the engine speed gradually to provide adequate lubrication to the bearings and to allow the oil pressure to stabilize.



CAUTION: It is not recommended to idle the engine for long periods of time. This will simply waste fuel and will annoy neighbors at campsites. Consistent periods of long idle could cause damage to the engine.

The engine temperature should be up to normal operating range (140° F / 60° C to 212° F / 100° C) before operating under full load or power.

During normal operations of the engine, look and listen. Most failures will give an early warning. Changes in performance, engine appearance and sound could indicate the need for service or repair. Some indicators to look and listen for are unusual engine noise, excessive smoke, loss of power and engine misfire. An increase of fuel, oil and coolant consumption could be signs of leaks resulting in sudden changes in operating temperatures and pressures.

ENGINE PROCEDURE (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 motor home is being operated. Cold weather operation can be defined in two categories: Winterize and Arctic.

Ether as a cold weather started aide may be used only with the ISM engine. Do not use excessive amount when starting the engine. Damage will occur



NOTE: Refer to the Operations and Maintenance Manual for more detailed information.

WINTERIZE (32° to -25° F) (0° to -32° C)

Use a 50 antifreeze / 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 motor home operates.

ARCTIC (-25° to -65° F) (-32° to -52° C)

Use a 60 percent antifreeze / 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.

Cold Weather Starting

The engine block heater may need to be plugged in 2 to 3 hours prior to starting. The engine block heater is rated at 1500 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.

Extended 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 Operations and Maintenance Manual for guidelines on troubleshooting low oil pressure, or contact a qualified service technician. Allow the engine to idle for 3 to 5 minutes before operating under a load.

Engine Shutdown

General guidelines for shutting the engine down are fairly simplistic. Allow the engine to idle 3 to 5 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 3 to 5 minutes is not necessary.

The ISM engine is equipped with an engine protection system which monitors critical engine temperature and pressures. The system will log diagnostic faults or codes, when an out of range condition occurs. Dash warning lamps will illuminate when the out of range conditions exist.

Engine Protection System

When using jumper cables to start the engine, make sure the cables are connected in parallel. That is positive (+) to positive (+) and negative (-) to negative (-). 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 for Cummins Customer Assistance Center.

EMERGENCY PROCEDURES

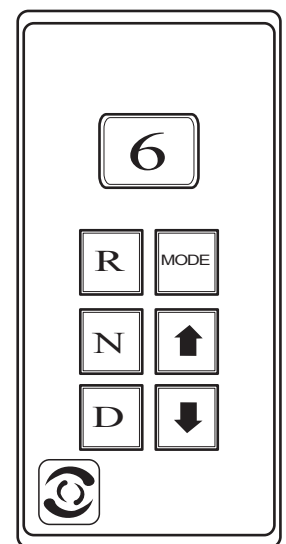
The Allison World transmission incorporates the World Transmission Electronic Control (WTEC) system. The system is comprised of five major components connected by a wiring harness: the electronic control unit (ECU), engine throttle position sensor, three speed sensors, remote shift selector (keypad) and the control module. The ECU will process 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 offgoing 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

TRANSMISSION



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 will appear 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 MODE button will enable 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.

Check Trans 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. Your 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 3 seconds. Some codes are self clearing while others will require service or ignition cycles to clear.

Periodic Inspections

The Allison WT Series requires minimum maintenance. Careful attention to the fluid level and the connections for the electronic and hydraulic circuits is very important.

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 your 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 you notify an Allison Transmission distributor or dealer 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

Because the transmission fluid cools, lubricates and transmits hydraulic power, it is important that the proper fluid level 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 WT 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 settle.
- 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

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 8000km (5000 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 40,000km (25,000 miles) or 18 months, whichever occurs first.

Transmission Lubricating Fluid

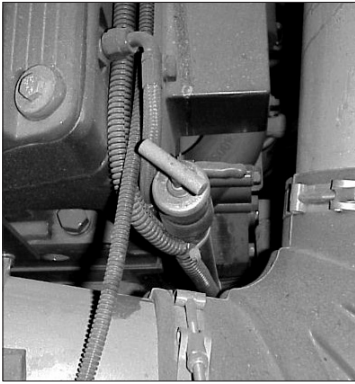
Fluid and Internal Filters Change Interval Recommendations

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.

Manual Check Procedures

Cold Check

The concept of a cold check is to determine adequate fluid level for safe operating until hot check can be performed.



Transmission Oil Level Dipstick.

- 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 (500-800rpm) 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 (500-800rpm).
- 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).



CAUTION: Low or high fluid level can cause overheating and irregular shift patterns. These conditions can damage the transmission if not corrected.

Hot Check

- Because 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 (500-800rpm).
- 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 1 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 your nearest Allison distributor or dealer.

The tire designed for your RV is a very technical and precisely engineered product. To obtain the maximum use and best service out of your 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 that supports the motorhome and its contents. In addition, since the tire is the only contact that 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.

TIRES & WHEELS

What is a tire's function?

The most important factor in maximizing the life of your 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.

The Importance of Air Pressure

A tire that is underinflated will build up excessive heat that may go beyond the prescribed limits of endurance 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 in its fuel economy.

Over inflation will reduce the tire's footprint or contact patch with the road, thus reducing the traction, braking capacity, and handling of the motorhome. A tire that is over inflated for the load will also contribute to a harsh ride, uneven tire wear and will be more susceptible to impact damage.

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

Federal law requires that the tire's maximum load rating be molded into the sidewall of the tire. If you look on your tire's sidewall you'll see the maximum load allowed for the size tire and load rating, and the minimum cold air inflation pressure needed to carry that stated maximum load. Utilizing less air pressure means a lesser load can be carried by the tire. The chart at the end of the section shows weights that can be supported by various air pressures.

How Much Air Should I Carry in My Tires?

The amount of air pressure you need to use is dependent on the weight of your fully loaded motorhome.

The GVWR (Gross Vehicle Weight Rating) and G.A.W.R. (Gross Axle Weight Rating) stickers on your RV (normally located on the support pillar next to the driver's seat) will show you the chassis manufacturer's and/or the RV manufacturer's total vehicle maximum weight ratings and per axle weight rating.

How to Determine the RV's Correct Weight

The GVWR is the maximum total weight for which the motorhome is

rated-including passengers, fluids, and cargo. The G.A.W.R. 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 your maximum loaded axle weights, and subsequently your correct tire inflation pressure. Every RV, even of the same make and model, will vary in actual loaded axle weights, because of different options and personal loads.

While your actual, loaded axle weight should be below the G.A.W.R., you must weigh your RV 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 G.V.W.R. yet overloaded on an axle. It is even possible for one wheel position to be overloaded, even though the G.A.W.R. 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 you a clear indication of exactly how the weight of your RV is distributed. The Tire Industry Safety Council provides instructions on how to weigh your motorhome by wheel position. These instructions and diagrams are presented on the following pages. Once you know the total weight, and the weight on each axle, the tire load data chart in this manual will show you the correct cold inflation pressure per tire for each axle.

Where to Weigh the Motorhome

There are probably several certified public scales in your area. You will find public-access scales in a variety of places such as moving and storage lots, farm suppliers with grain elevators, gravel pits, recycling companies and large commercial truck stops.

If you are not aware of a nearby public scale, check your area telephone book yellow pages under the “scales-public” section or “weighers.” A nominal fee will be charged, but this is money wisely spent.

How to Weigh the Motorhome

Your RV must be weighed fully loaded. That is, with passengers, food, clothing, fuel, water, propane, supplies, etc. Any towed vehicle (car/pickup, boat or trailer) or item loaded on brackets on the back of the RV, such as bikes or motorcycles, should also be included in the weighing.

Inflation & Weighing

To accurately determine the proper inflation pressure, the motorhome should be weighed after it has been fully loaded. First, position the front wheels on the scale and take a weight reading. Divide this reading by 2 to determine the load carried by each tire/wheel. Next position the rear drive wheels on the scale and take the weight reading. Divide this reading by 4 to determine the load carried by each tire/wheel to determine the proper tire pressure.

