



# OWNER'S MANUAL

CLASS A AND CLASS C  
MOTORHOMES



**Made to fit.**





## **WARNING**

**Operating, servicing and maintaining a passenger vehicle or off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle.**

**For more information go to: [www.P65Warnings.ca.gov/passenger-vehicle](http://www.P65Warnings.ca.gov/passenger-vehicle)**



**Made to fit.**

Congratulations on purchasing your new motorhome! Welcome to the wonderful world of RV'ing and to the Thor Motor Coach family of recreational vehicles.

We sincerely thank you for choosing the Thor Motor Coach brand. Our mission is to produce quality motorized recreational vehicles designed to provide you with carefree, comfortable travel and vacationing for now and for many years to come. We are confident that you will find your new motorhome is 'Made to fit' your recreational aspirations.

Your motorhome was built following the high standards set by Thor Motor Coach (TMC), the Recreational Vehicle Industry Association (RVIA), and (if applicable) the Canadian Standards Association (CSA) as well as complying with the requirements of all applicable state and federal agencies at the time of manufacture.

Our customers are extremely important to us, and we assure you that TMC will always strive to do everything possible to earn and retain your trust and goodwill.

Happy Travels!

P. O. Box 1486 • Elkhart, Indiana 46515-1486 • (Toll Free) 877.855.2867

[thormotorcoach.com](http://thormotorcoach.com)

# Table of Contents

## Section 1: Introduction

- About This Owner's Manual . . . . . 1
- TMC Warranty Guide . . . . . 1
- Owner's Packet . . . . . 1
- Chassis Packet and Chassis Warranty . . . . . 1
- Contact TMC Customer Care . . . . . 1
- Online Customer Support . . . . . 2
  - TMC Owners Resource . . . . . 2
  - TMC Instructional Videos . . . . . 2
  - TMC System Guides . . . . . 2
- Thor Diesel Club . . . . . 3

## Section 2: Consumer Information

- Dealer's Responsibility . . . . . 5
- Consumer's Responsibility . . . . . 5
- Change of Address or Ownership . . . . . 5
- Vehicle Identification Decals and Plates . . . . . 6
- How to Obtain Assistance . . . . . 6
- Suggestions for Obtaining Service . . . . . 6
- Emergency Weekend or After Business Hours
  - Warranty Repair Assistance . . . . . 7
- Obtaining Service Repair at Thor Motor Coach . . . 7
- Replacement Parts . . . . . 7
- Website Usage Disclaimers . . . . . 8
  - Website Disclaimer of Warranty . . . . . 8
  - Disclaimer of Endorsement . . . . . 8
- Thor Motor Coach® Recreational Vehicle
  - Privacy Notice . . . . . 8
- Ford Chassis Notice . . . . . 9
- Reporting Safety Defects . . . . . 9
  - In the United States . . . . . 9
  - In Canada . . . . . 9

## Section 3: Vehicle Safety

- Safety Alerts . . . . . 11
- Safety Decals and Information Labels . . . . . 11
- Fire Safety . . . . . 12
  - Basic Rules of Fire Safety . . . . . 12
- Fire Extinguisher . . . . . 13
  - Operation . . . . . 13
  - Inspection . . . . . 13
  - Replacement . . . . . 13
- Smoke Alarm . . . . . 13
  - Operation . . . . . 13
  - Test . . . . . 14
  - Maintenance . . . . . 14

- Replacement . . . . . 14
- Carbon Monoxide (CO) . . . . . 14
- Propane Gas Safety . . . . . 15
- Combination Carbon Monoxide and Propane
  - Alarm . . . . . 15
    - What to do if the Alarm Sounds . . . . . 16
  - Test . . . . . 16
  - Maintenance . . . . . 16
  - Replacement . . . . . 17
- Exhaust Fumes and Gases . . . . . 17
- Emergency Egress Window . . . . . 17
  - Lever Latch Operation . . . . . 17
  - Swing Latch Operation . . . . . 18
  - Maintenance . . . . . 18
  - Additional Egress Window Information . . . . . 18
- Driver and Front Passenger Seats . . . . . 19
- Front Air Bags . . . . . 19
- Seat Belts . . . . . 19
  - Operation . . . . . 20
  - Inspection and Replacement . . . . . 20
- Child Safety Restraint System . . . . . 20
- Transporting Pets . . . . . 21
- Safely Driving the Motorhome . . . . . 22
- Laws of The Road . . . . . 23
- Emergency Stopping . . . . . 23
- Mirrors and Vision Systems . . . . . 24
  - Mirrors . . . . . 24
    - Mirror Features . . . . . 24
    - Mirror Adjustments . . . . . 24
  - Vision Systems . . . . . 25
    - Vision System Prep Only . . . . . 25
- Clearance and Side Marker Lights . . . . . 25
- Chemical Sensitivity . . . . . 26
  - Formaldehyde . . . . . 26
  - Smoking and Medical Advice . . . . . 26
  - Ventilation . . . . . 27
- Mold . . . . . 27
  - Inhibiting Mold Growth . . . . . 27

## Section 4: Fuel Systems

- Fuel System Safety . . . . . 29
- Fuel Cap . . . . . 29
- Fuel Pump Collision Shut-off Switch (if equipped) . . 29
- Fuel Transfer System (if equipped) . . . . . 30
  - Fuel Transfer System Operation . . . . . 31

**Section 5: Tires and Wheels**

Tire Safety . . . . . 33  
 Tire Inflation . . . . . 33  
 Common Tire Wear Patterns . . . . . 34  
 Wheel Alignment . . . . . 34  
 Tire Replacement . . . . . 35  
 Lug Nut Torque . . . . . 35  
 Changing a Damaged Tire . . . . . 35  
 Tire Identification Information . . . . . 36

**Section 6: Weighing, Loading, and Towing**

Introduction . . . . . 37  
 Weight Terminology . . . . . 37  
 Federal Weight Label . . . . . 37  
 Motorhome Occupant and Cargo Carrying  
     Capacity Weight Label . . . . . 38  
 Weight Capacity of Rear Garage Area . . . . . 38  
 Weighing Your Motorhome . . . . . 39  
 Weight Distribution . . . . . 40  
 Loading the Motorhome . . . . . 40  
 Towing With Your Motorhome . . . . . 40  
     Towing a Vehicle With Your Motorhome . . . . . 41  
     Towing Hitch . . . . . 41  
     Safe Towing Tips . . . . . 41  
 Electrical Connections for Towing . . . . . 42

**Section 7: Leveling Jacks and Slideouts**

Leveling Jacks Safety . . . . . 43  
 Hydraulic Leveling Jacks . . . . . 43  
     Manual Leveling with Hydraulic Jacks . . . . . 44  
     Zero Point Calibration . . . . . 44  
 Electric Stabilizers (if equipped) . . . . . 45  
 Slideouts . . . . . 46  
     Extending the Slideout . . . . . 46  
     Retracting the Slideout . . . . . 47

**Section 8: Exterior**

Powered Entry Steps . . . . . 49  
     Operating Powered Entry Steps . . . . . 49  
     Maintenance . . . . . 50  
 Awnings . . . . . 50  
     Patio Awnings . . . . . 51  
     Entry Door Awnings . . . . . 51  
     Awning Lights . . . . . 51  
     Slideout Awnings . . . . . 51  
 Storage Compartments . . . . . 52  
 Exterior Ladder . . . . . 52  
 Roof . . . . . 53

Ramp Door . . . . . 53  
 Ramp Door Patio Enclosure . . . . . 53

**Section 9: Interior**

Interior Lighting . . . . . 55  
     Powering the Lighting System. . . . . 55  
 Appliances . . . . . 56  
     Refrigerators . . . . . 56  
     Washer and Dryer Installation . . . . . 58  
 Entertainment Systems . . . . . 58  
 WiFi Connectivity (if equipped) . . . . . 58  
 Sleeping Areas . . . . . 59  
     Powered Over-cab Bunks . . . . . 59  
     SkyBunk™ (if equipped) . . . . . 61  
     Electric Bed Lift Systems . . . . . 61  
     Class C Cab-over Bunks . . . . . 63  
     Bed Safety Systems . . . . . 63  
     Telescoping Bunk Access Ladders . . . . . 64  
     Sofa Bed Conversions . . . . . 65  
     Dinette Bed Conversions . . . . . 69  
     Murphy Beds . . . . . 70

**Section 10: Electrical System**

Introduction . . . . . 73  
 12 Volt Power System . . . . . 73  
     House (auxiliary) Battery(ies) . . . . . 73  
     Typical 12 Volt DC Electrical System Diagram . . . . . 74  
     Controlling Battery Power . . . . . 75  
     Master Battery Disconnect Switch . . . . . 75  
     Chassis Alternator . . . . . 76  
     Battery Isolation Relay . . . . . 77  
     Emergency (Auxiliary) Start Switch (if equipped) . . . . . 77  
     Battery Condition Indicator . . . . . 78  
     Battery Charging. . . . . 79  
         Charging by Vehicle's Alternator . . . . . 79  
         Charging by the Converter . . . . . 79  
         Charging by Solar Energy . . . . . 79  
             10 Amp Controller . . . . . 80  
             30 Amp Controller . . . . . 80  
             Solar Panels . . . . . 81  
             Solar Prep . . . . . 81  
     Battery Maintenance. . . . . 82  
         Storage . . . . . 83  
         Replacement . . . . . 83  
     Inverter. . . . . 83  
         Inspection and Maintenance . . . . . 84  
 120 Volt Power System . . . . . 85  
     Typical 120 Volt AC Electrical System Diagram . . . . . 85  
     Shore Line Power . . . . . 86

30 Amp, 120 Volt Shore Line Power Cord . . . 87  
 50 Amp, 240 Volt Shore Line Power Cord . . . 87  
 Powered Shore Line Cord Reel . . . . . 88  
 Connecting to an External Power Source . . . 88  
 Shore Power Wiring Configuration . . . . . 89  
 Shore Line Cord Plug Adapters . . . . . 89  
 Trickle Charging Batteries During Storage . . 90  
 Transfer Switch Protection . . . . . 90  
 Shore Power Cord Maintenance . . . . . 90  
 Generator . . . . . 91  
     Generator Safety Guidelines . . . . . 91  
     Generator Power Rating . . . . . 92  
     Starting and Stopping Procedures . . . . . 92  
     Generator Fuel . . . . . 93  
 Automatic Generator Start (AGS) . . . . . 94  
 Automatic Transfer Switch . . . . . 94  
     Transfer Switch Power Protection . . . . . 94  
 Power Load Center, 30 Amp . . . . . 95  
     120 Volt AC Circuit Breaker Panel . . . . . 95  
     12 Volt DC Fuse Panel . . . . . 96  
     Converter . . . . . 97  
 Power Load Center, 50 Amp . . . . . 99  
     120 Volt AC Circuit Breaker Panel . . . . . 100  
     12 Volt DC Fuse Panel . . . . . 100  
     Converter . . . . . 100  
     Multiplex System 12 Volt Circuit Breaker  
     Panel . . . . . 101  
 Monitor Panel . . . . . 102  
 Rapid Camp+ Multiplex Control Systems . . . 102  
     Basic Rapid Camp+ Multiplex Operation . . 103  
 Outside 120 Volt AC Receptacle . . . . . 103  
 GFCI Receptacle . . . . . 104

**Section 11: Propane System**

Propane Gas Safety . . . . . 105  
 Propane Tank . . . . . 106  
     Filling and Servicing . . . . . 106  
 Using the Propane System . . . . . 106  
 External Propane Hook-up . . . . . 107  
 Propane Leak Test . . . . . 108  
 Traveling with Propane . . . . . 108

**Section 12: Water System**

Fresh Water System . . . . . 109  
     Potable Water Hose . . . . . 109  
     Connecting to a Fresh Water Source . . . . . 109  
     Disconnecting from a Fresh Water Source . . 109  
     Filling the Fresh Water Tank . . . . . 110  
     Water Pump . . . . . 110

Water Pump Strainer . . . . . 111  
 Water Panel . . . . . 111  
 Water Heater . . . . . 112  
 Sanitizing the Fresh Water System . . . . . 112  
 Waste Water System . . . . . 113  
     Drain Pipes . . . . . 113  
     Vents . . . . . 113  
     Waste Water Holding Tanks . . . . . 113  
     Toilet . . . . . 113  
     Macerator Pump . . . . . 114  
     Termination Valves . . . . . 115  
     Emptying Waste Water Holding Tanks . . . . . 115  
     Black Tank Flush . . . . . 116  
 Winterizing the Water System . . . . . 116  
 De-winterizing Your Motorhome . . . . . 117  
 Cold Weather Use of the Water System . . . . . 117

**Section 13: Heating and Cooling System**

Introduction . . . . . 119  
 Dash Heater and Air Conditioner . . . . . 119  
     Control Panel . . . . . 119  
     Operating Features . . . . . 120  
     Warranty/Service . . . . . 120  
 Heating/Cooling with Multiplex Integration . . . 120  
 Wall-Mounted Thermostats . . . . . 121  
 Ceiling and Ventilation Fans . . . . . 121  
 Cooling the Motorhome . . . . . 121  
     Manual Controls for Roof-Mount  
     Air Conditioners . . . . . 122  
     Basic Air Conditioner Operation . . . . . 123  
     Heat Pumps . . . . . 123  
 Heating the Motorhome . . . . . 124  
     Furnace Operation . . . . . 125  
     Furnace Care and Maintenance . . . . . 126  
 Hydronic Heating Systems . . . . . 127

**Section 14: Maintenance**

General Information . . . . . 129  
 Chassis . . . . . 129  
 Class A Motorhome Engine Access . . . . . 129  
 Maintenance Access Panels . . . . . 129  
 Condensation . . . . . 130  
 Seals and Sealants . . . . . 130  
 Cold Weather Usage . . . . . 130  
 Extended Stay Usage . . . . . 131  
 Storage of the Motorhome . . . . . 131  
 Maintenance Schedule . . . . . 133

Index . . . . . 139

Thor Motor Coach (TMC) reserves the right to make changes in vehicles built and/or sold at any time without incurring any obligations to make the same or similar changes on vehicles previously built and/or sold by TMC. Information in this owner's manual is subject to change without notice and represents information relevant at the time this version was printed. Nothing in this owner's manual creates any warranty, either expressed or implied. The only warranties offered are those set forth in the Thor Motor Coach Limited Warranty and in the Thor Motor Coach Structural and Lamination Limited Warranty, as applicable to the motorhome.

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CUSTOMER CARE | 877.855.2867



# Introduction

## About This Owner's Manual

This Owner's Manual is intended to introduce you to the basic features of your new motorhome. It is not intended for use as a service manual, nor does it provide complete operational instructions. It is a guide to help you become familiar with the safe operation and use of your motorhome. It is general in nature, so the illustrations and descriptions provided may differ from the components installed in your motorhome. Please read and keep it, along with your TMC Warranty Guide, your Owner's Packet, and your Chassis Packet in your motorhome for future reference.

Information regarding the specific systems and components of your motorhome is provided through other TMC publications, media, and services. These resources include: TMC System Guides, component manufacturers instructional booklets, TMC-produced how-to videos, and through TMC's Customer Care representatives, who are available 24/7 to answer your questions and assist with your concerns.

A list of component suppliers is available through the Thor Motor Coach Owners Resource document service.

## TMC Warranty Guide

The Thor Motor Coach Limited Warranty and the Thor Motor Coach Structural and Lamination Limited Warranty are printed in your TMC Warranty Guide. The TMC Warranty Guide also contains your TMC Product Warranty Registration Form and other important information.

Please review all warranties, warranty restrictions, limitations, and actions needed to keep warranties in-force with your dealer. If you have questions regarding TMC Warranty coverage, contact TMC Customer Care, toll free:

**877-855-2867**

Electronic copies of Thor Motor Coach's Limited Warranties applicable to your motorhome are available from the Thor Motor Coach web-site:

[www.thormotorcoach.com/owners/owners-manual/](http://www.thormotorcoach.com/owners/owners-manual/)

## Owner's Packet

Included with your new motorhome is the Owner's Packet, which contains instructions regarding the warranty, safety, operation, and maintenance of the factory-installed components found in your motorhome. Please read, follow, and

retain for reference the information provided by these component manufacturers.

If you are missing component information, please contact the component manufacturer (using the supplier contact list provided through the TMC Owners Resource), your selling dealer, or TMC Customer Care at:

**877-855-2867**



TMC Owner's Packet

## Chassis Packet and Chassis Warranty

Supplied by the manufacturer of your motorhome's chassis, the Chassis Packet contains important warranty, safety, operation, and maintenance information pertaining to the motorized vehicle portion of your motorhome. Instructions for registering your applicable warranty using the chassis manufacturer's Delayed Warranty Start Form are printed in the TMC Warranty Guide.

## Contact TMC Customer Care

If you are unclear or unfamiliar with any procedure described in this Owner's Manual, your TMC Warranty Guide, Owner's Packet, Chassis Packet, including the operation of a component or system of your motorhome, or require service or warranty repairs, please contact your selling dealer or TMC Customer Care at:

**877-855-2867**

TMC Customer Care representatives are available 24 hours a day, 7 days a week. You can also email your inquiries to TMC Customer Care by filling out and sending the form located on the TMC website:

[www.thormotorcoach.com/customer-care/](http://www.thormotorcoach.com/customer-care/)

Response times from TMC Customer Care are within 1-to-2 business days. You must include your name and a valid email address. Include your contact information, Vehicle's Identification Number (VIN) and a brief description of your inquiry.

## Online Customer Support

A good working knowledge of your motorhome and how to care for it will help you enjoy many years of motorhome ownership. Specific operational and maintenance instructions for the systems and factory-installed components of your motorhome are not included in this manual, however, more detailed information associated to your motorhome is available on-line through the TMC Owners Resource service:

[www.thormotorcoach.com/owners/](http://www.thormotorcoach.com/owners/)

From the web-page listed above, click on the icons that will direct you to resources such as: TMC Owners Resource, TMC Customer Care, authorized TMC Service Center Locator, TMC Factory Parts, TMC Owner’s Manuals, and other useful and informative information.

### TMC Owners Resource

Clicking on the Owners Resource icon will direct you to the TMC Owners Resource document service. This service is complementary to owners of TMC motorhomes. Create a user account by entering your contact information and your motorhome’s 17-digit Vehicle Identification Number (VIN).



The site will return to you a list of instructional manuals, quick-start guides, and links to instructional videos associated to your motorhome’s factory installed components. Documents are provided in a viewable, printable, and download-able .pdf format. Visit your TMC Owners Resource account often, for updates and new features are continually being introduced.

### TMC Instructional Videos

As an added resource, TMC provides informational ‘how-to’ videos through the Thor Motor Coach YouTube channel. This video library is constantly being updated and includes helpful information regarding the operation and maintenance of the systems and components installed on your motorhome:

[www.youtube.com/user/ThorMotorCoach](http://www.youtube.com/user/ThorMotorCoach)

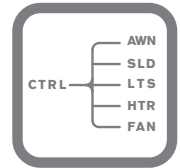
For your convenience, instructional videos are also listed and linked from your TMC Owners Resource account.

## TMC System Guides

A good source of operational and maintenance information pertaining to TMC motorhomes is available through TMC’s System Guides. System Guides are intended to inform TMC motorhome owners about the systems and components installed on their motorhome. System Guides are continuously updated as new features and components are added to the TMC model line-up. System Guides are available as download-able .pdf documents from the TMC website through your TMC Owners Resource account.

To date, guides are available covering these topics:

- Awnings, Leveling and Slideouts;
- Appliances and Entertainment;
- Care and Maintenance;
- Electrical System;
- HVAC (heating, ventilating, and air conditioning);
- Multiplex Systems;
- Propane System;
- Water System (Fresh and Waste).



## Thor Diesel Club

If you are an owner of a Class A diesel motorhome manufactured by Thor Motor Coach, you are eligible for membership to the Thor Diesel Club. Members discover a whole new level of camaraderie, while increasing their knowledge of their TMC motorhome and the RV lifestyle.

The Thor Diesel Club is an independently owned and operated entity that uses the Thor name under a license agreement. The Thor Diesel Club is not a principal or agent of Thor Motor Coach, Inc.

For more information regarding how you can become a club member, please contact:

**Thor Diesel Club**  
**5715 Hwy 85N #557**  
**Crestview, Florida 32536**

Website: [www.thordieselclub.org](http://www.thordieselclub.org)

Email: [thordieselclub@gmail.com](mailto:thordieselclub@gmail.com)

**NOTE:** If you have purchased a new, previously un-titled Class A diesel motorhome, Thor Motor Coach will pay for your first year of membership to the Thor Diesel Club. Simply visit the website listed below, fill out the form, and submit your request.

[www.thormotorcoach.com/owners/thor-diesel-club/](http://www.thormotorcoach.com/owners/thor-diesel-club/)

If you have purchased a used TMC Class A diesel motorhome, you may still join by visiting the Thor Diesel Club website.

[www.thordieselclub.org](http://www.thordieselclub.org)

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# Consumer Information

## Dealer's Responsibilities

Your selling dealer is responsible for inspecting both factory and dealer installed components for proper operation. This is referred to as a pre-delivery inspection (PDI).

Your selling dealer should also provide a thorough and complete walk through demonstration and perform a test drive with you. The demonstration should provide you with a good understanding of your new motorhome's safety features, operation, maintenance, and limited warranties.

Your selling dealer should discuss this Owner's Manual, the Owner's Packet, the Chassis Packet, and all individual component supplier documents with you at the time of sale. Their presentation should include assisting you with completing all warranty cards and registrations, and reviewing all individual component supplier information, including warranty, safety, operation, and maintenance information relating to your new motorhome.

Your selling dealer is required to complete and return the TMC Product Warranty Registration Form (located in the TMC Warranty Guide) to Thor Motor Coach within 15 days of delivery of your motorhome to you. Thor Motor Coach Limited Warranties are activated on the date of delivery of the new motorhome to its new owner(s).

**NOTE:** Failure to file the Product Warranty Registration Form with TMC will not affect your rights under the applicable TMC limited warranty as long as you can present proof of purchase and proof of delivery date to TMC, but it can cause delays in obtaining the benefits of the applicable TMC limited warranty, and it may inhibit any servicing facility's ability to provide proper repairs and/or parts replacement.

## Consumer's Responsibilities

You, as the owner/operator of the motorhome, are responsible for providing proper maintenance as outlined in this Owner's Manual, the TMC Warranty Guide, the Owner's Packet, TMC's On-line Customer Support, the Chassis Packet, and all individual component suppliers' information. Thor Motor Coach Limited Warranties do not cover maintenance performance or maintenance expenses.

If you have questions regarding warranty coverage, contact TMC Customer Care at:

**877-855-2867**

Inspect the entire motorhome during the test drive and pre-delivery inspection (PDI), and note any issues in writing on the TMC Product Warranty Registration Form. Ask any questions you may have before leaving the selling dealership.

1. Complete and return all applicable warranty cards and registrations at the time of sale.
2. Perform regular and proper maintenance (refer to Section 14). Be sure to have service performed in a timely manner to help avoid situations arising from neglect or abuse that are not covered under warranty.
3. Familiarize yourself with your new motorhome; its systems, features, and safe operational procedures. Follow all TMC, chassis manufacturer, and all individual component suppliers' instructions regarding the safety, operation, and maintenance of their respective products.

Electronic copies of Thor Motor Coach's Limited Warranties applicable to your motorhome are available from the Thor Motor Coach web-site:

[www.thormotorcoach.com/owners/owners-manual/](http://www.thormotorcoach.com/owners/owners-manual/)

### NOTES:

- Failure to properly maintain your motorhome could result in loss of warranty coverage.
- Your motorhome is not designed, nor intended, for permanent housing. Use of your motorhome for long term or permanent occupancy may lead to premature deterioration of its structure, interior finishes, fabrics, carpeting, and/or window treatments, etc.
- Damage and/or deterioration due to long term occupancy is not considered normal, and may under the terms of the warranty constitute misuse, abuse, or neglect, and therefore void certain warranty protections.

## Change of Address or Ownership

The 'National Traffic and Motor Vehicle Safety Act of 1966' in the United States, and Transport Canada require manufacturers to be able to contact vehicle owners when a correction of a safety-related defect or noncompliance issue becomes necessary.

To enable TMC to contact you, the current owner, with important vehicle product and safety updates, including vehicles with expired warranty coverage, please update

your vehicle-related or ownership information by contacting TMC in writing; by faxing (attention: Registrations):  
**574-294-3618**

or, by emailing:  
**registrations@tmcrv.com**

**INCLUDE THE FOLLOWING:**

- Your legal name;
- Your current mailing address (include your prior mailing address for change of address notifications);
- Your telephone number (home and/or cell);
- Your email address;
- Your vehicle's 17-digit vehicle identification number (VIN);
- Your vehicle's TMC serial number;
- Legal proof of purchase (e.g., a legible copy of your bill of sale or insurance card);
- Current motorhome odometer reading.

**Vehicle Identification Decals and Plates**

The vehicle identification number (VIN) and the TMC serial number is listed on a label affixed to the inside of the driver's door jamb of Class B and C motorhomes, while this label is affixed to the inside panel, just left of the driver's seat in Class A motorhomes. Please refer to the chassis manufacturer's owner's manual for the location of your 17-digit chassis VIN tag (see Section 6).

**How to Obtain Assistance**

Should a question or concern arise regarding your motorhome, the first step is to contact your selling dealer. Their sales, service, and parts professionals will be glad to assist you.

For assistance, you can also contact TMC Customer Care. Representatives are available 24 hours a day, 7 days a week by calling (toll free):

**877-855-2867**

Inquiries can also be directed to TMC Customer Care via email:

**wsupport@tmcrv.com**

or, through the on-line form located on the TMC website:

**www.thormotorcoach.com/customer-care/**

Response times from TMC Customer Care are within 1-to-2 business days. You must include your name and a valid email address. Also include your VIN and briefly describe the purpose of your inquiry. You will receive a reply by email, or if you choose, a TMC Customer Care representative will return a phone call as soon as possible.

Your selling dealer and/or your TMC Customer Care representative should be able to solve any question or concern regarding your motorhome. However, if their combined efforts are not satisfactory, please send a letter describing the circumstances to:

**Thor Motor Coach  
Attn: Customer Care  
PO Box 1486  
Elkhart IN 46515-1486**

**INCLUDE THE FOLLOWING:**

- Your selling dealer's name, address, and phone number;
- Your dealer contact's name;
- Your legal name, current mailing address, phone number, and email address;
- Your vehicle's 17-digit vehicle identification number (VIN);
- Your vehicle's TMC serial number;
- Current motorhome odometer reading;
- If applicable, include the individual component supplier's name, part description, model number, and serial number.

**Suggestions for Obtaining Service**

The following suggestions will help ensure your selling dealer provides the level of service you expect.

**CONTACT YOUR DEALER AT ONCE**

Service appointments are made based on each dealer's service schedule, so contact your dealer as soon as possible to have service or repairs performed.

**PREPARE FOR THE APPOINTMENT**

If warranty-covered work is being performed, have the following documentation available:

- TMC Warranty Guide;
- Applicable component warranties;
- Component serial numbers;
- Vehicle identification number (VIN);
- Vehicle serial number.

All work to be performed may not be covered by the TMC Limited Warranty or component manufacturer's warranties. Discuss warranties and possible service charges with the dealer's service professionals before authorizing service work.

#### PREPARE A LIST

Provide your dealer with a written list of specific repairs needed. It is important that you provide the vehicle's repair history to the dealer's service professionals. Keep a maintenance and service log for your vehicle and have it available for your dealer to review.

#### BE REASONABLE WITH YOUR REQUESTS

If you need your motorhome returned by a specific date and time, discuss the situation with the dealer's service professionals and list your repair items in order of priority. This may include making a second appointment for work not completed or a list of parts that the dealer may need to obtain prior to performing service work.

#### DON'T EXPECT TO LOOK OVER THE TECHNICIAN'S SHOULDER

Please don't be offended if you are not allowed in the service area while the service work is being performed. Some insurance requirements forbid admission of customers to service areas.

#### INSPECT THE WORK PERFORMED

Along with the service manager or representative, inspect the service or repair work when you pick up your motorhome. Notify the dealer's service professionals immediately of any dissatisfaction with the performed service work. If you cannot return the vehicle immediately for repairs or corrections, make an appointment as soon as possible.

Please be aware that all service shops require notification of any issues with their repairs within a specified time limit. Make sure you are familiar with the repair facilities policies.

### Emergency Weekend or After Business Hours Warranty Repair Assistance

In an emergency, if an authorized TMC dealer is not located nearby, please contact your selling dealer for assistance. If your selling dealer is closed, contact TMC Customer Care at:

**877-855-2867** (available 24/7)

For warranty pre-repair authorization and for emergency weekend or after-business-hours repair assistance, see How To Obtain Assistance, in this section.

**NOTE:** Please refer to your TMC Factory Service Appointment Form for important additional information.

2

## Obtaining Service Repair at Thor Motor Coach

If your motorhome is in need of service repair, and your dealer recommends that the repairs be made at the TMC Factory Service Center, your motorhome may be returned to TMC with the following guidelines:

- You, the current motorhome owner, or your referring dealer must make a confirmed appointment prior to dropping off your motorhome.
- You are responsible for all transportation costs and hotel accommodations; please be prepared accordingly.
- Unless prior approval has been obtained from the TMC Factory Service Center, all personal items must be removed from the area where you are requesting service repair and the refrigerator emptied. TMC is not responsible for any lost or stolen property, valuables, or loss of food items.
- Your motorhome holding tanks must be emptied and rinsed. TMC has a dumping station available for customer use.
- The propane system and all electrical systems must be shut down and turned OFF. TMC is not responsible for discharged batteries or loss of propane.
- During the appropriate season, please ensure your motorhome is winterized.
- You must retake possession of your motorhome within 7 business days of TMC notifying you that the repairs have been completed; otherwise, unless a longer storage time has been previously agreed to, in writing by TMC, you may be liable for additional daily storage fees payable to TMC.

## Replacement Parts

TMC does not sell retail parts directly to consumers. Please contact your selling dealer for assistance in obtaining replacement parts and/or accessories. If the original part is no longer available, TMC will make every effort to suggest or provide an appropriate substitute.

## Website Usage Disclaimers

Thor Motor Coach (TMC) hereby disclaims and sets forth as follows:

### WEBSITE DISCLAIMER OF WARRANTY

The services, information and materials on websites listed in this manual are provided 'AS IS,' and TMC shall have absolutely no liability whatsoever in connection with these website services, information, external links or third party links on these websites. Your use of these websites are at your own risk. TMC shall have no liability whatsoever for any errors, omissions or inaccuracies in the information regardless of how caused or for delays or interruptions in delivery of the information: or any decision made or action taken or not taken in reliance upon the information furnished.

TMC accepts no responsibility or liability whatsoever with regard to information on these websites as the information is meant to be of a general nature only and is not intended to address the specific circumstances of any particular individual or entity.

The information provided is not necessarily comprehensive, complete, accurate or up to date; the information is sometimes linked to external sites over which TMC has no control and for which TMC assumes no responsibility: TMC shall have no liability for any loss or injury caused, in whole or in part, by its actions, omissions or negligence, or for any contingencies beyond its control in procuring, compiling or delivering any information. The information is not professional nor does it comprise legal advice (if you need specific advice, you should always consult a suitably qualified professional).

### DISCLAIMER OF ENDORSEMENT

Any reference within external or third party links to any specific commercial products, process or service by trade name, trademark, manufacturer or otherwise, does not constitute or imply it's endorsement, recommendation or favoring by TMC. The appearance of external or third party links does not constitute endorsement by TMC of the linked web sites or the information, products or services contained therein. TMC does not exercise any editorial control over the information you may find at these locations. External or third party links may be provided for the convenience of the users of that website. TMC is not responsible for the availability or content of these external or third party sites and does not endorse, warrant or guarantee any products, services, information, centers, or schools described or offered at these links.

## Thor Motor Coach® Recreational Vehicle Privacy Notice

Your Thor Motor Coach RV contains systems which allow Thor Motor Coach to collect information about your recreational vehicle, how it is used, and where it is located, and your Internet connection established through the RV's embedded equipment. Thor Motor Coach may also collect information about you, your RV, and how and where it is used through devices, applications, and services you use in connection with your Connected RV.

Some data, including location information, may be transmitted to Thor Motor Coach (directly or through its service providers) via the included Winegard modem/router whenever that device is connected to the Internet (via wi-fi, cellular connection, or other means). This data may be transmitted regardless if your RV is parked or in motion.

Thor Motor Coach collects, uses, stores, and/or shares this data for a number of reasons, including providing assistance to you, troubleshooting, improving its products, and to offer you products and services which may be of interest to you. For more information and updates about what information Thor Motor Coach may collect, how we use, store, and share it, and how we protect it, please review the Thor Industries Privacy Policy ([www.ThorIndustries.com/privacy-policy/](http://www.ThorIndustries.com/privacy-policy/)) and the Winegard Company Privacy Policy ([www.Winegard.com/about/privacy-policy/](http://www.Winegard.com/about/privacy-policy/)).

You may prevent sharing by disconnecting the Winegard modem/router from the electrical power source. Note: if you disable or limit information sharing with Thor Motor Coach or its partners certain product features may not work or may have limited functionality.

Thor Motor Coach RVs with connectivity features are intended for use in the United States and Canada only. Data and privacy protection laws where you use the RV may impose certain responsibilities on you with respect to your use of RV and related services. You are responsible for ensuring you comply with such laws when you use the RV and related services. You are responsible for informing those you permit to use or occupy your RV (with or without you, and including anyone to whom you loan, give, or sell the Connected RV) how data related to their use of the RV may be collected and processed.

If your Thor Motor Coach RV is equipped with a Sirius Radio receiver, TMC will forward your vehicle and contact information to Sirius. They will use this information to activate your subscription.

Please contact Thor Motor Coach Customer Service at **877-855-2867** if you have any questions about this privacy notice or our privacy practices.



## Ford Chassis Notice

TMC Class A motorhomes built on the Ford F-53 chassis may be equipped with a modem and roof-mounted antenna. This device (installation required by Ford) is used to access important vehicle diagnostic information and may include other useful features. Refer to your Ford Owner's Manual, contact your Ford dealer, or visit Ford's website for system details and Ford's Vehicle Privacy Policy.

## Reporting Safety Defects

### In the United States

If you believe that your recreation vehicle has an alleged defect that could cause a crash or cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) and Thor Motor Coach.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your selling dealer, or Thor Motor Coach.

For additional information, go to the NHTSA website at:  
[www.safercar.gov](http://www.safercar.gov)

### TO CONTACT NHTSA BY PHONE:

Call the Vehicle Safety Hotline at: **888-327-4236**

TTY: **800-424-9153**

or: **202-484-5238**

A NHTSA representative will record your complaint information.

### TO CONTACT NHTSA BY MAIL:

**Office of Defects Investigations/CRD  
NVS-216  
1200 New Jersey Ave. SE  
Washington, DC 20590**

### TO CONTACT THOR MOTOR COACH BY PHONE:

Contact TMC Customer Care at: **877-855-2867**

### TO CONTACT THOR MOTOR COACH BY MAIL:

**Thor Motor Coach  
Attn: Customer Care  
P.O. Box 1486  
Elkhart, IN 46515-1486**

### In Canada

If you believe your recreation vehicle has an alleged safety defect, you should contact the Department of Transport and Thor Motor Coach. to report your safety concern.

### ONLINE:

[www.tc.gc.ca/recalls](http://www.tc.gc.ca/recalls)

### TELEPHONE:

Call: **800-333-0510** (in Canada)

or: **819-994-3328**

(Ottawa-Gatineau area or International)

### MAILING ADDRESS:

**Transport Canada - ASFAD  
330 Sparks Street  
Ottawa, Ontario  
K1A 0N5**

### TO CONTACT THOR MOTOR COACH BY PHONE:

Contact TMC Customer Care at: **877-855-2867**

### TO CONTACT THOR MOTOR COACH BY MAIL:

**Thor Motor Coach  
Attn: Customer Care  
P.O. Box 1486  
Elkhart, IN 46515-1486**

### Langue Française

### INTERNET :

<http://www.tc.gc.ca/rappels>

### TÉLÉPHONE :

Sans frais : **800-333-0510** (au Canada)

ou : **819-994-3328**

(dans la région de Ottawa-Gatineau et à l'extérieur du pays)

### ADRESSE POSTALE :

**Transports Canada - ASFAD  
330, rue Sparks  
Ottawa (Ontario)  
K1A 0N5**

### POUR JOINDRE TMC PAR TÉLÉPHONE :

Appelez l'assistance à la clientèle TMC au :

**877-855-2867**

### POUR JOINDRE TMC PAR COURRIER :

**Thor Motor Coach  
Attn: Customer Care  
P.O. Box 1486  
Elkhart, IN 46515-1486**

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# Vehicle Safety

## Safety Alerts

Thor Motor Coach uses the following safety symbols and signal words to warn you of possible safety concerns and to provide information to help prevent personal injury and/or damage to the motorhome:

**NOTE:** Provides important information and useful tips.



**This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death. This symbol may be used in conjunction with the following signal words and with a color that corresponds with the associated safety label.**

### **⚠ DANGER**

Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This alert information is limited to the most extreme situations.

### **⚠ WARNING**

Indicates a potentially hazardous situation that, if not avoided, may result in death or serious injury.

### **⚠ CAUTION**

Indicates an imminently hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

### **NOTICE**

Indicates a potential situation that, if not avoided, may result in property damage or damage to your motorhome.

## Safety Decals and Information Labels

### **⚠ WARNING**

**Do not remove manual or labels from RV. If manual is lost or misplaced or labels are damaged or illegible, contact manufacturer or go to manufacturer's website to obtain replacements. Thor Motor Coach, Inc.'s website is: <http://thormotorcoach.com>.**

There are safety decals and vehicle information labels affixed throughout your motorhome. Read and follow the instructions listed on all decals, labels, or data plates before and during operation and storage of your motorhome.

**NOTE:** Replacement Owner' Manuals and labels can be obtained from your selling dealer's parts department or TMC Customer Care.

## Fire Safety

### **⚠ DANGER**

#### **NO SMOKING**

**Before dispensing fuel, turn off all engines, fuel-burning appliances, and their igniters (see operating instructions).**

**Do not dispense fuel within 20 feet (6.1 meters) of an ignition source.**

**Can cause ignition of flammable vapors, which can lead to a fire or explosion and result in death or serious injury.**

### **⚠ DANGER**

**Vehicles and equipment powered by internal combustion engines and placed in recreation vehicles may cause carbon monoxide poisoning or asphyxiation, which could result in death or serious injury.**

**The flammable liquids used to power these items can cause a fire or explosion, which can result in death or serious injury.**

#### **TO REDUCE RISK:**

1. **Do not ride in the vehicle storage area when vehicles are present.**
2. **Do not sleep in the vehicle storage area when vehicles are present.**
3. **Close doors and windows in walls of separation (if installed) when any vehicle is present.**
4. **Run fuel out of engines or stored vehicles after shutting off fuel at the tank.**
5. **Do not store, transport, or dispense fuel inside this vehicle.**
6. **Open the windows, openings, or air ventilation systems provided for venting the transportation area when vehicles are present.**
7. **Do not operate propane appliances, pilot lights, or electrical equipment when motorized vehicles are present.**

### **⚠ WARNING**

**DO NOT attempt to use water to put out an electrical fire. Water can spread some types of fire, and electrocution is possible with an electrical fire.**

Awareness and adherence to fire safety procedures is an important part of being a responsible motorhome owner/operator. Make sure that everyone traveling in the motorhome is familiar with the location of exits, including emergency exit egress windows. By following these basic rules of fire prevention, the possibility of a fire can be significantly reduced:

- Never store flammable liquids within the motorhome.
- Keep cooking surfaces clean.
- Never use a flammable liquid or substance as a cleaning agent or solvent.
- Never leave cooking food unattended.
- Keep flammable materials away from open flames.
- Never smoke in bed; and when smoking, always use an ashtray.
- Never allow children to play with propane or electrical equipment.
- Never use an open flame as a source of illumination.
- Promptly repair faulty or damaged wiring and electrical components.
- Never overload electrical circuits.
- Locate and repair propane gas leaks immediately.
- Do not allow rubbish to accumulate.
- Spray fabrics annually with a flame retardant.

## Basic Rules of Fire Safety

1. Evacuate everyone (including pets) from the motorhome immediately!
2. After everyone is clear, check the fire to determine if it can be easily put out. **If the fire is too large, or the fire is fuel fed, stay clear of the motorhome and have the fire department manage the emergency.**
3. **If it can be safely done, without risking bodily harm or injury:**
  - Turn OFF the main propane gas valve at the propane tank;
  - Switch the 120 volts AC main circuit breaker to the OFF position;
  - Disconnect the shore line power cord from the shore power receptacle;
  - Turn OFF the generator (if equipped);
  - Disconnect the negative battery cable(s) at the auxiliary battery and chassis battery.
4. **DO NOT attempt to use water to put out the fire. Water can spread some types of fire (grease or oil), and electrocution is possible with an electrical fire.**
5. Always have faulty or damaged wiring, electrical components, propane tanks, valves, pipes, gas, and electrical appliances inspected by a certified RV repair technician and repaired immediately.

## Fire Extinguisher

Fire extinguishers are classified and rated by fire type, A, B, and C. These classifications identify the kinds of fires or burning materials they are designed to extinguish:

- Class A** - Solid materials such as wood, paper, cloth, rubber, and some plastics.
- Class B** - Liquids such as grease, cooking oils, gasoline, kerosene or other flammable liquids.
- Class C** - Electrical such as electrical wires or other live electrical equipment.

A dry-chemical fire extinguisher has been installed by the entrance door. It is suitable for extinguishing small fires of the Class B or C type only.



Typical Class B-C fire extinguisher

### Operation

For information on how to use your fire extinguisher, refer to the fire extinguisher manufacturer's owner's manual or the label affixed to the side of the fire extinguisher.

### Inspection

Inspect the extinguisher at least once a week (more frequently if it is exposed to weather or possible tampering). This should also be done before beginning a vacation or during an extended trip.

### Replacement

The fire extinguisher must be replaced following the fire extinguisher manufacturer's owner's manual instructions, and/or expiration date listed on the label affixed to the side of the fire extinguisher.

**NOTE:** Know the location of the fire extinguisher installed in your motorhome and become familiar with its operation.

## Smoke Alarm

### ⚠ WARNING

**This smoke alarm will not alert hearing impaired residents. Special alarms with flashing strobe lights are recommended for the hearing impaired.**

The smoke alarm installed in your motorhome is listed for use in recreation vehicles. They only work as intended if they are maintained in operational condition. Smoke alarms have a limited life and over time, will cease to function. Immediately replace the smoke alarm if it is not working properly, if it displays any type of problem, or as recommended by the smoke alarm manufacturer. Be sure to read, understand, and follow the information provided by the smoke alarm manufacturer, including information on the limited life of smoke alarms.



Typical RV smoke alarm

Be aware the smoke alarm is not fool proof and cannot detect fires if smoke does not reach it. Anything preventing smoke from reaching the alarm may delay or prevent an alarm.

Though the alarm horn in this detector meets or exceeds current UL standards, it may not be heard for reasons that include (but not limited to): a closed or partially closed door, distracting noises from electronics, appliances, loud outside noises, etc.

### Operation

The smoke alarm is operational once the battery is correctly installed. It will not function if the battery is missing, disconnected, dead, the wrong type, or not installed correctly. It requires one standard 9 volt battery. Refer to the smoke alarm manufacturer's owner's manual for correct battery and installation information.

The LED light indicates if the battery is functioning properly. When the production of combustion is sensed, the smoke alarm sounds a loud alarm that continues until the air is cleared of smoke. The LED light also gives a visual indication of a sounding alarm.

When the battery becomes weak, the alarm will 'beep' about once a minute indicating a low battery. This warning should last for 30 days. To assure continued protection, you **MUST** replace the battery once the smoke alarm's low battery warning (beeping) is detected.

Test

**⚠️ WARNING**

Test smoke alarm operation after vehicle has been in storage, before each trip, and at least once per week during use.

Failure to do so can result in an undetected faulty smoke alarm, which could lead to death or serious injury.

To test the smoke alarm, stand at arm's length from the smoke alarm, as the alarm horn is loud and may be harmful to your hearing. Actuate the test button, which will activate the alarm. Pressing the test button will accurately test all functions. Never use an open flame to test the smoke alarm.

Maintenance

Vacuum off any dust on the cover of the smoke alarm using a soft brush attachment. Test the smoke alarm once you have vacuumed. Never use water, cleaners or solvents to clean the smoke alarm as they may damage the alarm. Do not paint the smoke alarm. Refer to the manufacturer's owner's manual for detailed maintenance information.

Replacement

Smoke alarms have a limited life and must be replaced following the smoke alarm manufacturer's instructions, and/or the expiration date listed on the device.

Carbon Monoxide (CO)

**⚠️ DANGER**

Do not use gas cooking appliances for comfort heating. Can lead to carbon monoxide poisoning, which can cause death or serious injury.

**⚠️ WARNING**

The following symptoms are related to carbon monoxide poisoning and should be discussed with all members of the household:

- **Mild Exposure** - Slight headache, nausea, vomiting, fatigue; often described as flu-like symptoms.
- **Medium Exposure** - Severe throbbing headaches, drowsiness, confusion, fast heart rate.
- **Extreme Exposure** - Unconsciousness, convulsions, cardio-respiratory failure, death.

**⚠️ WARNING**

**CARBON MONOXIDE OR SUFFOCATION DANGER EXISTS**

- This is a storage area only and not intended for human or animal occupancy. Failure to follow these instructions could lead to injury or death.
- Do not allow children to enter or to play in or around this storage area.
- This area is not heated or cooled. Do not store perishables or items in this cargo area that may be damaged by heat or by exposure to cold temperatures.

Carbon monoxide (CO) is a poisonous gas that is colorless, odorless and tasteless. Many cases of reported carbon monoxide poisoning indicate, that while victims are aware they are not feeling well, they become so disoriented they are unable to save themselves by either exiting the vehicle or calling for assistance. Due to their physical size, young children and household pets may be the first to show symptoms of carbon monoxide poisoning.

The risk of carbon monoxide poisoning or suffocation exists in any confined space. Do not allow children or pets to play or become entrapped within the storage compartments of your motorhome.

