



Camper Basics 101

**A guide to frequently
asked questions about
camper ownership**

GREENWAY
RV SALES & SERVICE

Greenway RV strives to make sure that every customer who leave our facility with a new or used camper leaves with as much information as possible. We are here to answer your questions, not only during the sale, but after as well. Please don't hesitate to call.

In order to meet our goal to have our customers informed, we are providing you with this informational booklet. In here you will find many answers to the most commonly asked questions that go along with the purchase of a new or used RV. Our hope is that you will find it helpful and informative.

The information that you will find within this booklet is for general information purposes only and in no way should replace the information that is specific to your unit. Please make sure that you refer to the owner's manual for your camper to make sure that the information in this booklet is in keeping with the manufacturer's specifications and instructions.

Greenway RV does not assume responsibility for any customer who does not adhere to the advice given by the manufacturer and has issues resulting from consulting the information given in this booklet, which may not pertain to their specific unit's guidelines. This booklet, again, provides general information only.

Greenway RV goes above and beyond to ensure that the customer has the best service, from the time they walk through our doors until they leave. We trust that your experience with Greenway RV has been a positive one.

Thank you, again, for choosing Greenway RV to meet your RV and Service needs. We look forward to seeing you in the future to let us know how you are enjoying your new RV. Remember that if there is anything you need help with, don't hesitate to call

WELCOME TO THE FAMILY!

Table of Contents

Subject	Page Number
Towing	1
Driving in Wind	2
Placing Your Load	2
Wind From Passing Trucks	3
Trailer Sway	3
Load Equalizing Hitches	4
Hitching/Unhitching Weight Distribution Hitches	5
Fifth Wheel Hitching/Unhitching	5
Safety Check	7
Tow Cable	8
RV Generator FAQ's	9
Driving With Your Refrigerator On	10
RV Battery Basics	11
Battery Power Management	12
Winter Battery Maintenance	13
Furnace Care	14
LCD TV's	16
RV Refrigerator FAQ's	16
Water Heater Tips	19
RV Gel Coat Finish-Care and Maintenance	20
Winterizing Your RV	21
Sanitizing Your Fresh Water Tank	25
Rubber Roof Care and Maintenance	26
Canvas and Awning Cleaning	28
Operating Manual Awnings	29
Green Camping	30
Adjusting Day/Night Shades	32
Helpful Lists	32
Satellite TV Information	37
Wattage Use	39



Towing

- Practice, practice, practice -- If you have little or no previous RV-towing experience, practice before you hit the road. Find a vacant lot and practice parking, steering and braking to get a sense of how the tow vehicle and trailer handle.
- Find level ground -- When hooking a trailer or a fifth wheel RV to your tow vehicle, make sure you're on a level surface. You don't want the trailer to start rolling downhill before you have it on the hitch.
- Check the lights -- Make sure all lights (headlights, taillights, turn signals and marker lights) on both the tow vehicle and the trailer are working properly.
- Check the tires -- Check the tires on all vehicles to see that the tread is in good condition and that they're properly inflated.
- Make detailed plans -- Plan your trip ahead of time. Make note of locations where you might run into trouble with traffic or dangerous road situations.
- Secure the load -- Tie down loose objects in the RV and trailer. You don't want things flying around every time you make a turn, hit the brakes or go over a bump.
- Be alert -- In bad weather, don't park the RV where something dangerous can fall on it -- like a tree or an electric line.
- Pass with care -- Remember that your tow vehicle and trailer take up a lot of space. Between the tow vehicle and the trailer, you'll need plenty of extra room to maneuver in and out of traffic.
- Choose the correct gear -- When descending or climbing a hill, put the tow vehicle into a lower gear or turn off the overdrive. This gives the vehicle more power for the climb and it will slow the vehicle's descent as well.
- Braking concerns -- Don't ride the brakes all the way down an incline; if you do, the brakes will quickly overheat and fail. When it's safe to do so, downshifting may be a good alternative.
- Give yourself the space you need -- Give yourself plenty of extra room for stopping. Your tow vehicle and trailer have a lot of momentum and even the best brakes won't allow you to stop as quickly as you could without the extra weight behind you.
- Avoid reverse gear -- As often as possible, try to avoid situations where you have to back up. If you absolutely have to put the tow vehicle into reverse, have someone stand behind the trailer to guide you using hand signals.
- Always be prepared -- Take along a first-aid kit, a fire extinguisher, a flashlight, a toolkit and a cell phone, so that you can handle emergency situations. And don't forget the battery charger for that phone, too.



Driving in Windy Conditions

Wind can create havoc when towing a trailer, causing oscillations or sudden pulling to one side. Thirty mile an hour crosswinds can blow you off the road if there is a sudden gust. For example, say a hard gust of wind hits your rig from the left. Your rig pitches to the right and moves towards right. In order to stay on the road you turn left. With the rig leaning to the right, the centrifugal force generated by the left turn can be the added ingredient that puts you on your side, or worse yet, down the side of a ravine. The only way to help lower the risk traveling in these conditions is to slow down. This eliminates the centrifugal force that happens when you correct, and if the wind did blow you over it wouldn't be such a violent crash. The safest way is not to drive in extremely windy conditions. That's what the professional haulers do, and so should you. Park it until it's safe to continue. Wind can also have a dramatic effect on your fuel mileage when towing a heavy load. Plan your fuel stops accordingly



Placing The Load

It would be overly simplistic to say, "put the heavy items over the axles." Sometimes a lot of little items can far outweigh one big one. Some people believe the value of an item should be one of the first considerations of where it is put in a trailer. Arrange the load so that these items are protected by their location. Don't put big, heavy items in a place where they can't be securely tied down. A glued down rug makes a great floor for a cargo trailer. Things stay put and don't slide around. Of course, it would be easy to say everything should be securely tied down but it would be also unrealistic. Start with top heavy items if you have them. That's usually a good place to start because you must have plenty of room available to properly tie them down. Tying them straight down is not secure enough. They need to be tied off at several angles or they could fall over in an abrupt change in speed or direction. You need room to accomplish this. Smaller items can be used to fill the spaces around them later.

Once you have the heavy items located, check the tongue weight. If the load is radically off, make the changes necessary to get close. The smaller items can be loaded in such a way that they balance out the load. They should be located so that they will stay put. Placing them next to items that have already been tied down helps, but your main concern should be to not lose the balance of the trailer. Don't forget you can also get one side of a trailer a lot heavier than the other without a little planning. This can cause a very serious problem when cornering, even causing the trailer to turn over in a sudden turn.

Top heavy loads can cause problems not only in cornering but also in hard braking. They have a tendency to make the trailer "dive" in hard braking conditions. This suddenly increases tongue weight and can decrease front axle loading just when you need steering and those big front disc brakes the most. Center top heavy items or arrange the remainder of the load to act as a counter weight to minimize this effect. Never place heavy objects on add-on devices hung on the rear bumper or placed across the tongue frame. A bicycle may be fine to hang out in back, but not a motorcycle. This places heavy objects where they will dramatically effect handling





Top heavy loads can cause trailer "dive" under hard braking, possibly reducing steering and braking control.

in corners or bumps. Heavy weights placed well behind the axle can also aggravate swaying in turns.



Wind From Passing Trucks

An interesting thing happens when being passed by faster moving buses or large trucks. Large vehicles develop a high pressure wave of air in front of them and low pressure area to their rear as they go down the highway. This is variable and is dependent on the shape of the truck and the existing wind conditions. The effect is such that as the truck comes up to pass on your left, first your trailer and then your tow vehicle will be pushed to your right by the truck's "bow wave". As the truck passes, the low pressure zone will then pull you back to the left. You must steer first left and then right to counter the effect. It's not particularly dangerous, but it does keep you on your toes.

Handling Trailer Sway



A popular accessory to the weight distribution system is the sway control. Trailer sway can be caused by crosswinds, poor trailer loading (load too far back), or inadequate spring bar tension. The use of a weight distributing hitch by itself will help improve trailer sway, but some additional products can help eliminate it. A friction type sway bar installed between the tow vehicle and the trailer will cut down on the sway of the trailer being towed. If swaying occurs, steer as little as possible while you slow down. Because of your natural lag in reaction time, quick steering movements will actually make things worse and cause the oscillation to increase. Application of the trailer brake usually tends to help keep the vehicles aligned, while heavy braking with the tow vehicle may reduce trailer stability. Until the problem is identified and solved, travel at reduced speeds.

Here are some sway control quick facts:

- Sway Control cannot be used on trailers with surge brakes
- When towing during slippery conditions such as wet, icy or snow covered roads, or on loose gravel, remove all tension from the sway control or remove the sway control completely.
- Do not speed up if sway occurs. Sway increases with speed. Do not continue to operate a swaying vehicle. Check trailer loading sway control adjustment, and all other equipment, until the cause of the sway has been determined and corrected.
- Never paint or lubricate the slide bar.
- On some installations, damage to the sway control may occur during extremely sharp turning maneuvers. This can be checked by slowly backing vehicle into a jackknife position while someone is watching, Do not allow slide bar to contact completely or bumper to contact sway control. We recommend removing the sway control when backing up due to the possibility of contact.

- After about 1,000 miles of towing, remove the slide bar from the sway control and clean the friction surfaces with a wire brush. Repeat this every 10,000 miles.



Load Equalizing Hitches



A weight distribution hitch adds spring bars to the hitch system that apply leverage between the tow vehicle and the trailer. This leverage transfers the load sitting on the rear of the vehicle to all the axles of the vehicle and trailer. With the trailer tongue and rear cargo load distributed between the axles, the vehicle is leveled off and performance is greatly improved. Weight distributing systems should be used any time the trailer weighs more than 50 percent of the vehicle's weight. A load equalizing hitch is selected base on the trailer's actual tongue weight rather than on gross weight. This type of hitch has some real advantages, but government studies have shown they can actually work too well, lightening the load on the rear wheels of the tow vehicle sufficient to reduce traction. This kind of hitch should be selected carefully, installed by professionals and its operation understood by the user.



A temporary increase in loading occurs during dips or bumps in the road. A severe dip causes increased weight to suddenly be placed on hitch, axles and tires. Though hitch manufacturers take this into consideration in their designs, an overloaded or old, cracked and rusted hitch or tongue can be suddenly stressed beyond capacity, causing it to fail. Watch for bumps and large dips in the road and try to slow down for them. A conservative safety margin in loading will also be helpful in this type of unforeseen circumstance.



Just For Fun!



What I like about camping is you can get really dirty. Either you're all by yourself, so no one else sees you, or everyone you're with is just as dirty as you are, so nobody cares.

