

**10** Problems, Solutions! **Furnace on the Fritz?**

# **RV** ENTHUSIAST

NORTH AMERICA'S PREMIER HOW-TO RV RESOURCE

December 2021

## 'Skirt' an RV for Winter Camping

*Holding-Tank How-To:*

- **Pressure-Flushing Tanks**
- **Illuminate Dump Valves**

**Motorhome A/C  
Generator Swap**

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# RV ENTHUSIAST

NORTH AMERICA'S PREMIER HOW-TO RV RESOURCE

December 2021

Volume 1, Number 10

## INSIDE



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### Pickup Truck Overview 2022

Forget about cars. For the bulk of the North American market, trucks and SUVs are where it's at. And if you're in the market for a new tow vehicle — to say nothing of more performance and luxury — our RV-focused guide to the newest, coolest, and most capable tow vehicles for the new year should be required reading.



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### Skirting the Issue

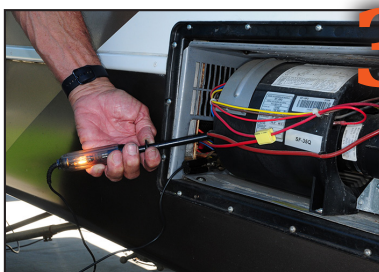
Winter camping is fast becoming the newest trend in the RV world — but unlike a brick-and-mortar home, RVs can lose a lot of heat down below. Using heavy-duty skirts to prevent heat-robbing wind from flowing under your fifth wheel is key to a warmer, less expensive winter.



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### Down the Drain

You can be fastidious about running water and using a cleaning wand in your black-water holding tank, and you still won't get it really clean. And what about your gray-water tank? It builds up gunk as well. An annual high-pressure flushing prevents waste build-up — and reduces odor.

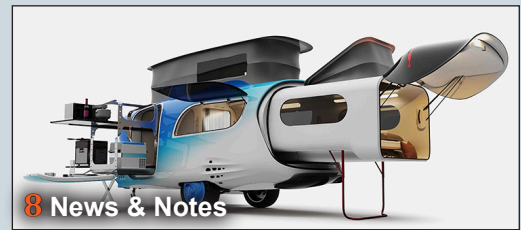


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### Is Your Furnace on the Fritz?

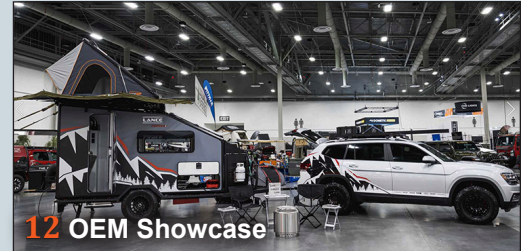
The time to discover that your furnace isn't up to the task of keeping your rig warm is not when you turn it on. A furnace can fail for a lot of reasons, from inadequate gas pressure to bug nests. Knowing the top 10 problems — and how to rectify them — will help keep your RV's interior warm and toasty.

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In the market for a new supplementary brake system? Need a new inverter or helper springs for your ProMaster-based Motorhome?



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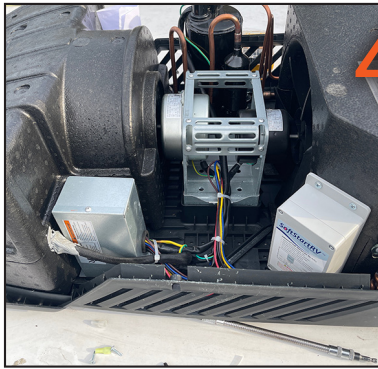
Arizona's Canyon de Chelly offers spectacular views — and a history lesson through amazingly preserved "rock art."



### On The Cover

Kevin Jorgensen, owner of Jorgensen Fabric Products, and technician Larry Jones install skirting on a 39-foot fifth wheel in preparation for winter living. Photo by Bruce W. Smith

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## Starting Softly

“Start surge” is an often-misunderstood aspect of RV air-conditioning that pushes the A/C’s initial power needs beyond the capacity of small portable generators. Reducing that power requirement with a SoftStart RV device adds off-grid versatility by making the impossible, possible.