**NOTE:** Know the symptoms of carbon monoxide poisoning. If you or your passengers experience symptoms of carbon monoxide poisoning, seek immediate medical attention:

▪ Dizziness	▪ Intense headache	▪ Sleepiness
▪ Vomiting	▪ Throbbing in the temples	▪ Inability to think coherently
▪ Nausea	▪ Weakness	
▪ Muscular twitching		

## Propane Gas Safety

### **⚠ DANGER**

#### IF YOU SMELL PROPANE GAS

1. Extinguish any open flames and all smoking materials.
2. Shut off the propane supply at the container valve(s) or propane supply connection.
3. Do not touch or operate electrical switches.
4. Open doors and other ventilating openings.
5. Leave the area until the odor clears.
6. Have the propane system checked and leakage source corrected before using again.

Ignition of flammable vapors could lead to a fire or explosion and result in death or serious injury.

### **⚠ DANGER**

Do not use gas cooking appliances for comfort heating. Can lead to carbon monoxide poisoning, which can cause death or serious injury.

### **⚠ DANGER**

All pilot lights, appliances, and their igniters (see operating instructions) shall be turned off before refueling of motor fuel tanks and/or propane containers.

Can cause ignition of flammable vapors, which can lead to a fire or explosion and result in death or serious injury.

### **⚠ WARNING**

THIS PROPANE PIPING SYSTEM IS DESIGNED FOR USE WITH PROPANE ONLY:

- Do not connect natural gas to this system.
- Securely cap inlet when not connected for use.
- After turning on propane, except after normal cylinder replacement, test propane piping and connections to appliances for leakage with soapy water or bubble solution.
- Do not use products that contain ammonia or chlorine to test for leaks. These substances may weaken piping components and cause gas leaks, leading to fire or explosion, which could result in death or serious injury.

### **⚠ WARNING**

Do not fill propane container(s) to more than 80 percent of capacity. A properly filled container contains approximately 80 percent of its volume as liquid propane.

Overfilling the propane container(s) can result in uncontrolled propane flow, which could lead to a fire or explosion and result in death or serious injury.

### **⚠ WARNING**

Gas cooking appliances need fresh air for safe operation.

#### Before operating:

- Open vents or windows slightly or turn on exhaust fan prior to using cooking appliance.
- Gas flames consume oxygen, which should be replaced to ensure proper combustion.
- Improper use can result in death or serious injury.

Warning labels are affixed throughout your motorhome to provide required information on propane safety. Read and follow the instructions listed, and exercise proper precautions when using propane and propane appliances.

Warning labels are located in the cooking area to remind you to provide an adequate supply of fresh air for combustion. Unlike a residential home, the oxygen supply in an RV is limited due to the size of the RV, and proper ventilation must be provided when using gas cooking appliances to help avoid the dangers of asphyxiation.

## Combination Carbon Monoxide/ Propane Alarm

### **⚠ WARNING**

The carbon monoxide/propane (CO/LP) combination alarm installed is intended for use in ordinary indoor locations of recreation vehicles.

Actuation of this alarm indicates the presence of carbon monoxide, which is a toxic gas that is colorless and odorless.

Do not disconnect the combination carbon monoxide/propane alarm from its power source.

Individuals with medical problems may consider using warning devices that provide audible and visual signals for carbon monoxide concentrations under 30 PPM.

This alarm will only indicate the presence of carbon monoxide gas at the sensor. Carbon monoxide gas may be present in other areas.

**⚠ WARNING**

**THE CO/LP COMBINATION DETECTOR OPERATES ON 12 VOLT HOUSE POWER; IT DOES NOT CONTAIN AN INTERNAL BACK-UP BATTERY. IT WILL BE DISABLED WHEN AUXILIARY BATTERIES ARE DISCONNECTED, OR SHORE POWER IS REMOVED, OR IF THE AUXILIARY BATTERY VOLTAGE DROPS BELOW THE OPERATING THRESHOLD VOLTAGE OF THE DETECTOR!**

Your motorhome is equipped with a combination carbon monoxide/propane alarm that is listed for use in recreation vehicles. The combination carbon monoxide/propane alarm will only provide its intended protection if it is maintained in operational condition.



Typical combination carbon monoxide/propane alarm

The combination carbon monoxide/propane alarm is wired directly to the motorhome's 12 volt DC electrical system, with continuous power being supplied by the auxiliary battery. There is not a back-up battery in the combination carbon monoxide/propane alarm. If the auxiliary battery cable is disconnected at the battery terminals, the combination carbon monoxide/propane alarm will not be powered, and therefore, will not function.

This alarm is designed to detect the toxic carbon monoxide gas that results from incomplete combustion, such as those emitted from appliances, furnaces, fireplaces, and auto exhaust, along with propane gas that may be present. A carbon monoxide/propane alarm is NOT A SUBSTITUTE for other combustible gas, fire or smoke detection alarms.

Please note that there are hazards against which carbon monoxide detection may not be effective, such as detection of natural gas and other harmful substances.

Although this alarm is designed to sense the presence of carbon monoxide/propane gas, there are other combustible fumes or vapors that may be detected by the sensor including, but not limited to: acetone, alcohol, butane, and gasoline.

These chemicals can be found in commonly used items such as deodorants, colognes, perfumes, adhesives, lacquer, kerosene, glues, wine, liquor, most cleaning agents, and the propellants of aerosol cans. Be sure to read, understand, and follow the owner's information from the manufacturer of the combination carbon monoxide/propane alarm. This includes information regarding the limited service life of the alarm.

### What to do if the Alarm Sounds

1. Operate the RESET/SILENCE button.
2. Call emergency services (911 in the United States or a local fire department).
3. Immediately move to fresh air (outdoors, or by an open door or window).
4. Do not re-enter the motorhome or move away from the open door or window until the emergency service responders have arrived, the motorhome has been aired out, and the alarm remains in its normal (OFF) condition.

If the alarm reactivates within a 24-hour period, repeat steps 1-through-4 and call a qualified appliance technician to investigate for sources of carbon monoxide and inspect for proper operation of this equipment. Make sure that motorized vehicle(s) and equipment are not, and have not been operating adjacent to the motorhome.

Have all identified problems corrected immediately. Note equipment not inspected by the technician and consult the manufacturer's instructions or contact the manufacturer directly for more information about carbon monoxide safety and this alarm.

### Test

**⚠ WARNING**

**Test the combination carbon monoxide/propane alarm after the motorhome has been in storage, before each trip, and at least once per week during motorhome use.**

**Failure to do so can result in an undetected faulty CO/LP alarm, which could lead to death or serious injury.**

The TEST switch is located on the front of the alarm. Pressing the switch should activate the alarm horn. If the alarm fails to sound, refer to your Owner's Packet for more information from the combination carbon monoxide/propane alarm manufacturer.

### Maintenance

Vacuum the alarm cover at least once a year. Clean the cover by hand using a cloth dampened in clean water. Dry with a soft cloth. Do not spray the front panel of the alarm with cleaning agents or waxes. This action may damage the sensor causing an alarm or cause the alarm to malfunction. Do not paint the face of the alarm.



## Replacement

The combination carbon monoxide/propane alarm has a limited service life and must be replaced following the alarm manufacturer's instructions and/or the expiration date listed on the device.

## Exhaust Fumes and Gases

### **⚠ WARNING**

**Avoid inhaling exhaust gases as they contain carbon monoxide, which is a toxic gas that is colorless and odorless.**

**If you are in a parked motorhome with either the engine running or the generator running there is a potential for exhaust fumes entering the motorhome.**

### TO AVOID BREATHING EXHAUST GASES, FOLLOW THESE PRECAUTIONS:

- Do not run the engine in confined areas, such as an enclosed garage, any longer than needed to move your motorhome in or out of the area.
- The windows should be closed while driving or running the generator (if equipped) to avoid drawing dangerous exhaust gases into the motorhome.
- If you suspect that exhaust fumes are entering the passenger compartment, have the cause determined and corrected as soon as possible.
- If you must drive under these circumstances, close all the windows and adjust the heating or cooling system to draw outside air into the motorhome (set the blower on high speed).
- Ensure the motorhome's ventilation system and the carbon monoxide alarm are properly maintained. Keep the ventilation inlet grill(s) clear of snow, leaves or other obstructions at all times.
- Ensure the motorhome's engine exhaust and the generator's exhaust systems are properly maintained and functional. Repair any damaged exhaust system components immediately.

## Emergency Egress Window

The emergency egress window (exit window) is designed to allow for a quick exit if the main entry door is blocked or becomes unavailable. All egress



Typical emergency egress window exit label

windows have red operational handles or levers. An egress window may be a large sectional window-pane or an entire window unit. It is important you know how to open and operate the egress window(s) in your motorhome before an emergency occurs.

1. Before traveling in your motorhome, review the locations and instruct all occupants on how to operate the egress window(s).
2. When pulling into your campsite, make sure the ground below each egress window is solid and there is a clear escape path directly outside the egress window(s); clear of trees or other obstacles.
3. Plan fire escape routes:
  - Decide who will exit through the egress window(s) first, and in what order.
  - The last person designated to exit the motorhome should be prepared to assist everyone exiting through the window.
  - Exit the motorhome as quickly as possible.
  - Designate a meeting place safely away from the motorhome.

### Lever Latch Operation

Egress windows may have a latch style similar to the illustration below. Larger windows may have two similarly styled latches. To operate:

1. Locate red window latch.
2. Lift and rotate latch to unlock window.
3. With latch completely in the upright position, push window open.



### Swing Latch Operation:

1. Remove window screens or other window obstructions and set aside, well out of the way of the egress window. Screens are removed by rotating the red tab located in the bottom corners of the screen frame.



2. Push the red handle towards the window frame and lift it to release from the latch. Egress window latches vary in style, but all will be clearly marked with an 'Exit' label and be red in color.



3. Rotate the handle until it is perpendicular to the window frame.



4. Push the handle, which opens the window. You may need to push on the window glass to free it from the window seal. Continue to push the handle until it is completely clear of the slot in the window frame.



### Maintenance

Open egress windows at least twice a year and lubricate the seals to keep the seals pliable and prevent sticking.

### Additional Egress Window Information

- When an egress window does not have a screen, it is only intended for use as an egress window and is not intended to be used for ventilation purposes. However, some models may be equipped with a window screen. For your safety, it is important that you do not add a window screen to an egress window if one did not come factory-installed.
- A top hinged exit window having a window screen can be used for ventilation purposes when the motorhome is parked. **DO NOT** open the egress window more than a 45 degree angle, as it is designed to break away from the RV if opened at an angle greater than 45 degrees to allow for emergency exit.
- To avoid window damage, the egress window must be closed tight and locked when the motorhome is traveling.
- Release latch mechanisms will vary, depending on the egress window design. The egress window may be hinged at the top or side, be designed to breakaway, or have a sliding window pane.

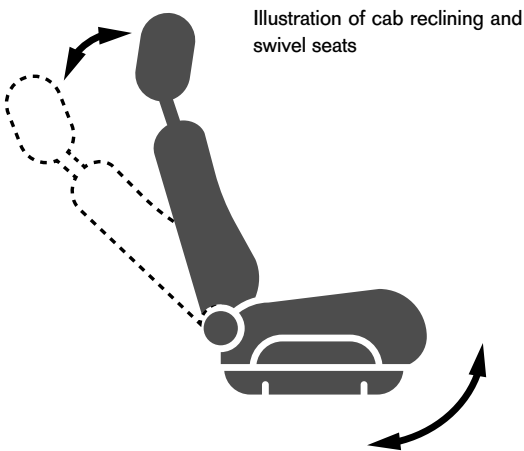
## Driver and Front Passenger Seats

### ⚠️ WARNING

All swivel seats located in the cab of the vehicle (driver and front passenger) must be in the locked, upright and forward-facing position while the vehicle is in motion and seats are occupied.

Driver, front passenger, and all occupants must always wear seat belts while the vehicle is in motion.

Failure to do so can result in serious injury or death.



For comfort and convenience, your motorhome may be equipped with tilt and swivel seats in the cockpit area. These features are designed to only be used when the motorhome is parked. Before travel or moving the motorhome, ensure all front seat backs are returned to an up-right position and swiveled to their forward-facing position.

Select TMC motorhomes include tilt and swivel seating in the coach area (sometimes referred to as barrel chairs). Any adjustable seat that is equipped with seat belts and intended for passenger occupation while the vehicle is in motion, must be returned to an up-right and swivel-locked position before travel.

## Front Air Bags

### ⚠️ WARNING

Your motorhome may be equipped with an air bag restraint system. Follow all air bag instructions provided by the chassis manufacturer, including all warnings regarding the placement and safety of child and infant passengers.

Failure to do so can result in serious injury or death.

If the vehicle is equipped with front passenger air-bags, ensure that the air bag system is appropriately set for the size and weight of the front passenger. Refer to the chassis manufacturer's owner's manual for front air bag operation.

## Seat Belts

### ⚠️ WARNING

- All occupants in this vehicle must be seated at a designated seating position and must wear seat belts at all times while this vehicle is in motion.
- All swivel and/or reclining seats must be returned to their upright, forward-facing and locked position while the vehicle is in motion.
- Seat belts are designed for single occupancy. Do not use a seat belt for more than one person at a time.
- The sleeping accommodations in this vehicle are designed for occupancy only while vehicle is NOT in motion. Do not occupy beds or any other seats that are not equipped with seat belts while the motorhome is in motion.
- Seat belts installed in areas that convert to beds or bunks may fall between cushions or framework. Be sure beds are in their upright seating position and all seat belts are properly and securely placed and available for use before travel.

Failure to do so can result in serious injury or death.

### ⚠️ CAUTION

Seat belts and seats can become hot in a vehicle that has been closed up in sunny and/or hot weather; they could burn the bare skin of a child. Check that seat covers and seat belt buckles are safe to the touch before seating children.

All occupants must be furnished with and use seat belts while the motorhome is in motion. However, it is not intended for all seats to be simultaneously occupied while



Typical seat belt located in dinette seating area

the vehicle is in motion without regard to the total loaded weight of your motorhome.

The sleeping accommodations in your motorhome are designed for occupancy only while the vehicle is parked. Never allow passengers to lie down while the motorhome is in motion. They would not be properly restrained in the event of a traffic accident or sudden vehicular movement, such as swerving to avoid a road hazard.

## Operation

Driver and front passenger seats must be locked in a forward facing position with seat belts fastened while the motorhome is in motion. Avoid seat rotation while in transit.

### USING SEAT BELTS

- Insert the belt tongue into the proper buckle (the buckle closest to the direction the tongue is coming from) until you hear a snap and feel it latch. Make sure the tongue is securely fastened in the buckle.
- Adjust the belt to the proper position; snug and as low as possible around the hips; not around the waist.
- To unfasten, push the release button and remove the tongue from the buckle.

## Inspection and Replacement

### **⚠ WARNING**

Failure to inspect and if necessary, replace damaged seat belts could result in severe personal injuries in the event of a collision.

If seat belt replacement is necessary, ensure mounting and fastening devices are torqued to manufacturer's specifications.

Inspect the seat belts in your motorhome periodically to make sure they work properly and are not damaged; make sure there are no nicks, tears, or cuts in the belt material. Replace the motorhome seat belts as necessary. A qualified service technician should inspect all seat belt assemblies after a collision. TMC recommends that all seat belt assemblies used in vehicles involved in a collision be replaced.

## Child Safety Restraint System

### **⚠ DANGER**

Never allow a passenger to hold a child on his or her lap while the motorhome is moving. You are required by law to use safety restraints for children in the United States and Canada.

If small children (generally children who are four years old or younger, and weigh 40 lbs. (18 kg.) or less) ride in your motorhome you must put them in safety seats made especially for children.

Rear-facing child seats or infant carriers should never be placed in the front seats of the motorhome.

### **⚠ WARNING**

- Improper installation or failure to properly secure a child restraint can lead to failure of the restraint. The child could be severely injured or killed.
- Follow the child restraint manufacturer's directions exactly when installing an infant or child restraint.
- Never place a child safety restraint in front of an air bag. A deploying passenger front air bag can cause death or serious injury to a child 12 years or younger, including a child in a rear-facing child restraint.
- Never install a child safety restraint in the front seat of a vehicle. Only use child safety restraints in the rear seats. If the vehicle does not have a rear seat that includes a safety restraint belt or anchor that enables securing a child safety seat, do not transport children requiring child safety restraints in that vehicle.
- To ensure proper safety belt fit, always use booster seats for children who are size and age appropriate. Refer to the vehicle manufacturer's safety information or governmental safety regulations for child sizing charts.
- Always follow the vehicle manufacturer's safety instructions, along with state and federal regulations regarding transporting children and small adults.

If your child requires a child safety restraint system (seat), TMC recommends installing the child safety seat in the forward facing booth dinette position. If your motorhome is not equipped with a forward facing booth dinette seat equipped with seat belts, small



Child Safety Seat Anchor

children that require a child seat should not be transported in your motorhome. For rear-facing child seats and infant carriers, the dinette table can be placed in the DOWN position to allow adequate room for the rear-facing child seat.

**Always follow the instructions and warnings that are included with any infant or child safety restraint system:**

- If the child is the proper size, restrain the child in a safety seat. Children who are too large for child safety seats (as specified by your child safety seat manufacturer) should always wear seat belts.
- If the shoulder belt portion of a combination lap and shoulder belt can be positioned so it does not cross or rest in front of the child's face or neck, the child should wear the lap and shoulder belt.
- Never use pillows, books, or other objects to boost a child, passenger, or pet.

**NOTE:** Check with your local and state or provincial laws for specific requirements regarding the safe transport of children in your motorhome.

For additional information, refer to <http://www.nhtsa.gov/parents-and-caregivers>

or, call 1-888-327-4236.

In Canada, refer to Transport Canada's website:

<https://tc.canada.ca/en/road-transportation/child-car-seat-safety>

## Transporting Pets

Air bags deploying in the front seat could harm your pet. An unrestrained pet will be thrown about and possibly injured, or injure a passenger during panic braking or in a collision.

Pets should be restrained in the rear seat (if equipped) in pet harnesses or pet carriers that are secured by seat belts.

## Safely Driving the Motorhome

- Always operate the motorhome at a safe speed, which in some conditions may be less than the posted speed limit.
- All passengers must wear safety belts.
  - a. Passengers can dramatically reduce their risk of being killed or seriously injured in a crash by wearing their safety belts.
  - b. Drivers should be responsible for ensuring all passengers are properly using safety belts.
  - c. Never transport more passengers that there are available safety belts installed in the motorhome.
  - d. Ensure infants and children are properly secured in age-and-weight appropriate safety restraints.
  - e. Secure pets in harnesses or other appropriate safety restraints.
- Drivers must be well-rested, alert and maintain a safe speed for weather and road conditions.
- Drivers should keep their eyes on the road and hands on the steering wheel.
- Drivers should not allow themselves to become distracted while operating the motorhome. If something other than operating the vehicle requires driver attention, safely pull off to the side of the road and attend to the situation.
- Drivers must be especially cautious on curved roads and maintain a safe speed to avoid running off the road or losing control of the motorhome.
- If the vehicle's wheels proceed off the roadway, gradually reduce speed and steer back onto the roadway when it is safe to do so. Avoid abrupt maneuvers to return the vehicle to the roadway.
- Your vehicle may be equipped with advanced driver assist technologies. Remember that even advanced technology cannot overcome the laws of physics. It's always possible to lose control of a vehicle due to inappropriate driver input for the conditions.
- In the event of a flat tire or tread separation, gradually slow down the vehicle, steer to the side of the road while avoiding abrupt maneuvers.
- In that motorhomes are substantially longer, wider and heavier than cars, they:
  - a. require more space and additional reliance on the side-view mirrors for changing lanes, turning corners, and making parking maneuvers;
  - b. require additional braking time and distance;
  - c. do not respond as quickly to abrupt steering inputs;
  - d. are affected by strong winds, which in some conditions, can make driving the motorhome difficult;
  - e. have a higher center-of-gravity, which affects the vehicle's handling characteristics.
- Ensure all drivers and co-drivers are practiced with the unique driving and handling characteristics of the motorhome.
- Backing the motorhome can present unique challenges and hazards. Use mirrors, back-up cameras and when necessary, a spotter (person outside the motorhome) to ensure safe vehicle movement.
- Always carry up-to-date and correct paperwork such as valid vehicle registration and proof of insurance, valid driver's license, etc.
- Do not exceed the vehicle weight limits or axle weight limits specified on the Federal Weight Label (see Section 6). Exceeding vehicle weight ratings could result in serious damage to the vehicle, loss of vehicle control, and increases the risk of vehicle rollover and personal injury.
- Towing trailers beyond the maximum recommended gross towing capacity of this vehicle and its towing hitch could result in a loss of vehicle control, vehicle damage, rollover, and personal injury. Refer to Section 6 of this manual and the chassis manufacturer's owner's manual for important towing information.

**NOTE:** Some states require a Commercial Driver's License, or CDL, depending on the weight and/or length of the motorhome. Please check with your Bureau of Motor Vehicles to ensure you have the proper endorsements on your driver's license.

## Emergency Stopping

If an emergency requires you to stop along the highway, follow these guidelines:

1. Pull off the road as far as possible.
2. Put the motorhome's transmission in the PARK position (neutral for diesel pushers) and apply the PARKING BRAKE.
3. Turn ON the hazard warning flashers.
4. Use three red warning indicators such as flares, reflectors, or lanterns as required by the Uniform Vehicle Code and Model Traffic Ordinance as follows:
  - a. Place the first warning indicator on the traffic side of the motorhome, directed toward traffic approaching the rear of the motorhome, approximately 10 feet from the rear bumper.
  - b. Place the second warning indicator 100 feet behind the motorhome, in the center of the lane or shoulder occupied by the motorhome, and directed toward traffic approaching the rear of the motorhome.
  - c. Place the third warning indicator 100 feet in front of the motorhome, in the center of the lane or shoulder occupied by the motorhome, and directed towards the traffic approaching the front of the motorhome.
  - d. If stopped within 500 feet of a curve, crest of a hill, or other obstruction to view, place a warning indicator in the direction of the obstruction (front and/or back of the motorhome), at a distance of 100 feet to 500 feet from the stopped motorhome so as to afford ample warning to traffic approaching the motorhome.
5. Always stand off the road, out and away from of the lanes of traffic.

**NOTE:** Curves and/or hills may affect the safe placement of warning indicators, such as safety reflectors, cones, flares, etc. Extinguish flares before leaving the emergency parking site.

Reference: Emergency signals, stopped commercial motor vehicles; Code of Federal Regulations: Title 49, Subtitle B, Chapter III, Subchapter B, Part 392, Subpart C, 392.22.

**NOTE:** Along with other emergency equipment (reflectors, first-aid kit, etc.), it is good safety practice to carry a reflective safety vest and wear it anytime you are outside of your motorhome while stopped or parked along a road or highway.

## 3

### Laws of the Road

It is advisable to contact the Department of Motor Vehicles in each respective state for up-to-date information regarding operation and licensing requirements for your motorhome and its drivers/operators.

The State of California requires operators of motorhomes over 40 feet in length to obtain a non-commercial class B license. California has also enacted legislation limiting use of motorhomes in excess of 40 feet, to approved roadways. Other states or provinces may have driver/operator restrictions and/or regulations pertaining to motorhome operation.

You may contact Caltrans at:

[www.dot.ca.gov](http://www.dot.ca.gov)

or, by calling:

**916-654-5741** for current information regarding California statutes.

## Mirrors and Vision Systems

For safe driving and maneuvering, both on and off the highway, it is imperative that the motorhome driver/operator becomes proficient with using mirrors and vision systems. Vision aids for motorhomes vary, due in part to the variety of motorhome classes and sizes. Optional equipment and driver preferences are also factors that determine the type of vision aids equipped on motorhomes.

### Mirrors

The mirrors on your motorhome should always be kept in adjustment and good working order. Although some mirrors have motorized adjustments, most mirrors also have provisions for manual adjustments.

### Mirror Features

The mirrors installed on your motorhome may include some or all of these features:

- **Side View Camera:** If your mirrors are equipped with side-view cameras, the left-side or right-side camera will automatically turn on with the application of the left or right turn signals. View the camera in the dash monitor (radio screen) to help aid with maneuvering the motorhome around the turn. When the turn signals cancel, the dash monitor will revert to the previous screen.
- **Blind-spot Indicator:** Your motorhome mirrors may be equipped with blind-spot indicators. If so, a symbol in the mirror surface will appear whenever a vehicle or object is along the side of the motorhome, out of the normal view of the mirrors. The indicator will turn off when the vehicle or object has moved out of the blind-spot zone.
- **Heated Mirrors:** Your motorhome mirrors may have built-in heating elements that will keep your mirrors free of ice and snow. A switch located on the dash controls mirror heaters.
- **The convex portion** of the mirror allows for a good side view of the motorhome and is used to detect cars or obstacles along the side of the motorhome. Note that convex mirrors affect visual perspective.

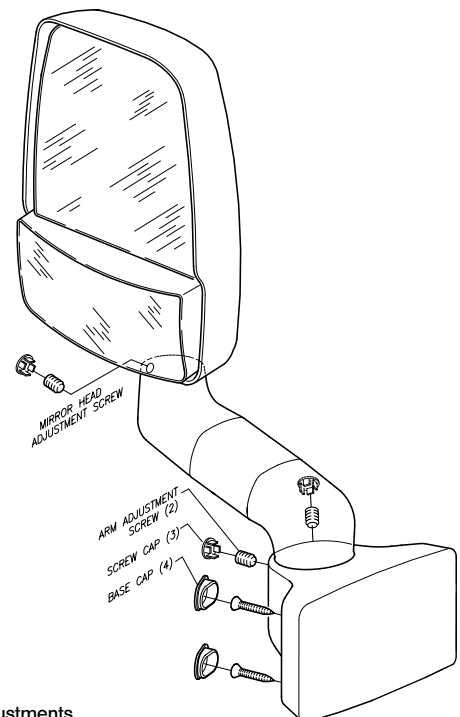
### Mirror Adjustments

It is usually best to enlist the help of someone stationed outside the motorhome to aid with mirror positioning.

1. Locate the adjustment screws on the mirror head and arm and obtain the correct size wrench or screwdriver for the adjustment screws.



Mirrors are a vital component of safe motorhome operation. Convex mirror and side-view camera illustrated below.



Typical mirror adjustments



2. Loosen the adjustment screws to where the mirror will move with slight force, but not so loose that the mirror will not hold position.
3. Sit in the driver's seat and adjust the seat for your normal driving position.
4. Look out the side windows at both the left and right mirrors and ask your helper to adjust the mirrors so that you can slightly see the side of the motorhome, while maintaining a good rearward view without needing to move your upper body.
5. Tighten the setscrews and check the mirrors again to ensure the mirrors held their position.

### Vision Systems

Your TMC motorhome may be equipped with a rear and/or side vision system. If equipped, the installation includes a rear-view camera mounted along the top of the motorhome's rear valance and an in-dash camera monitor (usually the dash radio screen). Some installations will also include side-view cameras. Camera signals are fed to the dash radio/camera monitor and appear when the gear selector is placed in reverse, or for side-view cameras, actuated by the turn signals. Some Class C installations include a camera monitor in the cab rear-view mirror.

#### TO OPERATE

1. For the camera monitor to function, the dash radio must be ON. It is powered by the auxiliary battery(ies), therefore, the Master Battery Disconnect Switch must also be ON. It is normal to keep the Master Battery Disconnect Switch in the ON position while traveling. Doing so also allows the vehicle's charging system to charge the auxiliary battery(ies) while the engine is running.
2. When the gear selector is placed in REVERSE, the radio display automatically changes to the rear-view camera monitor, allowing for a rearward view via the camera and monitor system.
3. When the gear selector is moved out of REVERSE, the camera will automatically turn off and the radio display will revert to the previous screen.

#### Vision System Prep Only

If your motorhome is not equipped with an electronic vision system, it may be pre-wired for it. Please contact your selling dealership for assistance in locating the vision system installation wires placed in your motorhome.



Typical dash radio with camera monitor



Typical rear vision camera

### Clearance and Side Marker Lights

For vehicle safety and visibility on the highway, clearance and side marker lights are installed on your motorhome. The location and color of marker lights are regulated by Federal law and must comply with all applicable requirements prescribed for it by FMVSS/CMVSS 108. Please maintain your motorhome's clearance and side marker lights as described in this reference:

[one.nhtsa.gov/cars/rules/standards/conspicuity/TBMpstr.html](http://one.nhtsa.gov/cars/rules/standards/conspicuity/TBMpstr.html)

## Chemical Sensitivity

### **⚠ WARNING**

**Operating, servicing and maintaining a passenger vehicle or off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle.**

**For more information go to: [www.P65Warnings.ca.gov/passenger-vehicle](http://www.P65Warnings.ca.gov/passenger-vehicle)**

Required chemical sensitivity safety label

When your new motorhome, and for some time afterward, has been closed up for an extended time period, you may notice a strong odor associated with chemical off-gassing (or out-gassing). This is not a defect in your motorhome. There are many materials and products used in the construction of recreational vehicles, such as carpet, linoleum, plywood, insulation, paint, and upholstery, which when new or when exposed to elevated temperatures and/or humidity, may off-gas chemicals, including formaldehyde. Off-gassing, may cause irritation of the eyes, nose, and throat and sometimes headache, nausea, and a variety of asthma-like symptoms. Elderly people and young children, as well as anyone with a history of asthma, allergies, or lung problems, may be more susceptible to the effects of off-gassing.

**NOTE:** Chemical off-gassing is not a defect in your motorhome and is not covered by the Thor Motor Coach Limited Warranty or the Thor Motor Coach Structural and Lamination Limited Warranty.

## Formaldehyde

Most of the attention regarding chemical off-gassing surrounds formaldehyde. Formaldehyde is a naturally occurring substance and is also a key industrial chemical used in the manufacture of the numerous materials and products used in the construction of recreational vehicles. Trace levels of formaldehyde are also released from smoking, cooking, use of soaps and detergents, such as carpet shampoos, cosmetics, and many other household items. Some people are very sensitive to formaldehyde, while others may not experience a reaction to the same level of chemical exposure. For the materials used in the construction of your motorhome, amounts of off-gassed formaldehyde decrease over time.

### CALIFORNIA 93120 PHASE 2 FORMALDEHYDE COMPLIANCE

Your motorhome may be compliant to California Formaldehyde Phase 2 codes. If so, it will be labeled with a compliance identification tag similar to the illustration below. If you have questions or concerns regarding formaldehyde and your motorhome, please contact Thor Motor Coach Customer Care:

**877-855-2867**

### Smoking and Medical Advice

TMC recommends that you do not smoke inside your motorhome. In addition to causing damage to your motorhome, tobacco smoke releases formaldehyde and other toxic chemicals.

If you have any questions regarding chemical sensitivity, consult with your physician or local health services provider.

**Vehicle Manufactured By:** THOR MOTOR COACH

**V.I.N.:** XXXXXXXXXXXXXXXX

**Date of Manufacture:** XX/XXX

**Serial Number:** XXXXXXXXXXXXXXXX

**California 93120 Phase 2 Compliant for Formaldehyde  
TSCA Title VI Compliant**

Typical California Formaldehyde Compliance Label

## Ventilation

To reduce exposure to chemicals from off-gassing, it is of utmost importance that you ventilate your motorhome. Chemical off-gassing is accelerated by heat and humidity, therefore, ventilation should occur frequently after purchase and at times when the temperatures and humidity are elevated. Keeping the motorhome tightly closed has the potential of increasing the formaldehyde level of the interior atmosphere. Ventilate the motorhome by opening windows, exhaust vents, and doors. Operating ceiling fans and vents, air conditioners, and the furnace will help dry the air and exchange the interior air with fresh outdoor air. Also, follow the recommendations regarding how to avoid condensation problems contained in Section 14. Many of the recommendations listed there will assist in avoiding exposure to off-gassed chemicals.

## Mold

Molds are microscopic organisms that naturally occur in virtually every environment, both indoors and out. Outdoors, mold growth is important in the decomposition of plants. Indoors, mold growth is unfavorable. Left unchecked, molds break down natural materials, such as wood products and fabrics. According to the Center for Disease Control, exposure to damp and moldy environments may cause a variety of health issues. Some people are sensitive to molds. For these people, molds can cause nasal stuffiness, throat irritation, coughing or wheezing, eye irritation, or skin irritation. People with mold allergies may have more severe reactions. Immune-compromised people and those with chronic lung illnesses may develop serious infections in their lungs when they are exposed to molds.

For mold growth to occur, temperatures must be between 40 degrees and 100 degrees Fahrenheit and there must also be a source of moisture, such as humidity in the air, standing water, damp materials, etc. Indoors, the most rapid mold growth occurs when warm and humid conditions exist.

**NOTE:** If using a dehumidifier, please read and follow all manufacturer instructions and recommendations for the use, cleaning, and maintenance of the dehumidifier.

## Inhibiting Mold Growth

By controlling relative humidity, the growth of mold and mildew can be inhibited. In warm climates, use of the air conditioner will reduce the relative humidity of the interior air. Opening vents that are located in bathing and cooking areas is advised during food preparation and bathing, even during cool or cold weather. Additionally, opening a window during these activities will assist in ventilation. In extremely humid conditions, the use of a dehumidifier (customer supplied) can be helpful.

Frequent cleaning of your motorhome is an important preventive measure. Spills should be wiped up quickly and dried as soon as possible. Avoid leaving damp items lying about. On surfaces, use mold or mildew killing cleaning products (test cleaning product to ensure it will not damage surfaces). Check window, door, and joint seals regularly and repair or reseal when necessary to avoid water intrusion. Proper regular and preventive maintenance to the motorhome and its accessories will help prevent the formation of molds.

**NOTE:** For more information about controlling moisture in your motorhome, refer to Section 14, Condensation.

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# Fuel Systems

## Fuel System Safety

### **⚠ DANGER**

Potentially explosive fuel vapor may be present at fuel filling stations and during refueling of equipment with the fuel transfer system.

Never enter a fuel filling station or refuel equipment if your furnace or water heater is operating or if your refrigerator is operating on propane. Both the flame and the igniters in the burners of these appliances are sources of ignition, and could cause an explosion.

These appliances must be turned OFF before entering a fuel filling station or refueling equipment. Turning OFF the propane main tank valve only is not sufficient. The appliances must be OFF at their electrical operating switches.

### **⚠ DANGER**

#### NO SMOKING

Before dispensing fuel into fuel tanks and propane tanks, turn OFF all engines, fuel-burning appliances, and their igniters (see operating instructions).

Do not dispense fuel within 20 feet (6.1 meters) of an ignition source.

Can cause ignition of flammable vapors, which can lead to a fire or explosion and result in death or serious injury.

### **⚠ WARNING**

Flammable clean up materials should be temporarily stored in a nonflammable, vapor-tight container until proper disposal facilities are available. Do not store flammable clean up rags or materials inside the motorhome, inside any other vehicle or near any source of flame or ignition.

### **NOTICE**

Depending upon model and chassis, TMC Class A and Class C Motorhomes may be equipped with either gasoline or diesel-fueled engines. Always be sure to fuel your motorhome with the correct petroleum products.

Be extremely careful when fueling your motorhome. Always shut OFF the engine, do not smoke, do not use cellular phones, and shut OFF all pilot lights before adding fuel. Fuel spills represent a serious fire hazard, and should be cleaned up immediately. Never restart the engine or relight pilot lights while fuel vapor is present.

In cold weather conditions or when your motorhome has not been used for a while, a fuel additive (customer supplied) may be needed. Refer to the chassis manufacturers recommendations for fuel additives.

## Fuel Cap

If you should lose your fuel cap it should be replaced as soon as possible with a cap of the same size and type. Always remove the fuel cap slowly and pay close attention to the fuel recommendations outlined in the Chassis Packet.

## Fuel Pump Collision Shut-Off Switch (if equipped)

If your motorhome is involved in a collision, an inertia switch in the fuel pump circuit may open, shutting down the flow of fuel to the engine. This is a safety feature designed to reduce fuel spillage resulting from an accident or collision. When this inertia switch has been activated, it is necessary to manually reset it before the motorhome can be restarted and moved. Review your Chassis Packet information for the location of the switch and instructions for resetting.

## Fuel Transfer System (if equipped)

### **⚠ DANGER**

**Any motorized equipment powered with flammable liquid can cause fire and explosion or asphyxiation if stored or transported inside the garage. To reduce the risk of fire, explosion, or asphyxiation:**

1. **Do not allow passengers to ride inside the storage area at any time.**
2. **Prior to storing vehicles in the garage, run fuel out of the engine after shutting OFF fuel at the vehicle fuel tank.**
3. **Do not store or transport any motor fuel inside the garage.**
4. **Ventilate the interior of the garage to reduce the risk of fire, explosion or asphyxiation. Open the ventilation panels on either side of the cargo area.**
5. **Do not operate propane appliances, pilot lights, or electrical equipment when motorized vehicles or motorized equipment are inside the garage. Set the cargo electrical disconnect switch to OFF.**

### **⚠ WARNING**

**Follow all safety label instructions when using the fuel transfer system of your motorhome.**

**Always use the grounding wire when fueling vehicles and equipment from the on-board fuel transfer system.**

**Using the metal clip, attach the grounding wire to the metal chassis or frame of the vehicle or equipment BEFORE fueling. Doing so will reduce the possibility of a spark which can be caused by static electricity between the motorhome and the vehicle or equipment being fueled.**

**Failure to follow safe fuel transfer practices could result in fire or severe bodily harm.**

Included on TMC Class A Outlaw models, a fuel transfer system allows you to transport a supply of gasoline for use in motorcycles, snowmobiles, ATVs, or other vehicles and equipment. A fuel pump switch is located inside an external access panel, along with a fuel gauge. A grounding wire with a metal clip is supplied and should always be used to reduce the possibility of static electricity discharge between the fuel station and the equipment being fueled.

#### THE FUEL TRANSFER SYSTEM CONSISTS OF:

- Fuel tank
- Fuel tank filling port
- Fuel transfer pump
- Fuel hose and nozzle
- Fuel pump switch and fuel gauge
- Grounding wire and clip

Static electricity-related incidents when refueling are possible. They can happen most often during cool or cold and dry climate conditions. Static related incidents have resulted in a brief flash fire occurring at the fill point, when the nozzle contacts the fuel tank being filled. A build-up of static electricity can also be caused by re-entering a vehicle during fueling. If you return to the fuel fill pump during refueling, the static may discharge at the fill point, causing a flash fire or sustained fire with fuel vapors.

#### MINIMIZE POTENTIAL FUELING HAZARDS BY FOLLOWING SAFE REFUELING PROCEDURES:

- Turn OFF vehicle engine. Disable or turn OFF any auxiliary sources of ignition: the furnace, water heater, stove, oven, and any pilot lights, etc. Turn OFF the main propane valve.
- Do not smoke, light matches or lighters while operating the refueling system, or when near fuel tanks or containers.
- Before dispensing fuel, always connect the grounding wire between the motorhome and the vehicle or equipment being fueled.
- Never jam or otherwise try to lock open the refueling latch on the fuel fill nozzle.
- Do not re-enter your motorhome during refueling. If you cannot avoid re-entering your vehicle, discharge any static build-up BEFORE reaching for the nozzle, by touching something metal with a bare hand, such as the vehicle body or frame that is located away from the fuel nozzle.
- In the event a static-caused fire occurs when refueling, leave the nozzle in the fill pipe and back away from the vehicle. Turn OFF the fuel pump master switch immediately.
- To avoid fuel spillage, do not over-fill or top-off your vehicle tank.
- Avoid prolonged breathing of gasoline vapors. Never refuel in an enclosed space or building.
- Keep your face away from the fuel nozzle and fuel container opening.
- Never siphon fuel by mouth. Never put fuel in your mouth for any reason. Fuel can be harmful or fatal if swallowed. If someone swallows fuel, do not induce vomiting. Contact an emergency medical service provider immediately.
- Avoid fuel contact with your eyes and skin.

- Remove fuel-soaked clothing immediately.
- Never use gasoline or diesel fuel as a cleaning solvent.

## Fuel Transfer System Operation

### TO FILL THE FUEL TRANSFER SYSTEM TANK

1. Remove the fuel filler cap and fill the tank with the grade and type of fuel required by your equipment.
2. Replace the fuel cap when fueling is complete. When replacing the fuel fill cap, be sure it seats squarely and turn it firmly to lock it on the fill pipe neck.

### TO TRANSFER FUEL TO ANOTHER VEHICLE

**IMPORTANT!** There is a safety lock-out switch installed on the Shore Cord Compartment that prevents the fuel transfer pump from operating if this compartment door is open. The Shore Cord Compartment Door must be closed before using the fuel transfer system.

1. Ensure the fuel stored in the Fuel Transfer System is compatible with the vehicle being fueled.
2. Ensure the Master Battery Disconnect Switch is ON.
3. Connect the ground wire from the motorhome to the vehicle being fueled. The clip must connect to a metal device of the vehicle being fueled, such as the frame.
4. Turn ON the fuel transfer pump switch. **NOTE:** One Press of the switch turns the pump ON; two presses of the switch turns the pump OFF.
5. Uncap the fuel tank cap on the vehicle being fueled and place the fuel nozzle into the fuel tank port.
6. Squeeze the handle on the fuel nozzle to dispense fuel. Be careful not to overfill or spill fuel on either the vehicle or ground.
7. Release the fuel dispensing handle when fueling is complete.
8. Replace the fuel hose and nozzle into its storage bay.
9. Turn OFF the fuel transfer pump switch by pressing twice on the switch.
10. Unclip the ground wire and place it in the storage bay.



Fuel Transfer System available on Class A toy hauler motorhomes



Fuel Tank Inlet for Fuel Transfer System



Fuel Pump Safety Lock-out Switch



Fuel Pump Switch and Fuel Gauge for Fuel Transfer System

## FUEL SYSTEM

### EMERGENCY SHUT-OFF SWITCH

If the fuel dispensing nozzle becomes stuck or jammed in the ON position, quickly turn off the fuel pump by pressing TWICE on the pump switch.

**INSPECT THE FUEL TRANSFER SYSTEM REGULARLY FOR LEAKS, CRACKS IN HOSES, DAMAGED FITTINGS, ETC. MAKE ALL NECESSARY REPAIRS IMMEDIATELY. DO NOT USE THE FUEL DISPENSING SYSTEM UNTIL NEEDED REPAIRS ARE COMPLETE AND THE SYSTEM IS SAFE TO USE.**

# 4

### NOTES:

- As of this writing, the capacity of the Fuel Transfer System's fuel tank is 28 gallons. Specification subject to change.
- The fuel pump switch also activates the fuel gauge for the Fuel Transfer System's fuel tank.



# Tires and Wheels

## Tire Safety

### **⚠ DANGER**

**Failure to follow proper inflation guidelines may result in tire failure, which under certain circumstances, can cause loss of vehicle control or accidents that may result in property damage, bodily injury, and/or death.**

### **⚠ WARNING**

**Check tire pressure at the beginning of each trip and frequently throughout the trip to obtain the maximum performance and life from the tires. Follow the instructions listed on the Federal Certification label, located inside your motorhome, to determine the correct tire pressures.**

Read and follow the safety instructions listed below before traveling in your motorhome:

- Proper care and maintenance of your motorhome's tires is essential to the safe operation of your motorhome.
- You must follow the tire inflation guidelines, located on the Federal Weight Label, for maximum load capacity (see Section 6).
- Under-inflation of tires is just as dangerous as over-inflation.
- To insure your motorhome tires are operating at their peak performance and safety, regular inspection of your tires and checking tire pressures is absolutely mandatory.
- Examine your motorhome tires frequently for unusual wear. Wheel alignment, tire balance and bearing wear will affect tire wear. Inspect tires for cracking, bulging, uneven tread wear, etc.



Always be attentive to the condition of your motorhome's tires

When traveling in your motorhome, check the inflation pressure of each tire at least weekly to insure maximum tire performance, and travel wear. Tire pressure should only be checked when the tires are cold. When the motorhome is underway, tires heat up and the air pressure inside the tire increases.

NOTE: NHTSA's tire rating listings are located on-line at: [www.safercar.gov/Vehicle-Shoppers/Tires-Rating](http://www.safercar.gov/Vehicle-Shoppers/Tires-Rating)

NHTSA also has more tire information located on-line at: [www.safercar.gov/tires/index.html](http://www.safercar.gov/tires/index.html)

5

## Tire Inflation

Your tires and wheels support the entire weight of your motorhome and its contents. The tires are also the only contact your motorhome has with the road surface. Determining and maintaining proper inflation is the most important factor in maximizing the life of your tires.

Driving on a tire that does not have the correct inflation pressure for the vehicle load is dangerous and may cause premature wear, tire damage, tread de-lamination and/or loss of control of your motorhome. Avoid premature tire damage by keeping tires properly inflated.



Tire pressure under and/or over inflation can cause serious tire failure

### FIND YOUR PSI:

PSI (pounds force per square inch) is a measure of air pressure used to correctly inflate your tires. The correct PSI listing for your tires is located on your motorhome's Federal Weight Label (see Section 6). KPa (kilopascals) is another commonly used air pressure measurement (1 PSI=6.894 kPa).

### CHECK IT MONTHLY:







At least once a month, check all tire pressures (including the spare tire) using an accurate pressure gauge. You cannot determine if your tires are over-inflated or under-inflated by visual inspection only.

Your vehicle may include a Tire Pressure Monitoring System (TPMS), but this is NOT a substitute for manually checking tire pressure. See the chassis manufacturer’s owner’s manual for additional information.

**NOTE:** Check and adjust tire pressure when tires are cold. You cannot determine over or under tire inflation by visual inspection alone. Check pressures with an accurate tire pressure gauge.

5

## Common Tire Wear Patterns

IF YOUR FRONT TIRES LOOK LIKE THIS						
TIRE PATTERN	TOE	CAMBER	CENTER	EDGE	CUPPING	PATCHY
COMMON CAUSE	VEHICLE WHEEL ALIGNMENT	VEHICLE WHEEL ALIGNMENT	TIRE OVER INFLATION	TIRE UNDER INFLATION	VEHICLE WORN SUSPENSION	TIRE OUT OF BALANCE

**NOTE:** The use of tire traction devices (snow chains) may either be prohibited or required in certain travel regions and/or weather conditions. Always check with the state’s Department of Transportation for vehicle operating guidelines and regulations.

## Wheel Alignment

**NOTICE**

The front suspension and steering system of this motorhome was factory aligned prior to it being dispatched to the dealership. The alignment is however, greatly affected by the way the unit is loaded prior to travel. This loading includes how much cargo, water, and LP are carried as well as the distribution of said cargo.

Thor Motor Coach advises to have the alignment checked in the fully loaded condition (the way you would normally load the unit to travel). Not having the alignment checked and reset can result in abnormal tire wear.

