



# OWNER'S MANUAL

[www.glaciericehouse.com](http://www.glaciericehouse.com)

## **INTRODUCTION**

Thank you for purchasing a Glacier Ice House. We hope you will get many years of productive use from it. This frame is designed to be pulled by a proper size vehicle. All product users must read and understand this manual prior to equipment operation. This manual is considered part of your fish house frame and should remain with it at all times. Do not allow anyone to operate or maintain this fish house frame that has not fully read and comprehended this manual. Failure to follow the recommended procedures may result in personal injury or death or equipment damage.

Some photographs, diagrams or illustrations in this manual may show doors, guards and shields opened or removed to aid in clarity and understanding of a particular procedure. All guards, shields and safety devices must be in their proper position prior to operation.

## **WARRANTY**

**Glacier**, warrants that its products and their components will be free from defects in material and workmanship for a period of one (1) year from the date of original purchase when used as intended and under normal service and conditions. This warranty does not cover or apply to any products or component parts which have been tampered with, modified or altered in any way or which have been subject to misuse, negligence, involved in an accident, or damaged by an act of weather.

## **EXCLUSION OF WARRANTIES**

**GLACIER MAKES NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE IN RESPECT TO ITS PRODUCTS OR COMPONENT PARTS. GLACIER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES FROM ANY BREACH OF WARRANTY, INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, INCONVENIENCE, AND THE COST OF RENTAL OR REPLACEMENT EQUIPMENT. NO AGENT, EMPLOYEE OR REPRESENTATIVE OF GLACIER HAS THE AUTHORITY TO BIND IT TO ANY AFFIRMATION, STATEMENT OF WARRANTY CONCERNING ITS PRODUCTS AND THEIR COMPONENT PARTS EXCEPT AS SPECIFICALLY SET FORTH HEREIN.**

## **SAFETY**

Read and understand this manual and all safety signs before operating and maintaining. Review the safety instructions and precautions annually.

**TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.**

**THIS SYMBOL MEANS - ATTENTION!**

**- BECOME ALERT!**

**- YOUR SAFETY IS INVOLVED!**

## SAFETY SIGNAL WORDS

Note the use of signal words **WARNING:** Indicates a potentially DANGER, WARNING and hazardous situation that, if not CAUTION with the safety messages. Avoided, could result in death or The appropriate signal word for each serious injury, and includes hazards has been selected using the that are exposed when guards are following guidelines: removed. It may also be used to alert against unsafe procedures.

**DANGER:** Indicates a **CAUTION:** Indicates a potentially hazardous Imminently hazardous situation that, if not avoided, may result that, if not avoided, will result in in minor or moderate injury. It may death or serious injury. This signal also be used to alert against unsafe word is to be limited to the most practices. extreme situations typically for machine components which, for functional purposes cannot be guarded.

## GENERAL SAFETY GUIDELINES

Safety of the operator is one of the main concerns in designing and developing a new piece of equipment. Designers and manufacturers build in as many safety features as possible. However, every year many accidents occur which could have been avoided by a few seconds of thought and more careful approach to handling equipment. You, the operator, can avoid many accidents by observing the following precautions in this section. To avoid personal injury, study the following precautions and insist those working with you, or for you, follow them.

Replace any CAUTION, WARNING, DANGER or instruction safety decal that in not readable or is missing. Location of such decals is indicated in this booklet.

For your safety, before operating the winches on your fish house frame, check all clamps to guarantee they are tight. Failure to do so may result in bodily injury.

Do not attempt to operate this equipment under the influence of drugs or alcohol.

Review the safety instructions with all users annually.

This equipment is dangerous to children and persons unfamiliar with its operation. The operator should be a responsible adult familiar and trained in this equipment's operations. **Do not allow persons to operate or assemble this unit until they have read this manual and have developed a thorough understanding of the safety precautions and of how it works.**

Do not paint over, remove or deface any safety signs or warning decals on your **fish house frame**.

Observe all safety signs and practice the instructions on them. Never exceed the limits of a piece of machinery. If its ability to do a job or, or to do so safely, is in question – **DON'T TRY IT.** 5

## Safety signs



On our frames there are several areas which are pinch point hazards meaning that there is a possibility of you pinching a body part so stay clear and be cautious of these areas.



All grease zerks are pre-greased at the manufacture. It is the consumer's responsibility to maintain grease updates. Axels should be greased twice annually, once in the spring and once in the fall.

### **ALIGNMENT:**

It is each customers responsibility to have their Glacier aligned after purchase, regardless if the Glacier is new or used. Alignments need to be done periodically throughout ownership. When one doesn't comply with these directions your Glacier may occur tire wear. Each customer will need to show a copy of their receipt of alignment done to receive any warranty on tire or other related axle issues.

## **Proper maintenance and tips for sealing your roof.** (Please use attached diagram for instructions).

- . Pressure wash the whole roof and remove any loose debris.
- . Remove any loose or cracked caulking around the outer edge.
- . Dry off all surface area.
- . Apply new self-leveling caulking around the outer edge and let stand 12 hours before transporting the unit.
- . Apply new sealant at least once a year to the following
  - . Roof, Trim, Windows, Doors, All corners.
- . Keep safety signs clean and legible at all times.
- . Replace safety signs that are missing or have become illegible.
- . Replaced parts that displayed a safety sign should also display the current sign.
- . Safety signs are available from your distributor or dealer parts department or the factory.

## How to Install Safety Signs:

- . Be sure that the installation area is clean and dry.
- . Decide on the exact position before you remove the backing paper.
- . Remove the smallest portion of the split backing paper.
- . Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
  
- . Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.
- . Small air pockets can be pierced with a pin and smoothed out using the piece of decal backing paper.

## TIRE SAFETY

- . Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death.
- . Do not attempt to mount a tire unless you have the proper equipment and experience to do the job.
- . Inflating or servicing tires can be dangerous. Whenever possible, trained personnel should be called to service and/or mount tires.
- . Always order and install tires and wheels with appropriate capacity to meet or exceed the anticipated weight to be placed on the equipment.

## DIRECTIONS FOR OPERATING YOUR DROP DOWN FRAME

When lowering your fish house frame, let the front hitch winch down first and then the side winches.

When raising the fish house, raise both side winches first, then the front hitch winch.

### **AFTER RAISING THE WHOLE HOUSE AND INSERTING THE PINS, RELEASE ALL TENSION ON THE STRAPS FOR TRANSPORT.**

When lowering or raising your fish house frame, DO NOT lean over the leaf spring, stand behind the winch.

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY CAUSE SERIOUS BODILY INJURY AND/OR DAMAGE TO OUR FISH HOUSE FRAME.

Keep hands and feet clear of the frame when lowering the front and side winches of the fish house frame.

### LIGHTING AND MARKING

- . It is the responsibility of the customer to know the lighting and marking requirements of the local highway authorities and to install and maintain the equipment to provide compliance with the regulations.

- . Lighting Kits are available from your dealer or from the manufacturer.

#### BEFORE OPERATION

- . For your safety, before operating the winches on your fish house frame, check all clamps to guarantee they are tight. Failure to do this may result in bodily injury.
- . Carefully study and understand this manual.
- . Keep wheel lug nuts or bolts tightened to specified torque.
- . Assure that tires are inflated to proper air pressure.
- . Give the unit a visual inspection for any loose bolts, worn parts or cracked welds, and make necessary repairs. Follow the maintenance safety instructions in this manual.
- . Do not use the unit until you are sure that the area is clear, especially children and animals.
- . Securely attach to towing unit. Use a high strength, proper-sized hitch ball with a mechanical retainer and attach safety chain.
- . Do not allow anyone to stand between the tongue or hitch and the towing vehicle when backing up to the equipment.

#### DURING OPERATION

- . Children should not be allowed on the product.
  - . Clear the area of small children and bystanders before moving the fish house frame.
  - . Make sure you are in compliance with all local and state regulations regarding transporting equipment on public roads and highways. Lights must be clean and visible by overtaking or oncoming traffic when fish house frame is transported.
  - . SAFETY CHAIN – If equipment is going to be transported on a public highway, a safety chain should be obtained and installed. Always follow state and local regulations regarding a safety chain and auxiliary lighting when towing your fish house frame on a public highway. Be sure to check with local law enforcement agencies for your own particular regulations. Only a safety chain (not an elastic or nylon/plastic tow strap) should be used to retain the connection between the towing and towed machines in the event of separation of the primary attaching system.
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- . Install the safety chain by crossing the chains under the tongue and secure to the draw bar cage or hitch or bumper frame.
  - . Beware of bystanders, particularly children! Always look around to make sure that it is safe to start the engine of the towing vehicle or move the unit. This particularly important with higher noise levels and quiet cabs, as you may not hear people shouting.

