WINTERIZING RV

ALL MODELS – 1st STEPS

1. Bring in Coffee Pot if susceptible to freezing
2. Bring any other items (e.g. dishwashing liquid, first aid supplies) that may be susceptible to freezing
3. Remove all food items from your RV. That includes boxed dry goods as well as canned goods. Cans can freeze and split, and dry goods will keep winter rodents fat and happy.
4. Account for critters. (Bounce, Poison, Traps, Fresh Cab, Electronic repeller, etc.)
    a. Setting a good multiple catch mouse trap will keep your RV secure as four-legged intruders try to make their home inside your RV
    b. Plug holes with steel wool and tape to make entry harder
5. Drain the fresh water tank
6. Turn OFF all power and propane to water heater
7. OPEN low-point water drains. Turn on water pump briefly to help drain lines. CLOSE when water ceases to drain from them (will reopen later).
8. Drain the Water Heater (leave Drain plug OPEN if a petcock, OUT if a plug)
9. Siphon water out of bottom of heater with ½" clear hose if possible
10. Bypass or remove all water filters
11. If you are not leaving your coach and refrigerator plugged in, prop refrigerator and freezer doors open

I: WINTERIZE WITH AIR

NOTE: One DOAI person blows out the system, then waits 24 hours and does it again to eliminate residual water.

NOTE: At least one other person used on-board coach air **(See Q/A Topic 1 for instruction)**.

1. Attach air compressor to city water inlet
2. Leave NORMAL/BYPASS valve in NORMAL position initially
3. Set air pressure to 40-55 PSI (err on the low side unless you know for certain that higher pressure is safe)
4. After the compressor runs for a few minutes (steps 3 & 4 are to clear the water line to water heater inlet), change NORMAL/BYPASS valve to BYPASS position and let pressure build to your pressure setting
5. Starting with farthest from water inlet, run water from each **hot** water faucet until only air escapes
    a. Bathroom sink(s)
    b. Shower/Bathtub
    c. Kitchen sink
    d. External shower if equipped
6. Close all hot water faucets and repeat step 3 for **cold** water faucets
    a. Include clearing water from lines to toilets
    b. Include toilet spray nozzles
7. With everything else closed, open the fresh water fill valve and blow air/antifreeze toward the fresh tank. (Thank you Marv McIntosh)
8. Pour a cupful of antifreeze in each sink drain and toilet. Flush toilets to put antifreeze on the valve mechanism
9. Winterize wash machine, dishwasher, ice maker, refrigerator water as appropriate
10. After winterization is complete and before disconnecting wash machine hoses (if planned), run about a cupful of antifreeze through water pump to protect it.
11. When all winterization steps (including appliances) have been completed, re-open low point drains and all faucets. This provides potential path for expansion and protects fittings if any residual water remains in the system freezes.

A: Dishwasher

a. With air pressure in the system, start the washer cycle to push water in the lines into the washer. If water in bottom of washer is significant, run on RINSE cycle to drain before next step.
b. With the machine power OFF, pour 2 cups of RV-type antifreeze into the bottom of the dishwasher
c. Run the dishwasher RINSE cycle to drain the antifreeze through the drain system

B: Residential Ice Maker

a. With pressure in the system, activate the ice maker. Run water through door water outlet if equipped.
b. Listen for air coming out of ice maker and/or water receptacle **(Q/A Topic 2 about alternate method)**
c. NON-RESIDENTIAL water dispenser and ice maker **(See Q/A Topics 4 & 5 for instruction)**

C: Washer

a. With air pressure in the plumbing system, start NORMAL wash cycle with temperature setting to WARM. This will open both the hot and cold water valves and allow air to push water in lines into the washer. If there is significant water in the drum, drain before next step.
b. Terminate cycle when lines are clear
c. Turn the machine power OFF and pour 2 cups of RV-type antifreeze into the washer drum
d. Close the door
e. Advance the Program Selector knob to a SPIN position. Cycle the washer in SPIN position to drain the antifreeze through the washer pump. Some newer washers might have a DRAIN button.