It is very important to maintain proper wheel alignment for your motorhome. Improper wheel alignment not only contributes to premature tire wear, but also severely affects vehicle handling. Keeping your motorhome’s front wheels in alignment is part of a normal maintenance routine. Please follow the recommendations listed in the notice above and on the corresponding label affixed to your motorhome.

Toe-in and toe-out (only) are inspected by TMC prior to shipment to your selling dealer.

## Tire Replacement

### **⚠ WARNING**

**Failure to replace damaged tires with tires of the same size, type, traction, and load rating than the originally equipped tires can significantly affect the weight carrying capacity, handling, and safety of your motorhome.**

**Ensure the spare tire is the same size and specifications listed on your motorhomes Federal Weight Label.**

Tires degrade over time depending on many factors such as weather, storage conditions, and conditions of use (load, speed, inflation pressure, etc.) experienced throughout the life of the tires. In general, tires should be replaced after six years regardless of tread wear. Heat caused by hot climates or frequent high-loading conditions can accelerate the aging process and may make it necessary to replace tires more frequently. Due to aging, you should replace the spare tire when you replace the road tires, even if it has never been used.

All tires should be replaced with the same size, type, load rating, traction, and temperature rating (or better) than the original equipped tires. Tire specifications are listed on the motorhome's Federal Weight Label (Section 6) or found within the chassis manufacturer's owner's manual.

The load index per tire configured as dual wheel is less than a single tire to provide a margin of safety for the load-carrying capacity of the tire in the event that one of the dual tires is punctured or otherwise fails.

**NOTE:** The tires supplied on your Class C and some Class A motorhomes carry a "Light Truck" rating.

Installing replacement tires with a higher limit than that of the originals does not increase the payload capacity of the motorhome. Refer to the chassis manufacturer's owner's manual for additional information.

## Lug Nut Torque

### **⚠ CAUTION**

**As part of your pre-travel check-list, always check lug nut torque with a properly calibrated torque wrench. Torque lug nuts to the vehicle manufacturer's specifications.**

**Always properly torque lug nuts as part of a tire changing procedure.**

Ensuring wheel mounting nuts (lug nuts) on the wheels are tight and properly torqued is a vitally important responsibility for safe motorhome travel. Inadequate and/or inappropriate wheel nut torque (tightness) is a major reason that lug nuts loosen or fail in service. Loose lug nuts can rapidly lead to a wheel separation with potentially serious safety consequences.

Refer to the chassis manufacturer's information for proper lug-nut torque and tightening sequence.

## Changing a Damaged Tire

### **⚠ WARNING**

**The motorhome is a very heavy vehicle. Raising the motorhome to replace the spare tire should only be done with extreme caution by a qualified technician and with the proper tools. The vehicle could slip, causing personal injury or death. DO NOT ATTEMPT TO DO THIS YOURSELF. ALWAYS CALL FOR ROADSIDE ASSISTANCE TO JACK YOUR MOTORHOME AND TO CHANGE DAMAGED TIRES.**

**Do not use the leveling jack system to support the motorhome while under the vehicle or changing tires. The leveling system is not designed to support the entire weight of the motorhome. Do not use the leveling jack system as a jack or in conjunction with a jack. If a tire change is required, it is highly recommended the work be performed by a knowledgeable and trained professional. Attempts to change a tire while supporting the motorhome with the leveling jack system could result in damage to the motorhome and risk causing serious injury or death.**

If you experience a flat tire while driving your motorhome:

- Gradually decrease your vehicle speed; braking lightly if possible.
- Hold the steering wheel firmly and direct the motorhome to a safe place along the side of the road.
- Once safely parked, place warning markers as described in Section 3, Emergency Stopping.
- Contact a road service provider, a qualified RV service repair center, or call 911 (in the U.S.) for assistance.
- To avoid personal injury, do not attempt to change a spare tire or jack the motorhome yourself. This is why a jack handle has not been included with your motorhome.

Make sure the road service technician reads and is familiar with the Chassis Packet tire changing information. Make sure the wheel nuts have been tightened to the proper torque as outlined by the chassis manufacturer.

## Tire Identification Information

To maintain the load capacity of your motorhome, it is vitally important to replace worn or damaged tires with tires with ratings equal to or higher than what was originally equipped on your vehicle. The illustration below describes important tire information that is embossed on every tire by the manufacturer.

The Load Index may be indicated with two numbers separated with a forward slash. The first number is the load index of the tire configured as a single tire on a single

wheel. The second number indicates the load index of the tire as a dual-wheel configuration. Multiplying the second number by 2 will give you the total Load Index for the dual wheel configuration.

**NOTE:** The load index per tire configured as dual wheel is less than a single tire to provide a margin of safety for the load-carrying capacity of the tire in the event that one of the dual tires is punctured or otherwise fails.

5

**R:** The “R” stands for radial. Radial tires have been the industry standard for the past 20 years.

**P or LT:** The “P” indicates the tire is for passenger vehicles. “LT” indicates the tire is for light trucks.

**NOMINAL WIDTH:** This three-digit number gives the width of the tire in millimeters from sidewall edge to sidewall edge. The larger the number, the wider the tire.

**MAXIMUM LOAD RATING:** This number indicates the maximum load the tire can carry.

**MAXIMUM PERMISSIBLE INFLATION PRESSURE:** This number is the greatest amount of air pressure that should ever be put in the tire. This is NOT the same as the vehicle manufacturer’s recommended tire pressure.

**TEMPERATURE:** The temperature rating indicates how well the tire resists heat.

**ASPECT RATIO:** This two-digit number gives the tire’s ratio of height to width. A number of 50 or lower indicates a short sidewall for improved steering response and better overall handling.

**TRACTION:** The traction rating indicates the tire’s ability to allow a car to stop on wet pavement in a shorter distance.

**TREADWEAR:** The treadwear rating indicates how long the tire should last. The higher the number, the longer it should take for the tires to wear down.

**RIM DIAMETER CODE:** This two-digit number is the wheel or rim diameter in inches.

**LOAD INDEX:** This two- or three-digit number is the tire’s load index. It is an indicator of how much weight each tire can support. Note: You may not find this information on all tires because it is not required by law.

**SPEED RATING:** The speed rating tells you the maximum speed capability of a tire. The speed ratings include speeds from 99 mph to above 186 mph. Note: You may not find this information on all tires because it is not required by law.

**M+S:** This indicates that the tire has some mud and snow capability.

**U.S. DOT TIRE IDENTIFICATION NUMBER:** This number begins with the letters “DOT” and indicates that the tire meets all Federal standards. The next two or three numbers or letters are the plant code where the tire was manufactured. The last four numbers represent the week and year the tire was built. For example, the numbers 3107 means the 31st week of 2007. The other numbers are marketing codes used at the manufacturer’s discretion. This information is for contacting consumers if a tire defect requires a recall.

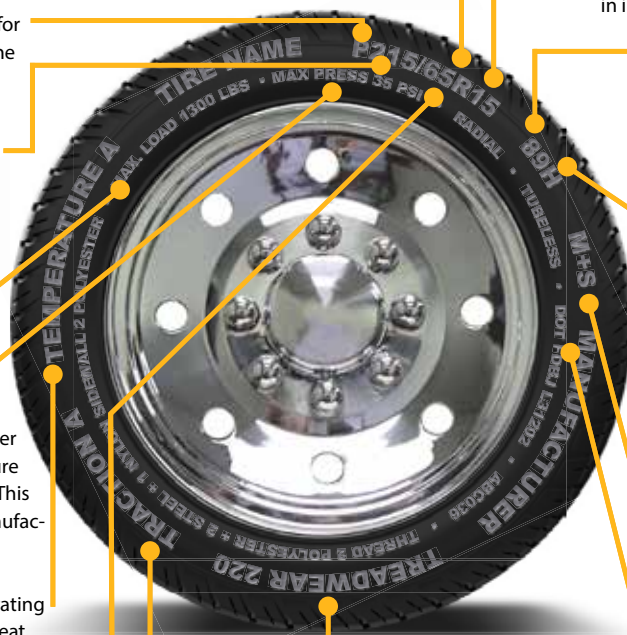


Illustration courtesy of NHTSA, [www.safercar.gov](http://www.safercar.gov)

# Weighing, Loading, and Towing

## Introduction

### **⚠ WARNING**

Do not exceed any applicable motorhome weight ratings. Doing so could damage your motorhome or affect handling and braking characteristics.

Your motorhome’s braking system is designed and rated for operation at the gross vehicle weight rating (GVWR) listed on the unit’s weight labels, not the gross combined weight rating (GCWR).

Proper loading is one of the most important considerations when traveling in a motorhome. Your motorhome is built to carry a certain safe maximum load (GVWR). Read and follow the information listed on your motorhome’s Federal Certification Label to determine safe load limits. For safe operation, NEVER OVERLOAD YOUR MOTORHOME.

## Weight Terminology

### GROSS VEHICLE WEIGHT RATING (GVWR)

The maximum permissible weight of this motorhome.

### UNLOADED VEHICLE WEIGHT (UVW)

The weight of this motorhome as manufactured at the factory with full fuel tank, engine oil, and coolants.

### OCCUPANT AND CARGO CARRYING CAPACITY (OCCC)

Equal to the GVWR minus UVW plus the weight of any carried LP fuel. Occupant and cargo carrying capacity (OCCC) is how much weight in occupants, cargo, water, and trailer tongue weight that can be added to the motorhome without exceeding the GVWR.

### GROSS COMBINED WEIGHT RATING (GCWR)

The maximum allowable loaded weight of this recreation vehicle with its towed trailer or towed vehicle.

### GROSS AXLE WEIGHT RATING (GAWR)

The value specified as the load carrying capacity of a single axle system, as measured at the tire ground interfaces.

## Federal Weight Label

The Federal Weight Label is typically affixed to the driver’s door jamb for Class B and C motorhomes and near the driver’s seat for Class A motorhomes. This label concisely states the gross vehicle weight rating (GVWR) of your motorhome, along with the gross axle weight rating (GAWR)

(both front and rear), tire size, tire weight rating, and proper tire inflation. This information meets the requirements of 49 CFR part 571.120 as issued by the National Highway Traffic Safety Administration (NHTSA).

<b>MANUFACTURED BY:</b> THOR MOTOR COACH, INC.			<b>OFFLINE:</b> MM/YY		
<b>GVWR:</b> XXXX KG (XXXXX LB)			<b>SERIAL:</b> XXXXXXXXXXXXXXX		
<b>INC. VEH. MFG. BY:</b> <Insert Chassis Manufacturer>			<b>MODEL:</b> XXXX		
<b>GAWR KG(LB)</b>	<b>TIRES</b>	<b>RIMS</b>	<b>COLD INFLATION PRESSURE</b>	<b>SINGLE</b>	<b>DUAL</b>
<b>FRONT:</b> XXXX (XXXX)	LT215/85R16	5.5 J X 16	XXX KPA(XX PSI)	<input type="checkbox"/>	<input type="checkbox"/>
<b>REAR:</b> XXXX (XXXX)	LT215/85R16	5.5 J X 16	XXX KPA(XX PSI)	<input type="checkbox"/>	<input type="checkbox"/>
<b>TAG:</b>				<input type="checkbox"/>	<input type="checkbox"/>
<b>THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT IN MM/DD/YYYY</b>					
<b>V.I.N.:</b> XXXXXXXXXXXXXXXXXX			<b>TYPE:</b> MULTIPURPOSE PASSENGER VEHICLE		

Typical Federal Weight Label, including GVWR, GAWR, and tire pressure information

## Motorhome Occupant and Cargo Carrying Capacity Weight Label

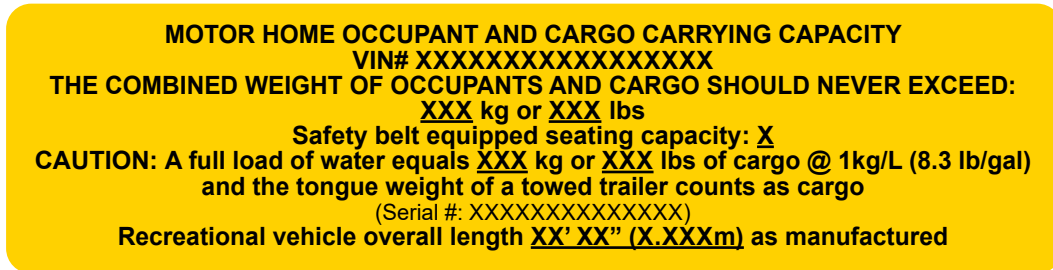
The Motorhome Occupant and Cargo Carrying Capacity weight label is affixed to the interior side of the forward-most passenger door of Class B and C motorhomes and on the interior surface of the entry door of Class A motorhomes. This label indicates how much weight you can safely carry within the motorhome. The total weight of passengers, cargo, trailer tongue weight, and water (fresh and waste) should never exceed the values shown on this label.

This label also includes important safety belt seating capacity information and the measured overall length of the motorhome.

**NOTES:**

- If a boat, trailer, or other vehicle is being towed, it should be weighed and combined with the motorhome's weight to ensure the total weight of the motorhome and towed vehicle does not exceed the gross combined weight rating (GCWR) of the motorhome. Contact your dealer or the chassis manufacturer for GCWR ratings.
- Depending on the date of manufacturer, the OCCC label attached to your motorhome includes length specifications.

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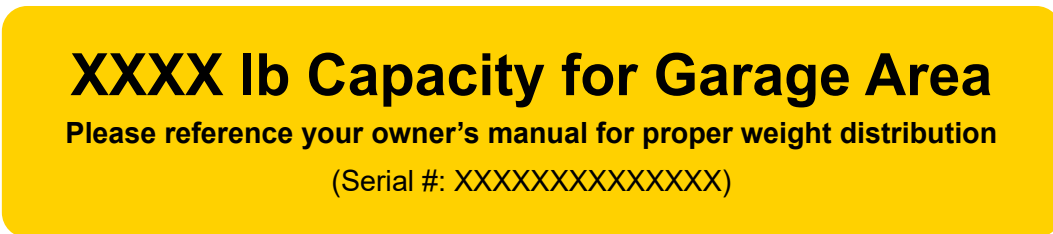


Typical Motorhome Occupant and Cargo Carrying Capacity Label

## Weight Capacity of Rear Garage Area

Motorhomes that include a rear garage area have a separate weight capacity rating for this cargo area. This weight capacity is listed on a label attached to the inside wall of the garage. The total weight of garage cargo must never exceed the labeled capacity AND the weight of cargo carried in the

garage must be included in the total weight of occupants and cargo of the motorhome. The total weight of the occupants, garage cargo, water (fresh and waste), trailer tongue weight, and other supplies must NOT exceed the Occupant and Cargo Carrying Capacity (OCCC) of the motorhome.



Typical Garage Area Weight Capacity Label

## Weighing Your Motorhome

When loading your cargo, be sure weight is distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions as possible. Too many items stored on one side of your motorhome may overload tires and cause handling issues.

Periodically weigh your motorhome at a public vehicle scale to determine axle loads. You can find certified public or commercial vehicle scales at moving and storage lots, farm suppliers with grain elevators, gravel pits, recycling companies, and large commercial truck stops.

To weigh your motorhome correctly, measure the fully loaded vehicle axle by axle and wheel position by wheel position. Allow adequate time, since the entire weighing process can take around 30 minutes. There may be a small fee for each weight reading taken, but the expense is a worthwhile investment toward the safe operation of your motorhome.

Your motorhome must be weighed fully loaded, which includes passengers, food, clothing, fuel, water, propane, supplies, etc. Any towed vehicle (car/pickup, boat, or trailer) or items loaded on brackets on the back of the motorhome should also be included in the weighing process.

The following procedure is suggested when using a long platform scale, although any method recommended by the scale operator that correctly determines weight value is acceptable. During all measurements, it is important to keep the vehicle as level as possible.

1. Pull onto the scale so that only the front axle is on the platform with the end of the scale midway between the front and rear axles and record the weight (**Reading A**).
2. Pull forward until the full unit is on the scale and record the weight (**Reading B**).
3. Pull forward so that only the rear axle is on the scale and record the weight (**Reading C**).
4. To determine the weight of individual wheel positions, repeat the previous three steps, but this time, use only one side of the motorhome on the scale. Record the weight readings.
5. To calculate the wheel position weight for the opposite side of the motorhome, subtract these weight readings from weight readings A, B, and C recorded in steps 1, 2, and 3.



Reading A: Front



Reading B: Total Coach



Reading C: Back

**NOTE:** Thick Black Lines in the illustrations above represent a vehicle weighing scale.

### OTHER FACTORS TO CONSIDER:

- Your motorhome must remain as level as possible on the scale, even though an axle or side is not physically on the scale. To obtain the side-to-side weight measurements, there must be enough space on either side of the scale to allow the motorhome to be partially off the scale.
- For improved accuracy, Thor Motor Coach recommends using a segmented 4-pad scale, when possible, to determine individual wheel weight measurements. The corner weight measurements should not exceed half of the respective Gross Axle Weight Rating (GAWR) or the maximum load rating for the tire or set of dual tires at the rear, whichever is less.
- Individual wheel position weight measurements must not exceed the maximum tire load capacity. The maximum load rating for the tire can be found embossed on the tire's sidewall.

- If any of the corner weight measurements exceed half of the listed GAWR or tire ratings, redistribute or remove a portion of the cargo until the weight is within the proper limits for all four corners of the vehicle.
- Periodically check and adjust your motorhome's cargo weight to obtain optimum mileage from your tires and to optimize vehicle handling. Inflate tires as recommended on the Federal Weight Label affixed to your motorhome.
- Distribute cargo side-to-side so the weight on each tire does not exceed one-half of the GAWR for either axle. For traveling safety, it is important to make sure any tie-down straps (if equipped) on appliances or furniture are secured.
- Give careful attention to where and what type of flammable materials you store and transport. Certain storage areas are clearly labeled DO NOT STORE COMBUSTIBLE MATERIALS. Examples of potential spark producing areas are: base kitchen cabinets, front dinette base, exterior refrigerator service compartment, as well as refrigerator cabinet. Be sure all canisters are secure and leak free.

**NOTE:** At approximately 8 pounds per gallon, water can add a considerable amount of weight to your motorhome. Additional cargo carrying capacity for other items can be obtained by reducing the amount of fresh and waste water carried while traveling.

However, to prevent the build-up of sludge, keep a few gallons of water in the black tank.

## 6

## Weight Distribution

Improper weight distribution, or too much weight on your motorhome's suspension system, can cause failure or damage to:

- Springs and suspension components;
- Shock absorbers;
- Brakes;
- Tires;
- Steering components.

An overloaded motorhome is hard to drive and hard to stop. In cases of serious overloading, brakes can fail completely, particularly on steep hills. Proper weight distribution also affects tire performance. The load a tire will safely carry is a combination of its size, its construction, its load range, and corresponding inflation pressure.

## Loading the Motorhome

Always consider proper vehicle loading when preparing for travel. By not overloading the motorhome and keeping the weight balanced side-to-side and as close to the axles as possible, the drivability and safe handling of the vehicle will be maximized.

- Store and secure all loose items inside the motorhome before traveling. Overlooked items such as canned goods, or small appliances on the countertop, cooking pans on the range or free-standing furniture items can become dangerous projectiles during a sudden stop.

## Towing With Your Motorhome

### **⚠ WARNING**

- **An auxiliary braking system may be required for control of a towed vehicle behind the motorhome. Do not assume the braking capabilities of the motorhome can also adequately stop the combined weight of the motorhome and towed vehicle.**
- **The designated hitch rating may exceed the GCWR or other towing capacity limits of the motorhome. It is your responsibility to properly load the motorhome, while staying within the tow ratings, GCWR, GVWR, and GAWR of the motorhome.**
- **Do not tow loads that cause the motorhome to exceed the Gross Combined Vehicle Weight Rating (GCWR).**
- **Do not exceed the vertical hitch load rating (tongue weight) as listed on the hitch label.**
- **Consult your owner's manual for additional information regarding towing guidelines for this motorhome.**

**Failure to comply can result in loss of vehicle control resulting in death or serious injury.**

### **⚠ WARNING**

**DO NOT USE WEIGHT DISTRIBUTING HITCHES OR WEIGHT DISTRIBUTING TOWING DEVICES WITH THIS MOTORHOME. Applies to Class A and Class C motorhomes.**



**⚠ WARNING**

**A SEPARATE FUNCTIONING BRAKE SYSTEM IS REQUIRED FOR ANY TOWED VEHICLES OR TRAILERS WEIGHING MORE THAN 1500 LBS WHEN FULLY LOADED. NEVER EXCEED THE GVWR, OR THE GAWR SPECIFIED ON THE MOTORHOME'S CERTIFICATION LABEL.**

**Never exceed the weight ratings of the trailer hitch installed on the motorhome. Failure to heed any part of this warning could result in loss of control of the motorhome and towed vehicle or trailer and may cause an accident and serious injury. For specific towed vehicle braking requirements, consult your chassis owner's manual.**

**⚠ WARNING**

**THE FULLY LOADED MOTORHOME AND THE TRAILER, OR TOWED VEHICLE, MUST NOT EXCEED THE MOTORHOME'S GROSS COMBINED WEIGHT RATING (GCWR).**

**Do not exceed the motorhome gross combined weight rating (GCWR), the hitch rating (in pounds), or the maximum tongue weight rating of the hitch (note: tongue weight is the weight in pounds pushing down on the hitch).**

**Consult with your selling dealer to determine the GCWR of the motorhome and the towing capacity of the motorhome.**

### Towing a Vehicle with Your Motorhome

There are three basic methods of towing a vehicle with your motorhome; all have advantages and disadvantages.

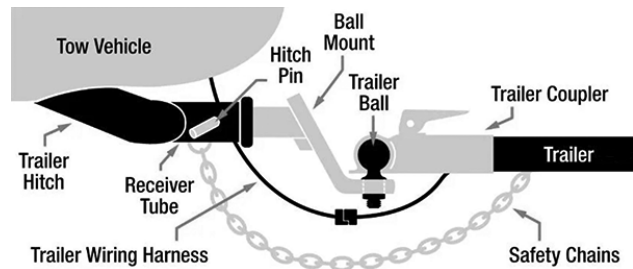
1. Flat towing with a tow-bar. With this method, a vehicle-specific tow bar is attached to front of the towed vehicle and the tow-hitch is attached to the motorhome. All four wheels of the towed vehicle remain on the ground. This method does not add tongue weight to the motorhome, which is an advantage. However, it is not recommended to back-up with a tow-bar due to the likely-hood of jack-knifing the towed vehicle.
2. Towing with a tow dolly. A tow dolly is designed to tow a variety of vehicles, therefore, the advantage is that it is not a vehicle-specific piece of equipment. It also presents minimal tongue weight to the motorhome; another advantage. However, like the tow-bar, it is not recommended to back-up with a tow-dolly, due again, to the likely-hood of jack-knifing the towed vehicle.

3. Towing a vehicle using a full vehicle trailer, either open or enclosed. A vehicle trailer presents the advantage of backing-up and since the towed vehicle is not in direct contact with the road surface, there is no additional wear to the vehicle while it is being towed. However, like all trailers, a vehicle trailer adds tongue weight to the motorhome.

If you are considering towing a vehicle behind your motorhome, consult with your dealer or qualified towing expert about the towing equipment options appropriate for your motorhome and travel needs.

### Towing Hitch

Your motorhome is equipped with a Class III towing hitch receiver and trailer wiring receptacle. Depending on the weight rating of your motorhome's chassis, hitch ratings range from 5,000 to 10,000 or more pounds. Please refer to the chassis manufacturer's owner's manual for towing recommendations and towing limitations for this vehicle.



Components of a typical tow coupling

### Safe Towing Tips:

- Never exceed the hitch tow rating, the hitch tongue weight rating and the towing capacity of your motorhome.
- There are several sizes of trailer balls available. **BE SURE THE TRAILER BALL MATCHES THE SIZE OF THE TRAILER COUPLER!**
- Always ensure the trailer coupler is properly seated and locked onto the trailer ball (see illustration).
- Always ensure the hitch pin is properly installed, securing the ball mount to the receiver tube (see illustration).
- Always use safety chains between your motorhome and the towed trailer or vehicle. Cross the chains under the trailer tongue and allow slack for turning corners. Connect the safety chains to the trailer or

vehicle frame or hook retainers. Never attach safety chains to the bumper of a vehicle (see illustration).

- Always check brake lights, running lights, emergency flashers, and turn signals of the towed vehicle at the start of the trip and often during the trip.
- 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 back-up maneuvers with a tow bar or tow dolly; doing so could result in damage to the motorhome, towed vehicle or towing device.
- Always chock trailer or towed vehicle wheels when disconnected from the towing vehicle (motorhome).

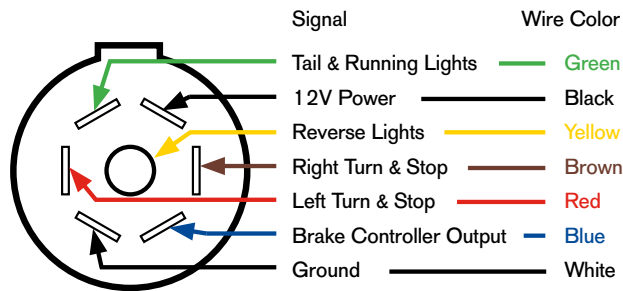
**NOTE:** Thor Motor Coach accepts no responsibility for damage to the chassis, property, and other components resulting from towing with your motorhome or towing loads greater than its designated specifications.

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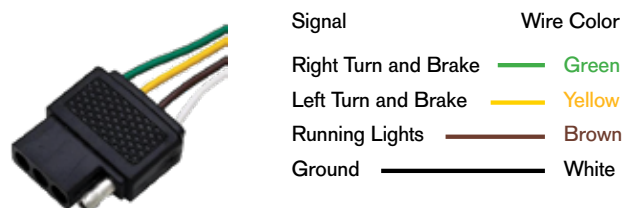
### Electrical Connections for Towing

A 4-way or 7-way trailer plug, supplied by the chassis manufacturer, is pre-wired to the chassis electrical system. This plug provides electrical power for running lights, turn signals, stop lights, and electric trailer brakes. Before connecting your motorhome to any towed vehicle, verify that the wiring of the towed vehicle plug conforms to your motorhome connector wiring. Refer to your Chassis Packet for additional information regarding vehicle towing.

#### 7-WAY CONNECTOR WIRING



#### 4-WAY CONNECTOR WIRING



# Leveling Jacks and Slideouts

## Leveling Jacks Safety

### **⚠ DANGER**

- FAILURE TO ACT IN ACCORDANCE WITH THE FOLLOWING INSTRUCTIONS MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.
- READ THE ENTIRE OPERATORS MANUAL AND ALL PRECAUTIONS PRIOR TO OPERATING THIS EQUIPMENT.
- DO NOT ATTEMPT TO OPERATE THE SYSTEM WHILE THE MOTORHOME IS IN MOTION. IF THE 'JACKS DOWN' ALARM SOUNDS WHILE DRIVING THE MOTORHOME, IMMEDIATELY FIND A SAFE PLACE TO PULL OVER AND STOP. SET THE PARKING BRAKE AND WHEN IT IS SAFE, INSPECT THE LEVELING SYSTEM.

### **⚠ WARNING**

- DO NOT OPERATE ANY SYSTEM FUNCTIONS WHILE ANYONE IS UNDER THE MOTORHOME. IF WORK UNDERNEATH YOUR MOTORHOME IS REQUIRED, SUPPORT BOTH FRONT AND REAR AXLES WITH JACK STANDS. DO NOT RELY ON THE SUPPORT OF THE LEVELING SYSTEM! FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH.
- DO NOT USE THE LEVELING JACKS TO CHANGE TIRES. THE SYSTEM IS DESIGNED FOR LEVELING AND STABILIZING, AND IS NOT MEANT TO LIFT THE WHEELS OFF THE GROUND! LIFTING THE WHEELS OFF THE GROUND MAY RESULT IN AN UNSTABLE VEHICLE CONDITION, WHICH MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.
- MAKE SURE THERE ARE NO OBSTRUCTIONS IN THE 'EXTEND' OR 'RETRACT' PATHS OF THE LEVELING JACKS. KEEP ALL PEOPLE AND PETS CLEAR OF THE MOTORHOME WHILE OPERATING THE LEVELING SYSTEM. ALWAYS VISUALLY CONFIRM THE JACKS HAVE FULLY RETRACTED BEFORE MOVING THE MOTORHOME. MOVING THE MOTORHOME WHILE THE JACKS ARE EXTENDED COULD CAUSE DAMAGE TO THE JACK SYSTEM AND THE MOTORHOME.
- NEVER EXPOSE HANDS OR OTHER PARTS OF THE BODY NEAR HYDRAULIC LEAKS. HIGH-PRESSURE OIL LEAKS MAY CUT AND/OR PENETRATE THE SKIN CAUSING SERIOUS INJURY.
- ALWAYS DISCONNECT TRAILERS OR TOWED VEHICLES FROM THE MOTORHOME'S HITCH BEFORE USING THE LEVELING SYSTEM.

### **⚠ CAUTION**

When the automatic leveling system is in operation, do not allow people to walk around inside the motorhome. Shifting weight inside the motorhome can disrupt the leveling system's sensing mechanism, while motorhome movements could cause falls or personal injuries.

## Hydraulic Leveling Jacks (if equipped)

Operate the hydraulic leveling system ONLY under the following conditions:

- Be sure all persons, pets, and property are clear of your motorhome while operating the leveling system.
- If you are operating an automatic system with occupants inside the motorhome, they must stay seated during the leveling process.

### TO EXTEND:

1. Park the motorhome on a reasonably level surface.
2. If towing a trailer or vehicle, disconnect it from the motorhome's hitch and chock trailer or towed vehicle's wheels.
3. Engage the motorhome's PARKING BRAKE.
4. Start the motorhome's engine and place the motorhome's transmission in:
  - a. NEUTRAL for rear mount diesel engine vehicles.
  - b. PARK for all front mount gasoline or diesel engine vehicles.
5. Turn OFF all unnecessary electrical devices. Doing this while keeping the motorhome's engine running will help ensure the hydraulic pump motor has adequate electrical power.
6. On the Leveling Jacks Control Panel, press the ON, then AUTO or AUTO LEVEL buttons. The leveling system will automatically deploy front and rear jacks to the needed extension in order to level the motorhome.
7. When automatic leveling is accomplished, the system will indicate that the leveling process is complete and successful by an indicator located on the Leveling Jacks Control Panel.
8. Press the OFF button on the controller. Turn off the motorhome's engine, while keeping the parking brake engaged.

## NOTES:

- As the system is leveling the motorhome, you may experience a certain amount of motorhome movement; up and down, and side-to-side. This is normal as the system automatically adjusts each of the four hydraulic jack rams.
- When parked on soft surfaces, the use of jack pads is recommended (not supplied by TMC). Jack pads can be easily made from 3/4 inch plywood, cut into 12-to-16 inch squares or circles.

## TO RETRACT:

1. Ensure that all slideout rooms are fully retracted BEFORE retracting leveling jacks (refer to slideout instructions).
2. Ensure all people and pets remain clear of the jacks. Remove any equipment or items that may have been stored underneath the motorhome.
3. Start the engine and ensure the vehicle's transmission is in park (for front engine) or neutral (for diesel pushers).
4. Ensure the vehicle's parking brake is engaged.
5. Press the ON button on the Leveling Jacks Control Panel.
6. Press the RETRACT ALL button. The panel will indicate when all jacks have retracted.
7. Before moving the motorhome, ensure all jacks have retracted by physically looking under the motorhome and confirming that all jacks are in their fully retracted position.

## Manual Leveling with Hydraulic Jacks

You may encounter some circumstances where automatic leveling of the motorhome can not be obtained. If possible, retract the jacks and re-position the motorhome to a more level parking area. If that is not possible or feasible, you may attempt to manually level the motorhome by deploying the jack rams in pairs.

1. Follow all leveling precautions listed previously.
2. Start the motorhome's engine, ensuring the parking brake is engaged and the transmission is in:
  - a. NEUTRAL for Class A Diesel Pushers;
  - b. PARK for Class A and Class C front engine gas or diesel motorhomes.

3. Press the ON button on the Leveling Jacks Control Panel.
4. Press either the FRONT or REAR button on the Control Panel. Depending on which switch is pushed, either the front or rear pair of jack rams will deploy. Release the switch when the jacks contact the ground (you should feel the motorhome slightly rise).
5. Press the opposite switch and hold until the motorhome rises slightly. Watch the control panel for an indication that the motorhome is level front-to-back.
6. Press either the LEFT or RIGHT button on the Control Panel (this will move the left or right-side pair of jack rams). Watch the control panel to determine if the controller can sense that the motorhome is level left-to-right.
7. If needed, press the opposite side switch while watching the control panel for an indication that the motorhome is level left-to-right.
8. Repeat this process, FRONT-to-BACK and LEFT-to-RIGHT until the controller indicates the motorhome is level.
9. Turn OFF the Leveling Jack Control Panel; turn off the motorhome's engine, while keeping the parking brake engaged.

**IMPORTANT: never completely lift a wheel or wheels off the ground with the leveling jacks. This creates an unstable situation. You may need to manually adjust the jacks or re-position the motorhome so that all wheels remain in contact with the ground.**

## Zero Point Calibration

Your hydraulic leveling system was calibrated at the factory with an unloaded vehicle. This is known as Zero-point calibration and is the point where the system will return the jacks when an auto-leveling cycle is initiated.

Vehicle loading and other factors can make it necessary to re-calibrate the Zero-point. Refer to the manufacturer's operation guide for further information regarding calibration and maintenance procedures.

**NOTE:** Complete instructions regarding the operation and maintenance of the hydraulic leveling system installed on your motorhome are available through your on-line TMC Owners Resource account.

## Electric Stabilizers (if equipped)

### **⚠ WARNING**

- **NEVER LIFT THE WHEELS OFF THE GROUND TO STABILIZE THE MOTORHOME! THE STABILIZING JACKS ARE NOT DESIGNED TO SUPPORT THE FULL WEIGHT OF THE MOTORHOME. LIFTING WHEELS OFF THE GROUND MAY RESULT IN AN UNSTABLE VEHICLE CONDITION, WHICH MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.**
- **ALWAYS MAKE SURE THAT PEOPLE AND PETS STAY WELL CLEAR OF THE STABILIZER JACKS WHEN IN OPERATION. THE MECHANISM OF THE JACKS PRESENT PINCH-POINTS THAT COULD CATCH ON LOOSE CLOTHING OR BODY PARTS AND CAUSE SEVERE INJURY.**
- **ALWAYS DISCONNECT TRAILERS OR TOWED VEHICLES FROM THE MOTORHOME'S HITCH BEFORE USING THE ELECTRIC STABILIZING JACKS.**

### **⚠ CAUTION**

Stabilizing jacks are not designed or intended to be used to level the motorhome. They are designed to reduce vehicle motion due to movement inside the motorhome only and not designed to carry the weight of the motorhome.

### **NOTICE**

If the vehicle's ignition is turned ON while the stabilizers are extended, a warning buzzer will sound, signifying that the jacks are down and possible damage could occur if the vehicle is moved.

Electric stabilizers (if equipped) are offered on select Class C motorhomes. If installed, they are located along the rearward portion of the chassis, just inside the rear bumper. If your motorhome is equipped with electric stabilizers, the operating button is located inside the motorhome by the entry steps. Be sure the electric stabilizers are retracted in the up (travel) position before driving the motorhome.

#### TO EXTEND:

1. Park the motorhome on a reasonably flat area.
2. If towing a trailer or vehicle, disconnect it from the motorhome's hitch and chock trailer or towed vehicle's wheels.
3. Press and hold either the left or right stabilizer switch in the DOWN position until the jack pad contacts the ground.

4. Press and hold the opposite stabilizer switch in the DOWN position until the jack pad contacts the ground.
5. If either stabilizer does not contact the ground while being fully extended, blocks of wood or other non-compressible materials may need to be placed under the jack pads.

#### TO RETRACT:

1. Press and hold the stabilizer switches in the UP position until the motors stop.
2. Visually check that the electric stabilizing jacks are retracted in the UP (travel) position before moving or driving the motorhome.

#### MANUAL OPERATION:

In the event that an electrical problem with the stabilizing system occurs, a manual override can be performed to extend or retract the stabilizers.

1. Disconnect one of the wire leads from the drive motor(s) to prevent back-feeding the motor.
2. Locate the actuating coupler located on the end of the drive screw, opposite the electric motor.
3. Insert the crank handle over the coupler and pin.
4. Rotate the crank handle clockwise to extend the jacks or counterclockwise to retract the jacks.

**NOTE:** Complete instructions regarding the operation and maintenance of the electric stabilizer system installed on your motorhome are available through your on-line TMC Owners Resource account.

## Slideouts

### **⚠ DANGER**

**DO NOT MOVE OR DRIVE YOUR MOTORHOME WITH SLIDEOUT(S) EXTENDED.**

### **⚠ CAUTION**

If installed with leveling jacks or stabilizers, the motorhome must be leveled or stabilized with the jacks in the down position before operating slideouts.

Ensure that children and pets are kept well away from moving slideouts. Always inspect the area outside the slideout prior to extending to safeguard that the slideout will not contact nearby trees, vehicles, utility poles or other obstacles.



Slideouts provide convenient and roomy interior living space

TMC motorhomes are equipped with slideouts that operate hydraulically, electrically, or a combination both. Please refer to the slide mechanism manufacturer's owner's manual and follow their safety, operation, and maintenance instructions. If you are missing this information, please contact your selling dealership, TMC's web-based Owners Resource (see note), or the slide mechanism manufacturer for assistance. For your convenience, many of TMC's suppliers make their manuals available for download from their respective websites.

Before extending the slideout, check around and above the exterior of the motorhome to be sure the slideout will not come in contact with anything outside when it is fully extended; also check the interior of your motorhome to be sure that slideout travel is free from obstructions.

### Extending the Slideout

### **⚠ CAUTION**

**BEFORE OPERATING SLIDEOUT ROOMS:**

- Remove travel bars or slide-locks if equipped;
- Engage emergency (parking) brake;
- Place driver and front passenger seats in the most forward position and place the seat-backs in the upright position, otherwise slideout may contact and damage these seats.

### **NOTICE**

When extending and retracting slideouts, it is good operating practice to maintain pressure on the control button continuously while the slide is in motion. Avoid stopping and starting the motors during slideout travel.

If the slideout motors are not in-sync, the slideout will likely bind while extending or retracting. If binding occurs, **CEASE OPERATING THE MOTORS**; the motors or gear tracks could be damaged. The slideout will have to be manually retracted. Refer to the manufacturer's instructions or the TMC Awnings, Leveling, and Slideout System Guide for manual retraction.

After completing the exterior and interior inspections prior to slideout operation:

1. Level the motorhome with leveling jacks or stabilize with stabilizing jacks (refer to Leveling and Stabilizing).
2. **DIESEL CLASS A MOTORHOMES:** Place motorhome's transmission in **NEUTRAL** and apply **PARKING BRAKE**. Engine must be **RUNNING** for hydraulic and electric actuated slideouts.

**GAS CLASS A AND ALL CLASS C MOTORHOMES:** Place motorhome's transmission in **PARK** and apply **PARKING BRAKE**. Engine must be **RUNNING**.

**This is a new procedure for Class C Motorhomes beginning with model year 2022. Early model year 2022 motorhomes equipped with BM Pro multiplex systems may have an ignition lockout system. See NOTE.**

3. Turn the Master Battery Disconnect Switch ON.
4. Locate the slideout operating switch (location varies per model and floor plan) and:
 

**Hydraulic slideout:** Press and hold the slideout operating switch until the slideout room is fully extended, then release switch.

**Electric slideout:** Press and hold the IN/Retract button for 3-5 seconds, then Press and hold the OUT/Extend button until the slideout is fully extended AND hold the switch for an additional 3-5 seconds, then release the switch (this procedure helps to keep the slideout motors in-sync).

### Retracting the Slideout

#### **⚠ CAUTION**

**Ensure that children and pets are kept well away from moving slideouts. Gear tracks present a serious pinch hazard; keep hands away from moving slideouts. Ensure that the interior floor and space is clear of any obstacles that could impede the slideout travel or become entrapped under the slideout.**

Use the same safety precautions as previously stated for slideout operation, and:

1. Be sure there are no obstructions on the floor of the coach or in the path of the slideout.
2. Ensure there is no visible dirt or debris in the track of the slideout or under it. Trapped dirt or debris could cause damage to your carpet or flooring, slideout rollers or gear tracks.
3. **DIESEL CLASS A MOTORHOMES: Place motorhome's transmission in NEUTRAL and apply PARKING BRAKE. Engine must be RUNNING for hydraulic-actuated slideouts.**

**GAS CLASS A AND ALL CLASS C MOTORHOMES: Place motorhome's transmission in PARK and apply PARKING BRAKE. Engine must be RUNNING.**

**This is a new procedure for Class C Motorhomes beginning with model year 2022. Early model year 2022 motorhomes equipped with BM Pro multiplex systems may have an ignition lockout system. See NOTE.**
4. Turn the Master Battery Disconnect Switch ON.

5. Locate the slideout operating switch and:
 

**Hydraulic slideout:** Press and hold the IN/Retract switch until the room is completely retracted, then immediately release the switch.

**Electric slideout:** Press and hold the OUT/Extend button for 3-5 seconds, then press and hold the IN/Retract button until the slideout is fully retracted. Continue to hold the IN/Retract button for an additional 3-5 seconds, then release the button (this action will help keep the slideout motors in-sync).
6. Install the slideout locking devices (if equipped).

#### NOTES:

- Slideouts will not operate properly if the 12 volt system's power delivery capacity is low. This is the reason the engine must be running; supplying additional power from the vehicle's alternator to ensure the slideout motors have consistent operating energy.
- For motorhomes with an ignition lock-out, engine must be OFF. Connect to shore power or operate the generator prior to slideout operation to ensure adequate power from the 12 volt electrical system.
- Many slideout problems can be avoided by keeping the slide motors in sync. Follow the instructions listed in Step 4 (above) every time the slides are extended.
- Always hold the IN or OUT switch until the slideout is completely in or out. Avoid releasing the switch while the slideout is partially open or closed.
- There is a 30 second delay feature on the tilt-a-bed slideout (if equipped), to allow time to raise the head of the bed.
- Before retracting a slideout, always visually inspect the roof and awning of the slideout for any debris or damage. Check the gear tracks for debris or damage. Always perform an interior and exterior visual inspection to ensure slideout is fully retracted and prepped for travel.
- For complete operational and maintenance slideout information, refer to the slideout documents and how-to videos available through your TMC Owners Resource on-line account:

[www.thormotorcoach.com/owners/owners-resources](http://www.thormotorcoach.com/owners/owners-resources)

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# Exterior

## Powered Entry Steps

### ⚠️ WARNING

**WITH THE POWER SWITCH IN THE 'ON' POSITION, AND THE ENTRY DOOR 'OPEN', IT IS POSSIBLE TO DRIVE OFF WITH THE STEPS EXTENDED. SERIOUS PERSONAL INJURY AND/OR DAMAGE TO THE STEPS AND MOTORHOME MAY OCCUR.**

**ALWAYS ENSURE THAT THE ENTRY DOOR IS FULLY CLOSED AND THE STEPS ARE RETRACTED BEFORE MOVING AND/OR DRIVING THE MOTORHOME.**

### ⚠️ CAUTION

- Steps must always be operated with a fully charged battery (12 volt electrical supply).
- Electric steps are designed to detect obstacles in the way of operation by sensing excessive amperage. Without a fully-charged battery, the steps may malfunction, which could cause serious personal bodily injury.

### ⚠️ CAUTION

- Prior to exiting the motorhome, always look downward to confirm that the entry steps are deployed (extended). It is possible to lock the steps in the retracted position or the steps have malfunctioned. Injuries caused by slips or falls are possible.
- Always use the handrails when entering and exiting the motorhome. Serious bodily injury could occur from a slip or fall.



Typical powered entry step. Depending upon motorhome model, steps may have one or more treads.

Your TMC motorhome may be equipped with powered entry steps. Depending on the size of the motorhome, powered steps will consist of one, two, or more treads. Powered entry steps makes entry and exit of your motorhome both safe and convenient (as compared to manually deployed steps). When enabled, the steps automatically deploy, or lower, when the entry door is opened and automatically retract, or raise, when the entry door is closed.

## Operating Powered Entry Steps

Powered steps are equipped with an ENABLE/DISABLE switch conveniently located near the entrance door, so that when you are parked and there is increased foot traffic in-and-out of the entry door, the steps can remain in the extended or down position. This eliminates unnecessary step deployment and retraction. When you are ready to move the motorhome, this switch should always be placed in the ON or ENABLED position, so that the steps will retract when the entry door is closed for departure.

### NORMAL OPERATING MODE: POWER SWITCH ON

1. Open the motorhome entry door; steps will automatically extend and lock when in the fully extended position.
2. Close the motorhome entry door; steps will automatically retract to the stowed position.

### SECURING THE ENTRY STEPS IN THE EXTENDED POSITION: POWER SWITCH OFF

1. Open the entry door; the steps should automatically extend. Look down and confirm that the steps have deployed and it is safe to exit the motorhome.
2. Exit the motorhome, while keeping the entry door open.
3. Locate the step power switch and press or turn it to the OFF position.
4. Close the entry door; the steps should remain deployed.

### RETURNING THE STEPS TO NORMAL OPERATING MODE

1. Open the entry door and locate the Step Power Switch.
2. Turn the switch to the ON position.
3. While standing outside the motorhome, close the entry door; the steps should retract, confirming that the steps are in Normal Operating Mode.

## EXTERIOR

4. Open the entry door; the steps should extend, confirming that the steps are in Normal Operating Mode.
5. Always confirm that the steps have retracted before driving the motorhome.



Typical powered entry step switch (center). Configuration may vary, however, all will be located near the entry door of the motorhome.

**NOTE:** If the powered entry steps are secured in the extended position, they are designed to retract when the motorhome's engine is started.

### Maintenance

Steps are equipped with self-lubricating bushings on the drive assembly and all step joints. No lubrication is necessary, yet if in extreme conditions lubrication seems necessary, a silicon-based grease or spray can be used; it will not harm the bushings.

#### BASIC TROUBLESHOOTING:

1. Check the fuse panel for a 'blown' fuse for the 12 volt circuit that powers the steps. If necessary, change the fuse.
2. The auxiliary battery may not be sufficiently charged to operate the steps. Charge the battery(ies).
3. There may be a faulty ground. Locate the ground lug(s); clean the connections and/or re-attach ground wires.
4. Check for bent or broken step joints or arms. The step mechanism may be binding when attempting to extend or retract.
5. The step motor or motor module may be faulty. Repairs will need to be made at an RV service center.