- . NO PASSENGERS ALLOWED – Do not carry passengers anywhere on, or in, the frame, except as required for operation.
- . Keep hands and clothing clear of moving parts.
- . Do not clean, lubricate or adjust your equipment while it is moving.
- . Be especially observant of the operating area and terrain – watch for holes, ice heaves, rocks, or other hidden hazards. Always inspect the area prior to operation.
- . DO NOT operate near the edge of drop-offs or banks.
- . DO NOT operate on steep slopes as overturn may result.
- . Operate up and down (not across) intermediate slopes. Avoid sudden starts and stops.

## HIGHWAY AND TRANSPORT OPERATIONS

### DO NOT!! EXCEED 55 MILES PER HOUR

- . Adopt safe driving practices:
- . Always drive at a safe speed relative to local conditions and ensure that your speed is low enough for an emergency stop to be safe and secure. Keep speed to a minimum.
- . Reduce speed prior to turns to avoid the risk of overturning.
- . Avoid sudden uphill turns on steep slopes.
- . Do not drink and drive!
- . Comply with state and local laws governing highway safety and movement of on public roads.
- . Local and state laws should be checked for all highway lighting and marking requirements.
- . Be a safe and courteous driver. Always yield to oncoming traffic in all situations, including narrow bridges, intersections, etc.
- . Be observant of bridge load ratings. Do not cross bridges rated lower than the gross weight as which you are operating.
- . Watch for obstructions overhead and to the side while transporting.
- . Always operate equipment in a position to provide maximum visibility at all times. Make allowances for increased length and weight of the equipment when making turns, stopping the unit, etc.
- . Be extra careful when working on inclines.
- . Avoid loose fill, rocks and holes; they can be dangerous for equipment operation or movement.
- . Operate the towing vehicle from the operator's seat only.

**PLUMBING SYSTEMS ARE NOT TO BE USED WHEN TEMPS FALL BELOW 32 DEGREES. THIS WILL VOID ALL MANUFACTURE WARRANTIES.**

## **PLUMBING SYSTEMS**

The plumbing system in your trailer is typically categorized into three primary sub-systems: Fresh water, Gray water, and Black water. Fresh or Potable water is stored in the fresh water tank or is directly introduced into the plumbing system by way of the city water fill located on the exterior of the trailer. Gray water system consists of the waste water from the sinks and tub/shower. Black water system consists of the waste water from the toilet. Road vibrations, and shock as well as excessive water pressure from city water sources are the main physical causes of water system damage. It is important to frequently inspect all plumbing fittings and joints for water seepage. Many times a minor leak is easily corrected merely by hand tightening the plastic fittings. Do not over tighten the fittings.

## **NOTICE**

Water leakage from plumbing joints may result in considerable damage if left unchecked. It is the owner's responsibility to promptly take necessary action to lessen damage due to water leakage.

## **FRESH WATER AND WATER PUMP SYSTEM**

The fresh water tank may be filled from the exterior water fill by inserting an open-end garden hose into the city water fill then filling until the monitor panel indicates the tank is full. Only open the valve on your garden hose faucet about 50% when filling the fresh water tank. Do not fill the fresh water tank at full volume/pressure of your garden hose as full volume may not allow the tank to vent quickly enough – thereby causing unnecessary strain on the tank.

1. Confirm water is present in the fresh water tank. You may visually check the tank or use the tank monitor panel to confirm water level.
2. Open hot and cold kitchen, bath, and shower faucets.
3. Open the water heater bypass valve to allow water heater to fill.
4. Turn on the water pump.
5. Close each faucet after the water is flowing steadily.
6. The water pump will stop running when the water lines are fully pressurized.
7. The pump is a demand only pump which means that when the pump switch is in the "on" position the pump will run when using water. Note: If the pump cycles on/off while not using water, you may require minor adjustment of the water pump pressure switch or have a minor water leak in the plumbing system. Seek service advice if the pump continues to cycle when not using water.

## **SANITIZING THE FRESH WATER SYSTEM**

Keeping the fresh water system free of contaminants is critical in proper use of the fresh or potable water system. To sanitize and reduce growth of algae and similar contaminants, you may sanitize the fresh water system using the following procedure:

1. Drain the fresh water tank.
2. Prepare a chlorine solution of using one gallon of water and  $\frac{1}{4}$  cup of liquid bleach for every 15 gallons of tank capacity.
3. Close all drains and faucets.
4. Pour the solution into the fresh water tank by way of the exterior tank fill.
5. Turn on pump and open each faucet until the water flows freely and a distinct odor of bleach is present. Close the faucets.
6. Allow the system to sit undisturbed for approximately 3 – 4 hours.
7. Drain the system by opening all faucets and drains while running the water pump.



8. Continue filling the entire water system with clean water and run water through all facets until the bleach odor is no longer present.
9. Fill the water system one more time followed by a final draining of the tanks.
10. Replace the water filter if so equipped.
11. The system is now ready for normal use. Connection to city water You may bypass the fresh water tank and connect a garden hose directly to the exterior water fill which is threaded to accept a garden hose. This method will bypass the fresh water tank and pump and will use the garden hose pressure to supply water to faucets. Typically this is the preferred water use method when in an improved campground.

## Water heater

The water heater in your trailer is fueled by propane with a 12-volt electronic ignition switch. Your water heater may also be equipped with a 120-volt electric heater element for use when connect to 120-volt shore power. NOTICE The water heater must be completely filled with water prior to turning on the propane or the electric heater element. Even momentary operation of the electric heater without submersion in water will burn out the 120-volt heater element. Element failure is not covered under any warranty terms. WATER HEATER PRESSURE RELIEF VALVE Your water heater is equipped with a pressure relieve valve which is located behind the exterior access door. This valve will open when excess pressure or temperature is reached. Due to the smaller size of the water heater tank, slight dripping of the pressure valve is normal due to water expansion when heating the water. One can minimize the dripping by creating or replenishing an air pocket at the top of the tank using the following the procedure list below.

1. Turn off the water heater
2. Turn off the water supply (if connected to city water) otherwise, turn off the water pump.
3. Open the Pressure Relief Valve by lifting up on the lever at top of relief valve. Relief valve is to remain open until water stops flowing. Caution: protect yourself from the hot water following from the valve as scalds and burn could occur.
4. Allow the valve to snap closed and turn on water pump or water supply and allow the system to refill. This procedure will allow formation of a small air pocket at the top of tank. This air pocket will assist in absorbing the expansion of water during future uses of the water heater. The water heater must be drained when placed in storage or when subjected to freezing conditions. A water heater failure due to freezing is considered misuse or abuse and is not covered under any warranty. Please see the water heater owner's manual supplied with the RV for further operating, use, and care instruction. WATER HEATER BYPASS VALVE Your trailer may be equipped with a water heater bypass valve system. This is a system of three valves located at rear of water heater accessible from inside the trailer. There will be a valve on the top (hot output) water line, a valve at the bottom (cold inlet) in addition to one valve located between the hot and cold lines. The purpose of this bypass system is the allow winterization of the water system without filling the entire water heater with antifreeze. Closed Open Open Closed Valve position for normal use. Valve position for water heater bypass Normal valve position Center valve is closed with top and bottom valve open 39 Winterization (bypass) position of the valves: Close top and bottom valve and open center valve. This position connects the hot and cold lines together and bypasses the water heater. Note: always check the positioning of the water heater bypass valves if at any time if the water heater is running but no hot water is available. The problem may be easily solved with proper placement of the valves.

## WATER LINE DRAINS

The freshwater system is typically equipped with at least one water drain which extend downward below the chassis frame. Removal of the threaded drain cap will allow water to drain out of the fresh water system. It will still be necessary to add RV antifreeze in order to fully winterize the water system.

## WINTERIZATION OF PLUMBING SYSTEM

It will be necessary to winterize the water system of your RV when storing or using the trailer in subfreezing weather. Failure to properly drain and winterize the water system will result in freeze damage this is not covered under any warranty.

1. Park the recreational vehicle on a level surface.
2. Completely drain the black and grey waste water tanks.
3. Turn the water pump off, and then open all faucets, low-point drains, water heater exterior drain plug, and fresh water tank drain.
4. When completely drained, close the faucets, and drains.
5. Remove water filter (if so equipped)
6. Position the water heater bypass valves to closed top and bottom with the center valve open. Note, if properly drained of water, it is not necessary to fill the water heater with RV antifreeze. Antifreeze (and water) is prevented from entering the water heater when valves are in the winterization mode.
7. Remove the inlet line to the water pump and connect a temporary hose from the inlet side of pump to a container of RV antifreeze.
8. Run the water pump until the RV antifreeze flows freely and is visible on both the cold and hot portions of each faucet.
9. Flush the toilet multiple times until the antifreeze is visible.
10. Add several cups of RV antifreeze to the kitchen sink drains, the bath sink drain and the tub/shower drain.
11. Reinstall the drain plug on exterior of water heater.
12. Remove the temporary hose at water pump and reconnect original water line.
13. Only use non-toxic RV anti-freeze.

