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INTRODUCTION

Valterra Products, Inc. is pleased to welcome you to the world of recreational vehicles. We manufacture many fine accessories available at your local RV store. Our motto is "Making Recreation Easy" and, in an effort to do so, we have teamed up with Bill Bryant to provide you with information that will help you get the most enjoyment out of your new RV.

This booklet is intended to help you understand your new pride and joy. It leads you logically (we hope) through the more important features of your RV, allowing you to learn and get acquainted at your own speed. It also should help you analyze a problem if and when something goes wrong.

For fast information on any part of your trailer, read the hint section first. Here lies the most important information organized in a simple to read Hint-by-Hint layout.

Hints marked with a << symbol cover general information. SAFETY HINTS are marked with a caution {{ symbol. Valterra and Bill hope that this truly is, EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT YOUR RV.

The HINTS are nowhere complete, because there is no limit to the unusual things that can happen, either at home or on the road. So, don't think that the HINTS will cover every eventuality. If there are any contradictions between HINTS and manufacturer's manuals, FOLLOW THE MANUFACTURER'S INSTRUCTIONS.

In preparing this book, Bill extends special thanks to his brother, Barney, a fellow RV'er, Dick Saal, a good neighbor who drags a 5th wheel trailer, and to Prince and Polly Wiginton, of Wiginton's RVs in Pensacola, Florida. Their suggestions and comments were of great value in completing this book.

Take a look at the back pages or visit our website at www.valterra.com to see Valterra's Best Selling RV Accessories, recognized by RV'ers everywhere for making their RV experience a more enjoyable one. If you see something of interest, our products can be found at RV retailers throughout the U.S. and Canada.

Now, go out and enjoy that RV!!

Valterra Products, Inc.

George Grengs, President

WHO IS BILL BRYANT?

Bill and his late wife Bonnie were RV'ers for more than 45 years. Bill probably has camping in his blood. Before he was born, his parents traveled on their honeymoon by team and covered wagon to homestead in Wyoming. What a trip it was! His mom wrote the story for him years later. It was early spring. They rode through rain, snow, and dirt covered roads. The trip took weeks. Bill jokingly calls that the original RV trip! His mom called it something different.

Bill's first RV in 1957 was a used 15 ft. Oasis travel trailer, a major step up from the canvas tent they had used before. Rained out campouts, drove them "indoors". The Oasis had the latest things for camping luxury; a small ice box (not a refrigerator), a single propane gaslight, and a tank of fresh water (with a hand pump to get water to the single faucet). The water heater was a teakettle sitting on the stove.

There was no toilet, and the sink drained into a bucket strategically placed below the open drain hose, which extended through a hole in the floor, below the cabinets. To heat the trailer, you lit the oven and left the oven door open. We've come a long way in 40 + years!

Through those years Bill and Bonnie and their two sons moved up to larger trailers, with more room and more features. With the boys on their own, they bought their first motorhome in 1977. Together they wore out three motorhomes. Bill is well on his way to wearing out a fourth, traveling from Maine to California and from Canada to Key West. Most of BILL'S HINTS included in this book are based on personal experience (some rather painful) or from observations of others learning about their RV's the hard way. He won't tell you which of the "learning experiences" are his!

If you spend a little time reading the various sections of the book, paying special attention to BILL'S HINTS, he guarantees that you will get far more enjoyment and a lot less grief from YOUR trailer.

By the way, don't hesitate to ask your fellow campers for advice if you are uncertain about something. As a group they are fine folks, and helpful to the last degree. And one of the favorite topics at campground get-togethers is talking about how to get more fun out of your RV.

WHAT IS A TRAVEL TRAILER?

The Recreation Vehicle Industry Association (RVIA) defines a Travel Trailer as a trailer designed to be towed by a motorized vehicle (auto, van, or pick-up truck) which is designed to provide temporary living quarters for recreational, camping, or travel use, ranging from 12 to 35 feet in length, and towed by means of a bumper or frame hitch attached to the towing vehicle. I'm just going to use the term travel trailer, remembering that 5th wheels and tent trailers have their own characteristics.

SAFETY HINTS

Even though Recreation Vehicle manufacturers incorporate many safety features, improper operation can create dangerous conditions that every user should be aware of. Many of them will be covered in subsequent sections of Bill's Hints. In some cases, these hazards are the same as those that you face at home, but in other cases, you are doing things in an RV that you don't even DO at home. Take a few minutes to review the HINTS below. They can literally be lifesavers.

FIRE

{{ Fire in a confined space can be very serious or even fatal. When camping or while traveling, you may not have professional fire protection, so you must use extra care.

{{ Check your fire extinguisher for proper charge before every trip. If you can't check it, replace it annually. Make certain that everyone knows where it is stored.

{{ Make sure that you keep flammables away from the stove and oven when they are in use. The oven exhaust is to the rear of the burners. Keep that area clear when the oven is lit.

{{ NEVER travel with the stove, oven or water heater burners lit.

{{ NEVER refuel your vehicle with the engine running, or with refrigerator or water heater operating on propane (LPG) gas.

{{ ALWAYS shut off main valve when refilling the propane tank.

{{ NEVER carry containers of gasoline, propane, or other liquid flammables inside the RV, nor in the storage bins.

{{ When opening fuel lines (like when changing filters), make sure that you have good ventilation and that no open flames are present.

{{ Test your smoke and carbon monoxide detectors before every trip. Replace the batteries at least annually.

{{ Propane is highly flammable in concentrations of 2% to 10%.

FUMES

{{ CARBON MONOXIDE (CO) results from the incomplete burning of fuels that contain carbon (gasoline, natural gas, LPG, kerosene, diesel fuel, etc). Although you sometimes can smell unburned fuel in engine exhausts, the CO itself is tasteless and odorless.

{{ A CO detector is a must. Install one and test it regularly.

{{ In case of fire, remember that burning plastics produce toxic fumes.

{{ An optional LPG detector can detect flammable vapors. Some are built-in and automatically shut down the LPG system when flammable/explosive vapors are present in the coach. Others simply sound an alarm to warn you. If you don't have a built-in model, buy a portable model and use it.

{{ At the first hint of unexplained propane (LPG) fumes, vacate the trailer and turn off the main propane valve until the source is identified. Leave the doors open.

ELECTRIC SHOCK

{{ The electric power in a trailer is no different than the electricity that you use in your home. When used properly, electricity is safe. When used improperly, it can be dangerous. You must think about what you are doing

{{ ALWAYS test for proper polarity before plugging into a strange campground receptacle. Testers cost less than $6 and take only a minute to ensure that the polarity is correct If the polarity is wrong, don't plug in (contact your campground manager).

{{ Monitor campground voltage with an inexpensive meter. Voltages below 108 Volts can damage motors, such as air conditioners, through overheating. If you don't use a meter, and the power cord and/or the extension cable feels hot to the touch, you probably have a low voltage source. Then reduce the load on your electrical cords by reducing your load consumption or disconnect.

{{ If you use extension cords (always of the proper rating), make all connections to the trailer before finally plugging into the campground power. Then you won't expose yourself to "hot" connectors.

((Before plugging into the campground power be sure that the breakers are turned off, then after you plug in turn the breakers back on.

{{ If the ground is damp; don't handle power cables that are plugged in without rubber gloves, and make sure you wear dry, rubber-soled shoes.

{{ If circuit breakers repeatedly "pop" without an identifiable reason, leave them OFF until a qualified electrician has found and corrected the problem.

{{ NEVER use a two conductor (two bladed) extension cord in a trailer. (Be sure that all extension cords have three blades, two flat blades and one round blade, the round blade is your grounding connector).

FALLS

{{ The roof of a Travel Trailer can be up to 12 feet above the ground. A fall from that height would be just like falling off your roof at home; at the least, dangerous; maybe fatal.

{{ Get on the roof only when absolutely necessary. It will hold you, but there are no safety rails.

{{ Never wear hard-soled shoes on the roof.

{{ Never get on the roof if it has any moisture on it.

{{ Children should NEVER be allowed on the roof.

{{ The metal ladder rungs leading to the roof can be very slippery if they are wet Shoes with hard soles can cause you to slip. If you need to get on the roof for cleaning, use rubber sole shoes.

{{ If you need to use a ladder to reach some part of the trailer, use only a step ladder.

{{ Never stand on the top 2 steps of a ladder. If your ladder is too short, get a taller one. If you have to stretch, you are close to falling.

{{ Never lean a ladder against the side or front of the trailer. Trailer surfaces are very slick, and when your weight shifts to the top half of the ladder, the legs of the ladder can "kick out", dropping you to the ground via the bumper or other appendage. Real fun!

{{ Always check the position of an electric step before exiting a trailer. It's always possible that the master switch is OFF and the step will not extend when the door opens. ***Most new models extend the step even if the switch is OFF.***

WEIGHT RATINGS

In my book, understanding these three weight ratings will keep you out of trouble.

1. Gross VEHICLE Weight Rating is abbreviated GVWR. It describes the absolute maximum weight limit for any vehicle (trailer OR tow vehicle).

2. Gross AXLE Weight Rating is abbreviated GAWR. It describes the absolute maximum weight limit for each axle of a trailer. (An axle as used here has a wheel on each end.)

3. Gross COMBINED Weight Rating is abbreviated GCWR. It is defined for tow vehicles, and describes the absolute maximum weight limit of the TOW VEHICLE AND THE TRAILER, and includes the tow vehicle and everything in it AND the trailer and everything in it.

That's it! If you adhere to these limitations, install the proper hitch and trailer brakes, 95% of your serious problems will be avoided. If you violate any of these limitations, you are courting disastrous consequences for you and your family every time you hit the road.

BILL'S HINTS about WEIGHT RATINGS

<<Weight Ratings are established by the manufacturer and are very difficult for the owners to increase. Just installing larger tires doesn't do it!

<<Using passenger tires instead of trailer tires (which are stamped ST) lowers GVWR on your trailer to an unknown figure.

<<GVWR is valid only if tires are at the correct pressure.

<<Tow vehicles have both a GVWR and a GCWR and both must be adhered to.

<<GAWR limits presume equal side-to-side loading of the trailer. You must balance your load accordingly, especially if you are close to GVWR.

<<Towing with the tongue high (or low) can overload one of your trailer axles. Set your ball height to level the trailer when attached to the tow vehicle.

<<Tongue weight for conventional trailers should be about 10-15% of the gross weight. Remember low tongue weight causes fishtailing and control problems.

<<Don't tow a conventional travel trailer without a load-leveling hitch, including a sway control. Weight carrying hitches are not only uncomfortable, but can be dangerous at highway speeds.

TOW VEHICLES

The most important features of tow vehicles concern GVWR and GCWR, as previously discussed. It isn't necessary to buy the trailer first, but you MUST know how much it will weigh. In general, an automatic transmission will give you a higher GCWR. With an automatic you must have a transmission cooler. A larger than stock radiator is also recommended. Most suitable vehicles are offered with a "towing package."

BILL'S HINTS about TOW VEHICLES

{{ Match the tow vehicle to the towed trailer. (Assume trailer weight will be at GVWR).

{{ Regardless of the GCWR, the brakes on the tow vehicle are only adequate for the tow vehicle GVWR. This means that most trailers MUST have brakes to be safe.

{{ Don't tow a travel trailer with a vehicle that has a wheel base less than 90 inches. Rule of thumb: 100-inch wheelbase to pull a 20-foot trailer. Add 4 inches of wheelbase for every extra foot of trailer.

<<The further the hitch is behind the tow vehicle axles, the less stable the tow will be. This is why 5th Wheel trailers are so stable and why trucks with long beds sometimes don't work as well in pulling a conventional trailer.

<<Remember that all the "stuff" in the truck bed is included in calculating Gross Weight.

CONVENTIONAL HITCHES

Once you have chosen the tow vehicle, you must consider the hitch. 5th Wheel hitches are discussed in the 5th Wheel section, which follows.

The Equalizing Hitch, also called the Load Distributing Hitch, is by far the most popular category of hitch for towing a Travel Trailer. It is a special type of receiver hitch incorporating a set of tension bars that, when connected, causes a portion of the weight of the trailer to be shifted forward to all four wheels of the tow vehicle. Actually, when the tension bars are properly adjusted, the tongue weight is shifted both to the tow vehicle and to the main trailer axles, eliminating the sagging rear end common with weight carrying hitches. When not being used for towing, the bar/ball can be removed and stored, eliminating the nuisance of something extending behind the tow vehicle, and minimizing the effects of weather on the hitch and ball.

There are three sizes of balls in use (1 7/8", 2", and 2 5/16"). The two smaller balls are used on tent trailers and very small Travel Trailers. The 2 5/16" ball is used for most Travel Trailers. The trailer tongue coupler MUST BE THE SAME SIZE AS THE BALL. Equalizing hitch receivers and bars are quite heavy, as you might imagine, and together with the ball, establish the Class of the hitch. Spring bars must be matched to the GVWR of the Travel Trailer being towed. The RECEIVER portion of these frame hitches often carries two weight limitations, one for a weight-carrying hitch, and a much higher one for an equalizing hitch. I strongly recommend an equalizing hitch for all Travel Trailers.

Spring bars can be adjusted to handle a range of many different tensions, usually by changing the number of chain links attaching it to the trailer tongue. It is easy to find the proper tension to use through trial and error: just measure the front and rear bumper heights on the two vehicles before attaching the trailer, set the fully-loaded trailer on the ball, and then adjust the tension bars until both vehicle bumpers have been lowered by the same amount. Note the chain links used, and use this for your standard setup. It can be adjusted to compensate for major changes in trailer loads.

The spring bars provide several benefits: the sag at the hitch point will be eliminated, which in turn keeps your headlights properly aimed; the excess load on the tow vehicle rear springs is reduced and the steering geometry of the tow vehicle is left closer to normal. Note that a small part of the tongue weight ends up on the main trailer wheels, so be sure that you have the reserve axle capacity before you load them up even higher.