Some national parks have long waiting lists for camping reservations. When you have to wait a year to sleep next to a tree, something is wrong.

It always rains on tents. Rainstorms will travel thousands of miles, against prevailing winds for the opportunity to rain on a tent.

If you think that you are too small to have an impact, trying going to sleep with a mosquito in the room.

Somebody told me it was frightening how much topsoil we are losing each year, but I told that story around the campfire and nobody got scared.

Hitching A Travel Trailer to a Weight Distribution Hitch

1. Raise the trailer tongue until there is enough room for the hitch ball to go underneath the coupler.
2. Back the tow vehicle until the hitch ball is under the coupler.
3. Open the coupler latch mechanism and lower the coupler onto the ball just enough so the latch mechanism will close correctly. Use a padlock or hitch pin to secure the lever.
4. Raise the tongue... the tow vehicle will also raise... about 3 to 4 inches with the tongue jack to make it easier to install the weight distribution spring bars.
5. Insert one end of the spring bars into the hitch head.
6. Lower the snap-up bracket (sometimes called the saddle) and place the proper chain link onto the hook.
7. If you have the Dual-cam hitch setup, rest the spring bars on the ends of the cam.
8. Using a short piece of pipe that should have come with your snap-up brackets, raise it back up to its normal position and secure it with a safety clip.
9. Repeat the above 2 steps for spring bar on the other side.
10. Safety clip the snap-up brackets.
11. Retract the tongue jack to allow sufficient clearance between it and the road.
12. Attach the safety chains to a permanent part on the tow vehicle. Cross the chains (like an X) under the hitch to make a cradle for the coupler. This will prevent it from hitting the ground should the hitch fail. The chains should be long enough to allow the tow vehicle and trailer to turn sharply, but not so long that they can drag along the ground.
13. Attach the breakaway cable to a permanent part of the tow vehicle. This should not be attached to any other part that is used to pull or support the trailer tongue. Should the receiver fail and the breakaway cable is attached to it, the trailer brakes will not activate.
14. Plug the trailer electrical cord into the receptacle on the tow vehicle making sure there is enough slack to allow for proper turning but it will not drag.
15. Check all lights.
16. Check brake controller for proper connection... a green light or other indicator.

Unhitching a Travel Trailer from a Weight Distribution Hitch

1. If you will be camping, make sure the trailer is as nearly level from side to side as you can get it by placing boards or blocks under all of the tires on the low side.
2. Chock the trailer tires so they won't roll.
3. Disconnect the electrical cord from the tow vehicle.
4. Disconnect the safety chains.
5. Disconnect the breakaway cable.
6. Raise the tongue high enough to take most of the weight off of the spring bars.
7. Remove the safety clips from the snap-up brackets.
8. Lower the bracket and release the chain. You should be careful here. If there is too much weight still on the spring bars, it could cause the lever to jerk out of your hands. Raise the tongue high enough to relieve most of the spring bar tension.
9. Lower the tongue until weight is on the hitch ball.
10. Unlock and release the coupler latch mechanism.
11. Raise the trailer tongue until the coupler is clear of the hitch ball.
12. Move the tow vehicle forward away from the trailer tongue.



Fifth Wheel Hitching

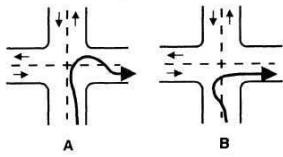
- o Raise or lower the 5th wheel trailer to set the 5th wheel kingpin to proper hitch height.
- o Drop truck tailgate ... if you don't have a special tailgate.*
- o Open locking bar on hitch.
- o Back under trailer until hitch engages the fifth wheel kingpin.
- o Secure hitch locking bar on the fifth wheel hitch.
- o Put truck in forward gear (don't give it any fuel/acceleration) and 'bump' the hitch to make sure it is locked.
- o Connect umbilical cord and breakaway switch cable.
- o Check fifth wheel trailer lights and brakes.
- o Raise pickup truck tailgate. *
- o Raise 5th wheel trailer Landing gear.
- o Remove wheel chocks from trailer wheels.

Fifth Wheel Unhitching

- o Pull into the site/storage, and situate the 5th wheel trailer where you want it.
- o Chock the wheels tightly so the trailer will not move.
- o Drop the fifth wheel landing gear. (Important!) Do this first so you won't forget!
- o Disconnect the umbilical cord and breakaway switch cable.
- o Drop the truck tailgate... if you don't have a special tailgate. *
- o Gently put your truck into reverse... don't give it any fuel/acceleration. This effectively moves the 5th wheel kingpin off the locking bar which will allow you to easily disengage it.
- o Shift in to neutral, step on brake and and apply parking brake.
- o Disengage the kingpin locking bar on fifth wheel hitch.
- o Slowly drive away. Making sure the kingpin is clear of anything in the truck bed and the umbilical cord and breakaway cable are not snagged.
- o Raise truck tailgate.*
- o Adjust the fifth wheel height to proper front to back level

**Disregard this step if you have a notched fifth wheel tailgate or you do not have a tailgate.*





Watch your trailer's wheels in turns. The longer the trailer, the wider you must swing out in a turn to make sure the trailer wheels clear the inside curb.

Whenever the trailer is detached from the tow vehicle, block the wheels so it is impossible for the trailer to roll off on its own. Better yet, don't ever detach the trailer on any kind of grade.



Just To Be On The Safe Side...

Before you even hop into the driver's seat, check out the following items on this list. There is no such thing as being too safe.

- Inspect safety chains
- Inspect brake wiring and harness, clean if necessary
- Inspect and/or clean lighting plug and receptacle
- Inspect all hitch components for cracking or broken welds
- Test breakaway switch (lubricate every 3 months)
- Check tire pressures, inspect each tire for wear
- Check wheel nut torque
- Check exterior lighting, brake lights and blinkers
- Lubricate coupler and latch as needed

Attaching the Cable to the Tow Vehicle

The breakaway switch cable needs to be secured to the vehicle bumper or frame. The cable can be attached in many different ways. The two most common methods are:



Route the pin through the safety chain loops on the hitch or bumper, then through the cable loop

OR



Route the pin through a tow hook, then through the cable loop

Notes:

- The cable should come straight out from the switch to attach to the vehicle
- Any angular attachment may cause breakaway switch failure
- Secure the cable on the same side of the trailer frame as you mount the breakaway switch
- Do not loop the cable over the hitch ball; the cable may bounce off while the vehicle is moving
- Before towing, test the breakaway kit by pulling the pin out of the switch to activate the brakes

Did you know that....

As early as 1920, RVers often camped in simple wooden house structures built in their backyard and added to a model T chassis to recreate their home environment on the road.

Early travel trailers ended up as permanent housing for families during the Great Depression.

A loaded mini van pulled in to the only remaining campsite.

Four children leaped from the vehicle and began feverishly unloading gear and setting up the tent. The boys rushed to gather firewood, while the girls and their Mother set up the camp stove and cooking utensils.

A nearby camper marveled at the youngsters. He then told the Father, "That, sir, is some display of teamwork." The father replied, "I have a system; no one goes to the bathroom until the camp is set up."



RV Generators-FAQ's

Q: How do I know what size generator I need?

A: To determine the proper size generator for your RV you need to know how much electrical power you will use.

1. Determine what electrical devices you will want to run from the generator. Survey your RV for appliances that run on 120 volts. TV, microwave and other kitchen appliances generally require the most power but smaller appliances can add up. Most RV lights are 12 volt but some may be 120 volt. Your RV A/C is the biggest power user.

2. Add up the power requirements, in watts, for all the devices that you are likely to operate at the same time. Wattage ratings are printed on light bulbs; other devices like hair dryers and electric heaters are also described by their wattage requirements. If the device doesn't provide a wattage requirement, you can determine watts by multiplying volts times amps. If you just can't find the power requirement of a device, look at our RV Appliance Wattage Chart. (Remember, the chart is just a guide; actual wattage requirements vary significantly among brands and types. See chart in back of this information book.) Be aware that some electrical devices have starting wattage requirements that are larger than the running watts. If so, use the starting wattage requirement for the largest of the devices you want to run and the running watts for all other devices.

3. Add together the wattage requirements for all the electrical devices that you want to use at the same time. This is the minimum wattage you will need from a generator. You should also consider a generator with a power rating somewhat higher than your minimum requirement. It's possible to get along with a smaller generator if you don't really need to run everything at the same time. But you're not likely to want to turn off the TV when you use the microwave. And it is likely you'll want to use a toaster or coffee maker while running the microwave.

Q: Will an RV generator charge my RV house battery?

A: Not directly. But your RV generator provides power to operate the onboard converter/charger, which charges the RV batteries.

Q: Can I run my RV generator for extra power while I'm hooked up to power at a campground?

A: RV electrical systems are designed to keep generator power and campground power sources separate. Connecting both power sources together is unsafe and should never be done.

Some RV manufacturers may wire the RV to allow you to power your second air conditioner with your RV generator so check your vehicle operator manual. If your RV is not wired this way but has a separate circuit for a second air conditioner, it can be rewired to do so but only a professional electrician or RV tech should do this.



RV Generators (More) FAQ's

Q: Can I power the motorhome RV air conditioner with my RV's generator while traveling on the road?

A: Yes, you can along with any other 120 volt appliances. As long as you don't exceed the power rating of the generator.

Q: Is it okay to run an RV Generator just a few minutes... say, to heat something in the microwave?

A: Ideally, generators should run for at least of 30 minutes to give them a chance to warm up. Once warmed up, running your generator for five minute intervals should be okay.

Q: What does it mean to 'exercise' an RV Generator.

A: Manufacturers recommend running an RV generator at least 30 minutes each month. If it's being run even though it's not needed for power, it is often referred to as exercising the generator. But remember to turn on some of the appliances so the generator has to work a little while it's running.

Driving With The Refrigerator On



Driving your motorhome, fifth wheel or travel trailer with the RV refrigerator on while traveling is definitely okay as long as you operate on 120 volt AC or 12 volts DC assuming your unit has the capability to do so. To operate on 120 volts you will need a generator or inverter. RVers with motorhomes frequently run their generators so that they can use their RV's air conditioner, TVs, Micro-waves etc. They can also operate the refrigerator.

To operate on 12 volts DC, check with your RV mechanic to make sure your alternator and batteries will handle the extra load.

Remember, when you park the rig for more than a few minutes the rig must be level or the refrigerator must be turned off to avoid damage to the appliance.

There is an ongoing debate about whether or not to travel with the refrigerator operating on propane.