**DO NOT** use automotive antifreeze to winterize your RV as serious injury or death may occur from ingestion of toxic antifreeze. Be sure to discuss winterization techniques and needs with your dealer who is familiar with your local climate. 40 De - Winterization of the freshwater system, the following procedures are recommended when removing the RV anti-freeze from the water system in preparation of vehicle use.

1. Fill water tank with fresh water.
2. Turn on water pump.
3. Run the hot and cold side of each faucet until the water is no longer tinted by the RV antifreeze.
4. Flush toilet until water is clear.
5. Drain the fresh water tank.
6. Perform the water system sanitization as prescribed in this manual.
7. Install a new water filter (if so equipped).
8. Upon completion of the sanitization process, change the water heater bypass valves to the normal position (top and bottom valves open and center closed). Reminder: do not turn on the water heater until the water heater is completely filled with water.

## WASTE WATER TANKS

The shower and sink water is discharged into a holding tank which is commonly referred to as a “Gray” water tank. This tank connects to an exterior valve with a connection for sewer hose. The toilet waste and water is discharged into a separate holding tank which is also referred to as a “Black” tank. This tank also connects to an exterior valve adjacent to the “grey” valve.

## EMPTYING THE WASTE WATER TANKS

1. Remove the exterior sewer valve outlet cover by turning it counterclockwise
2. Attach sewer hose to the valve outlet by placing the hose over the valve and turning it clockwise to latch.
3. Place the other end into an approved dump station inlet making certain the hose is secured so as to prevent movement when emptying the tank.
4. Arrange the hose to slope downward from the trailer to the drain.
5. Open the Black drain valve (the larger valve) by pulling the valve handle away from the trailer.
6. Open the Gray drain valve (the smaller valve) by pulling the valve handle away from the trailer.
7. Allow both tanks to drain completely.
8. Run fresh water through both tanks to rinse the tanks.
9. Close both drain valves.
10. Remove the sewer hose and rinse hose with fresh water.
11. Secure sewer outlet cover.
12. Secure sewer hose.
13. Add odor control chemicals and two or three gallon of water to the Black water tank prior to your next usage as this will assist in preventing build-up of solids. Waste tank tips • **Only empty tanks** into an approved dumping facility. It is unlawful to empty these tanks into sewer drains or other such unapproved locations. • Solid waste build-up inside the black water tank is possible. It is recommend you use adequate amounts of water when flushing the toilet as this will aid in rinsing out the tank when emptying the tank. Should you have a problem with solids build- up in the black tank, close the valve, fill the tank about  $\frac{1}{2}$  - $\frac{3}{4}$  full then drive around to agitate and loosen the solids. • Do not dump black tanks until  $\frac{3}{4}$  full. This practice assists in making certain that enough water is in the tank to flush out the tank waste. If necessary, fill the tank with fresh water to the  $\frac{3}{4}$  level prior to emptying the tank. • Do not introduce items such as paper, gum wrappers, sanitary products, cigarettes, facial tissues, paper towels, and food scraps to the holding tanks. Note some of these items may state they are flushable; however they are only flushable in home sewer systems. Addition of these items to the tank will likely cause significant obstructions which will not be easily removed. Note: removal of foreign objects from holding tanks is not covered under any warranty.

- State and local regulations may prohibit highway travel unless the holding tank outlet is securely capped.
  - Keep two garden hoses. One to fill the fresh water tank and one to rinse the sewer hose. Cross contamination between the hoses may occur causing significant health risks.
  - Use only biodegradable toilet tissues formulated for RV sewer systems
  - Do not place any item into the tank that can puncture, damage or scratch the tanks.
  - Use a deodorizing agent designed for RV use, in your black water tank
- Follow the maintenance safety procedures.

## FOLLOWING OPERATION

- . Store the unit in an area away from human activity.
- . Do not permit children to play on or around the stored unit.
- . Make sure all parked machines are on a hard, level surface and engage all safety devices.
- . Wheel chocks may be needed to prevent unit from rolling.

## FISH HOUSE WEIGHTS/ CAPACITIES:

MODEL	DESCRIPTION	GVWR	UNIT WEIGHT	CARRYING CAPACITY
A612	6.5 X 12 FT SGL CRANK	2990#	2680#	310#
A612SP	6.5 X 12 Ft SGL CRANK SPEAR	2990#	2720#	200#
A614RC	6.5 X 14 FT SGL CRANK	2990#	2840#	150#
A614RD	6.5 X 14 FT SGL CRANK	2990#	2815#	175#
A614FD	6.5 X 14 FT SGL CRANK	2990#	2810#	180#
A164FBH	8 X 16 FT SGL CRANK	5500#	4280#	1220#
A164RD	8 X 16 FT SGL CRANK	5500#	4260#	1240#
A164HYD	8 X 16 FT SGL HYD	7000#	4350#	2650#
817RD	8 X 17 FT SGL CRANK	5500#	4760#	740#
817RDHYD	8 X 17 FT SGL HYD	7000#	4860#	2140#
818RD	8 X 18 FT TANDEM HYD	7000#	5740#	1260#
8 X 21 FT TANDEM HYD		7000#	6460#	540#

## RV EXPLORER WEIGHTS/ CAPACITIES

MODEL	DESCRIPTION	GVWR	WEIGHT	CAPACITY
17'RVEXPL	8 X 17 FT SGL CRANK	5500#	5140#	360#
17'RVEXPL	8 X 17 FT SGL HYD	7000#	5240#	1760#
20'RVEXPL	8 X 20 FT TANDEM HYD	7000#	6080#	920#
22'RVEXPL	8 X 22 FT TANDEM HYD	10,000#	6600#	3400#
24'RVEXPL	8 X 24 FT TANDEM HYD	10,000#	6800#	3200#

## TOY HAULER MODELS

A164TH	8 X 16 FT SGL CRANK	5500#	4640#	860#
17'RVEXPLTH	8 X 17 FT SGL CRANK	5500#	5240#	260#
18'RVEXPLTH	8 X 18 FT TANDEM HYD	7000#	6060#	920#
24'RVEXPLTH	8 X 24 FT TANDEM HYD	10,000#	6820#	3180#

**CARRYING CAPACITY EQUALS THE TOTAL OF WHAT IS BUILT ON TO THE FRAME PLUS ANYTHING THAT IS CARRIED IN THE UNIT WHEN COMPLETE!**

## **PERFORMING MAINTENANCE**

- . Good maintenance is your responsibility. Poor maintenance is an invitation to trouble.
- . Be certain all moving parts on frame have come to a complete stop before attempting To perform maintenance.
- . Always use a safety support and block the wheels. Never use a jack to support the frame.
- . Always use the proper tools or equipment for the job at hand.
- . Use extreme caution when making adjustments.
- . Never replace hex bolts with less than grade five bolts unless otherwise specified.
- . After servicing, be sure all tools, parts and service equipment are removed.
- . Where replacement parts are necessary for periodic maintenance and servicing, genuine factory replacement parts must be used to restore your equipment to original specifications. The manufacturer will not claim responsibility for use of unapproved parts and/or accessories and other damages as a result of their use.
- . If equipment has been altered in any way from original design, the manufacturer does not accept any liability for injury or warranty.

Most trailer axle bearings are unlike those in your motor vehicle in that they require yearly maintenance to ensure reliable, safe operation of your trailer.

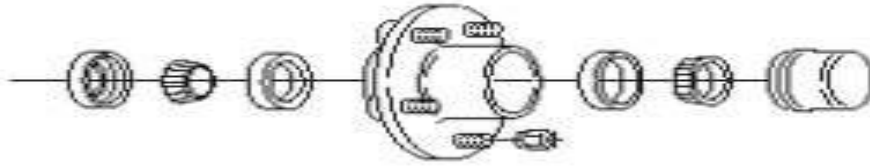
### **Greasing Bearings**

1. Remove dust cap to expose the axle nut.
2. Straighten cotter pin in order to remove pin from nut and axle.
3. Hub should now slide off of axle shaft.

### **Packing Bearings**

Prior to repacking bearings, all grease must be removed from the hub/drum and bearings. Bearings should be packed by machine or by hand methods to ensure that grease is forced into the cavities between the rollers, cone and cage of the bearings.

Use a high temperature, automotive type wheel bearing grease to repack your bearings. Once bearings are greased properly you are now ready to reassemble the hub to the axle.



## MAINTENANCE CHART

ITEM	INTERVAL
Check tire pressure.	Before transporting.
Check lug nuts for tightness.	Before transporting.
Grease wheel bearings.	Yearly.
Grease wheel assemblies & hinge points.	Yearly.
Review safety instructions.	Annually.
Clean & paint.	As needed.
Sealing Roof	Yearly.