Some interesting equalizing hitches eliminate the ball completely. The flexibility needed is provided by a universal joint-type device that is a permanent part of the steel bar, and that mates to a permanent fixture on the trailer tongue.

Hitches are rated by Class, and include the hitch, ball, load leveling bars, and safety chains. The old saying about a chain being only as strong as its weakest link applies. All parts of the hitch system must be rated for the same (or higher) Class. Safety chains are required with every type of hitch, and must, of course, be heavy enough to restrain the trailer if the coupler comes off of the ball. A good hitch shop will install the correct chains, and will make certain that the connecting point on the tow vehicle is adequate for the job.

Hitch Classes

Class I	Gross Vehicle Weight Rating up to 2000 pounds.
Class II	Gross Vehicle Weight Rating up to 3500 pounds.
Class III	Gross Vehicle Weight Rating up to 5000 pounds.

Class IV Gross Vehicle Weight Rating up to 10000 pounds.

BILL'S HINTS about HITCHES

<<Ask around to find a good, reliable hitch shop, and follow their recommendations.

<<Hitches must be matched to the trailer GVWR.

<<Safety chains are required with all Hitch Classes. They should be long enough to permit turning, but short enough to prevent dragging on the road. If the chains drag, unhook them and twist them together a couple of turns before re-hooking them.

<<Cross safety chains beneath the hitch before attaching to the tow vehicle. That provides a "cradle" to support the trailer tongue if the coupler comes off the ball

<<Once you find the proper adjustment on spring bars (usually a link in a chain), mark it so you can make a hookup without re-measuring bumper heights.

<<The tow bar is held in the receiver by a heavy steel pin, and a spring clip. Carry a spare pin and clip.

<<Gusty winds and semi-trailers at highway speeds will be less bothersome if you have sway bars installed.

<<The hitch height should be such that the trailer is level when attached to the tow vehicle. This keeps the weight properly distributed to all trailer axles.

<<If your tongue weight is too low, the trailer will tend to "fish-tail" when towed at highway speeds.

5th WHEEL HITCHES AND TRAILERS

The principal difference in 5th Wheel Trailers is the hitch mechanism itself, and the specially configured trailer. The actual towing is somewhat easier (the sway goes away), and backing is easier because of the short coupling (close to the rear axle of the tow vehicle), but there is still a learning process. When backing a 5th Wheel, the trailer is not as quick to start turning as with a conventional trailer. Functionally, it is similar to other travel trailers and most features are the same. So let's explore the hitch.

The 5th Wheel hitch gives the 5th Wheel Trailer its name, and requires a specially adapted pickup (or larger) truck to mount it. Rather than presenting a conventional ball coupler to the tow vehicle, the 5th Wheel presents a "gooseneck" overhang, with a connector called a hitch pin. The hitch pin extends downward from the overhang (similar to the hitch on a commercial semi-trailer) looking very much like a huge upside-down nail with a large flat head. On almost all hitches, with the hitch latch both unlocked and unlatched, the truck is slowly backed into position so that the hitch pin slides into a slot in the hitch

where it automatically latches into place. The "head" of the nail prevents the hitch pin from rising up, while the hitch latch prevents it from exiting to the rear. You must then move the locking lever into the locked position, where it can be pinned or padlocked securely. With these steps complete, the trailer cannot pull free of the hitch mechanism. No safety chains are required.

There is a flat surface surrounding the hitch pin that rests on a similar flat surface that surrounds the slot in the truck hitch. The trailer is therefore constrained against any up or down, or back and forth motion, but it is free to swivel around the hitch pin with very little friction. Hence the name, 5th Wheel. Special Teflon disks are available to reduce friction between the surfaces without using a lot of grease. The mating surface on the truck is free to rock forward and backward, thereby permitting the necessary flexibility to travel through dips and uneven patches of road without damage to the hitch mechanism.

What makes a 5th Wheel trailer different?

- Must be towed by a truck of some type.
- Requires an appropriate (Gross Weight Rated) hitch bolted to the bed of the truck.
- Has an extremely heavy tongue weight.
- Tends to be heavier.
- MUST be supported on the front end by landing jacks before uncoupling from the truck.
- Tows superbly when properly mated to the right truck, because the hitch point is very close to the truck rear axle.
- Provides for very easy backing and turning by the tow vehicle.
- Has living space above the overhang, increasing the usable space inside.
- Provides less "bucking" than a conventional trailer because of the tongue weight and hitch point.
- Usually provides a space for a generator.
- May have a pair of electrically operated jacks for the front.
- Is somewhat easier to hook-up because the slot for the hitch pin is a shallow "V" and the driver is able to watch the hitch pin from a distance of less than 6 feet through the truck rear window.
- Is generally taller than conventional trailer.

When hitched to the truck, with jacks retracted, the trailer should be riding level. For trailers with slideouts, this may require adjusting of the hitch height in the truck bed because the hitch pin on the trailer may be higher, both the hitch mounts and the hitch pin supports are adjustable by several inches. Conversely, if the truck is a 4-wheel drive model, the bed of the truck (and the hitch) may be too high for the trailer, causing it to ride front end high. It may be necessary to reverse the springs on the trailer to raise the height enough to attain a level hookup. This, in turn, may require a new set of entrance steps to compensate for the higher floor height.

In order to hitch and unhitch a 5th Wheel trailer, the truck and trailer should be properly aligned. Remember that the hitch pin must exit through the slot directly in the rear of the 5th wheel. In addition, the truck and the trailer must be fairly level (side to side) or the hitch pin will bind, and it will be difficult (or impossible) to disconnect. Some hitch models have a "wobble mode" that lets the 5th wheel platform tilt from side to side, facilitating the hitch/unhitch process. This feature also helps when going through sharp dips, as when entering service stations on an angle. Without this feature, such a maneuver produces truly alarming noises from the hitch.

Get specific instructions from your dealer about the hitch pin latching/locking procedure. Put it on your check-off list, and double-check it each time the trailer is hooked up. A sample check-off list is located at

the end of this manual. There are a lot of trucks out there with a crumpled tailgate, caused by either pulling forward when leaving without checking that the hitch pin is latched, or by forgetting to lower the front trailer jacks before pulling forward when parking. If you fail to use a check-off list, you will become a member of this club.

TRAILER BRAKES

Tow vehicle brakes are adequate only for the tow vehicle's GVWR, NOT THE GCWR! Any Travel Trailer weighing more than 1500 pounds should have trailer brakes. Most states require them. Remember that trailer brakes are available for 2, 4, 6, and 8-wheel trailers.

Hydraulic types are particularly useful if the trailer is to be pulled by several different vehicles, but they cannot be independently applied by the driver. They must be disabled when backing up, since they are normally activated by the force applied to the coupler while the tow vehicle is braking. Backing applies a similar force to the coupler.

Electric brakes are generally activated by electro-magnets that are integral to the shoe/drum assembly. They provide braking when the tow vehicle brakes are activated, or when trailer brakes are applied independently. Electric brake controllers use several methods to translate tow vehicle braking action to current flow. Some brake controllers bring the trailer brakes on slowly, increasing the current flow over several seconds to the pre-set maximum. All electric types have a lever or sliding control, located conveniently to the driver that can be used to increase trailer braking, or to apply trailer brakes even when the tow vehicle brakes have not been applied.

All trailers equipped with brakes must have a special breakaway switch, activated by a small stainless steel cable that is attached to the tow vehicle. In the event the distance from the tow vehicle and the switch exceeds the cable length, the cable pulls a pin, allowing the spring-loaded activator to apply the trailer brakes. On electric brakes, the switch applies a direct connection to the 12V on-board battery, giving full braking action. The cable should be attached to the tow vehicle, not to the hitch/ball.

BILL'S HINTS about TRAILER BRAKES

<<Without trailer brakes, at highway speeds stopping distances will be greatly increased.

<<Without trailer brakes, if you brake hard in an emergency, you can expect to jack-knife, with a strong probability of overturning. Wet or frozen pavement almost guarantees it.

<<Once a jack-knife starts, it is very difficult to control, even with manually controlled brakes.

<<My personal rule is never to tow if there is ice on the road, regardless of trailer brakes.

<<Using tow vehicle brakes alone while making a turn greatly increases your chances for a jack-knife, since the trailer is trying to push the rear of the tow vehicle to the outside of the turn.

<<Applying trailer brakes manually will usually dampen a sway, and cause the trailer to follow the tow vehicle rather than to jack-knife.

<<Breakaway braking is a requirement for trailers with brakes. Test the switch regularly with electric brakes.

<<Use lower gears when descending long, steep hills. Even trailer brakes will fade out if overheated. Once they are gone, they are gone!

<<Routinely apply trailer brakes manually before applying tow vehicle brakes. This minimizes any initial tendency of the trailer to swerve.

<<Trailer brakes are NOT self-adjusting. Have them adjusted annually, or every 10,000 miles. Have the bearings serviced at the same time.

<<Have your magnets checked annually. Since they rub on the rotating disk, when applied, there is a certain amount of wear.

<<You can feel trailer brakes take hold when you manually activate them, but you cannot be sure that all wheels are activating. While parked, have an outside observer listen at each wheel while you apply trailer brakes. He/she should be able to hear the magnets on each wheel activate.

<<With electric trailer brakes, make sure that the controller is mounted in a convenient spot to give the driver quick access, with no fumbling.

<<Don't tap into tow vehicle ABS brake systems to control trailer brakes. The results are unpredictable.

TOWING SWING AND SWAY

The most unusual aspects of trailer towing involve swerve control. When a swerve starts, the natural instinct is to apply the tow vehicle brakes, but that is the WORST thing to do. Slowing down will help, but not by using tow vehicle brakes! Apply the trailer brakes independently until the swerve is controlled before starting to brake the tow vehicle. Unless the swerve is severe, the trailer brakes will correct it without any other action.

Uncontrolled sway leads to the most dangerous aspect of trailer towing –the jack-knife. There's a long list of causes for trailer sway including improper loading, low tire pressures, broken or weak springs, gusty winds, improper braking, lack of trailer brakes, no sway control on the hitch, and proximity to other large vehicles traveling at high speed. Excessive towing speeds aggravate all of these conditions. A good starting point is to always stay 10 MPH below the safe speed of an unencumbered vehicle.

An alert driver will anticipate sway condition, preventing over-corrections. A certain amount of sway is normal when towing a Travel Trailer, but it should be both slight and temporary. That's why you must stay alert. If you can predict a sway, you can deal with it quickly and safely. If you are not prepared for some degree of sway, your instincts will quite often cause you to do the wrong thing. You first must learn that a slight sway, that quickly corrects itself, is of no concern. This is part of the learning process, and should be practiced at lower speeds.

A well-matched tow vehicle and trailer will feel downright comfortable as you roll down the road, and you will be tempted to cruise at your normal highway speeds. Don't be misled! There are trailers overturned in the ditch, and there are trailers whizzing by you. They are the same guy! One has had a disaster; the other one is going to. What might be a simple sway at reasonable speeds can quickly become a severe, uncontrollable swerve at high speed. If you are in such a hurry to get to your destination, start earlier or don't pull a trailer. Take a plane.

BILL'S HINTS about SWING AND SWAY

<<When towing, reduce your speed at least 10 mph to improve controllability.

<<With or without wind, being overtaken by (or even meeting) a large semi can give you momentary handling problems. Over-reaction to the initial sway may aggravate the sway until it becomes severe.

<<Over-braking will cause the sway/swerve to develop into a major disaster.

<<Applying tow vehicle brakes hard while the trailer is in the middle of a swerve will almost guarantee a jack-knife and a rollover.

<<A touch of trailer brakes will stop most swerves quickly, and tow vehicle brakes can then be employed to further reduce road speed.

<<Large steering corrections to a small sway can lead to complete loss of control. Small steering corrections will often damp-out momentary swaying, with no further action required.

<<Always apply trailer brakes slightly before tow vehicle brakes.

<<A barely adequate tow vehicle and an over-loaded trailer lead to an unacceptable and dangerous combination.

<<Contrary to popular belief, even a 5th Wheel Trailer can jack-knife on slick pavement. If sway is frequent or constant, there is a good chance that you have a loading problem—probably tail heavy. But check your tire pressures and step back and look at the way your trailer is sitting.

<<Check your hitch and sway control adjustments. Always check the springs for damage if you drag the trailer through a large "chuckhole" at high speed.

WIRING

An important aspect of hitch installation is the wiring of the tow vehicle to provide a variety of functions to the Travel Trailer. I recommend that you let your hitch shop wire your tow vehicle to match your

trailer. I thought that I would lose my mind working on my first trailer, and it had only four wires. My problems were a corroded ground connection on the trailer, plus a "fiddler" who had switched wire colors between the tongue and the rear lights!

BILL'S HINTS about WIRING

<<If you happen to have a 12V refrigerator, you may need an ignition sensing wire. Some trailers even have backup lights, in addition to those mentioned. A six or seven wire connector may be required.

<<Travel Trailer lights are "two wire" systems, using the same bulb element for brake lights and turn indicators. Many newer tow vehicles use the European system (separate stop lights and turn indicators). There are inexpensive converters available to make the two systems compatible. If your tow vehicle has the new system, make sure that you use a converter.

MIRRORS

Trailer towing mirrors are absolutely essential for safely towing trailers, and are required in most states. They must be mounted on both sides, extending so as to give the driver a look at what's behind the trailer. For this they must project beyond the extreme edges of the Travel Trailer.

BILL'S HINTS about MIRRORS

<<Mirrors have to be stable enough to give the driver a clear view of what's back there, and that requires firm mounting and bracing.

<<Mirrors should not be high enough to interfere with the forward field of vision, so they should be mounted below driver eye level.

<<Mount mirrors somewhere near the leading edge of the driver's door. If they are mounted too far forward, the field of view becomes too narrow to be useful in backing.

<<Small convex "spot" mirrors can be added to expand your view.