After hearing both sides of the debate, there is no real consensus and both sides are adamant in their beliefs. As far as I can tell there is no right or wrong answer, it's up to you to decide. Here are the arguments

Many RVers can see no danger in running the refrigerator on propane while on the road. They say they have traveled for years with no problems whatsoever. They point to the safety of propane

powered vehicles and argue that we travel with tanks full of gasoline which is much more dangerous. Generally it is legal to travel while using propane, but keep in mind that it is illegal to have any open flames while near a service station fuel pump. And some tunnels and bridges may have restrictions too.

It is Greenway RV's policy to state that traveling with the propane on is a disaster waiting to happen. During an accident a broken propane line could increase the possibility of fire, even an explosion. The only safe way to travel is with the propane tank valves closed!.

You may not have to travel with your refrigerator on at all.

If you travel less than four to five hours a day you can turn your refrigerator off and it will still stay cold enough to keep your food fresh. You can even open the door to get lunch or a cold drink if you don't open it too many times.

If you decide to travel with the refrigerator off here are some tips for keeping things cold.

- Start the refrigerator the day before you plan to travel.
- Put cold soft drinks and beer etc. in the refrigerator the night before.
- Pack the refrigerator full. Use the cold drinks to fill space.
- Pack the freezer full.
- Make sure everything is cold before you turn the refrigerator off.
- Plan ahead... know what you want before you open the door and get everything you want at one time.

RV Battery Basics



A 12-volt battery is not really a 12-volt battery. It's just a convenient term. A fully-charged 12-volt battery in good condition, allowed to "rest" for a few hours (or days) with no load being drawn from it or charge going to it, will balance out its charge and measure about 12.6 volts between terminals.

When a battery reads only 12 volts under the above conditions, it's almost fully depleted. Actually, if a battery's resting voltage... after charging... is only 12.0 to 12.1 it means only 20 to 25% of its useful energy remains and it probably needs to be replaced.

12-volt batteries supply useful energy only through a limited range — from over 14 volts (when fully charged and unrested) down to 10.5 volts in use/under load (when lights dim, pumps groan and TV pictures get small).

No 12-volt battery will remain at over 14 volts for more than seconds unless it's being charged. The lowest limit is 10.5 volts but this is too low and unsatisfactory in practical use.

Experienced RVers try to use no more than 20% to 50% of the energy available in a battery before recharging. That means they never let resting voltage get below 12.5. They never use more than 50% before recharging (resting volts of 12.3) except in an emergency. They know that, if resting voltage ever reaches 12.1, they have deep-discharged one cycle and that a battery is good for only so many cycles (from as low as 20 in an automotive battery to 180 in a golf cart battery, with the

typical RV/marine battery good for no more than 30).

Battery Power Management

How long can you run lights, TV, furnace water pump etc., before battery recharging is needed? Getting the most from your batteries is a mix of conservation, intelligent charging and proper care.

Follow the steps below to determine how many days you can rally or boondock before cranking up the generator. It's best to do this test when you have an electrical hookup available so you can recharge the batteries as soon as possible.

1. Start with fully charge batteries.
2. Switch the refrigerator to run on propane.
3. Turn off unnecessary 12 volt appliances.
4. Record the time.
5. Shut off converter/charger (or unplug your RV if there is no way to switch off the converter/charger).
6. Run your 12 volt appliances and lights as you normally do.
7. Occasionally check the battery voltage with a digital volt meter and record the time when meter drops to each % of charge. Don't go below the 50% level in this test.
8. When you reach the voltage that approximates 50% of charge (on chart), turn your battery charger back on.
9. Check the time.



You now know how long you can run the RV, in "normal" use, without charging, before a "deep cycle" condition.

Of course this time isn't exact and can change. The furnace will run more often in winter than in the other seasons. You use the lights more in the winter when days are shorter and skies are overcast. So, the more you run your RV on 12-volts the better you'll be at estimating the time.

NOTE: When the battery is under load, but not being charged, your volt meter will read lower than actual battery state. For example: If TV and lights are on, the meter might read 12.4. Don't panic. Turn heavy loads like those off. Watch meter. If batteries aren't bad, the voltage should increase and then stabilize. That's the point where you take your reading. (An easy, quick way to observe this is to watch the meter while you run enough water to make the pump start. You'll see a drastic drop in voltage. Shut water off. When pump stops you'll see meter reading start to creep back up.)

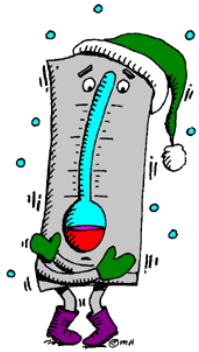
Don't be alarmed if your battery indicates it's at 50% of capacity. Most batteries are seriously overrated by the manufacturer, seldom yielding 80% of their stated rating.

Resting voltage means no charging and nothing drawing electricity. No night lights, clocks, radios or so-called "phantom loads" which include things like:

- LP gas detector/auto shut-off (just using an LP detector would be better)
- The refrigerator on the “brain” in a three-way uses 12 volts even when running on AC.

Needless to say, testing voltage this way can be a real pain. You should do it, though, so you can find the phantom loads that may end up haunting you later.

If you’re just interested in checking the batteries, there is an easier way to do it. Just disconnect them and charge fully with a reliable charger. Overnight is OK. A day or two is better. After charging, check the resting voltage. You only need to make this test once or twice a year. It’s a great time to clean your batteries and connections as well.



Winter Battery Maintenance

When you put your RV into long term storage, it’s a good idea to remove the batteries and put them in storage too. This is quite simple to do. The first thing you want to do is visually inspect the batteries for any obvious damage. Any fluid on or around the battery may be an indication that electrolyte is leaking from the battery. A damaged or leaking battery should be replaced immediately. Whenever you remove any battery, always remember to remove the negative terminal or cable first, and then the positive cable.

Battery Tip: When you remove a battery, turn off the ignition switch, all electrical switches, and any battery disconnect switches before you disconnect the battery cables. Whenever you remove any battery cables, label them first so you remember how they go back on when it’s time to put it back into your RV. When you reinstall the battery, do it in the reverse order. Install the positive cable first, and then the negative. Clean the battery with a 50/50 mixture of baking soda and water if necessary..



A discharged or partially charged battery will freeze much faster than a charged battery. Store the battery in a cool, dry place. Do not store it in a place that it might freeze. We recommend setting the battery on a small piece of wood or a metal grate. Batteries in storage will lose a percentage of current through internal leakage. It’s not uncommon for a battery to lose up to 10% of its charge while being stored. Cold temperatures slow this natural discharge process and warmer temperatures speed it up. Test the stored battery’s charge state every month and charge a battery that is below an 80% state of charge.

If you decide to leave the batteries in the RV while it is in storage, remember to check the state of charge monthly and charge any batteries at or below an 80% charge. If your RV converter charger charges the battery(s) at a constant rate (around 13.5 volts) this is too high for a float charge and can deplete the electrolytes over time. In this situation, plug the RV in periodically and allow the converter charger to charge the battery(s) for 8-10 hours. Some RV converter multi-stage chargers and aftermarket chargers are designed to maintain a float charge on the battery without removing the batteries from the RV. Remember, for the converter charger to work, the RV will need to be plugged in to electricity.



Caution: If you accidentally get battery acid on your skin, flush with lots of water. If you get it in your eyes, flush with low pressure water for about 15 minutes and call a doctor.

Furnace Care and Maintenance



Cleanliness

A clean furnace is a happy furnace. A trite statement? Perhaps, but true. As air moves in, out and around the furnace, dust, lint and other pollutants in the air will naturally accumulate. Too much accumulation and furnace failure is all but guaranteed. Each furnace is typically equipped with two blower wheels or squirrel cages; one to bring in fresh air to mix with the propane, and one to “force” the air over the heated chamber and push it through the coach ducting to the interior living sections. Excess dirt and lint wedges itself inside the blower assembly, essentially weighing it down.

In a normal sequence, the spinning of the main blower wheel closes a device called a sail switch, (so named since this small electrical switch is outfitted with a large “sail” or paddle that catches the air moved by the blower wheel). Even though adjusting the wall thermostat actually initiates the heating cycle, it’s the closing of the sail switch that starts the internal electrical sequence of furnace operation.

If the blower wheel is weighted down with excess dust and lint, it will not spin fast enough to close the sail switch (also called an “air prover” switch, by the way). It “proves” the fan is spinning fast enough, bringing in enough air to support combustion. Too much weight, the slower the spin; the slower the spin, the sail switch does not close. An open sail switch; the furnace fails to ignite.

Here’s where to start: With the thermostat in the off position, the LP container service valve completely off and the furnace at room temperature, vacuum in, around and about the innards of the furnace. It will likely be necessary to remove a front cover or access panel to expose the main furnace assembly.

If you have compressed air available, while vacuuming, blow out all internal sections of the furnace. Be sure to wear the appropriate eye protection, as dust and dirt will certainly be blown about. The goal is to keep the insides of the furnace assembly as clean as possible. Wipe all surfaces down with a damp shop rag.

Cleanliness of the warm air ducting is also crucial. Some heating systems incorporate a central, manifold ducting system either in the floor or the ceiling. Others simply have individual ducts running above the floor, under cabinets or through partition walls to each major section of the coach. Regardless of the type of delivery ducting in your rig, remove each register and vacuum as far into each duct as possible. Take care not to rip or tear the 4-inch round flexible ducting, if so equipped.

On the exterior of the RV, inspect the intake and exhaust vents carefully. Use a flashlight if necessary. If the coach has been inactive for a period of time, it’s common to find mud daubers or wasp’s nests inside the cozy confines of the vent tubes. Blockages in the intake tube can result in an overly rich fuel mixture, creating operational faults. Blockages in the exhaust tube can result in overheating, short cycling of the furnace and pose a fire hazard. Apply compressed air to the fresh air intake while covering the exhaust tube with a running vacuum cleaner.



Voltage

Probably the number one cause of flawed heating cycles in forced air systems today is low battery voltage. Furnace fan motors can create a relatively large amp draw on a malnourished battery bank. Add the excess weight of filthy blower wheels and current usage ramps even higher.

When dry camping, the minimum voltage requirement for most all 12-volt DC forced air furnaces is 10.5-volts DC, measured at the furnace. Conversely, when plugged into power, running off the converter output, excessively higher than normal DC voltages (above 13.5-volts DC), can create their own palette of problems for the delicate components found on some circuit boards. Maintaining a properly charged battery bank is critical for optimum furnace operation. Low voltage will cause the blower wheels to spin at a reduced rotation. Remember that earlier progression? Low voltage; less blower speed. Not enough blower speed and the sail switch will not close, regardless how clean those squirrel cages may be! Maintaining a healthy battery bank assures you'll have enough current on hand for the heating system.



