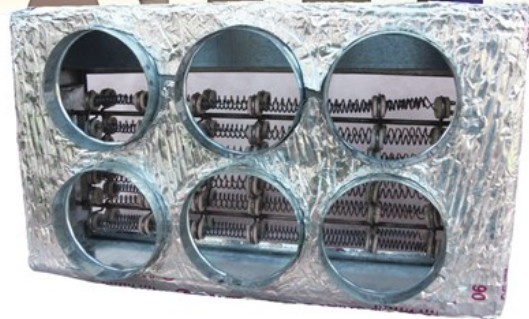


BY GARY BUNZER



A WARMING ALTERNATIVE

RV Comfort Systems has developed an electrifying new heating option to keep motorhomes comfy and cozy when the temperature drops.



Over the course of RV history, an assortment of methods have been used to heat the interior of recreation vehicles during cold winter excursions. These appliances usually required the burning of some type of fuel in order to warm the coach. Some of today's larger motorhomes are equipped with diesel-burning, multi-zone hydronic heating units, but for the majority of RVs, propane gas is the standard energy source used to fuel permanently installed interior comfort furnaces.

In the 1950s and early 1960s, RVs employed gravity heaters, often called radiant heaters, which were archaic by today's standards. Later variations included a small blower to assist in delivering heated air throughout the motorhome. Another type of gravity heater, called a forced-draft combustion unit, introduced the use of ducts and a larger blower assembly. Tall, heavy, modified mobile home furnaces also began appearing in some larger RVs. These are often considered the forerunner of the forced-air furnaces found on

The CheapHeat Add-On system employs electric-powered heating coils and the vehicle's existing furnace fan and ductwork to distribute warmth.

modern-day coaches. Thankfully, those behemoths of early heating designs are no longer used.

With the advent of the sealed combustion chamber, compact, ductless heaters began appearing on smaller motorhomes, which soon expanded into larger designs employing a

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OPERATING COSTS - PROPANE VS. ELECTRICITY

Energy Source	BTU of Heat Energy	Cost Per BTU	Delivery Unit	Furnace Efficiency	Actual BTU Output	Propane/Electrical BTU Equivalent Multiplier	Total Cost
Propane	91,502	\$2.90	Gallon	60%	54,901	1	\$2.90
Electricity	3,414	\$0.18	Kilowatt	100%	3,414	16.1	\$2.90

The chart above compares the cost of electricity to the cost of propane, taking into consideration that a gas furnace is approximately 60 percent efficient (40 percent of the heat energy goes out the flue). With electricity there is no flue, so it's figured at 100 percent efficient. Propane at \$2.90 per gallon is equivalent to electricity at \$0.18 per kilowatt. This means that if you compare gas heating at \$3 a gallon with electric heating, anytime you purchase electricity below \$0.18 a kilowatt-hour, you save money. (Propane Btu per gallon has varied dramatically over the years because of the way impurities have been processed out of it. The most current Btu per gallon is 91,502 Btu based on a National Propane Gas Association report issued in 1998.)

CHEAPHEAT™ EQUIVALENCY CHART

CheapHeat™ Model	Maximum Electrical Daily BTU Output	Equivalent Daily Use Propane (gallons)	Daily Electrical Savings (\$0.115 kWh) Compared to Propane (\$2.89 gallon)
DH18-120	147,485	2.7	\$2.86
DH37-240	307,260	5.6	\$5.89
DH50-240	409,680	7.46	\$7.88

The chart above looks at the maximum heat output an electric heater can produce in a 24-hour period in Btu per given CheapHeat heater configuration, and compares it to how many gallons of propane it would take to produce the same amount of heat. Money could be saved if electric heat were used rather than the gas heater based on the national average of \$0.115 per kilowatt hour provided by a 2010 Department of Energy report.



The controller (far left) ties together the CheapHeat system with the existing wall thermostat and fan. Fusible links (left) within the coil leg prevent overheating or over-current situations.