TRANSMISSION COOLERS

Transmission coolers are necessary for tow vehicles with automatic transmissions. It's safe to say that most automatic transmission failures are caused by excess heat. There is a transmission oil cooler already built into the tow vehicle's radiator, but that is only adequate for the tow vehicle itself. Extra

transmission coolers are connected in series with the original cooler, usually between the standard cooler and the return fluid line.

BILL'S HINTS about TRANSMISSION COOLERS

<<Coolers come in a variety of sizes, and should be matched to the GCWR of your tow vehicle.

<<Don't tow without one, and don't economize when you buy one.

<<If your automatic transmission fluid ever reaches 300 degrees Fahrenheit, it must be changed as soon as possible to prevent further transmission damage.

<<For temperatures above 180 degrees, every 20-degree increase in temperature halves transmission fluid life.

<<Without adequate cooling, your first indication of fluid failure may be complete transmission failure.

<<If you suspect overheating, "sniff" a drop from the dipstick. Fluid that has been overheated will look dark and smell "burnt." Change it.

TOW VEHICLE HOOK-UP

It is very easy to become careless about hitching up your Travel Trailer. You may do it more than once a day when traveling and you tend to "look without seeing" and that could be very dangerous. Problems that occur with the hitch/trailer may not be apparent until they become major. A lost wheel or an uncoupled hitch could easily total your trailer, as well as your tow vehicle.

You should develop a "standard" procedure for hooking up your Travel Trailer. There are several simple steps, but they are all important. When you have locked the coupler on the ball, remove the wheel from the tongue jack. It is important to maximize the road clearance of the jack. PUT THE WHEEL IN YOUR STANDARD STORAGE SPACE! You'll need it again some time. Double check each step, using your HOOKUP CHECKLIST located in the back of this manual. If you are about to tow, make sure that the inside of the trailer is properly stowed. Loose items typically shift FORWARD or to the side in turns. If you have a front gravel guard, make sure that it is lowered and properly secured. Review your TRAVEL CHECKLIST; lock all doors, store the steps, awning is in, gas is off and you're ready to take off!

BILL'S HINTS about HOOKING UP

<<Always use a hookup checklist like the one in the back of this book.

<<When you are ready to hook up, check that the ball size is right on the hitch bar, and that it is lubed.

<<Always keep trailer wheels chocked until the coupler is locked onto the ball.

<<When backing up to the trailer, an outside helper is a big help. For safety's sake, use hands-free radios.

<<Heavy articles that shift can cause unexpected handling problems or cause suspension failures.

<<Within the first 50 miles, make a brief stop and recheck the hitch, ball, safety chains, tires, and the lug nuts for proper torque. If you find any lug nuts that move, recheck after the next 50 miles of towing.

<<At every fuel or rest stop, recheck the turn indicators, and from behind, visually check for any out-of-level appearance of the trailer. If one side appears lower, you either have a loading problem or a broken spring. Proceed at low speed until it has been checked, or call for a tow if necessary.

<<If your safety chains drag on the pavement, unhook them and twist them together a couple of times and reconnect. This will remove the slack and stop the chains from dragging. Make sure that you don't overdo it or they will cause problems when turning.

<<Try to have the trailer and tow vehicle lined up before hitching or unhitching. Otherwise, you may have problems setting or releasing the tension bars. You may not be able to get the coupler off the ball if you are too far out of alignment or level.

DRIVING

Almost everyone is capable of towing a Travel Trailer. However, a few adjustments in driving habits are required to allow for slower acceleration, increased stopping distances, reduced maneuverability, and most of all, decreased visibility to the sides and rear. Travel Trailers fit comfortable into the marked traffic lanes on US and Interstate highways. Very narrow roads, with shoulders in poor condition, are best tackled only after some experience in towing the trailer.

BILL'S HINTS about DRIVING

<<An unused portion of a large parking lot makes an excellent place to get acquainted with your Travel Trailer.

<<Watch your mirrors to see how the trailer acts when you make various turns.

<<Practice backing up in an open parking lot using the marked parking spaces as a guide. Try centering the trailer between the lines. Use your mirrors to make your adjustments.

<<When backing, a common rule of thumb is to place your hands at the bottom of the steering wheel and turn the wheel the way you want the TRAILER to go.

<<Make small corrections when backing, and watch for the effect.

<<When there are other obstacles, don't give all of your concentration to the trailer; you must also watch the front fenders of your tow vehicle.

<<Have someone outside to help you watch. Two-way, hands-free radios help.

<<When you make a turn, particularly a sharp turn, the trailer will "cut the corner" to some degree. The trailer wheels will not track exactly where the tow vehicle wheels went. You need to know how much to allow for this phenomenon, and nobody can tell you what that amount is. Practice will teach you what kind of allowances to make when turning in traffic and in close quarters.

<<If possible, have someone else make sharp turns at low speed while you stand outside and observe the actions of the trailer.

<<Apply what you have learned by turning past bricks or boards placed on the pavement, trying to avoid hitting them with the trailer wheels.

<<When the tow vehicle turns to the right, the trailer tongue's first action is to move to the left (and vice versa). This will hardly be noticed when towing with "bob-tailed" mini-van, but can be very pronounced when towing with a vehicle with a hitch far behind the rear axle. If you are not conscious of the potential, you will sooner or later come to grief. Notice the dented front corners of other trailers, and you will see what I mean.

<<You must be conscious of overhead obstructions because of the trailer height. Measure your trailer height in advance so that when you see clearances posted, you will know if you can safely proceed.

<<Above all else, keep your speed down to maintain good control.

<<Remember the bad habits of poor drivers, and drive defensively.

<<Recognize that commuters and other poor drivers will do ANYTHING to avoid getting behind a Recreational Vehicle. Most cars at intersections WILL pull in front of you.

<<Avoid abrupt, unexpected changes in speed or position.

<<Know (by checking mirrors regularly) where other vehicles in your vicinity are, and what they are doing.

<<Drive in the right hand lane on four-lane roads, except for passing and when making room for vehicles merging from on-ramps.

<<Change lanes only when there is plenty of room and time. Signal lane changes and intentions well in advance.

<<Use on-ramps and acceleration lanes to build up speed for merging.

<<Be PATIENT, PATIENT, PATIENT!

<<When descending steep grades, don't let your speed build up. Shift to a lower gear range to let your engine keep your speed down. Diesel engines are less effective for this, unless they have some form of exhaust brake.

<<Don't keep your foot on the brakes to keep the speed down, they will overheat and become ineffective when you need them most.

<<When approaching a red signal, slow down, and try to catch the signal after it has turned green. This will save you fuel and help you keep up with traffic.

<<Make allowances for your increased wheel base/length by making wider turns. At intersections, delay the start of your turn until you know that your trailer wheels will clear the corner curbing. Avoid high speed turns.

<<When making a right turn from the right-hand lane you must make a "wide" turn, just like the commercial trucks do. This may cause you to turn into the inside lane of a four-lane road, or into the ONCOMING lane of a two-lane road. Obviously, sharp right turns must be carefully planned and executed. Left turns are generally easier, since you want to turn to the far lane anyway.

<<Above all else, SLOW DOWN. If you are in a hurry, take a plane.

There is much more to driving than what I have covered, but mainly you will need practice. If you are really uncomfortable about your driving, check with your RV dealer for someone in your area who conducts driving seminars or runs an RV school.

SETTING UP

Try to arrive at your campground before dark, at least on your first few trips. Picking a suitable spot and setting up in the dark is at least 10 times as difficult as in daylight. Features you are looking for are: level, access, length, shade, proximity of other sites, tables and grills, convenience of public showers, and other priorities that you will establish. In the dark, locating these is next to impossible. So is backing into a site in the dark. Your observer MUST have a strong light, and a good radio link is a MUST.

Before backing into a campsite, test the campground electric receptacle (discussed earlier). You don't want to wrestle with backing and leveling only to find that the power is bad. Position the trailer in the site approximately where you want it. If you have slideouts, check for obstacles that may be in the way and check the side-to-side level. If necessary, pull forward enough to place your boards where the wheels on the low side will be. Back up until all wheels on that side are fully supported. When you are satisfied with the side-to-side level, CHOCK THE WHEELS TO PREVENT THE TRAILER FROM MOVING. Install the jack wheel, release the torsion bars, and raise the coupler from the ball, remove chains, breakaway cable, and electric pigtail, and slowly move the tow vehicle forward. With a 5th Wheel, use the front trailer jacks to take the weight off the hitch, (note the position for hooking up later) unlock and

release the hitch, disconnect the electrical pigtail and breakaway cables, and slowly move the tow vehicle forward.

Lower the front of the trailer until the trailer is slightly front-end low. Position rear jacks and raise the front until the trailer is level front to back, and then place the front jacks in position. Plug into campground power, pull out the steps, and connect the water and sewer hoses. If you have slideouts, this is the time to extend them out. Then turn on the propane tanks and light the water heater. Raise the TV antenna, fix yourself a Cool One, and relax!

Now, let's go inside and see how things work.

THE ENTRANCE DOOR

Keeping the door closed is always a concern, but on a travel trailer in motion, it is critical. With the unknown twisting of a trailer being towed, a door that is not firmly closed can spring open without warning. Even though the hinges are installed to cause the wind to push the door closed, there will still be times that the door will "flap" in the wind, or even swing open in a tight turn. Obviously, any time the door is open while the vehicle is in motion, there is a chance that something of value will fly out the door.

There are other considerations for not only closing, but also locking the trailer doors while towing. In town driving, and in parking lots, while the vehicle pauses or stops, there is an opportunity for someone to enter the trailer through an unlocked door.

BILL'S HINTS about THE ENTRANCE DOOR

<<Always lock the door from the inside when retiring for the night.

<<The striker plate provides for a two dimensional adjustment, but if you loosen it, make certain that it is properly tightened when you are done.

<<Keep the lock operating smoothly by spraying silicone or WD 40 in the keyhole twice a year.

<<A small amount of paraffin on the striker plate will make the closing smoother.

THE ENTRANCE STEP

Most trailers depend on a manual step that stows flush with the trailer when the outer edge is lifted and the step is pushed inward. Trailers with slideouts usually have a two or three-level step, since the trailer floor and slideout usually must be high enough to clear the wheels. A manual step should be easy to operate, but it you forget and leave it extended, you are almost certain to redesign it (or tear it off) on a

narrow bridge or when parking too close to a high curb. It can also spoil the day for any pedestrian who walks too close to the roadway. Make sure that the step is on your Towing Checklist and make sure that you use your Checklist every time!

For those with an electric step, there is a master control switch located adjacent to the door. With this switch in the "ON" position, a spring-loaded switch similar to the courtesy light on a car door controls the step position. When the trailer door is opened, the step extends to the DOWN position (watch your shins). When the door closes, the step RETRACTS. The automatic mode gets to be a nuisance when you are camped, or while loading for a trip. Turning the master switch to the "OFF" position while the step is DOWN disables the door switch, and the step will stay in the DOWN position, whether the trailer door is open or closed.

Don't forget to turn the master control switch to the "ON" position before you take off. On some models, if you leave the master switch off, your step may stay extended and can be easily damaged.

Don't forget to turn the master control switch to the "ON" position before you take off. If you leave the master switch off, your step will stay extended and can be easily damaged.

Oh, yes—there is a courtesy light below the electric step that comes on whenever the master switch is "ON" and the step is down. This is convenient at night, but it causes a constant drain on your batteries unless you are plugged into campground power. (If your battery goes dead, there is no way to get the step to manually retract.) If your trailer doesn't have a power step, I can't think of a more valuable add-on.

BILL'S HINTS about THE ENTRANCE STEP

<<Two or three times a year, put a few drops of oil on the friction points on both sides of the step to keep it operating smoothly. Be careful not to get oil on the non-skid material on the step(s).

<<Find out where the fuse for the electric step is located.

<<An electric step can be wired to automatically retract when the tow vehicle ignition is turned on, even if the master switch is still off, but this requires a special wire to the tow vehicle.

<<A bad ground connection on an electric step will keep the step from extending or retracting. The ground connection is usually immediately adjacent to the step itself.

THE MASTER CONTROL PANEL

The Master Control Panel (MCP) provides a lot of information. It is usually conveniently located in the kitchen area, and consists of a series of labeled switches, most with one or more LED lights. The lights report the status of the tank or device when the appropriate switch is activated. Some of the switches are spring loaded, returning to the OFF position when released. Others are 2 or 3 position switches that remain in the last position selected. Some of the newer MCPs have a single momentary TEST switch that

performs most of the tests discussed below. There is nothing standard about the many MCP's installed in RVs, but they share most of the following functions:

Fresh Water Supply	(momentary)
Fresh Water Pump	(on/off)
Gray Water Holding Tank	(momentary)
Black Water Holding Tank	(momentary)
Water Heater	(on/off) (electric or gas)
Propane Supply	(momentary)
Trailer Battery Condition	(momentary)
Exhaust Fan Switch	(Hi/off/low)

Occasionally you will find the generator start/stop switch on or nearby the MCP.

DEFINITIONS:

Some of the terms above may be new to you, and will be explained below. You may find some of the switches located independently, but they serve the same function.

Fresh Water Supply. This switch shows you through illuminated LED lights the approximate (1/4, 1/2, 3/4, Full) quantity of water stored in your fresh water tank. The tank is gravity filled through an external fitting.

Gray Water Holding Tank. Gray water refers to the waste water from your kitchen sink, bathroom sink, and shower. The holding tank is beneath the living area of the RV; held for later disposal. LED lights show status of the tank when the switch is pressed (1/4, 1/2, 3/4, Full).

Black Water Holding Tank. Black water refers to the combination of human waste, chemicals, and water flushed through the commode. Black water is held in a separate holding tank for later disposal. LED lights show status of the tank when the switch is pressed (1/4, 1/2, 3/4, Full). The switches for the holding tanks will probably be labeled Tank 1 and Tank 2. If they are not labeled it is important to establish which is which. Check your owner's manual.