Now that you have found what the correct air pressure per axle needs to be for your RV, you need to know when to check your air pressure. You should check the air pressure every two weeks or at least once a month, and before any major trip. Your RV tire air pressure should be checked every “drive” morning on long trips. On short trips, driving a day or less, your tires should be checked before you leave on your trip and again before you start your trip home. If your motorhome is stored for any length of time, air pressure should be checked prior to storage, but more importantly, when it comes out of storage.

When to Check the RV's Tire Pressure

Check your tires when they 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 you must check your tires when they are warm or hot, do 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. Never let air out of a hot tire.

To maintain the inflation pressure in your tires you will need the proper equipment. It is recommended you purchase a quality truck tire air gauge which has an angle dual head. This type of gauge allows you to check inflation on the inner dual wheel which has the valve stem pointing toward you, and on the outer wheel which has the valve stem pointing away from you. Nothing should restrict your ability to check your tire's air pressure daily when you are driving your RV. Pressure sealing valve caps should always be used to prevent air from escaping from the valve stem. If you use valve stem extension hoses, make sure they are good quality stainless steel braid reinforced and are securely anchored to the outer wheel. If your RV has a wheel cover which must be removed to check the inflation, consider removing them as the extra time and effort required may lead you to avoid checking your air pressure.

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. An accurate tire gauge should be used to check the cold tire pressure. Cold tire pressure can be defined as a tire that has been dormant for three or more hours, or a tire that has been driven less than one mile.

Proper inflation pressure should be determined after the motor home has been fully loaded and weighed. Divide the steer axle weight by 2 when determining the load carried by each of the front tires. The drive axle weight is divided by 4 when determining the load carried.

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

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

The useful tire life of your tire is achieved by the uniform wear for all tires. This can be increased with tire rotation. The first tire rotation is the most important. The tire rotation pattern used for your motorhome should be evaluated by your Goodyear Tire Center. Any unusual or unique wear pattern which may have developed should be evaluated before rotation. Misalignment, imbalance or other mechanical problem 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 Goodyear warranty. Monaco Coach Corporation is not responsible for tire wear.

The correct wheel alignment promotes longer tire wear and ease of handling while minimizing the strain on the steering system and the axle components.

Camber

Camber, as shown below, 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.

Nominal Camber Values-Degrees

- Left .15 degree tolerance .50 degree
- Right .15 degree tolerance .50 degree

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.

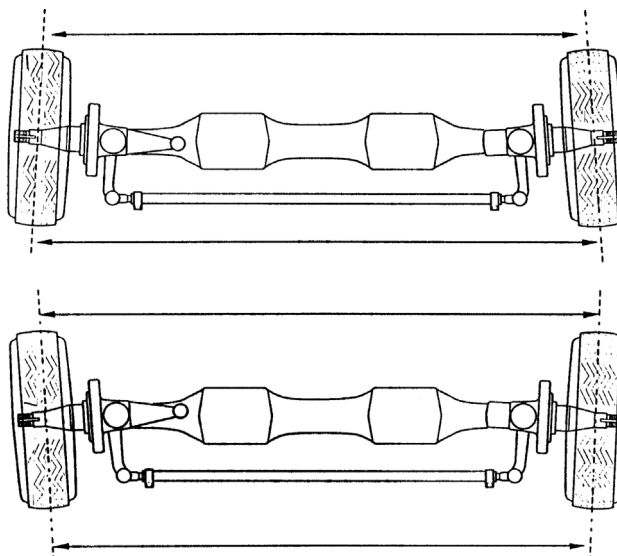
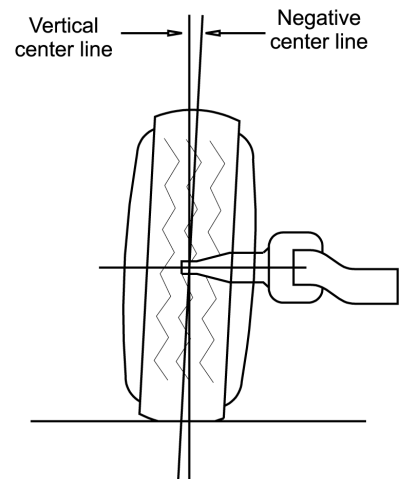
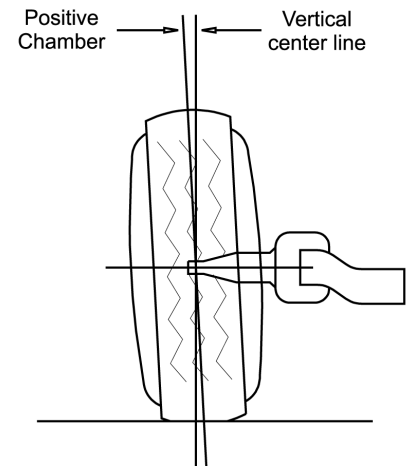
Toe-out occurs when the tire front distance is greater than the tire rear distance.

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.

The toe setting is .03 degree.

WHEEL ALIGNMENT



Caster Adjustments

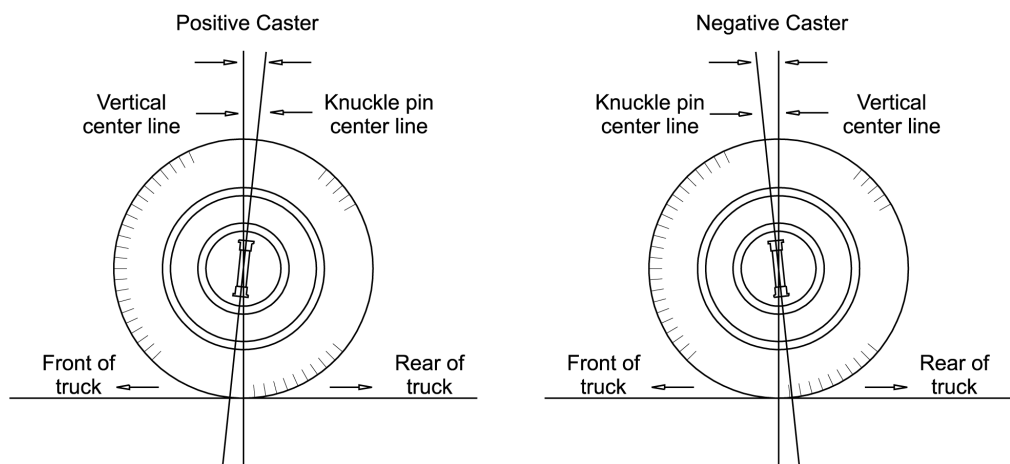
Caster is the fore and aft tilt (toward the front or rear of the motor home) of the steering kingpin as viewed from the side of the motor home.

“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.

The caster angle will be $6^{\circ} \pm 1^{\circ}$.



Care & Maintenance of Tires Preflight Checklist

What if you don't check your air pressure? If a tire picks up a nail or screw that creates a slow leak and causes some air pressure loss, you might eventually spot this visually, if it is a front tire or an outside rear dual. However, if it is an inside dual, the chances of spotting it without an air pressure check are very slim. If you begin driving without finding it, very quickly (in most cases a few miles) your outside rear tire next to the low air pressure tire is going to heat up carrying double its load, which will cause both tires to fail. Then you have two tires down on the same side and on the same axle.

As you “preflight” check your motorhome every drive morning, include an air pressure check of your tires. The peace of mind is worth the extra few minutes!

Proper Cleaning

Like the rest of your RV, it pays to keep your tires clean. Road oil will cause deterioration of the rubber. Dirt buildup will help hold chemicals in the air next to the tire and will also deteriorate the tire.

As with the cleaning of any rubber product, proper care and methods in cleaning must be used to obtain the maximum service years out of your tires. A soft brush and the normal mild soap that you would use to clean your RV may be used. If you use a dressing product to “protect” your 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 itself that can be a problem, but more the chemical reaction. When these same dressing products are used on a passenger care 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 much longer due to limited annual mileage, and the chemical reactions have much longer to take effect.

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

***Blocks
- Using Blocks to
Level Motorhomes
Equipped with
Radial Tires***

Your RV is designed for recreation, not long-term storage. However, unless you are a “full timer,” you have no other choice. Rubber tires age faster when not being used. A cool, dry, sealed garage is your best bet for storage. However, many RVs are stored outside in the elements. Some storage surfaces may cause tires to age prematurely. For this reason, Goodyear recommends placing a barrier (i.e. card board, plastic or plywood) between the tire and the storage floor/ground surface.