Glacier desires that you have full enjoyment of your new Glacier Ice House recreational vehicle. If for any reason your vehicle is out of service

and cannot be used because of a manufacturing or chassis defect for a cumulative total of seven (7) days during the warranty period you are to

immediately contact Glacier LLC by certified mail, return receipt requested, setting forth the service problems and asking for immediate assistance, RV Warrior is willing and able to make every effort for a quick response.

## **WARRANTY SERVICE**

- 1. GLACIER CARRIES A LIMITED ONE YEAR WARRANTY FROM THE DATE OF PURCHASE BY THE CUSTOMER**
2. Warranty service under your Limited Warranty is to be performed by your authorized Glacier Ice House service center. For those appliances and equipment not maintained by Glacier Ice House your dealer has a vested interest in your satisfaction.
3. If you are traveling and an issue occurs, service can be done by an authorized dealer (with Glacier approval). Keep your warranty registration form with the vehicle at all times since it must be presented for warranty service. This form is your proof of purchase and provides the date of retail sale, both of which are necessary to determine warranty eligibility.
4. If you cannot locate an authorized Glacier Ice House Service Center contact:  
Glacier LLC  
11287 ASH AVE  
BRAINERD, MN 56401  
218-454-1078 ph.  
218-454-1079 fax
5. Other warranties – the retail customer is responsible for completing and forwarding warranty forms for all items not covered by either the chassis manufacturer's or warranty.

Occasionally, a warranty or service matter may not be handled to your satisfaction. In this case, we recommend that you discuss the problem with service center management. If

you are unable to find satisfaction at the dealer level, please contact the Glacier Ice House Service Department, where we will make our best effort to reach an agreeable solution.

## **LP GAS HEATING AND LP GAS APPLIANCE SAFETY REGULATIONS**

The United States Government requires that the manufacturer of this recreational vehicle provide the following safety information by the National Fire Prevention Association (NFPA) and the American National Standards Institute (ANSI).

**WARNING: LP GAS CONTAINERS SHALL NOT BE PLACED OR STORED INSIDE THE VEHICLE. LP GAS CONTAINERS ARE EQUIPPED WITH SAFETY DEVICES THAT RELIEVE EXCESSIVE PRESSURE BY DISCHARGING GAS TO THE ATMOSPHERE.**

**WARNING: IT IS EXTREMELY DANGEROUS TO USE COOKING APPLIANCES FOR COMFORT HEATING. COOKING APPLIANCES NEED FRESH AIR FOR SAFE OPERATION. BEFORE OPERATION (1) OPEN THE OVERHEAD VENT OR TURN ON AN EXHAUST FAN AND (2) OPEN A NEARBY WINDOW. A WARNING LABEL HAS BEEN PLACED IN THE COOKING AREA OF THE VEHICLE TO REMIND YOU THAT YOU MUST PROVIDE AN ADEQUATE SUPPLY OF FRESH AIR FOR COMBUSTION. UNLIKE HOMES, THE AMOUNT OF AIR IN AN RV IS LESS DUE TO ITS LIMITED SIZE (VOLUME). PROPER VENTILATION WHEN USING COOKING APPLIANCES WILL AVOID THE DANGERS OF ASPHYXIATION.**

**THE THREAT OF ASPHYXIATION INCREASES WHEN A COOKING APPLIANCE IS USED FOR LONG PERIODS OF TIME, THUS, THEY SHOULD NEVER BE USED FOR INTERIOR HEATING PURPOSES.**

**WARNING: PORTABLE FUEL-BURNING EQUIPMENT, INCLUDING CHARCOAL GRILLS AND STOVES, SHALL NOT BE USED INSIDE THE RV. THE USE OF THIS CATEGORY OF**

EQUIPMENT INSIDE AN ENCLOSED SPACE MAY CAUSE ASPHYXIATION AND CREATES A FIRE HAZARD.

**WARNING: DO NOT BRING OR STORE LP GAS CONTAINERS, GASOLINE OR OTHER FLAMMABLE LIQUIDS, INSIDE THE VEHICLE DUE TO THE POSSIBILITY OF EXPLOSION AND FIRE.**

A warning label has been attached near the LP gas container. The label reads: **DO NOT FILL CONTAINER(S) TO MORE THAN 80 PERCENT OF CAPACITY.**

Uncontrolled gas flow can result from overfilling LP gas containers, resulting in a fire or explosion. A properly filled container will contain approximately 80 percent of its volume as liquid.

The following label has been placed in the cooking area of the vehicle:

**IF YOU SMELL GAS:**

1. Extinguish any open flame, pilot light and smoking material.
2. Do not touch any electrical switch.
3. Shut off the LP gas supply at the tank valve(s) or gas supply connection.
4. Open doors and other ventilation openings.
5. Leave the area until the odor clears.
6. Have the gas system checked and leakage source corrected before using again.

LP gas regulators must always be installed with the diaphragm vent facing down. Regulators that are not in compartments have been equipped with a protective cover. Make sure the regulators vent faces down and the cover is kept in place to minimize vent blockage; blockage could result in excessive gas pressure and, therefore, possibly cause a fire or explosion.

Notice: All LP gas regulators are factory tested for proper pressure output. Pressure output should be checked periodically by a qualified LP

dealer. Only qualified persons should install, adjust or service LP gas regulators. If service is needed contact a qualified LP dealer.

## **GENERAL SAFETY**

### **FIRE SAFETY**

Prevention is the best form of fire safety. Carefully follow the instructions for the care and operation of the various appliances in your vehicle (see appropriate sections).

Follow the same basic rules of fire prevention that you use at home. **DO NOT SMOKE IN BED. DO NOT OVERLOAD THE ELECTRICAL SYSTEM. DO NOT PERMIT CHILDREN NEAR THE LP GAS CONTROLS OR CONTAINER. DO NOT STARE FLAMMABLE LIQUIDS INSIDE THE UNIT.**

Carry-over your preparedness from your home to your Glacier Ice House by having a pre-planned escape route. **BE SURE EVERYONE KNOWS WHERE THE EMERGENCY EXIT IS LOCATED AND HOW IT OPERATES.**

Your Glacier Ice House is equipped with a fire extinguisher. **MAKE SURE EVERYONE KNOWS WHERE IT IS LOCATED, HOW TO OPERATE IT AND WHAT TYPES OF FIRES IT IS DESIGNED TO HANDLE.**

Check the fire extinguisher on a regular basis to make sure it is charged.

### **SMOKE DETECTOR**

All units are equipped with a smoke detector. Check its operations on a regular basis. If it does not check properly, get it serviced or replaced prior to using the vehicle again.

**NOTE: IF A FIRE DOES START WITHING THE UNIT, GET ALL OCCUPANTS OUT IMMEDIATELY. IF IT IS A SMALL FIRE, USE THE FIRE EXTINGUISHER. IF THE FIRE IS NOT QUICKLY PUT OUT, GET OUT OF THE VEHICLE. CONTACT**



THE FIRE DEPARTMENT. IF POSSIBLE, CLOSE THE LP GAS SERVICE VALVE. MOVE A SAFE DISTANCE FROM THE VEHICLE.

## **CARBON MONOXIDE SAFETY**

Carbon Monoxide is a colorless, odorless, tasteless gas, which can be fatal if a high concentration builds up in a sealed area over a period of time. Carbon monoxide is a by-product of burning fuel, and is found in high concentrations in exhaust from gas burning engines. A water heater or furnace operating improperly can also produce Carbon Monoxide. Under normal conditions your Glacier Ice House should be free from Carbon Monoxide at any given time. Due to the safety hazards of Carbon Monoxide (CO), each Glacier Ice House is equipped with a CO Detector.

Carefully read the instructions included with your CO detector to ensure proper use and maintenance. Most CO detectors require only occasional dusting and weekly testing. DO NOT use any type of cleaner when dusting your CO detector. Doing so may render the unit useless without warning.

Carbon Monoxide is often confused with illness such as “flu like symptoms” (Headaches, nausea, dizziness). Such symptoms should be discussed with all vehicle occupants. RV certified CO detectors will sound an alarm if 100 PPM (parts per million) if CO is present within 90 minutes. 50 PPM is allowed in a work place for up to 8 hours. Cigarette smoke contains about 5 PPM Carbon Monoxide.

If your CO alarm sounds, exit the vehicle immediately. After exiting the vehicle take a head count and make sure everyone is accounted for. Air out the vehicle and check again to ensure that the alarm came from the CO detector, as your vehicle is also equipped with a smoke detector. Following instructions included with your CO detector is recommended.

## **LP GAS SAFETY**

LP appliances should never be operated while the vehicle is in motion.