PHOTOS BY AUTHOR

labyrinth of individual ductwork that snaked its way around the coach. From this design evolved today's, compact, lightweight, forced-air furnace. Though thermostatic control, manifold/duct design, and methods of ignition have improved or been added over time, the common denominator has always been the burning of propane gas as the fuel source.

Even as RV absorption refrigerators and water heaters adopted alternative energy sources, the RV heating system remained reliant on burning propane. Today's RV absorption refrigerators can "produce cold" by energizing an electrical heating element powered by 120-volt-AC or 12-volt-DC electricity. The modern water heater typically burns propane

to heat water in its enclosed tank, but it also might be equipped with an electrical heating element much like a refrigerator, or outfitted with internal tubing through which engine coolant is routed (motor-aid) so as to keep the water hot while traveling. Yet, the typical RV heating system has relied on propane to provide comfort heating.

RV Comfort Systems, a Bothell, Washington-based firm, has successfully engineered an alternative. The company offers an electrically powered add-on heating assembly for any RV propane furnace, giving today's RVer the option to use propane or electricity to heat the interior of the coach. Called the CheapHeat Add-On system, this unit is mounted directly downstream of the existing

gas furnace and employs tungsten heating coils powered by 120-volt-AC or 240-volt-AC electric to provide the heat. The 12-volt-DC fan motor on the furnace then pushes the heated air through the existing distribution ductwork in the coach. The CheapHeat system can be configured to three wattage ratings — 1,800, 3,750, or 5,000 watts — depending on the shoreline cord limitations. According to the manufacturer, the electrical heat source is 100 percent efficient; all heat produced is forced through the ducts since the heating core itself is mounted in the direct flow of the distribution system. In comparison, the burning of propane for comfort heating is approximately

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A toggle switch (right) lets the users choose the heating energy source. The CheapHeat Stand-A-Lone unit (far right) includes its own blower assembly and can be mounted anywhere in the motorhome.



60 percent efficient (check with the manufacturer). The all-electric CheapHeat system is a viable option for serious coach owners to consider.

In addition to the heating coil assembly, the CheapHeat system's other main component is the solid-state controller. The controller is the heart of the system. It communicates directly with the existing wall thermostat and the fan motor so all the user has to do is select electric or gas on a conveniently installed wall switch. This well-designed and sturdy controller is engineered and applicable to handle both 30-amp and 50-amp shore power configurations. It coordinates all the functions of the existing propane furnace with the added electrical heating coil assembly. Considering actual load demands, all internal wiring components and connectors are purposely oversized

by at least 30 percent. In addition, every component in the CheapHeat controller is UL Listed and mounted in an industrial-grade NEMA-1 UL Listed/Certified metal box.

The coil assembly is engineered with redundant safeguards, making the CheapHeat unit safe and permanently installed, which is certainly not the case when RVers use consumer-grade portable space heaters. Aside from the oversized components in the controller, a bimetal, high-limit safety switch wired into the coil assembly protects it from over-temperature situations. In addition, a fail-safe device called a fusible link is included for the common "leg" of the coils. The fusible link performs as an in-line circuit breaker to protect against any over-current and/or overheating situations. With these integrated safety measures, plus the

fact that electricity does not produce carbon monoxide, the CheapHeat system is deemed safe and viable for use inside a motorhome. The only connection between the CheapHeat unit and the existing propane furnace is a simple wiretap on the fan motor conductor. The existing furnace circuit board and all associated relays of the propane furnace are bypassed when using electric heat.

Tests have shown that the CheapHeat unit successfully warms the motorhome in less operating time, meaning the furnace blower assembly works less to heat the same space as it would when burning propane. Here's why.