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## Conquering Darkness

No, you don’t absolutely need to install a light to illuminate your holding-tank termination pipe/valve area. But take it from us: This is a fun and easily accomplished installation that, once completed and used, will make you wonder how you ever managed to go camping without it.



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## Planes, Trains and Automobiles

Part 2 of our sojourn across America in search of the best transportation museums begins in Montana and won’t end until we cross the Wyoming state line. As a bonus, we added Washington, D.C. and its amazing historical repositories to the mix. Buckle up — it’s gonna be a great trip!



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## A New Generation

One drawback to modern living is that we’ve grown so accustomed to things just working that we’re lost when they don’t. Some you can live without, at least temporarily — but your motorhome’s A/C generator isn’t one of them. When it bites the dust, here’s how to swap in a new one.

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## SEISMIC POWER PORT ACCESSORIES

The new Power Port feature located on the armrests of the Seismic Series furniture pieces (left- and right-hand recliners only), allows you to plug in various accessories so you can enjoy even more relaxation inside your RV.



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**Three-Speed Portable Fan**



**Integrated Power Port (in Seismic only)**



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**LED Reading Light**

# What 'Present' Are You Getting Your RV This Year?

By Bruce Hampson

You can always tell who the hard-core RVers are when the holidays roll around. They're the ones who continue to drink out of a Yeti tumbler with a safety lid on even though their RV has been winterized and is safely tucked away for the winter, decorate their trees with travel trailer party lights and find themselves still reaching for the unbreakable Melamine dinnerware when setting the table. They're also the ones whose "wish lists," once peppered with requests for the latest cell phones or touchscreen tablets, now include camping griddles, socks stitched with "I'd Rather be RVing" across the soles, "campy" T-shirts and maybe a gift subscription to *RV Enthusiast* magazine.

If you number among these fine folks, I have a question for you: What 'present' are you buying your RV this year?

No, I'm not being facetious or poking fun at the spirit of the season. It's a serious question, because this really is the best time of the year — and, sometimes, we overlook a few things when caught up in the festivities. Chief among them? Scheduling maintenance and repairs *now*.

We've all probably heard horror stories — if you want to call them that — of RVers who opened up their rig in preparation for a long-awaited trip only to realize certain components weren't up to snuff. They then did what any of us would: They called their local dealership to schedule service — and found out it would be six or eight weeks before they could be fit in. Goodbye vacation. I'd like to say things are getting better and, well, they eventually will. Before that, though, they'll probably get worse.

According to Statistical Surveys Inc., a market share data research firm, the RV industry set a record of 515,819 retailed (sold) units in 2020 — the first time the half-million mark had been eclipsed since retail data has been tracked. Most expect even that number to fall when the final figures come in for 2021. And, while manufacturers shipped more than 430,000 RVs to dealers last year, that number has already been surpassed in 2021 — with two months still to be reported. Industry watchers expect wholesale shipments (which are an indicator of sales and dealer confidence) to exceed 600,000 rigs this year when all is said and done.

What's that mean for you? More owners are traveling in their RVs and needing more service work, whether it's for a warranty claim or a failed part. Don't blame the dealers; they are more than willing to take your money. But even if they had enough service technicians — a shortage the industry has grappled with for years — they may not have the space or the time. There are a lot of different systems, from plumbing to electronics, in a modern RV, and only so many hours in the day to tackle repair problems.

And, as we've all heard from news reports, the bottlenecks at West Coast ports — not the most efficient in the world in the best of times — have only exacerbated the problem, as have COVID shutdowns and more folks letting their fingers

do the buying on the Internet. Dealers and manufacturers are no different from the rest of us: They place orders for parts and must wait for them to come in. And it's not just the RV industry that's suffered. Someone we know was pulling his fifth-wheel with a 2020 Ford F-250 on Interstate 10 in Southern California last spring and was sideswiped. That was nine months ago, and he's still waiting for a bracket so the body shop can finalize repairs to the truck. The RV? It's still waiting on parts to make repairs.

Granted, these are extreme cases — but months-long waits are not uncommon.