If the pungent odor of LP gas is detected, immediately shut off the LP gas valve and check the LP gas label for further instructions.

Check other sections of this manual for more information on the LP gas system.

## **VEHICLE LOADING**

### **CARRYING CAPACITY**

During the design and development of our Glacier units the number and size of storage compartments and the liquid tank capacities are maximized for value and convenience. If the operator fills all liquid tanks to capacity, fills all storage compartments and cupboards to maximum volume the vehicle will probably be overloaded. According to National Highway Traffic Safety Administration figures, an average occupant weighs 150 pounds and each gallon of water weighs over eight (8) pounds. The operator is responsible for analyzing the conditions in which the RV will be utilized for each trip and ensuring the RV is not overloaded.

The placement of cargo will affect the amount of water and cargo that you can carry. It may be necessary to reduce the amount of water carried and unload some cargo items normally carried in order to provide for larger carrying capacity.

**WARNING: DO NOT EXCEED THE RATED LOAD OF THE RV OR THE RATED LOAD OF ANY AXLE.**

**NOTE: THE CARRYING CAPACITY OF YOUR RV CAN BE DETERMINED BY WEIGHING. THE SHIPPING WEIGHT DOES NOT NORMALLY INCLUDE OPTIONS SUCH AS AWNINGS, ROOF PODS, EXTRA CABINETS, ETC. THE WEIGHT OF**

THESE ITEMS MUST BE SUBTRACTED FROM THE TOTAL OF THE CARGO CARRYING CAPACITY.

Notice: If your RV is equipped with holding tanks, empty the holding tanks before filling fresh water tank otherwise you will limit cargo capacity.

### LOADING TIPS

After you have determined how much weight you can safely carry and selected those items to make up that weight, make a list and keep it for future reference. Load the RV and distribute the load so that you get proper weight on the axle(s). Do not load upper cabinets with heavy items. Secure and brace items so they won't move during travel, thereby shifting the load in the RV. Do not load heavy items near either end of the RV. Adjust cargo storage to keep the side to side wheel loads as equal as possible. If your RV has holding tanks, carry only as much water as needed for travel use or to balance the load. Always empty your waste water and sewage holding tanks before traveling.

**WARNING: DO NOT INSTALL ANY TYPE OF WEIGHT CARRYING RACK OR FRAME TO THE RV. DAMAGE TO THE RV AND UNSTABLE HANDLING CHARACTERISTICS MAY RESULT.**

**WARNING: EXCEEDING THE GAWR, GVWR OR GCWR OF YOUR RV CAN CAUSE UNDESIREABLE HANDLING CHARACTERISTICS AND MAHY CREATE A SAFETY HAZARD. MODIFICATION OF YOUR VEHICLE BY ADDITION OF RACKS NOT SPECIFIED BY THE MANUFACTURER TO CARRY ADDITIONAL EQUIPMENT OR VEHICLE IS NOT RECOMMENDED, MAY CREATE A SAFETY HAZARD AND MAY VOID YOUR WARRANTY.**

Make a loading diagram of your properly loaded RV. It will help you locate where specific items are stored, and will help speed the loading process. Store emergency items in a readily accessible location. Include tools, first-aid kit, rain gear, flashlight, highway warning devices and an electric cord or light.

The difference between the empty weight and the weight of the RV in traveling configuration is your usable load. If the loaded weight of your RV exceeds the GVWR or the weight on any axle exceeds that axle's GAWR, the RV is overloaded and you'll have to remove items to bring the weight down to or below the GVWR and GAWR.

All items must be considered for their weight and stored according to how heavy they are. Heavy items should be placed close to the floor and in the center of the vehicle. Luggage and similar cargo carried inside the RV must be secure to prevent possible damage in the case of a sudden stop or an accident.

### MANUFACTURER'S LABELS

Your vehicle is equipped with several federally required labels pertaining to the vehicle's weight, load capacity and operating limitations.

On the outside of the vehicle on the driver's side is the sticker that lists the manufacturer's serial number, the axle(s) GROSS AXLE WEIGHT RATING (GAWR), the vehicle's GROSS VEHICLE WEIGHT RATING (GVWR), tire and wheel rim sizes, tire operating pressure, and the VEHICLE IDENTIFICATION NUMBER (VIN). (FIG 1)



FIG 1

### FEDERAL WEIGHT DEFINITIONS

**GAWR:** The allowable weight, INCLUDING CARGO AND PASSENGERS, which can be SAFELY supported by a specified axle.

GVWR: The maximum permissible weight of your vehicle, INCLUDING CARGO, ALL OPTIONS, PASSENGERS, GASOLINE AND WATER.

**USEFUL WEIGHTS:**

Water – 8.328 pounds per gallon

Gasoline – 6.0 pounds per gallon

**TIRES**

The tires installed on your RV have been preselected as the proper size and weight for the type of RV built. The tag located on the outside of the RV will show the proper tire size for your RV. When replacing tires, make sure these guidelines are followed:

**TIRE MARKINGS**

Sample tire size: LT225/75R 16 E

- LT reflects the “Light Truck” usage. Light truck tires are used on anything from compact pickups to class A motor homes.
- 225 indicates the “contact patch” width. The contact patch is the amount of tire surface that actually comes into contact with the pavement. In this case the width is 225 millimeters wide.
- 75 indicates the height to width ratio of the tires.
- R identifies the construction type of the tire. R-Radial, B-Bias belted, D-Diagonal Bias. Some tires may have a speed designation label in front of the construction type. Example – MR tires are rated for use up to 81 mph. SR tires up to 112 mph. ZR tires carry the highest speed rating, and are safe for speed over 150 mph. However, ZR tires should never be installed on any motor home or travel trailer. If no speed rating is listed on the sidewall, the maximum speed for light truck tires is 87 mph, and for passenger cars 105 mph.
- 16” is the rim size. This is the only measurement made in inches.

- E is the load range.

**TIRE LOAD RATINGS**

Load ratings for tires go up as the corresponding letter changes. For example, load range “E” tires have a heavier rating than load range “D” tires. Load capabilities of tires can change as the psi (air pressure) is lowered. As much as 220 lbs. of load carry capacity is lost per tire for each 5 psi below the recommended inflation. This decreased load amount varies from one tire manufacturer to the next; therefore it is recommended that you contact your tire manufacturer for further information in this regard.

**TIRE AIR PRESSURE**

When checking air pressures, if the tire has been driven more than 6 miles, you can add 4-6 psi to the rated maximum “cold” inflation recommendations. For example, if the tire has a maximum rating of 90 psi cold, you can inflate the tire to 96 psi after being driven on. Under inflation generates excessive heat (a tire’s worst enemy!), increases tread wear in the shoulder area, and reduces your vehicle’s fuel economy.

Never mix radial, bias belter or bias type tires. Never mix brand names. This can adversely affect vehicle handling and stability. Use only the tire size that is listed on the Safety Compliance Certification Label.

**TIRE MAINTENANCE**

When cleaning tires, try to use a tire-cleaning agent. Never use any cleaner that contains solvents. Solvents will draw oil from tires and cause them to prematurely crack. Inspect your tires prior to each trip, looking for bulges or cracks in sidewalls.

When storing your RV for long periods you should completely unload the vehicle so that a minimum weight will be placed on the tires. Make sure the tires are inflated to the

recommended operation inflation pressure. Move the vehicle at least every three months to prevent ozone cracking in the tire bulge area as well as “flat spotting” from prolonged strain of sidewall and tread deflection. Make sure you check the inflation and adjust to the recommended operating pressure before putting the vehicle back into service.

## **ELECTRICAL SYSTEM**

Your Glacier RV is equipped with two (2) separate electrical systems that provide your vehicle with power.

### **12-VOLT DC/110-VOLT AC**

Like all vehicles, it has a 12-volt system that is used for running the vehicle’s equipment designed for 12-volt operation as well as other accessories. This is a direct current (DC) system (12V).

Like your home, the vehicle has a 110-volt alternation current (AC) system that requires an external source of 110-volt electricity. A shoreline connection (extension cord) or a power generator or an inverter can provide this power. In order to use your 12-volt electrical system, your shoreline (power cord) should be plugged into either a properly rated external power source or the generator should be running, or in some cases the inverter should be turned on. **TO CONSERVE BATTERY POWER, USE OF THE SHORELINE IS RECOMMENDED WHENEVER POSSIBLE.**

Consult your generator’s manufacturer’s owner’s manual for further details on its use and maintenance.