All propane-fired, forced-air furnaces require a pre-purge and post-purge cycling of the blower assembly to remove any traces of unburned propane or other gases that might remain in the sealed combustion chamber. Some pre-purge cycles can approach a full minute, while post-purge cycles can run up to approximately 90 seconds each. If the furnace is equipped with a three-try circuit board, the run time on the fan motor will increase even more. With the switch placed to electric mode, the fan motor operates only when heat is being produced. I receive questions every season from disgruntled RVers who experience this pre- and post-purge cycling in their furnaces and cannot understand why cold air is blowing



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out. Unless a fault exists, it's just the nature of propane-burning furnaces. Every heating cycle typically includes a full 2.5 minutes of run time with no flame or heat being produced.

Because of an approximate 40 percent energy loss through the flue, along with the pre- and post-purge cycles, the realized heat output into the coach from a 40,000-Btu propane furnace, for example, is reduced to approximately 18,000 Btu an hour when measured at the discharge registers. The CheapHeat system, meanwhile, produces a true one-to-one Btu-per-hour heat output at the registers. Another factor to think about is that it's common for the propane furnace to heat above the temperature setting of the thermostat in order to compensate for the purging cycles. The elimination of this pre- and post-purge cycling is a welcome relief to RVers, because it adds to the comfort level for occupants.

Full disclosure mandates I mention that both Atwood and Suburban have issued service bulletins stating that furnace warranties will be voided if the CheapHeat Add-On system is installed on one of their units. Perhaps their reasoning is that the addition of the electric heating element alters the listing by which their warranties were created. The concern apparently stems from the fact that the CheapHeat system taps into the fan motor wire and that the heating coil assembly attaches at the rear of the existing furnace. Fair enough, although RV Comfort Systems has addressed this issue by expressly stating that the company will extend the warranty of the furnace fan motor for an additional year at no cost to the motorhome owner. If the fan motor burns out, regardless of fault, RV Comfort Systems will replace it free of charge. Whether the concerns of the furnace manufacturers are real or perceived, performance tests have shown that the furnace's fan motor actually runs less when using the electric heat option than it does when burning propane to heat the motorhome to

the same temperature — and at a cooler operating temperature, since no radiant heat from a combustion chamber is transferred to other components in the furnace. The heating coils are actually mounted downstream of the propane furnace.

For motorhome owners not willing to forego the warranty of the furnace manufacturer, RV Comfort Systems also offers the Stand-A-Lone all-electric heater and the blow-through Ductless heater, which was designed for park models but can be installed in any RV. Using the same electric heating coil, but mounted into its own blower assembly, the Stand-A-Lone heater can be installed anywhere inside the motorhome. Propane furnaces must be installed on an exterior wall in order to be vented to the outside and to draw in fresh air to mix with the propane. The Stand-A-Lone units provide the same amount of heat as the Add-On system.

The DH50-240 is comparable to a 40,000-Btu propane furnace, but it requires 50-amp shore power service. The DH37-240 is akin to a 30,000-Btu propane furnace and requires 50-amp service as well. The smaller DH18-120 is equivalent to a 20,000-Btu propane

furnace and requires only 30-amp electrical service. If your existing propane furnace does not have adequate space for the Add-On unit directly behind it, or if you'd really like a furnace positioned on a partition wall in the galley, for example, perhaps the Stand-A-Lone CheapHeat system is something to consider.

For additional information regarding the complete line of CheapHeat products, visit www.rvcomfortsystems.com or call (425) 408-3140.

In a poll found on www.rvtravel.com, the following question was asked: "If an RV manufacturer offered the option to switch back and forth between gas and electric on an RV heater, would that interest you?" As of June 26, 2013, 1,466 of 1,614 respondents (nearly 91 percent) had replied "yes," indicating that RVers are interested in having some flexibility when it comes to choosing the energy source for their heating. Isn't it about time the furnace entered the multiple energy source realm for motorhomes, joining the water heater and the absorption refrigerator? Welcome to the 21st century! Remember, RVing is more than a hobby; it's a lifestyle! **FMC**



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