Ducting

Aside from the cleanliness issue mentioned above, for those coach owners with individual runs of 4-inch flexible ducts, inspect and straighten all sharp bends or turns whenever possible. Shorten any lengths that appear too long. Excess duct lengths will eventually create an overheated situation within the furnace housing and prohibit sufficient heat delivery throughout the living sections. Thankfully this is usually not a concern for floor or ceiling ducts.

Also realize that furnace manufacturers mandate a minimum requirement for the number of ducts, based on the BTU rating (size) of that particular furnace. Trust troubleshooting/repair procedures only to Certified or Master Certified service technicians.



Return Air

Perhaps more important than an unobstructed heated air duct, a clear path of return air to the furnace enclosure is nothing short of a mandate. A literal "breathing" appliance, the forced air furnace must also inhale fresh breaths of return air as the warm air is circulated throughout the RV in order to operate optimally. You're probably aware of at least one interior vent located near the furnace compartment, this is the pathway of return air back to the furnace compartment.

Some coach owners mistakenly install a filter in this vent space; a definite no-no. Unlike a home heating appliance, there should not be a filter installed anywhere in the path of the return air. Additionally, never stow gear or supplies in the furnace compartment. Aside from a fire hazard, it may inhibit the path of the necessary return air. Just like the required number of ducts, furnace makers calculate just how much volume of return air is necessary for their unit to operate properly. The size of the return air grill is further deduced to ensure the return air passage meets the minimum number of square inches of free-flowing air as specified for that particular model of furnace. In some cases, coach manufacturers may even modify the cabinetry to meet these minimum requirements.



Could my LCD TV Freeze?

Absolutely! As the name "liquid crystal display" (LCD) implies, the display technology uses a substance that shares the same properties as liquids. It therefore can freeze if left in cold enough temperatures. In most cases however, it will also defrost without damage once returned to room temperature. Check the specifications for your LCD device and you'll find two temperature ranges given -- one for storage and one for use. LCDs will only work properly in a certain temperature range, and can usually be stored in a larger range with colder and warmer temperatures. Most LCDs can be stored down to -40F or up to 115F before damage occurs, but will only operate properly in a more comfortable 50F to 90F range. This varies by screen, so you'll want to check the specifications in your TV's manual. If your LCD is left out in the cold, make sure to allow it to rise to room temperature before attempting to power it on, and it should be just fine

FAQ's About Your RV Refrigerator

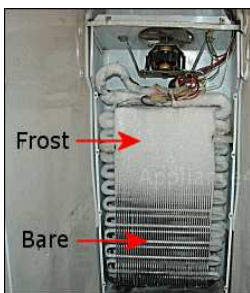


What maintenance should be performed on my refrigerator and how often?

Your refrigerator will give you years of trouble-free service if you do the following simple checks every three to six months. Refer to the operator's guide provided with your refrigerator for details.

Care Checklist:

- *Keep the food compartment and the freezer clean.
- *Defrost the refrigerator as necessary.
- *Make sure the door seals correctly.
- *Be aware of any cooling changes that are not because of weather, loading, or gas control changes. If changes occur, contact your dealer or service center.
- *Make sure the gas supply is LP gas only and not butane or a butane mixture.
- *When in LP gas operation, examine the appearance of the flame.
- *Make sure the air flow in the lower intake vent, through the refrigerator coils and condenser, and out the upper exhaust vent is not blocked or decreased.
- *Make sure the area behind the refrigerator is clear. Do not use the area behind the refrigerator for storage of any combustible materials, especially gasoline and other flammable vapors and liquids.



Why is frost on the interior cooling fins only on the right side?

It is normal to accumulate frost on the right side of the bank of cooling fins. The coldest part of the cooling fins are those on the right side of the refrigerator as viewed from the front. Gas/Electric refrigerators will build frost of varying amounts depending upon the environmental conditions (temperature and humidity), how often the doors are opened, and what is stored in them. Defrosting

is not required until a decline in performance is noted. Refer to your operator's guide: "Defrosting and Cleaning the Refrigerator Interior."

Can I defrost my refrigerator using a hair dryer, a heat gun, or boiling water?



Never use these items to defrost your unit. The use of any of these items may permanently damage the liner of the refrigerator. Please refer to owner's manual for model specific defrosting instructions.



What should I do to increase the speed of defrosting?

Place pans of warm (not hot) water in the refrigerator and freezer.

Can I use bleach to clean the inside of the refrigerator?



Do not use abrasive cleaners, chemicals, or scouring pads because they can damage the interior of the refrigerator. Wash the interior with a mild cleaner or a solution of liquid dish detergent and warm water. Rinse with a solution of baking soda and clean water.



At what ambient temps should I stop using my icemaker?

Stop using when temps reach 0 degrees Fahrenheit and store it.

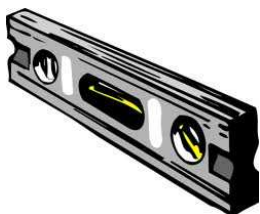
When should I turn my icemaker off?

The icemaker lever arm should be in "Off" position whenever you do not have potable water to the icemaker. Allowing the icemaker to operate dry may damage the mold.



Why doesn't my icemaker make ice when operating on LP mode?

The icemaker will produce ice as long as there is 108-132 volts AC available to the icemaker. Certain models have independent power sources just for the icemaker while others employ the same power cord as the one that supplies to the power board.



How level must the refrigerator be?

If you have a gas absorption refrigerator, normal leveling of the vehicle is sufficient. The refrigerator is made to operate within 3 degrees off level side-to-side and 6 degrees off level front-to-back (looking at the front of the refrigerator).

Does the refrigerator perform better on gas or electric?

The refrigerator is designed to operate efficiently on both gas and AC electric. The AC electric is dependent upon the AC input voltage to the refrigerator. Be sure that the input voltage is between 108 volts AC and 132 volts AC. The efficiency of the refrigerator while operating in the gas mode is dependent upon the correct burner flame. The burner flame requires correct



input gas supply pressure, air input, and burner and burner orifice cleanliness. Refer to the refrigerator's operators guide, "Refrigerator Maintenance and Care List."

My refrigerator cools well on AC but not on LP Gas. Why?

Most cases the decrease in LP performance is caused by a dirty burner. Burners must be properly maintained as outlined in your owner's manual. Service should be performed by a service center.

How soon can I load my refrigerator with food once I start it up?

On initial start-up, allow the refrigerator to cool between 8-12 hours on the coldest temperature setting before loading it with food. Warm foods, high ambient temperatures and frequent door openings will increase the cool down time. Do not cover the shelves with plastic, paper, etc. If the unit does not start to cool after two hours, contact your dealer or an authorized service center.

Why is the section between the freezer and food compartment warm to the touch?

The unit has heater(s) that prevent moisture from forming on the center divider between the two doors. This heater operates only when the refrigerator is ON.



Why does it require 12-volts DC to operate when using LP gas?

A 12-volt DC supply voltage is required to maintain the refrigerator's operating control function and the refrigerator's interior light.

How Do I Get My Refrigerator Ready for Winter Storage?



- Always check your owner's manual. However, the basic steps are:
- *Drain the RV water system.
 - *Disconnect the water lines from both the inlet and outlet sides of the ice maker's water valve.
 - *Drain the lines into a cup and allow the lines to dry.
Do not use antifreeze.
 - *Leave the door ajar, and you're done.

***PLEASE NOTE**– If you have a RESIDENTIAL STYLE refrigerator that has an icemaker, you must cycle antifreeze through the ice maker until PINK ice cubes are made to make sure that there is anti-freeze in all of the lines. This will take about 20 minutes on average.



Some Water Heater Tips



Flushing To Remove Unpleasant Odor

A rotten egg odor (hydrogen sulfide) may be produced when the electro galvanic action of the cladding material releases hydrogen from the water. If sulfur is present in the water supply the two will combine and produce an unpleasant smell.

1. Turn off the main water supply. Drain the water heater tank and reinstall the drain plug. Remove the pressure-temperature relief valve. Mix a solution of 4 parts vinegar to 2 parts water. (For a 10 gallon tank, use 6 gallons of vinegar to 3 gallons of water.) Using a funnel, carefully pour solution into the tank.
2. Cycle water heater with the above solution, letting it run under normal operation 4-5 times.
3. Remove drain plug and thoroughly drain all of the water from the tank. Flush the water heater to remove any sediment. You may flush the tank with air pressure or fresh water. Pressure may be applied through either the inlet or outlet valve on the rear of the tank or through the pressure-temperature relief valve coupling located on the front of the unit.



To Flush Tank With Air Pressure

To flush your tank using air pressure, insert your air pressure through the pressure-temperature relief valve coupling. With the drain valve open, the air pressure will force the remaining water out of the tank.



To Flush Tank With Water Pressure

Fresh water should be pumped into the tank with either the onboard pump or external water pressure. Continue this flushing process for approximately five minutes, allowing the fresh water to agitate the stagnant water on the bottom of the tank and force the deposits through the drain opening.

1. Replace the drain plug and pressure-temperature relief valve.
2. Refill the tank with fresh water that contains no sulfur.

If you use your RV frequently or for long periods of time, flushing the water heater several times a year will prolong the life of the storage tank.

Gel Coat Care

Fiberglass is a common term for fiber-reinforced plastic, or FRP, which is a plastic material, strengthened using glass fiber cloth and used on many RVs for sidewalls and caps. To give the fiberglass a smooth and shiny surface, a clear or colored gel resin material is applied to the outer surface. Gelcoat is available in many colors and is very durable, but it can become dull or faded as it weathers. Sunlight, heat and moist air combine to oxidize the gelcoat surface, fading it and making the surface cloudy. So how do you keep your fiberglass looking good? Simple, you clean and apply a top quality wax twice a year or every 3 months in cases where the vehicle is in constant exposure to the elements.

General Maintenance

Normal maintenance of your gel coated fiberglass RV is similar to the care you would give your automobile. In general, automotive cleaners and waxes work well. Do not use caustic, highly alkaline (high pH) cleaners or those containing ammonia. These cleaning agents may darken white or off-white weathered gel coat surfaces. The staining that results is a chemical reaction within the weathered gelcoat, and can be removed with a rubbing compound or by light sanding with 400 grit sandpaper followed by application of rubbing compound and waxing.

Cleaning

Periodic cleaning with a mild detergent product is necessary to remove normal accumulations of soil. This soil is the result of regular use of your RV as well as environmental pollutants, soot, smog, etc. General washing as needed prevents soil build-up, staining, etc.

