

DRAFT - Quest for the Perfect 3 way Fridge

Gas absorption refrigerators can be temperamental beasts. But for RVing they are the way to go. Running on propane they can go weeks on a tank of propane. They can run on shore power when available and one 12 volt power when driving (don't try this when parked without hookups, the fridge will drain your battery in a couple of hours).

But gas absorption fridges have their downsides too. They take a long time to cool down. And their cooling ability is often tied to ambient temperature. Some say that 40 degrees below ambient is a good as it gets. We haven't found that to be the case, but without some tune ups on your installation, you might find it quite difficult to achieve the temperatures you want.

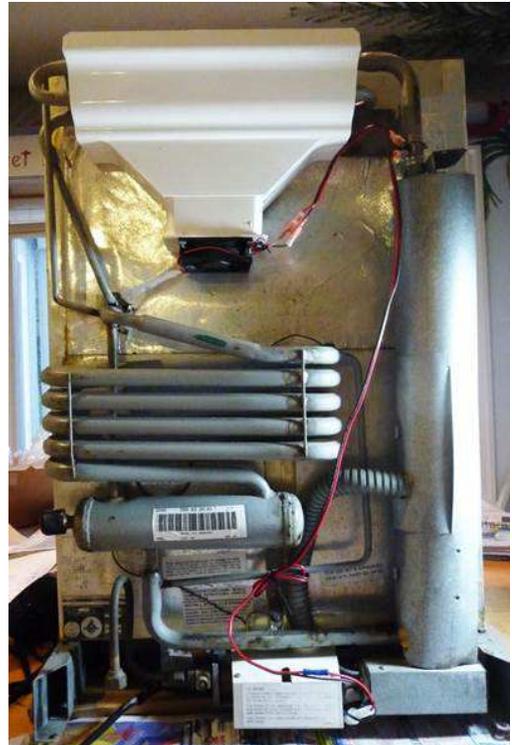
The fridge in our 1995 Roadtrek is the original Dometic 2310. It is a fully manual fridge with bottom controls. There is also a manual fridge with top controls that Roadtrek used after the 2310 and before the automatic switching mode switching models. Dometic no longer sells a fully manual fridge of this size in North America. We like the manual fridge because it does not require 12 volts from the battery to run ignitor, lights, and a circuit board. It can run forever on a dead house battery. That is a very nice feature to have, in our opinion, so we are very reluctant to consider replacing it. Still it is 21 years old.

We like to see our fridge temps between 28 and 38 degrees and we like to see the freezer temperatures in the single digits. It seems we have finally achieved that goal. We have learned that unless you change the temperature setting overnight, it will get too cold (and the lettuce freezes) and then if you forget to turn it back down in the morning it will get too warm. Our solution is to add warm items at night. A few warm bottles of water or cans of pop will temper the overnight drop and you will not have frozen lettuce in the morning.

Although generally happy with our fridge, there were times when we would have trouble keeping things cool enough. Mostly this would be in very hot weather or when driving.



Snyder Kit – one of the first things we did was to install a Snyder Kit. It was a plenum (a slightly modified downspout part from Lowe's), a fan, a temperature switch, a fuse and wiring. It helped, but it was not the cure all. The Snyder Kit is no longer made. The fan added 0.1 amps to the constant battery load (which was 0.3 amps without it), and you could hear it hum when it was quiet. But there was not an obvious breeze between the top and bottom fridge vents.



One of the most bothersome items has been the problem of rising fridge temperatures when driving. The Snyder Kit did not seem to help when moving. Even when everything was great stationary, the minute we started moving the temperature started creeping upward. Others had tried scoops or bumps to facilitate airflow from bottom to top vent when moving. We tried that. It was hard to say if it helped. Regardless it didn't cure the problem of rising temperatures when driving.

Others had noticed that the Roadtrek installation does not meet Dometic's specs. The height and width matched, but the distance between the fins on the back and the wall is supposed to be 1 inch. And the top is supposed to be curved toward the vent. The problem is that a van wall is not straight, it bows out some and the distance varied quite a bit. Our friend Loren made a modification to his Roadtrek by adding a sheet metal panel (with insulation behind it to help with heat load in the sun) to keep the wall behind the fridge at a constant 1 inch of clearance. He was running a Snyder Kit also. His stationary testing looked good. Loren helped us make the same mod to the back of our fridge compartment.

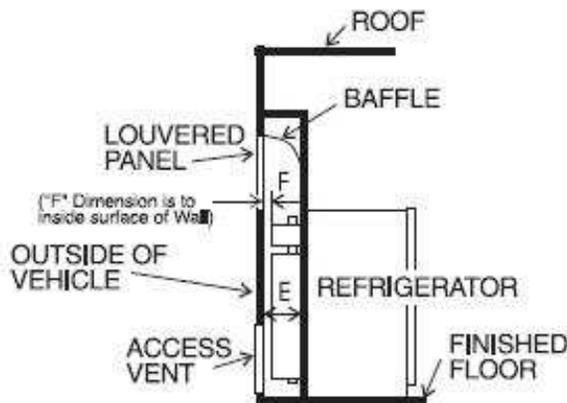


Loren then reported the same problem of rising temps while driving. He surmised that if more air made it worse, less air should help. He blocked half the bottom vent. Eureka. His fridge held temperature while moving. Seemed odd, but it makes some sense. He has since changed to blocking 2/3 of the bottom vent and is reporting that the fridge is rock steady when driving.