**NOTE:** If there is an electrical failure to the steps, they may be manually retracted by removing the two bolts that hold the step arm collars to the drive shaft. With these bolts removed, manually push the steps closed. The steps may need to be tied to the framework in the retracted position to keep them in-place while traveling to a repair center.

Be cautious whenever the steps are inoperable; physical injury could occur due to falls or missteps. Always use the handrails when entering and exiting the motorhome.

## Awnings

### ⚠ CAUTION

- **IF THREATENING WEATHER APPROACHES, RETRACT ALL AWNINGS.**
- **If the awnings are rolled up wet, open them back up as soon as possible to allow them to dry.**
- **Do not drive during periods of high winds. Doing so may cause damage to the awning; they could possibly unfurl from their stowed position.**
- **Any damage to the awning caused by driving under such conditions will not be covered under warranty.**

### ⚠ CAUTION

**In the event of power loss or awning motor failure the automatic patio awning can be manually retracted (refer to the component manufacturer's owner's manual).**

**If you cannot perform this procedure, contact the nearest authorized service center for assistance. Do not drive the motorhome with the awning in the extended position.**

### ⚠ CAUTION

**Keep hands away from awning mechanisms while in operation. Some mechanisms present pinch points that can cause severe injury.**

## Patio Awnings

Awnings can create a pleasant outdoor space that provides shade from the sun and semi-protection from certain weather conditions. Most patio awnings operate from the motorhome's 12 volt DC electrical supply. However, the awnings installed on some Class A diesel motorhomes operate from the 110 volt AC system. For DC operated awnings, the Master Battery Disconnect Switch, generator, or shore power will need to be ON prior to operating the awning. For AC operated awnings, the generator or shore power will need to be ON prior to operating the awning(s).

### TO EXTEND THE AWNING

1. Before extending the awning, ensure there are no obstacles in the path of operation.
2. Provide power to the awning by turning ON the Master Battery Disconnect Switch, or operate the generator, or connect to shore power (see reference to 12 volt DC and 110 volt AC above).
3. Press and hold the EXTEND switch, located near the entrance door, or on the multiplex touch-screen panel, or remote (see note), until the awning is opened to the desired setting.

### TO RETRACT THE AWNING

1. Before retracting the awning, ensure there are no obstacles in the path of operation.
2. Provide power to the awning by turning ON the Master Battery Disconnect Switch, or operate the generator, or connect to shore power.
3. Press and hold the RETRACT switch, located near the entrance door, or on the multiplex touch-screen panel, or remote (see note), until the awning is fully retracted.



Awnings provide shade, weather protection, and can enhance outdoor enjoyment.

### NOTES:

- Some awnings feature ONE TOUCH operation. If equipped, a single press of the extend or retract button will operate the awning.
- For convenient operation, some awnings are equipped with a remote control. In addition, many multiplex systems offer remote control of awnings and other electrical systems via a smartphone or tablet app.
- The generator must be operational or shore power must be used in order to operate 110 volt AC awnings (installed on select Class A Diesels).

## Entry Door Awnings

Select Class A diesel motorhomes are equipped with an entry door awning. Generally, if the patio awning operates on 110 volts AC, then the entry door awning also operates on 110 volts AC. Follow the operating procedures listed above.

Observe the same awning operational cautions when extending and retracting an entry door awning as when operating a patio awning.

## Awning Lights

Your patio awning may be equipped with LED strip lighting or other lighting types. These lights are controlled by a switch located near the Awning EXTEND/RETRACT switch, or on your multiplex touch-screen panel, or on a remote control device.

## Slideout Awnings

All slideouts are equipped with an awning that automatically extends and retracts with the extension and retraction of the slideout. These awnings provide protection for the top of the slideout from environmental debris (leaves and twigs), rain, and snow. Although slideouts have weather seals, the slideout awning adds an extra measure of protection, making it possible to retract the slideout without first cleaning off its top. While traveling, the slideout awning has an auto-lock feature that prevents wind from billowing or unwinding the awning. When parked and it is time to deploy the room slideout, the auto-lock feature unlocks—making manual locking and unlocking unnecessary.

As part of your routine exterior inspection, check slideout awning(s) for proper operation and potential damage. Refer to the TMC Awning, Leveling, and Slideout System Guide for care and maintenance information.

## Storage Compartments

### **⚠ WARNING**

#### **CARBON MONOXIDE OR SUFFOCATION DANGER EXISTS**

- This is a storage area only and not intended for human or animal occupancy. Failure to follow these instructions could lead to injury or death.
- Do not allow children to enter or to play in or around this storage area.
- This area is not heated or cooled. Do not store perishables or items in this cargo area that may be damaged by heat or by exposure to cold temperatures.

### **⚠ WARNING**

Storage compartments have load limits. Do not exceed load limits posted on warning labels. Distribute the weight evenly and do not overload.

### **⚠ WARNING**

When closing the compartment storage doors, make sure that hands and fingers are clear of pinch points. Make sure all compartment doors are completely closed and latched, and all contents are properly secured prior to moving the motorhome.

Exterior storage compartments provide a convenient and secure location to stow travel items and equipment. Most exterior storage bays are equipped with lockable latches. Some are equipped with struts or other convenient features.

When storing items in the compartment bays, do not overload them with heavy packed items. Remember that any carry-on items or equipment placed in storage compartments affects the overall weight of the vehicle. Ensure that the side-to-side loading is balanced, and the load distributed evenly. Please refer to Section 6, Weighing, Loading, and Towing.

**NOTE:** Items placed in exterior storage compartments may shift during travel.

## Exterior Ladder

### **⚠ WARNING**

#### **LADDER CAPACITY IS 250 lbs. MAXIMUM**

- Exceeding the maximum capacity can lead to ladder collapse and possible personal injury.
- Always face ladder and use both hands to climb slowly.
- Always wear shoes that provide good traction. Failure to comply can result in a fall hazard and result in a personal injury.

If equipped, the exterior rear ladder provides access to the roof for inspection and maintenance of the roof and roof mounted items.



Typical roof ladder

- When ascending and descending the ladder, ensure the ladder is clear of debris, such as water, ice, and other slippery substances.
- Always use both hands when ascending and descending the ladder.
- Always face the motorhome when ascending and descending the ladder.
- Always wear shoes that provide good traction, and do not wear sandals or other types of slip-on footwear when ascending or descending the ladder.
- Take into consideration the additional length the ladder adds to the motorhome when backing up or parking your motorhome.

## Roof

### **⚠ WARNING**

**DO NOT CLIMB ON OR WALK ON THE ROOF WHILE WET, ICY, OR SNOW COVERED. THE ROOF COULD BE VERY SLIPPERY CAUSING YOU TO FALL, WHICH CAN RESULT IN SERIOUS INJURY OR DEATH. DO NOT USE THE ROOF AS AN OBSERVATION PLATFORM OR STORAGE AREA, AS IT IS NOT DESIGNED FOR THESE PURPOSES.**

TMC motorhomes have plywood reinforced roofs which are strong enough to walk on, but is not designed to be an observation platform. Use the exterior ladder to climb up on the roof to inspect and maintain the roof, roofing seals, and roof-mounted components.

## Ramp Door (if equipped)

There are several ramp door configurations, depending on your motorhome model year, make, and model. Each ramp door has a load limit weight rating label, set and affixed by the ramp door manufacturer. If you have questions regarding the operation or maintenance of your motorhome ramp door, please contact your selling dealer or TMC Customer Care at:

**877-855-2867**

## Ramp Door Patio Enclosure

### **⚠ WARNING**

- **Make sure there are no obstructions when raising, lowering or using the ramp door. Keep all people and pets clear of the motorhome while operating the ramp door.**
- **Always visually confirm the ramp door is shut and locked in the travel position before moving the motorhome. Moving the motorhome while the ramp door is lowered to the ground or in the patio position could cause damage to the ramp door and the motorhome.**
- **Never exceed the weight limits of the ramp door when it is being used as a loading ramp (down position) or as a patio, if equipped (horizontal position). Never exceed the carrying capacity of the garage area and the GVWR of the motorhome.**
- **To prevent falls and injuries, never use the ramp door as a patio without the patio barriers.**

### **⚠ CAUTION**

**Do not allow jumping, running, or rough play on the patio enclosure. Stress or failure of the mounting and/or support mechanisms could occur, which could lead to severe personal injury.**

Thor Motor Coach Outlaw models (Class A and C) may be equipped with an optional ramp door patio enclosure. The ramp door patio consists of a patio barrier, a gate, and often an awning installed over the back of the motorhome. Some patio enclosures may include steps that can be installed to allow access to the ground level. Refer to the instructions included in your Owner's Packet for Ramp Patio set-up and stowage.

To prevent injuries due to falls, inspect ramp door cables and attachment brackets before each use to ensure the cable system is in good working order. Always use the patio barriers whenever the patio is in use and ensure all fasteners are secure. Never overload the ramp door when it is used as a patio or loading ramp.

**NOTE:** Full instructions for operating Class A and Class C Ramp doors and patio enclosures are provided in the TMC Outlaw Class A and C Supplement, available through your on-line TMC Owners Resource account.

8



Typical Ramp Door Patio

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# Interior

## Interior Lighting

The interior lighting installed in your Thor Motor Coach motorhome provides safe and convenient illumination for the living space of your RV. All interior lighting fixtures, which include ceiling, reading, accent, and safety illumination operate on 12 volts DC. In later model motorhomes, interior lighting comprises of energy-efficient and long-lasting LEDs.

Most control switches for interior lights are located on a wall-mounted switch. Multiplex systems include a master lighting control menu. Some accent lighting fixtures have a built-in push-on, push-off switch located in the center of the fixture cover.

## Powering the Lighting System

Since all interior lighting fixtures operate on 12 volt DC power, the motorhome's 12 volt DC power system must be activated.

### TO OPERATE LIGHTING FIXTURES BY THE ON-BOARD 12 VOLT AUXILIARY BATTERY(IES):

1. Turn ON the main battery disconnect switch, located near the main entrance door of the motorhome.
2. Operate interior lights as needed.

### TO OPERATE LIGHTING FIXTURES BY SHORE POWER:

1. Connect the shore power cord to an external power source.
2. Operate interior lights as needed. Power for the lights (and other 12 volt devices) is sourced through the on-board converter (located within the power load center), which transforms incoming 120 volts AC to 12 volts DC.

### TO OPERATE LIGHTING FIXTURES BY THE ON-BOARD GENERATOR:

1. Turn the main battery disconnect switch ON (must be ON in order to start and operate the generator).
2. Operate interior light as needed. Power for the lights and other 12 volt devices is sourced through the on-board converter (located within the power load center), which transforms incoming 120 volts AC to 12 volts DC.



Efficient 12 volt LED lighting provides safe and convenient illumination in all areas of the motorhome

#### NOTES:

- Motorhomes equipped with a multiplex control system have the interior lighting controls integrated into the main control panel, with additional remote lighting panels located throughout the motorhome. Individual lighting icons that display and arrow are dimmable. Press and hold the light icon until the light fixture dims to the desired illumination level.
- When leaving the motorhome for longer than a few hours and not connected to shore power, it is good practice to turn off interior lighting and turn OFF the main battery disconnect switch. Doing so will prevent the auxiliary (house) battery from unnecessary discharging.

## Appliances

### **⚠ DANGER**

**DO NOT USE GAS COOKING APPLIANCES FOR COMFORT HEATING. CAN LEAD TO CARBON MONOXIDE POISONING, WHICH CAN CAUSE DEATH OR SERIOUS INJURY.**

**DO NOT OPERATE GAS RANGES OR GAS COOKTOPS WHILE THE VEHICLE IS IN MOTION.**

### **⚠ WARNING**

**GAS COOKING APPLIANCES NEED FRESH AIR FOR SAFE OPERATION. BEFORE OPERATING:**

- **Open vents or windows slightly or turn on exhaust fan prior to using cooking appliance.**
- **Gas flames consume oxygen, which should be replaced to ensure proper combustion.**
- **Range covers must be open when the surface burners are in operation.**
- **Improper use can result in death or serious injury.**

### **⚠ WARNING**

- **RANGE COVERS MUST BE OPEN WHEN THE SURFACE BURNERS ARE IN OPERATION.**
- **IF YOUR MOTORHOME HAS A PRIVACY CURTAIN WITHIN 6 FEET OF THE GAS COOKTOP; do not operate unless the privacy curtain is secured away from the appliance or removed.**
- **DO NOT STORE COMBUSTIBLE MATERIALS ON OR NEAR GAS APPLIANCES.**
- **May cause a fire, which could result in death or serious injury.**

Due to the wide variety of appliances installed in TMC motorhomes, appliance operational instructions are not included in this manual. Individual component operational manuals are included with your TMC Owner's Packet. Component manuals are also available from TMC's Owners Resource web-site:

[www.thormotorcoach.com/owner-resource/](http://www.thormotorcoach.com/owner-resource/)

Please refer to the specific appliance component manufacturer's owner's manuals for safety, operation and maintenance instructions. If the information is missing from your Owner's Packet, please have the brand, model, and serial number of your specific appliance available before contacting your selling dealership for assistance in obtaining a replacement. For your convenience, many appliance manufacturers have their component manuals

available for download from their respective websites.

Each appliance in your motorhome is warranted by its manufacturer. It is very important that you review ALL the literature provided in your TMC Owner's Packet. Fill out and mail any warranty registration cards as required by the appliance manufacturers. Please contact your selling dealer, TMC Customer Care, or the appliance manufacturer if you have any questions regarding the operation, maintenance, or safety of the appliances in your motorhome.



Typical range and microwave

## Refrigerators

### **⚠ DANGER**

**TO PREVENT SPARKS AND POSSIBLE EXPLOSIONS OR FIRE, TURN OFF THE GAS/ELECTRIC TYPE REFRIGERATOR AND ITS IGNITER WHEN FUELING THE MOTORHOME OR RE-FILLING THE LP TANK.**

### **⚠ WARNING**

**Read and follow all appliance manufacturers warnings, safe operating instructions, and safety labels, installed on your motorhome, provided in your Owners Packet, available through the TMC Owners Resource document service, or available directly from the appliance manufacturer.**

Your TMC motorhome is factory-equipped with one or more of the following types of refrigerators:

- Residential, 120 volt AC (compressor type);
- RV Gas/electric (absorption type), or;
- Electric, 12 volt DC (compressor type).



Compressor type refrigerators are similar to those found in most residential homes, therefore, they may be referred to as a 'residential-type' refrigerator. These refrigerators use an electric motor, which drives a compressor. Cooling is accomplished as the refrigerant cycles through phases of condensing and evaporating.

Absorption-type RV refrigerators use a heating element, a heat-transfer device, and a mixture of water and ammonia as a means of cooling the interior of the refrigerator. The heat source is supplied by a LP burner or an electric heating element, which is powered by 120 volts AC. Cooling is accomplished as a cycling process of the ammonia evaporating from the water, and then being re-absorbed when it condenses. There are no moving parts in an absorption refrigerator.

The 12 volt DC refrigerator has a compressor-type refrigeration unit, but the motor operates on 12 volts DC. Both the absorption -type and the electric 12 volt DC refrigerators require 12 volts DC for control circuitry.

#### POWERING REFRIGERATORS DURING TRAVEL

To keep the refrigerator operating while the motorhome is either in-transit or off-the-power grid, each type of refrigerator is provided with a unique method of power. If your motorhome has a residential, 120 volt AC, compressor-type refrigerator, it is equipped with an inverter that has adequate power output to operate the refrigerator via power delivered from the auxiliary batteries. Be sure the master battery disconnect switch is ON, along with the inverter. To prevent battery discharge, only operate the refrigerator via the inverter when the vehicle's engine is running. You can also operate the refrigerator from power supplied by the on-board generator while in-transit.

If your motorhome is equipped with a gas/electric refrigerator, operate the refrigerator on gas (on-board LP) while in-transit. Be sure the main gas valve is ON at the LP tank and that the master battery disconnect switch is ON (supplying control circuitry with 12 volt power). Some states have strict regulations regarding operating gas appliances while in-transit. If regulations prevent LP gas use while in-transit, operate the refrigerator on 120 volts AC, delivered by the on-board generator.

If your motorhome is equipped with a 12 volt DC compressor-type refrigerator, it can be operated on the auxiliary battery(ies) while in-transit. To prevent severe battery drain, the motorhome will also be equipped with a stand-alone Automatic Generator Start (AGS) device (refer to AGS, Electrical Section). When ON, the AGS will automatically start and operate the generator, supplying power to the refrigerator via the on-board converter, which also supplies charging voltage to the auxiliary battery(ies).



Typical gas/electric refrigerator



Residential refrigerator

For complete instructions on the refrigerator supplied with your motorhome, refer to the manufacturer's instructions provided in your Owner's packet. Also, refer to the TMC Quick Start Guide, Refrigerators, available through the TMC Owners Resource on-line document service.

**NOTE:** Stored food items may shift during travel. Use caution when opening the refrigerator door during and after travel.

## Washer and Dryer Installation

If you are installing an optional dryer (motorhome models that accept washer/driers), it is important to follow the directions listed on the label affixed to the motorhome:

### WHEN INSTALLING CLOTHES DRYER IN THIS CLOSET

REFER TO APPLIANCE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR:

- a) DRYER TO BE LISTED BY THE APPLIANCE MANUFACTURER AS "SUITABLE FOR INSTALLATION" IN CLOSET LOCATIONS.
- b) VENTILATION OPENINGS (FRESH AIR) TO BE SIZED PER INSTALLATION INSTRUCTIONS.
- c) EXHAUST DUCT TO BE INSTALLED AND SIZED PER INSTALLATION INSTRUCTIONS.

**NOTE:** DUE TO VARIATIONS OF DRYER MANUFACTURERS, NO DRYER VENT FRAMING HAS BEEN INSTALLED. REMOVE THIS PANEL TO COMPLETE THE DRYER VENT INSTALLATION.

DA2182

**NOTE:** Always turn OFF the air conditioner, furnace, and all electrical appliances before disconnecting the shore line power cord from the 120 volts AC power source or shutting OFF the generator.

## Entertainment Systems

### NOTICE

If installed, exterior speakers are waterproof, however, exterior televisions are NOT waterproof or water resistant. Care must be exercised to keep exterior televisions from water and wet weather conditions.

TMC motorhomes are factory-equipped with many different entertainment devices, depending on motorhome model, floor plan, and options selected. For more detailed information regarding a specific component installed in your motorhome please refer to the respective component manufacturer's owner's manuals included your TMC Owner's Packet or download from the Owners Resources section of the TMC website. For your convenience, many component manufacturers make their literature available for download from their respective websites.



Typical living area entertainment system

## WiFi Connectivity (if equipped)

Your motorhome may be factory-equipped with a Winegard WiFi extender. Designed specifically for the mobile environment, the Connect™ 2.0 is a long-range, high performance WiFi extender that increases the range of existing WiFi hotspots. It maximizes speed and range from both WiFi and 4G LTE networks to keep users connected in all but the most remote areas. The Connect™ 2.0 will also accommodate WiFi calling mode in the absence of cell signal inside the RV.

To become operational, the WiFi extender requires set-up procedures that are unique to each unit. Refer to the manufacturer's set-up and operational guide, provided by the manufacturer and included with your TMC Owner's Packet. Contact the manufacturer for technical support.

<https://winegard.com/support>



Winegard® Connect™ 2.0 WiFi and 4G LTE extender

### NOTES:

- If equipped, turn your TV antenna booster ON while watching local television stations (OTA); turn OFF the TV antenna booster when watching cable or satellite.
- Depending on the model, the WiFi Extender installed on your motorhome may not include FM or other OTA antennas.

## Sleeping Areas

### **⚠ DANGER**

The sleeping accommodations in this vehicle are designed for occupancy **ONLY** while the vehicle is **NOT** in motion. All occupants in this vehicle must be seated at a designated seating position and must wear seat belts at all times while this vehicle is in motion. Failure to do so can result in serious injury.

### **⚠ CAUTION**

#### **BEFORE OPERATING ELECTRIC BED:**

- Remove travel locks and recline driver and front passenger seat backs.
- Lower bed completely before use.
- The bunk has a weight limit; never exceed the weight limit of the power drop-down bunk.
- **USE TRAVEL LOCKS (PINS) WHENEVER BED IS IN THE RAISED POSITION.**

### **⚠ CAUTION**

#### **XXX LBS. MAX LOAD CAPACITY FOR THIS TWO PERSON BED**

- Failure to comply with the load capacity could cause bed failure which can result in injury.
- Elevated beds can present a fall hazard which may result in injury.
- Do not allow adults, children, or pets on drop-down beds or bunks while the lift mechanism is in operation.
- **BEDS ARE NOT TO BE OCCUPIED DURING TRAVEL.**

TMC motorhomes are well designed with a variety of sleeping accommodations. Many floor plans feature permanent queen and king size beds, while others feature folding beds, powered bunks and Murphy beds that conveniently raise or stow-away for added living space when not in use.

## Powered Over-cab Bunks



(Above) Powered Over-cab Bunk in the Raised position. (Below) Powered Over-cab Bunk in the lowered position. Your dealer is can instruct you in the operation of beds, bunks, and convertible furniture.



#### **TO LOWER THE POWERED OVER-CAB BUNK:**

1. Level and/or stabilize the motorhome with the on-board hydraulic leveling system or electric stabilizing jacks.
2. Turn the chassis engine OFF.
3. Ensure the Parking Brake is ENGAGED.
4. Turn ON the Master Battery Disconnect Switch.
5. If your motorhome is equipped with windshield and cab side window privacy shades (powered or manual), it is best to pull down or install the shades before lowering the bunk.

6. Remove the safety pins, both left and right side (Figure 1).
7. Fully recline the driver's and passenger's seat backs (Figure 2).
8. PRESS AND HOLD the operating switch to lower the over-cab bunk. Hold the switch until the bunk is completely lowered, and continue to hold the switch for a few additional seconds. This operation helps to keep the operating motors synchronized.

**NOTE:** Non multiplex systems require a master power key be turned ON prior to operation (Figure 3).

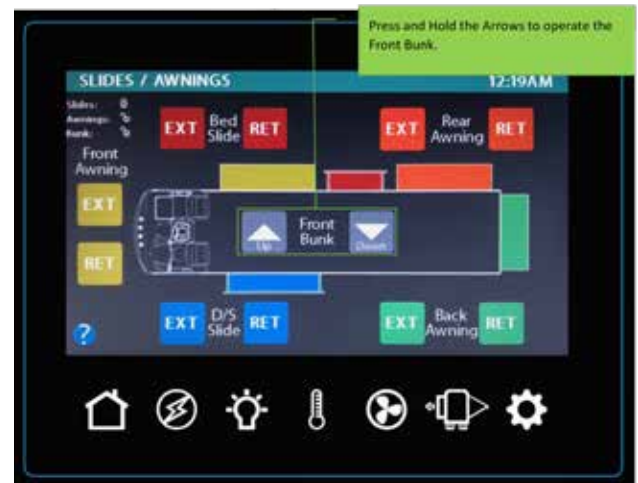


Figure 1. Remove both left and right-side travel safety pins.



Figure 2. Recline both front seat backs before lowering the powered over-cab bunk.

Figure 3. Motorhomes not equipped with multiplex control systems are equipped with safety switch panels similar to this illustration. Use a key to activate the control switch to either raise or lower the powered bunk. The key lock prevents unintended bunk operation.



With multiplex systems, the powered over-cab bunk operating controls are usually located on the Slides/Awnings Menu. Some multiplex systems will also include bunk controls on a convenient wall switch.

**TO RAISE THE POWERED OVER-CAB BUNK:**

**⚠ CAUTION**

- The powered over-cab bunk must be completely raised and secured in the travel position before driving the motorhome. Always travel with the driver and passenger seats in the fully upright (non-reclined) position.
- **DO NOT USE THE BUNK FOR STORAGE.** Using the bunk for storage may prevent the bunk from fully retracting, therefore preventing the placement of the safety pins.

1. Remove all non-bedding items from the bunk before raising.
2. Raise over-cab bunk until it stops; continue to hold the control switch for 3 additional seconds.

3. Install the travel lock pins.
4. Lower the powered over-cab bunk down onto travel lock pins; continue to hold the control switch for an additional 3 seconds. This operation helps keep the motors synchronized.
5. Return the front seats backs to their full up-right position.

**NOTES:**

- Powered over-cab bunks are usually equipped with an ignition lock-out that prevents the operation of the bunk while the vehicle's engine is running.
- If your motorhome is equipped with a multiplex control system, controls for the powered over-cab bunk are incorporated into the main touch-screen panel; usually on the Slides/Awnings menu screen.
- If your motorhome is not equipped with a multiplex control system, operation of the powered over-cab bunk is located on a separate switch panel, which includes a safety lock-out device, preventing unintended operation of the bunk.
- Powered bunks operate via the 12 volt electrical system and require fully-charged auxiliary battery(ies). If the auxiliary battery(ies) are not fully charged, plug into shore power or operate the generator to ensure adequate operating power for the power bunk.
- Powered over-cab bunks usually consist of an operating system of motors and gear tracks similar to electric slideouts. As with slideout operation, holding the operating switch until the bunk is either fully lowered or raised helps keep the motors in-sync. Avoid stopping mid-travel; motors have a tendency of becoming un-synchronized, which causes binding and prevents proper operation.

**SkyBunk™ (if equipped)**

Select TMC motorhomes models are equipped with SkyBunks, which are permanent bed areas, typically installed over a garage area and accessed by a ladder or stairway. There are weight restrictions for this elevated bed and lounging area. Weight restrictions will be posted on a safety label prominently affixed near the bunk access or access device.

**Electric Bed Lift Systems****⚠ WARNING****BEDS ARE NOT TO BE OCCUPIED DURING TRAVEL**

- **The sleeping accommodations in this vehicle are designed for occupancy only while the vehicle is NOT in motion.**
- **All occupants in this vehicle must be seated at a designated seating position and must wear seat belts at all times while this vehicle is in motion. Failure to do so can result in serious injury.**
- **Ensure there is no fuel, fuel containers, or other flammable liquids or materials in the garage area if it is to be used as a sleeping area. Breathing fumes is harmful and fumes present a fire hazard.**
- **Before operating any motorized bed system, ensure children and pets are well away from moving mechanisms.**
- **Stay clear of moving parts, which can pinch, crush, or cut.**
- **Do not allow children to ride or play on beds when beds are in motion.**
- **Do not raise beds when occupied with adults, children, or pets.**
- **Do not use raised bed as a storage area.**
- **Elevated beds present a fall hazard, which may result in injury. Use of safety nets is recommended for children using elevated beds.**
- **When the bed is in the raised position, always use safety lock pins to prevent beds from un-intended lowering.**

**⚠ CAUTION****BEFORE OPERATING ELECTRIC BED:**

- **Remove safety lock pins before attempting to lower bed.**
- **Lower bed completely before use.**
- **Drop-down beds have weight limits; never exceed the weight limit of the power drop-down bunk. Failure to comply with load capacity limits could cause bed failure, which could result in injury.**
- **The rear garage powered bed must be stowed and properly secured in the UP or raised position prior to and during travel.**

**⚠ CAUTION**

**XXX LBS. MAX LOAD CAPACITY FOR THIS TWO PERSON BED**

- Failure to comply with the load capacity could cause bed failure which can result in injury.
- Elevated beds can present a fall hazard which may result in injury.
- Do not allow adults, children, or pets on drop-down beds or bunks while the lift mechanism is in operation.
- **BEDS ARE NOT TO BE OCCUPIED DURING TRAVEL.**

Select TMC motorhome models may be equipped with electric drop-down beds located in a rearward garage area. Do not exceed weight ratings for drop-down beds or bunks.

When equipped, drop-down beds gives this area a convenient multi-purpose use; storage space for travel and sleeping accommodations when parked.

In addition, Class A Outlaw models feature powered over-cab drop-down bunks. and Class C Outlaw models have a permanent over-cab bunk area.

NOTE: All drop-down beds have a maximum weight rating. Never overload the bed. The garage bed lift system is a chain-driven two trolley mechanism operated by a 12 volt DC motor.

The typical load rating of the bed is 500 pounds in the stationary (lowered) position, however, follow all weight restriction labels installed on or near bed lifts.

**OPERATING PRECAUTIONS:**

- **ALWAYS** raise the bed(s) to the full up position before travel to avoid damage to the bed lift system.
- **ALWAYS** make sure the safety lock pins are securely fastened to all four corners of the bed platform before traveling.
- **ALWAYS** make sure that the areas above, below, and adjacent to the bed(s) are free from obstructions before operating the bed.
- **ALWAYS** check before operating bed to ensure that there is nothing interfering with the travel of the chain mechanism inside the c-channel.
- **ALWAYS** use care when loading cargo or vehicles in the garage area to avoid damage to the bed mechanism.



Drop-down bunk available in Class A (above) and Class C (below).



Typical safety lock pin



Typical Bed-lift switch panel. Styles may vary.

- **ALWAYS** properly secure loads in the garage area to avoid damage to the bed mechanism from shifting or falling loads.
- **NEVER** operate the bed with any items other than bedding on the bed platform.
- **NEVER** travel with any items other than bedding on the bed. Loose items can become projectiles.
- **NEVER** operate the bed with people or pets are on the bed platform.
- **NEVER** hang items from the bed frame or hang more than 20 pounds of weight on the cross connecting shaft.

#### TO LOWER THE GARAGE DROP-DOWN BED:

1. Ensure children, pets, and obstacles are well clear of the path of the moving bed.
2. Turn ON the master battery disconnect switch or plug into shore power, or operate the generator.
3. Locate the bed operating switch. In some installations the bed operating control may be integrated within the multiplex touch-pad controller. Other installations, the switch is located on a separate bed-lift switch panel.
4. Remove travel lock pins (4). To facilitate pin removal, slightly raise the bed, which releases tension from the pins.
5. Lower the bed to its sleeping position.

#### TO RAISE THE GARAGE DROP-DOWN BED:

1. Ensure children, pets, and obstacles are well clear of the path of the moving bed.
2. Locate the bed operating switch. In some installations the bed operating control may be integrated within the multiplex touch-pad controller. Other installations, the switch is located on a separate bed-lift switch panel.
3. Activate the switch to raise the bed.
4. Insert safety lock pins, usually one in each corner of the bed lift mechanism.

**NOTE:** Powered bunks operate via the 12 volt electrical system and require fully-charged auxiliary battery(ies). If the auxiliary battery(ies) are not fully charged, plug into shore power or operate the generator to ensure adequate operating power for the power bunk.

## Class C Cab-over Bunks

### **⚠ CAUTION**

**Risk of injury due to falls exist with all raised beds, bunks, and ladder use.**

- **Never occupy a cab-over bunk when the vehicle is in motion.**
- **Never exceed weight restrictions of a cab-over bunk area.**
- **Always use an appropriate ladder to access the bunk area.**
- **Use safety netting when children occupy cab-over bunk areas.**

Most Class C models include a roomy bunk area above the cab. When used safely, the cab-over bunk provides a convenient and out-of-the-way sleeping and lounging area. Over-cab bunks have weight limitations, which are posted on a safety label prominently affixed near the bunk access.

Always follow safe practices when using cab-over bunk areas, especially when occupied by children.

## Bed Safety Systems (owner supplied)

### **⚠ CAUTION**

**Ensure that safety nets or bed rails do not interfere with an emergency evacuation of the motorhome.**

Bed safety systems are not typically provided by TMC. You, the motorhome owner, should determine if a bed rail or safety net system is necessary and based on your intended uses, the age of the occupants, and their risk of injury. There are numerous bed safety system designs available. Inquire with your dealer about suitable bed safety systems and options. Your dealer should be able to assist you.

When installing a bed safety system, follow the manufacturer's installation instructions carefully, ensuring anchors are securely affixed to structural components. Take in to account the size and height of the mattress (either originally installed or a replacement) so that the safety system is the appropriate height above the top of the mattress. Make sure the bed safety system allows for rapid occupant egress in the event of an emergency.

#### TIPS FOR SAFE USE:

- Please use sound judgment when allowing children to sleep in any style of elevated bed. Generally, it is not advisable for children to sleep or occupy an elevated bed or bed loft area without adequate fall protection.

- Discuss proper usage of any elevated bed/electric bed lift system with your children and make sure they are supervised if playing in the bedroom/sleeping area of the motorhome with elevated beds. Do not allow horse-play on or under the elevated beds and do not hang items such as hooks, belts, jump ropes, or towels from any part of an elevated bed.
- Always follow the weight restrictions posted on the warning label near elevated beds.
- Do not allow children to operate powered bed lift systems (if equipped). Lowering and raising of powered beds should only be done by an adult.
- No person or pet should be on powered beds when being lowered or raised.

If you have any questions about elevated beds, powered bed lift systems, or bed safety systems, please contact TMC Customer Care at: **877-855-2867**

### Telescoping Bunk Access Ladders

#### **⚠ CAUTION**

**Only use ladder for its intended purpose as an aid to access over-cab bunks or other raised sleeping areas. Observe all weight restrictions of the telescoping ladder and ensure rungs are locked and secure before use.**

**Before climbing the ladder, ensure ladder clips are fully engaged into the ladder securing brackets located on the face of the bunk. Improper use and abuse of the ladder could lead to serious injuries.**

Your Class A or Class C motorhome may be equipped with a telescoping ladder that is designed specifically to be used to access over-cab or other elevated bunk areas. The ladder easily expands for use and collapses for compact storage.

Ladders are supplied in a variety of lengths and rungs, appropriate for use in your specific motorhome's application.

#### EXPANDING THE LADDER

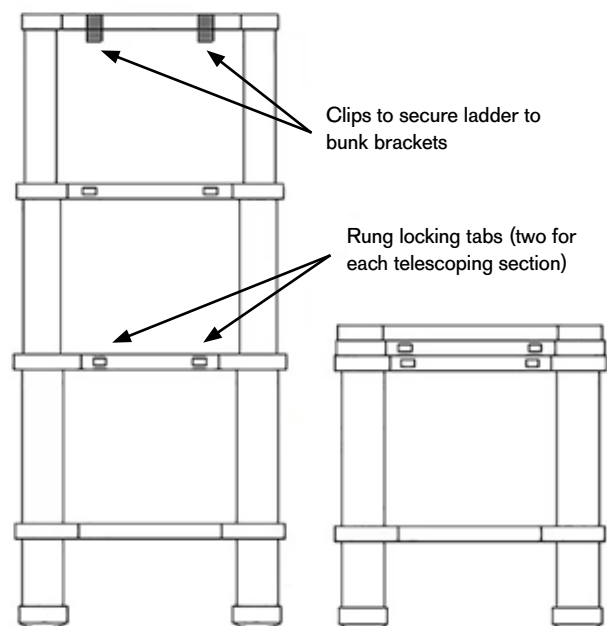
1. While holding the collapsed ladder in an upright position and ensuring your balance, place one foot on the lower rung.
2. Grasp the upper rung and pull upward until the ladder is fully extended.
3. Ensure the locking tabs on each rung fully engage.
4. Engage the clips located on the top rung into the ladder brackets located on the face of the bunk.
5. Carefully climb the ladder to gain access to the bunk area.

#### COLLAPSING THE LADDER

1. Lift the ladder, disengaging it from the securing brackets located on the face of the bunk.
2. Starting with the top rung, disengage the locking tabs by sliding the tab towards the center of the rung. When you hear a clicking sound, the tab will stay in an unlocked position. Repeat for the tab on the other side of the rung.
3. With the rung tabs unlocked, collapse the ladder tubes into the next lower section.
4. Repeat until all ladder sections are collapsed.
5. Stow the ladder.



To Unlock: slide tabs towards the center of the rung. When a 'click' is heard, tab will lock OPEN, allowing section to collapse.





## Sofa Bed Conversions

### **⚠ CAUTION**

Sofa beds contain hinged panels and brackets which present pinch points. Keep fingers and other body parts away from hinged panels and brackets.

#### TO CONVERT A JACK-KNIFE SOFA INTO A BED:

1. If the sofa is installed along a slideout wall, extend the slideout.
2. Lift the front edge of the bottom cushion to approximately 45 degrees and pull towards you (Figure 1).
3. With the pulling motion, the back of the sofa should begin to recline. Push the back down while continuing to pull the bottom towards you (Figure 2).
4. When the back cushion is horizontal, lower the bottom cushion to lay flat (Figure 3).

#### TO RETURN THE BED TO A SOFA:

1. Lift the leading edge of the bottom cushion to approximately 45 degrees (Figure 4).



Jack-Knife Sofa Bed

2. Push the leading edge of the bottom cushion in a downward and backward direction. This will lift the back cushion. Pull the back towards you while continuing to push the bottom cushion downward and backward (Figure 5).
3. When the back cushion is in its up-right position, lower the bottom cushion to its seating position (Figure 6).



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

**NOTE:** Sofas are usually fitted with safety belts, which may fall into the sofa base during bed conversion. When converting the bed back to a sofa, be sure to feed the safety belts through the space between the bottom cushion and back panel so that the safety belts are available for passenger use.

**EXPANDING THE L-SHAPE SOFA'S SEATING:**

1. If the sofa is installed along a slideout wall, extend the slideout to ensure adequate floorspace for the sofa extension and bed (Figure 1).
2. Release the catch-lever located on the outside arm of the sofa (Figure 2).
3. Pull the L-Shape seat to its full extension (Figure 3).
4. Grasp the pull strap located along the front edge of the seat cushion and pull up AND outward. Then lower the seat cushion in its extended and horizontal position (Figure 4).
5. Flip the back panel to its vertical position (Figure 5).
6. Place the back cushion against the back panel (Figure 6).



L-Shape Sofa

**RETURNING THE SEAT TO ITS STOWED POSITION:**

To stow the L-shape seat, reverse steps 1-6.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

**NOTE:** Sofas are usually fitted with safety belts, which may fall into the sofa base during bed conversion. When converting the bed back to a sofa, be sure to feed the safety belts through the space between the bottom cushion and back panel so that the safety belts are available for passenger use.

**CONVERTING THE L-SHAPE SOFA TO A BED:**

The sofa can be converted to a bed with the L-Shape seat expanded or contracted.

1. Remove the back two cushions and place them to the side (Figure 7).
2. Grasp the bottom of the seat cushion, lift up AND pull towards you. With this motion, the back panel should begin to rotate and move in a downward motion (Figure 8).
3. Move your hands to the top of the cushion and continue to push it downward until it is in a horizontal position (Figures 9 and 10).
4. Place the two back cushions on the horizontal back panel. This completes the bed conversion (Figures 11 and 12).

**TO RETURN THE BED TO A SOFA:**

1. Lift the leading edge of the bottom cushion to approximately 45 degrees.
2. Push the leading edge of the bottom cushion in a downward and forward direction. This will also lift the back panel. Grasp the top of the back panel and pull towards you while continuing to push the bottom cushion downward and into the sofa base.
3. When the back panel is in its vertical position, lower the bottom cushion to its horizontal seating position.
4. Place the two back cushions along the back panel, in their up-right seating position.



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11



Figure 12

**NOTE:** Sofas are usually fitted with safety belts, which may fall into the sofa base during bed conversion. When converting the bed back to a sofa, be sure to feed the safety belts through the space between the bottom cushion and back panel so that the safety belts are available for passenger use.

**TO CONVERT A TRI-FOLD SOFA INTO A BED:**

1. If the sofa is installed along a slideout wall, extend the slideout to ensure adequate floorspace for the bed.
2. Remove the back cushions and set aside (Figure 1).
3. Grasp and lift the front edge of the bottom cushion (Figure 2) and rotate to approximately 90 degrees (Figure 3).
4. While holding the seat in position, flip and lock both folding legs (Figure 4).
5. With a firm grasp of the bottom of the sofa, lift and pull towards you (Figure 5).
6. Continue to lift and pull out the seat cushion panel until the seat panel and center panel are fully extended and lower to the floor (Figure 6).
7. Grasp the back panel and lower to its horizontal position (Figures 7 and 8).
8. Place the back cushions against the outside wall (Figure 9).

**NOTE:** Sofas are usually fitted with safety belts, which may fall into the sofa base during bed conversion. When converting the bed back to a sofa, be sure to feed the safety belts through the space between the bottom cushion and back panel so that the safety belts are available for passenger use.

**TO RETURN THE TRI-FOLD BED TO A SOFA:**

1. Rotate the back panel to its vertical position.
2. Lift the outside edge of the seat panel upward while folding the middle panel into its stowed position.
3. Fold the flip-out legs to their stowed position along the bottom of the seat panel.
4. Lower the seat panel to its seating position.
5. Return the back cushions to their seating position.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9

## Dinette Bed Conversions

### **⚠ CAUTION**

To avoid injuries, ensure tabletop is secured by its locking mechanism when it is in the up-right (dinette table) position.

Most dinette seating areas are convertible to a sleeping berth. The table top is lowered from its normal position and becomes part of the bed foundation. Some tabletops are attached to brackets (Dream Dinette), which allows the tabletop to be easily lowered to the bed position, while other dinette designs require the removal of tabletop from support pedestal tubes, and manually placed into the lowered position.

#### STANDARD DINETTE BED CONVERSION:

1. Remove the dinette seat and back cushions and set aside.
2. Lift the tabletop from its support pedestal(s).
3. Remove the support pedestal(s) from the floor bracket(s).
4. Place the tabletop between the dinette seats, ensuring the table edges are engaged in the seat channel.
5. Place the seat and back cushions on top and across the lowered table and dinette seats.



Typical Dream Dinette

#### DREAM DINETTE BED CONVERSION:

1. Remove both dinette back cushions (Figure 1).
2. From underneath the tabletop, flip the locking lever to its unlocked position (Figure 2).
3. Pressing equally and down on both long edges of the tabletop (Figure 3), lower the tabletop to its lowest position (Figure 4).
4. Place the seat and back cushions on top and across the lowered tabletop (Figure 5).

When returning the bed to the dinette configuration, be certain to lock the tabletop in the up-right position, with the lock-lever (Dream Dinette), or ensure the tabletop is securely fastened to the pedestal tube(s) and the pedestal tube(s) are secured into their floor bracket(s).



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5

NOTE: Dinette seating areas are usually fitted with safety belts. When converting the dinette back to normal seating, be sure safety belts are available for passenger use.

## Murphy Beds

Several TMC motorhome floor plans are equipped with space-saving Murphy beds. These beds simply fold-down from their up-right and stowed position for comfortable bed-time use. When more floor space is needed or when prepping the motorhome for departure, Murphy beds are easily returned to their up-right and stowed position.

### MANUAL MURPHY BED: LOWERING THE BED

1. Remove back cushions and place to the side (Fig. 1).
2. Pull up and raise the foot bar, ensuring it locks into its fully extended position (Fig. 2).
3. Pull down on the release latch located along the upper right corner of the bed mechanism (Fig. 3).
4. Carefully rotate and lower the bed to its horizontal position (Figures 4 and 5).
5. Be sure the foot bar is in its fully vertical and locked position when the bed is in its fully horizontal position.

### RAISING THE BED

1. Lift the outer edge of the bed to a near vertical position.
2. Rotate the foot bar down and towards the bottom of the bed.



Manual Murphy Bed

3. Continue to push and rotate the bottom of the bed to its full up-right position, ensuring the latch located along the right-side and upper edge engages; securing the bed.
4. Replace the back cushions.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

**POWERED MURPHY BED: LOWERING THE BED**

1. Remove the back cushions and place to the side (Fig 1).
2. Locate the power switch. Turning the key to the right (clockwise) unlocks the control pad (Fig. 2).



Figure 1

3. Press and hold the DOWN switch and lower the bed to approximately 45 degrees (Fig 3).



Figure 2, 3

4. Grasp the folded foot bar and rotate approximately 180 degrees (Fig 4).



Figure 4

5. Pull the locking pin to release the lower portion of the foot bar and rotate to its extended position. Be sure the lock mechanism secures the lower foot bar in the lowered position (Fig 5).



Figure 5

6. Press and hold the DOWN switch until the bed is in its full horizontal position.

Be sure the foot bar remains in its fully vertical position (Fig 6).



Figure 6



Powered Murphy Bed; stowed (above) and lowered position (below)



**RAISING THE BED**

7. Press and hold the UP switch and raise the bed to approximately 45 degrees.
8. Pull the locking mechanism to release the lower foot bar and rotate to its folded position.
9. Rotate the folded foot bar to its stowed position, on top of the bed mattress (Fig 9).
10. Continue to press and hold the UP switch until the bed is fully vertical.

11. Turn the switch key to the left (counter-clockwise) to secure the control pad.

12. Replace the back cushions.



Figure 9

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# Electrical System

## ⚠ WARNING

**Whether a device or appliance operates on 120 volts AC or 12 volts DC, great care must be observed while using any electrical device and working with electrical wires and connections. Although all electrical circuits of your motorhome are protected by either fuses or circuit breakers, the electrical system has the potential of delivering dangerous electrical shock or the possibility of fatal electrocution. A qualified electrical technician should perform all maintenance and repairs to the wiring, devices, or components of the electrical system.**

## Introduction

Your motorhome is designed to provide you and your traveling companions with many modern living conveniences, while enjoying the freedom of traveling the highways and byways of your choosing. Your motorhome's electrical system is designed to provide safe, reliable energy to power the mobile features that enhance the RV'ing experience.

The electrical system is a blend of two distinct electrical platforms, consisting of an 120 volt alternating current (VAC) system, and a 12 volt direct current (VDC) system. The 12 volt DC system is further segregated into the coach (house) and the vehicle (chassis) segments. Both the AC and DC power systems are required in order for your motorhome to function as intended. For terminology purposes, this manual will reference the living space of the motorhome as the HOUSE, while the vehicle portion will be referred to as the CHASSIS.

**NOTE:** Throughout this section, the term 'house' or 'RV' is used to describe the recreational vehicle (RV) living quarters, components, systems and features of your motorhome, while the term 'chassis' refers to the vehicle manufacturer's components, systems, and features.

Most of the electrical components of your motorhome are designed to operate on 12 volts DC. This includes lights, furnace control, water heater control, water pump, powered ventilation fans, awnings, slideout rooms, and some appliances. While other features, such as some kitchen appliances, air conditioner(s), TV's, DVD players, and some awnings operate on 120 volts AC. Provided with your motorhome are power outlets for both 120 volts AC and 12 volts DC; so that you can conveniently power portable appliances you bring along while traveling.

**NOTE:** Due to the many model variations, options, and continuous production changes offered by TMC, wiring diagrams are not included in this manual. Any specific questions you may have regarding the electrical system of your motorhome should be directed to your TMC Motorhome Dealer or to a TMC Customer Care representative, which can be reached via telephone (toll free): 877-855-2867.