Waxing

As the gel coat begins to lose its gloss from constant exposure to the natural environment and pollutants, it will require some special attention to restore the original gloss and color. After washing with mild soaps and detergents, a good polishing with a self-cleaning automotive wax will restore most of the original gloss. A fall and spring wax job is generally all that is needed to maintain the original appearance. If the surface has been allowed to weather badly, and cleaning and wax polishing does not restore the finish satisfactorily, then compounding will be necessary.

Compounding

Polishing compound (fine abrasive) or rubbing compound (coarser abrasive) is recommended for use on fiberglass RVs to remove scratches, stains, or a severely weathered surface. Polishing or rubbing compound can be applied by hand or by mechanical means, such as an electrical or pneumatic buffer. After the scratched, stained or weathered surface has been removed, it should be waxed to enhance the gloss and color while providing a seal to retard staining or new soil accumulation.

Removing the Discoloration

Discoloration of the gel coated fiberglass surface may occur if regular washing and waxing has been neglected. Discolored areas are very shallow in depth and, in fact, are on the surface. They can be removed by gently wet-sanding only the affected areas with 600 grit "wet or dry" sandpaper to remove the blemishes. Always sand in one direction, using plenty of water. After sanding, dry the areas and ensure all the discoloration has been removed. If not, repeat the process. Once all discoloration has been removed the affected surface area will need to be buffed. Buffing, using an electrical or pneumatically operated buffer at low speed (1750 rpm - 2250 rpm), will restore the luster to the sanded surface. Use a soft wool pad and apply a generous amount of rubbing compound using circular motion. When the buffing has been completed, wash off the rubbing compound with clean water. Dry the surface. Wax your RV with a high-grade automotive wax.

Water Heater Winterizing (Flushing) Instructions



To insure the best performance of your water heater and add to the life of the tank, periodically drain and flush the water heater tank. Before long term storage of freezing weather drain and flush the tank.

1. Turn off the main water supply (the pump or water supply hook up source).
2. Drain the water heater tank by removing the drain plug. If the water flows sporadically or trickles instead of a steady stream of water, we recommend the following action; first open the pressure-temperature relief valve to allow air into the tank and secondly, take a small gauge wire or coat hanger and poke through the drain opening to eliminate any obstructions.
3. After draining the tank, because of the placement of the drain plug, approximately two quarts of water will remain in the tank. This water contains most of the harmful corrosive particles. To remove these harmful particles, flush the tank with either air or water. Whether using air or water pressure, it may be applied through the inlet or outlet on the rear of the tank or the pressure-temperature relief valve. (If you are using the pressure-temperature relief valve the support flange must be removed). The pressure will force out the remaining water and the corrosive particles. If you use water pressure, pump fresh water into the tank with the assistance of the on-board pump or use external water for 90 seconds to allow the fresh water to agitate the stagnant water on the bottom of the tank and force the deposits through the drain opening. Continue repeating adding water and draining until the particles have been cleared from the water remaining in the tank.
4. Replace the drain plug and close the pressure-temperature relief valve. The approximately two quarts of water remaining in the tank after draining will not cause damage to the tank should freezing occur.

Winterizing Your RV

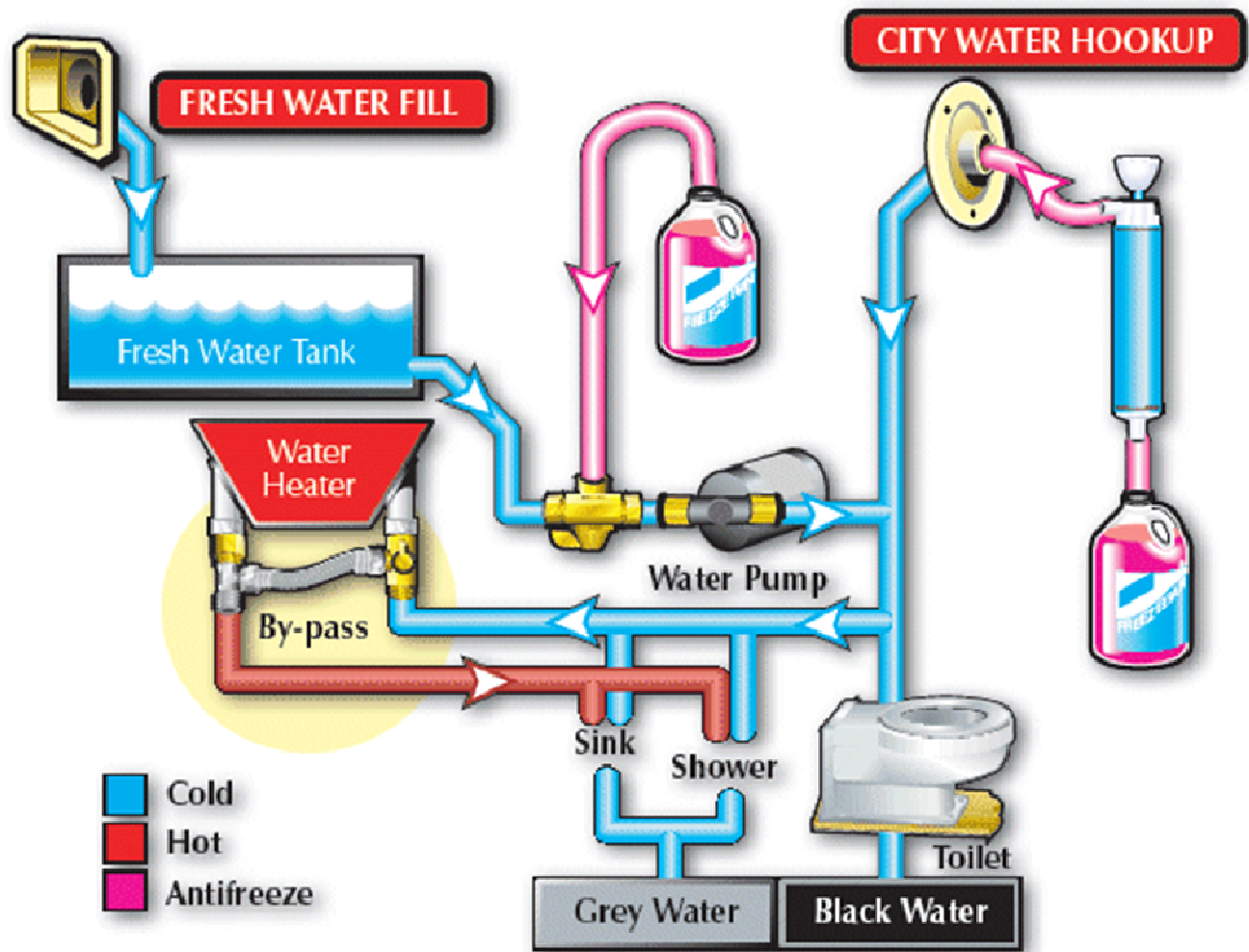
It's time to store your RV for the winter. Follow this guide to properly winterize and prepare your RV for long or short term storage. Note: use RV/Marine antifreeze for the winterization of your RV. It is safe for fresh water plumbing.

Let's begin by talking about how your RV water system works.

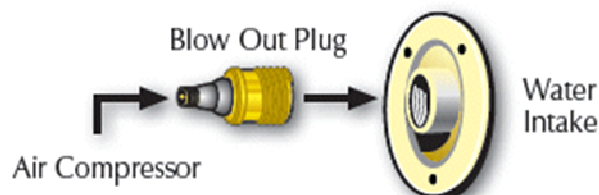
Your RV's water system draws water either from your fresh water tank and/or from the city water hookup. From the fresh water tank, a water pump is used to push water through the RV. (No pump is needed for water coming from the city hookup.) The water from the water tank and city water hookup will always be cold. To get hot water, the water must flow from your water pump into your water heater. The water is then heated and flows to your hot water fixtures such as sinks and shower. When winterizing your RV you will need to by-pass the water heater.

Winterizing Instructions

The following are general suggestions. **Read your owner's manual** for winterization methods specific to your RV.



1. **Disconnect the outside water source.**
2. **Drain the water system.** There should be up to three low-point drains. One for the cold water lines, one for the hot water lines and one for the fresh water tank. Open the petcocks to drain as much water from your pipes as possible. Open the water taps at all the faucets, showers and flush the toilet to drain any remaining water from the system.
3. **Drain Water Heater.** On the outside of your water heater either remove the drain plug in the lower left had corner or open the drain valve in the same location. By leaving a faucet open on the hot water side, air will equalize pressure and easily drain the tank. You may want to use a bendable straw to put into the drain hole while water is coming out to create a siphon which will drain almost all the water to the bottom of the rounded tank.
4. **Blow out the lines.** After draining as much water as possible, it is recommended that a blow out plug be attached to the City Water Intake. Apply air pressure from an air compressor (not to exceed 45 PSI) to drain the remaining water. Although blowing out the remaining water is not required, the remaining water will dilute your anti-freeze. Close all faucets and petcocks when complete.



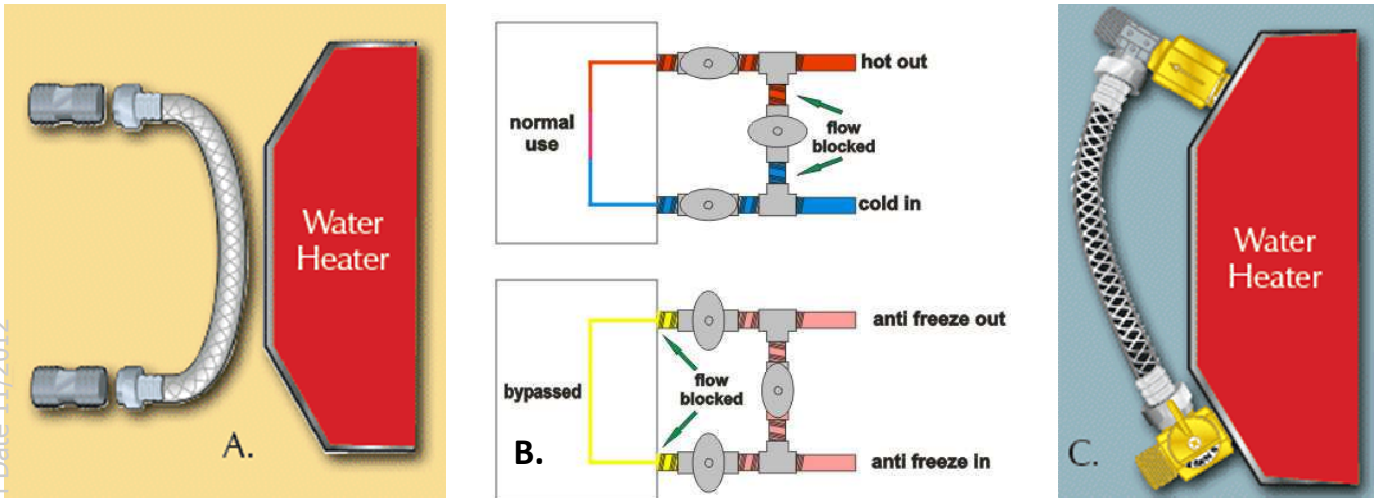
5. By-pass your water heater.