NOTE: If you are going to disconnect hoses or lines, do it **after** all other winterizing steps are done. Flag a note somewhere obvious to remind you when you unwinterized that you have disconnected hoses.

f. Turn the water supply hoses OFF and disconnect the inlet hoses from the faucets if they are accessible. Drain any remaining water from the hoses. (My 40E has an access panel secured with 4 small screws in the closet next to the washer)

II: WINTERIZING WITH ANTIFREEZE (3-5 GAL)

1. Change the hot water bypass from NORMAL to BYPASS (if you don't have a bypass, you can purchase one from Valterra)
2. Insert a line from water pump inlet to a jug or bucket containing RV antifreeze. (I had a separate line with a valve installed so I need only change the valve position to draw from the jug or bucket rather than the fresh water tank. Kits are available or you can fabricate your own.)
3. Starting with farthest from pump, run water from each **hot** water faucet until pink liquid flows
    a. Bathroom sink(s)
    b. Shower/Bathtub
    c. Kitchen sink
    d. External shower if equipped
4. Repeat #2 with **cold** water from each faucet
    e. Include toilets
    f. Include toilet spray nozzles
5. With everything else closed, open the fresh water fill valve and blow air/antifreeze toward the fresh tank. (Thank you Marv McIntosh)
6. Where the water hose hooks up to the wet bay for your fresh water take a punch or something like a pen and there is a spring-loaded ball valve at the female fitting. Push it in until pink stuff comes out to clear that small amount of water from the fitting (Thank you, Joe Jones) **(Q/A Topic 6 – see photo)**
7. Pour a cupful of antifreeze down each drain and toilet. Flush toilets to put antifreeze on the valve mechanism
8. Winterize wash machine, dishwasher, ice maker, refrigerator water as appropriate
9. When all winterization steps (including appliances) have been completed, re-open low point drains and all faucets. This provides potential path for expansion and protects fittings if any residual water remains in the system freezes

A: Dishwasher

a. Run the washer Rinse cycle to push antifreeze in the lines into the washer
b. Verify the liquid in the bottom of the dishwasher is pink
c. Antifreeze will drain via washer pump at end of RINSE cycle

B: Ice Maker

NOTE: I do not know how to winterize non-residential type ice maker/door water, but think you have to remove the solenoid. If someone will send me detailed steps, I'll update this list.

a. Activate the ice maker and let it run until you make pink ice cubes **(Q/A Topic 3 about pink; Q/A topic 2 about alternate method)**
b. Run water through door water outlet if equipped until it is pink

c. NON-RESIDENTIA water dispenser and ice maker **(See Q/A Topics 4 &5 for instruction)**

C: Washer

a. Start NORMAL wash cycle with temperature setting to WARM. This will open both the hot and cold water valves and allow antifreeze into the washer.
b. Terminate cycle when liquid entering the machine is pink
c. Advance the Program Selector knob to a SPIN position. Cycle the washer in SPIN position to drain the antifreeze through the washer pump. Some newer washers might have a DRAIN button.
d. Turn the water supply hoses OFF and disconnect the inlet hoses from the faucets if they are accessible. (My 40E has an access panel secured with 4 small screws in the closet next to the washer) **NOTE:** If you are going to disconnect hoses, do it **after** all other winterizing steps are done. Flag a note somewhere obvious to remind you when you unwinterized that you have disconnected hoses.

D: Splendide Washer/Dryer

a. With the machine's power OFF, turn the WASH TEMP knob to HOT
b. Advance the Program Selector to REGULAR in Cotton Heavy Duty
c. Press the ON/OFF Button (IN) and let the machine fill until anti-freeze is in the drum
d. Advance Program Selector to RESET. Wait 5 seconds (Status/Door Lock LED will blink)
e. Advance Program Selector knob to a SPIN position. Let the antifreeze drain from the drum.
f. Advance Program Selector to RESET. Wait 5 seconds (Status/Door Lock LED will blink).
g. Turn the Wash Temp knob to COLD
h. Advance the Program Selector to REGULAR in Cotton Heavy Duty
i. Let the machine fill until you see anti-freeze in the drum
j. Advance Program Selector to RESET. Wait 5 seconds (Status/Door Lock LED will blink).
k. Advance Program Selector knob to SPIN. Let the antifreeze drain from the drum.
l. Press the ON/OFF Button (OUT)

UNWINTERIZING RV (in development)

1. ***ALWAYS BE LOOKING FOR LEAKS AT EVERY STEP DURING THIS ENTIRE PROCESS***
2. **CLOSE** low-point water drains
3. Change water heater bypass valve from BYPASS to **NORMAL FLOW**
4. Replace or reinstall all water filters (If bypassed, reconfigure for normal flow)
    a. Main whole house canister filter in water bay
    b. Refrigerator
    c. Any under-sink filters
5. Insert water heater drain plug and close pressure/temperature relief valve (If you have an anode rod, now is the time to inspect and/or replace it)
6.
7. Open hot water faucet near water heater
8. Turn on water source
9. Fill water heater maker **(See Q/A Topic 7 about necessary expansion pocket)**
10. Close hot water faucet when water heater is full
11. Run water through each hot and each cold-water outlet (faucets, shower, outside shower, toilets) until it no longer runs pink or until the air has been purged from the system
12. Turn Propane on
13. Perform **Post-Unwinterization Inspections (See inspection steps below)**
14. Replace items that were susceptible to freezing and removed during winterization
    a. Coffee pot
    b. Dish soap
    c. First-aid supplies
    d. Make-up