***RV Tire
Long Term
Storage***

There are a few steps that you can take to reduce the aging effects from long-term storage or a non-use period. Thoroughly clean your tires. Cover the tires to block direct sunlight and ultraviolet rays. Store your RV out of a high ozone area. Failure to take these steps can cause early deterioration and shorten the life of your tires.



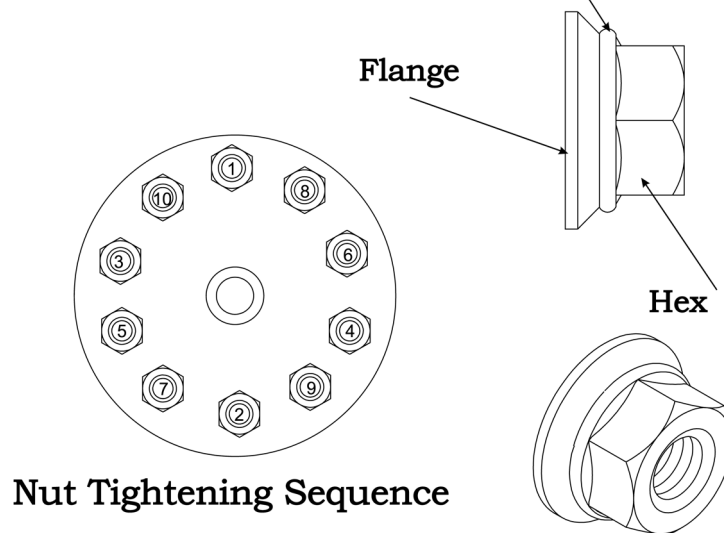
NOTE: When the motorhome is stored, tires should be inflated to maximum inflation pressure as indicated on the sidewall of the tire.

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

Flat Tire -Emergency Procedure

If you have a flat tire, it is recommended you call for roadside service. The size and weight of the motor home and the size and weight of the tire, require proper equipment to change the tire. A professional service technician will have the proper equipment and training to repair or replace your 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 your ignition off and turn your hazard flasher system ON. Goodyear has an emergency number which offers 24 hours assistance, contact (877) 484-7376. The old tire should be saved for warranty.

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



Nut Tightening Sequence

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 the 500 ft.lbs sequence as shown in the illustration.

Dual Rear Wheels

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

Snug the nuts in sequence, do not tighten them fully until all have been seated. Tighten the nuts to 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

- Be sure to tighten the wheel nuts to the recommended 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.

Aluminum Wheels**Care and Maintenance of Aluminum Wheels**

- Clean frequently with high pressure water from a hose. The use of mild detergent will speed the cleaning process. Use no harsh alkaline, alcohol or acid cleaners. 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 to remove dirt and corrosion for the appearance surface of the wheel.
- To maintain the original appearance of your aluminum wheels, the following procedures are recommended.
 1. After installing new wheels and 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 your aluminum wheels as frequently as required to maintain their appearance.

LEVELING SYSTEM -Hydraulic Leveling System (RVA)

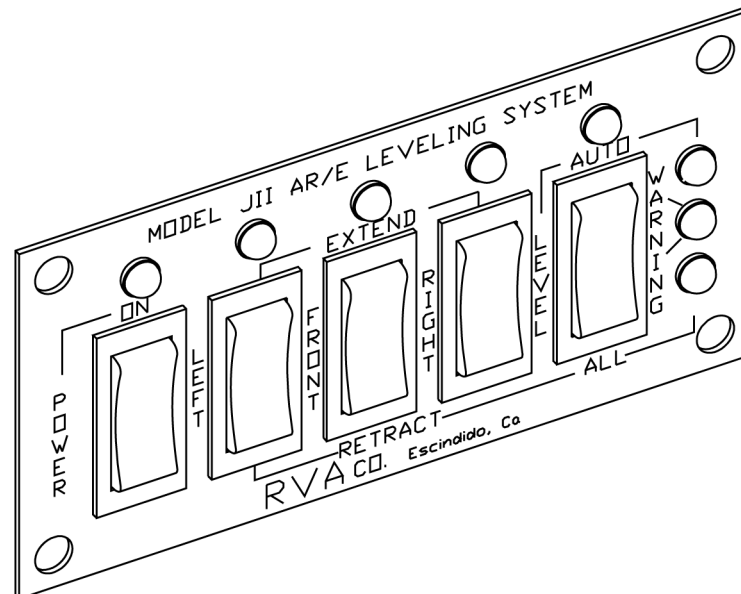
The three point leveling system features a multiple warning system with flashing light and a bong alarm to alert you of the jack position. The system also features a remote control panel located next to the driver seat. The torsion stress is significantly reduced during proper operating procedures. Damage resulting from improper procedures can range from windshield damage to entry doors jamming.

The model 35 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 vdc. Optimum requirements for operating the system are voltages above 9.6 vdc.

The Auto leveling system consist of two primary control components, a transmitter module located in the first storage compartment overhead and the remote control panel located next to the driver's seat. The remote control panel is compromised of the various retract/extend switches for the jack legs, a switch for automatic leveling and all retract and the power ON/OFF switch.



NOTE: The leveling system jacks are not designed for use in changing tires. This can cause problems with the suspension system, frame alignment and damage to the windshields.



Manual Leveling

When manually operating the leveling system, always lower the front jack first. The front jack acts as a pivot point for 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 1/2 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 automatically dump from air bags when leveling cycle begins. This will lower the motorhome and require less extension by the jacks. To expedite the air dumping, the motorhome is equipped with a manual air bag release switch located on the dash panel.

- Place the gear selector in neutral.
- Apply the parking brake.
- Turn the ignition switch to the ON position.
- Engage switch labeled POWER on jack control console.
- Each yellow light and switch combination corresponds to each jack as positioned on the chassis and is labeled as such.
- To extend a particular jack, push rocker switch to extend the side and hold until the desired extension is reached.
- To retract a particular jack, simply push rocker switch to the retract position and hold until the desired retraction is reached.
- When the yellow light goes off, that particular jack is in the level position.
- Turn off the switch labeled POWER on the jack control panel.
- Turn off the ignition switch.

Automatic Leveling System

The ALL JACKS RETRACT mode or MANUAL mode can be engaged at any time during automatic leveling operation.

Prior to automatic leveling it is essential that there is no movement in the motorhome. To extend the jacks automatically proceed as follows:

- Place gear selector in NEUTRAL.
- Apply the parking brake.
- Turn ignition switch to the ON position.
- Switch the main jack control power switch ON.
- Press the AUTOMATIC LEVELING/ALL JACKS switch.

If the yellow lights illuminate, press down the rocker switch labeled AUTOMATIC LEVELING and release. The top green light will start blinking. After a ½ second delay, pump motor will come on and all jacks will extend downward. The system will attempt complete leveling in one operation. The motorhome is level when all yellow lights, as well as green lights, go out.

If leveling is unsuccessful on the first phase, the system will attempt to level four subsequent times at seven second intervals.

If both green lights start flashing alternately, the motorhome has reached maximum extension on one or more jacks. One or more yellow lights will blink, indicating that additional height is required under one of the jack pads. This can be attained by moving motorhome to another location or getting additional height by placing a 2x8 block under one of the jack pads.

If you block under a jack pad, **ONLY ONE JACK SHOULD BE BLOCKED AT A TIME**. If blocking a rear jack pad while motorhome is on a slope, opposite set of rear wheels must be chocked to prevent rolling.



WARNING: Once jacks are extended down a red JACKS DOWN warning light will blink and an alarm will sound. An alarm will sound again if jacks are down and ignition switch is turned ON.

Once motorhome is level turn off POWER switch on control console and turn off ignition switch. **BEFORE DRIVING OFF, ALWAYS PERFORM A VISUAL INSPECTION TO INSURE THAT JACKS ARE UP.**

Automatic Retract:

Prior to retracting levelers it is advisable to start engine and build air pressure.

- Gear selector should be in NEUTRAL.
- Parking brake applied.
- Turn ignition switch to ON position.
- Engage power switch to ON position on jack control console.
- Press down rocker switch labeled ALL JACKS RETRACT and release.