Water Heater. When it is propane fueled, the water heater switch has a companion light (sometimes the switch itself has an embedded light) that illuminates briefly when the switch is turned ON. If the propane burner ignites, the light goes out. If the propane fails to ignite (or later goes out) the water heater light will remain ON. When the water heater is working normally, the light is NOT on, even though the switch IS. Many newer units allow you to switch from propane to AC, when 110V AC power is available.

Propane Supply. The propane switch, like the water tank switch, shows approximate quantities of propane in the tank by illuminating lights when the switch is pressed (1/4, 1/2, 3/4, Full). The propane is the liquefied gas stored in a supply tank accessible only from outside the RV. There is also a hard-to-read manual gauge mounted on the tank itself.

Batteries. There is a dedicated battery(ies) that supplies 12V to all lights, fans, pumps, and other devices used in the living space of a trailer. Activating the switch shows the general status of the battery charge; green = high level of charge, amber = partly discharged, red = almost completely discharged. If the tow

vehicle engine is running, or the batteries are being charged from any source, the test is meaningless. However, if you are "dry camped" with no external power, you can use the test switch to avoid the unexpected depletion of your batteries.

Exhaust Fan. A two-speed fan is located in the hood above the cooking stove. There are usually no lights associated with this switch, but you don't need one! You will hear it running if it is on. This is a three-position switch, with center OFF.

Dry Camping. Self contained camping without water, sewer and/or electric hookups.

MANAGING YOUR CONSUMABLES

When you are at home, managing your utilities is limited to getting the kids to turn off the lights, and fixing faucets that are dripping. Beyond that, your management comes down to paying the bills. That changes when you move into your trailer for an outing. All of your utilities become consumables and you must make them last: fresh water, battery, propane, waste water storage, and refrigeration.

When you are traveling or parked where replenishment is not available, you will have to conserve some or all of the above to keep your RV fully functional. It isn't as scary as it sounds, but it does require that you have a good understanding about how these systems operate. Your Master Control Panel becomes your information center. You can quickly assess the status of most of your consumables (except for gasoline) from the indications given there. If you seldom stay where hookups are available, you must practice strict conservation to keep everything working. Because your consumables are inter-related, they will be explained as a group in the next few pages.

FRESH WATER

There are only two sources of water in your trailer: water pumped from the fresh water tank that you previously filled; or water delivered from a campground faucet through your hose. You can gravity-fill your tank through a spout in the side of your trailer. It normally has a locked cover to prevent anyone from tampering with your water supply. Monitor your Master Control Panel while filling. Since water weighs 8 lbs/gal, carry no more than you think you need. Experience will show you how long 1/2 tank will last. If you are careless, it won't last a day. If you are careful, it will last 4 or 5 days. Always use a special tasteless, non-toxic white or blue coiled hose, available at all RV stores. Keep it scrupulously clean, and NEVER use it for waste water applications.

The water pump is a demand type device, running only as required to maintain pressure, drawing water from the fresh water tank. If a faucet is open when the switch is turned on, the pump will run until the supply is exhausted (or until you turn the faucet off). There is a light that shows that the SWITCH is ON. It does not indicate that the PUMP is (or is not) running. The pump runs on 12V DC. There may be an additional switch in the bathroom. Either one, when turned on, will energize the pump.

BILL'S HINTS about FRESH WATER

{{ Keep everything about your water supply CLEAN.

<<For your water supply hose most RV stores sell a threaded plug to close your external pressure fitting. This keeps out dirt and bugs. If you don't have one, get one and use it.

<<Use an adapter with a flexible tube to facilitate gravity filling. Keep it in a clean plastic bag when not in use. These adapters are available at any RV store.

<<When done with your hose, coil it up and screw the ends together tightly to keep out bugs and dirt while it is stored. Flush it thoroughly before use.

<<While parked where there is a good source of water, you may choose to connect directly to that source through your pressure fitting. This fitting includes a simple one-way valve that lets water enter your distribution system but prevents losing water when the hose is disconnected and your pump is again turned on. Water entering through the pressure fitting will NOT automatically refill your fresh water tank, unless you have a special manually operated diverter valve that makes this possible.

<<If your water pump runs a few strokes and then stops, only to repeat the sequence a few minutes later, you probably have a dripping faucet or a leak. In addition to all faucets, check the pressure fitting for a drip and the water heater drain plug for leaks. If no leaks are found, you probably have a malfunctioning pump pressure cutoff switch.

<<Your internal water system is rated for only about 50 pounds of water pressure. Unless you are certain that you have a pressure regulator built-in, always add one to your hose before connecting it to your pressure fitting. Install it on the water source end of your hose.

<<Always turn your pump OFF before pressurizing the system with a hose from an external source. Use only a special hose that is safe to leave pressurized.

<<Carry a minimum of two 25' hoses. Not all spigots are handy to your parking spot, but a 50 footer is a nuisance when you are parked close to the faucet.

<<Always TASTE water before adding to your fresh water tank from an unfamiliar source. It's a lot easier to keep bad water out than to GET it out.

<<If you want to maximize your on-board water supply, fill your water heater before topping off your storage tank. This is needed only if the water heater tank has been emptied.

<<Your fresh water tank (full) may contain 30 or 40 gallons of water. While that sounds like a lot, at home you probably use several HUNDRED gallons a day. Obviously, you will have to learn new habits or buy a very long hose, so you can stay connected while you travel.

<<There is a double purpose to saving water. In addition to the limited supply, remember that everything that goes down any drain ends up in one of your holding tanks. And you can't just open those tanks to drain out on the ground. That is not only unsanitary, but in most places, illegal.

<<Showers are water wasters but they don't have to be. Most trailer showers have "telephone" type showerheads (on flexible hoses) with a built in shut-off valve.

<<Adjust your water temperature, divert it to the shower, then turn water on and off at the showerhead. Practice the Navy way – wet down; soap up; rinse off. Use just enough water to wet down; then shut it off. Soap up your suds and scrub as required. Quickly rinse off.

<<Wash your dishes in the smallest container practical. Using only as much soap as needed minimizes rinsing. Do NOT rinse by using a running stream of water. Use a second container to rinse. This water can then be carried outside to irrigate trees or plants if the park allows, saving your holding tank capacity. (Always check with the RV Park before discharging any gray water).

<<When brushing your teeth, do not let the water run. Use a small paper cup of water to wet and rinse your brush. Refill to rinse your mouth.

<<Flush stool only long enough to carry away waste material. Keep a toilet bowl brush handy to help clean the bowl.

<<Children have a hard time leaning how to conserve water (and so do some adults). Supervise them carefully until they have learned how to do it.

BATTERY POWER

The trailer batteries (usually two) operate interior lights, blowers, fans and pumps, and are charged when the tow vehicle engine is running.

When appropriate power is being provided, there is a small battery charger that converts 110V AC power (from whatever source) to 12V DC, charging the batteries, while at the same time supplying the trailer with 12V DC power. There are two sources of 110V AC power: from the auxiliary generator and from the power cable that can be plugged into an appropriate external receptacle. Both sources will be discussed in detail in a later section. The battery charger/power converter is always activated when 110V AC power is present.

The second source of battery charging is the tow vehicle engine alternator. With the proper trailer connector, when the engine is running, the batteries are being charged. This is several times faster than charging with the power converter. If you regularly deplete the batteries, you should ensure that they are "deep discharge" batteries with large capacities. Conventional batteries are very short-lived if they are repeatedly discharged. Two six volt batteries connected in series will give you 12 volts, but with more capacity than two 12 volt batteries in parallel, because the internal plate area is much larger.

BILL'S HINTS about BATTERY POWER

<<The biggest single load on the batteries is the gas furnace blower. Try to hookup, or run your generator if you are using the furnace heavily. Even then the built-in charger may not keep up.

<<Keep all battery terminals clean, bright, and tight. Check battery water level at least monthly if the RV is connected to a 110V source. The power panel is supposed to prevent overcharging of the batteries, but if it fails to do so, you can burn up the batteries. If you need to add water regularly, you are probably overcharging.

<<When adding water to batteries, use distilled water if possible.

<<Clean battery tops regularly with baking soda in water. Do not let soda water get into the cells.

<<The power converter panel contains circuit breakers for 110V AC and fuses for 12V DC circuits. It also has the built-in battery charger, but its capacity is limited.

<<If "dry camping" (no hookups) the auxiliary generator should be run for several hours whenever your battery test switch (on the Master Control Panel) shows an amber light. The small amount of gasoline used will ensure that your batteries stay charged. A separate 20-30-amp charger, powered by the generator and connected directly to the batteries will do the job faster.

<<When dry camping, do not leave lights on unnecessarily. Make certain that the step is down and the step control switch is OFF.

<<Always keep your batteries fully charged in freezing weather. Battery voltage drops rapidly when used in cold weather. A low battery is susceptible to rupture when frozen.

<<Overcharging can destroy batteries. Battery disconnect switches can be installed to temporarily remove individual batteries from the charging system. These switches permit leaving the RV plugged in to 110V for refrigeration, microwave, coffee makers, air conditioning, etc. Short camping trips are not a problem, but long-term storage can be.

<<The trailer batteries power numerous devices even when the RV is stored. Some have ON/OFF switches; others do not. Turn off all switches. Pulling fuses on the fuse panels for those that do not have switches will prevent depletion of these batteries.

<<When your RV is stored, the Vehicle battery will slowly discharge because of clocks and other devices that are always powered. You might want to disconnect the Vehicle battery.

FUSES AND BULBS

Trailer fuses and circuit breakers for original equipment are normally located in the power distribution panel. Add-on accessory fuses may be located in unusual places. Note where they are and what styles are used. The very nature of trailers, with various add-on options, makes it difficult to find a blown fuse in the dark and in the rain. When else would you have a problem? Some critical fuses are fresh water pump, auxiliary generator, electric step, and propane furnace blowers.

Make sure that you have identified all of the essential fuses on your trailer. Label them if you can. At least, make a written record for yourself. Carry a good supply of the sizes and styles of spare light bulbs for all of your inside and outside lights, as well as the type fuses used in your trailer.

PROPANE

Propane is a liquefied petroleum gas (LPG), stored under pressure in a ventilated external tank on your trailer. Through permanently installed piping, propane is furnished to the refrigerator, water heater, stove, oven, built-in furnace, and in some cases, to the auxiliary generator. There is a manual shut-off valve and a direct reading gauge on the propane storage tank. In some trailers there is a vapor detector inside the trailer that cuts off the propane electronically while sounding an alarm in the trailer. The vapor detector will activate on propane fumes, gasoline fumes, hair spray, and some after shave lotions and perfumes. It's a great safety device, but it can be very frustrating, because as long as it “thinks" there are dangerous fumes around, the propane is shut off at the tank. Keep a fan handy to clear the area around the sensor if it shuts down on a false alarm. By itself, it can take quite a while. If an alarm sounds without an obvious reason, do not flip any switches. Get outside immediately. Leave the door open, and turn off the propane at the tank. Re-enter only after all LPG fumes are gone.

Managing your propane is very straightforward. Refill it whenever the level reaches 1/4 or whenever you are planning cold weather operation (heaters use a lot of propane), or dry camping (especially if you have a propane fueled auxiliary generator). All other uses of propane are moderate and you will find you can operate for extended periods on a full tank.

BILL'S HINTS about PROPANE

{{ All flames, such as the refrigerator and oven pilot light, should be turned off before refilling either the RV gasoline tank or the propane tank itself.

{{ If you smell propane at any time (except briefly while lighting the cook-stove), vacate the coach and turn propane off at the tank until the source is known. Leave doors open.

{{ There is a small valve (sometimes called the 20% valve) that should be left open while the tank is being filled. Stop the filling when liquid fuel starts spraying from this valve: the tank is full. This provides a safety expansion of 20% to protect the tank (and you) from increased pressures caused by sunlight on the tank(s).

<<In extremely low temperatures, propane vapor pressure may be so low that flames cannot be kept lit. Check with suppliers about minimum usable temperatures and the use of electric tank warmers, if you are going to operate in severe conditions.

<<If your refrigerator doesn't have a 12V capability, propane is critical to maintaining refrigeration while driving. The only other source of power for refrigeration would be running the auxiliary generator, which provides 110V AC.

<<In general, your refrigerator will be colder when operating on propane.

<<Many private campgrounds sell propane. Others have sources that can deliver propane to your campsite. Check before you park if you know you need propane.

<<Most state parks do not sell propane. National campground guides usually contain at least a partial list of propane service centers.

<<Propane is unavailable within some city limits. Your best bet is to inquire at your campground to find a source.

<<Unless you are using your oven a lot, leave the pilot light turned off when you are not cooking. It uses a surprising amount of propane.

REFRIGERATION

Most people would not consider refrigeration a consumable, but I list it that way because, without it, the RV doesn't function very well. And, of course, getting refrigeration DOES deplete other consumables. Early RV refrigerators used propane gas for fuel, which was a great improvement over the simple icebox. A few years later the capability was added to operate the refrigerator on gas **or** 110V electricity. The user has a manual switch to select the mode. Later models automatically shift to 110V when available.

You may wonder how burning gas or running an electric heater can cause your ice to freeze and your food to stay cold. There is a sealed evaporator unit on the RV refrigerator in which fluid/gases are circulated using thermal heat exchange principles. Either a gas flame or an electric heater adds heat. The mixture is cooled by circulation up the back of the refrigerator. When these gases condense inside the box, heat is absorbed from the contents. Of course, the process is somewhat more complex than this, but you get the idea. The process is slow, but is extremely efficient and efficiency is the name of the game in RVing, remember? Once the box is cooled down, it requires a very small amount of heat to keep the process going.

Since heat exchangers work on the DIFFERENCE in temperatures in the two media, the amount of cooling is directly related to outside air temperature. At 100 degrees in the shade your box may only be able to hold a 50/60-degree temperature. It will work better while traveling because of the increased airflow around the cooling unit. When stopped, opening the external access vent door (which is at the bottom) increases airflow. An electric fan can be blown into the lower vent to force an increased airflow. Most times the unit works fine without heroic measures, but you will find that in hotter weather you may have to move the dial to a colder position to maintain the desired temperature inside the box. In cool weather you will find your eggs and lettuce frozen if you forget to move the thermostat to a warmer position. A small battery-powered fan inside the refrigerator will help prevent the concentration of cold air at the bottom (where the lettuce is). They are sold at all RV stores.