A: Dishwasher

a. Turn the input water line valve (if equipped) to dishwasher to **NORMAL FLOW** position
b. Run dishwasher through a **FULL** cycle to clear antifreeze or air and verify proper operation

B: *Ice Maker*

a. Set input water line valve to ice maker/refrigerator to **NORMAL FLOW** position
b. Activate the ice maker. Make ice until ice is clear (no pink if antifreeze was used)
c. Verify ice maker and water dispenser are working properly

C: Clothes Washer

a. Reconnect water hoses if they were disconnected during winterization
b. Turn faucets on if they were turned off during winterization

c. Run washer through a **FULL** cycle to remove pink antifreeze and ensure proper operation

D: Splendide Washer

a. Reconnect the water inlet hoses to the proper HOT/COLD faucets if you have previously removed them. Be sure to verify that the gaskets and hoses are in good shape and that no leaks exist. Turn the faucets ON.
b. Plug the washer-dryer's power cord back in if disconnected, or reconnect the power supply.
c. With the ON/OFF Button in the OFF position (OUT), pour 1/2 TBSP. of powder detergent (or liquid equivalent) into the "Detergent" compartment inside the Dispenser Drawer.
d. Advance the Program Selector to an EXPRESS cycle.
e. Press the ON/OFF Button (IN) and allow the machine to run through the complete cycle to clean out any remaining antifreeze.

POST-UNWINTERIZING INSPECTIONS

These are the things you should do or check after unwinterizing and before the first time out. You decide. More detailed instructions are available if needed.

A: Galley Stove

a. Have patience. Idea is to light the burner – not ignite the air around and above it.
b. Verify Propane is turned on
c. Attempt to light one galley stove burner
d. Push knob in until you smell propane (rotten egg smell)
e. Wait at least 2 minutes (5 is better), then attempt to light the burner
f. If burner doesn't light in a few seconds, wait a few minutes, then try again.
g. After 1 burner lights, exercise the other burners to verify each operates correctly

B: WATER HEATER

a. Turn on water heater using propane source to verify water heater flame ignites and stays lit for about at least a minute (if it stayed lit that long, it is probably working right)
b. Shut off water heater and turn back on, this time with electric source, and leave on to verify that it is heating the water fully

E: Water Heater (Sanitize)

a. Turn off water heater sources (electric and gas)
b. Bypass Valve should be in NORMAL FLOW position
c. Drain the water heater and reinstall the drain plug
d. Remove the pressure/temperature valve
e. Make a mixture of 65% white vinegar to 35% clean water and fill water heater (10 gal water heater requires about 6 ½ gal of solution)
f. Using funnel or other innovative idea, pour mixture into pressure/temperature (P/T) valve opening
g. Turn on water source and run through a few cycles
h. Reinstall P/T valve in water heater
i. FMC magazine recommends running through hot water lines until vinegar is smelled; I am not sure this step is necessary **(comments??)**
j. Open P/T valve and remove drain plug to drain tank – allow water source to continue running into tank to carry remaining sediment out
k. Use a water heater flush attachment to flush the inside of the water heater.
l. Reinstall drain plug and let water heater fill

E: Fresh Water Tank (Sanitize)

a. Remove filters or replace them after sanitizing
b. Drain Tank
c. Mix ¼ to ½ cup bleach/15 gal water and refill tank

d. Turn hot water heater bypass to the BYPASS position
e. Using water pump run water through the entire system
    1. Showers
    2. All sink faucets
    3. Toilets
    4. Refrigerator water/ice maker
f. Let it sit for at least 4 hours; overnight is better
g. Drain fresh water tank and refill
h. Run fresh water through entire system until no bleach smell
i. If needed, repeat drain/refill/system flush again

D: Batteries (Exercise proper battery safety at all times)

a. Clean batteries and compartment with baking soda/water solution and rinse
b. Top off distilled water in house batteries
c. Check battery connections for corrosion; clean if necessary
d. Verify battery connections are all secure