You can help alleviate the situation. With service shops booking fast, determine how much of what needs to be done to your RV can be performed by yourself at home. For example, while *RV Enthusiast* has "only" been publishing since March, our database (at [rventhusiast.com](http://rventhusiast.com)) already has about 100 technical articles detailing the step-by-step processes for repairing or replacing everything from plumbing systems to windows. Read them — and don't be afraid to tackle what might appear to be a formidable undertaking. Most repairs, when broken down into segments, are actually fairly easy to achieve.

That's especially true when it comes to the need for regular maintenance. While it's impossible to control all breakdowns, staying on top of scheduled maintenance and inspections will mitigate many potential problems. The travails of two acquaintances of RVE staffers really hammer this home. One lost

all radiator fluid on the highway due to a bad coolant tube. The end result? A \$2,500 bill to tow the 43-foot diesel pusher to the repair shop, and an additional \$1,000 charge to repair the damage. The other was more fortunate, but still spent the night on the side of the road near Boise, Idaho, because of a tire blowout. Bad weather and the lack of immediate availability of a new wheel and tire forced them into a precarious position — and the blowout caused a lot of collateral damage. It could have been prevented, because checking the tires afterward revealed that they had "timed out" and needed replacing.

You don't even have to turn a screwdriver to be fastidious about inspecting your rig completely on at least an annual basis, from tires and engine/ancillary components to just closely scrutinizing the floor — especially near walls — for any slight change in support that might indicate a leak from a window seal or a loose pipe fitting. Check all the appliances, the hitch and tow bar integrity, the LP-gas and smoke detectors — all of it. If you'd prefer to not get up on your roof — a prime point of origin for many problems that can and will become huge complications if not caught in time — ask a friend or pay a shop. But do it.

It all starts with your eyes. Spend the time now and don't overlook anything, or you'll spend major dollars later — if you can schedule a service appointment before your vacation dates. **RVE**



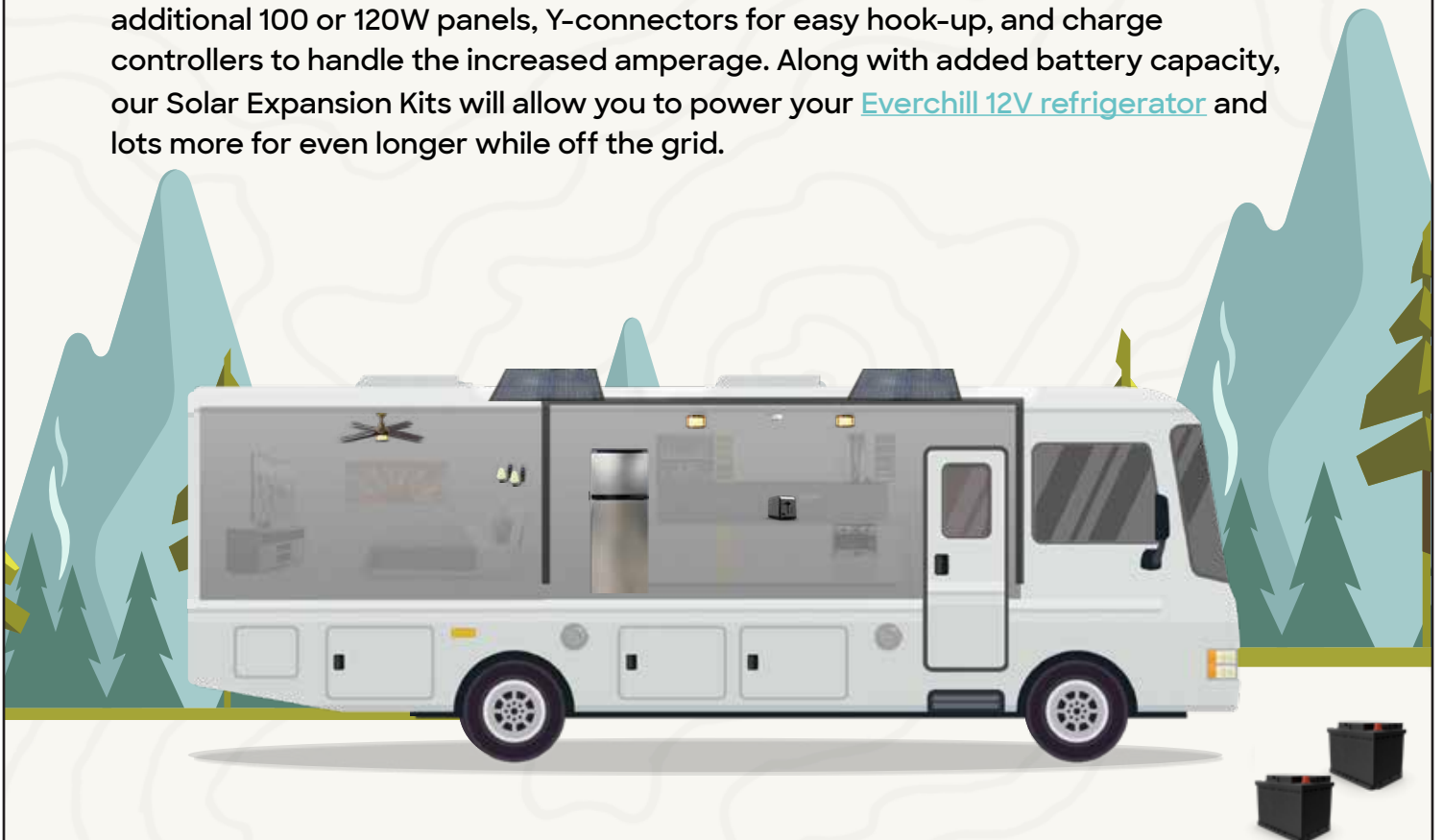
*This Holiday Time Light-up LED Camper with Christmas Tree (found at Walmart) is exemplary of RV-themed holiday decorations.*