In some models, there is a third type of heater built into the heater section - 12V DC. This heater can only be used with the tow vehicle engine running, enabling the excess capacity of the engine alternator to be used to run the refrigerator. The control board for a three-way RV refrigerator uses logic to control the heat source. If the switch on the refrigerator is ON, the following logic is used:

• If 110V is available, it will be used.
• If no 110V is available, check tow vehicle ignition switch.
• If ignition is ON, the 12V DC heater will be used.
• If tow vehicle ignition is OFF, the propane burner will be used.

When you shut down the tow vehicle engine, the refrigerator, which has been running on 12V, goes into a delay mode. The propane is supposed to remain off, giving you time to refuel without a fire hazard. But you can't always control how long it will take to refuel, and if the delay period expires while you are refueling, **THE PROPANE BURNER WILL COME ON**.

Regardless of your refrigerator type, before you pull into the gas pump area, **TURN *OFF* THE REFRIGERATOR, STOVE, WATER HEATER, and FURNACE.**

After you have pulled clear of the gas pumps, turn the refrigerator back ON and the logic board will choose the appropriate mode of operation.

If the 12V heating element burns out, the computer still senses that the ignition switch is ON. The computer will prevent the propane from taking over while you drive, which is not good. You need to have the refrigerator fixed. In the meantime you have food that will spoil if not refrigerated. If you want to save your food this is what you need to do.

Remembering that the computer prefers 110V AC most of all:

(1) You can plug into an external power source and it will start operating on 110V, but then you can't get to a repair shop.
(2) You can run your auxiliary generator to provide 110V, but you just might be days from getting a repair made.
(3) Before you have a problem, search the back of the refrigerator through the outside access door to identify the ignition sensing wire. It will be labeled IGN or IGN LOCK. If you can't identify this wire, ask your dealer's mechanic to point it out to you. Mark it with a strip of tape for future reference. If you disconnect this wire and cover the bare end with tape, guess what? The computer doesn't know that the vehicle ignition is ON, so it lights the propane. Now you have a 2-way refrigerator, 110V AC or Propane. Whenever you get the 12V heater replaced, have them reconnect the IGN wire.

Now I've spent a lot of time on the refrigerator, but few things are as urgent as loss of refrigeration. Understanding how it works lets you make intelligent decisions about alternatives available to you.

By the way, you will find that most refrigerators installed today are the old reliable two-way propane/AC electric models. Some don’t even have a temperature dial. You can force propane operation by way of a switch on the refrigerator control panel. The refrigerator really uses only a small amount of propane, anyway.

BILL'S HINTS about REFRIGERATION

<<Above all else, your refrigerator MUST be fairly level to operate properly.

<<Before your first trip, level your trailer (using jacks or blocks of wood) so that the freezer SHELF is as level as you can get it both front-to-rear, and side-to-side. Position your level inside the refrigerator. Once you're sure the refrigerator is level you can remove the bubble level from the refrigerator and find a location outside the refrigerator (or the trailer) that is both level and convenient for permanent installation. Make sure the bubbles are absolutely centered before you permanently fasten them down. After that, you can always level your trailer while parking without opening the refrigerator doors.

<<If your 110V heater burns out, just unplug the 110V cord at the rear of the refrigerator (accessible from outside). The computer, which is powered by 12V, will switch you to propane.

<<If you have trouble getting your propane burner to light (or stay lit) after long storage, clean the burner with a thin bottle brush to get rid of rust flakes and carbon particles that are blocking the orifice.

<<If the burner doesn't light, or blows out, the gas control will automatically shut off the propane flow.

<<There are usually mechanical locks for the freezer and main refrigerator doors. Use them always, and make sure they are on your check-off list before leaving camp. Without the locks both doors will fly open on bumpy roads and in hard turns.

<<If you smell ammonia, either inside or outside the trailer, especially around the refrigerator, you may have developed a leak in the sealed cooling loop. Monitor your temperatures carefully. It is a major problem to service a leaking unit.

<<If you are not getting the cooling that you expect, check the vent at roofline for birds' nests, or other obstructions.

<<Long periods of storage can cause problems for RV refrigerators. It's possible for chemical contents of the cooling unit to settle out and not mix when the refrigerator is started. If at all possible, run the refrigerator for 3 days once a month. Use either 110V or propane. Manufacturers say that on their new units this isn't necessary, but it can't hurt.

<<Very few campsites are actually level. Without leveling jacks, you must carry short lengths of 2"x6" boards (or commercial wheel lifts) in order to obtain proper level while camped. Operating the refrigerator for long periods while out of level can stop the evaporation process. It takes care of itself while driving. If you must park unleveled for a brief time, turn the refrigerator OFF.

<<The term UP or DOWN is ambiguous when talking about refrigeration. Think of it as turning it COLDER or WARMER. To that end, the thermostat control may display a white streak that gets wider as you rotate the knob. It represents how thick the ice will get, (thick ice is the coldest setting; thin ice is the warmest). Newer units have a temperature control on the outside labeled 1-5, which is much handier, but not quite as flexible. Number 5 is the coldest setting.

<<The refrigerator light is 12V operated, so just because the light comes on doesn't mean that 110V power is available. When the trailer is stored, with the refrigerator door open, remove the bulb to prevent battery exhaustion.

<<Monitoring temperature in the refrigerator/freezer can be done with an inexpensive thermometer. This will help avoid food spoilage from temperature extremes.

<<Any shade you can provide for the back of the refrigerator will improve performance when parked in hot weather. If you regularly camp in very hot weather, install a thermostatically controlled 12V fan that improves air circulation around the cooling coils in the back of the refrigerator. They are available at all RV stores.

<<Don't let frost get too thick in your freezer. Ice is a good insulator, preventing the refrigerator from cooling properly.

<<If your RV is stored with the refrigerator turned OFF, turn it ON several hours before putting food into it.

<<Make your ice at night. The box works better. Besides, unfrozen water will splash out of the trays if you are traveling.

RV TOILETS

The marine-style toilet installed in your trailer is designed to conserve fresh water. A foot pedal or handle opens the bottom drain to let waste drop into the black water tank, which is located directly beneath the toilet. Pressurized water is used to rinse the toilet bowl. The most common toilets have two valves. One opens the drain AND rinses the bowl; the other valve only adds water to the bowl.

When either valve is released, water flow stops. By design, and unlike your toilet at home, a minimum of water is used in the flushing process. If you hold the valve open, thinking you are getting a better flush, all you accomplish is filling your black water tank. Kids are great at this.

If the bowl is still soiled after flushing, there may be a hand-held spray similar to the spray found in your kitchen at home, which is connected to the fresh water supply for the stool. It is pressurized only when the water valve is held open. Use this spray, together with a toilet bowl brush, to quickly clean the bowl.

Read the sections on Holding Tanks, Waste Treatment and Odors, and Sewer Hook-up and Dumping so you understand the complete waste system.

BILL'S HINTS about RV TOILETS

<<Most toilets are made from some form of plastic, and have a highly polished finish. Do not use abrasive cleaners. Once the finish has been dulled, waste will be hard to clean off without hard scrubbing.

<<Minimize paper products and other solids flushed down the stool.

<<The holding tanks have limited capacity. Don't flush excessive amounts of water into them.

<<Keep the lid closed to prevent foreign objects from falling into the toilet. It is a major job to retrieve anything from the holding tank.

<<If a water leak develops behind the toilet it's most likely the fresh water ball valve. Improper winterization of the toilet is one of the main causes of ball valve leaks. Although easy to replace it will usually entail the removal of the toilet because of the tight work space.

<<Most mechanical seal toilets have a paddle that creates the gas seal between the inside of the RV and the tank. Odors can infiltrate the RV if this seal is leaking so periodically check for any build up on the paddle seals. The other toilet seal is at the floor which is seldom a problem.

WASTE WATER HOLDING TANKS

Black and gray water holding tanks were defined earlier. Both holding tanks, black water (waste) and gray water (sink & shower) are located below floor level. The two tanks have drain pipes that terminate into sliding gate valves. The cleaner the waste tank remains the better off you are. A clean tank with clear roof vents will eliminate most problems with odor and expensive service work. Remember that most tanks are very functional and drain properly but some will take more work. For a complete understanding of the waste system review the sections on Toilets, Waste Treatment & Odors, and Sewer Hook-up & Dumping.

BILL'S HINTS about HOLDING TANKS

{{ If you decide to use any tank-flushing product that hooks up to a fresh water hose and connects to the tank or valve system, always install an anti-siphon valve onto your fresh water faucet. This under $5 investment will protect your fresh water supply from contamination.

<<There are three types of tank cleaning devices; those that connect to the valve system and flush fresh water into the system cleaning the exit to the tank; those that attach to the tank and spray fresh water into the tank; and spray wands that are placed into the tank through the toilet. All have their plusses and minuses but at the end of a trip any extra tank cleaning is recommended.

<<Clear fittings are available for attachment to the valve system so you can see when the tank is clean.

<<Remember to always use RV Safe toilet paper that breaks down easily. Paper can be big trouble in an RV waste tank causing trouble with monitor panel sensors. Paper is also difficult to breakdown so it can add tremendously to clogging problems. Minimize the amount of paper used. Don't put Kleenex or other disposable products down the toilet. Don't put any insoluble material down the toilet that will contribute to clogging or jam your dump valve in the OPEN position

<<Don't let waste dry up in your black water tank. Before storing your trailer it's best to get the best possible flushing action when dumping the tank for the last time each season. To do this fill the tank and if your unit has been stationary for a long period, drive it around to help agitate the tank prior to dumping.

<<Gray water tanks that accept water from the sink and shower need little maintenance but will occasionally need a deodorizer (use the same one you use for the black water tank). Enzyme waste

digesters can be used for the gray tank and have the added benefit of keeping the p-traps clear under the sink and shower.

WASTE TREATMENTS & ODORS

Waste Treatment products can be classified into two general categories: chemical and natural. Chemical treatments are inexpensive and provide a perfume-mask of odors but do little to breakdown waste and clean your tank. Natural enzyme based products are effective for both odor control and keeping the tank clean by quickly digesting waste and paper products in the tank. Keeping the tank clean is the secret to never having odor or service problems.

Formaldehyde, the most common ingredient in chemical treatments is a poison and EPA recognized as a cancer-causing agent. It's lethal to the naturally occurring enzymes and bacteria needed to breakdown wastes in septic systems. For this reason, many RV parks with septic systems are no longer accepting formaldehyde treated waste.

In general, odor should not be a problem if you have a relatively clean waste tank, the tank roof vent is clear, and the seal to your toilet is sealing off the tank gases from the inside of your unit. Your gray water tank (sink & shower water) will occasionally need treatment for odors (sometimes they're worse than the waste tank). Use of an enzyme tank treatment product will have the added benefit of keeping the p-traps clear under the sink and shower.

For a complete understanding of the waste system review the sections on Toilets, Waste Water Holding Tanks, and Sewer Hook-up & Dumping.

BILL'S HINTS about WASTE TREATMENT & ODORS

{{ Do not mix different types of tank deodorants and cleaners. You may create a dangerous or deadly combination.

<<When buying holding tank treatments always check how many treatments are in the bottle. Treatment doses range from 2oz. to 8oz. Don't be fooled by big jugs that may have fewer treatments than you think.

<<When using holding tank treatments remember you can vary the dose to some degree based on the sensitivity of your own nose.

<<Some treatments require a dose every few days and some require only one dose per tank. Read the directions and remember in either case if you smell a hint of odor you should add more treatment product. This is especially true in extreme heat.

<<Some treatments become less effective over time. If you have an old bottle, consider doubling up the dosage or buying a fresh one.

<<Odors can be caused by a tank vent pipe that is plugged, which will force gases up through the toilet. This can happen with bird nests in the vent pipe at the roof or paper stuck to the top of the tank covering the vent pipe opening (you let the tank get too full).

<<Odors can also creep into the RV interior if the toilet paddle that opens when you flush is not sealing correctly. Check for buildup on the paddle seals if you suspect a problem.

<<Some waste treatment products become less effective in hard water. If this is the case you will need to increase the dose based on what your nose is telling you.

SEWER HOOK-UP & DUMPING

Hooking up to the sewer is accomplished by using flexible sewer hose. Before connecting your hose, remove the twist-on bayonet waste cap that is on the valve assembly. One end of the hose attaches to the valve outlet with a twist-on bayonet hose adapter. The other end attaches to a sewer fitting for connection to the ground level sewer. Some sewer fittings fit loose while others form a gas tight seal which is now required in many states. Once the hose is properly connected on both ends, dumping of holding tanks requires only pulling the handles of the slide valves to the open position. Some of these valves are hard to access and use because they are low to the ground and the direction of opening can be awkward. For your first try do a test while the tanks are empty to see what you have to do to get them open. Sometimes a kneeling pad for your knees will be required. In general, basement models are easier to operate, because the tanks are higher off the ground. Slide valves should always be kept fully closed or fully open. A partially opened valve will allow for solids to dry on the valve track or in the drain pipes both which can lead to problems.

Always dump black water first, which is usually the larger of the two valves. Ideally, dumping the black water should be delayed till the tank is more than half full. This ensures a strong flushing action to carry solids out of the tank and through the flexible drain hose. When the black water tank is empty open the gray water valve. This relatively clean water (from the sink and shower) will then flush clean the valve and flexible sewer drain hose. When it stops running, close both dump valves. Disconnect the drain hose from your waste connection on the RV, and rinse the inside with clean water. **Do not use your white fresh water hose for this purpose.** Drain and remove the flexible hose from the ground sewer connection and store it**. REMEMBER TO REPLACE THE OUTLET TWIST-ON CAP.**

For a complete understanding of the waste system review the sections on Toilets, Waste Water Holding Tanks, and Waste Treatments and Odor.