## 12 Volt Power System

Power for the 12 volt DC electrical devices installed in your motorhome is supplied either by the on-board battery(ies) or by the converter when connected to shore power or operating the generator. The block diagram on the following page shows the major components of the 12 volt power system and how they work as a system.

## House (Auxiliary) Battery(ies)

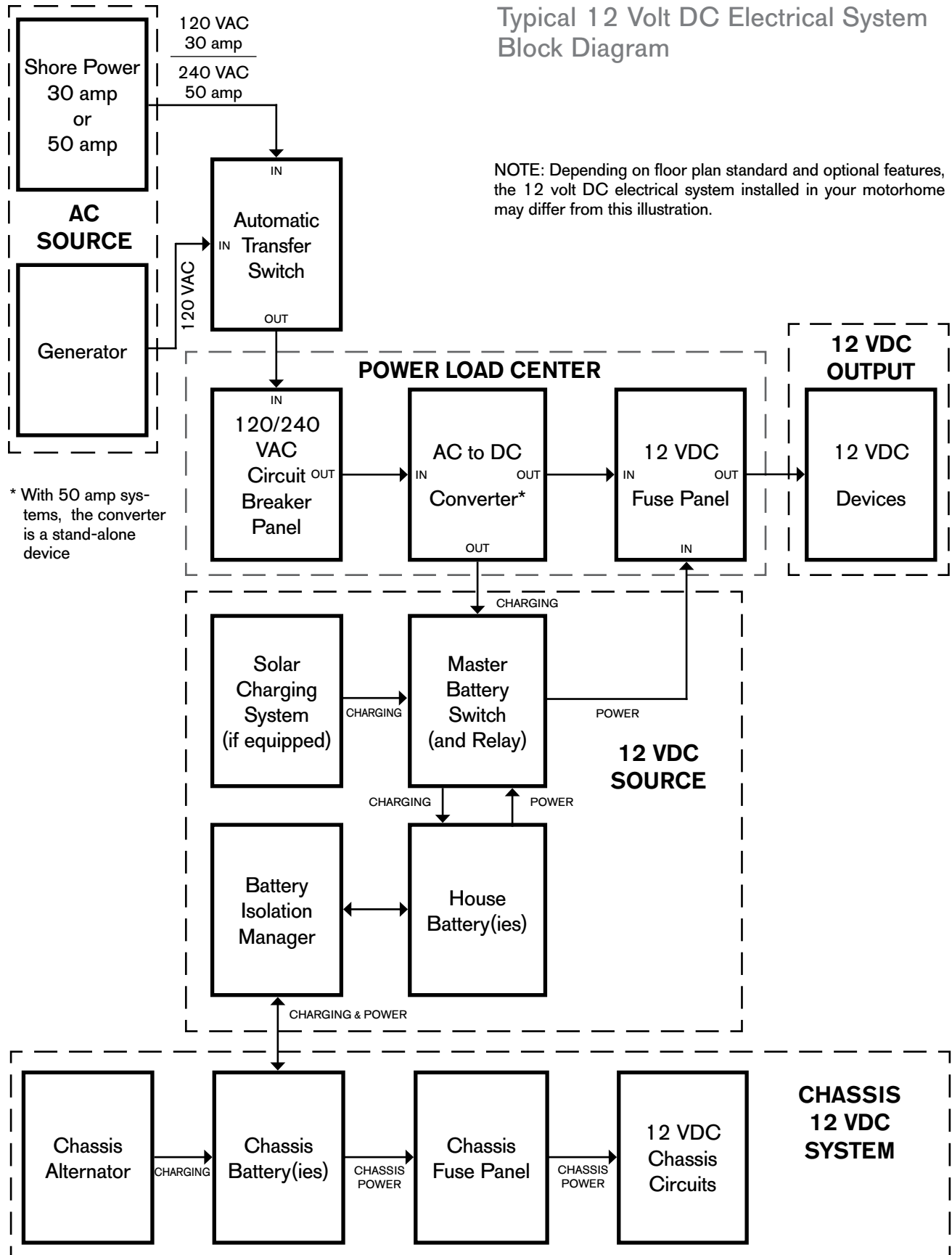
### ⚠ WARNING

**Do not store items in the battery compartment or near the battery(ies) that might come in contact with the battery terminals. This could cause an electrical short circuit, drain the battery, cause a spark, or ignite combustible materials.**

Your motorhome is supplied with lead-acid, deep-cycle type storage battery(ies), similar to the batteries found in recreational boats and golf carts. Deep cycle batteries are designed to be less susceptible to internal damage when operated in cycles of near depletion (discharge) and full recharge. Depending upon the features installed, the motorhome may be supplied with more than one auxiliary battery. Some floor plans allow for the addition of extra batteries, to enhance electrical storage capacity.

For Class C Motorhomes, the house battery is generally located in a compartment underneath the entry steps. Class A motorhomes usually have a battery compartment, accessed by a panel located along the lower portion of the exterior. Some models are provided with a slide-out battery tray, making battery access more convenient. Class A diesel motorhomes may have multiple 6 volt batteries, but are wired to deliver 12 volts DC to the house. This battery configuration is designed to provide increased battery amperage capacity.

### Typical 12 Volt DC Electrical System Block Diagram



NOTE: Depending on floor plan standard and optional features, the 12 volt DC electrical system installed in your motorhome may differ from this illustration.

\* With 50 amp systems, the converter is a stand-alone device

## Controlling Battery Power

There are several devices of the electrical system that are designed to control power to and from the motorhome's house and chassis batteries. Battery power management is important in order to:

- Turn the 12 volt electrical power ON and OFF;
- Charge the house and chassis batteries;
- Manage battery power output;
- Monitor battery charge condition.

Following, is a brief description of the electrical devices used to control the 12 volt power system of your motorhome.

## Master Battery Disconnect Switch

### NOTICE

**When traveling, the master battery disconnect switch must be turned ON to operate the dash radio and backup camera system (if equipped).**

The master battery disconnect switch is typically located just inside the motorhome's main entrance. It is used to connect power from the auxiliary (house) battery(ies) to the motorhome's 12 volt DC electrical system, hereby providing power to the motorhome's interior lighting and other 12 volt DC devices. Although the style of this switch may vary, from a rocker-type to a rotary switch, the function remains the same.

- When the switch is in the ON position, the auxiliary (house) batteries are connected to the 12 volt electrical system.
- When the switch is in the OFF position, the auxiliary (house) batteries are disconnected from the 12 volt electrical system.

In some installations, the master battery disconnect switch does not directly connect and disconnect 12 volt power. Direct power connection is accomplished through a battery relay, which is controlled by the master battery disconnect switch. The battery relay is located in the battery compartment and can be identified by the direct connection of the positive battery cables to it.

When connected to 120 volt shore power or the on-board generator is being used, the 12 volt system is powered through the converter, therefore, the master battery switch is not controlling 12 volt system power. However, when connected to shore power or operating the on-board

Typical Class A motorhome auxiliary (house) battery compartment



Typical Class C motorhome house battery location (under entrance step)

Typical master battery disconnect switches; rotary and rocker-type. Rocker-type switches control a relay, which in-turn, turns on and off power from the auxiliary battery(ies).



generator, charging voltage is provided to the auxiliary battery(ies) whenever the master battery disconnect switch is ON. Similarly, the master battery disconnect switch must be ON in order for charging energy from the solar charging system to connect to the auxiliary battery(ies).

### USING THE MASTER BATTERY DISCONNECT SWITCH

It is good practice to turn the master battery disconnect switch ON when first entering the motorhome and leave the switch ON whenever the motorhome is occupied, whether parked or traveling.

- This will energize the 12 volt electrical system, so that interior lights, appliance control circuits, and other 12 volt devices can be used.
- This provides charging voltage to the auxiliary battery(ies) via the vehicle's alternator (when traveling) or by the converter when connected to shore power or using the on-board generator.
- This will provide power to the dash radio, which is powered by the auxiliary battery(ies). Therefore, keeping the master battery disconnect switch ON while the motorhome is in motion, will allow the use of the dash radio and driving cameras, which in most installations, use the dash radio display for rear view and side view camera monitoring.
- When leaving the motorhome unattended for a few hours or more and not connected to shore power, turn the master battery disconnect switch OFF to conserve battery power, unless you need to keep an appliance, such as the refrigerator, operating.

- On select diesel motorhomes, the master battery disconnect switch, along with 12 volt circuit breakers, is located on a panel installed in a service bay of the motorhome.

### Chassis Alternator

The 12 volts DC chassis alternator supplies power to both the automotive systems as well as the auxiliary battery, if equipped, while the motorhome's engine is running. The alternator compensates for electrical usage in the vehicle, the power drawn by lights, fans, and other 12 volt powered items, as well as charging of the automotive and auxiliary batteries.

When driving, if the alternator is not keeping pace with the draw on your motorhome's electrical system, it means it is working in a negative mode; more power is being used than the alternator is capable of supplying. If you draw too much power from your batteries there may not be enough power left to start the motorhome or run the 12 volts DC appliances when you stop for a break or for the night.

The alternator will charge at a higher rate right after the motorhome has been started, replacing the power used to start the vehicle, but the charging should quickly drop back to 'normal' and hold its own even when you turn on lights or appliances.

If the alternator shows a discharge while the vehicle's engine is running, turn OFF appliances and lights to see if a charge comes on or if the alternator indicates 'neutral.' Then apply a load (turn ON a 12 volt DC appliance) on the system to see if a discharge returns. If a discharge persists, your alternator may not be working correctly; contact your dealer.

#### NOTES:

- Use the monitor panel to check both house battery and chassis battery voltage. A fully charged lead-acid battery will read 12.7 volts DC and 1.265 specific gravity at 80°F (32°C). A lead-acid battery is considered discharged at 11.8 volts DC by electronic standards.
- When voltage drops below these levels, permanent damage may occur. Due to their large energy storage capacity and depending on the rate of depletion, it may take up to 24 hours for a lead-acid battery to fully recharge.
- When connected to a 120 VAC power source, the converter (or the inverter) will trickle charge the house, and in some installations, the chassis battery.

## Battery Isolation Relay

### ⚠ CAUTION

Unless you intend to run the vehicle engine, keep the ignition switch in the OFF position. Doing so will:

- Reduce the risk of unnecessary chassis battery drain.
- Allows the battery isolation relay to connect the auxiliary battery to the house charging system.

When the motorhome's engine is running and the master battery disconnect switch is ON, the vehicle's charging system is connected to the house battery(ies) through the Battery Isolation Relay. This connection provides charging energy to the house battery(ies) when traveling.

When the motorhome's engine is not running, the chassis and auxiliary battery(ies) are electrically isolated by the use of a battery isolation relay. This device prevents house power consumption from discharging the chassis battery while the motorhome is parked.

### ADDITIONAL CHARACTERISTICS OF THE BATTERY ISOLATION RELAY:

1. The battery isolation relay electrically delays connecting the auxiliary batteries to the vehicle charging system for approximately 15 seconds; this allows the alternator time to reach full charging ability.
2. After this initial time delay, the battery isolation relay senses the voltage of the vehicle charging system. The isolator connects the auxiliary battery to the vehicle's charging system only when the chassis charging system reaches the correct voltage.
3. If the vehicle's charging voltage drops below 13.2 volts for a period of 4 seconds, due to low idle speed and/or excessive load, the battery isolation relay will disconnect the auxiliary batteries from the vehicle's charging system until the vehicle's charging voltage returns to a level of 13.2 volts or above. For this feature, there is a built-in delay period of approximately 10 seconds.
4. The battery isolation relay allows vehicle starting from the auxiliary battery(ies) via the Emergency (Auxiliary) Start Switch.

## Emergency (Auxiliary) Start Switch (if equipped)

### NOTICE

Turn off all 12 volt DC devices before using the emergency start feature. This will help ensure that all available energy stored in the auxiliary battery(ies) can be used for vehicle starting.

Your motorhome may be equipped with an Emergency (auxiliary or AUX) Start Switch. Located in the vehicle's cockpit, near the drivers seating area, this switch connects the auxiliary battery(ies) to the vehicle's starting circuit. This feature is used for situations when the chassis battery is too depleted to start the vehicle on its own. Connecting the auxiliary battery(ies) to the engine starting circuit may provide the needed energy to start the motorhome's engine. When the Emergency Start Switch is released, the auxiliary battery(ies) are removed from the engine starting circuit.



Typical emergency start switch

### TO OPERATE:

1. Depress the 'EMER START' switch, located on the front driver's dash and HOLD.
2. Use the ignition switch (key or start button) to start chassis engine.
3. Release the 'EMER START' switch after the engine has started.

### EMERGENCY GENERATOR STARTING:

The Emergency Start switch can also be used to deliver extra starting power to the generator. This is accomplished by tying the chassis battery to the house battery via the battery isolation manager. This feature is useful in circumstances when the house battery is too depleted to start the generator.

1. Ensure the main battery switch is ON.
2. Press and hold the Emergency Start Switch.
3. While holding the Emergency Start Switch ON, DEPRESS the generator start switch (see generator starting procedure). Since these two switches are not physically near

each other, you may need the assistance of another person to operate one of the switches.

- When you detect the generator has started, RELEASE the generator start switch and the Emergency Start switch.
- Keep the main battery switch ON while the generator is operating. This will allow power from the generator to charge the house and chassis batteries via the converter (or in some installations, the inverter).

**NOTES:**

- When using the Emergency Start feature, do not hold the ignition key in the start position for more than 30 seconds.
- Be careful not to run down the auxiliary battery as this could leave you without 12 volts DC power.
- If starting cannot be accomplished, operating the generator for a few minutes may give the batteries the charge needed to start the vehicle.
- Emergency Start is not available on Mercedes-Benz Sprinter-based motorhomes.

**TO OPERATE:**

- Press and hold the BATT switch;
- One of an array of 4 LEDs will illuminate, indicating the charge condition of the house battery(ies);
- Read the battery condition and release the switch.



Typical Monitor Panel. Battery condition monitoring is usually located in the upper right corner.

**Battery Condition Indicator**

The charge condition of the batteries can be checked with the Battery Condition Monitor, located on the monitor panel or, if equipped, the Multiplex touch-screen panel. To check, press and hold Battery Test Switch while reading the charge level on the battery gauge LED. The indicator is divided into sections from weak through fully charged.

10

Press the BATT switch. A LED will illuminate; indicating the charge condition of the battery

LED Condition Indicators



Battery Condition LED's:

L = Low    F = Fair    G = Good    C = Full Charge



Typical multiplex main control panel. Electrical system monitoring is usually located on the main menu (House) screen.

**NOTE:** Monitor panel design, features, and functions vary depending on make, model year, and floor plan of the motorhome.

## Battery Charging

It is important to keep the auxiliary battery(ies) in a condition of full or near-full charge. Doing so will ensure you will have enough stored 12 volt DC energy when needed. Battery charging is accomplished by:

- Automatic charging through the converter or inverter (shore power or generator);
- With the vehicle engine running, auxiliary battery(ies) are charged via the chassis alternator (when Master Battery Disconnect Switch is ON);
- Auxiliary battery charging via solar charging system (equipped as standard, optional, or customer installed).

Take time to turn off all lights or other 12 volt accessories when not in use. Connect the motorhome to a 120 volt AC external source or run the generator whenever possible. Doing so will keep the auxiliary battery charged.

The auxiliary batteries are a deep-cycle type and are capable of being deeply discharged and rebound to full capacity when recharged. Due to their large energy storage capacity, the auxiliary battery(ies) may take up to 24 hours to completely recharge.

If for any reason, you recharge a auxiliary battery with a charger or power source other than what was supplied as part of the motorhome's original electrical system, make sure to follow all battery maintenance and safety instructions from the battery and battery charger manufacturers.

**NOTE:** The Master Battery Disconnect Switch must be ON in order to charge the battery(ies) by any on-board method described in the following sections.

### Charging by the Vehicle's Alternator

The motorhome's electrical system is wired so that when the vehicle's engine is running, and the chassis alternator is properly operating, charging voltage is supplied to both the chassis and house battery(ies). The master battery disconnect switch must be ON in order for the house battery to be charged by the chassis alternator (see Chassis Alternator and Battery Isolation Relay Sections).

### Charging by the Converter

The Converter is a 12 volt power supply, which operates on 120 volts AC (see Converter section) and is designed to

power the 12 volt system when the motorhome is connected to shore power or when the generator is running. The Converter also provides charging energy for the auxiliary (house) battery(ies).

If the battery condition is below its full charge, the charger will begin recharging the auxiliary battery at a rate that reflects the level of discharge. When the battery is fully charged, the charger drops its charging level back to a maintenance or trickle level to keep the battery fully charged.

### Charging by Solar Energy

Your Thor Motor Coach motorhome may be factory equipped with a solar battery charging system. Consisting of a solar charge controller, along with a roof-mounted solar panel (not typically factory-supplied), this system is designed to provide an alternate battery charging method for your auxiliary (house) battery(ies).

A properly installed solar panel charging system offers many advantages:

- **Clean, quiet, and easy to use**
  - ▷ Solar panels consume no fuel and give off no waste.
  - ▷ There are no moving parts, which means no mechanical noise.
  - ▷ Simply place the solar panel in the sun and you generate electricity.
- **Low maintenance**
  - ▷ Since solar panels consume no fuel and have no moving parts to wear out, there are no air, oil, or fuel filters to change. Simply keep the surface of the panels clean.
- **Safe and reliable**
  - ▷ Due to its relatively low power output and if the system is installed using proper wire sizes and fuses, it is inherently safe.

The solar charging system seamlessly integrates with your motorhomes 12 volt DC power system. The auxiliary batteries are automatically charged when the solar charge controller is ON, **along with the master batter disconnect switch**. The solar charge controller provides monitoring of battery condition, monitoring of the charge energy being supplied by the solar panel(s), and regulation of the charging energy.

When the controller senses that the auxiliary battery(ies) require a rapid-charge, the controller allows the full energy from the solar panel to charge the battery. When

the battery(ies) reach 100% state of charge, the controller reduces charge energy to a trickle charge level, thus protecting the battery(ies) from damage caused by overcharging.

Depending on the model, the maximum input current rating of the solar controller is 10 or 30 amps (energy supplied by the solar panel(s)). The typical factory-installed solar panel is rated for 100 watts (peak), with some solar panels having a rating of 190 watts (peak power). The output charge voltage is up to 14 volts DC. Solar panel(s) installed on your motorhome may vary from these specifications; refer to your Owner's Packet for details.

Maintenance and operational instructions from the manufacturer are included with your owner's packet and also available on-line, through the TMC Owners Resource document service.

#### NOTES:

- Peak solar panel power is obtained with full and direct exposure of sunlight. Atmospheric conditions determine the available power from the solar panel(s).
- The solar charge controller and associated solar panel is not designed to directly power the appliances and/or electric components installed in your motorhome.

All 12 volt systems and components are either powered directly from the auxiliary batteries or through the converter, which receives input power from either the on-board generator or external shore power service.

- For details regarding your solar panel and solar charge controller, refer to the manufacturer's owner's manuals included with TMC Owner's Packet.

10

### Solar Charging, 10 amp Controller

#### **⚠ CAUTION**

**Battery type selection on the controller determines charging parameters that best suit the battery type. Incorrect battery type selection settings may damage the battery.**

When installed, a 10 amp solar charging system includes 1 - 10 amp solar controller and 1 - 100 watt solar panel. This factory-installation is wired with 10 gauge wire from the solar panel to the solar controller and to the house battery. Due to controller capacity, it is not recommended to add additional solar panels to this system.



Typical 10 Amp Solar Charge Controller

### Solar Charging, 30 amp Controller

Select TMC motorhomes are equipped with a 30 amp solar charging controller and system. These installations include 1 - 30 amp solar controller and 2 - 100 watt solar panels, wired in parallel (200 watts). Some TMC models are equipped with a 30 amp solar charging controller and one 190 watt solar panel.

#### Operating Instructions for both 10 and 30 Amp Controllers

1. Turn ON the solar charge controller. Check the battery manufacturer's specification to select correct battery type. The controller provides 4 battery types for selection: Gel, AGM, WET (conventional lead acid), and Calcium. Check the label on the battery to determine the type.
2. Press **BATTERY TYPE** button and hold for 3 seconds to enter the battery type selection mode. The battery type selected will display on the LCD panel. This setting is placed in the controller's memory.
3. With the battery type selected, the solar charger is ready to use. The LCD displays the charging states as below. Pressing the **AMP/VOLT** button sequences through these displays:
  - Battery Voltage;
  - Charging Current;
  - Charged capacity (amp-hour), and;
  - Battery Temperature (if an external temperature sensor is connected).
4. Turn ON the master battery disconnect switch to connect the solar charger to the auxiliary battery(ies).



Once the battery type is entered into the controller's memory, it does not need re-setting, unless the auxiliary battery(ies) are replaced with a different type.

Refer to the manufacturer's instructions for additional operational details.

## Solar Panels

### NOTICE

**When installing a roof-mounted solar panel(s), ensure they are securely attached to mounting brackets and to structural components of the motorhome's roof. All mounting points and wiring ports need to be well sealed from moisture intrusion.**

Many TMC motorhome models are pre-wired from the factory for a dealer or owner installed solar panel. On select models, a 100 watt or a 190 watt solar panel is a standard factory-installed feature. When installed, a solar panel and associated power controller becomes part of the auxiliary (house) battery charging system.

The wattage rating of your solar panel was derived by a standard test method that all solar panel manufacturers use. This rating represents the solar panel's peak output under ideal conditions of sunlight intensity, direction, cleanliness of the surface and temperature of the panel. There are many atmospheric factors and physical conditions that will affect the output of your solar panel. On average, however, you should expect the output of your solar panel to be approximately 75-80 percent of its peak rating.

## Solar Prep

### ⚠ WARNING

**If not installed properly, a solar charging system can present electrical and fire hazards. Always ensure installations strictly follow all manufacturer's safety and installation guidelines.**

**Never install solar panels that have a higher current rating than the maximum input capacity of the solar controller installed in your motorhome.**

Most TMC models are factory-equipped with either a solar charging system (10 or 30 amp) or solar prep. All factory-installed solar preps include 10 gauge wire to the roof area, where a solar panel can be installed, along with 10 gauge wiring from the solar controller installation area to the battery compartment.

Along with 10 gauge wiring, many solar prep installations also include a 10 amp controller. With this configuration, it is simply up to the user to add solar panels to the roof area and connect the panels to the controller and the controller to the house battery. One **MUST ALWAYS** be aware of the maximum current capacity of the solar controller and never install solar panels of a higher current capacity than the rated input of the solar controller.

Follow all solar panel and solar controller manufacturer's safety and installation guidelines when installing a solar charging system to your motorhome.

NOTES: Consult with your dealer or TMC Customer Care when installing a solar panel with your factory-installed solar controller.

10 Gauge stranded wire is rated for up to 300 watts of electrical energy. Where:

- Wattage = Voltage x Current,
- 300 w = 12 volts x 25 amps
- Do not exceed the capacity of the solar charging wiring.

A 10 amp solar controller has the maximum input current capacity from the solar panels of 100 -120 watts:

- 120 w = 12 volts x 10 amps
- Do not exceed the input current capacity of the solar controller.
- Ensure all installations are properly fuse protected.

A 30 amp controller has the maximum input capacity from the solar panel array of:

- 360 w = 12 volts x 30 amps
- The system is wired with 10 gauge wire.
- Do not exceed the input current capacity of the solar controller or the system wiring.

## Battery Maintenance

### **⚠ WARNING**

- Keep sparks, cigarettes and flames away from the batteries as the hydrogen gas they create may explode.
- Do not connect a booster battery or other power source that outputs more than 14.2-volts DC to the motorhome batteries.
- Use adequate ventilation when charging or using batteries in an enclosed space.
- Remove metal jewelry and always wear eye protection when working around batteries.
- Do not allow battery electrolyte (acid) to come into contact with skin, eyes, fabric or painted surfaces. Electrolyte is a sulfuric acid solution that could cause serious personal injury or property damage.
- If your hands, eyes, clothes or the painted surface of your motorhome are exposed to electrolyte, flush the exposed area thoroughly with water.
- If electrolyte gets in your eyes, immediately flush them thoroughly with water and get prompt medical attention.

### **⚠ WARNING**

- **DO NOT SHORT ACROSS THE BATTERY TERMINALS.** The spark could ignite the gases. Do not wear metal jewelry, such as rings, watches, or metal wrist bands when working on a battery.
- Before doing ANY work on electrical system, disconnect battery cable and the 120 volt power cord. Do not reconnect the cables until all work has been completed. This will avoid the possibility of shorting or causing damage to electrical components or shock to the servicing person.
- Battery electrolyte is a corrosive, poisonous, sulfuric acid. Avoid contact with skin, eyes, clothing, or any painted surface.
- **ALWAYS WEAR SPLASH PROOF SAFETY GLASSES OR FACE SHIELD AND USE ACID-PROOF RUBBER GLOVES WHEN HANDLING AND WORKING WITH LEAD-ACID BATTERIES.**

Proper battery maintenance is important in order to ensure the battery retains its power delivery capacity while prolonging its useful life. Listed here are a few instructions for maintaining and servicing batteries. Some instructions apply only to batteries which are NOT maintenance-free, or sealed batteries.

The house batteries and chassis battery supplied with your motorhome may be maintenance-free, sealed type battery. Do not open or break seals on maintenance-free batteries.

1. Keep the battery mounted securely. Routinely check the battery terminals for loose battery clamps. Tighten when necessary.
2. Keep battery hold downs and trays clean and free of debris and corrosion.
3. Check the electrolyte level of the house batteries at regular intervals. Keep each cell filled to just above the plates with DISTILLED water only. Once the plates have dried out, they cannot be reactivated, and the capacity of the battery is reduced in direct proportion to the area of plate surface that has become dry. This kind of damage can occur quickly. If the fluid level is low, simply add distilled water.
4. Be cautious when removing battery fill caps. Pry off caps carefully. Forcing caps off can cause the electrolyte solution to splash. Electrolyte solution can burn, and even small amounts can damage eyes and skin. Always use proper personal protective equipment when working with batteries.
5. Keep the battery terminals clean. Corroded terminals make poor electrical contact and will prevent normal operation of the 12 volt system. Battery terminal corrosion occurs when the battery has been standing in a discharged condition over a long period of time, or when the battery has been operated continually in a state of partial discharge. Use a baking soda solution to neutralize the corrosion on the battery terminals and cable clamps. Do not allow the soda solution to enter the battery. Make sure the vent caps are secure. Flush with water. Thoroughly dry all cables clamps and terminals, reinstall, and use a battery terminal protecting spray or compound, available at automotive parts or auto service centers.
6. Check the outside condition of the battery. Look for cracks in the case or vent plugs. If the case is cracked, the battery must be replaced. If the vent plugs are cracked, they must be replaced.
7. Keep the battery in a full-charged condition. This will help prolong its useful life and help maintain its charge-holding capacity.

8. Watch for overcharging. Three indications of overcharging are:
  - a. Active material on the vent cap (heavy deposit of black lead-like material on the underside of the vent cap);
  - b. Excessive use of water or water escaping at vent caps;
  - c. Abnormal voltage regulator output.
9. When removing a battery, disconnect the ground battery clamp first. When installing a battery, always connect the grounded battery clamp last.
10. When replacing batteries, make sure the new battery is the same type and rating of the battery that was originally equipped with your motorhome. If in doubt, consult your RV dealer for advice on battery replacement.

**NOTES:**

- Only use distilled water when filling battery cavities. Be careful not to overfill battery cavities and never move or travel with a battery that is uncapped.
- Use a battery terminal conditioning spray (available at auto parts stores) to prevent battery terminal corrosion.

**Storage**

To prevent house battery discharge when the motorhome is not connected to power through the shore line power cord, turn OFF the main battery switch and disconnect the negative battery cable at the terminal.

If the motorhome is connected to power through the shore line power cord, it is recommended the main battery switch be left ON (do not disconnect the battery(ies)). This will allow the converter, inverter (if designed to do so), or solar panel (if so equipped) to trickle charge the house battery(ies).

**Replacement****⚠ WARNING**

**TO PREVENT HAZARDS FROM DANGEROUS BATTERY GASES;**

**If replacing or adding additional batteries to the 12 volt electrical system, ensure batteries are always located in a well-ventilated area and separated from the living space of the motorhome.**

When replacing batteries, make sure the new battery is the same type and rating of the battery that was originally equipped with your motorhome. If in doubt, consult your selling dealer or a qualified RV technician for assistance. Always re-connect the battery cables in the original factory-installed positions.

- Do not replace a deep cycle battery with a starting battery. Only use deep cycle batteries for your motorhome's house application.
- Do not replace your chassis, or starting battery with a deep cycle battery. A starting battery is designed to deliver higher instant amperage, needed to start the vehicle's engine.
- Check to be sure the replacement battery will fit the battery tray of your motorhome. Group 24 batteries are physically smaller than Group 27 batteries.

**Inverter****⚠ WARNING**

**Review all manufacturer's information and observe all manufacturer's safety warnings and cautions before using the inverter installed in your motorhome.**

**The factory-installed inverter is not intended for use with medical device(s).**

**⚠ CAUTION**

**Some appliances and equipment may not operate correctly from the modified sine wave of an inverter, and other appliances may actually be damaged if operated on inverted power.**

**Check with the device manufacturer regarding the suitability of use with an inverter.**

Select TMC motorhomes are equipped with an inverter. An inverter takes 12 volts DC power from the auxiliary (house) battery(ies) and transforms it into 120 volts AC power. It is mainly used to power a few select electrical circuits and devices when



Typical inverter: model, features, and installation location varies, depending on motorhome model and floor plan.

an external source of 120 volts AC power is not available, or when it is not appropriate to operate the on-board generator. Inverters are also installed in motorhomes that have a household-type refrigerator (compressor, instead of an evaporator type). These appliances usually require 120 volts AC in order to operate, therefore the inverter allows the refrigerator to be used whenever shore power or generator power is not available.

**NOTE:** TMC installs 12 volt DC, compressor-type refrigerators in some motorhomes. These refrigerators do not require the inverter to be ON in order to operate. Similarly, gas (LP) and gas/electric refrigerators do not use inverted power.

Some inverters include a built-in automatic transfer switch, which will connect the inverter to the electrical system when needed, and disconnect when either shore power or generated power is detected. In addition, some inverter models also perform the function of a converter (supplying 12 volt DC power from a 120 volt AC source). Inverter/Converter models are mainly installed on Class A diesel motorhomes. Although wiring varies from model to model, in general terms, the inverted-powered outlets are those that feed power to the main TV, household-type refrigerator (if installed), and a few essential AC power outlets.

All inverters have a wattage rating that will indicate the maximum load (or electrical power) the inverter can supply. For example, an 1,800 watt inverter will be able to provide approximately 15-20 amps of current (amperage). Sometimes, the wattage capacity is stated in kilowatts (kW). For example, 1,800 watts becomes 1.8 kW. Depending on the model and floor plan, TMC typically installs inverters with power ratings of 1,000 watts, 1,800 watts, or 2,000 watts.

Since the inverter is drawing power from the auxiliary battery(ies), the condition and storage capacity of the batteries determines how long the inverter can supply power to your 120 volt AC devices. Keep in mind that while traveling, a charging voltage to the batteries from the vehicle's alternator is available, as long as the master battery disconnect switch is ON. Maintaining a charging voltage to the auxiliary battery(ies) will prolong the energy available from the battery(ies) to the inverter.

Battery voltage is also important for proper inverter operation. Most inverters have an automatic shut-off feature that turns the inverter off in the event that the incoming voltage of the supply battery(ies) drops out of range; usually below 10 volts DC or above 16 volts DC.

For details regarding the inverter supplied to your motorhome, its features and functions, please refer to the manufacturer's operational guide included with your Thor Motor Coach Owner's Packet, available through the TMC Owners Resource service, or directly from the inverter manufacturer's website.

#### NOTES:

- The condition of the house battery should be monitored when using the inverter. During some load conditions, it is possible to completely deplete the stored energy of the battery(ies).
- Calculating the total power consumption (in watts) is very important for proper inverter use. **DO NOT** exceed the power output rating of your inverter.
- Inverters will safely operate most AC loads within their power rating. However, some appliances and equipment may not operate correctly with the modified sine wave of inverted power and actually be damaged if operated by an inverter. It is especially important to check all medical devices to determine if they can operate safely with inverted power.
- Except for the TMC Class B motorhome outfitted with the Re(li)able battery power system, inverters do not power air conditioning units.

## Inspection and Maintenance

With most inverter installations a separate circuit breaker is installed in the battery compartment, near the auxiliary battery. This circuit breaker protects the inverter from overloads (attempting to draw more power from the inverter than it is designed to supply). If the inverter is not working, check to determine if this circuit breaker is 'tripped.' If so, re-set it and reduce power consumption through the inverter.



Typical Inverter Circuit Breaker located in the battery compartment.

Also check the fuse located on the inverter. Inverters are typically installed behind a panel or bed pedestal near the Power Load Center (fuse and circuit breaker panel). There are no customer serviceable parts inside the inverter case and the manufacturer's warranty will be void if the case has been opened. The inverter's cooling fins and the cooling fan should be kept clear of any obstructions. If you have further concerns contact your dealer.

## 120 Volt Power System

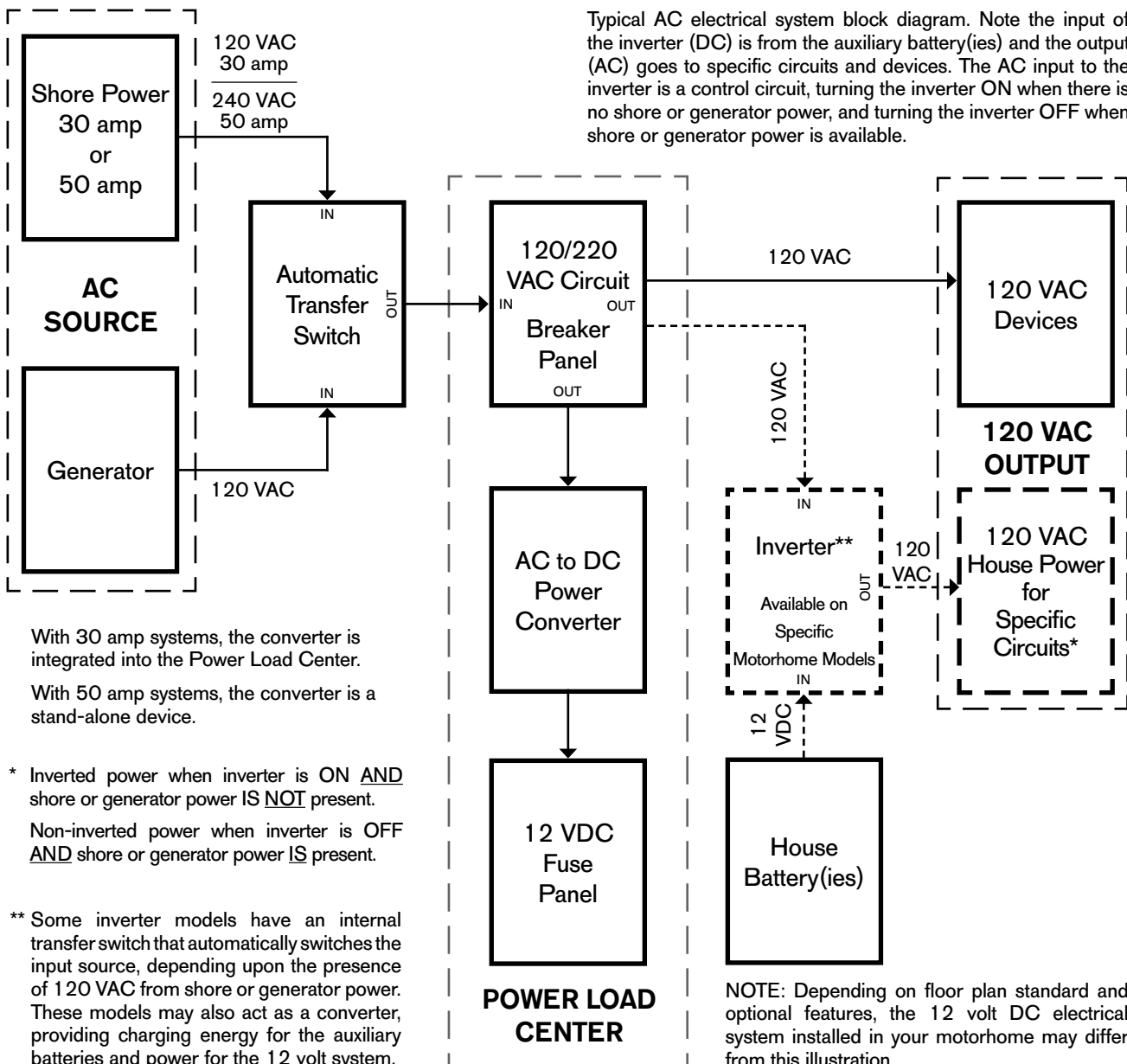
Power for the 120 volt AC electrical devices installed in your motorhome is supplied either by the on-board generator or by connecting to an exterior power source, commonly known as Shore Power.

Also, if equipped, limited 120 volt AC power is provided by the inverter, which converts 12 volt DC power from the auxiliary battery(ies) to 120 volts AC. The inverter is not

designed to power the entire 120 volt system and when used, care must be exercised so that overloading the inverter is avoided.

The block diagram depicted here shows the major components of the 120 volt AC power system and how they work as a system.

### Typical 120 Volt AC Electrical System Block Diagram



## Shore Line Power

**⚠ DANGER**

CONNECTING THE SHORE CORD TO A NON-GROUNDED OR IMPROPERLY GROUNDED POWER SOURCE CAN RESULT IN DANGEROUS AND POSSIBLY FATAL ELECTRIC SHOCK.

Due to the potential danger in failing to heed this warning, the motorhome manufacturer cannot be responsible should damage, injury, or death result from failure to connect the power cord to a properly grounded power source.

**⚠ WARNING**

The campsite 120 volt power receptacle(s) should always be tested for proper functionality prior to connecting your motorhome's shore line power cord to it. Do not hook up the shore line power cord to any receptacle until you have verified proper polarity and grounding.

DO NOT plug the shore line power cord into a campsite receptacle:

- That has reverse polarity;
- With non-functioning ground circuits;
- That shows outward signs of heat or other damage.

Doing so may result in property damage or serious injury. Damage or injury resulting from a connection to a malfunctioning or improperly wired power source is not covered by warranty.

It is the responsibility of the owner of the electrical receptacle to ensure that the receptacle is properly wired and grounded. Reverse polarity and/or improper grounding of your motorhome can cause equipment damage, personal injury or death.

**⚠ WARNING**

Make sure the circuit breakers at the electrical power source are in the OFF position before connecting or disconnecting your shore line power cord.

The shore line power cord must be fully extended when in use, and not left coiled in the electrical compartment or on the ground.

**⚠ WARNING**

- Do not use cheater plugs, adapters, or extension cords to reconfigure incoming alternating current (AC) power or break the continuity of the circuit connected to the grounding pin.
- Do not connect the shore line power cord into an outlet that is not grounded, or adapt the power cord plug to connect it to a receptacle for which it is not designed.
- Do not remove the grounding pin to connect to a non-grounded receptacle. Removal of the ground pin disables an important safety feature designed to prevent shock and electrocution hazards.
- Do not lengthen the shore line power cord with an extension cord. Use of an improper extension cord will cause overheating of the cord as well as potentially causing premature failure of on-board AC equipment.

**⚠ CAUTION**

- It is strongly advisable to test the wiring of any external power source BEFORE connecting your motorhome. Along with a proper ground, the 120/220 volt AC source must have properly wired neutral and hot terminals.
- Testing for correct power source wiring can be easily accomplished with a portable polarity tester, obtained from a RV parts supplier or dealer. Follow the instructions provided by the manufacturer when operating the tester.
- If a problem with the external power source is found, CONTACT THE CAMPSITE MANAGER for repairs. Do not attempt repairs to the site power source and do not connect your motorhome to the site power source until it is determined safe to do so.

Typical Camp-ground electrical service stand. This illustration shows 50 amp, 30 amp, and 15-20 amp outlets, along with corresponding circuit breakers.



## 30 Amp, 120 Volt Shore Line Power Cord

**⚠ WARNING**

**MOTORHOMES THAT ARE FACTORY-EQUIPPED WITH A 30 AMP ELECTRICAL SERVICE SHOULD NEVER BE CONNECTED TO A POWER SOURCE THAT WILL PROVIDE MORE THAN 120 VOLTS AC.**

Although 30 amp RV connectors look similar to 240 volt AC connectors found in residential homes (electrical dryers, stoves, etc.), the 30 amp RV power service is designed to accept 120 volts incoming AC only.

**Failure to follow this power requirement will result in serious damage to appliances and electrical devices.**

If your motorhome is designed for 30 amp electrical service, a 30 amp shore line power cord is provided to attach the motorhome to a grounded 110-125 volt AC, 30 amp external power source. Always turn OFF the main power switch or circuit breaker of the shore power electrical outlet before connecting or disconnecting the shore line power cord. This will eliminate arcing of electrical contacts and reduce the potential of electrical shock. Please strictly follow all electrical-related safety labels affixed to your motorhome.

**NOTE:** The motorhome end of shore line power cords may be affixed to the motorhome, while other shore line power cords may have connectors on both ends. Connect the pronged (or male) end to the shore power cord to the external electrical service, and the socket (or female) end to the motorhome's electrical connection port.

**⚠ WARNING**

**THIS CONNECTION IS FOR 110-125-VOLT AC, 60 HZ, 30 AMPERE SUPPLY. DO NOT EXCEED CIRCUIT RATING. EXCEEDING THE CIRCUIT RATING MAY CAUSE A FIRE AND RESULT IN DEATH OR SERIOUS INJURY.**

A Warning Label, similar to the one shown here, is affixed on your motorhome, near the 30 amp shore line cord inlet.



4-prong 50 amp shore power cord (left) and 3-prong 30 amp shore power cord (right)

## 50 Amp, 240 Volt Shore Line Power Cord

**⚠ WARNING**

**MOTORHOMES THAT ARE FACTORY-EQUIPPED WITH A 50 AMP ELECTRICAL SERVICE ARE DESIGNED TO BE CONNECTED TO A 50 AMP EXTERNAL POWER SOURCE, WHICH PROVIDES A COMBINED TOTAL OF 240 VOLTS AC.**

The 240 Volts comes from two 120 Volt power legs (measured to neutral or ground and 180 degrees out of phase). This power service provides 100 amps total to the motorhome. The motorhome should never be connected to a power source that supplies voltages that are more than 120 Volts on either incoming power leg.

**Failure to follow this power requirement will result in serious damage to appliances and electrical devices.**

Depending on the model, your motorhome may be supplied with a 50 amp electrical service and have a 50 amp shore line power cord, which is used to attach the motorhome to a grounded 50 amp external power source. Similar to the incoming power service to your house, the incoming voltage of a 50 amp service is 240 volts AC, consisting of two 120 volts AC power legs. At the circuit breaker panel of the Power Load Center, the 2 power legs are split, each feeding 120 volts AC power to separate sections of the fuse panel.

Always turn OFF the main power switch or circuit breaker of the external power source when connecting or disconnecting the shore line power cord. This will eliminate arcing of electrical contacts and reduce the potential of electrical shock.

**NOTE:** A 50 amp shore power source supplies 240 VAC incoming power; 120 VAC on each of the two power legs. The Power Load Center is wired to split the incoming 240 VAC into two 120 VAC branches for the motorhome's electrical circuits.

**⚠ WARNING**

**THIS CONNECTION IS FOR 208Y/120-VOLT or 120/240-VOLT AC, 3-POLE, 4-WIRE, 60 HZ, 50 AMPERE SUPPLY. DO NOT EXCEED CIRCUIT RATING. EXCEEDING THE CIRCUIT RATING MAY CAUSE A FIRE AND RESULT IN DEATH OR SERIOUS INJURY.**

A Warning Label, similar to the one shown here, is affixed on your motorhome, near the 50 amp shore line power cord inlet.

## Powered Shore Line Cord Reel

Select TMC motorhomes are equipped with a powered shore line cord reel. 50 amp shore power cords have large diameter wires and, due to their size and weight, can be difficult to handle. A powered cord reel facilitates retracting the shore line cord when not in use.

The motor of the powered cord reel operates on 12 volts DC from the auxiliary (house) batteries. Therefore, the master battery disconnect switch must be ON in order to operate the powered cord reel.



50 amp shore power cord attached to an electrical-powered reel.

## Connecting to an External Power Source

Inquire with the campsite owner or manager if they provide the electrical service your motorhome requires. It is always advisable to ensure the external electrical source is properly wired and grounded before connecting your motorhome. If the external electrical source is confirmed to be appropriate for your motorhome's electrical system, follow this electrical hook-up procedure:



Typical shore line power cord connection port

1. Locate the load center inside your motorhome and turn OFF the main AC circuit breakers. Some panels will have two main circuit breakers.
2. Carefully extend the entire length of the shore line power cord (approximately 35 feet) from the electric cable port on the motorhome to the external power source.
3. Ensure the circuit breaker(s) at the external power source are OFF.
4. Connect the shore power cord to the receptacle on the motorhome. If the connector has a locking ring, carefully engage the threads until snug. Some connector designs may require a slight twist after insertion, while some power cords are wired directly to the motorhome, making this step unnecessary.
5. Plug the shore line power cord into either the 30 amp or 50 amp external power receptacle, matching the power requirements and power cord connector of your motorhome. Be sure all the connector prongs are properly and completely inserted into the power source receptacle.
6. Turn ON the circuit breaker at the external power source.
7. Turn ON the main circuit breaker(s) at the motorhome's load center.

When you are ready to leave the campsite, reverse the shore line power cord connection process. Use care to prevent damaging the electrical connection pins when connecting or disconnecting the shore line power cord. Grasp the plug to remove the shore line power cord from the outlet; do not unplug it by pulling on the cord.



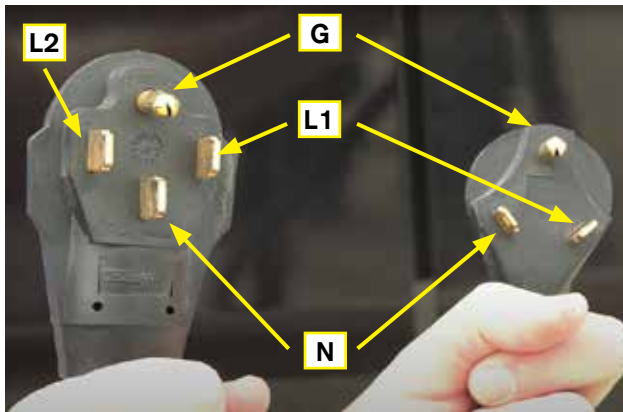
Attach the shore power cord to the motorhome by slipping the connector over the pins of the connection port. Give the connector a slight twist to the right, then spin-on the locking ring to secure the power cord to the motorhome.