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**WAY** Take your home  
on the road

# Winghamm Brings Oasi 540 Stateside

While as a class they don't have the overall numbers of, say, travel trailers or even Class C motorhomes, the Class B "conversion van" market is exploding in popularity — with good reason. With high-end SUVs now surpassing the \$100,000 plateau, people who would otherwise never consider a motorhome are using these well-appointed "mini" coaches as able replacements for tailgating, team sports events, and quick getaways. The fact that they also feature full galleys, bathrooms, beds and, in many instances, multiple TVs just further cements their status as easily the most complete vehicles built today.

This hasn't been lost of European manufacturers, where because of space constraints and narrow roads smaller RVs rule the roads. Just how small they tend to be is evident with the Winghamm Oasi 540, coming soon to a dealership near you.

In July, Italian-based RV manufacturer Winghamm announced plans to bring the company's Oasi 540 stateside, through an exclusive distribution deal with TM Motorhome Sales, LLC. The first two dealerships are Walt Whitman Shops in Long Island, New York, and Santa Monica Place in Santa Monica, California, with plans to go nationwide. According to the company, the Oasi 540 is the first "Micro Class" RV, so named for their diminutive size: the Oasi 540 is just 17 feet, 9 inches long — shorter than a typical Ford F-150 pickup — while still having a full bath and the ability to sleep four.

What sets Winghamm and the Oasi 540 apart is its custom fiberglass monocoque shell, which not only gives the Oasi 540 its distinct sleek appearance but also allows for innovation in the design and functionality of the vehicle.

The bed, for example, requires no traditional interior space. By recessing the bed into the ceiling when it is not being used and then protracting it down when needed, Winghamm created more useable floorplan space. The bathroom includes a standing shower, sink and vanity with countertop space, toilet and medicine cabinet with mirror — again, in an RV less than 18 feet long. Sewage disposal, by the way, is handled via a cassette system that plugs into the exterior side of the van and, when engaged, has a catalyst inside that rapidly breaks down solid matter into an easily disposable liquid. When full, the cas-



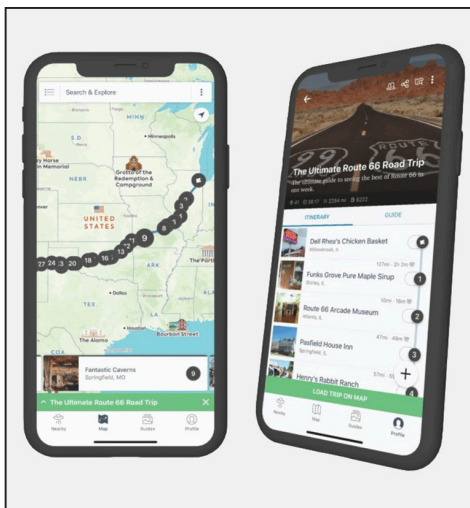
sette can be removed from the side of the van and wheeled into any bathroom where it can be simply emptied into a toilet and flushed.