BILL'S HINTS about SEWER HOOK-UP & DUMPING

{{ Find out for certain which light on the master control panel (1 or 2) designates black water so you can monitor it. Then you can decide when and where to dump.

<<Keep either disposable or reusable waterproof gloves handy to wear while dumping. Even though you seldom come in contact with wastewater, the hose is often dirty and wet after dumping.

<<Always close dump valves before storing the trailer. In warmer weather, leave a gallon of water and some tank treatment product in the black water tank. In cold weather, add some anti-freeze.

<<Carry a spare waste outlet cap. If you fail to put the cap back on after dumping, it will probably be torn off while driving.

<<Special waste tank outlet caps are available for draining gray water (**NOT** black water) through a standard garden hose, leading out of the campsite. Use this only when such discharge is permitted. Carry a colored hose for this purpose. (Do not use your white drinking water hose.)

<<Do not leave the black water dump valve open when connected to a sewer. Liquids containing the deodorizer will drain away, leaving smelly solids behind, which can then solidify. In extreme cases you may have to replace the tank, a very expensive proposition.

<<Gray water dump valves may be left open when connected to a sewer, since no solids are involved.

<<If you dump black water every night, you will waste a lot of chemicals, and will generally get a weak flush of the tank. Unless you are heading into a situation where you need maximum holding tank capacity, dump only when the tank is at least half full.

<<Carry an extra 10 or 20 foot length of sewer hose, with appropriate fittings installed, just in case the sewer is located too far from your waste outlet for your regular drain hose to reach.

<<Flexible sewer drain hose comes in many grades. The most important feature is the vinyl mil thickness over the wire and this is the best determinate of hose quality. Mil thicknesses vary between 8 and 21 mil. Terms like heavy duty and standard can be misleading, so just focus on the mil thickness.

<<Protect your drain hose by supporting it. Don't drag it over rough surfaces. Even then, it will not last forever. At the first sign of brittleness, or pinhole leaks, replace it! It is not a pretty sight when the hose ruptures while you are dumping a full black water holding tank!

<<If your waste valves are hard to open, spray the shaft of dump valve handles with silicone each time the valves are in the open position to ease operation.

<<There are many different sewer hose fittings on the market. The black ones are inexpensive but must be used with hose clamps. Colored fittings are the upgraded versions. Whichever you decide on just make sure they're easy to install, won't come off during dumping, and create a good seal.

<<Clear fittings allow you to determine when the tank is clean. Use them – otherwise you will be cleaning longer than you need to and wasting water.

<<Sometimes the people who design and/or build dump stations have never used one. They slant the paving the wrong way and you can't completely empty your tanks. Use your jacks (or boards under your right-side wheels) to tilt the trailer toward the sewer connection.

>>If the sewer connection is on the wrong side, or is too far to reach from your campsite, check to see if the campground has a dump station to use as you depart. Or, drive through any empty campsite when you leave, pausing long enough to dump your tanks in an accessible sewer pipe.

AWNINGS

Awnings vary by manufacturer and model, and so do the procedures for using them. Make certain that you get thorough instructions from your dealer on how to extend, retract, and store your awning before you try to use it. Small window awnings add to your inside comfort, and help reduce air conditioning loads.

BILL'S HINTS about AWNINGS

<<Always leave one end of the extended awning lower than the other. If both ends are the same height, rainwater will collect, causing the canvas to sag. When the collected water gets heavy enough it will destroy the fabric, or the metal frame, or both.

<<Sometimes you have to roll up the awning while it is still wet. Remember to extend it later to dry the canvas and prevent mildew from forming.

<<Don't leave the awning out when thunderstorms are in the area. It will tear off.

<<In moderate winds, it is recommended to use an awning tie down or anchor on the outer corners to protect awning and reduce wind noise. When you leave the trailer unattended for extended periods, roll up the awning.

LEVELING AND STABILIZATION

Your trailer needs to be leveled and stabilized as part of the set up process. Leveling is done for comfort (especially during sleep) and also for the proper operation of your refrigerator. Stabilization stops the trailer from tilting and swaying when you use the entrance step, extend one or more slide-outs, or just walk around inside the unit. This movement is not only annoying and uncomfortable but can also be a safety hazard with hot liquids on the stove.

Before disconnecting from the tow vehicle, make sure that the trailer wheels are "chocked" in both directions. Establish your side-to-side level first (usually done with boards or plastic levelers), then front-to-rear with your tongue jack. Make sure that the tires are fully supported if you drive onto boards or plastic ramps for leveling. Once level the weight of the trailer is being supported by the springs on the axle so you still have a stabilization problem. Without stabilizers, the trailer springs tend to compress somewhat when weight changes occur inside the unit; more so with side to side changes and less so with front to back weight changes.

Sometimes stabilization is attained with the leveling device such as scissor jacks but in many instances it's a two step process. First you level, and when the rig is as close to level as possible you stabilize by using either manual stack jacks on the corners or more effective stabilizers like Wayne's RV Stabilizers. The Wayne's unit is especially good at stabilization because they're quicker to set up and secure the unit to the ground with consistent upward pressure. One of these stabilizers placed to the side of the entrance door eliminates all back to front shifts or up and down movement when entering or exiting the entrance door. A second one at the rear bumper locks down the unit in all directions creating a home-like feel to RV living.

When using manual stack jacks, you can make adjustments to the level by using the front tongue jack. The process goes like this; for placement of the rear stack jacks lower the tongue jack, adjust the height of stack jacks as necessary and place at the rear corners. Then raise the tongue jack slightly above level, adjust the height of the remaining two stack jacks as necessary and place at the front corners before lowering the tongue jack back down

BILL'S HINTS ABOUT LEVELING AND STABILIZATION

<< Try to park as level as possible to minimize further leveling tasks.
<< Chock wheels in both directions BEFORE uncoupling from tow vehicle.
<< When level, stabilize side to side before extending slideouts.

SLIDEOUTS

The design and layout of trailer interiors has always been a compromise; trying to incorporate all of the features wanted by users, while leaving room for more than one person to move around. Usually the result was a narrow aisle down the middle, with cabinets, closets, furniture and bathrooms on both sides. Slideouts have changed all that. They greatly increase interior space without increasing length. Most units sold today have one or more slideouts. Large 5th wheel trailers often have three or four and most recently five. Each slideout is a powered segment of floor and wall that are self-supporting. They are 12V powered, either hydraulic, cable, or rack and pinion gear driven. There are pluses and minuses for each of the power choices, but with the technical improvements being constantly introduced, it is impossible to pick one that is clearly better. Slideouts are a valuable addition to a trailer. Regardless of the type, use care in the operation of the slideout that you have.

Newer units use limit switches to stop the motion, but there are a lot of the old units out there. Even with limit switches, care should be used when the slideout approaches full extension. A combination of operator error and engineering failures can still cause a lot of damage. Holding a finger constantly on the OUT or IN button without paying any attention to the position of the slideout can still cause damage if the stop is out of adjustment. The mechanism may continue to push on the sidewall until it fails.

Owners who tried to make their own limit switch or equalizing valve adjustments to correct actual or perceived problems have caused many unnecessary failures. Factory-trained technicians should make ALL adjustments to slideouts. No manufacturer can honor a warranty when the operating mechanism has been tampered with.

Still other problems involve maintaining the alignment of the rails as the room is extending. Any misalignment will cause a jam, and the slideout cannot be extended or retracted. This can occur with both hydraulic and cable driven systems. Much engineering effort has been applied to eliminate these problems, but only time will tell whether one or the other is superior. The rack and pinion systems evolved as yet another solution to smooth, perfectly aligned extension and retraction, with positive stop

control to avoid structural damage. While this solution seems promising, success depends on the strength of the operating parts. Any failure of the drive system (such as stripped gears) could leave the slideout stalled in some degree of extension. Both hydraulic and cable driven systems have a release mechanism and a hand-cranked emergency retract that should ensure that the slide-out can be positively retracted. Rack and pinion systems have cranks for manual retraction, but any problem with the gears themselves may prevent manual retraction. In an extreme case, I have seen a "come-along" used to retract the side with stripped gears, while the other side was closed electrically! Very tricky!

Most of the early problems with slideouts have been solved, but even if the slide mechanism is perfect, the application design of the trailer builder must be equally good. Look for a builder that has high enough volume to provide a well-engineered and tested design. Those units will most likely be more trouble-free. Of course the weather seals, both extended and retracted, must be tight enough to exclude both wind and water. This may require some adjustment by trained technicians after the slideout has been in use for some period of time. The mechanism should be smooth and relatively quiet in operation.

BILL'S HINTS about SLIDEOUTS

{{ Don't permit anyone on the slideout while it is in motion.

{{ Always have an outside observer with good communications while extending a slideout.

{{ Don't permit children to operate the slideout.

{{ Make certain that when you park your RV, the slideout area is clear of obstructions, trees, or other RVs. Always look up!

{{ Make certain that the slideout has the safety pin in before driving off.

<<Raise the front of the vehicle VERY slightly to minimize the collection of moisture on the roof of the slideout. Don't overdo it. Remember the refrigerator needs to be as level as possible.

<<Use an outside observer while extending the slideout to ensure that the area remains clear. Radio Headsets are great, here. See next section.

<<Observe the movement of the slideout carefully while it is being extended or retracted. Stop extending the slideout if it is jerky or making unusual noises.

<<Before retracting, make certain that there are no obstructions INSIDE the trailer (like open drawers in the path of the slideout).

<<Inspect hydraulic systems occasionally for any sign of hydraulic fluid. There should never be any oily spots below the mechanism. Repairs should be made at the first sign of a leak.

<<Two things will slow down the slideout movement: lack of lubrication and weak batteries. Clean and grease the rams, if appropriate. If batteries are weak, run the vehicle engine until the slideout is properly positioned, replace the batteries.

<<Do not use jacks on the outer edge of extended slideouts. Any upward force at this point will cause the weather seal at the top to leak.

<<When you check the roof seals on your trailer (annually), don't forget to check the roof of your slideout, too.

<<When moving the slideout and approaching the limit, stop the motion by releasing the switch. Continue the action by short momentary actuations. This will minimize the impact with the stops and/or your wall. Stop when seals are in full contact.

<<Before retracting the slideout, check for dew, snow, tree leaves, or other debris on the slideout roof. Remember that the roof will be inside your vehicle when it is retracted.

<<Special awnings are available that automatically extend and retract as the slideout is moved. These will minimize, but not eliminate, the debris/water accumulation on the slideout roof.

<<Vehicle jacks are essential for stabilization with rooms extended. Level and stabilize before extending the slideout. If you do not stabilize first, the slideout will change your level when it is extended.

<<Find out the exact procedures for emergency manual retraction before you need to use them. Write them out in language that you can understand and keep them where you can find them. You probably will never use them, but Boy Scouts have a good motto: Be Prepared!

BACKING YOUR RV

Probably the most dangerous part of towing your new trailer is backing into a campsite. Most sites were designed for tents or very short trailers, with narrow access roads, tight turns and lots of obstacles. Many campgrounds now offer optional “pull-throughs” for parking. You drive into one end, hook up for parking, and then drive out the other end. No backing. Handy for overnight stops, but little sense of “camping”, with the privacy and atmosphere that most campground back-ins provide.

As RVs have become much larger, fitting one into the back-in campsite requires two people—the driver (who needs both hands), and a safety observer/director who is outside, watching for obstructions (above, behind, and on both sides), while watching for kids, other pedestrians and animals; a very demanding job. To make the observer meaningful, there must be a very reliable and fast, two-way form of verbal communication with the driver. Shouting to (or at) each other just doesn’t make it!

Various methods have been tried, with varying degrees of success. Hand signals, carefully practiced and memorized, work well for some, but only in daylight. Light signals, at night, generally only add to the confusion. CB and other hand-held “Family” radios are susceptible to interruptions (always at critical times), and require button pushing and other distractions, including the operator who forgets to release the transmit button when done speaking. Or the one that forgets to PUSH the button **before** speaking.

After 40 years of trying ideas, I found what, to me, was the ideal solution. Light-weight, battery-powered, hands-free radio headsets, worn like earmuffs, with no wires or buttons to push; no volume or frequency controls, operating on two frequencies (each transmitting on one, and listening on the other), permitting either party to interrupt and ask questions at any time. After finding a source, at reasonable prices, I started to sell them to other RVers. After selling more than 10,000 of them, I now have them manufactured and sell them by mail order, for well under $100 per pair. I call them ESP, for Easy, Safe, Parking. I have two slogans; "Park your RV using ESP", and "Save your marriage!" The complimentary letters that I receive confirm those slogans!

Other uses include extending jacks & slide-outs, raising and aiming TV antennas, etc.

To get info on current price and availability, contact me at:
Bill Bryant, P O Box 916, Bowling Green, VA, 22427 E mail to billbryant@pobox.com

AC ELECTRIC POWER

Power is supplied to your trailer either by way of a 30 or 50-amp power cable plugged into a special campground outlet or from the auxiliary generator (when installed). Both sources feed into the Power Distribution Panel (PDP), located within the trailer. There is often an automatic switching relay that prevents feeding power from both sources simultaneously. It defaults to external power, if available. NEVER plug into external power while the generator is carrying a heavy load (like air conditioners). The switching relay will be destroyed. Shut down the load and/or the generator before plugging in.

The PDP contains the circuit breakers for all 110V functions and the fuses for the 12V trailer system. It also has a relatively small battery charger that feeds a few amps directly to the trailer batteries whenever 110V power is being supplied. More power is available from the generator than from a 30-amp campground outlet. Two air conditioners can be operated from the generator (5KW or more) while only one can be operated from 30-amp campground power. NEVER plug into campground power while the generator is carrying a heavy load.