By-passing the water heater can save you money by not having to fill the water heater tank with anti-freeze, saving as much as 6 to 10 gallons of anti-freeze. Some RVs come with a by-pass system pre-installed but many do not.

Before you start:

- Make sure to turn off all power to the water heater (the electric water heaters usually have their own power on-off switch).
- Make sure the water heater gas pilot is NOT lit.

There are three methods for by-passing the water heater:

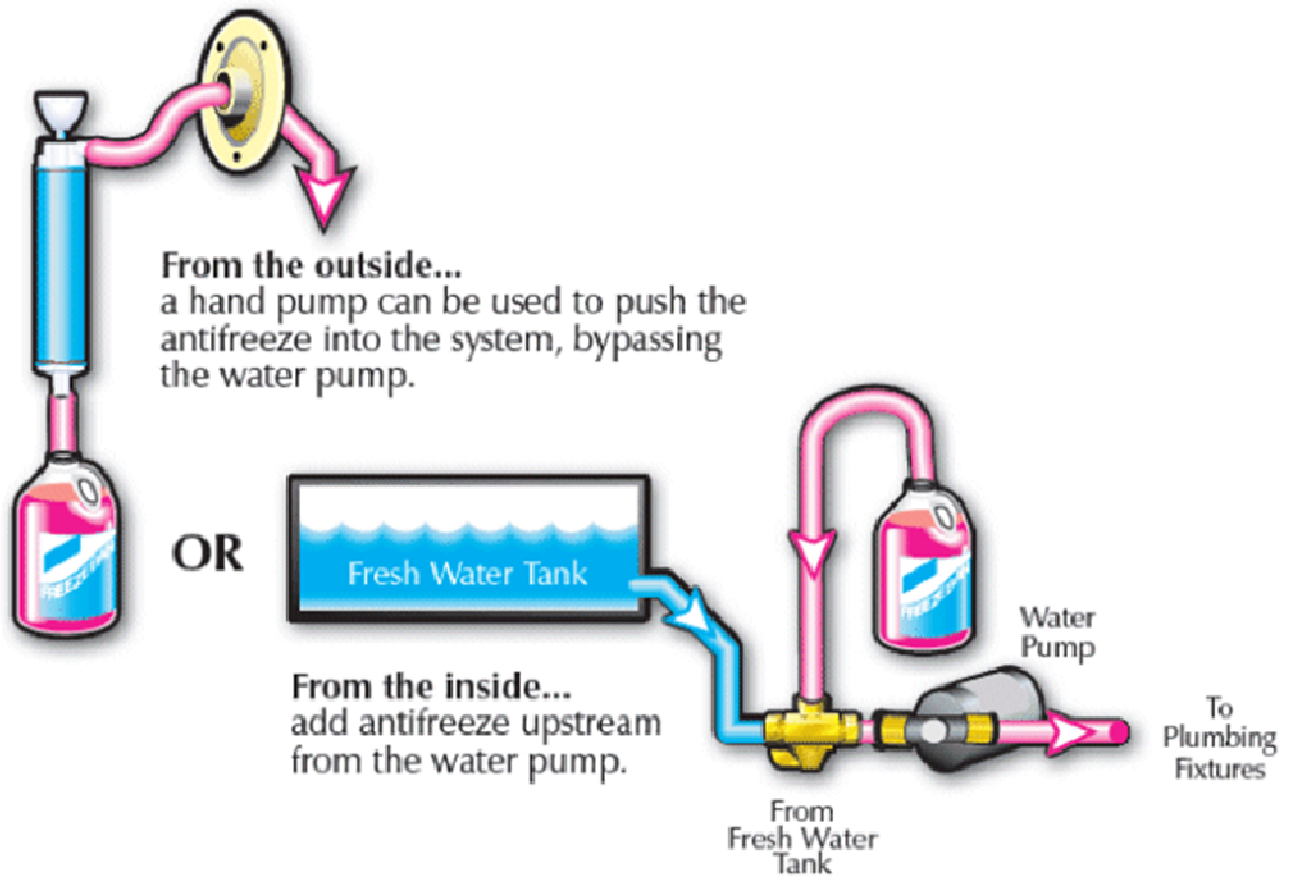


- Seasonal By-Pass Kit.** This temporary by-pass allows you to hook up for winterizing and remove in the spring for reconnecting the system. If your water heater does not have a by-pass kit installed you will need to use a temporary kit that has two male-to-male connections and a short length of hose to bypass the water heater.
- Permanent By-Pass Kit.** This is a simple and permanent installation of an elbow by-pass kit that allows you to quickly disconnect the water heater by turning two valves at both the cold water entry and the hot water exit of the water heater.
- Permanent Quick-Turn By-Pass Kit.** The easiest system to use is a permanent installation of a single valve and a back-flow preventer. The valve is located on the cold water entry and diverts water to a hose and past the water heater. A back-flow preventer is installed to prevent water from flowing into the water heater through the hot water exit.

6. **Add Anti-Freeze.** You can add anti-freeze either from the inside using a Water Pump Conversion Kit or from the outside using a hand pump. Be sure to check your progress by opening up one faucet at a time, starting from the highest and working to the lowest point in the fresh water system. Begin with the kitchen faucet. Open the HOT side of the kitchen faucet ONLY. Pump anti-freeze until flow from the faucet becomes very pink. This will indicate that all water has been flushed from your system. Close the faucet. Repeat on the COLD side. Continue to the next lower fixture. This is normally the bathroom sink, then the shower and finally the toilet. Don't forget your outside shower if so equipped. Also, open the two low point lines for the HOT and COLD water lines to make sure anti-freeze gets to the valves and that no water is trapped. Finally, close all faucets and the low point valves.

**** Note:** If you use the hand pump from the outside method, remember to manually add antifreeze to your water pump OR if you use the water pump conversion kit method, remember to manually add antifreeze to the water line and the city water intake check valve (this is done by turning off the pump,

removing pressure from the system by opening a faucet; then from the outside remove the screen at the city water intake and push in slightly on the check valve to purge any water from the line until pink anti-freeze comes out). **



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7. Pour at least 2 pints of anti-freeze into all sink and shower drains. The ice maker, washing machine and external shower will also need to be winterized. Look for this information in your appliance manuals.
8. Drain and dump your gray and black water tanks. Remove battery, charge and store in a safe location.
9. You are done winterizing. There are two options at this point.

Option 1. Leave the anti-freeze in the system until spring and then summerize. You should reinsert the water heater drain plug to keep dirt, debris and insects out of the water heater.

Option 2. Drain the anti-freeze out of the system by opening the low points in the lines and letting gravity drain the anti-freeze. When the anti-freeze is removed you can prepare your camper for summer use by closing the low points, putting the water heater drain plug back in and removing the water heater by-pass. There will either be nothing but air in your water system or some anti-freeze where it cannot drain. Either way, your water system will be protected for the winter and your camper will be ready to go in the summer. All you will need to do in the spring is run water into the system and flush the remaining anti-freeze from your water lines.

DO NOT ADD WATER UNTIL SPRING WHEN THERE IS NO CHANCE OF FREEZING.

Also remember the following:

- Remove any food that can spoil or attract mice from your RV.
- Clean storage areas, oven, range, refrigerator and areas around dinette.
- Examine seals around exterior doors and windows. Caulk if necessary.
- Check the roof for small leaks or other damage. Make repairs if necessary.
- Check plumbing vents, roof vents and air conditioner shroud.
- Disconnect your 120 volt line cord and store away.
- Add water to battery (if serviceable), charge, and disconnect battery cables.
- If possible, remove battery and store in a cool dry place. Cold weather will freeze a low battery.
- Clean and store your sewer hose.
- Replace bumper caps.
- Park with emergency brake on and use wheel chocks.
- Stabilize your RV. Make sure it does not rock when you walk inside it.
- Keep RV out of direct sunlight if possible.
- Now is a good time to wash and wax.
- Clean the awning. Do not use a dish detergent. They contain de-greasers which can cause your awning to dry out and crack. Use an awning cleaner that will clean, moisturize and remove mildew.



Sanitizing Fresh Water Tank

These are the steps to sanitize your fresh water tank:

1. Drain water tank completely, then refill halfway with clean, fresh water.
2. Mix $\frac{1}{4}$ cup of household bleach for every 15 gallons of tank capacity in a container with a gallon or two of clean water.
3. Pour this mixture into the water tank.
4. Top off the water tank with fresh water. Drive the rig around the block to mix the solution.
5. Pump water through each faucet so that all the lines are filled with the water/bleach mixture from the tank. Usually, running a quart of water out of each faucet is adequate.
6. The hot-water tank holds at least 6 gallons of water. Run the hot-water faucets until this much solution has passed to insure that the old water has been purged from the hot-water tank and it is now filled with the water/bleach solution from the water tank.
7. Let the water stand for four (4) hours.
8. Drain the entire water system, hot-water tank included.
9. To remove the bleach odor, dissolve one box of baking soda with four to five gallons of water and pour into the fresh water tank.
10. Fill the tank completely and pump this solution through the water heater and rest of the water lines. This solution can sit in the system for a few days. Driving the rig around the block will slosh water around and thoroughly clean the tank.
11. Drain the entire system and thoroughly flush with fresh water twice. Refill with fresh, clean water.

Rubber Roof Care and Maintenance



What does "EPDM" stand for?

Ethylene Propylene Diene Monomer

Is my roof going to oxidize and run down the sides when it rains?

Yes. It's suppose to. In a dozen years it may oxidize 10% of it's thickness. This is normal. Cleaning it at least 4 times a year using a medium bristle brush will greatly help.

Do I need special materials to maintain my roof?

No. We do recommend you use Greeneways' products for maintenance simply due to the fact that all of our products have been thoroughly tested and approved. We know the products are safe and effective for maximum care and maintenance of your roof. You can absolutely NOT use anything that is petroleum based!

What do I need to care for my roof?

Periodic cleaning. We recommend you stay away from anything that smells "fruity" or "flowery". These smells will attract birds, bees, squirrels, raccoons & other "critters".

How long can I expect my roof to last?