The Oasi 540 also features radiant floor heating and the monocoque shell is said to provide superior insulation because, unlike metal used in other Class B/Class B+ motorhomes, fiber-

glass is not a thermal conductor; there is no temperature dispersion from the inside to the outside. The monocoque cabin, in combination with a proprietary structural sealant, also eliminates the vibrations and frictional noises that plague the drivers of most motorhomes.

To learn more visit, <https://www.winghamm.com/us/>.

## Togo Group Now 'Roadpass Digital'



Togo Group, which is creating the leading technology platform for road travel and outdoor experiences, announced in November it had rebrand-

ed as Roadpass Digital, a name that reflects the company's mission and best-in-class tools to empower road-based recreational travelers.

Roadpass Digital's products include [roadtrippers.com](https://www.roadtrippers.com), a trip-planning app that offers users the unique ability to collaborate with friends, sync across map apps for seamless navigation, identify and save destinations; [campendium.com](https://www.campendium.com), a crowd-sourced and editorially-curated web and mobile application that allows users to search, preview and provide feedback on more than 32,000 public and private RV camping locations across the continental United States, Canada, and Baja Mexico; [togorv.com](https://www.togorv.com), called "the ultimate app" to keep RV owners organized, inspired, and on the move with a set of tools focused on improving the RV experience; and [village.com](https://www.village.com), the largest and most

active social network of RV owners and enthusiasts.

Each digital experience and mobile app will retain its existing name as the company adopts a universal Roadpass-branded user account to enable consumers to seamlessly access the

## October RV Shipments Break Record

After falling off slightly in July, wholesale RV shipments to dealers resumed their escalating numbers to North American dealerships in August — and, according to a report issued in late

company's comprehensive set of travel tools for roadtrippers and RVers.

Learn more about Roadpass Digital and Compendium, Roadtrippers, RVillage, and Togo RV products at [roadpass.com](http://roadpass.com).

November by the RV Industry Association (RVIA), the October 2021 shipment total of 57,971 units was the highest production total on comparable record for any month.

The previous record? 55,014 units — set in September.

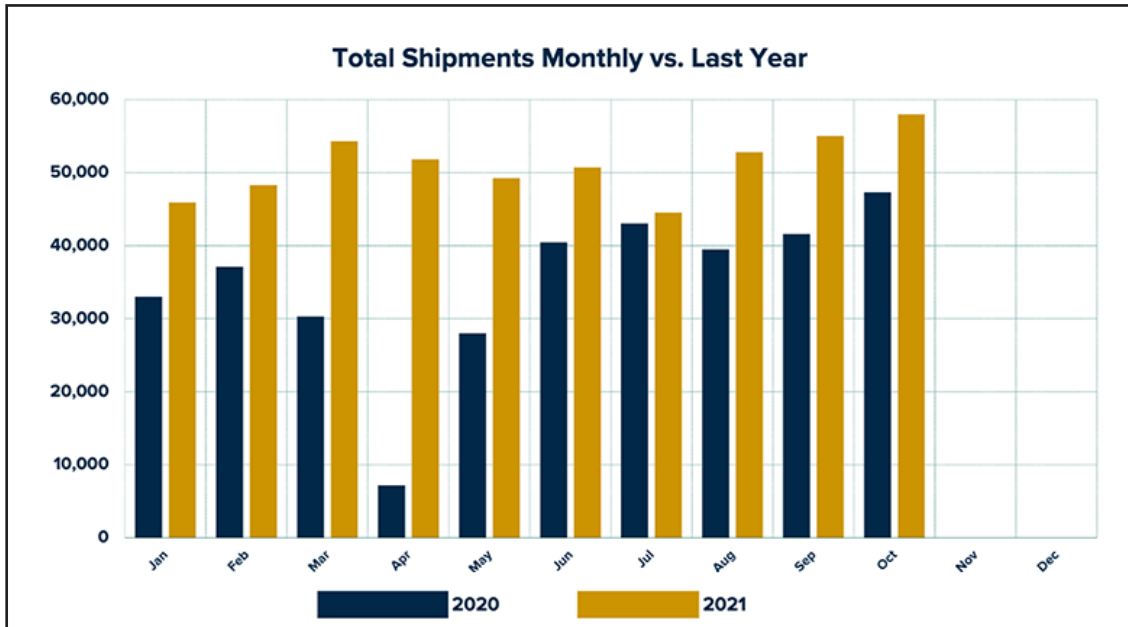
Results for RVIA's October 2021 survey of manufacturers determined that total RV shipments ended the month with 57,971 units, an increase of 22.5% compared to the 47,326 units shipped during October 2020; this October was also the best on comparable record with shipments surpassing the October 2017 total of 48,926 units by over 18%.