CAUTION: Do not move motorhome while jacks are still in contact with ground or extended, damage to jacks can occur. Do not raise any wheels off the ground, which could result in damage to the motorhome.

Bottom green light will begin blinking and all jacks will retract. This operation is on a four minute timer which green light will stop blinking and go out.

Hydraulic pressure, in all jacks, is automatically released when ALL JACKS switch is engaged. Jacks are retracted by the weight of motorhome and retract springs on each jack.

Manual Retract Valves:

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 front generator access.

This 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 the position of the retract valve.



NOTE: Do not move the motorhome until the jacks are fully retracted.



CAUTION: The motorhome will raise or lower as the bypass valves are opened. Do not crawl under the motorhome to access the valves. Make sure there is ample room to open the valves safely.

Maintenance:

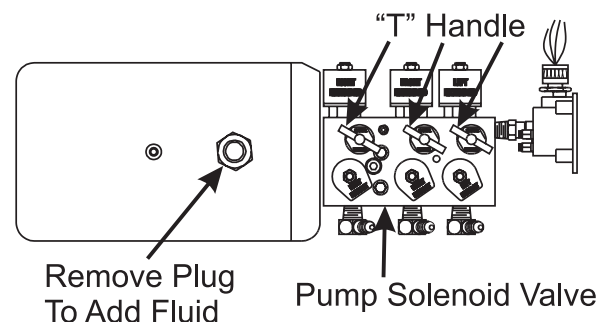
Occasionally while the jacks are fully extended, wipe dirt from the jack rod. This will help lengthen the life of the jacks. This can vary from the amount and type of usage of the jacks. Dexron III will serve as a solvent as well as a lubricant. Occasional oil or grease on the extended jack ram is normal 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.

Calibration:

The transmitter module may require recalibration to ensure an accurate level is obtained. The recalibration procedure requires two persons for convenience and accuracy. This should only be performed by qualified service technicians.

Adding Fluid

1. An indication of a system needing fluid is a chime sounding when turning corners. Use Dexron III automatic transmission fluid.
2. Extend any jack 6 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 power ON rocker switch. 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.
-

LEVELING SYSTEM **-Air (Optional)**

A touch panel, computer controlled, four point air leveling system is optional on all models of the Executive. Models which are equipped with the air leveling system must remember the ignition has to be ON for the suspension to operate. This is critical to note in the event the motorhome requires emergency towing.

Automatic Air Leveling:

- Air leveling will operate faster if engine is running.
- Set parking brake.
- Transmission must be in neutral (Important no movement in motorhome while leveling).
- Press AIR button once to enter air mode. AIR indicator light and four AIR BAG warning lights will glow steady.
- Press AIR button a second time. AIR indicator light will start flashing and air leveling will begin.
- When all four yellow LEVEL SENSING lights are out leveling is complete. AIR indicator light will stop flashing and turn steady red. Processor is now in a SLEEP MODE for 30 minutes. Engine may now be turned off. Every 30 minutes processor will check motorhome's level condition, make any corrections and return to SLEEP MODE. This will continue until system is turned off by pushing OFF button or transmission is taken out of neutral position and parking brake released.

Excess Slope:

If system was unable to level motorhome one or two yellow LEVEL SENDING indicator lights will remain on and EXCESS SLOPE light will come on. System will remain on but will not go into SLEEP MODE.

Manual Air Leveling Operation

- Air leveling will operate faster if engine is running.
- Set parking brake.
- Transmission must be in neutral.
- Press the AIR button once. AIR indicator light will glow steady.
- Individual RAISE and LOWER buttons (UP or DOWN ARROWS) will add or dump air from suspension air bags to raise or lower coach for leveling.
- These are momentary buttons. Function will stop when button is released.

Yellow LEVEL lights indicate a side, end or corner of motorhome is low. Lower opposite side or end of motorhome to achieve leveling. If a level position cannot be achieved by dumping air, raise motorhome according to lighted yellow LEVEL lights.

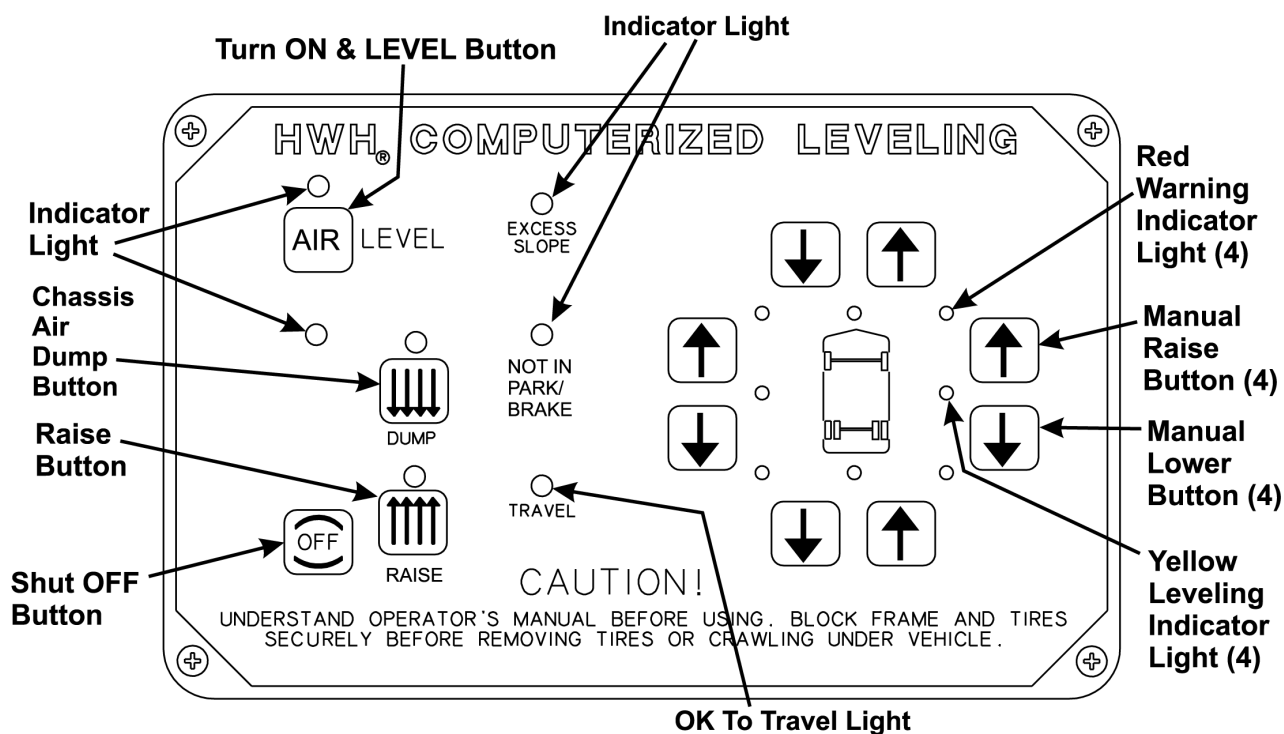
- **IMPORTANT:** Always give preference to any side light before leveling motorhome front to rear.
- Turn ignition switch OFF. Turn air leveling system OFF.

Start engine and allow air pressure to build to recommended pressure for travel. Push system OFF button and allow motorhome to return to travel position. All red indicator lights must be OFF and travel indicator light must be lighted before traveling. Ensure that the motorhome is at the proper ride height before moving. **DO NOT** solely rely upon the warning lights.

Air Leveling Traveling Preparation



CAUTION: Do not rely solely upon warning lights. It is the operator's responsibility to check that the motorhome is at the proper ride height before moving the motorhome.



TAG AXLE



Remove the center hub cap to inspect the tag axle oil level.

The tag axle is standard equipment on all Executives which are 40 foot and up. The tag axle design allows for more carry weight, thus making it possible to create a longer coach. A longer coach offers a wider variety and range of floor plans.

While the tire should be off the ground, there is no specific height requirement for the tag axle in the up position. If the tag axle requires being raised higher, adjustments can be made by taking up one chain link on the tag axle.

The tag axle switch is located on the left hand shifter panel. There are two lights on this switch: One to be lit when the headlights are turned to the on position, the other to be lit when the tag axle switch is turned on. The tag axle should only be in the raised

position when severe maneuvering in your motorhome is performed under 5 mph.