If properly maintained, the roof should last a minimum of 20 years. The membrane itself has been weather tested for 20 years.

What is the warranty of my roof?

Most Manufacturers offer a 10 or a 12 year warranty for the rubber membrane only. The warranty covers only premature deterioration to the point of failure due to weathering only. It does not cover the original installation or the (glue, lap Sealant, Butyl tape) to install the roof. It is a pro-rated warranty. The first 5 years would include parts and labor. Years 6-12 are pro-rated for material replacement only, no labor. This warranty is offered only to the original purchaser.

My roof has air bubbles. Is this normal?

Typically, if air bubbles occur they occur during or very soon after the roof has been applied. A couple of reasons for the air bubbles would be that they were not broomed out during application, and we ask the installer not to stretch the material during installation to allow for expansion and contraction of the membrane. Air bubbles will occur with weather conditions and humidity. Air bubbles can also occur at the seams of the roof decking due to flexing and twisting that occurs during transit. Sometimes they occur if there is a significant difference in the temperature between the inside and outside of the unit.

Will the air bubble effect the performance of my roof?

No. The air bubbles will not blow up and pop. They will come and go with the weather conditions, humidity, etc. Please do not puncture the air bubbles. Air bubbles mean there is room for expansion and contraction, lessening the chance of stress cracks later.

Is it easy to repair tears in the roof membrane?

Yes. Any tear in an EPDM roof membrane can be repaired using a number of repair methods.

If my roof has to be repaired, how long should I expect the patch to last?

If the repair is applied properly, the patch should last the duration of the membrane. It should be checked periodically.

Are there any other cautions concerning the roof membrane?

We would suggest you use extreme caution when working on the top of the vehicle. The wet membrane may be extremely slippery.

- Do not use cleaners or conditioners containing petroleum distillates, harsh abrasives, or citric based cleaners.
- Beware of areas where fruit, tree sap or harsh environmental fall-out may stay on the roof for an extended period of time. These conditions may result in unremoveable stains. You may have to increase the frequency of your cleaning or premature deterioration may occur.

CLEANING MOLD AND/OR MILDEW FROM RUBBER ROOFING MATERIALS NEEDED:

- BUCKET OF WATER
- SPONGE
- MEDIUM BRISTLE BRUSH
- TILEX BATHROOM CLEANER

There are no ingredients in EPDM rubber roofing that will promote the growth of mold and/or mildew. Atmospheric dirt, shade, sun, humidity and moisture are some of the contributing factors that form mold and/or mildew. Regular cleaning of your rubber roof will help prevent mold and/or mildew from forming on the EPDM roof. We recommend that you wash your roof an average of 3-4 times a year using a non-abrasive cleaner and a medium plastic bristle brush. Mold and/or mildew on your EPDM roof is simply a parasite that attaches itself to the roof and grows – similar to bathroom mold that grows in your shower. It does not attack the membrane but is unsightly and if allowed to grow will discolor the roof completely and may become a stain that cannot be removed. Please note, the removal of mold and/or mildew is not a job to be rushed.

- Cleaning lap sealant used around roof mounted accessories and railings: If soap and water do not clean the seal to your satisfaction, use a cloth dampened with mineral spirits to wipe away dirt build-up on the seal. HOWEVER, mineral spirits has petroleum based distillates so it is very important not to get any on the roof membrane.

- Repairing lap sealant or adding sealant: If, after a period or time, the lap sealant needs touched-up or additional seal is needed, use a cloth dampened with mineral spirits to eliminate all foreign materials from the surface of the seal, let set for at least 15 minutes and apply Dicor lap sealant directly over the existing seal – allowing the new sealant to touch the EPDM and/or accessory surface.

Cleaning Mold Off Canvas (Pop-Up Campers)



- Cover cushions with plastic as cleaning solution may get on the inside of the unit.
- Clean canvas with a solution of EITHER:
10% bleach and 90% water
OR
60% vinegar and 40% water
- Rinse canvas with clear water.
- Let dry.
- Take canvas off unit. Spray with waterproofing chemical.
- Let canvas dry just enough so you can work with it.
- Put canvas back on unit while still quite damp. (This is necessary because the waterproofing shrinks the canvas. If canvas is left to dry before it is put back on unit, it will no longer fit.)
- Leave unit set up until waterproofing is completely dry.



Cleaning Pine Sap Off Of Awnings & Campers

- First clean area with soap and water
- Spray WD-40 on sap and then let set for 30 seconds
- Wipe the pine sap off with a clean cloth

Manual Awnings

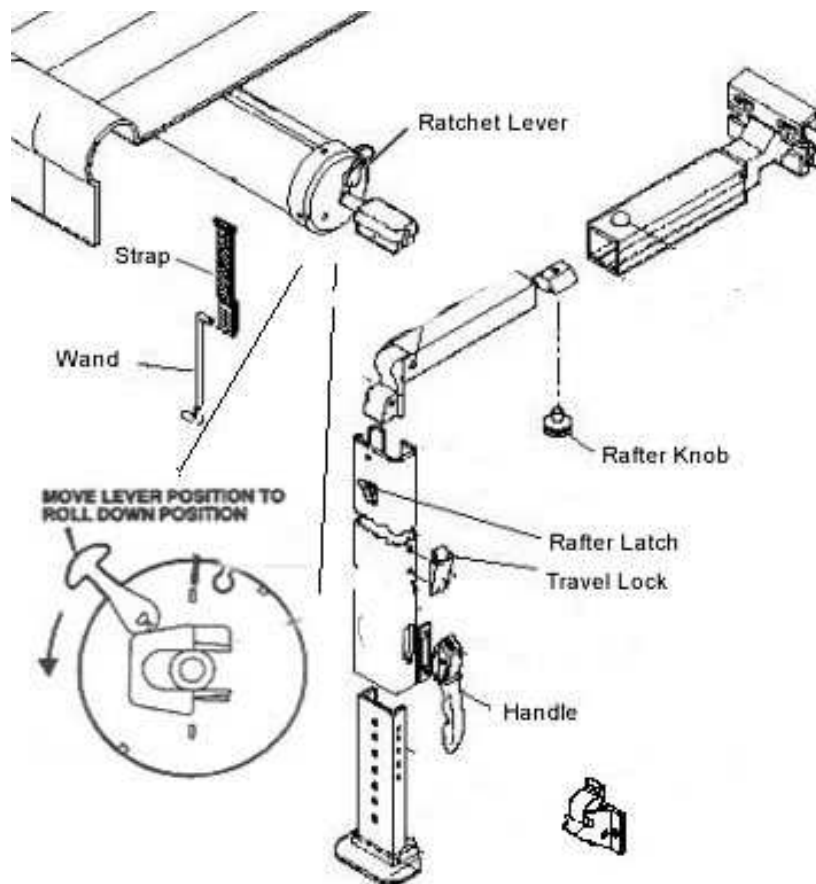
To put the awning out:

1. loosen the rafter knobs on both rafter arms
2. release the travel locks from the awning arms
3. move the ratchet lever to the "roll down" position
4. insert the wand into the loop of the strap
5. pull to roll down the awning completely
6. slide each rafter arm up the awning arms into the locked position
7. pull slightly on the lower portion of the rafter arm (to snug fabric) and snug the rafter knob, repeat on other side grab the handle on one of the awning arms, lift the awning arm to half the desired height, grab the other arm handle and lift to desired height, return to the first arm handle and lift to desired height

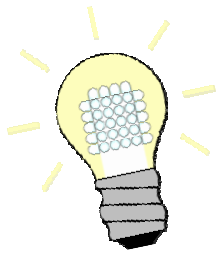
Remember that it is wise to keep one side slightly lower to allow water to run off.

To bring the awning in:

1. lower the awning using the handles in the reverse procedure as above
2. loosen both rafter knobs
3. pull on the rafter latch and slide rafter to resting position, repeat on other side
4. hold strap in left hand and pull slightly to help move the ratchet lever
5. move ratchet lever into the "roll up" position
6. while holding the awning from rolling up with the strap, slide the strap to the center of the awning tube
7. insert the wand into the loop of the strap
8. while holding the wand, slowly walk towards the camper, allowing the awning to roll up
9. latch the rafters to the awning arms
snug both rafter knobs



Go "Green" Camping



Lighting

Are LED's costly?

LEDs are more energy efficient than normal halogen bulbs (around 90% less) and can cut the usage demands on an RV, boat or off grid housing battery bank. They may also cut the costs of rising electric bills for the average household. On average, around 90% of the electricity consumed by an LED is converted into light, whereas a standard bulb only converts around 15%.

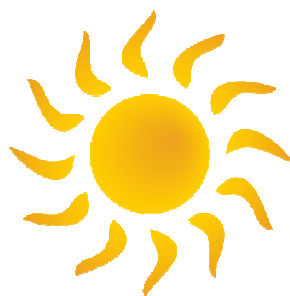
Although the initial cost is higher, the savings in battery power and long service lifetimes, typically 25,000 to 100,000 hours will more than recapture the cost outlay and even create savings in the long run. Good LED bulbs last about 60,000 hours, compared to a 1003 incandescent bulb which is rated to last 200 hours.

Are LED's good for the environment?

LED's are very energy efficient and reduce carbon emissions. In fact, you may never need to buy a replacement bulb again, so no more throwing burnt out bulbs in the trash. They are also ROHS compliant and mercury free, unlike florescent bulbs which contain a high amount of mercury and phosphor. This can create a health hazard if broken inside a living area or if disposed of incorrectly.

Do LED Bulbs give off any heat?

"LED BULBS" by design use heatsinks, which absorb the heat and move it away from the LED and allow the LED to operate at its optimum temperature. So "YES", LED bulbs can get hot but nowhere near as hot as incandescent or halogen filament type bulbs.



Solar



How long can I run my RV off of a solar panel?

Solar panels are designed to convert sunlight into electricity so they can only charge your batteries during the day. So how long you can run your RV off of your solar panels depends on three things:

- 1) The size, quality and efficiency of your solar panels
- 2) How big your battery bank is

3) How much electricity you use in your RV

Determining how much electricity you can use without running your batteries dead is the most important step. So what you want to do is figure out how the maximum power you would ever use in a day and then get an RV solar panel kit that provides you with 30% more than that.

How many batteries do I need to use solar power?

The best recommendation we can give you is to have at least a minimum of two batteries with your RV solar panel kit.

Think of it this way. If you had a gas station down the street giving away free gas, you would bring as many cans as you could transport. The same thing goes for solar power. Since sunlight is totally free, you have the opportunity with your RV solar panels to collect and store as much of that free fuel as you can.