Towable RVs, led by conventional travel trailers, ended the month up 23.3% against last October with 52,856

wholesale shipments. Motorhomes finished the month up 14.4% compared to the same month last year with 5,115 units.

The new shipment report comes on the tail of a recently released survey by RVIA showing more Americans plan on RVing in the next year than ever before. The survey showed 72 million Americans planning an RV trip in the next year in an RV they own, rent, or borrow — an 18% increase compared to the 61 million reported in the same survey a year ago.

Through October, total RV shipments for 2021 were 510,608.



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## 'ROTV' Rebrands as 'RVing Today'



"Paws On Board" with Dr. Marissa Fitzpatrick — aka "Dr. Fitz" — kicked off this year on ROTV.

"Rollin' On TV," the popular RV lifestyle program seen in 100-plus markets and viewed in 375,000 homes each week, is rebranding as "RVing Today."

The move will occur over the next several months and, according to founder and producer Jose Moniz, will

be more than a simple name change. "Virtually everything about 'RVing Today' is new and created for today's generation of RVers and outdoor enthusiasts," he said.

As Moniz pointed out, the rebranding allows him and his team to rethink how

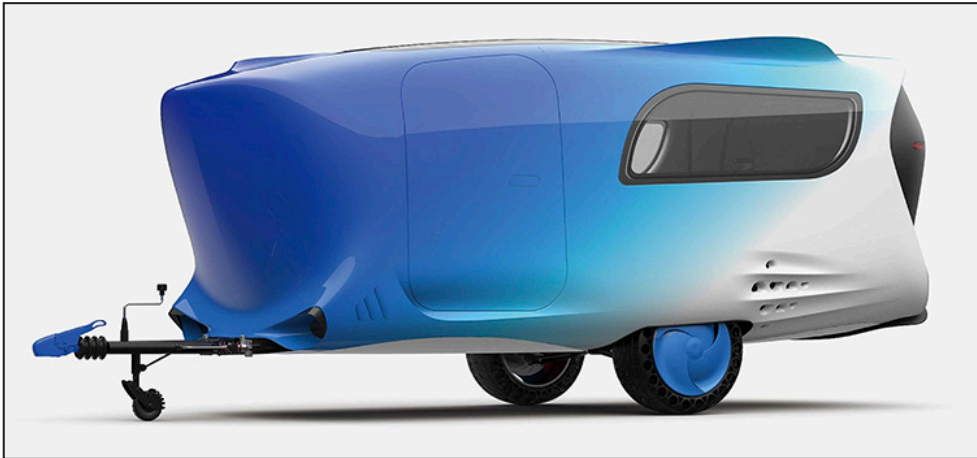
to best reach today's RVers. Supported by an all-new website, "RVing Today" will deliver content through multiple channels — including over-the-air TV, cable, streaming sources, and via the web, YouTube and social media.

"Rollin' On TV" first launched in January 2010 and is arguably the longest-running RV lifestyle program on the airwaves.