**DO NOT USE A CHEATER PLUG TO HOOK UP YOUR MOTOR HOME TO A 110-VOLT CIRCUIT.**

**DO NOT USE AN EXTENSION CORD WITH A CURRENT RATING LESS THAN THE AMPERAGE YOUR RV REQUIRES. EXTRA EXTENSION CORDS**

**REDUCE THE AMPERAGE AND VOLTAGE BEING SUPPLIED TO THE RV AND MAY CAUSE DAMAGE TO ELECTRICAL COMPONENTS.**

### **30-AMP 110-VOLT SERVICE**

Your Glacier RV comes with a 30-amp service. 30-amp service is 110-volt service limited to a total of 30 amps of draw. A three pronged power supply cord much like your clothes dryer would have in your house identifies this type of power supply. Each appliance in your vehicle is capable of working by itself with this type of service. However, you may not be able to operate all your appliances at the same time without causing a circuit breaker to blow.

A typical component in your vehicle such as a TV or VCR will draw only about 1 amp. Other items such as coffee makers and microwaves will draw 10-15 amps when used. Roof air conditioners usually draw the most, pulling up to 15 amps when the compressor is running. Using other items in your coach such as converters, refrigerators, water heaters, etc. may put your draw over the 30-amp mark causing a circuit break.

30-amp service is the most common electrical service in the RV industry and can be found at most, if not all, RV campgrounds. This makes 30-amp service the most user friendly as far as availability.

Listed are components that might be used in Glacier vehicles and the maximum amperage draw each one has:

- Roof A/C unit – 15 amps
- Electrical water heater – 12 amps
- Microwave – 15 amps
- TV – 1 amp
- Refrigerator – 3.5 amps

### **POWER CONVERTER**

Your vehicle is equipped with an electrical power converter that changes 110-volt power to 12-volt power to run 12-volt powered appliances your vehicle. It gets the 110-volt power by way of the shoreline or a power generator.

The circuits in the vehicle are protected by circuit breakers and fuses. Locate the converter and see where the fuses are located. If you blow a fuse, turn off the appliance, unplug the fuse, check the fuse for breakage and replace it with a new fuse of the proper rating. If the fuse continues to fail, contact your nearest dealer. **NEVER REPLACE A FUSE WITH A HIGHER RATED FUSE THAN WHAT IS DESIGNATED.**

## **BATTERY**

The RV has a battery on board. Check the electrolyte fluid on a regular basis, especially during hot weather conditions. Refill as necessary with either distilled water or clean tap water in an emergency. **DO NOT ALLOW THE FLUID LEVELS IN THE BATTERY TO FALL BELOW THE INTERNAL BATTERY PLATES. DAMAGE TO THE BATTERY MAY RESULT AND SHORTEN THE LIFE OF THE BATTERY.**

When charging the battery do not charge at such a fast rate as to cause spewing of the electrolyte from the cells. However, do not charge the battery with the cell vent caps off.

**WARNING: NEVER USE AN OPEN FLAME AROUND THE BATTERY. AVOID MAKING ELECTRICAL SPARKS. FUMES FROM THE BATTERY ARE COMUSTIBLE.**

**KEEP AN EYE FOR CORROSION ON THE BATTERY TERMINALS. CORRODED TERMINALS CAN CAUSE A LOSS OF AVAILABLE POWER AS WELL AS CUT DOWN THE EFFICIENCY OF THE CHARGING/ELECTRICAL SYSTEM.**

If your battery has problems prior to the end of their warranty period, consult the nearest representative of the battery manufacturer.

## **BATTERY TYPES AND CHARGING**

Deep-cycle batteries are usually rated in Amp-hours, which is based on a 20-hour discharge rate. Therefore, a 100 amp-hour battery can deliver 5 amps for 20 hours. Deep-cycle batteries can be discharged about 80% of capacity before damage occurs. Shallow cycling (50%-60% drain before recharge) will result in much longer battery life. To find out how long your battery will last when using various equipment in your RV, research the amperage of the items in use and use that number to gauge what size amp-hour battery you think you need. Keep in mind that you should recharge your battery when they are 50% discharged, so only half of the amp-hour rating is actually used.

Completely charging wet cell deep-cycle batteries requires that battery voltage to be raised beyond what is known as the gassing point. This is the voltage at which the battery begins to bubble and gas is given off. If charging stops short of this point, sulfate is left on the plates and deterioration of the battery begins. The gassing point will vary with battery temperature. At 77 degrees F, the gassing point of a 12-volt battery is about 14.0 volts.

## **LP GAS**

### **GENERAL**

The liquid petroleum gas system in your unit furnishes fuel for various appliances. It is comprised of propane (LP) gas. LP gas provides an efficient and inexpensive source of energy.

The gas is stored in two (2) pressure tanks located on the front driver's side of the unit. Under pressure the LP gas turns to vapor; it is this vapor that burns.

Each tank has an automatic eighty percent stop-fill valve that allows space in the tank for vapor

expansion. The high pressure of the vapor in the tank is reduced in two stages as it makes its way to your appliance. The tank pressure will vary with temperature and altitude, but it may be in the range of 100 to 250 pounds per square inch (psi) or more. It is reduced by a pressure regulator to about 12 psi in the first stage and then to about 6.25 ounces in the second stage. The 6.25 ounces psi can also be expressed as 11 inches of water column.

The LP gas system is designed and built to rigid standards and tested before leaving the factory. Your dealer also tests the system prior to customer delivery.

Except of simple maintenance and occasionally tightening a connection, you should take your unit to an authorized dealer for LP gas problems. The LP gas tank should always be filled by an authorized LP supplier.

**NOTE: YOUR UNIT'S MANUFACTURER IS NOT RESPONSIBLE FOR PERSONAL INJURY OR PROPERTY DAMAGE RESULTING FROM IMPROPERLY MAINTAINED LP GAS APPLIANCES AND SYSTEMS.**

**CAUTIONS: READ LP GAS PRECAUTIONS IN THE FRONT OF THIS MANUAL. BECOME FAMILIAR WITH THEM AND MAKE SURE YOUR ENTIRE FAMILY IS COMPLETELY AWARE OF THE SAFETY ASPECTS OF LIVING AROUND LP GAS.**

### **CLIMATE DIFFERENCES**

The appliances in your vehicle will not function if the LP gas does not vaporize. Propane has become the main type of LP gas used in RV's in recent years. Butane should not be used. The LP gas dealer will have the correct or blend for this locale. If you plan on traveling from a warmer climate to a cold climate, check with your local gas dealer to see if the blend he supplies is appropriate for the part of the country you plan on visiting.

### **OPERATION**

To operate any LP gas appliance, the LP gas tank's service valve must be OPEN. When first used, or after a refill, there may be some air in the gas lines that will escape when the range burner or similar gas valve is opened. The air may extinguish the match or igniter the first time or two you attempt to light a stove burner.

Also remember that when you close the tank's service valve, some gas will remain in the lines. To completely bleed the lines of gas, close the tank valve and light the range burner. When the flame burns out, turn off the appliance.

### **GAS LINE CHECK**

Check the gas line connection and all other connections regularly. To check, turn OFF all burners and pilot lights. Open all doors and windows. OPEN the LP gas tank service valve and use soapy water or an approved leak detector fluid to test all line connections. DO NOT use products that contain AMMONIA or CHLORINE. The appearance of bubbles in the soapy solution indicates a leak. Tighten the connections with two (2) open-end wrenches until the bubbles stop. If this does not take care of the leak, contact your gas dealer. DO NOT OVERTIGHTEN.

### **GAS TANK REGULATOR FREEZE-UP**

LP gas regulator freeze-up can be prevented if owners are aware of its causes. Freeze-up may be caused one of these things: moisture in the tank, an overfilled tank or a greater vapor withdrawal demand than the tank can deliver at a particular temperature.

Freeze-up occurs more frequently in cold weather since liquid gas does not vaporize as quickly. This, along with a higher demand, can cause frosting of the tank and regulator. Moisture may enter the tank in the LP gas through condensation if air is allowed to enter the tank through an open valve. This can be

avoided by using moisture free gas and keeping all tank valves CLOSED during storage.

An overfilled tank can allow liquid gas, rather than the needed vapor, to flow through the regulator. This can result in erratic regulator delivery pressure, improper appliance operation and possible frosting of the regulator and gas line. This can be avoided by following the procedures outlined in "Filling the LP Tank." Always contact your local gas supplier for current procedures.

### **HOSE REPLACEMENT**

The flexible LP gas hoses connected to your LP tanks should be checked regularly for signs of deterioration and may need to be replaced every two to three years. Be sure to replace the hoses with approved and properly rated products.

## **PLUMBING**

### **FRESH WATER**

Fresh water for your RV is provided by filling the FRESH WATER TANK or by hooking directly to a city water connection. These sources supply water to the kitchen sink, shower, lavatory, toilet and water heater.

### **CITY WATER**

Allows you to connect a hose to a city pressurized water faucet to the unit's CITY WATER INLET. Your vehicle will have a separate water fill for the FRESH WATER TANK. The fresh water tank and water pump or by-passed when the city water hook up is used.