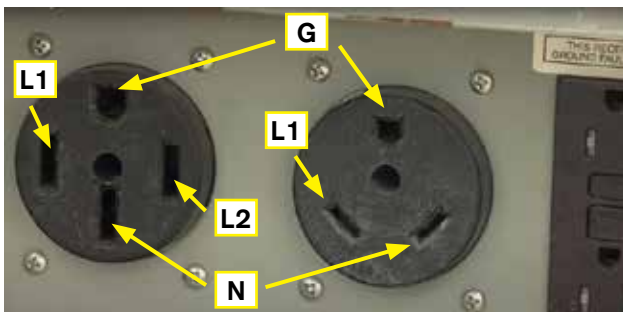
## Shore Power Wiring Configuration

For safe electrical power for your motorhome's electrical system, it is important that the external power source is correctly wired. If the shore power source is incorrectly wired, it is possible that the chassis frame and metal objects could become energized. It is also extremely important that the shore power source is properly grounded, thus protecting from the physical hazards of electrical shock.

Below are illustrations of the proper wiring for the 50 amp and 30 amp shore power cords and their corresponding power receptacles. Please talk to the campground's maintenance personnel if you have any questions or concerns regarding the wiring of the campground's electrical hook-ups.



G = Ground    L1 = Leg 1 (120 VAC measured to neutral or ground)  
 N = Neutral    L2 = Leg 2 (120 VAC measured to neutral or ground.  
 L1 and L2 are 180 degrees out of phase)



## Shore Line Cord Plug Adapters

### ⚠ WARNING

**USE EXTREME CAUTION WHENEVER ADAPTING SHORE POWER CORDS TO A UN-MATCHED ELECTRICAL SERVICE.**

- 50 AMP SHORE POWER CORD TO A 30 AMP SERVICE.
- 50 OR 30 AMP SHORE POWER CORD TO A 15-20 AMP SERVICE.

**THE SIGNIFICANTLY REDUCED AMOUNT OF AVAILABLE INCOMING POWER COULD DAMAGE ELECTRICAL MOTORS, COMPRESSORS, AND OTHER DEVICES.**

### ⚠ WARNING

**NEVER ADAPT A 30 AMP SHORE POWER CORD TO A 50 AMP EXTERNAL POWER SERVICE.**

**SEVERE ELECTRICAL OVERLOAD TO THE SHORE POWER CORD AND/OR THE MOTORHOME'S ELECTRICAL SYSTEM COMPONENTS COULD CAUSE ELECTRICAL FIRES OR OTHER DAMAGE.**

### ⚠ CAUTION

**REDUCE POWER LOADS WHENEVER ADAPTING A LARGER AMPERAGE SHORE POWER CORD TO A SMALLER SHORE POWER SOURCE.**

**DO NOT USE POWER-CONSUMING ITEMS, SUCH AS AIR CONDITIONERS, MICROWAVE OVENS, ETC.**

Plug adapters are available to allow connecting your 4-prong, 50 amp shore line power cord to a 3-prong, 30 amp shore power service, and a 3-prong, 30 amp shore power cord to a standard, 3-prong household electrical plug.

**WARNING**, if you are adapting from a 50 amp electrical system to a 30 amp power source, your motorhome will NOT be supplied with the total electrical power required to operate all on-board devices simultaneously. A 30 amp, 120 volt service can only supply up to 3,600 watts of power (watts = amps x volts), where a 50 amp, 240 volt service can supply up to 12,000 watts of power, or 3 times the power compared to a 30 amp service.

Only do so as a **TEMPORARY** means of supplying limited electrical power to your motorhome. Do not use high-demand electrical devices, such as air conditioners and kitchen appliances. Electrical overloads can easily happen and could cause damage to the electrical devices of your motorhome.



Power cord adapters are available in several styles and configurations. Only use adapters when absolutely necessary and on a temporary basis. Always be aware that the use of adapters usually restricts the available power to the motorhome.



**USING A 120 VOLT, 15-20 AMP POWER ADAPTER**  
Use 120 volt, 15-10 amp adapters only for extremely limited use, such as powering a few internal lights, powering a refrigerator, or providing charging energy for your auxiliary batteries when the motorhome is in storage.

**NOTE:** In limited shore power situations such as described here, when possible, it is a better solution to use the motorhome's generator to supply electrical power.

**NOTE:** Batteries in Class A Diesel Pushers with inverter/chargers can be charged without the master battery disconnect switch ON.

## Transfer Switch Protection

Beginning with model year 2022, all TMC motorhomes are equipped with transfer switches that provide reverse polarity and open neutral protection. If there is a fault with the shore power source or generator power, a fault warning message will be displayed either on the multiplex main panel screen or an indicator on the monitor panel and power will not be passed through the transfer switch to the motorhome.

If a ground or reverse polarity fault is detected, the shore power source or generator must be repaired by a qualified technician or electrician.

## Shore Power Cord Maintenance

Inspect the shore line power cord for damaged contact pins, cuts, cracks, and worn insulation; replace damaged shore power cords immediately.

**NOTE:** Travel with a circuit tester or a digital multimeter in your tool bag. This will allow testing shore power service and help diagnose power-related issues.

# 10

## Trickle Charging Batteries During Storage

The shore power cord and the motorhome's converter can be used to keep the auxiliary batteries charged during storage.

1. Use a plug adapter to convert the shore power plug to a standard, 3-prong household outlet.
2. At the motorhome's circuit breaker panel, turn ON the Main Circuit breaker(s) and the Converter circuit breaker. Turn OFF all other circuit breakers.
3. Plug in the shore power cord to the household outlet.
4. Turn ON the master battery disconnect switch.
5. Ensure all interior lights and 12 volt devices are OFF or disconnected from the power source.

## Generator

### **⚠ DANGER**

**OPERATING THE GENERATOR CREATES EXHAUST GASES THAT CONTAIN CARBON MONOXIDE. CARBON MONOXIDE IS POISONOUS AND CAN CAUSE UNCONSCIOUSNESS AND DEATH.**

- **THE GENERATOR PRODUCES DANGEROUS FUMES WHEN IT IS RUNNING. SEVERE PERSONAL INJURY, DEATH, AND EQUIPMENT DAMAGE CAN RESULT FROM OPERATING THE GENERATOR IN A GARAGE, BUILDING, OR A CONFINED SPACE. WHENEVER THE MOTORHOME IS PARKED OR STORED IN A GARAGE OR CONFINED SPACE, DISABLE THE AGS SYSTEM TO PREVENT THE GENERATOR FROM AUTOMATICALLY OPERATING.**
- **TO AVOID EXHAUST GAS ENTRY INTO THE MOTORHOME, KEEP WINDOWS CLOSED WHEN THE CHASSIS OR GENERATOR ENGINES ARE RUNNING.**
- **Test the CO/LP detector installed in your motorhome frequently to ensure protection from carbon monoxide and/or LP gas leaks. If an alarm sounds, immediately shut off the generator and all gas and electric appliances and evacuate the motorhome. Turn off the main battery disconnect switch and main gas valve at the LP tank. Seek medical assistance if necessary. Have all necessary repairs to equipment made by a qualified technician before continuing use.**
- **Disable the AGS system when sleeping in the motorhome. The potential of carbon monoxide poisoning is present when the generator is operating and the alarm may not awake you to the hazard.**
- **When parked, be sure that the generator's exhaust is clear of any obstructions, such as underbrush, rocks, and snow. Follow all generator safety guidelines provided by TMC in your owner's manual and the instruction manual provided by the generator's manufacturer.**

### **⚠ CAUTION**

**Read and understand the generator owner's manual before operating the generator. Observe all operating instructions and warnings, as well as all recommended maintenance schedules and procedures.**

The on-board generator provides 120 volts AC energy when shore power is unavailable. Most generators are designed to operate whether the motorhome is stationary or in-motion, therefore, it is a convenient source of 120 volts AC power. As when connected to shore power, the generator also works in unison with the converter (See Converter



Typical Cummins-Onan RV Generator

Section) to also supply 12 volts DC to the motorhome, thus conserving house battery usage.

Always be mindful that exhaust gas produced by the generator contains deadly carbon monoxide gas! **NEVER sleep in the motorhome with the generator running.** Before you start and use the generator, inspect the exhaust system. Do not use the generator if the exhaust system is damaged. Test the carbon monoxide detector every time you use the motorhome. Know the symptoms of carbon monoxide poisoning:

If you or any of your traveling companions experiences these physical symptoms, move the person to fresh air immediately. If the physical symptoms persist, seek medical attention! Shut the generator down and do not operate it until it has been inspected and repaired by a professional technician.

- Dizziness
- Vomiting
- Nausea
- Muscular twitching
- Intense headache
- Throbbing in the temples
- Weakness and sleepiness
- Inability to think coherently

## Generator Safety Guidelines

**Always follow these generator safety guidelines:**

- **NEVER** store anything in the generator compartment. Always keep the compartment clean and dry.
- **DO NOT** operate the generator in an enclosed building or in a partly enclosed area such as a garage.

- READ and be familiar with all safety precautions for fuel and exhaust fumes found in your owner's manual.
- READ and be familiar with the instructions, cautions and warnings associated with the generator that are provided in the manufacturer's owner's guide.
- DO NOT operate the generator when the motorhome is parked in high grass or brush. Heat from the exhaust could cause a fire in dry conditions.
- NEVER operate the chassis or generator engine, or the engine of any vehicle, longer than necessary when the vehicle is parked.
- DO NOT simultaneously operate generator and a ventilator which could result in the entry of exhaust gas.
- When parked, position the motorhome so that the wind will carry the exhaust away from the motorhome. DO NOT open nearby windows, ventilators, or doors into the passenger compartment, particularly those which can be 'down wind,' even part of the time.
- DO NOT operate the generator when parked in close proximity to vegetation, snow, buildings, vehicles, or any other object which could deflect the exhaust under or into the motorhome.
- DO NOT touch the generator when running, or immediately after shutting OFF. Heat from the generator can cause burns. Allow the generator to cool before attempting maintenance or service.
- Before using the generator, inspect the exhaust system. Do not use it if the exhaust system is damaged. Test the carbon monoxide alarm every time you use the motorhome. If the CO alarm sounds, immediately move everyone to fresh air and ventilate the motorhome. Shut the generator OFF, and do not operate it until it has been inspected and repaired by a qualified technician.

### Generator Power Rating

Every generator has a power capacity rating, stated in watts or kilowatts:

**1,000 watts = 1 kW**

Most Class C gasoline motorhomes are equipped with generators ranging from 3.2 kW to 4.0 kW. Some Class C diesel models have 6.0 kW generators. Class A motorhomes are supplied with generators ranging from 4.0 kW to 6.0 kW and up to 10.0 kW for the larger diesel models.

Often, this power rating is referred to as the generator's 'size,' which does not refer to the generator's physical

dimensions, but its power-generating capacity. The 'size' of the generator supplied with your motorhome was determined by the supply amperage of the motorhome, 30 amps or 50 amps, and the number of electrical circuits and features of the motorhome. Larger motorhomes typically require more power than smaller models, due to additional electrical features. It is important to know the generating capacity of your motorhome's generator and have a good knowledge of the power demands of the devices contained within the motorhome, both built-in features and the extra electrical devices you bring along with your travels. Typically, devices that use a significant amount of electrical energy are those that contain motors, compressors and electrical heating elements.

The generator has built-in overload protection, which will turn off electrical power if the demand exceeds what the generator can safely supply. This overload protection device, similar to a circuit breaker, is located on the generator's control panel. Typically, this is not a remotely mounted device. It is important not to exceed the power-generating capacity of the generator by attempting to operate too many appliances at the same time.

### Starting and Stopping Procedures

Your generator can be started and stopped from the integral control panel on the generator, or from the optional remote control panels or switches located inside the motorhome. Outlined here are the simple steps for starting and stopping the generator:

- Before starting the generator, turn OFF air conditioners and large electrical loads.
- Before starting in cold weather, turn OFF all appliances for best long-term performance.

#### TO START:

1. Locate the Generator ON/OFF switch, on the Monitor Panel or integrated into the Multiplex Control Panel.
2. Prime the engine by holding the OFF position of the start/stop switch for a few seconds. The LED on the switch will turn on.
3. After priming, press and hold the ON position until you hear the generator start. The LED will flash during starting, then remain on when the generator is running.
  - a. The engine will turn over and should start within a few seconds.
  - b. If the engine fails to start within a few seconds, do not over-crank.

4. Before turning ON appliances, let the generator warm up for a few minutes. Generally, a beep from an appliance indicates that the generator is supplying electricity.

Under normal operating conditions, you may detect the engine of the generator increase and decrease in RPM (run faster and slower). This is normal, due to changes in electrical power demand.

#### TO STOP:

1. Turn off air conditioners and large electrical loads and allow the generator to run for 3-5 minutes before stopping, to allow the generator to cool down.
2. Press and hold the OFF switch position until the generator stops. The indicator LED on the switch will turn off.

#### NOTES:

- To prevent generator overload due to initial start-up current demand, turn ON air conditioners and appliances in a sequential order and **ONLY AFTER THE GENERATOR IS STARTED AND RUNS FOR A FEW MINUTES**.
- If you lose power to the motorhome while operating the generator, check the overload circuit breaker on the generator; it may have tripped due to too much power demand. Turn off some appliances or electrical devices in order to reduce the total power demand.
- Control switches for operating the generator are located on the monitor panel or, if equipped, on the multiplex touch-screen panel.
- Your motorhome's generator may be equipped with features that prevent operation if certain maintenance parameters are not met, i.e., low engine oil level, clogged air and fuel filters, etc.
- If your generator fails to start or remain running, and there is an adequate fuel supply and 12 volts DC present, it may need maintenance attention. Refer to the manufacturer's owner's manual for troubleshooting and maintenance procedures.
- The generator will continue to run after a circuit breaker trips. Turn OFF all appliances before resetting the breaker. If the breaker trips again with all electrical loads off, turn OFF the generator and contact a qualified technician for repairs.

- If your motorhome is supplied with an AGS system, refer to your motorhome's Owner's Packet for details regarding its features, set-up programming, and operation.
- If your motorhome has a multiplex wiring system, settings for the automatic generator start system are incorporated in the Settings Menu of the multiplex system.
- For complete generator instructions, refer to the manufacturer's guidelines included in your Owner's Packet, or available through your TMC Owners Resource account, or available from the manufacturer's website.

## Generator Fuel

Depending on the motorhome model, generators may be fueled by either gasoline, diesel, or propane (LP). If the generator is fueled by either gasoline or diesel, fuel for the generator is drawn from the vehicle's fuel tank. There is provision built into the fuel delivery system that prevents the generator from depleting the entire fuel supply, which could potentially leave the vehicle stranded. Fuel to the generator will be cut-off when the level in the vehicle's fuel tank reaches 1/4 full.

Select motorhome models are equipped with a LP-fueled generator. LP is drawn from the motorhome's propane tank to fuel the generator's engine. There is no fuel cut-off provision with the LP system, so it is possible for the generator to deplete the fuel in the LP tank, leaving little-to-no LP for other gas appliances.

#### NOTES:

- Diesel and gasoline-fueled generators require 12 volt DC power to start. Operating fuel is drawn from the motorhome's fuel tank. If the fuel level of the motorhome's fuel tank drops to or below 1/4 full, the generator will automatically shut OFF and cannot be restarted until the motorhome's fuel tank is filled to above 1/4 full.
- Propane-fueled generators also require 12 volt DC power to start, but draw operating fuel from the LP tank. There is no fuel-limiting provision, therefore, monitor LP usage to ensure an adequate supply of LP remains available for other LP appliances (furnace, refrigerator, stove, water heater).

## Automatic Generator Start (AGS)

### DANGER

**Disable the AGS system when sleeping in the motorhome or when the motorhome is parked in a garage or confined space. The potential of carbon monoxide poisoning is present when the generator is operating.**

Your motorhome may be equipped with an Automatic Generator Start (AGS) system. An AGS can be a stand-alone system, part of the generator's control circuitry, or part of the inverter's control system. The purpose of an AGS system is to automatically start (and run) the generator when certain programmed parameters are encountered:

- When the auxiliary battery(ies) voltage drops to a pre-determined level, the AGS circuitry will sense the low voltage condition and start the generator, which, in turn, supplies charging voltage to the batteries through the inverter/charger. Once the system batteries have regained a sufficient amount of charge, the AGS will automatically turn off the generator.
- When there is a power demand from air conditioners, some models may feature a thermostat interface, where if the temperature of the coach rises to a programmed level, the generator will start, allowing the air conditioner to operate. The AGS will automatically turn off the generator after the air conditioner turns off.
- Some units are time-programmable, enabling the user to determine when the generator will operate. This feature is useful if the campground has restrictions regarding running generators during certain time periods of the night.
- Some units may also have 'shore power sense', so that when shore power is connected, the AGS system will place the generator in a stand-by mode, only allowing the generator to operate if electrical demand cannot be fulfilled by shore power alone.
- Motorhomes equipped with a 12 volt DC compressor-type refrigerator are typically outfitted with a stand-alone AGS. When turned ON, the AGS will automatically start the generator when the auxiliary battery(ies) drop to a programmed voltage level, therefore, keeping the refrigerator operational.

When the auxiliary battery(ies) have reached a state of full-charge, the AGS will automatically turn OFF the generator.

Refer to the manufacturer's instructions for complete AGS operating and safety information. Copies are included in your Owners Packet or on-line through the TMC Owners Resource document service.

## Automatic Transfer Switch

### WARNING

**The transfer switch provides protection from reverse polarity and ground faults due to faulty incoming AC power from the shore power source or generator.**

**DO NOT DEFEAT THESE PROTECTIVE FEATURES. SEVERE DAMAGE TO THE ELECTRICAL SYSTEM, INCLUDING ELECTRICAL SHOCK COULD OCCUR.**

The Automatic Transfer Switch is an electronically controlled relay that senses the presence of 120 volts AC incoming power; either from shore power or from the on-board generator. It automatically switches between these two incoming power sources, connecting the active incoming power source to the Power Load Center, thereby powering the motorhome's electrical system.

When 120 volts AC is not present, the Automatic Transfer Switch connects the auxiliary battery to the house 12 volt system. If an inverter is installed, limited 120 volts AC is available for a restricted number of circuits and appliances.

### THE AUTOMATIC TRANSFER SWITCH OPERATES UNDER THESE CONDITIONS:

- When shore power is sensed, it connects the external AC power source to the Power Load Center.
- If there is a shore power outage and the generator is started, either manually or by the Automatic Generator Start System (see Section 10, AGS), incoming power is switched from the shore power source to the generator after a 20-45 second delay.
- If shore power returns while the generator power is present, the system remains on generated power until the generator is turned off. With the generator off, electrical power for the motorhome is switched to the shore power source.
- The generator overrides shore power.
- If 120 volts AC is not present, check the circuit breakers at the shore power source and/or the output of the generator.

### Transfer Switch Power Protection

Beginning with model year 2022, TMC motorhomes are equipped with transfer switches that provide reverse polarity and open neutral protection. If there is a fault with the shore power source or generator, a fault warning message will be displayed either on the multiplex main panel screen or an indicator on the monitor panel and power will not be passed through the transfer switch to the motorhome.

**IF A FAULT MESSAGE IS DISPLAYED:**

1. Contact the park maintenance personnel to check the wiring of the shore power source. **DO NOT ATTEMPT TO REPAIR A FAULTY SHORE POWER SOURCE. LEAVE IT TO A PROFESSIONAL ELECTRICIAN.**
2. If 120 volts AC is NOT present while attempting to power your motorhome with the on-board generator, check the circuit breakers on the generator.
  - Turn OFF air conditioner and other electrical appliances.
  - Reset circuit breakers if needed.
  - Re-start the generator and after 30 seconds, turn ON electrical appliances. If power is not restored, have a qualified service technician look into possible problems with the generator or transfer switch.

**NOTE:** The transfer switch supplied with your motorhome is rated for either 30 amp or 50 amp service, depending on the electrical system configuration of your motorhome.

**Power Load Center, 30 Amp, All-in-one**

The All-in-One Power Load Center of your motorhome provides electrical control for both 120 volt AC and 12 volt DC circuits. This unit consists of three main components:

- 120 volt AC Circuit Breaker Panel;
- 12 volt DC Fuse Panel;
- Converter.

The Power Load Center is usually located in the rear bed pedestal or a rear closet, but may be located elsewhere within the motorhome. Each circuit of the main power panel is labeled according to the device(s) connected to it.



Typical 30 Amp Power Load Center with integrated converter

**120 Volt Circuit Breaker Panel****⚠ DANGER**

- **Do not force a tripped circuit breaker into resetting. A tripped circuit breaker indicates a problem with the circuit that must be corrected.**
- **Do not replace circuit breakers with one of a higher current rating.**
- **Do not replace blown fuses with a fuse of a higher current rating.**
- **Circuit damage could result, creating the potential of electrical shock, electrocution, and fire.**

**⚠ WARNING**

- **A qualified RV electrician should perform any repairs to the electrical system of your motorhome. If misused, electrical energy is dangerous and can cause fires, electrical shock, or electrocution.**
- **Replacement circuit breakers must be of the same voltage, amperage rating, and type. Never use a higher rated replacement circuit breaker than what was originally installed with your motorhome. Doing so may cause a fire by overheating the motorhome's wiring.**

The 120 volt AC section of the Power Load Center contains toggle-type circuit breakers. Circuit breakers protect the 120 volt wiring and components in your motorhome from circuit overloads and shorted circuits. Should a circuit overload or short circuit occur, the circuit breaker protecting the affected circuit will 'trip,' preventing the flow of electricity through that circuit.

A circuit breaker identification label is permanently attached to the inside surface of the 120 volt AC Load Center. The circuit breakers will not offer complete protection of the motorhome electrical system in the event of a power surge or spike.

If a circuit breaker trips, turn OFF and unplug the electrical appliance(s) or devices on that circuit and allow the circuit breaker to cool down. After the cool down period, reset the circuit breaker by moving the switch to the OFF position and then back to the ON position, then plug-in the electrical devices and try operating them. If the circuit breaker re-trips or frequently trips, unplug the appliances(s) on the circuit and contact your selling dealer's service department to have the electrical problem diagnosed and repaired. It is possible that the appliance is faulty, not the circuit.



Typical 30 Amp circuit breaker and fuse panel. Note circuit and device labels.

If the circuit breaker refuses to re-set, this indicates there is something wrong with that circuit. **DO NOT ATTEMPT TO FORCE IT TO THE ON POSITION:**

- The circuit may be overloaded with too many devices.
- The device may draw more current than what the circuit is designed to supply.
- The device may have developed an internal short circuit.
- The circuit wiring or outlet (receptacle) may be damaged.

**Do Not attempt to use that circuit or device until the problem is determined and repaired by a qualified electrician.**

#### NOTES:

- Circuit breakers and fuses are vital in keeping the electrical system of your motorhome in a safe operational condition. Never bypass or defeat circuit breakers or circuit fuses.
- Some electrical appliances may have their own circuit breakers. If there is an interruption in electrical service of an appliance, consult the manual for that appliance to determine the recommended action to take.
- For select motorhomes equipped with a multiplex wiring system, the power load center and associated circuit breaker/fuse panels is quite different than the power load center described in this section.

For information regarding multiplex wiring systems, please contact your selling dealer or a TMC Customer Care representative.

## Maintenance

Before using your motorhome, inspect the circuit breakers and replace them as needed. Test each circuit breaker by moving the individual switches to the OFF position, and then back to the ON position. Circuit breakers may degrade over time and, as part of your motorhome's maintenance, must be replaced as needed.

### 12 Volt Fuse Panel

#### **⚠ WARNING**

**Replacement fuses must be of the same voltage, amperage rating, and type. Never use a higher rated replacement fuse as it may cause a fire by overheating your motorhome's wiring.**

The circuits that receive power from the 12 volt DC section of the Power Load Center are protected by automotive blade-type (ATC) fuses. The 12 volts DC fuse panel label indicates fuse sizes, positions, and the electrical components powered through the 12 volt circuits. To determine if a fuse has BLOWN (unable to pass electricity), it must be pulled from its socket and visually inspected. A blown fuse will have a distinct, open gap in the wire or conductor between the fuse blades.



ATC Blade-Style Fuse

Only replace blown fuses with fuses of the same size and current rating of the fuse that was originally supplied in the fuse socket. Each socket is labeled with the correct current rating. Replacing any fuse with a higher current rated fuse will create an unsafe condition, possibly causing circuit damage and a fire.

A blown fuse indicates a problem with the circuit that is associated with the fuse. You must determine the cause and take corrective actions whenever a fuse is blown. Possible causes of blown fuses are:

- Too many devices attached to the circuit, causing circuit overload;
- The circuit may be overloaded by a device that demands more energy than what the circuit is designed to deliver;
- A short-circuited or defective device attached to the circuit;
- A short-circuited wire or outlet associated with the circuit.





Automotive-type 12 volt fuses

Before replacing a fuse always shut OFF the engine, generator, and all motorhome electrical systems completely. Make sure the electrical components listed on the fuse label are in the OFF position:

1. Shut OFF the chassis engine.
2. Disconnect the shore line power cord.
3. Shut the generator OFF (if equipped).
4. Turn the inverter OFF (if equipped).
5. Turn OFF the Master Battery Disconnect Switch.
6. Remove the fuse panel cover.
7. Turn OFF the electrical device identified on the fuse label.
8. Pull the fuse straight out of the fuse block. If inspection of the fuse confirms that it is not blown, some other electrical problem may exist.
9. Insert a new fuse of the same specified voltage, amperage rating, and type in the original location. Never use a higher rated replacement fuse. Additionally, lower-rated fuses will likely blow, for they will not allow adequate current for the device(s) on that circuit.

The fuse panel label should be kept permanently affixed to your motorhome. The fuses will not offer complete protection of the motorhome electrical system in the event of a power surge or spike. Fuses are maintenance components and must be replaced as needed. Please contact your selling dealer's service department for further repair assistance.

Take corrective action to repair any defective electrical circuit or device. If help is needed, seek assistance or repairs from a qualified RV electrician or technician.

**NOTE:** Blade-type fuses come in several sizes; mini, standard and large. The fuse sockets of the Power Load Center only accept standard ATC-size blade type fuses.

Keep a supply of properly rated blade-type fuses on hand in case a fuse needs to be replaced. Replacement fuses can be obtained at auto parts stores or auto repair facilities.

## Converter

When 120 volts AC is present, either by an external power source (shore power) or the generator, 12 volts DC power requirements for the motorhome are provided by the converter. The converter is a switching power supply, effectively transforming 120 volts AC to 12 volts DC; providing power for lights, slideouts, awnings, battery charging, and other 12 volt DC-powered items. The output of the converter is connected to the 12 volt fuse panel, which in turn, provides electrical power to each 12 volt circuit. Whether your motorhome has a 30 amp or 50 amp electrical service, and if the converter is part of the Power Load center or a stand-alone unit, the converter is designed to integrate with the Power Load Center, becoming an integral part of the power distribution system of your motorhome.



Typical converter: model, features, and installation location varies, depending on motorhome model and floorplan.

## CONVERTER OPERATION MODES

Most converters are automatic three-stage switching power supplies. The converter senses which mode it needs to be in by sensing the demands of the motorhome's power distribution system.

**The three modes/stages of operation include:**

- **Absorption mode/Normal operation**

The converter normally provides a constant target output voltage of 13.6 volts (nominal) to power all the branch circuits. However, it is current limited, and if the output (load) current reaches its maximum, the output voltage will drop as necessary to hold the converter's maximum output current level (the amperage rating) without exceeding it.

- **Bulk mode/Charge mode**

If the output current reaches its maximum (normally caused by a discharged battery), this will cause the converter to go into Bulk Mode, which means the target output voltage will change to 14.4 volts and a timer will start. Although the converter is outputting 14.4 volts, the voltage increase will not be detectable on a voltmeter due to the voltage-current relationship. The actual output voltage will not rise until the load is reduced, which happens naturally as the battery charges or if 12-volt appliances are turned off.

Bulk Mode will be maintained until the current draw drops to approximately 5 amps, or until the timer reaches four hours (whichever happens first). Then the target output voltage is changed back to 13.6 volts for Absorption Mode. Lights that are powered from the output may change brightness slightly at that time.

- **Float mode/Trickle charge**

After the output has been maintained at 13.6 volts (Absorption Mode) for 44 hours, the converter will change to Float Mode with an output of 13.2 volts. This output may then reset to Absorption Mode (13.6 volts) if power is interrupted, or to Bulk Mode (14.4 volts) if the output current limit is reached.

**NOTES:**

- While in Float Mode, the converter will supply a trickle charge to the battery. If the motorhome is in storage for any length of time, check the battery(ies) and battery fluid levels every 3 weeks.
- In order for electrical charging energy from the converter to connect to the auxiliary battery(ies), the master battery disconnect switch must be ON.

If the transfer switch does not sense 120 volts AC at its input, it automatically switches the auxiliary (house) batteries to the 12 volt DC electrical system and the auxiliary

batteries become the source of 12 volt power. When connected to a 120 volt AC power source, the transfer switch automatically disconnects the auxiliary batteries from the 12 volt electrical system and again, the converter becomes the source of 12 volts DC power.

**NOTE:** Converters installed in motorhomes with 50 amp electrical service are usually stand-alone units; physically separate from the Power Load Center.

## USING THE CONVERTER

**NOTICE**

**If the converter is not operating correctly, the reverse polarity protection fuse may be blown (located on the converter front panel). Check the connections on the auxiliary battery(ies) for proper polarity and correct if necessary. If a fuse requires replacement, only replace with one of the same type and rating.**

Under normal operating conditions, the converter requires no user attention or maintenance. However, if the auxiliary batteries happen to become reverse connected, fuses that protect the converter from cross-polarization may blow. If your converter is not operating, check the polarity of the auxiliary battery connections and correct if necessary. If the fuses on the front panel of the converter have blown, replace with the same type and amperage rating. If the incoming AC voltages are normal, but the converter output is still **NOT** delivering 12 volts DC, the converter requires repair. Contact the manufacturer for service details.

The converter has several design features that protect it and the 12 volt electrical system of your motorhome.

- **Over-Temperature Protection**

If the internal temperature of the converter exceeds a critical point, it will shut down. This protects the unit from excessive heat that may damage sensitive components. The unit will restart once the internal temperature of the converter has dropped to a safe level.

- **Electronic Current Limiting**

In the event that the output current exceeds the maximum rating for the WF-9800 Series Converter/Charger, the output current will remain constant, but the output voltage will begin to drop. If this occurs, the unit will recover once loads are reduced.

- **Short-Circuit Protection**

Should a short circuit occur in the motorhome's 12 volt system, the WF-9800 Series Converter/Charger will drop the voltage output to zero volts. If the short-circuit condition is removed and no other fault conditions are detected, the converter will resume normal operation. However, short-circuit conditions are dangerous, and the electrical system will require inspection by a qualified service technician.

Due to the high level of electrical energy it supplies, the converter may be warm to the touch when operational, and this is normal. It does, however, have built-in thermal protection; if it gets too hot, it will turn itself off. After it cools down, the converter will return to normal operation. In most cases, this thermal cycling is caused by some object being placed in too close of proximity to the converter, preventing it from receiving adequate ventilation.

**DO NOT OBSTRUCT VENTILATION OPENINGS.** Make sure not to place anything near the converter that could obstruct ventilation.

#### INSPECTION AND MAINTENANCE

If the power converter is not working check the fuse(s) located on the outer case. There are no customer service-able parts inside the converter case and the manufacturer's warranty will be voided if the case has been opened. If you have further concerns please contact your selling dealer.

## Power Load Center, 50 Amp

### **⚠ DANGER**

- **Do not force a tripped circuit breaker into resetting. A tripped circuit breaker indicates a problem with the circuit that must be corrected.**
- **Do not replace circuit breakers with one of a higher current rating.**
- **Do not replace blown fuses with a fuse of a higher current rating.**
- **Circuit damage could result, creating the potential of electrical shock, electrocution, and fire.**

### **⚠ WARNING**

- **Any needed repairs to the electrical system of your motorhome should be performed by a qualified RV electrician. If misused, electrical energy is dangerous and can cause fires, electrical shock, or electrocution.**
- **Replacement circuit breakers must be of the same voltage, amperage rating, and type. Never use a higher rated replacement circuit breaker than what was originally installed with your motorhome. Doing so may cause a fire by overheating the motorhome's wiring.**



Typical 50 Amp Power Load Center

Except for a few smaller models, almost all TMC Class A motorhomes are equipped with a 50 amp power service, which includes the following:

- **Power Load Center, including 120 volt AC circuit breaker panel and 12 volt DC fuse panel or 12 volt DC breaker panel;**
- **Stand-alone Converter.**

The Power Load Center is usually located in the rear of the motorhome; in a bed pedestal, closet, or wall panel. Although the location differs, all power load panels are readily accessible, regardless of slideout positions.

Each circuit of the power load center is labeled according to the device(s) connected to it.

### 120 Volt Circuit Breaker Panel

The Power Load Center contains toggle-type circuit breakers. Circuit breakers protect the 120 volt wiring and components in your motorhome from circuit overloads and shorted circuits. Should a circuit overload or short circuit occur, the circuit breaker protecting the affected circuit will 'trip,' preventing the flow of electricity to that circuit.

A circuit breaker identification label is permanently attached to the inside surface of the 120 volt circuit breaker panel. The circuit breakers will not offer complete protection of the motorhome's electrical system in the event of a power surge or power spike. Delicate electronic devices should be protected by separate surge protectors (customer supplied).

If a circuit breaker trips, turn OFF and unplug the electrical appliance(s) or devices on that circuit and allow the circuit breaker to cool down. After the cool down period, reset the circuit breaker by moving the lever to the OFF position and then back to the ON position, then plug-in the electrical devices and try operating them. If the circuit breaker re-trips or frequently trips, unplug the appliances(s) on the circuit and contact your selling dealer's service department to have the electrical problem diagnosed and repaired. It is possible that the appliance is faulty, not the circuit.

If the circuit breaker refuses to re-set, this indicates there is something wrong with that circuit. **DO NOT ATTEMPT TO FORCE IT TO THE ON POSITION:**

- The circuit may be overloaded with too many devices;
- The device may draw more current than what the circuit is designed to supply;
- The device may have developed an internal short circuit;
- The circuit wiring or outlet (receptacle) may be damaged;
- The circuit breaker may be faulty and requires replacement.

**DO NOT** attempt to use that circuit or device until the problem is diagnosed and repaired by a qualified electrician.

#### NOTES:

- Circuit breakers and fuses are vital in keeping the electrical system of your motorhome in a safe operational condition. Never bypass or defeat circuit breakers or circuit fuses.
- Some electrical appliances may have their own circuit breakers. If there is an interruption in electrical service of an appliance, consult the manual for that appliance to determine the recommended action to take.
- For information regarding multiplex wiring systems and circuit control devices, please contact your selling dealer or a TMC Customer Care representative.

### Maintenance

Before using your motorhome after a long storage period, inspect and test each circuit breaker by moving the individual switches to the OFF position, and then back to the ON position. Circuit breakers may degrade over time and as part of your motorhome's maintenance, must be replaced as needed.

### 12 Volt Fuse Panel

Except for select diesel pusher motorhomes, the 12 volt fuse panel section of the 50 amp Power Load Center is similar in operation to the 30 amp panel described earlier in this section.

### Converter

See previous converter section.

### Multiplex System 12 Volt Circuit Breaker Panel

Instead of a fuse panel, select diesel pusher motorhomes with 50 amp electrical service and using a Firefly multiplex system, may have a 12 volt circuit breaker panel, similar to the illustrations shown on this page. Panels like this are typically located in a rearward closet or service bay.

These panels will contain a list of 12 volt circuits and devices printed on the face and include a corresponding row of LEDs that indicate whether or not the circuit or device is in-service. Along the bottom or side-edge of the panel will be a row of push-button circuit breakers with the prefix label of 'B'. The face label indicates the circuit that is controlled by each corresponding circuit breaker.

If a device LED is not illuminated, press the corresponding circuit breaker button to reset. If resetting the circuit breaker does not restore power to the device, there is either a problem with the device or circuit. If the circuit breaker refuses to re-set, this indicates there is something wrong with that circuit. **DO NOT ATTEMPT TO FORCE IT TO THE ON POSITION:**

- The circuit may be overloaded with too many devices;
- The device may draw more current than what the circuit is designed to supply;
- The device may have developed an internal short circuit;
- The circuit wiring or outlet (receptacle) may be damaged;
- The circuit breaker may be faulty and requires replacement.

**DO NOT** attempt to use that circuit or device until the problem is diagnosed and repaired by a qualified electrician. Contact your dealer or TMC Customer Care for electrical system advice.



Typical 12 volt circuit breaker panel for Firefly multiplex system



On select diesel motorhomes, the master battery disconnect switch, along with 12 volt circuit breakers, is located on a panel installed in a service bay of the motorhome.

## Monitor Panel



Typical Monitor Panel

Monitor panels provide a convenient and centrally-located place for electrical controls and monitoring of motorhome systems. Items that may typically be found on the monitor panel include (inclusion and location will vary by model year, brand and model):

- Holding tank level indicators and switch(es);
- Battery condition indicator (L=Low, F=Fair, G=Good, C=Full Charge);
- Water heater switches (electric & propane gas);
- Water pump switch;
- Generator start / stop switch;
- Generator hour meter;
- Tank heater switches;
- Light switches for some interior and exterior lights;
- Slideout control switch(es);
- Shore Power Fault Indicator.

**NOTE:** Monitor panel design, features, and functions vary depending on model year, make, and model. Motorhomes equipped with multiplex systems have other features integrated into the controller.

For further assistance, contact your selling dealer or TMC Customer Care at 877-855-2867.

## Rapid Camp+® Multiplex Control Systems

Select TMC motorhomes are equipped with Rapid Camp+® multiplex wiring systems. A multiplex system uses low-voltage, digital signals to control the electrical and electro-mechanical devices within your motorhome via an intuitive, user-friendly touch-pad. Control functions vary from motorhome to motorhome, depending upon the standard and optional equipment available. However, in its typical configuration, a multiplex system will allow the user to monitor and operate these features from the main touch screen panel:

- Lighting and fan controls;
- Climate (HVAC) controls;
- Holding tank level monitoring;
- Water heater and water pump on/off;
- Electrical system monitoring; both AC and DC;
- Battery monitoring and charging; both auxiliary and chassis batteries;
- Inverter settings and controls;
- Generator on/off;
- AGS (Automatic Generator Start) settings and controls;
- PCS (Power Control System) settings and controls;
- Slideout and awning control;
- Shore Power Fault Indicator.



Typical multiplex main control panel. Features vary depending upon model and floor plan

## Basic Rapid Camp+® Multiplex Operation

### NOTICE

During very cold or very hot weather conditions, the image on touch-screen control panels (radio, multiplex, and other liquid crystal display (LCD) panels) may appear unclear or react slowly. Once the interior temperature of the motorhome stabilizes, normal LCD panel display and operations will resume.

Depending on the model and floor plan of your motorhome, it may be supplied with a multiplex control system from a variety of manufacturers. However, every multiplex system is designed to be intuitive to operate. Basic operation involves these steps:

1. Ensure power is ON, either from 12 volts DC or 120 volts AC (shore or generator power). With a power source ON, locate the main system panel. Some system panels will automatically 'turn on' when power is present, while other panels will require the user to press a button on the panel, or touch the display.
2. Select the feature or feature menu you want to control. Some panels will have feature icons along one edge of the panel, while other panels will have feature icons displayed on the panel's touch-screen.
3. With the feature menu selected, operate the control. For example, turn on or off the lights, raise or lower the temperature, turn on or turn off the generator, operate slideouts, or awnings.
4. Return to the main menu by either pressing the 'Home' icon, located along the bottom edge of the panel, on the touch screen, or on some panels, press a return arrow on the display.



Multiplex systems provide easy touch-control of all electrical functions of the motorhome.

Most multiplex systems include individual wall switch panels located in the bedroom and bathroom for control of lights, fans, etc.

Multiplex systems details are described in the manufacturer's owner's manuals included with your TMC Owner's Packet. Multiplex system how-to videos are also available on TMC's YouTube site:



Typical multiplex wall switch panel

[www.youtube.com/user/ThorMotorCoach](http://www.youtube.com/user/ThorMotorCoach)

## Outside 120 Volt AC Power Receptacle

### ⚠ WARNING

**NEVER USE AN APPLIANCE OR ELECTRICAL DEVICE THAT IS NOT PROPERLY GROUNDED OR HAS A MISSING OR DEFEATED GROUND PIN. INJURY OR DEATH DUE TO ELECTROCUTION IS POSSIBLE.**

Your motorhome is equipped with a convenient outside 120 volt AC power receptacle that is useful for operating appliances and entertainment devices. For your safety, the outside receptacle is grounded and ground-fault protected (Ground Fault Circuit Interruption, or GFCI).

### POWERING THE OUTSIDE RECEPTACLE:

The outside 120 volt AC power receptacle is energized whenever the motorhome is connected to shore power or the on-board generator is running. In typical RV wiring fashion, this receptacle is wired to a circuit that is ground-fault protected and likely includes other receptacles; usually located in the bathroom and kitchen; areas where the likelihood of water is present. Refer to your motorhome's 120 volt wiring diagram to locate other receptacles on the GFCI circuit.

## GFCI Receptacle

### ⚠ WARNING

**If the GFCI fails EITHER the self-test or manual test, turn OFF power to the failed circuit at the Power Load Center. Do not restore power to the faulty circuit until proper repairs have been made.**

Your motorhome is furnished with ground fault circuit interruption (GFCI) protection on specific 120 volt AC receptacles (recepts). GFCI receipts are found in the bath, while receipts in the kitchen area and exterior may be electrically connected to this circuit; therefore, also GFCI protected.

The GFCI does not protect against short circuits or electrical overloads. Circuit breakers in the Power Load Center, which supply power to the circuit, will trip if these conditions exist.



Typical GFCI receptacle

GFCI receipts are compliant to the self-test industry standards implemented in 2015. These new GFCI's automatically monitor the presence of ground, and if a ground fault is present, whether a load is plugged in or not, the GFCI shuts off power to the recept. Although the self-testing feature increases the safety of the recept, it does not eliminate the need for occasional manual testing of the GFCI circuit breaker to ensure it is working properly. Manually test GFCIs at the beginning of the travel season and monthly thereafter.

#### TO TEST THE GFCI CIRCUIT BREAKER:

1. Make sure power is switched ON to the circuit. Use a test meter, test probe or a low-wattage electrical device.
2. PUSH the test button. The RESET button should pop out.
3. With the RESET button out, all power should be interrupted (OFF) to the recept being tested.
4. Verify there is no voltage to the recept by using the test probe or low-wattage electrical device.
5. Push the RESET button IN to restore power to the GFCI.
6. Verify that voltage has been restored to the GFCI recept.

If the reset button does not pop out after pushing the test button, or GFCI circuit breaker continues to trip, or if the power is not interrupted to the test light, immediately turn OFF power at the main circuit breaker panel and have a qualified electrician repair the circuit or replace the GFCI. Do not use that circuit until repairs are made.

If a non-GFCI receipt is 'dead', check the near-by GFCI circuit breaker; it may need to be reset. If so, unplug all electrical devices from the GFCI receipt and all receipts wired to this circuit, and reset it. Then, monitor it for proper circuit functionality.

If resetting the GFCI does not restore power to it and to the other GFCI-protected receipts **and** the corresponding circuit breaker in the Power Load Center is **not** tripped, then there is a problem with the electrical circuit or GFCI receipt. Enlist the service of a qualified electrical technician for repairs. Do not use that circuit until repairs are made.

**NOTE:** It is normal RV wiring practice to wire one or more electrical receptacles to the GFCI circuit. If another outlet in the motorhome is 'dead' check the GFCI in the bathroom; it may be tripped.



# Propane System

Propane or liquefied petroleum (LP) gas is a clean and efficient source of energy. The propane system in your motorhome furnishes fuel for cooking and heating, providing hot water, and generating electricity (by a propane-fueled generator, if equipped). Propane is also used as an alternative energy source for refrigeration. The propane system is comprised of numerous components such as the propane tank, hoses, propane gas regulator, and piping and copper tubing lines to each appliance.

There are propane-related safety labels affixed to your motorhome that pertain to propane safety. Always observe and follow proper handling and safety precautions when using propane gas and propane appliances.



Propane provides clean, dependable energy for a variety of appliances

## Propane Gas Safety

### NOTICE

#### IF YOU SMELL PROPANE GAS

- Extinguish any open flames and all smoking materials.
- Shut off the propane supply at the container valve(s) or propane supply connection.
- Do not touch electrical switches.
- Open doors and other ventilating openings.
- Leave the area until the odor clears.
- Have the propane system checked and leakage source corrected before using again.

**Ignition of flammable vapors could lead to a fire or explosion and result in death or serious injury.**

### ⚠ DANGER

**All pilot lights, appliances, and their igniters (see operating instructions) shall be turned off before refueling of motor fuel tanks and/or propane containers.**

**Can cause ignition of flammable vapors, which can lead to a fire or explosion and result in death or serious injury.**

### ⚠ DANGER

**Do not use gas cooking appliances for comfort heating. Can lead to carbon monoxide poisoning, which can lead to death or serious injury.**

### ⚠ WARNING

**THIS PROPANE PIPING SYSTEM IS DESIGNED FOR USE WITH PROPANE ONLY**

- Do not connect natural gas to this system.
- Securely cap inlet when not connected for use.
- After turning on propane, except after normal cylinder replacement, test propane piping and connections to appliances for leakage with soapy water or bubble solution.
- Do not use products that contain ammonia or chlorine to test for leaks. These substances may weaken piping components and cause gas leaks, leading to fire or explosion, which could result in death or serious injury.

#### FOR SAFE PROPANE USE:

- Strictly adhere to all propane warnings printed on propane appliances and devices.
- Propane is a colorless and odorless gas that, when under pressure, is in a liquefied state. An odorant (usually a sulfur compound) is added as a warning agent.
- Propane is heavier than air; the gas tends to flow to lower areas and will sometimes accumulate in these low areas, such as the floor.
- If you smell propane within or around your motorhome, quickly and carefully perform the procedure listed on the safety labels at the beginning of this section and affixed to your motorhome.
- Hand tighten the main propane gas system valves only, do not use a wrench or pliers as over tightening may damage the valve seals and cause them to leak.