Most trailers with 30- amp service are marginally wired for 110V AC. Too many outlets are on a single circuit breaker. You will find that breakers trip frequently when you simultaneously operate multiple devices, like toaster, coffee pot, space heater, electric skillet, and the 110V heater in your refrigerator.

BILL'S HINTS about AC POWER

{{ NEVER use an ungrounded (two wire) power cable.

{{ If you get any kind of shock or "tingle" when you grab the door handle while standing on the ground, UNPLUG your power cable. On rare occasions campground power is found to be improperly wired. In wet weather it could be fatal.

<<Carry a "polarity tester", available in RV stores. Use it before plugging in at a strange campground. It is small, inexpensive, and displays two green or amber lights when plugged into a properly wired outlet. Using one of your adapters, you can test the campground outlet before you plug in.

<<Use the shortest power cable possible. Voltage drops result from long cable runs. Most permanently attached power cables are 25 feet long and are rated at 30 or 50 amps. Buy and carry a 25-foot extension with appropriate RV connectors.

<<If campground power is more than 50 feet away, you can use additional extensions, but you must reduce your electrical load to 15 or 20 amps.

<<A 14-gauge extension cable should be no longer than 25 feet. A 12-gauge extension cable should be no longer than 40 feet. Do not use any extension cord smaller than 14 gauge. (The higher the "gauge" number, the smaller the wire).

<<When plugged into a circuit rated at 15 amps, do not run even one air conditioner. You may burn up the compressor motor.

<<Learn to "stagger" your electrical loads. Shift the refrigerator to gas while fixing breakfast.

<<You will need a variety of power adapter plugs/receptacles. RV receptacles are distinctive, whether 30 or 50 amp, both in size or shape. If your campsite does not have 30/50 amp receptacles, you can't just plug your RV cable directly into a conventional 15 or 20 amp receptacle. You need an adapter, RV female to 15-amp male. The better ones incorporate several inches of heavy 30-amp cable and are commonly called "dogbones".

<<If your trailer power cable won't reach the campsite receptacle, you will need to use one of your longer (smaller) extension cords. Since these cords have conventional 15 amp male ends, you need another adapter - 15-amp female to 30-amp RV male. Most (but not all) campgrounds have both 30/50 and 20-amp receptacles.

<<Occasionally you may stay in a park where only 50-amp receptacles are available. For this you may need another adapter: this one is 50-amp male to 30- amp RV female.

<<As you can see, the variety of combinations goes on and on. Be prepared (or be prepared to go without electricity).

AUXILIARY GENERATOR

An auxiliary generator, as much as any other accessory, makes any type of RV capable of independent operation. By generating your own electric power, batteries can be kept charged; 110V appliances can be operated; heat and air conditioning can be used all without the need for an electric outlet to plug into.

All the generator needs is a tank of fuel (propane, for some), a battery for getting it started, and storage to accommodate it. Due to space restraints, generators are usually found only in larger trailers and 5th wheelers. However, a wide variety of portable generators are available that are relatively small, contain

their own gas tank, and can be carried in the tow vehicle when not in use. With the generator running, the trailer power cord can be plugged in just like it is for campground power.

BILL'S HINTS about GENERATORS

{{ Any device that burns fuel may produce Carbon Monoxide (CO), a very dangerous gas to inhale in any concentration. Make sure the wind does not carry the generator exhaust (yours or anybody else's) in through your windows.

{{ Check your generator exhaust system regularly for leaks.

{{ Make sure that you have a CO detector in your coach, that it is turned on, and that it works.

<<Do not stop the generator with the air conditioners running. Doing so can damage the air conditioner's motors.

<<NEVER plug in external power while the generator is running and carrying a heavy load. The automatic transfer switch (if you have one) will most often fail, leaving you without any AC power capability.

<<Most generators will stop if they run out of oil (low oil pressure), so they don't require a monitoring oil pressure gauge.

<<Check the 110 Volt AC with a meter. It should be 110-115V and steady under all loads.

<<Change oil and filter at recommended intervals and have the generator serviced annually, or every 200 operating hours.

<<When operating at altitudes above 5000 feet, it may be necessary to make an adjustment to the automatic choke on the generator engine. Learn how to do this before you need to do it.

<<Be considerate of your neighbors as generators can disturb the quiet serenity of a campground. Some campgrounds have rules limiting or prohibiting generators.

WATER HEATER

The classic trailer water heater is a 6-gallon, propane-fueled device that draws outside combustion air through a grill, and exhausts combustion gases through the same grill. Early models had to be lit by long matches or strikers from the outside of the vehicle; a difficult task in the wind and rain.

Newer models have some form of electronic ignition, requiring only the activation of an ON/OFF switch on the Master Control Panel. Some higher priced units have an alternative, selectable, 110V heating option. Larger water heaters are available, but are not very popular. The 6 gallon units are preferred

because they hold less water, are significantly lighter, are faster heating, cheaper, and less storage space is sacrificed to accommodate them.

Water heaters have a thermostat on the units themselves, which is secured by a setscrew. Water must be manually drained from the tank (through a drain valve or threaded nylon drain plug) to empty it to protect it from freezing temperatures. Since the heater is exposed to outside temperatures through the grill, it is very vulnerable to freezing conditions.

You MUST install a water heater bypass kit if you plan to camp in freezing weather. If not installed, you must keep water heater lit at all times when camped (empty when traveling or stored).

BILL'S HINTS about WATER HEATERS

{{ Don't EVER light the water heater when the tank is empty. It could explode from steam pressure. There is a pressure relief valve, but don't depend on it, since it is seldom tested. Once activated, it often tends to leak because of mineral deposits or dirt on the seal.

{{ Don't set thermostat higher than you need it. High settings waste propane and increase the possibility of scalding in showers and wash basins.

<<When the switch is turned ON, the monitor light will blink ON and then turn OFF. If it stays OFF, the propane is ignited and the thermostat will control the heater until you manually turn it off. If the light comes back on, the pilot light has gone out. Check to see why. Sometimes the gas does not reach the burner in time to prevent an automatic shutdown. Turn the switch OFF and start over. If it doesn't light correctly in 3 or 4 tries, make sure that the propane is not turned off at the tank. If this isn't the problem, something is wrong and the heater should be left off until checked.

<<To refill the water heater after it has been drained, just open a hot water faucet, and pressurize your water system. When the faucet runs a steady stream, the tank is full. Turn the faucet off and refill your supply tank. (This is only necessary if the hot water heater has previously been drained.) Draining the fresh water tank does NOT drain the hot water tank. To drain the water heater, open the drain valve (or unscrew the plug) and open all hot water faucets. The water distribution system must NOT be pressurized or the tank will be refilled as fast as it is drained.

<<Inexpensive adapters are available that screw into the external pressurized water hose fitting. They incorporate a Schrader tire valve that lets you pressurize your water system with air, helping to expel the water from pipes and the hot water heater while faucets and drain valves are open. Since it would be easy to exceed safe pressures in the system, use them cautiously. They are especially useful to expel the last water from the hot water tank, when gravity draining is only producing a trickle.

<<If you use air pressure to drain the pipes, make certain that you have one or more faucets/drain valves open.

<<Hot water is produced very quickly, so you don't normally have to keep the heater lit. Plan ahead.

<<If the flame blows out, the propane is automatically turned off. The light on the Master Control Panel will come on.

FURNACE

The thermostatically controlled furnaces installed in trailers are fully automatic. There is an on/off switch associated with the thermostat. With the switch ON and the thermostat set to a temperature above ambient, the 12V blower will start blowing. If there is an adequate flow of combustion air, electronic ignition is automatic and within one minute warm air should be felt from heater outlets.

After reaching the set temperature, the thermostat will turn the flame OFF, but the fan will continue to run until the combustion chamber and heat exchanger have cooled to a predetermined temperature. Since there is no pilot light, each time the furnace comes on, the same procedure is repeated. AC power is not required, but watch your batteries. Furnace blowers draw 8 to 10 amps, maybe more than the capacity of the battery charger. If battery power is low, the furnace will not get enough combustion air to permit a start. In severely cold weather this could be a real problem.

The furnace is another producer of Carbon Monoxide. A CO detector is a necessity for safe operation of this type of heater, especially since you will usually be closed up tight in cold weather.

BILL'S HINTS about FURNACES

{{ The combustion air intake and carbon monoxide exhaust are external to the trailer directly adjacent to the furnace. These must be kept free of obstructions. Wasps and "mud-daubers" like to build mud nests in these protected areas, and this will stop the unit from functioning. Keep the outlets covered when the weather is warm, and the furnace is not being used. Be sure to uncover them before a trip. Watch out for the furnace exhaust cover when it's running. It gets very hot!

{{ Do not run the furnace if all the occupants are asleep.

<<The furnace will not start if the DC voltage AT THE FURNACE is less than 10 Volts. A bad connection or a bad ground connection will prevent ignition. Low air pressure caused by an obstruction in the intake vent or from weak batteries will also cause the furnace not to start.

<<If the furnace won't start, remove the intake/exhaust cover, clean out the two tubes leading into the furnace and try again. If it still won't start, start the tow vehicle engine. If the furnace then starts OK, you have a low battery voltage problem, not a problem with the furnace itself.

<<A small electric space heater should be carried. It can be used, when AC power is available, to supplement the furnace and make your heating more "even". By itself, it provides safe heat while you are sleeping. If the furnace won't start, at least you have some heat. Many air conditioners have a heat strip or heat pump capability, but require AC power.

<<The furnace blower will slowly deplete your trailer batteries. It usually draws more amps than your PDP battery charger can supply.

<<Many air conditioners incorporate “heat strips” that use 110V AC to warm the trailer. Heat pump models are now available to give both heat and cooling.

ROOF AIR CONDITIONERS

Roof air conditioners are rated by BTU and are limited to about 13000 BTU by power considerations (15-amp circuits). Unless you have an extremely well insulated trailer, you will need the largest sizes available in most climates. Most large trailers need two. These units combine multi-speed blowers with thermostatically controlled compressors for cooling. Heat strips are optional, and when present, are operated by the same switches and thermostats. With the older models, both fan speed and thermostat controls were at ceiling level, which was hard to reach for some. Also, on the older units, once the fan speed was selected, it did not vary, regardless of what the thermostat did. Latest models have wall mounted controls and thermostats. A few installations also use air ducts instead of a direct blast below the unit. These improve the comfort level for the occupants.

When plugged into 30-amp campground power, only one air conditioning unit can be operated. Switches let you select which unit that will be. One unit will use up to half of the capacity (12-15 amps) of the campground service, leaving only a few amps for the other things you want to use, including the refrigerator and battery charger. Trailers with 50-amp service can use two air conditioners at the same time. (**When plugged into 15-amp power, neither unit should be turned on**.) To be sure, measure voltage at the campground box with your compressor running. If measured voltage is less than 110V, turn the air conditioning OFF. Not only are you in danger of tripping the campground breaker, but also your air conditioner motor is in danger of overheating from operating at the lower voltages that may occur. As the outlet box and associated wiring heats up, voltage will continue to drop. As long as your power cables are rated at better than 15 amps, there will be no danger to trailer wiring itself, but overheating will occur in the campground power lines and in the compressor motor.

When powered by an auxiliary generator of more than 5000 watts, both air conditioners can be operated, since the generator has more amperage available. Special switch settings enable simultaneous operation of the two units. You must be unplugged from campground power for the generator to assume the load. Unplug before starting the generator.

BILL'S HINTS about ROOF AIR CONDITIONERS

<<Air conditioners are made to fit through the square vent holes built into the roof of trailer. If the seal fails, you will have leaks and they will not always appear to come from the air conditioners. If you have roof leaks and have checked all other sources, they probably come from one of the units. The seal is quite thick and if it starts to leak, there are 3 or 4 adjustment bolts (accessible with inside cover removed) that can be tightened down to reseal the air conditioner. Don't over-tighten. If you clamp them down tight, you will have no future adjustment capability. All you want to do is stop the leaks.

<<Change/clean your air filters often. They are accessible inside, without removing the cover.

<<Try to shade the walls and roof of your trailer to reduce the heat load.

<<Awnings help a lot, but choose how and where you park to get the maximum benefit. Tinted windows also help, as do shade screens and awnings.

<<Keep drapes and blinds closed.

<<Cover operable roof vents with inside opaque covers. Some covers include insulated inserts as well.

<<Air conditioners make a great load for the generator when you are giving it your monthly "run", even in the winter.

TIRES

Manufacturers equip their vehicles with the proper tire rating for the specified gross vehicle weights—GVWR, remember? With add-ons, full tanks, camping and travel gear, it is safe to say that most trailers on the road are close to being maxed out. You can (and should) calculate your weight carefully. Gasoline weighs 6 pounds per gallon, and water weighs 8 pounds per gallon. Consider the weight of water in your full water tank, the water heater, and possibly your waste tanks, and it could easily reach 700 or 800 pounds. And that's before canned goods, beer, soft drinks, etc.

Keep loading in mind when deciding how much fresh water to carry. Dump your gray water regularly. Don't carry all of the tools necessary to rebuild your trailer or to overhaul your tow vehicle engine. And remember—you can buy soft drinks and canned goods when you are close to your campsite. Don't haul around a lot of "stuff" just in case you might need it.

If you have been careful about taking care of your tires, and still have problems, you are probably overloaded or running your tires under-inflated. Do not use regular automotive tires on a trailer. Use only "Special Trailer" tires (marked ST on the sidewall). They are specially made for this purpose, and generally carry much higher air pressure and load than automotive tires of the same size. Low tire pressures can produce handling problems (like uncontrollable swaying). Check them regularly.

Tires suffer from overloading, under-inflation, high temperatures, high speed, and lack of balance. Some combination of the first three probably wipe out most trailer tires that fail. The effects of sun beating down on your tires while stored will eventually break down the sidewalls and harden the tread, but you can prevent most of that by buying tire covers, and using them when you come in off the road. When storing the trailer, try to raise the axles on blocks to remove the load on the tires, and to keep tires from contact with porous materials. Expect to replace tires every seven or eight years, even if they have plenty of tread. Very few trailers are towed far enough to wear down the tread before they reach the time limit for safe operation.