**CAUTION:** A PRESSURE REGULATOR SHOULD BE ALWAYS BE USED WHEN CONNECTING TO CITY WATER. EXCESSIVE WATER PRESSURE CAN DAMAGE LINES AND CONNECTIONS, CAUSING WATER DAMAGE TO YOUR RV. MAKE SURE WATER PRESSURE NEVER EXCEEDS 60 PSI.

## **WATER TANK**

UNLOCK the GRAVITY WATER FILL HATCH and use a hose or vessel to fill the water tank.

**CAUTION:** NEVER LEAVE THE RV UNATTENDED WHEN FILLING THE FRESH WATER TANK! ALTHOUGH PROPER VENTING IS ALLOWED FOR OVERFLOW, THE WATER PRESSURE CAN EXPAND THE TANK AND CAUSE STRUCTURAL DAMAGE.

Use only fresh, potable water in the storage tank. To insure that the tank is clean, drain after each use. Sanitize the tank when new, whenever contamination is suspected, or whenever it has not been used for a long period of time.

### **SANITIZING THE WATER TANK**

To drain, OPEN the WATER TANK VALVE. When the tank is empty, CLOSE the valve. Mix three (3) gallons of water with three-quarters cup of LIQUID HOUSEHOLD BLEACH. Pour this solution into the tank through the GRAVITY FILL. Wait three hours, drain and flush several times with fresh drinking water.

### **WATER PUMP**

The RV water pump is a 12-volt DC appliance that is activated by a switch in the kitchen area. The switch may be left ON while camping. This is called the demand system.

Turn the faucet on when you want water. The pump will run only as long as needed. If the pump fails when the switch is ON, check the fuse located in the converter. If the pump continues to operate whether the faucet is open or closed, check the water tank to see if it is empty and check to see if there is a leak in the system.

**DO NOT RUN THE WATER PUMP WITHOUT WATER IN THE SYSTEM. ALWAYS KEEP THE**

PUMP SWITCH OFF WHEN THE SYSTEM IS EMPTY OR WHEN CONNECTED TO CITY WATER. RUNNING THE PUMP DRY CAN DAMAGE IT AND VOID THE WARRANTY.

### **WINTERIZING THE WATER PUMP**

With the water drained from the potable water tank, disconnect the water pump outlet hose and then turn the pump on to allow the remaining water to be pumped out (less than one cup).

If you desire, you can blow out the water lines with compressed air by opening all valves and placing the air nozzle into the system where the outlet hose has disconnected. Replace pump hose.

### **DRAINING AND SEWER**

Your RV has a Drainage/Sewer system that operates much the same way as the one in your home. It includes a drain line from the kitchen sink and shower to a GRAY WATER HOLDING TANK. There is also a marine toilet and lavatory that empties into a separate BLACK WATER HOLDING TANK.

The drainage system also includes vents that carry odors caused by drain water and waste out of the RV, while also equalizing air pressure. Drain clean outs are provided to clean lines between fixtures and holding tanks.

### **DRAINAGE P-TRAPS**

By code, all drains are equipped with P-traps to keep holding tank odors from entering your RV. If you detect a foul odor, which you believe is from your holding tanks, add water to all drains to ensure that your P-trap water hasn't evaporated from long term storage. Places to add water include the kitchen sink, bathroom sink and shower.

### **HOLDING TANKS**

Your unit has a GRAY WATER HOLDING TANK and a BLACK WATER HOLDING TANK. The tanks should be emptied frequently. The tanks should always be emptied at a special DUMPING STATION. Most campgrounds and highway rest stops and many gasoline stations are equipped with proper DUMPING STATIONS.

NOTE: MOST STATES HAVE LAWS PROHIBITING EMPTYING SEWAGE BUT AN APPROVED DUMPING STATION.

While camping, it is normal practice to leave your GRAY WATER HOLDING TANK valve open if your campsite is equipped with sewer hook-up. NEVER leave BLACK WATER TANK valve open while using the RV. Since the system utilizes gravity to empty, the BLACK WATER TANK will not drain properly unless it has sufficient liquid to help drain out the solids.

### **EMPTYING HOLDING TANKS**

To empty the holding tanks, be certain that your RV is level since this process depends upon gravity. Remove sewage drain hose from its storage location. Remove the cap from the termination outlet and connect the drain hose.

NOTE: DRAIN THE TOILET (BLACK) HOLDING TANK FIRST.

To drain either holding tank, pull out the TERMINATION VALVE by pulling out the dump valve slide handle. Close the valve after the tank has drained. Flush or pour about two gallons of water through the toilet when emptying the black tank and drain hose. Repeat as necessary.

Follow the same procedure for the GRAY WATER HOLDING TANK. A repeat flush is not necessary. When the tank is empty, push the dump valve handle in until it seats. Remove the hose, wash and replace it in its storage location. Replace termination outlet cap.

### **HOLDING TANK MAINTENANCE**



Keep your tanks well flushed out when the vehicle is not in use. One way to help flush them out is to drain them at the campground, then fill each tank half full of water for the trip home. The constant agitation while driving home usually does a good job of cleaning the tanks. Then before you arrive at home, stop at a local approved dumping station and drain the tanks completely.

When camping there are a few things you can do to help facilitate the cleaning process later. First, you should always use some type of chemical additive in your holding tanks specifically designed for RV use. These types of chemicals will break down the contents of the tanks and help ensure good drainage. In addition, try using tissue designed for recreational vehicles. It will break down more than residential style tissue, and usually never clogs your drain valve.

#### **DO'S AND DON'T'S OF HOLDING TANK USE**

- DO** Clean the holding tank with an approved cleaner.
- DO** Add a special chemical additive to sanitize and improve tank action.
- DO** Guard the tank against freeze-up.
- DO** Keep the dump valve closed to allow the tanks to get as full as possible to facilitate drainage.
- DO** Keep the dump valve closed and the drain cap in place to allow the use of the system when not parked at a campsite.
- DON'T** Put facial tissues, paper, automotive type antifreeze, sanitary napkins, diapers or household toilet cleaners in your holding tank.
- DON'T** Put foreign objects in the system that could clog or damage it in any way.

#### **WATER SYSTEM WINTERIZING**

**NOTE: READ THIS BEFORE WINTERIZING YOUR WATER SYSTEM.**

If your RV is going to be stored unheated, in temperatures that **COULD GO BELOW FREEZING**, the fresh water and waste systems must be winterized.

Follow this procedure:

1. Drain the fresh water tank.
2. Drain pipes by turning the water pump ON and opening a cold water faucet. Wait for the water flow to stop. Turn pump OFF. Leave faucets OPEN.
3. Turn ON all faucets and OPEN the HOT and COLD WATER PIPE DRAIN VALVES. Leave these valves in the OPEN position. These valves are located either under the galley sink or in an exterior compartment, and permit the water to drain onto the ground below the RV.
4. OPEN the WATER HEATER drain valve located at the bottom of the heater (or remove plug). Let the water drain out. OPEN the heater SAFETY VALVE.
5. Flush the toilet.
6. After each faucet has been opened, drained and closed, CLOSE the WATER LINE DRAIN VALVE.
7. Drain the WASTE WATER HOLDING TANK.
8. Double check that ALL WATER has been drained.
9. Secure all protective caps including the water tank filler, city water inlet and waste drain outlet.

**CAUTION: DRAINING THE WATER SYSTEM ALONE MAY NOT BE ENOUGH TO PROVIDE COMPLETE COLD WEATHER PROTECTION FOR AN UNHEATED ENVIRONMENT WHERE TEMPERATURES DROP BELOW FREEZING. CONSULT YOUR DEALER FOR MORE INFORMATION ON THE BEST METHOD OF WINTERIZING YOUR VEHICLE.**

Some people may choose to remove water from the plumbing system by using air pressure. If

you choose to do this, make sure that the air pressure never exceeds 60 psi.

**WARNING:** DO NOT USE AUTOMOTIVE ANTI-FREEZE OR WINDSHIELD WASHER FLUID ANTI-FREEZE IN THE UNIT'S WATER SYSTEM. THESE CAN BE HARMFUL IF SWALLOWED. YOUR DEALER CAN PROVIDE YOU WITH SPECIAL ANTI-FREEZE THAT IS SAFE AND APPROVED FOR RV WATER SYSTEMS. ALWAYS FOLLOW MANUFACTURER'S INSTRUCTIONS FOR THESE ADDITIVES.

## **APPLIANCES**

**WARNING:** THE HOT WATER HEATER AND FURNACE USE LP GAS AS FUEL AND IN THE COURSE OF NORMAL OPERATION HAVE PARTS/SURFACES THAT BECOME VERY HOT AND ALSO EMIT COMBUSTION GASSES. BE CAREFUL TO ALWAYS FOLLOW MANUFACTURER'S RECOMMENDATIONS ON VENTILATION AND DO NOT TOUCH THE AIR EXHAUST PORTS OR ALLOW ANY MATERIAL TO COVER THEM OR EVEN COME IN CONTACT WITH THE INTAKE OR EXHAUST OF THESE APPLIANCES.