If the tag axle switch is in the raised position while you start your coach, a beeping alarm will sound. You will need to flip the switch to lower the tag axle. Once the tag is lowered, it will require a few minutes with the engine running to build up enough air pressure before it will be ready to travel.

When a tag axle switch is turned on in a motorhome with air leveling the following will take place: the 12 volt power will be in the 14 gauge yellow with green stripe wire, which will go all the way to the rear mac valve for the tag axle located on the roadside rear. Once the rear mac valve has been activated, the air pressure will go through the orange air line to both tag axle brake chambers to lift the tag. The air in the air bags will be released to the outside air. The tag axle will remain in the raised position until the switch is turned to the off position.

Tag axle pressure is preset by the factory trained personnel and should not require any adjustments. However, any adjustments of the pressure regulator should only be performed by factory trained service personnel. The pressure regulator incorporates a pressure gauge which should be checked during any check of the engine area. A drastic change in the reading could indicate potential problems. Any adjustment of the pressure regulator directly affect weight and load capacity ratings. The weight **MUST** be verified by factory trained personnel when adjustment are made to the pressure regulator. **DO NOT ATTEMPT TO MAKE ANY ADJUSTMENT.**

Checking the Oil Level (Oil Bath Hubs Rear Only)

All tag axles will use the oil bath hubs on the tag axle only. The tag axle has a chrome hub cap that will need to be removed before the inspection can take place. You can locate the full and add mark on the outside of the plastic see through cover. You will be able to see the oil level. You should inspect the oil level before every trip or every 5,000 miles.

Lube Intervals:

The frequency of lubricant changes depends upon the individual operating conditions, speeds and loads. Change whenever the seals are replaced, when the brakes are relined or at 30,000 miles (48,000km). If yearly mileage is less than 30,000 miles, change it twice a year (spring and fall).

For low mileage operations, the grease may not need changing until every 50,000 miles (80,500km) or two years. However, check the grease twice a year (spring and fall) for contamination. Change if required.

Your tag axle has come to you with Shell Hypoid gear oil, GL-5, S.A.E. 80w/90. Specifications, minimum outside temperature -15°F (-26.1°C). There is no upper limit on these outside temperatures of oils and greases. The axle sump temperature must never exceed 250°F (+121°C).

The recommended oil change interval is based on the operating conditions, speeds and loads. Limited service applications may allow the recommended interval to be increased. Severe applications may require the recommended interval to be reduced. For more information, contact a Meritor service representative.



Check the oil level on the tag axle.

Lubricating the Camshaft Bushings

Apply the specified grease at the grease fitting on the spider. Apply grease until new grease purges from all the seals. Greasing intervals will be once a year, or every 30,000 miles. Use a multi-purpose grease NLGI Grade 1 or 2. The grease classification should be lithium 12-hydroxy stearate or lithium complex.



NOTE: Under no circumstances should you ever drive your motorhome over 5 mph when the tag axle is raised. Monaco Coach Corporation will not be held liable for any damage that may occur while driving over 5 mph with a raised tag axle.

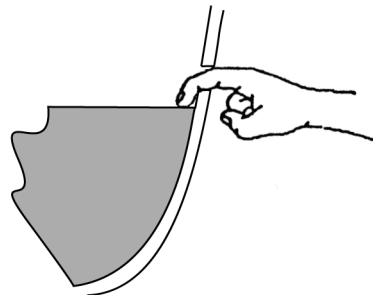
DRIVE AXLE LUBRICANT

Proper Drive Axle Lubricant Level

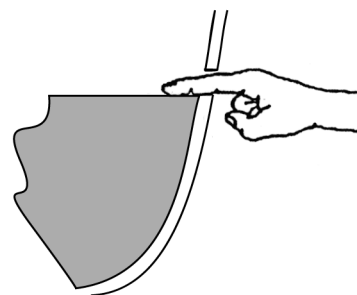
- Regular inspection of the drive axle lube levels is an essential maintenance procedure.
- The lubricant should be level with bottom of the hole.
- Important: The lube level close enough to the hole to be seen or touched is not sufficient. The lube must be level with the hole.
- Your differential is 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.



Incorrect Oil Level.



Correct Oil Level

HYDRAULIC FLUID RESERVOIR



Hydraulic Fluid Reservoir.

As you perform walk around and pre-checks, look for oil leaks under the coach and / or at hose fittings. If oil seepage appears at a hose connection, have the oil cleaned as soon as possible as this may be an early warning sign of potential trouble.

The hydraulic cooling fans and the power steering are operated by the hydraulic pump. The hydraulic fluid reservoir is located in the rear engine access on the curbside of the coach. The reservoir is filled with Dexron III.

Check the oil level in the reservoir every 6000 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. Change the hydraulic oil filter every 15,000 miles, or once a year.



NOTE: Prevent dirt, dust or other foreign matter from entering the hydraulic system. Always clean off around the reservoir cap prior to removal.

Care and Maintenance of the Hydraulic Filter

The interceptor hydraulic filter element features a specially designed media which absorbs damaging water. By also trapping solid contamination, such as dirt, the media protects precision hydraulic components from abrasion. As the element fills with water and plugging occurs, fluid slows and the filter head will go into a by-pass mode.

When changing the hydraulic filter (IN HC 5720) make sure you use a 10 micron filter for replacement.

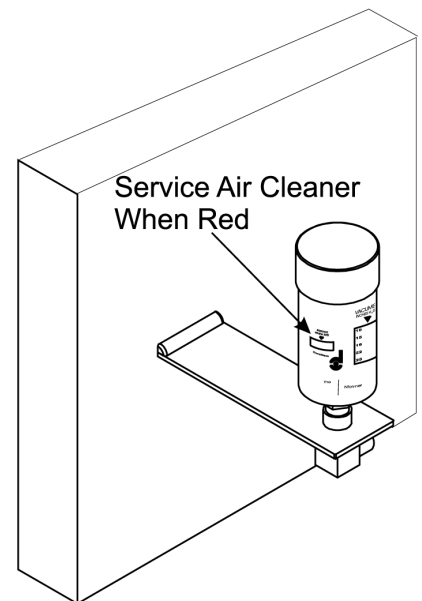
Located on the filter head is a differential gauge which registers in the operating or green position when the engine is running in normal conditions. The differential gauge will move to the right into the red when the filter becomes clogged and needs to be replaced.



Hydraulic filter for the power steering and hydraulic cooling fans.

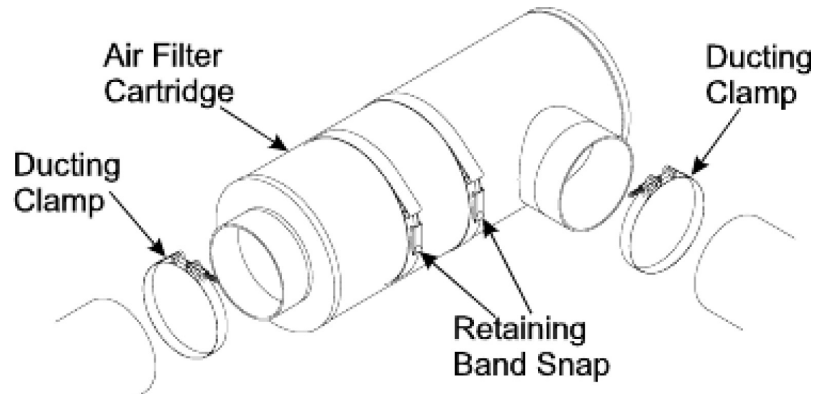
The air filter minder is a precision airflow restriction gauge designed to take the guesswork out of air cleaner replacement. The air filter minder is located in the engine rear compartment. Its operation is simple and virtually fool proof. As dirt captured by filter cartridge slowly builds up, the system 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 MINDER



AIR FILTER - Changing

When the air filter needs to be changed, the entire air filter cartridge is discarded and replaced by loosening the inlet and outlet ducting clamps and releasing the retaining band snaps. The air filter is located in the rear engine compartment. The changing of the air filter will need to be performed from the bed deck access.