- As part of your normal maintenance routine (at least once a year), have a qualified propane service technician perform an inspection of your entire propane system, including a system pressure test (appliances, tank, regulator, piping, and fittings).

## Propane Tank

### **⚠ DANGER**

**Always shut OFF the engine while refueling propane tank. Do not smoke. Turn off all appliances with automatic igniters and do not operate other ignition sources while refueling.**

### **⚠ WARNING**

- **Do not fill propane container(s) to more than 80 percent of capacity. A properly filled container contains approximately 80 percent of its volume as liquid propane.**
- **Overfilling the propane container(s) can result in uncontrolled propane flow, which could lead to a fire or explosion and result in death or serious injury.**
- **If you suspect your propane container has been overfilled, contact your selling dealer or a qualified propane technician for assistance immediately. Do not attempt to service or correct a propane container overfill yourself.**

### **⚠ CAUTION**

**Propane tanks are to be installed, fueled, and maintained in accordance to country, federal, state, and local codes, rules, regulations, laws, or guidelines.**

A permanently mounted A.S.M.E. (American Society of Mechanical Engineers) approved propane container (tank) is located under the floor of your motorhome. Propane expands 1½ percent for every ten degrees Fahrenheit of increase in temperature. It is imperative to leave sufficient space inside the container to allow for natural expansion of gas during warmer weather.



Typical propane gas tank

## MONITORING PROPANE LEVELS

The amount of propane remaining in the propane tank can be monitored by pressing the appropriate monitor buttons on the motorhome's monitor panel or main multiplex system panel (if installed). Refer to Electrical System, Section 10.

## Filling and Servicing

Given that the propane tank is not removable, the motorhome will need to be driven to a qualified propane facility for filling and servicing. Only an authorized propane service technician(s) should be near the motorhome while the propane tank is being filled. Drivers and passengers should wait at a safe distance away from the motorhome until LP filling and servicing is complete.

New propane containers are filled with an inert gas, which must be carefully purged before filling with propane. The propane tank must NEVER BE OVERFILLED with propane.

Never allow your propane tank to be filled above the maximum safe level as indicated by the fixed liquid level gauge. Overfilling the propane container above the liquid capacity indicated on the gauge could allow liquid propane to enter the system that is designed for vapor only, creating a hazardous condition.

**NOTE:** The capacity or size of a propane tank is expressed in pounds (lbs.) and correlates to the weight of the propane it is capable of containing when filled to 80% capacity, not the total volume capacity of the tank.

## Using the Propane System

### **⚠ WARNING**

**GAS COOKING APPLIANCES NEED FRESH AIR FOR SAFE OPERATION. BEFORE OPERATING:**

- **Open vents or windows slightly or turn on exhaust fan prior to using cooking appliance.**
- **Gas flames consume oxygen, which should be replaced to ensure proper combustion.**
- **Improper use can result in death or serious injury.**

**⚠ WARNING**

**RANGE COVERS MUST BE OPEN WHEN THE SURFACE BURNERS ARE IN OPERATION.**

**IF YOUR MOTORHOME HAS A PRIVACY CURTAIN WITHIN 6 FEET OF THE GAS COOKTOP; do not operate unless the privacy curtain is secured away from the appliance or removed.**

**May cause a fire, which could result in death or serious injury.**

**⚠ WARNING**

**DO NOT STORE COMBUSTIBLE MATERIALS ON OR NEAR GAS APPLIANCES.**

**May cause a fire, which could result in death or serious injury.**

**NOTICE**

**Some appliances, such as furnaces, water heaters and refrigerators, are equipped with automatic propane igniters, while some stove or oven models may require lighting a pilot light before operating the appliance.**

1. Ensure ALL burner valves, controls, and pilot light valves are CLOSED.
2. Open the main valve in the propane tank slowly to avoid a fast rush of propane vapor to the propane pressure regulator, which could cause propane 'freeze-up.' If you experience propane freeze-up, close the main valve and wait 15 minutes before trying again.
3. Listen carefully as propane begins to flow. If a hissing noise is heard for more than one or two seconds, close the main valve and contact your selling dealer's service department to have the propane system tested.
4. Light or turn on the appliance(s) as needed, following the appliance manufacturer's instructions.

**Make sure that you read and fully understand ALL safety requirements for handling and operation of the propane system.**

**NOTE:** Propane tanks installed in TMC motorhomes range from 40-68 pounds capacity for Class C motorhomes, and 40-105 pounds capacity for Class A motorhomes (specifications subject to change).

## External Propane Hook-up

**⚠ WARNING**

**WHEN USING THE OUTDOOR COOKING AREA:**

- The vehicle must be level and stabilized.
- Do not violate manufacturers' instructions on required clearances for cooking appliances during use.
- Do not store cooking appliances until cool to the touch.

**Can lead to a fire and explosion and result in death or serious injury.**

**⚠ CAUTION**

- Ensure that children and pets stay well away from any gas appliance in use or connected to the external propane hook-up.
- Do not use or operate appliances designed for outdoor use inside the motorhome.
- Potential injuries due to trips, falls, flame and heat exists.

Your motorhome may be equipped with an external propane quick connect/quick disconnect. This low-pressure gas source is a convenient propane connection for an external gas appliance, such as a gas grill, fryer, or other gas device.



Typical external propane hook-up

This external propane hook-up has its own manual gas shut-off valve, located directly behind the quick disconnect port. To operate the Propane Hook-up:

1. Ensure the manual shut-off valve is OFF.
2. Turn ON the main gas valve.
3. Confirm your gas appliance is fitted with a proper gas hose and mating connector, and if so, connect it to the propane quick-release port.
4. Slowly open the manual shut-off valve, listening to ensure there are no gas leaks. **IF A GAS LEAK IS DETECTED, IMMEDIATELY CLOSE THE SHUT-OFF VALVE. DETERMINE AND REPAIR THE SOURCE OF THE LEAK.**

5. When safe to do so, operate the gas appliance.
6. After using the gas appliance, turn OFF the manual shut-off valve.

**ENSURE THIS GAS VALVE IS OFF WHENEVER TRAVELING, RE-FUELING, AND WHEN THE EXTERNAL PROPANE HOOK-UP IS NOT IN USE.**

Always follow the gas appliance manufacturer's instructions for safe operation of all gas devices.

NOTE: Some gas appliances may have built-in gas regulators that could make the device incompatible with this low-pressure propane source.

## Propane Leak Test

### **WARNING**

**If a propane gas leak is detected, close all gas valves and turn off all igniters.**

**Do not use any part or component of the propane system until the leak is properly repaired by a qualified technician.**

Leaks may be found easily with a soapy water solution. Do not use a solution containing ammonia or chlorine when searching for leaks. These products are corrosive to copper gas lines and brass fittings, which could result in deterioration of the copper and brass components.

Apply the soapy solution to the outside of the gas piping fittings. If a leak is present, the soapy solution will 'bubble' at the leak point. If a leak is indicated, shut OFF the propane system valve(s) at the propane tank, and immediately contact your selling dealer's service department or qualified propane service representative to arrange repairs.

## Traveling With Propane

Some states prohibit propane appliances to be operated during travel, especially in underground tunnels. Make sure you are familiar with the propane transportation laws for the regions where you travel.

# Water System

## Fresh Water System

Potable (drinking) water is supplied throughout your motorhome from either the fresh water holding tank or from a connection to an outside water source. When using the fresh water holding tank, water is pressurized and travels through the water lines by means of the water pump. When utilizing an external water source, such as a campsite water spigot, the water pump is not needed (it is bypassed by check valves), as the campsite water source provides pressurized water to the motorhome.

## Potable Water Hose

To supply safe potable water to your motorhome, purchase and keep separate a sanitized water hose, whose sole function is for use with your potable water delivery and storage. Use a different water hose for other water-related activities, such as cleaning outdoor furniture, washing the motorhome, maintenance, or sewer system cleanup.

## Connecting to a Fresh Water Source

### ⚠ CAUTION

**Some external water sources develop high water pressure, particularly in mountainous regions. These campgrounds or hook-up locations may not have regulated water pressure, which could be considered excessive.**

**High water pressure is anything over 55 psi. Excessive pressure may cause leaks or damage to your motorhome's water system.**

### NOTICE

**When connected to an external water source, it is strongly recommended that a water pressure regulator is used in-line with the water supply delivery hose. Water pressure regulators are designed to reduce high external water supply pressures to a level that is safe for your motorhome's water system; preventing potential damage. RV water pressure regulators can be obtained at RV suppliers or dealers.**

1. Set your water heater bypass valves (if installed) to the correct position listed on your water system label. **DO NOT OPERATE THE WATER HEATER IF ITS WATER SUPPLY IS BYPASSED.**
2. Remove the cap from the fresh water inlet on the side of the motorhome.

3. Attach one end of your potable (drinking) water hose to the external water source spigot.
4. Connect the other end of the hose to the motorhome's city water inlet.
5. Turn ON the external water source spigot. Gradually open the hot and cold water at the sinks and shower to clear air from the lines. Close the faucets when the water is flowing freely.



Typical city water fill connection

## Disconnecting from a Fresh Water Source

1. Turn OFF the external water source spigot.
2. Disconnect your potable water hose from the supply valve and the fresh water inlet.
3. Remove the water hose and store it in an appropriate place.
4. Reinstall the cap on the fresh water inlet.

### NOTES:

- The use of in-line water filters and pressure regulators (not supplied by TMC) is recommended whenever potable water is being delivered by an external source. Ask your dealer for details.
- If you will be away from your motorhome for a few hours or more, it is a good practice to disconnect or turn off the valve from the city water source. This will prevent or reduce any damage that could be caused by a pressure-induced leak in the motorhome's water system pipes or fittings.

## Filling the Fresh Water Tank

### **⚠ WARNING**

**POTABLE WATER ONLY. SANITIZE, FLUSH, AND DRAIN FRESH WATER TANK BEFORE USING.**

**Failure to maintain tank may result in death or serious injury.**

### **NOTICE**

**Do not leave the motorhome unattended while filling the fresh water tank. Although the fresh water tank has an overflow vent, incoming water volume may exceed the capacity of the overflow vent, creating excessive pressure within the water tank and possible damage to seals and fittings.**

When an outside source of water is unavailable, water can be drawn from the fresh water holding tank in the motorhome.

1. Set your water heater bypass valves to the correct position listed on your water system label. **DO NOT OPERATE THE WATER HEATER IF ITS WATER SUPPLY IS BYPASSED.**
2. If your fresh water tank overflow valves are shut OFF or capped:
  - a. Open the fresh water tank overflow shut-off valves; or,
  - b. Unscrew and remove the fresh water tank overflow valve caps.
3. Remove the water fill cap.
4. Attach a potable water hose to the gravity fill inlet, while attaching the other end of the hose to a source of safe drinking water. Turn ON the valve at the water



Typical fresh water gravity fill

source. Only use a water hose designated for potable water purposes.

5. When the tank is full and water is coming out of the fresh water overflow tubes located under your motorhome:
  - a. Stop filling the fresh water tank;
  - b. Replace the water fill cap.

To use water from the fresh water tank, turn the water pump ON to pressurize the water in the lines and to the water heater. When ready, gradually open the hot and cold water at the sinks and tub to clear air from the lines. Close the faucets when the water is flowing freely.

When traveling, it is good practice to only carry a quantity of fresh water that will meet your fresh water needs until arriving at your next destination with a safe, potable water source. This will reduce the total weight of your motorhome, allowing for carrying capacity for other items, if needed. Refer to Section 6, Occupant and Cargo Carrying and Capacity (OCCC).

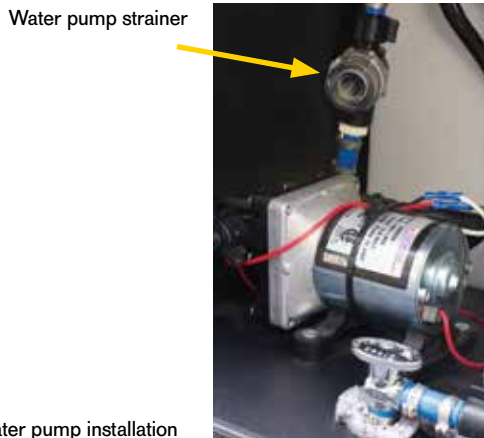
**NOTE:** While traveling, water can slosh in the fresh water tank and a small amount may escape through the overflow tube. This is a normal occurrence and you should not be alarmed if you arrive at your destination with less fresh water than you expected.

## Water Pump

### **NOTICE**

- **Do not turn the water pump ON if the fresh water tank is empty. Doing so could cause damage to the water pump.**
- **Do not turn ON the water pump when using water from an external source. Only run the water pump if using potable water stored in your fresh water tank.**
- **The water pump should be turned OFF when the motorhome is left unattended for any amount of time. This may help limit potential damage should something fail within the water system.**

When the motorhome is not connected to city water (e.g., campsite water) and you want to use water from the fresh water holding tank, you will need sufficient 12 volts DC power to operate the water pump. Once turned ON at the monitor or multiplex or panel, the water pump (also known as an on-demand pump) will self-prime, pressurize the water lines, and provide water to the faucets, shower, and toilet. As long as the water pump switch is ON, and



Typical water pump installation

there is water in the fresh water holding tank, the pump will turn on and off automatically as water demand requires.

### OPERATING THE WATER PUMP

The water pump is designed to operate automatically on an as-needed basis. Using the water pump continuously, such as leaving a faucet open for an excessive time period, or operating the water pump without water in the fresh water holding tank, will shorten its operational life and is not covered by warranty. The water pump has a check valve that prevents water from back-flowing into the fresh water tank.

**DO NOT OPERATE THE WATER PUMP IF THE FRESH WATER HOLDING TANK IS DRY OR THE MOTORHOME IS CONNECTED TO AN EXTERNAL WATER SOURCE.**

1. Make sure there is adequate supply of water in the fresh water holding tank.
2. Be sure the water heater bypass valves are set correctly according to your water system label. **DO NOT OPERATE THE WATER HEATER IF ITS WATER SUPPLY IS BYPASSED.**
3. Open all the faucets (first hot, then cold) including your interior and exterior shower faucets.
4. Turn the pump switch ON, and allow the water pump to fill the water lines and hot water heater tank (if installed). After water is flowing in a steady stream from all your faucets, turn the faucets OFF. The water pump should stop operation automatically when all faucets are closed. The pump should now run 'on-demand' when a faucet is opened, and stop when the faucet is closed.
5. The water pump switch must be ON to provide water to the toilet.

The switch for the water pump is usually located on the Monitor Panel or Multiplex Main Control Panel (if equipped). Refer to Electrical System Section.

For additional information on the care and operation of the water pump, refer to the water pump manufacturer's information.

### Water pump Strainer

If equipped, periodically check the in-line water pump strainer for accumulated debris. To clean the water pump strainer shut OFF the water pump, unscrew the clear cap, remove the reusable metal cartridge, clear any debris, and reinstall the strainer and cap.

### Water Panel

Select motorhome models are equipped with a water systems panel, similar to this illustration. However, if your motorhome is not fitted with a water systems panel, it will include most, if not all features depicted, just located in other areas of the motorhome. Water systems may include:

- Valve panel;
- Fresh water inlet;
- House water filter;
- External shower;
- Low point drains;
- Water pump switch;
- Black tank flush;
- Compartment light.

Your dealer or TMC Customer Care representative can assist you in locating water system features of your motorhome.



Illustrated here is a water system panel for a Class A motorhome. Features vary by model and floor plan.

## Water Heater

Your motorhome will be equipped with one of these three types of water heaters:

- Tank-type (6 and 10 gallon);
- Tank-less (on-demand);
- Hydronic (on-demand).

For complete safety information and operational instructions on the particular water heater installed in your motorhome, please refer to the water heater manufacturer's guide contained in your Owner's Packet or visit the water heater manufacturer's website. For information concerning your particular motorhome's installed equipment, contact TMC Customer Care or refer to the TMC Water System Guide, available from the TMC website.

## Sanitizing the Fresh Water System

Sanitize the fresh water system before initial (first time) use, after extended periods of motorhome storage, at least once a year during continuous use, or if the fresh water system, fresh water supply, or fresh water holding tank has been compromised or contaminated.

1. Remove or by-pass the potable (drinking) water filter (if equipped).
2. Disconnect and cap (or by-pass) the refrigerator ice maker inlet water line (if equipped).
3. Disconnect and cap (or by-pass) the dishwasher inlet line (if equipped).
4. Disconnect and cap (or by-pass) the washer inlet line (if equipped).
5. If equipped with a dishwasher, ice maker, or washer, follow the appropriate appliance manufacturer's instructions pertaining to sanitization.
6. Prepare a solution using a gallon of water and  $\frac{1}{4}$  cup of liquid household bleach (5% sodium hypo-chlorinate solution). Use one gallon of solution for each 15 gallons of tank capacity.
7. Open your fresh water tank bypass tube shut off valves, or uncap them.
8. With an empty tank and all faucets and drains closed, pump the solution into the fresh water tank, via the water fill cap using the water pump. Or, carefully pour  $\frac{1}{4}$  cup of bleach for every 15 gallons of holding tank

capacity into your potable (drinking) water hose before connecting it to the water source. The water source pressure will push the chlorine and water into the fresh water tank, making the correct dilution when the fresh water tank is full.

9. Completely fill the fresh water tank with fresh water.
10. Switch ON the water pump. Open all the faucets one at a time until all air is purged, and the water flows freely.
11. Add fresh water to the fresh water tank again, until the water level reaches the fill spout.
12. Allow the solution to stand in the fresh water tank for at least three (3) hours.
13. Drain the fresh water system by opening all faucets and the fresh water tank drain valve while flushing the system with fresh potable (drinking) water.
14. Continue flushing the system, allowing the water to flow for several minutes.
15. Close the fresh water tank drain valve and the faucets. Refill the system with potable (drinking) water.



## Waste Water System

The waste water system of your motorhome consists of bathroom fixtures, drainage plumbing, waste water holding tanks, drainage vents, and sewage valves. It is important to familiarize yourself with the motorhome's waste water system, for it does require monitoring, routine and long-term maintenance.

### Drain Pipes

#### NOTICE

**Remove the waterless trap before using mechanical drain-rooting devices. Otherwise, the waterless trap can be damaged.**

Drain pipes have P-traps and/or waterless traps (HEPVOs) installed to help prevent drain odors from escaping into the motorhome. During travel, water within P-traps may displace, which could allow waste water system odors into the motorhome. Drain-related odors come from decomposing materials in the holding tank. If odors are detected, place a few cups of water down each drain and use a RV approved deodorizing agent, which will reduce drain odors and help keep the drain lines and tanks clean and free flowing. Drain chemicals are available at RV supply stores.

### Vents

Vent pipes and vents release air from the gray and black water holding tanks. The exterior vent cap is attached to the roof, and must be kept clear of debris and obstructions to perform as intended. On some brands and models, the vent pipe may be part of the drainage system referred to as a "wet vent" (water flows downward as air flows upward in the same pipe).

## Waste Water Holding Tanks

Your motorhome is fitted with waste holding tanks designed to separately collect waste water and waste solids. Typically, waste water from kitchen sinks, bathroom sinks and bathroom shower(s) is collected and stored in the Gray Water tank, while solids from bathroom toilet(s) is collected and stored in the Black Water tank. Some floor plans have two black holding tanks, while others may drain bathroom sinks and/or the shower into the black tank. Waste water collection tanks have valves that allow for emptying the tanks into an external sewage collection facility, commonly known as a 'dump station.'

When traveling, it is good practice to minimize the waste water (gray and black) carried in your motorhome. This will reduce the total weight of your motorhome, allowing for

carrying capacity for other items, if needed. Refer to Section 6, Occupant and Cargo Carrying and Capacity (OCCC).

**NOTE:** Monitoring the level of waste water within the holding tanks is provided for on the Monitor Panel or, if equipped, on the main Multiplex touch-screen panel. Typically, tank level is indicated in 1/3 increments.

### Toilet

#### NOTICE

**Unless connected to a city water supply, unnecessary frequent flushing of the toilet will quickly deplete the fresh water supply within the fresh water holding tank. There is black tank overflow protection built into the waste water system. If the black water holding tank becomes full, you will no longer be able to flush the toilet until the black water tank is emptied.**



Typical motorhome toilet installation

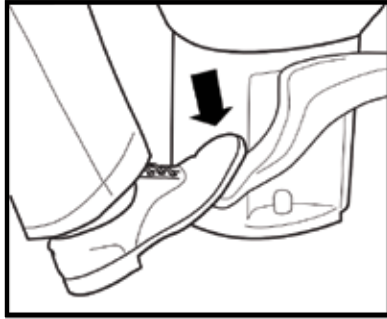
The toilet(s) installed in your motorhome are designed to provide convenient and trouble-free operation when used properly. Unlike most residential toilets, RV toilets are usually tank-less, meaning that the user fills the bowl just prior to use. Most toilets are operated by a foot-actuated pedal, located either on the right side or front of the toilet bowl.

#### TO USE:

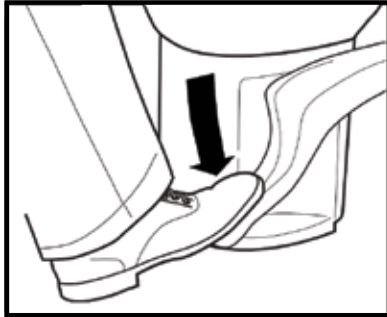
1. First, add water to the bowl, depress the lever or pedal half way. This will open the water valve, filling the bowl, and keep the waste valve closed. Water in the toilet bowl will aid waste evacuation.
2. To flush, depress the lever or pedal all the way, which opens the waste valve and evacuates the bowl to the black tank. Hold down the lever (pedal) until rinse water clears waste from the bowl. Be sure to release the lever or pedal slowly.

Toilet Flushing Procedure:

1. Depress lever 1/2 way to add fresh water to toilet bowl.



2. After using toilet, depress lever to the floor, which rinses the bowl with fresh water and opens the waste valve, flushing waste into the black water holding tank.



It is a good practice to always check the toilet bowl for water as part of your prepping process for departure. Flush (empty) the toilet bowl before departure. If not, water remaining in the toilet bowl could slosh onto the bathroom floor while traveling.

Follow the toilet manufacturer's recommendations supplied with the toilet for cleaning, troubleshooting, and maintenance. If you have a toilet that differs from the description given here, make sure to follow the manufacturer's operating instructions.

NOTES:

- **IMPORTANT** - Only use RV or Marine toilet paper with your motorhome's waste system. These paper products are specially formulated to break-down more readily than standard toilet paper products and help prevent waste system clogging.
- Do not flush hygiene, paper towels, plastics, or other non-biodegradable wastes into the waste water system.
- The toilet manufacturer may also recommend using particular cleaning products or chemicals that deodorize or aid waste decomposition.

Macerator Pump

**NOTICE**

The macerator pump operates automatically, turning on and off whenever a discharge from the toilet is sensed.

The macerator pump operates on 12 volts DC. The main battery switch must be ON for the macerator pump to operate as intended.

TMC motor-home models may utilize a waste material macerator pump; either as part of the toilet, or as a separate pumping unit. The macerator



Typical 12 volt Macerator Pump

is a device that grinds toilet waste material into fine particles, then pumps the waste to the black holding tank; making waste decomposition and disposal more efficient. Macerators are typically used where the toilet installation is somewhat removed from the black water holding tank location. They are also used where a bathroom toilet is installed in a slideout, making toilet wastes easily pumped into the black water holding tank.

RECIRCULATION MODE:

**NOTICE**

**DO NOT** operate the macerator pump in recirculating mode when the black tank is empty. Only operate the macerator pump in recirculating mode when the level of the black tank is at least 1/3 full. This will ensure the pump mechanism is not damaged by operating in a dry condition.

In some installations, a macerator pump is also used as a recirculating pump for the waste tank. As it performs this function, it is reducing waste solids to very fine particles, thus reducing the chance of waste solids build-up on the tank surfaces and tank level sensors. If this function is available, there will be a macerator-recirculating switch located on a bathroom wall switch panel, along with a switch located near the termination valves.

Please refer to your TMC Owner's Packet to determine if your motorhome is equipped with a macerator pump and if so, read and follow all special care and maintenance procedures.

## Termination Valves

The termination compartment generally contains the waste water components listed in this section. Please note that due to the variety of TMC motorhome models and floor plans, the items described in this section are general in nature and may or may not pertain to your termination valve configuration.

- Termination valve handles for both gray and black water holding tanks. To open, grab handle, and pull outward. Make sure that the sewer drain hose is connected before opening these valves.
- Termination cap. Remove cap to install the flexible sewer drain hose (not supplied by TMC). Be sure that the termination valves are closed before removing this cap.
- Sewer holding tank flush attachment. Attach the city pressure hose and allow the water to flow for three minutes. Refer to the Black Tank Flush description in this section.
- Hatch cover. Open this and pass your city pressure hose through. Close with hose passing through small opening in the cover.
- Access cap for sewer pipe. Located directly under sewer drain, remove cap and feed flexible sewer hose up through, and attach to the drain outlet.
- Exterior faucet. For mixing the water temperature for the exterior shower head.

Note: It is typical to have one gray and one black termination valve for the gray and black tanks respectively. However, depending on the quantity and location of bathrooms, some floor plans have two black tanks with their own individual termination valves.



Typical termination valve configuration

## Emptying Waste Water Holding Tanks

### NOTICE

**When connected to a campground sewer system, it is best to keep the termination valves CLOSED until the waste water storage tanks need to be emptied. Doing so will prevent campground sewer gases from entering the waste water system.**

1. Remove the cap from the sewer drain and connect your flexible sewer drain hose.
2. Place the other end of the flexible sewer drain hose into the dump station inlet. Be sure both ends of the flexible sewer drain hose are secured.
3. Drain the black water holding tank first by pulling the termination valve handle away from the valve body. Be sure to allow sufficient time for the black water holding tank to completely drain, then rinse the black water holding tank with several gallons of water by depressing the toilet flush pedal, flush handle, or use the black tank flush (if equipped).
4. Drain the gray water holding tank by pulling the termination valve handle away from the valve body. Draining the gray water holding tank after the black tank allows the soapy water in the gray water holding tank to rinse the flexible sewer drain hose.
5. When both the black water and gray water tanks are emptied, close the termination valves by pushing the handles back to the closed positions.
6. Remove the flexible sewer drain hose, and rinse it thoroughly with clean water. Remove the other end from the dump station inlet, and replace it in its storage container.
7. Replace the sewer caps on both the motorhome outlet and the dump station inlet.
8. Flush the toilet a few times to add a small amount of water to the black tank. This will help keep any remaining solids from drying to the tank surfaces.

NOTE: Always wear rubber or vinyl gloves and protective eye wear when emptying the holding tanks.

## Black Holding Tank Flush

### ⚠ CAUTION

**Do not use the black tank flush system unless the black tank termination valve is in the open position.**

**The black tank could overflow if the termination valve is not open, which will result in an unsanitary condition, leading to illness or potential personal injury.**

If your motorhome has a black tank rinse system (San-T-Flush, or similar rinse port), connect it to the dump station water supply with a garden hose reserved for this task. For sanitary reasons, do not use a fresh water hose for the black tank rinse. Do not turn on the rinse water until the black tank has been emptied.



Typical black tank flush

After black tank dumping, some solids may be left at the bottom of the black water tank as well as on the tank sidewalls. The black tank flush is designed to help rinse and flush the black tank. Turn on the water and let it run for several minutes to help remove solids left in the tank. During the flushing process, be sure the termination valve remains open and the flexible sewer drain hose remains connected between the motorhome's sewer drain outlet and the dump station inlet.

If the motorhome does not have a black tank rinse system, you can use water from the toilet bowl to rinse the black holding tank:

1. Ask your partner to flush the toilet several times to duplicate the action of black tank rinse system. Do this immediately after dumping the black tank and while the flexible sewer hose is still connected to the sewer outlet of the motorhome and to the dump station inlet, and while the black termination valve is open.
2. This rinsing process may need to be done several times. Please be sensitive to others waiting to use the dump station facilities.

## Winterizing the Water System

### ⚠ WARNING

**Automotive antifreeze (ethylene glycol) and windshield washer antifreeze (methanol) are poisonous. Never use these products in your fresh water system. These products are harmful and may be fatal if swallowed.**

**Only use biodegradable RV antifreeze to winterize your motorhome's fresh water system.**

### NOTICE

**Antifreeze can be damaging to internal components of the water heater. For proper water heater winterization, drain the water heater tank and bypass the water heater inlet before adding antifreeze to the fresh water system.**

Preparing for colder weather or storage is a very important part of routine motorhome maintenance. The motorhome should be winterized at the end of the camping season, or when exposed to temperatures that will fall at or below 32°F (0°C). Repairs due to freezing water damage are not covered by warranty. Add only RV antifreeze to the fresh water system to ensure freeze protection. It may be easier to winterize the motorhome with another person assisting you.

1. Level the motorhome and drain the fresh water plumbing system by opening all low-point drain valves and draining the water heater.
2. Remove or by-pass the potable (drinking) water filter (if equipped).
3. If you have a dishwasher, ice maker, or washer follow the appropriate appliance manufacturer's instructions pertaining to winterization (and de-winterization):
  - Disconnect and cap (or by-pass) the refrigerator ice maker inlet water line (if equipped);
  - Disconnect and cap (or by-pass) the dishwasher inlet line (if equipped);
  - Disconnect and cap (or by-pass) the clothes washer inlet line (if equipped).
4. Turn OFF the water heater switch on the monitor or multiplex panel.
5. Turn OFF the gas valve at the water heater or turn OFF the tankless water heater switch.
6. Turn the water heater bypass valves (if equipped) to the BYPASS position. A tankless water heater may not have bypass valves.

7. If the water system includes a water valve panel, move the valves to the WINTERIZE position, as shown on your water system label.
8. Close the low point drains.
9. Attach a hose to the city water fill and insert the other end of the hose into a gallon container of RV antifreeze (this quantity should be enough to winterize the motorhome). To assist the siphoning process, put the container on a surface approximately two feet above ground level and use a short length of garden hose (15 feet or less).
10. Turn the water pump ON. If the water pump fails to self-prime, temporarily open the low point drains. Close the low point drains as soon as the water pump primes (RV antifreeze will begin draining out), and before continuing to the next step.
11. Open the hot water side on all faucets (kitchen, lavatory, shower, and exterior shower) until RV antifreeze begins to flow continuously.
12. Close the faucet hot water lines and repeat with the cold water lines on all the faucets.
13. Flush the toilet a couple of times until you see antifreeze in the bowl.

#### WHEN YOU ARE DONE ADDING RV ANTIFREEZE:

14. Remove the water hose from the container of RV antifreeze.
15. To prevent staining, wipe the RV antifreeze out of the sinks, shower (or tub) and toilet using a soft, dry cloth.

## De-winterizing Your Motorhome

1. Drain the holding tanks (fresh water, waste water, and sewage).
2. Attach a garden hose to the fresh water fill, and fill the fresh water tank.
3. Turn ON the water pump switch and open the cold water side of all faucets and shower fixtures. Shut OFF the faucet and shower fixtures after the water runs clear (no pink residue), and repeat for the hot water side.
4. Flush the toilet until clear water runs into bowl.
5. Dump the holding tanks again.
6. Sanitize the water system (refer to Sanitizing the Fresh Water System).

7. If a potable (drinking) water filter has been installed: drain the water lines, remove the assembly, clean and reinstall using a new potable (drinking) water filter.
8. When ready to use the water heater, open the bypass valve allow water to enter and fill the water heater tank (remember to shut OFF the water heater bypass mixer valve, if equipped).

**NOTE:** For information concerning your particular motorhome's water system and installed equipment, contact TMC Customer Care or refer to the TMC Water System Guide, available from the TMC website.

## Using the Water System in Cold Weather

### NOTICE

**Temperatures below freezing (32°F; 0°C) can damage water system components. Damage caused by freezing temperatures may not be covered by warranties. Always ensure the water system of your motorhome is protected from freeze damage.**

Many owners choose to use their motorhomes throughout the entire year or encounter freezing temperatures during travel. Due to the risk of severe damage, prolonged use of the water system in severely cold weather is not recommended. However, winter traveling can be safe for your motorhome's water system if you follow a few precautions.

- To avoid damage caused by freezing, the water system and storage tanks of your motorhome are dependent on the ambient temperature of the motorhome remaining above 32° F (0° C). When fully functioning and the temperature is set properly, the furnace will provide enough heat to protect the water system. In severe cold however, it is wise to monitor the water temperature in the tank, and take appropriate steps to drain and winterize if necessary. In weather below freezing, it may also be necessary to open the lower cabinet doors at night in both the bath and kitchen areas to keep warmer air circulating around the water pipes, drain pipes, and fixtures. Always ensure you have an adequate supply of LP fuel to keep the furnace operational and regularly test your LP/CO detector to ensure breathable air inside the motorhome remains safe.

## WATER SYSTEM

- If you are going to leave the motorhome unheated for any length of time in severe cold conditions, you must drain all water from the system. This includes draining the water heater and water supply lines. Also protect drain P-traps with antifreeze. Refer to the system winterizing procedures outlined in this manual.
- In cold weather conditions, it may work best to carry cooking and drinking water with you in plastic bottles or jugs instead of using the on-board fresh water system. If you decide to use bottled water, be cautious of water being placed down drains or being flushed through the toilet. Water that remains in P-traps and holding tanks is susceptible to freezing. If available, use campground bathhouse facilities.

### HOLDING TANK HEATERS (IF EQUIPPED)

Some TMC motorhomes are equipped with water holding tank heaters. These devices are heat-pads installed underneath the tanks and are manually activated by a switch, usually located on the main monitor panel or multiplex main touch-panel. Activate holding tank heaters whenever encountering sub-freezing temperatures. Other TMC motorhomes may be designed with furnace heating ducting directed to the water storage bays, which is designed to effectively prevent freeze damage to the water storage tanks. Ask your dealer if your motorhome is equipped with supplemental water storage tank freeze protection.

**NOTE:** For additional information on your motorhome's water system, refer to the Winterizing Quick Start Guide and the TMC Water Systems Guide available through the TMC Owners Resource on-line document service.

# Heating and Cooling System

## Introduction

Your motorhome's heating and cooling system consists of equipment sourced from a variety of manufacturers, yet the individual components are designed to function as an integrated system. Components may have manufacturer's warranties and registrations. Your dealer can assist you with completing component registrations.

Due to the wide variety of Thor Motor Coach models and floor plans, heating and cooling information that is uniquely specific to your particular motorhome is not included in this manual. Please review and retain all manufacturer's instruction manuals and documentation that is included with your TMC Owner's Packet. The manufacturers of the heating and cooling equipment installed in your motorhome are the best source for information regarding component features, operation, and maintenance.

Always refer to the manufacturer's documentation if you have questions regarding your heating and cooling system that are not covered in this manual. TMC Customer Care representatives are also available to answer any question you may have. Call toll free:

**877-855-2867**

The heating, ventilation, and air conditioning (HVAC) functions of your motorhome consist of two separate systems: the dash (vehicle) and house (living space). Much like the heating and air conditioning systems in passenger cars, the dash system is designed to heat and cool the front driver and passenger compartment, along with providing windshield defrosting. Although the dash heating and air conditioning system of your motorhome is generally more powerful than standard automobile systems, it is not designed to heat and cool the entire motorhome, even while the vehicle is in motion.



Regardless of the outside temperature, your motorhome's heating and cooling system will keep you and your traveling companions comfortable.

If cooling of the living space is needed while the vehicle is in motion, it is possible to operate the house air conditioner(s), however, to do so, the on-board generator must be in operation, supplying 120 volts AC to the air conditioning units. The Master Battery Disconnect Switch must also be ON, providing power to HVAC control devices.

**DO NOT OPERATE THE PROPANE GAS FURNACE, OR ANY OTHER PROPANE APPLIANCE, WHILE THE VEHICLE IS IN MOTION.**

## Dash Heater and Air Conditioner

### **⚠ CAUTION**

**The vehicle air conditioning system contains refrigerant 134a under high pressure and should only be serviced by qualified technicians. Improper service methods could cause serious personal injury.**

### Control Panel

The heater and air conditioner dash controls for most TMC Class C motorhomes is similar to what is found in many passenger and light commercial vehicles and is installed by the chassis manufacturer. For Class C dash control operation, refer to the chassis manufacturer's instructions provided in your Owner's Packet.

Class A dash heating and air conditioning units differ in that they are installed by the motorhome manufacturer. Both operate similarly in controls and functions, and both require the vehicle's engine to be running in order to heat or cool the cockpit of the motorhome.

The typical control panel consists of three rotary dials, which regulate FAN SPEED, TEMPERATURE, and VENTING. The configuration of these controls may differ from model-to-model, but the functions are similar. Motorhomes may be equipped with touch-panel dash temperature controls.



Typical Class A heating and air conditioning dash controls

The heater/air conditioner unit is located beneath the dash or on the firewall. In most modes of operation, the unit takes fresh air from outside of the vehicle and heats or cools it before discharging into the cockpit area. Only when operated in the MAX A/C mode does the system recirculate air from inside the cockpit area, thus maximizing the cooling effect of the air conditioner.

### Operating Features

The air conditioning system is designed to operate in all modes except VENT, FLOOR and OFF. Operating the air conditioner provides significant moisture, dust, and pollen removal for enhanced passenger comfort. Use MAX A/C and HI Fan for quick cool down. To assist with cooling, close all windows and vents to hot, humid outside air.

To achieve the maximum comfort in the motorhome, the air must be directed where it is needed. Some dash units may feature a mode switch, which gives the driver the ability to select where the air will flow; floor, dash vents, or a blend.

### GENERAL MAINTENANCE

Keep the condenser and radiator free of bugs and debris. During periods of little use, operate the A/C system monthly to keep the compressor lubricated. Periodically inspect belts and hoses for wear and proper tension.

### Warranty/Service

If repairs are necessary during the terms of the motorhome warranty, please contact the nearest authorized Thor Motor Coach dealer for service. In the event repairs are necessary during your travels, contact Thor Motor Coach Customer Care. Certain individual parts of the Heating and Air Conditioning System such as the compressor, dryer and condenser are covered under the chassis manufacturer's warranty.

**NOTE:** Components covered under the TMC Limited Warranty must be Original Equipment Manufacturer (OEM) parts. The installation of after market components or unauthorized repairs may void the warranty.

## Heating/Cooling with Multiplex Integration

Your motorhome may be equipped with a programmable multiplex system that, among other features, will include integrated control of the motorhome's interior climate (both heating and cooling), and all HVAC-related devices. Your multiplex system panel may look different than the illustrations below, but will function similarly.

### TO OPERATE:

1. Turn ON the Master Battery Disconnect Switch, providing 12 volt DC power to the HVAC control unit(s).
  - a. If heat is desired, ensure the main propane valve is ON prior to selecting HEAT.
  - b. If cooling is desired, ensure 120 volts AC is available for the air conditioner(s).
2. Select the Temperature-setting feature by either touching the temperature icon along the edge of the multiplex panel, or touching the temperature icon on the panel screen.
3. Select the zone you wish to control. Depending on motorhome configuration, there may be one, two, or three temperature zones.
4. Select cooling or heating by pressing the appropriate area on the screen.
5. Select the desired temperature setting by either touching the UP or DOWN arrows.

If desired, select the fan speed by touching the HIGH, LOW, or AUTO areas on the screen.



Typical multiplex control panels depicting climate control display



6. For total automation, select AUTO, which will turn on the air conditioner(s) or if needed, the furnace depending on selected temperature setting.
7. Return to the MAIN MENU by touching the 'House-shaped' icon on the panel or touching return arrows on the screen.

## Wall-mounted Thermostats

Unless equipped with a multiplex control system, your TMC motorhome will have a wall-mounted thermostat for convenient control of the heating and air conditioning functions. Although different in appearance, RV thermostats offer the basic functions of:

- Selecting between Heat, Cool, or Fan Only;
- Selecting a fan speed range;
- Selecting the temperature set point.

The thermostat remotely operates both the furnace and the air conditioner(s) of your motorhome and depending on thermostat model, may offer other control features. Wall mounted thermostats may be analog or feature a digital display. Both models operate similarly. If your air conditioning units are equipped with the optional Elect-A-Heat function, this selection will be indicated as electric heat on the front of the thermostat.

### TO OPERATE:

1. Turn ON the Master Battery Disconnect Switch, providing 12 volt DC power to the HVAC control unit(s).
  - a. If heat is desired, ensure the main propane valve is ON prior to selecting HEAT.
  - b. If cooling is desired, ensure 120 volts AC is available for the air conditioner(s).



Typical RV thermostats illustrating Analog and Digital temperature setting

2. On the thermostat, select Heat, Cool, or Auto.
3. Set the desired temperature. Depending upon the selection, the furnace or air conditioner(s) will begin operation.

If a wall-mounted thermostat or multiplex system is not installed in the motorhome, then air conditioner functions are controlled from a panel on the unit itself (ceiling panel).

**NOTE:** For complete information regarding the particular HVAC control device installed on your motorhome, refer to the information contained with your TMC Owner's Packet, supplied with your motorhome.

## Ceiling and Ventilation Fans

Your vehicle may be equipped with high-volume ceiling and ventilation fan(s). If equipped, the fan(s) can be operated as a powered vent; to draw in cool outside air, or as a ceiling fan to circulate the inside air of the motorhome. Fans are usually equipped with a translucent rain cover, which can be opened, partially opened, or closed.

Refer to the TMC HVAC System Guide for complete operational and maintenance instructions pertaining to motorhome ventilation and fan operation. Also, refer to the Care and Maintenance Section of this manual for important condensation information.

## Cooling the Motorhome

Your motorhome is equipped with one or more roof-mounted air conditioners. Select motorhomes are equipped with roof-mounted heat pumps (air conditioners with built-in heating features), while other motorhomes may feature a combination of roof-mounted and wall-mounted air conditioning units. The compressors and fans of all roof-mounted air conditioners operate on 120 volts AC, supplied by shore power or from the on-board generator, while the control circuits usually operate on 12 volts DC.

Typical Roof-mount Air Conditioner



Due to the electrical load of an air conditioner, they are not powered by the standard inverter that is supplied with an on-board electrical generator system.

All air conditioners are rated in British Thermal Units (BTU), which is a measure of their cooling capacity. The higher this number, the higher the unit's cooling ability. Ensure that the shore power source is adequate for the power needed to operate the air conditioner(s).

### TEMPERATURE DIFFERENTIAL

The ability of the air conditioner to maintain the desired inside temperature depends on the heat gain of the motorhome. The size of the vehicle, amount of window area, amount of insulation, amount of direct exposure to the sun, outside temperature, and the number of people occupying the inside space are factors that may increase the heat gain to such an extent that the ability of the air conditioner to cool the motorhome to the desired temperature is compromised. Under most operating conditions, you can expect a 15-to-20 degree temperature differential between the outside air and the discharge air of the air conditioner.

As long as this temperature differential is being maintained, the air conditioner is operating at its capacity. If the desired inside temperature (normally 75°-80° F) cannot be maintained, then the heat gain within the motorhome is too great for the capacity of the air conditioner.

To increase the effectiveness of the house air conditioner, try reducing the heat gain of the motorhome by:

- Park the motorhome in a shaded location.
- Use window and patio awnings when outside ambient temperature is above 95° F to help deflect the heating effects of the sun. If window awnings are not installed or cannot be used, cover windows with shades or blinds.
- Try to avoid using the cook top or oven when the ambient temperature is over 95° F.
- When parked, keep windshield covered when facing the afternoon sun.
- Minimize opening exterior doors when the air conditioner is running.

### NOTES:

- 120 volts AC must be present in order to operate air conditioners and/or heat pumps. The energy can be supplied by shore power or the on-board generator.
- Air conditioners are designed to cool approximately 20 degrees Fahrenheit lower than the outside ambient air. On extremely hot days, the air conditioner may not be able to cool the motorhome to the desired temperature.
- During warm weather, it is best to start the air conditioner early in the day, allowing it to cool-down and keep the interior of the motorhome at a comfortable temperature before the outside temperature creates too much of a temperature differential.

### Manual Controls for Roof-Mount Air Conditioners

Three basic controls on the air conditioner's ceiling assembly operate the air conditioner's functions. The three controls are:

#### SELECTOR SWITCH

The selector switch determines which mode of operation the air conditioner will be in. By rotating the selector switch, the operator can obtain any system function desired. System functions vary depending upon options of the air conditioning unit.

#### THERMOSTAT (TEMPERATURE CONTROL)

In the cooling mode, the thermostat regulates the ON and OFF temperature setting at which the compressor will operate. For 'Heat/Cool' models (heat pumps and units with built-in heating coils), the thermostat also controls the ON and OFF temperature setting of the heater assembly.

#### LOUVERS

The louvers are located at both ends of the ceiling assembly shroud and are used in directing the discharge air from the air conditioning unit.

**NOTE:** Some air conditioners are supplied with an optional Elect-A-Heat heating assembly, which is intended to take the chill out of the indoor air when the air is a few degrees too cool for comfort. This heating assembly is an effective 'chill chaser,' but is not a substitute for a furnace.

## Basic Air Conditioner Operation

### NOTICE

**NEVER operate air conditioners and heat pump without filters. Doing so will clog the evaporator coil and may substantially degrade the performance of the unit.**

The following basic instructions pertain to all air conditioner installations, regardless of the control device (multiplex panel, wall-mounted thermostat, or on-unit control panel).

1. Turn ON the Master Battery Disconnect Switch. This will provide 12 volts DC to the control system of the air conditioner.
2. Turn ON the generator OR connect the motorhome to a shore power source (refer to Electrical System, Section 10). This will provide 120 volts AC to the air conditioner's compressor and fan.

### COOLING

1. Turn the selector switch (if applicable) to the LOW COOL or HIGH COOL positions.
2. Rotate, slide, or move the thermostat (temperature control) to the desired interior temperature setting. The thermostat will turn the compressor on when the temperature of the air entering the air conditioner rises a few degrees above the setting you have selected. The thermostat will continue to cycle the compressor on and off in the above mentioned fashion until the selector switch is turned to another mode of operation.
3. Position the louvers to the desired direction of air flow.

### OPERATION DURING COOLER NIGHTS

When the outdoor temperature drops in the evening or during the night to below 75 degrees F., it is important that the thermostat (temperature control) be set at a midpoint between WARMER and COOLER. If the setting is at COOLER, the evaporator coil may become iced-up and stop cooling. During the day when the temperatures have risen above 75 degrees F., reset the thermostat switch to the desired setting.