Our initial testing was baffling – it was spring and the temperatures were mild. We had the Snyder Kit on a lighted switch inside the Roadtrek as well as the thermal switch on the fridge plumbing itself. We loved it because a glance above the kitchen sink would tell us the Snyder Kit fan was running and hence the fridge was running. It seemed like our fridge kept going out! Then one day, before going to restart it the light came back on. It was cooling so well that the Snyder Kit thermal switch was shutting off the fan! We knew that couldn't be good, and tried Loren's trick of blocking off half of the lower vent. That worked. For the first time ever we saw the temperature go down while driving! Clearly this helps for mild weather. Don't know about hot weather yet.

But when summer hit and the ambient temperatures were in the upper 80s, our fridge was struggling to stay below 45 on the max setting. Well, it was a 20 year old cooling unit. We bit the bullet and bought an "Amish" rebuilt cooling unit to install. It was an interesting process and we learned quite a bit more about the fridge operation in the process. It was not difficult but study the instructions carefully to save yourself some time. The old cooling unit was returned for a core charge. We also replaced the gasket on the front door of the fridge while it was out.

At the same time we changed our fan setup. We removed the Snyder Kit and installed 3 small fans into a sheet metal panel to cover the upper fridge vent. We used the same Snyder Kit thermal switch as before. The fan load is 0.25 amps when running. The fans would have been better oriented parallel to the panel. They could have been raised slightly higher.



We finished the conversion of the fridge compartment to match the Dometic spec by using a piece of sheet panel to create the rounded roof (baffle on diagram) for the upper cooling vent. The triple fans were then placed to cover the upper vent. The spec for "F" is 1 inch between the fins and the wall. Originally this was

about 4 inches. The Phillips mod changed this to match the specs.

Days after installing all this we headed off for a week of boondocking at a conference that meant our Roadtrek sat in full sun in a parking lot during the day. The fans worked well, there was always some hotter than ambient air coming out of the top vent. The daily max temperatures were 91 to 99 degrees all week (and the humidity was very high). Our fridge managed to stay below 43 degrees and the freezer maxed out in the mid teens. Although the ambient temperatures were lower later in the week our fridge temps were slightly higher. We think the cause may be icing on the fins in the fridge, but we never looked. That was the next thing to check.

On the next trip the temperatures maxed at about 90 degrees, but most days were mid-80s. And after the first day, the humidity wasn't bad. Our fridge easily stayed in the 27-37 degree range, but one night when we didn't add anything warm or change the setting it got down to 22 degrees in the fridge. Fortunately we had no lettuce to freeze. I checked the fins several times, no ice on them. On the fifth day the temperatures were creeping up. I checked the fins – there was a thin coating of ice on them. The freezer had minimal icing.

The plan was to try the Fridge-Fix fan to see if that eliminates (as it claims) any icing on the fins. We installed one and took power from the same temperature sensor as the vent fans. This way it will always be off when the fridge is off. It does have a switch on it, and the fans have a blue LED, so opening the fridge door reveals the food lit with an odd blue glow.

We are still having the issue of the fridge temperatures climbing while driving. We haven't tried blocking more of the lower vent and only made one inconclusive test on turning off the vent fans. Might be worthwhile to either move the temperature switch higher up or change to a higher temperature setting for the fans. But summer is coming, so more testing can be done.



After about six months we can say that the Fridge-Fix fan definitely prevents ice buildup on the fins. We never find water in the catch tray after use any more. And we have used it in very humid environments.

We also decided that our triple fan setup needed options - especially when boondocking - so we had more control over the power use. If the Fridge Fix fan and the other three fans are running, the power use becomes significant. No problem on hot days with solar putting out more than we can use, but in bad weather we didn't need as much air movement anyway. So we pulled the fridge (yet again - cleaning burner, jet, etc. while it was out) and modified things so we could run the high speed fan (in the center) or the two low speed fans or all three at the same time. About this time we found the report of a trailer owner that



reported the same issue with temperatures rising in the fridge when moving. Like Loren, he eventually concluded that excessive air was cooling the gas absorption process too early. His conclusion was that it was air coming in the top vent and he closed off part of the top vent when moving. When we removed the fans to rewire we changed their orientation and enlarged the sheet metal piece slightly to cover all (not just most of) the upper vent. We used metallic tape to cover any gaps. This means that the air going out the top vent must go through the fan openings regardless of whether the fans are running. When stationary the fans do vent a lot of heat. Next time we pull the fridge we plan to add a temperature sensor to the fridge coils to monitor temperatures as we change the ventilation methods. As before we found if the fans are running the fridge temperature goes up while moving. With the fans turned off, the temperatures would actually go down! Yay!



We found that we wanted to leave the fans on because the lighted switch showed us that the fridge was running, so we installed an LED light (like we did for the furnace and the water heater so we would know when they were turned on). The amber LED is quite bright and actually makes a good night light for the bathroom.

Last trip it was hot and humid, but we did keep the fridge in the 28 to 38 range (except when the door came open while driving), and the freezer was in the single digits (-5 to +7 degrees mostly). The temperature did go down in the fridge while moving. When driving we turned the 3 exhaust fans off (Fridge-Fix was running). When stopped we had all fans running. We either added warm items to the fridge at night or turned the thermostat back two settings to prevent items from freezing in the fridge. Everything seems to be working as we want.