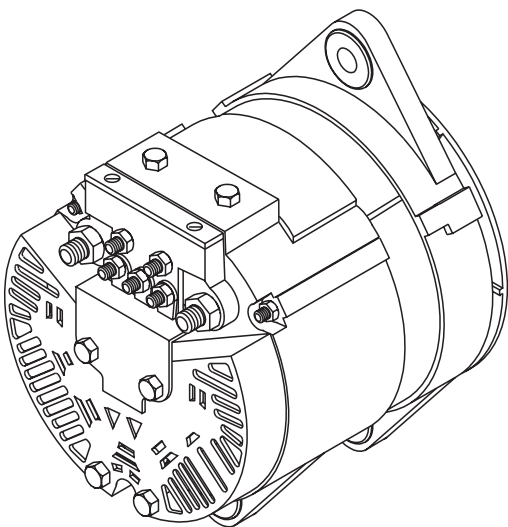


ALTERNATOR

The 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 4884J deliver the same reliable, heavy duty performance all Leece-Neville alternators are known for. The 4884J features an integral regulator and rectifier for compact installations. While driving, if you notice that your tachometer is not operating, you may want to have your alternator checked. The tachometer is wired to the stator terminal of the alternator. Always keep a close eye on the voltmeter in the dash area.

Specifications

- The integral rectifier system utilizes 12: 50-amp diodes mounted in multiple aluminum heat sinks for efficient heat dissipation during high-output operation.
- Aluminum housings
- Bi-directional fan
- Front bearing: 305 cartridge type
- Enclosed brush system
- Weight 33 pounds
- Operation Ambient Temperature Range (-40° to 200°F)
- Negative Ground Configuration
- Regulator Adjustment Range 13.6 to 15.4 Volts
- Batteries may start to gas at 14.3 Volts
- Max. Operating RPM 8,000



Check Out Procedure

- The output of the alternator range is 13.6 to 15.4 vdc. Connect a voltmeter to the (B+) terminal of the alternator and chassis ground. Idle the engine up to 1200 rpm.
- Check all wiring for burnt or loose connections. Repair as needed.
- Check all grounds and connections to ensure they are clean and tight.
- 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.

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.

Your motorhome was not designed for extended use in below freezing (32° F/O° C) weather. However, you may not experience any problems as long as the temperature doesn't fall too low. Interior water lines, fixtures, water storage tank and pumps are normally protected from moderate freezing temperatures as long as the Aqua Hot operates. Exposed drains may freeze quickly. If you are in doubt what temperatures your motorhome will tolerate, winterize with potable antifreeze.

Your hydraulic fans and power steering reservoir are filled with Dexron III.

If your motorhome uses a gas furnace it will have one two inch hose directed on top of fresh water tank and will maintain some heat into bay of your motorhome. If for some reason you find yourself using your motorhome in temperatures below 32° then more furnace ducts and insulation may need to be added.

If your motorhome comes with an aqua hot unit you will have a separate thermostat in bay and a separate heat exchanger for bay heat. Again depending on use it may need to have the temperature set different.

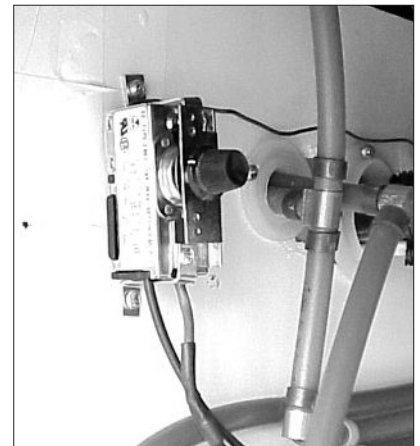
Never try to charge a frozen battery. Battery will need to be thawed out and charged at a slow rate and each cell checked with a hydrometer.



NOTE: Before operating your motorhome in sub zero temperatures you may want to consider changing your hydraulic fluid to pennzoil awx arctic blue.

Some Points to Ponder

- If your motorhome comes with an aqua hot unit. You will have a sepa-

COLD WEATHER USE

Aqua-hot bay thermostat.

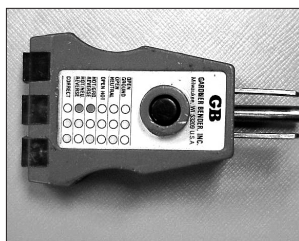
rate thermostat in the bay and a separate heat exchanger for bay heat. Again, depending on use it may need to be bigger, or the temperature set differently.

- Never try to charge a frozen battery. The battery will need to be thawed out and charged at a slow rate and each cell checked with a hydrometer.
- The furnace should be kept running to provide heat to storage bays.
- The engine speed should not be above a low idle until the coolant temperature gauge needle moves, or 20 minutes have elapsed. This will provide adequate warm up for the fluids.
- Extra insulation may be needed for the bay doors.
- Insulation should be added under the bedroom floor and cargo bays.
- Insulation should be added around the entry step well.
- Adding extra batteries and solar panel resulting from the increase draw of heating coils.
- Spray foam offers a small insulation value.
- Adding an additional heater for ducting in the storage bays.

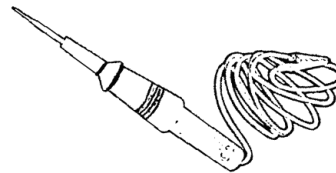
The diesel engine will operate in extremely cold environments if the engine is properly prepared and maintained. The correct lubricants, fuels, and coolant **MUST** be used for the cold weather range for which the motorhome is being operated.

CHECKLIST - ITEMS TO CARRY

- 12 Volt DC test light, this may be helpful on the phone with a technician.
- Battery hydrometer, to check each battery cell during maintenance.
- One 12-volt continuous duty solenoid.
- An assortment of spare fuse.
- One link kit for ride height control assembly.
- A spare alternator belt.
- Hump hose clamp for the Charge Air Cooler.



Polarity Tester.



Test Light



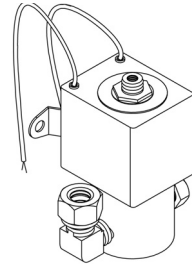
Hose Clamp



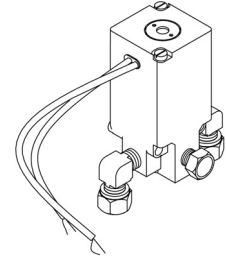
Link

PARTS - COMMON SOLONOIDS & SENDERS**Rear Bag Dump Solenoids**

- Only used on hydraulic leveling.
- Dumps air in the rear bags.
- Two air bag solenoids, one for each side.
- Location - Open rear the engine compartment door, the solenoids are located on the roadside, usually under the alternator, near the frame rail.

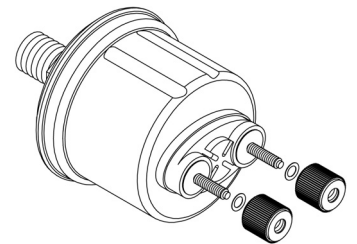
**Front Bag Dump Solenoid**

- Only used on hydraulic leveling.
- Dumps the air in the front air bags.
- Location - Open the generator slide and the solenoid is located on the curbside, front support tube.

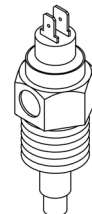
**Sending Unit Locations**

Oil Pressure/Low Oil Pressure Warning Dual Post Sending Unit.

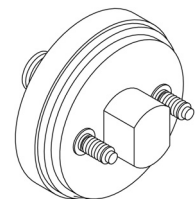
- One post oil pressure.
- One post low oil pressure/warning buzzer and check gauges will illuminate.
- I.S.M. 500 engines, the sending unit is located on the roadside near the oil filter.

**Water Temperature/High Water Temp Dual Post Sending Unit**

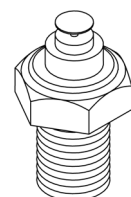
- One post water temperature.
- One post high water temperature/warning buzzer and check gauges will illuminate.
- I.S.M. 500 engines, the sending unit is located on the roadside under the exhaust manifold.

**Low Air Switch**

- 1/8-27 NPTF thread.
- Actuates at 66 psi.
- Single pole, two terminal.
- Located on the back side of the front air tank.
- Switch may be relocated under front dash access panel on some models.