WHENEVER YOU OR SOMEONE IN YOUR VEHICLE SMELLS LP GAS, TAKE PRECAUTIONS AS OUTLINED EARLIER IN THIS MANUAL.

### **WATER HEATER**

NEVER IGNITE THE HOT WATER WITHOUT FIRST FILLING IT WITH WATER.

Turn on the hot water faucet at the galley sink to see if the tank is full. Operating instructions can be found in the manufacturer's owner's manual.

**NOTE:** ONLY QUALIFIED TECHNICIANS SHOULD PERFORM SERVICE ON THE WATER HEATER. IF NOT SERVICED PROPERLY A FIRE COULD OCCUR.

### **RANGE**

Also operated with LP gas are the range burners and the oven. The basic operation is the same as the units in your home except that extra care must be taken to provide adequate ventilation in your RV. Unlike your home, the RV has limited air space, thus, a limited amount of oxygen available for combustion.

**WARNING:** DO NOT USE OPEN FLAMES, SUCH AS THE RANGE BURNERS, TO HEAT THE RV. THE FLAMES CONSUME THE OXYGEN IN THE VEHICLE AND COULD RESULT IN ASPHYXIATION.

Always provide adequate ventilation when using the range and oven. It is always best to use the range exhaust hood and open a window slightly.

Read the manufacturer's owner's manual to become familiar with the safe operation of this appliance.

### **MICROWAVE**

Read the manufacturer's owner's manual to find all the information on its operation and cleaning.

### **REFRIGERATOR**

Unlike your home refrigerator, the unit on your RV can be operated on LP gas and 120-volt AC electricity. Read over the manufacturer's owner's manual before putting the refrigerator into operation.

The refrigerator will not operate correctly if the vehicle is not level while parked. The refrigerator coolant will not circulate properly if the unit is not level.

For best results, make sure the outside vents are always clear of debris. Without proper circulation of the rear coils the unit will not keep food cold.

Upon initial operation, or after being stored, the refrigerator could take up to 24 hours before the unit is cool enough for use.

## **FURNACE**

Your RV is equipped with a forced-air furnace similar to the type found in most homes with the exception that it is fueled by LP gas. Each unit is equipped with a wall mounted thermostat that controls the temperature. Read the manufacturer's owner's manual for operating and maintenance information.

Your furnace is designed to sustain a desired temperature in the vehicle at most times. The furnace also needs to have unobstructed air flow from all its vents, including interior and exterior.

**WARNING: DO NOT SUPPLEMENT THE FURNACE WITH ANY PORTABLE FUEL-BURNING APPLIANCE FOR HEATING THE INTERIOR OF THE RV. THESE APPLIANCES ARE NOT SAFE. ASPHYXIATION AND CARBON MONOXIDE POISONING IS POSSIBLE IN ANY SMALL, WELL-SEALED SPACE.**

## **AIR CONDITIONER**

Your Glacier RV is pre-wired and braced for a roof air conditioner. Air conditioners are capable of cooling air a maximum of 18 to 22 degrees in a 50% humidity environment. As the humidity goes up, the cooling difference goes down. If the temperature inside your RV is 100 degrees when you turn on the air conditioner, it will only put out 80 degrees. Eventually the air inside the coach will cool, and as it cools the air put out by the air conditioner will cool also. However, when starting out at 100 degrees, the cooling could take several hours before it reaches your desired temperature. Therefore, if you know the weather will be hot, turn your air conditioner on early.

The two most common complaints with roof air conditioners are they won't run at all or when

they do turn on, they won't put out cold air. Obviously, if the unit won't turn on you may have a problem with something other than the air conditioner. Always make sure you have sufficient power to run your air conditioner. Most air conditioners require a minimum of 13 amps to operate properly. Familiarize yourself with the amperage draw from the other appliances in your RV so that the amperage draw between the combinations doesn't push you over the 30 amp limit.

## **EFFECTS OF LONG TERM OCCUPANCY**

If you intend to use your RV for extended periods of time you must be prepared to deal with condensation and humid conditions that may be encountered. The normal activities of even a small number of occupants in the relatively small volume of a modern RV with its tight construction will lead to rapid saturation of the air inside the vehicle and the appearance of visible moisture, especially during cold weather.

Estimates indicate that a family of four can vaporize up to three gallons of water daily through its breathing, cooking, bathing and washing. Unless this vapor is carried outside by ventilation, or removed from the air by dehumidifier, it will condense in the inside of the windows and walls as moisture. In cold weather it will appear as frost or ice. It may also condense in the walls or ceiling and appear as stains on paneling. This will increase the heating load on the furnace somewhat, but it will greatly reduce condensation. You should increase ventilation when large numbers of people are present.

**CAUTION: DO NOT USE COOKING APPLIANCES FOR COMFORT HEATING. IN ADDITION TO THE TOXIC FUMES AND OXYGEN DEPLETION, OPEN FLAMES ADD MOISTURE TO THE AIR INCREASING CONDENSATION.**

## **SLIDE OUT SYSTEM**

If your RV is equipped with a slide out there are several precautions that should be taken before operation of the slide room:

1. Make sure you have clearance on the exterior.
2. Make sure your slide out awning is unlocked.
3. Make sure that all interior items are clear.
4. Make sure that you have sufficient battery power.

If you slide out room rails to move in or out you may have a low battery. Make sure that the battery is fully charged and try the operation again (the slide out will not operate on the converter alone, also, a battery that reads 12 volts may not be at full amperage capacity). Your slide room responds to increased amps to stop. If your room is inoperable, turn your battery disconnect switch off. This will allow you to manually push your room in until you get to an authorized Glacier RV service center.

### **SLIDE OUT CIRCUIT BREAKER SWITCH**

If attempting to move the slide and its perceived that the motor has no power, check the 12 volt 50 amp mini-breaker located in the electrical panel to make sure it has not been tripped. Reset the breaker as needed.

### **SLIDE OUT WEATHER SEALS**

Periodically check all seals and gaskets on the slide out walls for proper fit and operation.

Slide outs are not designed to have a 100% air-tight seal; however, you will find that the best seal possible can be achieved with proactive maintenance and proper use.

## **VEHICLE MAINTENANCE**

Generally, sealants are designed to last more than a few years, however, varying weather

conditions and different climates can breakdown those sealants in as little as 1 year.

Probably the most important area to check is the roof. Generally, this area should be checked twice a year. Other areas that will need attention include the moldings used on the side walls and the entry door edge moldings. Since these areas are more accessible for periodical checks, it is recommended to inspect the side walls and windows every time you wash your RV. Sometimes washing the side walls can actually remove some necessary sealants. If you find an area on your side walls that needs resealing, a clear silicone, or one that matches the color of the existing sealant should be used.

The last few areas that might need attention are those around the clearance lights, tail lights and around accessories and windows. All these areas can be resealed using a common silicone based sealant/adhesive. However, when sealing windows, be careful to keep from sealing over any weep holes. These holes are designed to drain any water that may have found its way to the inside of a window or mirror.

Keeping up on the maintenance of your sealants will keep your RV looking beautiful for a long time. If you are not sure what type of sealants should be used on any part of your RV, a simple phone call to your dealer or service center for direction will prove beneficial.

If you plan on using wax on your side walls you should use a marine type wax. Marine type wax is best suited for fiberglass surfaces. Regular automotive wax is suitable for painted surfaces of the RV.

## **CORROSION PROTECTION**

Your Glacier RV has been designed to withstand normal environmental conditions but the sand

and salt used on highways can cause the metal components to corrode.

To protect your RV from this corrosion, it must be thoroughly cleaned as soon as possible after exposure to these elements. Washing the undercarriage with a high-pressure washer will remove the majority of the salt. This will not replace the paint that is literally sandblasted off the undercarriage by the road salt and sand.

Regularly scheduled inspections and maintenance is necessary to protect your RV and its various components and fixtures from the elements and keep it corrosion free.

In addition to maintenance, you should keep from storing your vehicle in grassy areas for long periods of time. The stagnant, moist air developed under the coach will speed up the corrosion process. Always store your vehicle on pebble, concrete or asphalt.

## **AWNINGS**

Proper use, care and maintenance procedures for awnings are included in the literature provided with the awning.

Before you open your awning, make sure that you have sufficient clearance from obstructions.

### **AWNING CARE**

Be sure to clean off all debris as you roll up your awnings. Periodically wash off the awning fabric with soapy water solution. Long term exposure to the sun may cause some fading over time, which is normal.