So the answer to your question is to store as much as possible. A larger bank of batteries will make sure that you have plenty of power on hand especially if you run into a few days of clouds where the solar panels can't produce as much power.

Can a solar panel operate my microwave?

Absolutely! However since both the RV solar panels (and the batteries it charges) creates only on direct (DC) current, you'll need an inverter. An inverter is a device that takes the direct current (DC) from your batteries and converts it to alternating current (AC) so you can run your 120 volt appliances (like your microwave) in your RV. The great thing is the silent combination of solar power, batteries, and inverter can eliminate the need for ever running a noisy polluting generator.

What is an inverter?

An inverter is a device that takes battery power (DC) and converts it to household power (AC). There are two different types of inverters:

- * Modified sine wave inverters were the earliest type of inverter. They produce AC power, but not perfectly. Many devices will not work properly when powered by a modified sine wave inverter.
- * Pure sine wave inverters or true sine wave inverters, produce a perfect replica of AC power. They will run any AC appliance within the wattage range of the inverter and will not cause you the grief a modified sine wave inverter can bring you.





Adjusting The Day/Night Shades

When the Day/Night shade is correctly adjusted, you should be able to raise the bottom rail and have the center rail stay in the upper position. When the shade is put together and properly set, it should last a long time.

Friction is the biggest problem—a nylon cord through a nylon or brass bushing. The faster the shade is raised, the faster it will wear out.

- Hang the head rail of the shade in the top of the valance.
- Screw the cord retainers to the wall
- Feed the cord through the cord retainer to take up slack or excess cord. Pulling the cord through too fast will damage the retainer.
- After removing the slack, mark the spot where the cord exits the retainer hole.
- Remove the screw and tie a knot in the cord 1/4" tighter (higher) than your mark
- Repeat the previous step on the opposite side
- Replace the cord retainers and slowly operate the shade.
- If more tension is required, loop one side of the cord around the cord retainer. Another method is to loosen the retainer screw and rotate the cord retainer to adjust the tension

Make a List...Check It Twice

On the next few pages you will find a variety of lists. We hope that these might help you in organizing your next trip. Each list is on a separate page so that copies can be made for each one. One of the most frustrating things is to get to your vacation destination and realize that you have forgotten something important. Here's hoping you find them useful!



Basic Trailer Equipment Checklist



- Barbecue supplies
- Barbecue tools
- Battery jumper cables
- Campground directory or mobile app
- Emergency road kit with approved reflectors
- Extension cords and Electrical Adaptor
- Extra bulbs
- Extra fuses
- Fire extinguisher
- First-aid kit
- Flashlight and batteries
- Folding chairs
- Water Pressure Regulator
- Good set of tools
- Hydraulic and/or scissors jack suitable for weight of your vehicle's heaviest tire
- Leveling blocks or boards
- Matches or lighter
- Rags
- Rubber gloves
- Sewer hose with hookup fittings
- Shovel
- Spare fuses
- Tire-pressure gauge
- Water hose (designed for drinking water)
- Wheel chocks

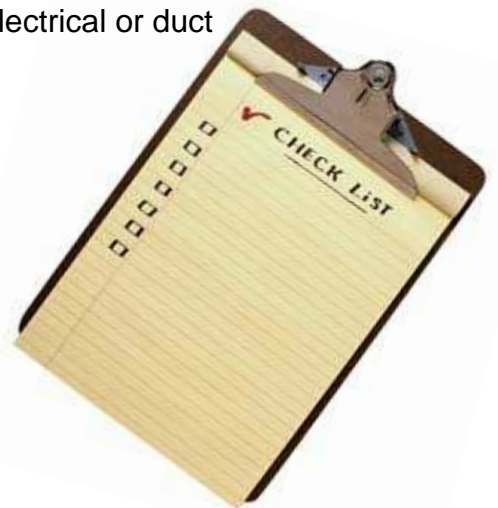
Kitchen and Bathroom Checklist

- Aspirin
- Baking soda
- Bath towels
- Can opener
- Cleaning supplies
- Coffee Pot
- Deodorant
- Hand lotion
- Hand soap
- Holding-tank chemical
- Insect repellent
- Insect spray or pest strips
- Knives
- Lip balm
- Measuring cups
- Napkins
- Paper towels
- Peroxide or antiseptic
- Personal items
- Plastic wrap and foil
- Pot holders
- Salt and Pepper
- Serving bowls
- Shampoo
- Sponges
- Sugar
- Sunscreen or sun block
- Table settings (plates, cups, silverware)
- Toaster
- Toilet paper
- Toiletry kit
- Toothpaste
- Trash can or trash liners

Nice To Have Extras Checklist

- Alarm clock
- Axe
- Bungee cords
- Extra extension cords
- Eyeglass repair kit
- Paper clips
- Pens and pencils
- Playing cards and games
- Pocket knife
- Rope
- Rubber bands
- Tape, electrical or duct
- Wire

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Pre-Trip Checklist

- Dump holding tanks if dump station is available
- Roll up and store awning, power cords and hoses
- Close and secure all windows, vents, doors, drawers and hatches
- Check roof rack or storage pod
- Lower TV antenna/satellite dish
- Lower any roof vents
- Retract entry step
- Secure interior: items on counter tops, refrigerator/freezer doors
- Turn off water pump
- Turn off air conditioner
- Turn off furnace (unless required for winter travel)
- Turn off water heater (close pilot)
- Shut off all gas pilot lights
- Lock refrigerator door
- Retract stabilizers or jacks; store wheel chocks
- Pull in any slide-outs
- Be sure inside weight is evenly distributed
- Check lights/turn signals, tires and engine oil
- Drain hoses and stow
- Disconnect any electrical cords and stow



Troubleshooting Tools Checklist



- 1/2 inch drive socket set
- 3/8 inch drive ratchet set with sockets
- Clean rags
- Combination wrenches
- Common sizes of screwdrivers
- Duct tape
- Electrical circuit checker
- Electrical test light or digital multimeter
- Extra cotter pins
- Extra fuses and light bulbs
- Extra hoses
- Flashlight
- Hammer
- Jumper Cables
- Locking pliers
- Motor oil and automatic transmission fluid - a few quarts of
- Needle-nose and regular pliers
- Pocketknife
- Spare electrical wire in several gauge sizes, a wire crimper, butt connectors and wire splicer
- Spare fuses
- Spark-plug socket (check your engine's size)



Automatic roof mounted satellite systems.
Watch LIVE TV while traveling down the road!



No set up or storage space required!

Ready whenever you are, Road Trip automatic antennas provide an easy one-button on/off operation. If you are looking to enjoy LIVE television while traveling down the road, then an in-motion antenna is the solution. Whether you want a 15.6" or 12.9" dome height, you can be certain that a RoadTrip antenna will deliver solid and reliable performance for all of your road trip adventures!

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The Best of the Best!

TRAV'LER Satellite Antennas are designed to bring
you EVERYTHING that satellite television offers.

Unique multi-satellite viewing capability so you can enjoy any program on any TV at the same time!

Perfect for families with different television viewing needs and the only automatic solution for DIRECTV HD. TRAV'LER antennas work great with DVR's allowing you to watch pre-recorded shows even while traveling down the road. Made with approved and certified reflectors, these antennas provide the strongest signal strength on the market and are built for long lasting durability.



How It Works

The Tailgater Portable Antenna connects to the HD solo receiver using a single coax cable (include) and brings live satellite television service from inside your home to the great outdoors.

Setup

Setup for the Tailgater Portable HDTV System is easy. After connecting your devices as instructed in the User Guide and Quick Reference Guide, follow the on-screen instructions. The tailgater will automatically find the satellite orbital locations for your DISH Network programming. When you're done watching, simply power down the Tailgater and receiver, disconnect the cables and take your system with you. It's portable and lightweight, so it's easy to carry from one outdoor activity to the next.

Note: The Tailgater Portable HDTV System will only operate within the 48 contiguous United States.

Features

- Supports both HD and SD programming
- Display resolutions 480i, 480p, 720p, 1080i
- Portable and lightweight with built in ergonomic handle
- Compact to fit in any space
- Weather-resistance cover.
- Integrated security bracket.

List of Appliances by Room or Type	Wattage
Kitchen	
Can Opener	175
Carving Knife	90
Coffee Maker	900
Deep Fat Fryer	1,500
Food Blender	390
Waffle Iron	1,100
Food Mixer (hand and table)	100
Frying Pan	1,500
Hot Plate	1,320
Kettle	1,500
Microwave Oven	1,000
Toaster	1,150
Toaster Oven	1,250
Lighting	
Heat Lamp (infrared)	250
60 Watt Incandescent Lamp	60
Compact Fluorescent-60 Watt Equivalent	18
Ceiling Fixture - 3 x 60 Watt Bulbs	180
Tri-Light (table lamp)	100
Sun Lamp	280
Bedroom & Bathroom	
Electric Blanket	180
Hair Dryer (portable)	1,000
Heating Pad	65
Shaver	15
Toothbrush	10

Iron	1,000
Sewing Machine	75
Home Entertainment	
Computer - Monitor & Printer	200
Stereo	30
Television	80
Video Recorder (VCR) DVD Player	40
Heating & Cooling	
Air Conditioner 13,000 BTU*	1,500
Dehumidifier	350
Electric Heater (portable)	1,000
Fan (portable)	115
Humidifier (portable)	100
Indoor - Miscellaneous	
Ceiling Fan	60
Clock	5
Drill	300
Floor Polisher	300
Power Saw	275
Vacuum Cleaner (portable)	800

Notes:

BE A HAPPY **CAMPER.**
TRAVEL AND EXPLORE.

BE EXCITED ABOUT THE
OPEN ROAD AHEAD BUT
WANDER FROM IT OFTEN.

DON'T BE AFRAID TO GET LOST -
YOU MAY FIND YOURSELF.

ARRIVE. STAY. MOVE ON.
LEAVE NOTHING BEHIND.

SHARE YOUR DREAMS
WITH **PASSION** TO INSPIRE OTHERS. **ENJOY.**

CREATE. LOVE. BE FREE.

SIMPLIFY YOUR LIFE IF ONLY FOR A SHORT TIME.

ENJOY STYLE AND FUNCTION.

CARRY ONLY WHAT'S PRECIOUS TO YOU.

LIVE. LOVE. **LAUGH.** SHARE. PLAY.

SMELL THE CAMPFIRE. RESPECT NATURE.

LOVE FAMILY, FRIENDS AND PEOPLE YOU MEET ON THE ROAD. FORGET THE WORLD.

PAUSE. SWITCH-OFF. REFLECT. FOR A TIME BECOME

STARGAZE. **TRULY HAPPY.**
SHARE OUR INSPIRATION