E: Tires (Have them professionally inspected every two years)

a. Inspect for (especially abnormal) wear
b. Inspect sidewalls for weather cracks filters or replace them after sanitizing
c. Check air pressures (based on corner weights if you know them)

D: Miscellaneous

a. Inspect carefully for any signs of critters
    1. Webs
    2. Droppings
    3. Etc.
    4. Clean and disinfect if necessary
b. Smoke, Propane, Carbon Monoxide Detectors
    1. Know where they are and what each is for
    2. Replace batteries annually if battery operated; test each detector and always test before each trip
c. Lubricate locks with graphite-based lubricant
d. Lubricate all step joints (TBD What kind of lubricant? I think silicon NOT recommended)
e. Clean and lubricate Jacks
f. Check (particularly on roof) for cracked or pealing sealants (Be sure to use the CORRECT sealant for any resealing)
g. Inspect, clean, and treat rubber seals. (TBD: What do we treat with?)
h. Inspect windshield wipers and replace if necessary
i. Fill windshield washer reservoir
j. Check around windows for leaks

DISCUSSION/Q & A

Q/A No. Locator	Topic	Discussion
Q/A-1 Notes	Use of on-board air to winterize.	I thought I would share what I put together last year to blow out my water lines that has a regulator on it so you could use your on-board compressor. It is basically a paint spray gun regulator from Lowes, a dishwasher supply line with a 3/4" female to 3/8" male connector and a garden hose quick disconnect coupling from where the garden water hoses are located in the store. Two 3/8 " air chucks. I had most of this around the house and if you go out and buy all of it would be around $35 - 40 dollars not cheap but should be a onetime buy that should last for many seasons. One picture is of my onboard air quick connect in my front street side cargo bay. (Thank you, Joseph Jones)
Q/A-2 I-B-a II-B-a	Alternative method for residential water dispenser & Ice Maker	I am able to empty the water line to the icemaker by putting a glass at the water dispenser and flushing it until only air comes out. Then I turn the shut off valve to the Icemaker that on my coach is under the stove, pump the pink antifreeze in the water lines up to the shut off valve. When I de winterize I disconnect the supply line to the Icemaker connect a spare supply line to the shutoff valve and put the other end in a bucket and flush the water line out until it runs clean of pink. Then reconnect the supply line to the Icemaker. That way I don't have pink antifreeze in my Icemaker lines or my $50.00 water filter in my refrigerator. Sounds like a pain others may not agree or have a different or better way but that's how I do mine. (Thank you Joe Jones)
Q/A-3 II-B-a	Residential Icemaker -pink antifreeze	Running pink liquid through icemaker will not freeze antifreeze solid, but may produce slush, which will collect in ice storage pan. Seeing the pink assures you that antifreeze has gotten to the icemaker. Downside is inconvenience. It can leave an aftertaste and you'll need to make several trays of ice cubes until you clear the line and taste when you un-winterize. (Thank you, Jason)
Q/A-4 I-B-c II-B-c	Non-Residential Ice Maker	Don't let pink stuff get in the upper part of the ice maker. There is no valve at the top of the ice maker hose so all you have to do is remove it from the solenoid and all the water runs out. Leave it disconnected all

		winter. Remove the hose which goes in side of the solenoid and most if not all of the water will dribble out of the solenoid valve. You can loosen it and turn it over to shake out the last drops. The supply line comes from below and can be winterized with **either** air or pink stuff. Leave it off the ice maker solenoid all winter but don't forget to put it back on before turning on the water next spring or you'll be sopping up some water behind the fridge. (Thank you, Gary Osburn)
Q/A-5 I-B-c II-B-c	Non-Residential Ice Maker	I just completely remove the solenoid and put it in my shop. I remove the water filter underneath the sink and blow the water out if the ice maker feed line. The line from the solenoid to the ice maker will drain by gravity. (Thank you, Ross Murphy)
Q/A-6 II-6	Winterization: Input water check valve	Photo of check valve: (Thank you Joe Jones) 
Q/A-7 Unwinterizing step 10	Required air pocket in Water Heater	Excessive dripping from the pressure/temperature valve could indicate a bad valve, but also could indicate that the expansion area inside the tank has filled with water. This occurs in all water heaters over time due to the chemical reaction between water and the air in the expansion area. It is easy to rectify 1. Turn off the water heater and sources 2. Open hot water faucet in RV 3. Open the Pressure/temperature relief valve 4. Close the P/T valve when water stops dripping from the opened valve 5. Turn on water sources 6. Close faucet in RV 7. Restart water heater