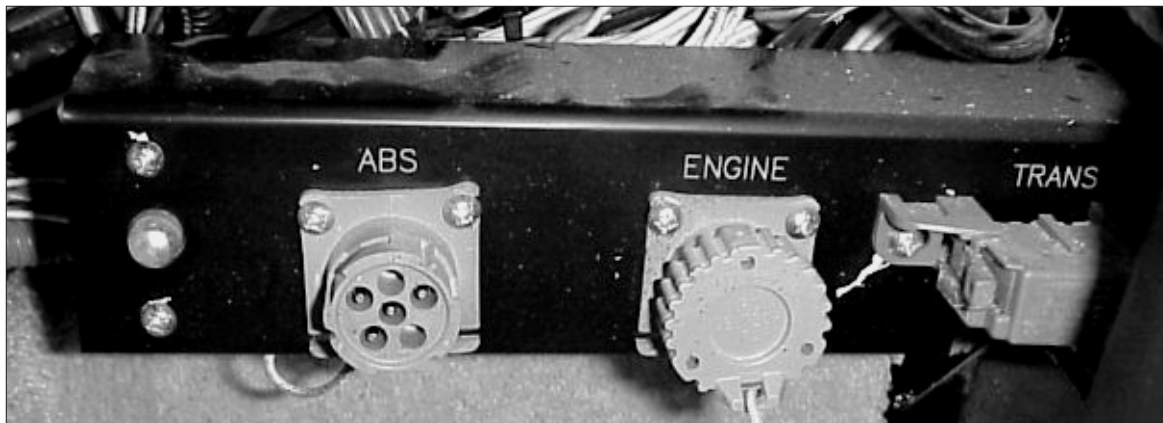
**Transmission Temperature Gauge Sending Unit**

Located on the transmission tailshaft housing near the u-joint flange. The sending unit is located on the curbside.

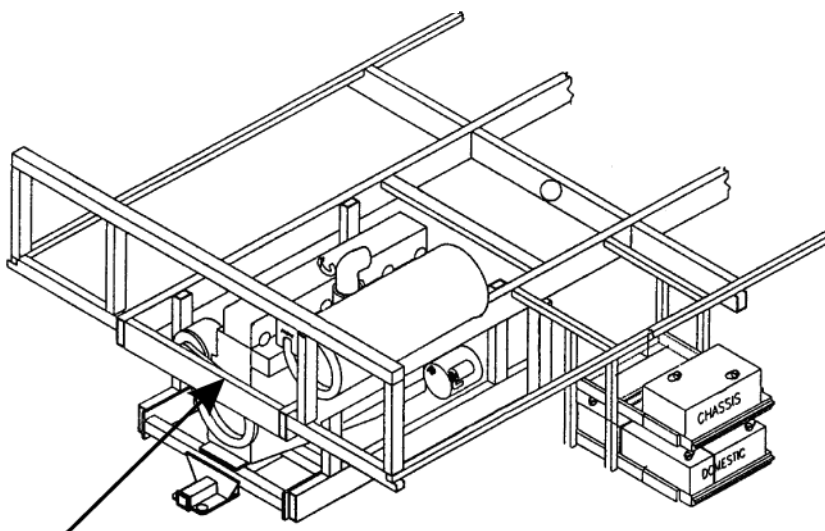


DIAGNOSTIC PLUG LOCATIONS

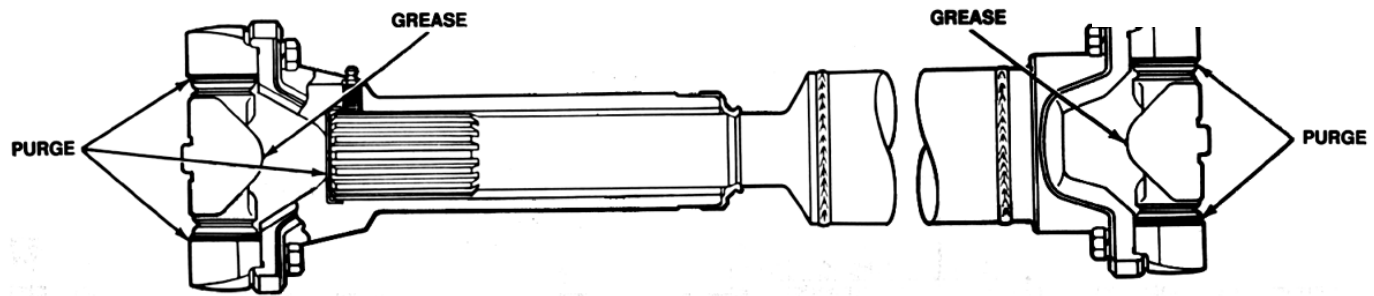
Eaton, Cummins and Allison diagnostic plugs are located under the left side of the dash.



Engine Diagnostic Bracket



Engine Diagnostic Bracket Located
In This General Area

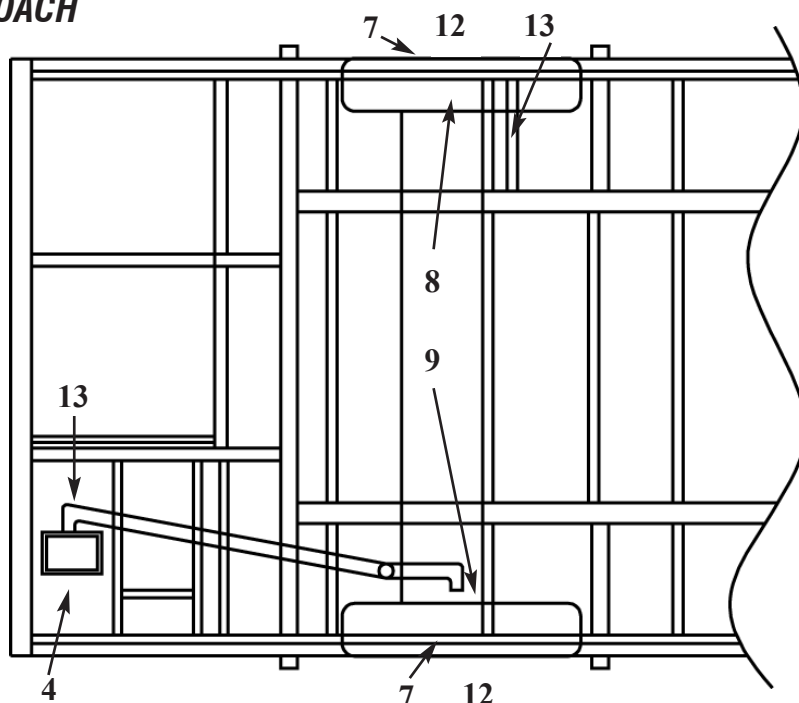
DRIVELINE**Greasing the Driveline Universal Joint:**

1. Check the driveline for looseness. If loose, service the driveline 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 annual