**NOTE:** Should icing-up occur, it is necessary to let the cooling (evaporator) coil defrost before normal cooling operation is resumed. During this time, operate the unit in the 'High Fan' position with the system at maximum air flow. When increased or full air flow is observed, the cooling coil should be clear of ice.

### AIR CIRCULATION ONLY

- Turn the selector switch to LOW FAN or for maximum air flow, HIGH FAN.
- Position the louvers to the desired direction of air flow.

### SHORT CYCLING

When an air conditioner is in operation, its compressor circulates refrigerant under high pressure. Once off, it will take two to three minutes for this high pressure to equalize.

The air conditioning compressor is unable to start against high pressure. Therefore, once the air conditioner is turned off, it is important to keep it off for two to three minutes before restarting.

Short cycling the compressor (or starting it before pressures have equalized), will in some instances, trip the circuit breaker.

### Heat Pumps

Select TMC motorhomes are equipped with roof-mounted heat pumps. Heat pumps provide both cooling and supplemental cabin heating. When the cabin temperature rises to where air conditioning is needed, the heat pump provides cool, comfortable air. If the cabin temperature drops to where heat is required, the heat pump provides heated air to maintain cabin comfort. The controller will automatically turn on the LP gas furnace (or hydronic heating system, if installed) when the outside air temperature reaches a level where the heat pump can no longer efficiently heat the cabin.

The advantage of a heat pump system is that when connected to shore power, the heating needs of the cabin are supplemented by the heat pump, therefore, reducing the heating demands of the furnace, which conserves LP usage (or diesel fuel, with a hydronic heating system).

The roof-mounted heat pump installed on your motorhome has a low-profile design, for reduced wind resistance while underway. 120 volts AC shore power or on-board generated power must be available in order to operate the heat pump.

Roof-mounted low-profile heat pump. Exterior cover may be white or black.



## HEAT PUMP OPERATION

The operation and maintenance of the heat pump is similar to the roof-mounted air conditioner mentioned in the previous section. Refer to the HVAC Control Section for heat pump operation.

Motorhomes with multiplex control systems, climate control may be integrated with the multiplex control panel(s).

**NOTE:** For complete information regarding the operation and maintenance of your motorhome's air conditioner(s) and/or heat pump(s), please refer to the manufacturer's instruction manual, supplied with your TMC Owner's Packet, your on-line TMC Owners resource information service:

[www.thormotorcoach.com/owner-resource/](http://www.thormotorcoach.com/owner-resource/)  
or, visit the appliance manufacturer's web site.

## Heating the Motorhome

**⚠ DANGER**

**BE SURE THE FURNACE AND ALL IGNITION SYSTEMS ARE 'OFF' DURING ANY REFUELING AND WHILE VEHICLE IS IN MOTION OR BEING TOWED.**

**DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS APPLIANCE.**

**⚠ WARNING****CARBON MONOXIDE POISONING WARNING:**

- Doors must be properly sealed and draft cap and assemblies must be adjusted and sealed correctly to prevent carbon monoxide from entering coach.
- Combustion air must NOT be drawn from within any living area.
- DO NOT vent exhaust into living area or outside into an enclosed porch area.
- DO NOT vent any other appliance with venting systems serving the furnace.
- DO NOT allow snow or any objects to block exhaust system of furnace.
- DO NOT use the furnace cabinet area as a storage compartment.
- DO NOT block furnace outlet registers or return air grills.
- Keep all insulating materials away from furnace.
- Installation, repairs, and preventive maintenance should be done by a qualified service technician only.
- Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death or property damage.

**⚠ CAUTION**

**THIS APPLIANCE IS EQUIPPED WITH AN ELECTRONIC IGNITION DEVICE THAT AUTOMATICALLY LIGHTS THE BURNER. DO NOT TRY TO LIGHT THE BURNER BY HAND.**

**DO NOT touch exhaust grills when furnace is operating.**

**Heat registers can reach high temperatures when the furnace is running and can cause a burn if skin is in contact with the register.**

Most TMC motorhome models are equipped with a propane-fired, forced-air furnace, appropriately sized for the living space of the motorhome. Also, depending on the size of the living space, the heating system may have multiple registers that facilitate even heating throughout. With a forced-air system, there will be one, centrally located thermostat used to control the air temperature of the motorhome.

Select Class A motorhomes are equipped with a hydronic heating system. This system uses a diesel-fueled, or with some models, a gas burner (with a supplemental electrical heating element) to heat a volume of fluid (which contains special properties), that is circulated to zoned heat exchangers located throughout the motorhome. The hot fluid enters the heat exchangers, where the fluid passes through a series of coiled tubing. As the coils rise in temperature (due to the hot fluid passing through), a fan blows ambient air across coils, heating the air, which is directed to the living space of the motorhome. Heating zones are separately controlled by individual thermostats, so that the air temperature of specific areas of the motorhome can be individually controlled.

Detailed information regarding the heating and cooling equipment that is uniquely specific to your motorhome is not covered in this manual. Please review and retain all manufacturer's owner's manuals and documentation that is included with your TMC Owner's Packet. The manufacturers of the heating and cooling equipment installed in your motorhome are the best source for information regarding component features, operation, and maintenance.

For safe heating system operation, please follow all safety warnings pertaining to the furnace, hydronic system (if installed), propane system and electrical system printed in all manufacturer's documentation and labels attached to your motorhome. It is also recommended that you read the Propane Systems Guide and become familiar with the entire propane system of your motorhome. If you have questions regarding your heating and cooling system, TMC Customer Care representatives are also available to answer any question you may have; call, toll free at:

**877-855-2867**

Typical forced-air furnace installation



Hydronic system main unit, typically installed in a service bay of the motorhome



### Furnace Operation (propane, forced-air type)

The furnace supplied with your motorhome is equipped with an electronic ignition. Never attempt to light the burner by hand.

Before operating the furnace, smell all around the appliance area for gas. If gas is detected, either by smell or by the CO/LP alarm, DO NOT attempt to operate the furnace. For your safety, gas leaks MUST be repaired before operating any gas or electrical appliance.

#### WHAT TO DO IF YOU SMELL GAS

- Extinguish all open flames.
- Evacuate all persons and pets from the vehicle.
- Shut off the gas supply at the LP gas tank.
- Do not touch electrical switches or operate electrical devices.
- Contact nearest gas supplier or qualified service technician for repairs.
- Do not turn on gas supply or operate gas or electrical devices until the gas leak has been repaired.

## TURNING THE FURNACE ON

1. Ensure the motorhome's 12 volts DC electrical system is ON by turning on the Master Battery Disconnect Switch, connecting to shore power or operating the generator.
2. Turn ON LP gas supply at the propane tank. Counterclockwise rotation opens the valve; clockwise rotation closes the valve.
3. Check that power to the furnace is ON at the main power distribution panel.
4. Set the thermostat selector switch to HEAT.
5. Set the desired temperature on the thermostat. The furnace should automatically come on if the temperature setting on the thermostat is higher than the ambient air temperature.

## TURNING THE FURNACE OFF

- Reduce the temperature setting on the thermostat to its minimum level.
- Set the selector switch on the thermostat to OFF.
- If you are preparing to travel, turn OFF the LP gas supply at the tank.

## NOTES:

- During the initial operation of the furnace, you may detect slight fumes caused from the burning of residue and oils left from the manufacturing process. This is a normal occurrence and these fumes should subside within several minutes
- If the outside temperature will drop below 32° F (0° C) AND your motorhome is remaining parked, AND is not winterized, allow the furnace to operate in order to prevent the possibility of on-board water freezing and causing damage to the motorhome's water system.
- For additional information regarding heating and cooling systems installed on your motorhome, please refer to the TMC HVAC System Guide and the HVAC manufacturer's product information available through the TMC on-line Owners Resource Document Service:

[www.thormotorcoach.com/owner-resource/](http://www.thormotorcoach.com/owner-resource/)

## Furnace Care and Maintenance

**⚠ DANGER**

**The combustion of any hydrocarbon-based fuel creates carbon monoxide (CO) gas, which is extremely poisonous to humans and pets. Carbon monoxide gas is tasteless and odorless!**

- **Inspect furnace burners annually for proper combustion. Inspect for holes or cracks in combustion chambers, that if exist, could allow carbon monoxide gas into living space of the motorhome.**
- **Inspect propane (LP) system annually for cracks, leaks and worn components.**
- **Repair or replace faulty furnace and/or propane (LP) system components promptly.**
- **Do not block or restrict furnace air intakes and/or exhausts.**
- **Test the LP/CO detector regularly to ensure proper operation.**
- **Know and practice evacuation procedures if LP and/or CO gas is detected.**

**⚠ WARNING**

- **DO NOT use this appliance if any part has been under water. A flood-damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion.**
- **A qualified service technician should be contacted to inspect the furnace and to replace all gas controls, control system parts, electrical parts that have been wet or replace the entire furnace, if deemed necessary.**
- **ROAD VIBRATION CAN LOOSEN PROPANE FITTINGS. It is important to check the Propane System for leaks at least every 5,000 miles, and whenever the tank is filled. It is also recommended to have the entire Propane System checked annually by a qualified propane service technician.**
- **DO NOT install screens over the intake air or exhaust vents for any reason. Screens will become restricted and cause unsafe furnace operation.**
- **For your safety, only factory authorized parts are to be used on your furnace and venting system.**

Listed here are several safety related instructions that you, the owner, should follow each heating season to assure continued safe operation of the furnace. A periodic inspection of the furnace by a qualified service technician is also recommended.

- At the beginning of the travel season, before each trip, and periodically during the travel season, test the combination CO/LP detector for proper function. Immediately repair or replace malfunctioning CO/LP detectors.
- Inspect furnace venting. Venting must be free of obstructions, absent of soot, and properly terminated to the exterior of the motorhome. Make sure that the vent assembly is positioned tight against outer door.
- Periodically inspect the exhaust vent for soot. Soot is formed whenever combustion is incomplete. This is your visual warning that the furnace is operating in an unsafe manner. If soot is present, immediately shut furnace down and arrange for repairs by a qualified service center or technician.
- Keep furnace clean. More frequent cleaning may be required due to excessive lint from carpeting, bedding material, pet hair, etc. It is imperative that the control compartment, burners, and circulating air passage-ways of the appliance be kept clean and unobstructed.
- The furnace motor is permanently lubricated and requires no oiling.
- Keep the furnace area clear of any combustible materials, flammable liquids or vapors.
- Before operating furnace, check the location of the furnace vent to make sure it will not be blocked by the opening of any door or obstacle. Do not operate the furnace if the vent is blocked or obstructed in any way.
- Do not restrict the flow of combustion air or the warm air circulation of the furnace. To do so could cause furnace malfunction, leading to personal injury and/or death.
- Never operate the furnace if you smell gas. Do not assume that the smell of gas in your motorhome is normal. Any time you detect the odor of gas in you motorhome, consider it life threatening and correct the problem immediately. Extinguish all open flames; evacuate the motorhome; shut off the LP gas supply at the tank.
- Immediately shut furnace down and call a service technician for repairs if the furnace cycles erratically or delays on ignition.
- Never attempt to repair the furnace by yourself or by an unqualified person.
- Never restrict the ducting installed by the RV manufacturer. To do so could cause improper furnace operation.
- Do not install air boosters (fans) in the duct system. Such devices will cause the furnace to cycle on limit and to have erratic operation.
- Do not place clothing or other flammable materials on or near the furnace.
- Always follow operating instructions. Do not deviate from step-by-step instructions.
- Do not use petroleum or citrus type cleaner on plastic parts, as damage may occur.

## Hydronic Heating System

### **⚠ DANGER**

**The heaters (both diesel and electric) must be switched OFF when refueling the motorhome.**

**DO NOT operate the Aqua-Hot's diesel-burner inside an enclosed building.**

### **⚠ WARNING**

**Read and follow all safety warnings affixed to the Aqua-Hot boiler unit and published in the manufacturer's manual.**

Select TMC diesel motorhomes are equipped with an Aqua-Hot® Hydronic Heating System. This low-emissions system uses hot water to heat the cabin and bay areas of the motorhome. The Aqua-Hot Heating System is three systems in one:

- Interior Heating System: provides quiet, comfortable interior heat with independent temperature zones that provide cabin-wide even temperature control.
- Bay Heating System: keeps pipes and tanks from freezing in the bay storage area.
- Tank-less Hot Water System: provides a steady flow of continuous hot water.

**NOTE:** Detailed information regarding hydronic heating systems is not covered in this manual. Refer to the manufacturer's owner's manual included with your TMC Owner's Packet, the on-line TMC Owners Resource, The TMC HVAC System Guide, or visit the manufacturer's web site.

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# Maintenance

## General Information

Periodic maintenance and cleaning of your motorhome is necessary to retain the dependability, safety, and appearance that will provide you with many years of satisfied ownership, as well as protecting your investment.

Make sure you read and follow all the maintenance tips and schedules that appear not only in this manual, but also in the manuals provided by the chassis manufacturer and various component manufacturers. Keep good records of performed maintenance, inspections, and service. Make sure to perform all owner obligations as may be required to retain your coverages under warranty.

It is also important to note that operating conditions will affect service timetables. Driving in extreme conditions such as heavy dust, continuous short trips, or start and stop heavy traffic means that service durations will be shortened. Discuss service timetables with both your dealer and chassis service representative. Preventative maintenance will pay for itself many times over by catching or preventing problems before they occur. Often, repair costs are greatly increased due to a small problem left unattended, can begin to affect other parts and systems of the motorhome.

If there are cleaning or maintenance or procedures for which you are unsure of performing, please contact your dealer or chassis service representative for recommended instructions.

**NOTES:**

- TMC's Limited Warranties require certain owner obligations. Please review the TMC Warranty Guide included in your Owner's Packet or available through the TMC website:

[www.thormotorcoach.com/owners/owners-manual/](http://www.thormotorcoach.com/owners/owners-manual/)

- Obligations and expenses incurred due to performing periodic maintenance service are not covered under Thor Motor Coach's Limited Warranties.

## Chassis

For information regarding proper maintenance and other important chassis details, refer to the Chassis Packet information. You, as the owner, are responsible for taking proper precautions when attempting any repair or maintenance for your motorhome. If you are not sure what action to take, or are uncomfortable with performing a maintenance

or repair function, contact your selling dealer, or a designated chassis manufacturer's service center for assistance. Contact your chassis manufacturer for information on locating a service center near you.

**NOTE:** Direct all issues regarding the chassis warranty, parts and service to the chassis manufacturer.

Follow the recommendations outlined in the chassis manufacturer's information packet to ensure proper engine performance and fuel economy.

## Class A Motorhome Engine Access

**⚠ WARNING**

**IF THE ENGINE COVER IS NOT SEATED CORRECTLY, EXHAUST GASES MAY LEAK INTO THE MOTORHOME, CREATING A DANGEROUS AND POTENTIALLY LETHAL CONDITION.**

A Class A motorhome's engine can be accessed for service from inside the motorhome. If you cannot locate the engine cover, please contact your selling dealer or TMC Customer Care for assistance. When reinstalling the engine cover, make sure that it is seated and sealed correctly without obstruction from carpet, floor mats, etc.

## Maintenance Access Panels

There may be maintenance access panels located in key areas of your motorhome. Access panels allow service and maintenance to electrical, plumbing, gas, and other systems and are identified by a label such as the one depicted here. Access panels may be fastened by screws, bolts, or other fastening devices.

**REMOVE THIS PANEL FOR ACCESS TO**

DD-93

Typical Access Panel Label

## Condensation

Excess moisture trapped within your motorhome can cause severe long-term damage to laminates, surfaces, fixtures and other components of your motorhome. Therefore, it is important to follow moisture-reducing procedures as a normal routine of motorhome ownership and maintenance.

### TIPS FOR CONTROLLING CONDENSATION

- Allow excess moisture to escape to the outside when bathing, washing dishes, hair drying, laundering, and using appliances and non-vented gas burners by opening ceiling vents.
- Always use the vent hood when cooking.
- Keep the bathroom door closed and the vent or window open when bathing and for a period of time after bathing.
- Do not hang wet clothes in the motorhome to dry.
- In hot weather, start the air conditioner early in the day as it removes excess humidity from the air while lowering the interior temperature.
- Keep the interior temperature set as reasonably cool during cold weather as possible. The warmer the motorhome, the higher the temperature differential between the cold wall surface and the interior air, which can contribute to the formation of condensation on wall surfaces.
- Use a fan to keep air circulating inside the motorhome so condensation and mildew cannot form in dead air spaces. Allow air to circulate inside closets and cabinets (leave doors partially open). Please keep in mind that a closed cabinet full of stored goods prevents circulation and may contribute to the formation of condensation.
- A natural tendency would be to close the motorhome tightly during cold weather. This may actually increase inside humidity. The warm inside air may be more humid than the cool outside air. Allowing some cool outside air into the motorhome may help reduce relative humidity inside the motorhome.

## Seals and Sealants

The exterior shell of the motorhome is the primary weather and moisture barrier. Over the life of the motorhome, the shell will require regular care and maintenance. The shell includes the roof, sidewalls, windows, doors, and under carriage of the motorhome. Regular inspections and

maintenance is required to ensure the exterior shell provides a barrier against water intrusion.

The shell should be inspected periodically for cracks, tears, gaps, and condition of sealants. Check corner and joint moldings for sealant damage. Areas that require maintenance should be resealed utilizing a high quality sealant that has the same or similar characteristics as the original sealant materials.

Particular attention should be devoted to ensure slideouts are sealed properly. Regularly inspect slideout seals for chips, cracks, or other damage. Repair or replace damaged slideout seals as soon as possible. Check door, window, and vent seals for cracks, chips or other damage and replace damaged seals as soon as possible.

**NOTE:** Damage caused by deficient sealant maintenance is not covered under the Thor Motor Coach Limited Warranty.

## Cold Weather Usage

When using your motorhome in freezing or below freezing temperatures, these precautions should be taken:

- Make proper preparations to avoid freeze damage of the fresh water and drainage systems.
- Propane regulator freeze-ups can occur in any weather if there is moisture in the tank or if the tank has been over-filled. Always use moisture-free propane fuel and make sure the tank is not filled beyond 80% of capacity.
- Ventilation or the use of a dehumidifier (customer supplied) may be required to reduce condensation.
- To avoid damage due to cold weather, check the exterior extrusions for frozen moisture before operating or using the motorhome compartment doors, locks, slideouts, windows, vents, etc.
- To protect from freeze-damage, it may be necessary to winterize the water system. Refer to Section 12, Winterizing the Water System.

**NOTE:** Damage caused by the use of your motorhome in freezing temperatures and/or performing deficient cold weather precautionary measures is not covered by the Thor Motor Coach Limited Warranty or the Thor Motor Coach Structural and Lamination Limited Warranty.

## Extended Stay Usage

### NOTICE

**Your motorhome is not designed, nor intended, for permanent housing. Use of your motorhome for long term or permanent occupancy may lead to premature deterioration of its structure, interior finishes, fabrics, carpeting, and/or window treatments, etc.**

**Damage and/or deterioration due to long term occupancy is not considered normal, and may under the terms of the warranty constitute misuse, abuse, or neglect, and therefore void certain warranty protections.**

Your motorhome was designed primarily for recreational use and short-term occupancy. If you expect to occupy the motorhome for an extended period of time, be prepared to actively address condensation and the humid conditions that may be encountered.

The relatively compact space of a motorhome means that the normal living activities of even a few occupants could lead to rapid moisture saturation of the air contained in the motorhome. During cold weather, when relative humidity of the interior air is high, moisture condensation on surfaces can be higher compared to other dwellings because the insulated walls of a recreation vehicle are much thinner, therefore, generally colder. Estimates indicate that a family of four can vaporize up to three gallons of water daily through breathing, cooking, bathing, and washing.

Unless water vapor is carried outside by ventilation or reduced by a dehumidifier (customer supplied), moisture will condense on the inside of the windows and walls of the motorhome. Moisture may also condense out of sight within the walls or the ceiling where it will manifest itself as warped or stained panels. Appearance of these conditions may indicate a serious condensation problem. When using your motorhome, always take necessary precautions to minimize the effects of excessive air-borne moisture and surface condensation.

## Storage of the Motorhome

During periods when your motorhome is not in use, care must be taken to ensure damage to your motorhome caused by excessive moisture and other conditions does not occur. The ideal storage location of your motorhome would be in an enclosed, climate controlled environment, however, this is not always possible. Follow these important storage steps to protect your motorhome:

- Turn OFF and disconnect from all water sources.
- Turn OFF all combustion appliances.

- Winterize your motorhome's water system.
  - a. Drain and flush all holding tanks.
  - b. Drain the water heater tank and fresh water lines.
  - c. If freezing temperatures are expected, treat plumbing pipes and fixtures with RV antifreeze.
- Slightly open all closets, cabinet doors, and drawers; this allows for air circulation.
- Close all windows and entrance doors.
- Open a roof vent enough to allow for some limited ventilation, but not so far as to allow snow or rain to enter the motorhome.

When storing the motorhome in climates of high relative humidity (greater than 60% year round) control humidity inside the motorhome by operating a dehumidifier (customer supplied), drained to the exterior.

## Winter Storage

When storing your motorhome for the winter, extended periods, or in other extreme conditions, certain precautions need to be made to protect it from possible damage. Make sure to talk with your local RV dealer concerning any special requirements for long-term storage in your geographic area. The following steps are general and your dealer can help you choose those that are most appropriate to your needs.

### CHASSIS:

Perform chassis maintenance and recommend storage procedures outlined by the chassis manufacturer (refer to the chassis manufacturer's owner's manual).

### TIRES:

Block up motorhome with wooden blocks or on a hard, level surface to relieve the constant pressure on one area of the tires. Inflate tires to their maximum pressure. Cover to protect against sunlight with burlap, plywood or specially designed tire covers, which are available at RV dealerships.

### BATTERY(IES):

- Be sure that both the chassis and auxiliary (house) batteries have the proper electrolyte level and that they are fully charged. Add distilled water and recharge if necessary. (NOTE: batteries installed in your motorhome may be sealed or maintenance-free).
- Batteries should be checked for charge at least monthly. Use of a trickle-charger may be appropriate. Inquire with the battery manufacturer regarding trickle-charging methods. A discharged battery could freeze and may crack the case, causing severe damage

to the battery and surrounding area. In storage, a battery will lose charge gradually over a 30 to 45 day period, even when disconnected from the positive and negative battery cables.

- You may wish to remove the batteries from the motorhome and store them in a heated area (approximately 50 – 60° F). However, even in warm storage, the battery charge level must still be maintained.

**FUEL:**

Store the motorhome with a full fuel tank, treated with a fuel additive to prevent condensation buildup and fuel degradation. Use fuel additives recommended by the chassis manufacturer.

**DASH AIR CONDITIONER:**

Operate the unit for a short period of time throughout the storage period to assure the compressor seal is lubricated.

**EXTERIOR:**

Clean and wax exterior surfaces. Lubricate locks and hinges. Seal roof joints and mounting points as needed. Follow exterior cleaning guidelines outlined in the TMC Care and Maintenance System Guide, available through your on-line Owners Resource account.

**WINDOWS:**

Treat seals with silicone spray. Close and lock. Inspect exterior body seals and reseal if necessary.

**ROOF:**

Keep the roof clear of significant snow accumulation or damage may occur. Inspect and reseal if necessary.

**APPLIANCE VENTS:**

Check all furnace, water heater, refrigerator, range hood, and A/C vents for blockages. Remove nests created by pests and other debris. Inspect periodically throughout the storage period and keep vents open.

**AIR CONDITIONER(S):**

Remove air filters and clean or replace. Cover the shroud.

**HYDRAULIC JACKS AND STABILIZERS:**

If installed, store your motorhome with the hydraulic jacks and stabilizers in the UP position.

**GENERATOR:**

Prepare the generator for long-term storage as outlined in the manufacturer's instruction manual.

**WATER SYSTEM:**

Winterize the water system as outlined in the Water System Section of this manual.

**PROPANE SYSTEM:**

- Inspect all hoses, pipes, valves, joints, and couplers for leaks. Refer to Propane Leak Test in Propane Section.
- Turn off all propane supply valves and appliances and keep vents open, while preventing vents and intakes from becoming blocked due to insects or rodent nests.
- After storage, inspect entire propane system, including vents, before use.

**INTERIOR:**

- Remove all food items.
- Clean all interior surfaces and fabrics.
- Inspect the interior of the motorhome monthly while in storage to make sure leaks have not developed, or condensation has not formed that can cause damage to interior components. Condensation can most readily be observed as moisture accumulation on windows and exterior surfaces. To reduce condensation, make sure to ventilate the motorhome during storage.
- Use insect and rodent repellents to protect against damage; following repellent manufacturer's guidelines. Test to ensure repellent will not damage surfaces.

**CURTAINS AND BLINDS:**

Close all the drapes and curtains, and protect the curtains from sun fading by placing foil or paper between the windows and the curtains/blinds.

**MICROWAVE, COOKTOP, AND OVEN:**

Clean interior and exterior surfaces with mild detergent and water. Wipe dry. Ensure all appliances are OFF.

**REFRIGERATOR:**

Clean inside and outside surfaces. Leave doors propped slightly open to allow for air circulation. Leave an opened box of baking soda inside the refrigerator to prevent odors.

**SINKS, TOILET, AND SHOWER:**

Clean with disinfectant and dry. Pour one cup of nontoxic RV antifreeze into the drains to prevent freezing. Wipe-up any spilled antifreeze from surfaces.

## Maintenance Schedule

ITEM	EVERY TRIP	EVERY MONTH	EVERY 3 MONTHS	EVERY 6 MONTHS	EVERY YEAR	PRIOR TO STORAGE	AS REQUIRED	PROCEDURE TO BE PERFORMED:
								Maintenance schedules are minimum requirements. Heavy use, unusual temperatures or humidity, or other extreme conditions may require more frequent maintenance.
Engine/Chassis	x			x			x	Check engine oil and top off with type recommended by chassis manufacturer. Change oil and filter at recommended mileage intervals.
	x						x	Check fluid levels including: brake, steering, coolant, transmission, washer, etc. Top off reservoirs as needed with fluids recommended by chassis manufacturer.
	x						x	Inspect underneath engine and transmission for leaks. Repair as necessary.
				x			x	Inspect air and fuel filters and replace at interval recommended by chassis manufacturer.
					x		x	Inspect chassis battery, terminals and cables. Repair and replace as necessary.
					x		x	Inspect suspension, steering components, exhaust systems etc. Repair and replace as necessary.
	x						x	Generator exhaust: inspect for cracks, blockages, damage. Replace immediately if any faults are discovered.
Brakes	x		x			x	x	Check fluid levels. Top off reservoir as needed with fluid specified by chassis manufacturer and only from an unopened container.
				x			x	Inspect pads and rotors. Replace as necessary.
	x				x		x	Inspect parking brake for proper function. Repair and replace as necessary.
	x						x	Inspect brake lights and turn signals for proper function. Repair and replace components as needed.
Weight Distribution	x						x	Check for proper weight distribution of equipment and components. Place heavy items as near and over axles as possible.
							x	Weigh loaded motorhome with vehicle scales to determine loading. Do not overload vehicle per GAWR and GVWR ratings (see manufacturers specifications).
Tires	x						x	Inspect for proper inflation (PSI). Inflate to proper cold pressure (PSI). Inspect for wear. Repair or replace ONLY with tire(s) of proper size and load rating. Unusual wear patterns indicate problems that should be addressed by qualified technicians.
	x						x	Check all wheel lug nuts and tighten using a properly calibrated torque wrench. Torque per chassis manufacturers specifications.
	x						x	Inspect spare tire for proper inflation (PSI). Inspect for cracking, aging. Replace as necessary.
Wheel Alignment							x	Inspect tires for uneven wear, dents in the wheel rims, and if vehicle steering seems unusual. All are indications that front wheels need re-aligned. Align as needed with a fully loaded vehicle and only by qualified technicians.
Exterior: mirrors, vision systems	x						x	Inspect rear-view mirrors and adjust when needed. Replace broken mirrors and components promptly. Inspect rear and side-view vision systems for proper operation. Repair and replace components promptly.

ITEM	EVERY TRIP	EVERY MONTH	EVERY 3 MONTHS	EVERY 6 MONTHS	EVERY YEAR	PRIOR TO STORAGE	AS REQUIRED	PROCEDURE TO BE PERFORMED: Maintenance schedules are minimum requirements. Heavy use, unusual temperatures or humidity, or other extreme conditions may require more frequent maintenance.
Safety Equipment		x			x			Test smoke alarm. Replace battery annually.
		x			x			Test combination LP/Carbon Monoxide alarm. Replace promptly if found to be inoperable.
				x			x	Inspect fire extinguisher for proper pressure. Replace if low or after any use.
Seat Belts			x				x	Inspect driver and front passenger lap and shoulder belts for wear or defective latches. Replace worn or defective components promptly.
	x		x				x	Inspect all passenger seat belts and latches and replace worn or defective components promptly.
	x		x				x	Inspect child safety harness brackets and tighten bolts if loose. Replace faulty components promptly.
Exterior: windows, doors, seals	x						x	Inspect windshield for cracks, chips, and damaged seals. Repair and replace as needed.
					x		x	Check vinyl seals around slideouts when washing exterior. Repair and replace as needed.
			x				x	Check door and window seals for damage. Repair as needed.
							x	Lubricate power step components with spray or lithium grease.
					x			Lubricate hinges, locks, & strike pockets of entrance, storage, and maintenance access doors.
		x					x	Operate emergency egress window latches and open window(s) frequently to ensure easy operation. Lubricate seals and latches with light coating of silicone grease.
							x	Inspect external corner and edge molding for damage; repair and reseal as needed.
					x		x	Inspect and replace wiper blades and windshield washer system components as needed.
Exterior: fiberglass			x					Wash surface with warm water and mild detergent. Do not use solvents or abrasive cleaners.
					x			Wax with liquid or paste non-abrasive automotive wax.
Exterior: roof			x			x	x	Inspect and reseal roof and component attachments; vents, antennas, ladders, HVAC, etc.
			x			x	x	Clean roof surface with warm water and mild detergent.
					x		x	Lubricate fan and power vent mechanisms with light oil. Clean surfaces as needed.
					x		x	Inspect air conditioner(s) housing, mounting, condensation drains, etc. Repair and replace as needed.
					x		x	Inspect ladders for broken rungs, loose mounting components and bent rails. Replace as needed.
Exterior: lights	x						x	Inspect running, clearance, side-marker lights and repair or replace as needed.

ITEM	EVERY TRIP	EVERY MONTH	EVERY 3 MONTHS	EVERY 6 MONTHS	EVERY YEAR	PRIOR TO STORAGE	AS REQUIRED	PROCEDURE TO BE PERFORMED: Maintenance schedules are minimum requirements. Heavy use, unusual temperatures or humidity, or other extreme conditions may require more frequent maintenance.
Awnings: patio, door, & window	x						x	Operate awnings to ensure proper functioning.
			x				x	Clean awning fabric with warm water and mild detergent. Allow fabric to dry before retracting. Lubricate hinges and joints with silicone grease.
Awnings: slideout topper			x				x	Inspect for proper operation, wear, or damage. Repair and replace as needed.
Slideouts: electric	x						x	Inspect and test for proper operation. Inspect gear tracks for unusual wear. Lubricate per manufacturers recommendations.
Slideouts: hydraulic	x						x	Inspect and test for proper operation. Inspect rams and hydraulic fittings and hoses for leaking fluids. Top off reservoir with fluid recommended by manufacturer.
Leveling Jacks: hydraulic	x						x	Inspect system for proper function. Ensure jack rams extend properly and fully retract and stay retracted. Ensure jacks deploy only when vehicle's transmission is in park and the parking brake is engaged. Inspect hydraulic lines for leaks. Inspect hydraulic fluid reservoir, top off as needed with manufacturers recommended fluid.
Stabilizers: electric	x						x	Ensure stabilizers deploy properly and fully retract. Clean deployment mechanism with mild detergent and rinse with water. Lightly lubricate as needed. Inspect jack pads for damage. Replace worn or damaged components as needed.
Cab/Cockpit	x						x	Vehicle horn: test for proper function, repair if defective.
	x						x	Gauges and switches: ensure all vehicle control functions and driver aids are in proper working order before every trip. Repair and replace as needed.
							x	Cockpit seating: lubricate mechanisms, repair or replace damaged seats or seating components.
							x	Engine cover gasket: Inspect for proper fit and seal. Replace if damaged.
							x	Inspect heater and air conditioner for proper function. Repair as necessary.
Electrical System: 12 volt			x				x	Check and service auxiliary and chassis battery(ies). Add ONLY distilled water as needed or replace batteries that fail to hold a charge. Do not attempt to open maintenance-free batteries. Keep batteries on trickle charge when stored for an extended period of time.
					x		x	Check battery charging system: chassis alternator, inverter/ converter, solar controller. Ensure proper charging voltage via multimeter reading (battery manufacturers charging recommendations).
	x						x	Multiplex system (if installed): check using 'Hot Skin Test'; with a multimeter set to 12 volts, place one probe on main panel and one probe to a known ground. There should be no voltage. If voltage is present, have multiplex system inspected by a qualified technician.
	x						x	Interior 12 volt lighting: repair and replace as needed.
							x	Check 12 volt power plugs, USB ports and electronic device charging stations. Repair or replace as needed.

ITEM	EVERY TRIP	EVERY MONTH	EVERY 3 MONTHS	EVERY 6 MONTHS	EVERY YEAR	PRIOR TO STORAGE	AS REQUIRED	PROCEDURE TO BE PERFORMED: Maintenance schedules are minimum requirements. Heavy use, unusual temperatures or humidity, or other extreme conditions may require more frequent maintenance.
Electrical System: 12 Volts, <i>continued</i>					x		x	Inspect automatic transfer switch (ATC), inverter, and converter for proper function. Replace fuses or faulty circuit breakers.
	x						x	Inspect radio, navigation, and camera monitoring system. Repair as needed.
					x		x	Inspect towing electrical plug (4-way or 7-way). Apply electrical contact spray or electrical contact grease to contact surfaces.
				x				Solar panels (if installed): clean solar panels with water spray and soft cloth (do not use detergents or abrasive cleaners).
Electrical System: 120 volt	x						x	Inspect shore cords, receptacles, extension cords for damage. Repair or replace as necessary.
							x	Inspect fuses and circuit breakers at the fuse box or circuit breaker panel. Replace blown fuses ONLY with type and rating indicated on the panel. Have a qualified electrician inspect circuits associated with blown fuses or circuit breakers to determine if additional repairs are required.
		x					x	Generator: perform maintenance procedures per manufacturers recommendations. Check generator engine oil level regularly and top off as needed with oil type recommended by manufacturer. Check air filter and spark plug, replace as needed.
		x						Test ground fault circuit interruption (GFCI) receptacle(s) to ensure their proper function.
							x	Inspect 120 volt electrical receptacles. Repair and replace as necessary.
Propane System				x				LP tank, pipes, fittings: check for leaks and damage by using a mild soapy solution to detect leaks. Tighten fittings and/or repair as necessary.
					x			LP line pressure: inspect and check tank and gas line pressures by a qualified LP technician.
							x	LP tank purge (new tanks): purge tank of inert gas and fill with propane at certified propane dealer and/or supplier.
Water System			x				x	Water hoses, pipes, and fittings: inspect for leaks or damage. Repair or replace as necessary.
	x						x	Bathroom and kitchen fixtures: inspect toilet(s), sinks, shower, and faucets for leaks and damage. Repair as necessary.
	x						x	Water pump: ensure proper operation. Repair as necessary.
	x						x	Waste water system: inspect drains and holding tanks. Repair clogs. Inspect termination valves and caps. Repair leaks and replace damaged components as necessary.
			x				x	Water heater: inspect for leaks. Inspect gas line for leaks. Inspect inlet and exhaust for insect nests or other restrictions. Repair and replace damaged components. DO NOT SANITIZE.
			x				x	Inspect water supply hose, water filter(s), water pressure regulator, water service hose, and sewer hose for damage. Repair and replace as necessary.



ITEM	EVERY TRIP	EVERY MONTH	EVERY 3 MONTHS	EVERY 6 MONTHS	EVERY YEAR	PRIOR TO STORAGE	AS REQUIRED	PROCEDURE TO BE PERFORMED: Maintenance schedules are minimum requirements. Heavy use, unusual temperatures or humidity, or other extreme conditions may require more frequent maintenance.
Water System, <i>continued</i>				x		x	x	Sanitize and flush fresh water system.
						x	x	Winterize fresh and waste water systems.
Heating System	x				x		x	LP (gas) furnace: inspect for function. Inspect exhaust ports for restrictions. Have qualified service technician inspect furnace annually. Repair and/or replace faulty components immediately.
	x				x		x	Hydronic heating system: inspect for proper function. Inspect fuel filter. Inspect hydronic fluid reservoir and top off with fluid recommended by manufacturer. Inspect burners and igniters and replace at recommended intervals. Have system inspected by qualified technician annually.
Air Conditioner(s), Heat Pump(s)	x				x		x	Inspect for proper function. Inspect and clean filters. Repair or replace faulty components as necessary.
Appliances: LP (gas)	x						x	Check ranges, ovens, refrigerators for proper functioning. Repair gas leaks immediately.
Appliances: electric	x						x	Check microwave, refrigerator, fans and vents. Repair or replace as necessary.
Entertainment Systems			x				x	Inspect TV's, radios, DVD player, sound systems, WIFI extender, lifts, and mounting brackets. Repair and replace as necessary.
Beds, Bunks	x						x	Inspect bed/bunk lifts for proper function. Repair damaged lift mechanisms immediately.
					x		x	Bed conversions: inspect for broken or damaged brackets. Lightly oil hinges and joints. Repair and/or replace damaged components.
Furniture							x	Inspect sofas, dinettes, tables, etc. Repair or replace damaged components.
Fabrics and Upholstery							x	Clean with mild household detergents and upholstery cleaners.
Countertops							x	Clean with mild, non-abrasive household cleaners and soft cloths.
Bath Fixtures, Sinks							x	Clean with mild, non-abrasive household cleaners and soft cloths.
Carpets, Flooring							x	Vacuum and mop and shampoo as necessary. Use water sparingly and wipe-up immediately.

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# Index

- 30 amp service, 86-87
- 50 amp service, 86-87
- After Business Hours Assistance, 7
- Air Bags, 19
- Air Conditioner, 121-124
- Alignment, 34
- Alternator, Chassis, 76
- Appliances, 56
- Assistance, How to Obtain, 6
- Automatic Generator Start (AGS), 94
- Automatic Transfer Switch, 94
- Auxiliary Start Switch, 77
- Awnings, 50-51
- Awning Lights, 51
- Basic Multiplex Operation, 103
- Battery, Auxiliary (House), 73
- Battery Charging, 79-81
- Battery Disconnect Switch, 75
- Battery Isolation Relay, 77
- Bed Conversions, 65-71
- Bed Nets and Rails, 63
- Black Tank Flush, 116
- California 93120 Phase 2 Label, 26
- Capacity of Garage Area, 38
- Carbon Monoxide, 14-17
- Carbon Monoxide/Propane Combo Alarm, 15
- Cargo Carrying Capacity Weight Label, 38
- Change of Address, 5
- Change of Ownership, 5
- Changing a Damaged Tire, 35
- Charging, Battery, 79-81
- Chassis, 129
- Chassis Alternator, 76
- Chassis Packet, 1
- Chassis Warranty, 1
- Chemical Sensitivity, 26
- Child Safety Restraint System, 20
- Circuit Breakers, 84, 86, 95, 100, 101, 104
- Clearance Lights, 25
- Cold Weather Usage, 117, 130
- Condensation, 130
- Consumer Information, 5-9
- Contact Thor Motor Coach, 1, 6-7, 9
- Controller, Solar Charge, 74, 79-81
- Converter, 74, 85, 95, 97, 100
- Cooling/Heating, 119-128
- Customer Care, 1
- Consumer's Responsibilities, 5
- Customer Support, Online, 2
- Dash Heating/Cooling, 119
- Dealer's Responsibilities, 5
- De-winterizing, 117
- Diesel Club, 3
- Dinette, 69
- Dinette Bed Conversion, 69
- Disclaimers, 8
- Drain Pipes, 113
- Driving the Motorhome, 22
- Dream Dinette, 69
- Egress Window, 17-18
- Electric Bed Lift, 59-63
- Electrical Connections, Towed Vehicle, 42
- Electrical System, 73-103
- Elevated Beds, 59-64
- Emergency Egress Window, 17-18
- Emergency Stopping, 23
- Emergency Weekend Assistance, 7
- Engine Access, Class A Motorhome, 129
- Entertainment Systems, 58
- Entry Door Awnings, 51
- Entry Steps, 49-50
- Exhaust Fumes, 17
- Exit Window, 17-18
- Extended Stay Usage, 5, 131
- Exterior, 49-54
- External Propane Hook-up, 107
- Federal Weight Label, 37
- Filling, Propane Tank, 106
- Fire Extinguisher, 13
- Fire Safety, 12-14
- Fire, Electrical, 13
- Formaldehyde, 26
- Formaldehyde Label, 26
- Fresh Water System, 109-112
- Fresh Water Tank, 110
- Front Cab Power Bunk, 59-61
- Fuel Cap, 29
- Fuel Pump Collision Shut-Off Switch, 29
- Fuel Systems, 29-32
- Fuel Transfer System, 30-32
- Fuel System Safety, 29
- Furnace, 124-127
- Fuses, 74, 85, 95, 96-97, 100
- Generator, 91-93
- Ground Fault Circuit Interrupter (GFCI), 104
- Heat Pumps, 123
- Heating and Cooling, 119-128
- Heating/Cooling with Multiplex, 120
- Holding Tanks, Waste Water, 113
- Holding Tanks, Emptying, 115
- Hook-up, External Propane, 107
- Hydraulic Leveling Jacks, 43-44

- Hydronic Heating, 125, 127
- Interior, 55-72
- Introduction, 1-4
- Inverter, 83
- Isolation Relay, 77
- Jack-knife Sofa, 65
- Kilopascals (kPa), 33
- L-Shape Sofa, 66-67
- Ladder, Exterior, 52
- Ladder, Telescoping, 64
- Laws of the Road, 23
- Leveling Jacks, 43-44
- Leveling Jacks and Slideouts, 43-48
- Loading the Motorhome, 40
- Lug Nut Torque, 35
- Maintenance, 129-138
- Maintenance Access Panels, 129
- Manual Leveling, 44
- Marker Lights, 25
- Master Battery Disconnect Switch, 75
- Medical Advice, 26
- Mirrors, 24
- Mirror Adjustment, 24
- Mirror Options, 24
- Mold, 27
- Monitor Panel, 78, 102
- Multiplex Control Systems, 101-103
- NHTSA, 9, 33, 36
- Obtaining Assistance, 6-7
- Obtaining Service, 6-7
- Online Customer Support, 2
- Owners Resource, 2
- Owner's Manual, 1
- Owner's Packet, 1
- Patio Awnings, 51
- Patio Enclosure, 53
- Pets, Transporting, 21
- Potable Water Hose, 109
- Power Drop Down Overhead Bunks, 59-61
- Powered Entry Steps, 49-50
- Prep Only, Rear View Vision System, 25
- Privacy Notice, 8
- Propane Tank, 106
- Propane Gas Safety, 15-17, 105-108
- Propane Hook-up, 107
- Propane Leak Test, 108
- Propane System, 105-108
- Propane/Carbon Monoxide Combo Alarm, 16-17
- Propane, Traveling with, 108
- Propane, Using the System, 106-107
- PSI, 33
- Ramp Door, 53
- Ramp Door Patio, 53
- Ramp Door Weight Restriction, 53
- Rapid Camp+, 102
- Rear View Mirrors, 24
- Rear Vision Camera System, 24-25
- Replacement Parts, 7
- Reporting Safety Defects, 9
- Roof, 52, 53
- Safe Towing Tips, 41
- Safety Alerts, 11
- Safety Seat Anchor, 21
- Safety Defects, Reporting, 9
- Sanitizing the Fresh Water System, 112
- Sealants, 130
- Seat Belts, 19-21
- Serial Number, 6, 37, 38
- Service Repairs, 6-7
- Service Repair Suggestions, 6-7
- Servicing Propane Tank, 106
- Shore Line Power Cord, 86-90
- Side Marker Lights, 25
- SkyBunk, 61
- Sleeping Areas, 59-72
- Slideout Awning, 51
- Slideout Systems, 46-48
- Smoke Alarm, 13-14
- Smoking in the Motorhome, 26
- Spare Tire, 35
- Sofa, 65-68
- Solar Charging, 74, 79-81
- Stabilizing Jacks, 45
- Storage Compartments, 52
- Storage of the Motorhome, 131
- Swivel Seats, 19
- System Guides, 2
- Table of Contents, A-C
- Temperature (Tire Rating), 36
- Thermostats, 121
- Thor Diesel Club, 3
- Tilt and Swivel Seats, 19
- Tire Identification Information, 36
- Tire Inflation, 33, 34, 36
- Tire Replacement, 35
- Tire Safety, 33-36
- Tires and Wheels, 33-36
- TMC Factory Service, 7
- TMC Recreational Vehicle Privacy Notice, 8
- Towed Vehicle Electrical Connections, 47
- Towing a Vehicle, 41
- Towing Coupling, 41
- Towing Hitch, 41
- Towing With Your Motorhome, 40-42
- Transport Canada, 9
- Transporting Pets, 21
- Traction (tire rating), 36
- Traveling With Propane, 108

Treadwear, 33-34  
Tri-fold Sofa, 68  
Vehicle Safety, 11-28  
Ventilation, 27, 130  
Ventilation Fans, 121, 130  
Vents (plumbing), 113  
VIN, Chassis 17-digit, 6, 37, 38  
Vision System, 24-25  
Warranty, Chassis, 2  
Warranty, Registration Form, 1, 5  
Warranty, TMC, 1  
Warranty Guide, 1  
Waste Water System, 113-118  
Water Fill, 109-110  
Water Heater, 112  
Water Hose, Potable, 109  
Water Panel, 111  
Water Pump, 110  
Water Pump Strainer, 111  
Water System, 109-118  
Water System, Sanitizing, 112  
Weighing, Loading, and Towing, 37-42  
Weighing Your Motorhome, 39-40  
Weight Capacity of Garage, 48  
Weight Distributing Hitch, Warning, 40  
Weight Distribution, 40  
Weight Label, 37  
Weight Terminology, 37  
Welcome Letter, Inside Cover  
Wheels, 33-36  
WiFi Connectivity, 58  
Window, Emergency Egress (Exit), 17-18  
Winterizing the Water System, 116-117, 130, 131-132

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