

**Editor's note-** We are pleased to introduce Gary Brinck as a new technical contributor to this publication. You will see Gary's postings on the ACA Yahoo group, DoItYourselfRV.com, Bus Conversion Magazine, AboutRVing.com and also on RVForum.net as well. He brings a wealth of RV technical and mechanical knowledge to the table, and we are pleased to have him join us.

### ***RV Absorption Refrigerators- Protecting you and keeping them cool***

In recent years the RV absorption refrigerator has fallen out of favor because of numerous reports of poor cooling performance, cooling unit failures and even fires resulting from refrigerant leaks. The Norcold fridges in particular have had their reputation tarnished by recurrent problems and a massive safety recall, but Dometic has also recalled over 900,000 refrigerators for similar problems. The absorption refrigeration industry has responded slowly to these issues and residential-style refrigerators have made a huge inroad in the high end RV market where electric-powered refrigeration is both practical and desirable. However, the absorption unit remains the refrigerator of choice in smaller motorhomes where battery power is limited, in towable RVs where engine or generator power is less available, and among those who routinely spend days or weeks without access to the power grid. What can be done to make these refrigerators last longer and operate more safely?

The primary cause of early life failure in RV refrigerators is excess heat, which causes deterioration of the refrigerant itself and thermal stress on the physical cooling unit. An overheated boiler in the cooling unit will crystallize the sodium chromate used to prevent internal corrosion by the ammonia, resulting in clogging of the tubing in the condenser and reducing or halting the cooling. At the same time, the loss of the sodium chromate makes the metal cooling unit susceptible to ammonia corrosion which eventually results in pinhole leaks. At the same time, the high heat stresses the welded joints to the point where cracks occur and the refrigerant is lost, perhaps spraying onto an area hot enough to burst into flame.

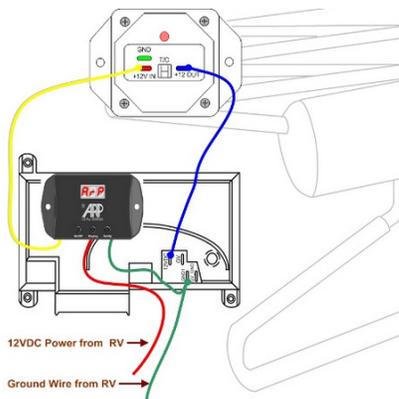
The existing design of both Dometic and Norcold fridges allows the boiler to reach temperatures as high as 800 degrees F., far higher than the roughly 350 degrees F. needed to sustain the ammonia hydrogen absorption cycle. This can be prevented with the addition of a boiler temperature controller that monitors the heat and pauses the cycle whenever the temperature rises much above the optimum value. Such a device exists – the patented **Absorption Refrigerator Protection Control for RVs (ARPRV)**. If every RV absorption fridge had this simple device installed, failures due to excess heat would largely be eliminated.



Why do RV refrigerators overheat and how does ARPRV help? There are a variety of reasons that can occur in normal operation. One of the best known is off-level operation, which interferes with the gravity flow of refrigerant back to the boiler and stops the cycle while the heater (LP gas or electric) continues to raise the boiler temperature.

It only takes 3-6 degrees of tilt and several minutes to cause the temperature to shoot up. RVers may know that the fridge needs to be level, but often are unaware that overheating can occur in just a 15 minute lunch stop or while registering at the campground office. Nobody is going to level up their RV in a brief situation like that, yet each occurrence causes cumulative damage that will eventually result in an early life failure.

Another reason is turbulent air flow over or into the refrigerator upper vent, halting the flow of air over the cooling unit and overheating. This can happen when the RV is moving down the highway and winds buffet the upper vent area, or even when parked in certain wind conditions. Still another cause is poor installation and limited ventilation of the cooling unit, resulting in excess heat during hot summer days. Frequent 100+ degree weather across the country has shown that refrigerators installed in slide-outs are very susceptible to this because of the reduced air circulation when there is no rooftop vent). ARPRV continuously monitors the boiler temperature and pauses the heat source if the optimum range is exceeded. This is a different strategy than refrigerator manufacturer's built-in controls, which allow the temperature to go to near the bursting point and then permanently shuts down the boiler. That approach does not prevent internal damage and allows the cooling unit to reach potentially dangerous temperatures, plus the food in the fridge is likely to be lost as a result of the shutdown. ARPRV is proactive in its management, keeping the refrigerator cooling unit in a narrow range where damage is minimal to none and saving the contents by restarting the operation after temporary overheat conditions have subsided. That's a difference that every RV owner can instantly appreciate



Adding the **ARPRV** to an RV refrigerator is simple enough that any competent do-it-yourselfer or RV technician can do it in an hour or two and it requires no skills beyond basic 12v wiring. The display can be mounted either inside the RV where the owner can see it, or tucked away under or behind the refrigerator and left to do its job alone.

An optional alarm circuit can be used to warn if a shutdown has occurred. ARPRV can also be used to control the operation of additional fans for both the cooling unit and interior.