FRONT of COACH

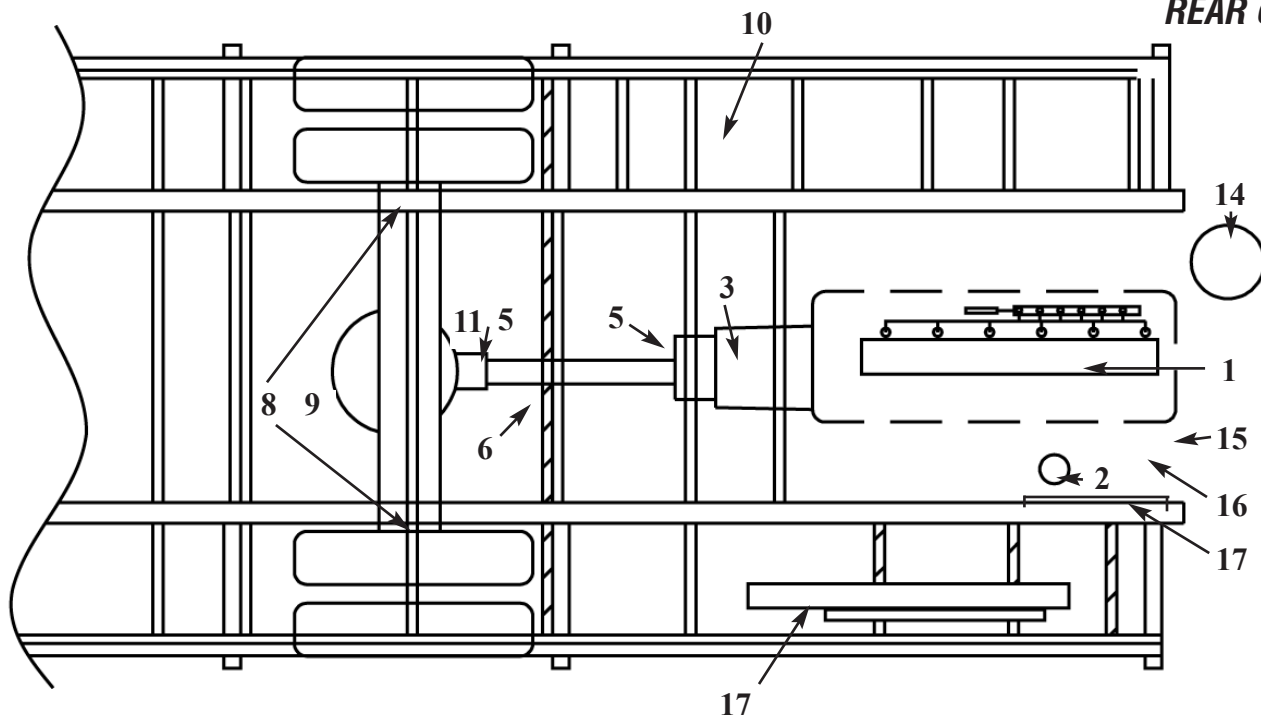


LUBRICATION

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.

Chart on Next Page

1. Engine Oil	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	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	100,000 or 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	Check Daily	TF
15. Hydraulic Fluid Filter (if applicable)	Replace	15,000 or Annually	TF
16. Fuel Filter	Replace	At oil change	FF
17. Engine Coolant Capacity	Replace	Every 2 Years	AF
Approx. 12 gal.			

REAR of COACH**Lubrication Code Chart**

- CL-4 U-Joints located inside coach under steering cover
- EO Engine oil as recommended by engine manufacturer
- OP Refer to operators manual
- MP API GL-5 or MT-1 type gear lubricant - Pennzoil Gear Plus SUPER-EW 75W-90, Synthetic
- HT High temperature bearing grease
- CL 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 3 transmission fluid only
- FF Fuel Filter

CHART - TIRE

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI).												
TIRE SIZE	PSI	70	75	80	85	90	100	105	110	115	120	125
225/70R22.5	Single (S)	3815	4005	4190	4370	4550	4895	5065	5205(G)	4550		
	Dual (D)	3585	3765	3970	4110	4275	4455	4610	4675(G)	4275		
245/70R19.5	Single (S)	3640	3740	3890	4080(F)	4190	4545(G)	4620	4805(H)			
	Dual (D)	3415	3515	3655	3875(F)	3940	4375(G)	4500	4625(H)			
255/70R22.5	Single (S)	3815	4005	4190	4370	4550	4895	5065	5205(G)	5510(H)		
	Dual (D)	3585	3765	3970	4110	4275	4455	4610	4765(G)	5070(H)		
295/75R22.5	Single (S)	4725	4945	5155	5370	5510(F)	5980	6175(G)	6370	6610(H)		
	Dual (D)	4690	4885	5070(F)	5260	5440	5800	6005(H)				
11R22.5	Single (S)				4990	5200	5640	5840	6175(G)	6240	6430	6610(F)
	Dual (D)				4760(F)	4950	5300	5470	5750(G)	5800(H)		

	MAXIMUM LOAD AT INFLATION								LOAD RANGE	TIRE WEIGHT		SPEED RATING (MPH)
TIRE SIZE	Single (S)				Dual (D)					LB	[KG]	
	LBS	PSI	[KG	KPA]	LBS	PSI	[KG	KPA]				
245/70R19.5	4080	85	[1850	590]	3875	85	[1760	590]	F	69	[31]	75
255/70r22.5	5510	115	[2500	790	5070	115	[2300	790]	H	86	[39]	75
11R22.5*	6610	120	[3000	830]	5800	110	[2630	760]	H	132	[69]	75
295/75R22.5	6610	110	[3000	850]	6005	110	[2725	800]	H	115	[52]	75

*G159A - # Imported Tire. All data is tested under the condition of highway speed of 65 mph. 1. Letter in parenthesis denote load range for which **BOLD FACE** loads are maximum.
2. Always use Approved Tire and Rim Combinations for Diameters and Contours.

CHART - FILTERS & BELTS

	MANUFACTURER	ISC 350	ISM 500
Coolant Filter	FLEETGUARD	WF 2071	WF 2071
Oil Filter	FLEETGUARD	LF 3000	LF 9001
Fuel Filter Pri	RAYCORE	S 3201 T	200-200
Fuel Filter Sec	FLEETGUARD	FS 1022	FS 1000
Aqua Hot Fuel	RAYCORE	R 12 T	R 12 T
Hydraulic Filter	PARKER	INHC5710	INHC5710
Alternator Belt	DAYCO	3911581	3028521
A/C Belt	DAYCO	17475	3401283
Air Filter	DONALDSON	P53744802(MP*-2329)	P53744802(MP*-2329)

*MP = Monaco Part #



NOTE: Filter and belt numbers were correct at the time of printing. Verify the numbers at time of removal. Monaco Coach Corporation 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

CHASSIS SPECIFICATIONS

	38' Model	40' Model	42' Model	43' Model
GVWR	36,000 lbs.	36,000 lbs.	46,000 lbs.	43,000 lbs.
GCWR	46,000 lbs.	46,000 lbs.	56,000 lbs.	53,000 lbs.
GAWR - Front	13,000 lbs.	13,000 lbs.	13,000 lbs.	13,000 lbs.
GAWR - Rear	23,000 lbs.	23,000 lbs.	23,000 lbs.	20,000 lbs.
TAWR - Tag Axle	N/A	N/A	10,000 lbs.	10,000 lbs.
Wheel Base	246"	250"	261"	261"
Exterior Overall Height	11' 10"	11' 10"	11' 10"	11' 10"
Exterior Width	100.5"	100.5"	100.5"	100.5"

TANK CAPACITIES (Approximate Gallons)

	38' Model	40' Model	42' Model	43' Model
Diesel Fuel	144.4	144.4	144.4	150
Water Heater	10	10	10	10
Grey Holding Tank	63	63	63	63
Black Holding Tank	45	45	45	45
Fresh Water Tank	100	100	100	100
LP Gas Tank*	55	55	55	55

* Actual filled LP - Gas capacity is 80% of listing due to safety shut-off required at tank.

ENGINE SPECIFICATIONS

	Roadmaster Chassis	Roadmaster Chassis
Cummins Diesel Eng.	350hp	500hp
Tire Size	11R22.5 HRated	11R22.5 HRated
Fuel Tank (Approx. Gal.)	144.4	144.4
Alternator (Amp)	200	200
Rear Axle Ratio	4:78	4:30

AIR DISK BRAKE GREASE SPECIFICATIONS (1540, 1560, 1760)

Component	Meritor Specifications	NLGI Grade	Grease Description	Outside Temperature
Caliper	0-616-A 0-645	1 2	Clay Base Synthetic Oil, Clay Base	to -40° F to -65° F
Slide Pin Retainers	0-637* 0-641	1-1½ ---	Calcium Base Anti-Seize	Refer to the grease manufacturer's specs. for the temp. service limits
Powershaft Splines	Any of Above	See above	See Above	See Above

CHASSIS INFORMATION

Date	Mileage	Dealer Address	Service/Remarks

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Glossary of Terms

AC Electricity - Alternating current also known as household power.

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

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

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

Chassis Battery - Powers chassis 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 that you hook-up to when you are at campgrounds. It is called city water because you pull water from a central source (like in a city) and not the fresh water tank.

Curbside - This refers to the side of the motorhome which faces the curb when it is parked. Often called the door side.

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

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

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

DC Electricity - Direct current also known as battery power.

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

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

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 anything from another source.

Dump Station - Sites where you can drain your waste (gray) 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 (gray 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 camp ground that has city water, shore power and sewer hook-ups or connections available.

Gray 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 12V 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.

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 camp ground 120 volt electrical supply.

Shore Line Plug - This is the 120 volt outlet that you can plug your motorhome into a campground.

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.

NOTES