BILL'S HINTS about TIRES

<<Get a good tire gauge and check your inflation regularly.

<<Under-inflated tires reduce GVWR to an unknown level and uneven pressures may cause swaying.

<<Don't forget to check the spare.

<<Watch tread wear for axle alignment problems.

<<Balance your tires. Uneven wear, once it is severe, can't be stopped by balancing. Replace worn tires before starting a long trip. You don't need the aggravation of replacing one on the road.

<<High speed on a really hot day severely stresses tires. Slow down to reduce the stress, especially if you are fully loaded.

<<If your tires develop a problem called "cupping", you have a spring or loading problem. A tire that does not stay in contact with the road will wear unevenly. Once started, cupping cannot be stopped, and the tire should be replaced or moved to the spare. You don't need a failure on the road.

<<Make sure that you have a lug-wrench and jack that will work with YOUR trailer. The jack must fit under the axle **when the tire is deflated**.

<<Do not use liquid sealer/inflator devices. They do not make a permanent repair, and may even make the tire unrepairable.

<<If you use boards to raise one side of the trailer for leveling, make sure that all of the tires are completely supported by the board(s). That requires a minimum of a 2" X 6" board, long enough to support all wheels on that side. Redwood works well since it is lightweight, but sturdy enough for this purpose. Don't let the tires spill over the edges or ends of the boards. You can break the belts internally. Interlocking plastic levelers are designed for the purpose and have plenty of width.

<<Don't try to level by raising only one wheel. You can overload that axle/spring beyond GAWR so level both tandem tires.

<<I recommend that you treat your tires well and buy a good road service policy that includes tire service.

TOW INSURANCE

Good tow insurance is a "must" if you want peace of mind in towing your trailer. Commercial towing can cost up to $10 per mile, or more, and getting to a service area may take a lot of miles. A cellular phone can be invaluable, but only if you are within range of a tower. Tow insurance is worthless if you can't place a trouble call.

Tow insurance is available from several RV "clubs", RV accessory chains, Allstate, and others. Shop carefully for features and costs.

BILL'S HINTS about TOW INSURANCE

<<Make sure that there is no maximum on your towing charges. My first policy covered only the first $100. Luckily, I didn't need to use it.

<<Make sure that your tow vehicle is covered, too.

<<Most policies provide an 800 number to call. You give them your location and problem and they dispatch the nearest available assistance that can handle your size rig. You have NO "up front" costs. You just validate the bill with your signature.

SPRING CLEANING

Except in very warm climates, trailers tend to be neglected during late fall, winter, and early spring. Hopefully, you will heed the earlier advice about keeping batteries charged, and refrigerators periodically activated. But these are preventative measures, intended to avoid mechanical problems. They don't really prepare your vehicle for that first trip of the season.

In all probability, any trailer stored outside will be badly in need of a bath, and maybe even a wax job. At the very least, the sides will need a special cleaning to remove the black streaks that develop below windows, etc. Anyway, you need it clean to make a good inspection for potential leaks. Check the slideout, too.

There is a tendency for trailers that are closed up tightly to develop stale and unpleasant odors. It is not surprising, considering that you cook inside, at least some of the time, and food odors and grease can permeate curtains and upholstery. A good airing out will literally "clear the air." But it may not be enough. A quick washing of the curtains, and a thorough washing of counter tops and other kitchen surfaces will help. Vacuuming or even cleaning the rug will most certainly help. (Remember that catsup you spilled on the carpet last time out?) Clean the windows. Pour some drain cleaner down the kitchen sink to flush out the small amount of waste water and anti-freeze that remains in the trap. This is a source of odors often overlooked. For this purpose, you can leave your gray water drain valve open and let the relatively clean water drain on through. Catch it in a bucket for proper disposal.

If you thoroughly cleaned out your black water tank before storage, you need only flush it out with clean water and add a little water and some deodorant to prepare it for the first trip. If you failed to clean it last fall, add the water and deodorant, and take the vehicle for a short spin. The agitation will help break up any solids stuck to the inside of the tank, allowing you to go to a dump station and drain out the contents. Add fresh water and deodorant and remember to clean it next time.

Fill and flush your fresh water tank several times. Add some chlorine (bleach) in one of the early fills. You can drain it through the outside drain valve. Refill it with fresh water, and turn on your water pump. Open each cold faucet in turn, and let the air escape. Then open one hot water faucet and leave it open until it runs a steady stream of water. If available, use a hose connected to your pressure fitting for this step. Briefly open each hot water faucet until a steady stream is obtained. Now light the water heater and ensure that it stays lit.

Run both air conditioners, turning thermostats to full cold to force the compressors to run. Hold your hands directly in front of the cold air outlets. The air should be cold enough to make your hands

uncomfortable. While you're at it, and while the trailer is cold, check out the furnace(s). See that they light and produce heat.

After ensuring that the trailer is level, start the refrigerator on propane, and let it run for several hours. If possible, switch it to electric mode, and again ensure that the cooling continues. Leave the refrigerator running overnight, and check temperatures in both the freezer and refrigerator compartments.

A short campout (even in a nearby campground) will give you the final checkout. Operate all of the accessories, and check your storage spaces to see, first of all, that you have what you need. Second, to see what you have that you DON'T need. Keep your weight down. On the way to your campsite, pay special attention to steering, brakes, and transmission shifting patterns on your tow vehicle.

Of course, you should check your roof for potential leaks on a regular basis. This is one of those times. Re-seal any obvious or suspicious water entry points. (You cannot see the air conditioner seals.) Literally, the life of your trailer depends on a watertight roof and tight seams between windows, doors, and other entities that penetrate the skin of the vehicle. If in doubt, re-seal them.

Make yourself a little check-list, like the one below. Check everything thoroughly. A day or two spent getting everything done will pay great dividends. You want your first outing of the year to be a pleasant experience—not a disaster.

- Change smoke, CO detector, and vapor detector batteries.
- Check engine fluids (coolant, transmission, brake, power steering).
- Change the tow vehicle engine oil and filter.
- Check engine air filter, belts, and hoses.
- Check tires for tread and pressure (remember the spare).
- Change generator oil and oil/air filters, if required.
- Check lights (head, stop, turn, tail, and backup).
- Check batteries (clean connectors; use baking soda to clean battery tops; check water).
- Clean/replace roof air conditioner filters.
- Check out all internal lights and fixtures for proper operation.

COLD WEATHER OPERATING & STORAGE

Moderately cold weather does not seriously affect RV operations, but you should not attempt to use your trailer in severe weather until you have considerable experience with normal operations. Even then, careful planning will be required to avoid problems. Cold weather makes everything harder and taxes the systems that are installed in your trailer. RV manufactures began offering cold weather packages as an option the last few years, which include tank heaters and other cold weather upgrades.

BILL'S HINTS about COLD WEATHER OPERATION

{{ For storage, if draining of the fresh water pipes is not possible, RV stores sell special non-toxic antifreeze that can be poured into the fresh water tank, and carefully pumped through all pipes and faucets. Don't forget the water supply to the toilet. REGULAR ENGINE ANTIFREEZE MUST NOT BE USED FOR THIS PURPOSE. IT IS POISONOUS. Don't forget to pour antifreeze in all sink and shower drains.

<<Propane vapor pressures drop in cold weather. At some point, furnace and hot water heaters will stop working.

<<Water heater plumbing is exposed to outside air and may freeze and burst.

<<Batteries are hard to charge in cold weather. They charge slowly and discharge quickly.

<<Battery loads are high in cold weather. The furnace blower is the heaviest user of battery power. If the blower does not operate fast enough, you cannot get the furnace to work.

<<Starting vehicle engine or auxiliary generator requires more battery power in cold weather.

<<Water supply hoses will freeze if left pressurized and connected to the RV pressure fitting. For prolonged fresh water hook-ups in cold weather use a stiff high pressure polyethylene hose that can be used with low voltage "heat tape" to keep from freezing.

<<Holding tanks can freeze, particularly while driving in subzero weather. Dumping valves can (and will) freeze and become unusable until thawed. A hair dryer is most useful for this.

<<Internal plumbing, including the fresh water tank, is usually protected from outside temperatures, but in severe weather, could still stop functioning. Keeping electric heat on in the trailer, with cabinet and storage doors open should protect plumbing. Do NOT insulate inside pipes from the warm air. In really severe weather conditions, leave the water system drained or filled with anti-freeze, and carry potable water in jugs for cooking and drinking. Protect your holding tanks with automobile anti-freeze. Replace anti-freeze after dumping.

<<Storing your trailer for severe cold requires draining the fresh water AND the water heater. Install a water heater bypass kit and then drain the water heater. The entire water distribution system should be drained through a low point drain or by blowing the pipes clean, using compressed air. Don't forget the water supply to the toilet. Kitchen, shower, and washbasin traps should be filled with nontoxic antifreeze. Batteries should be removed or kept fully charged.

<<Most auxiliary generators are air-cooled and require no special attention. For long-term storage, the carburetor should be full of fuel treated with a stabilizer.

<<If camped in below freezing weather, make sure that you have a propane torch and a "heat tape" that can be used to safely thaw pipes and fittings. An electric hair dryer works fine.

<<Talk to several experienced cold weather campers before you venture out on your own. You need all of the information that you can get in order to stay out of trouble.

<<Even non-toxic antifreeze IS TOXIC in concentrated form. Make sure that you flush well when preparing your RV for use after winter storage.

ABOUT TENT TRAILERS

The tent trailer (pop-up) is often the first RV vehicle for many campers. In general, it is inexpensive, lightweight, and easy to tow with a small vehicle. Even so, it offers many of the features previously discussed for travel trailers. The warnings and limitations are even more important to adhere to when talking about pop-ups, because they are most often towed by passenger cars.

The pop-up can be as simple as a place to sleep, with a tiny kitchen and a table with seating, or can be as elaborate and complete as the largest 5th wheel trailer. The differences, of course, are in the sizes and features of the installed accessories. Refrigerator, stoves, air conditioners, bathroom fixtures, water tanks, waste tanks, storage, and floor space are all smaller. Most pop-ups can sleep six (or more) but if more than two people get up, someone has to go outdoors! They are designed to be used for camping. Most cooking and eating is done outdoors. Many feature the ability to move the propane powered stove to an attachment on the outside of the trailer for cooking.

Starting from the simplest pop-up, the list of add-ons is almost endless, but each one adds weight and/or requires a larger, heavier frame and a larger tow vehicle as well. Although the canvas sides and low towing silhouette reduce the weight and drag on the tow vehicle, all of the previous discussions of weight, weight distribution, hitches, leveling, stabilizing wheel chocking, and towing apply. In fact, they are often even more critical on a pop-up. The useful load is far less on a pop-up, and the temptation to overload it threatens the tires, suspension, and stability.

Setting up and folding up are the most unique differences in a pop-up. In the traveling mode, the hard roof is tightly secured to the lower body of the trailer. After parking, leveling, and supporting all four corners of the trailer, the top is released, and can be raised, either electrically, manually, or by spring-loaded support arms. With the basic sides (either soft or hard) properly secured, the bed(s) can be extended to the rear and/or the front. With the bed(s) extended, special supports **MUST** be externally installed before any weight is applied to the sleeping area(s). The sink and stove area is commonly stored in the center walkway of the trailer (to reduce the towing profile) and must be raised and secured to the "kitchen cabinets." Of course, there are a variety of securing devices to "lock" everything in place before use.

Recirculating chemical (airline-style) toilets are common because they are self-contained, and require no special holding tanks. A small quantity of water and a special additive are added to "charge" the unit. With each flush, solids and paper are macerated, and the bowl is rinsed with the deodorized and sanitized liquid. When the stool eventually fills up, it must be dumped, just like a black water holding tank. By using it only at night or in inclement weather, this type of system lasts a long time before dumping. Portable units (porta-potties) are also commonly used.

Fresh water, if carried internally, is limited, but most pop-ups provide for connecting to an external faucet. Most kitchen drains are "overboard" and must be caught in a bucket or other portable container for proper disposal.

Electric power is either 15/20-amp or 30-amp service. The advantage of 15/20-amp service is that it can be plugged into virtually any power source. The advantage of 30-amp service is the ability to support more, larger electric devices, including air conditioning.

The (smaller) refrigerators are commonly gas/DC-powered units. DC power maintains refrigeration while towing, and propane powers the refrigerator while camped. The power source has to be manually switched.

Not all pop-ups have trailer brakes installed, but they are highly recommended, especially since small vehicles that have only limited excess brake capacity generally tow them.

Great care must be given to folding up a pop-up. There is a specific sequence to be followed for each model. Failure to perform each step properly guarantees damage to the pop-up or the installed equipment. Essentially, it will be an exact reversal of the steps taken to extend it. The final securing of the top must be carefully performed. If it does not secure properly without undue force, something is wrong. Don't force it!

DATA SHEET

Use the information from your annuals to fill in this sheet. You will find it useful to have.

Item	**Mfr.**	**Model**	**Capacity**
Refrigerator			___cuft
Water Heater			____gal _
Air Conditioner			____BTU
Power Panel			N/A
Generator			____KW
Water Pump			N/A
Toilet			N/A
Water Tank			____Gal

Hold Tank I	____Gal
Hold Tank 2	____Gal
Propane	____Gal

PERSONAL PHONE LIST

When you are traveling, it is impossible to anticipate every event affecting you, your family, or your permanent residence. A list of significant account numbers, as well as critical numbers for accessing them is a MUST. Also keep a list of the NEXT OF KIN, important numbers for traveling, neighbors, credit cards, emergency, and at home services.

ALWAYS THINK ABOUT OTHER PHONE #S THAT YOU MIGHT NEED IN AN UNUSUAL SET OF CIRCUMSTANCES. WHEN YOU ARE TRAVELING, THE SIMPLEST PIECE OF INFORMATION MAY BE INVALUABLE (AND THE HARDEST TO GET!).