Like its predecessor, "RVing Today" will continue to report on RVs, campgrounds, destinations and aftermarket products, as well as provide user-friendly RV tips. Additionally, Moniz said the channel will carry more content like the new-this-year pet-vet segment "Paws On Board with Dr. Fitz," offering veterinary advice from a licensed veterinarian specifically tailored for RVs traveling with their pets.

Moniz noted that as the RV market grows and changes, "RVing Today" will change along with it, delivering the content viewers want in the format they prefer. Along with the rebranding, "RVing Today" also will be adding local content, made possible by the recent agreement with NEXSTAR Media Group, the country's largest television station owner. The "RVing Today" website is currently under construction. Watch for updates at [rollinontv.com/](http://rollinontv.com/).

## A Whale of an Idea



Photos courtesy of [red-dot.org](http://red-dot.org)

It's been said — sometimes with good reason — that American personal transportation is oftentimes a bit staid in design and performance. This is just as true with RVs as it is automobiles. If you truly want to see some amazing motorized and towable RVs, save up your money and buy a ticket to Dusseldorf, Germany, next September for Caravan Salon, the world's largest RV show and a showcase of awe-inspiring European design.

That mindset appears to be filtering into China, as well. Witness, as Exhibit A, this unique Whale Trailer Cabin. Designed for the growing Chinese RV market by Hu Yong, the concept makes amazing use of space. In transport mode, this lightweight (note the single axle) trailer is said to be easy to tow; campside, it nearly doubles in size. The rear extends, pop tops in both the main cabin and rear sleeping area provide plenty of headroom and a fully equipped kitchen slides out from the side. Best of all, the website [motor1.com](http://motor1.com) reports that it may be in the early development stages for production. But as automotive aficionados are painfully aware, that doesn't mean it may make it stateside. We can only hope.

# Keystone Up-grades 'Blade' Airflow System



Along with redesigned duct elbows and wyes, the Blade signature register collar and diffuser creates convection air currents in the coach, delivers 360° cool air circulation and eliminates hot/cool spots.

While it may have escaped the attention of some, Goshen, Ind.-based Keystone RV Co. is fast becoming an innovator of not only recreational vehicles but of many of the components used in them. The company worked with ASA Electronics to develop the iN•Command smart trailer system, the composite HyperDeck RV floor, Max-Turn technology to add an additional 8 inches of fifth-wheel turning radius — heck, the Keystone Innovation Lab even designed and engineered its own chassis: the NGC2 (Next-Generation Crawlspace Chassis), used under the company's Arcadia fifth wheels and travel trailers, uses a "crawlspace" design that allows vital systems to run between supporting crossmembers and the floor of the unit.

Last year, the lab developed the Blade high-performance airflow system. Recognizing that there was a disconnect between new high-output air conditioners and the systems used to distribute cooled air throughout the RV, Keystone's team leveraged core fluid dynamics principles to redesign the system. Elbows and wyes with larger intake openings that taper into the ducting not only reduced air turbulence but increased cold air speed throughout the full length of the ductwork. Blade also introduced a new vent design that uses negative pressure to drive air flow into the cabin; the Blade vent diffuser eliminates hot and cool spots by distributing cold air in a circular pattern and setting up natural convection throughout the RV. The system also eliminates the reliance on foil tape alone by adding

*continued on page 68*

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# RVs In the Spotlight at 2021 SEMA Show

*“Overlanders” — boondock-ready rigs — in particular were attracting a lot of attention at the iconic trade show of horsepower and automotive-lifestyle products*

By Bruce Hampson

For anyone with premium fuel running through their veins, the annual SEMA Show in Las Vegas is Nirvana — a place where cosmetic components may have taken center stage in recent years but horsepower is still king. SEMA — which started out as the Speed Equipment Manufacturers Association but now stands for Specialty Equipment Market Association — was formed by a number of automotive performance icons in 1963 to showcase the West Coast car culture. The first show, with 98 manufacturers manning booths, was in 1967, held in the basement of Dodger Stadium in Los Angeles. It now occupies more than one million feet square feet at the Las Vegas Convention Center and is considered one of the largest automotive trade shows on the planet.

And, yes, as a trade show, it's closed to the public.

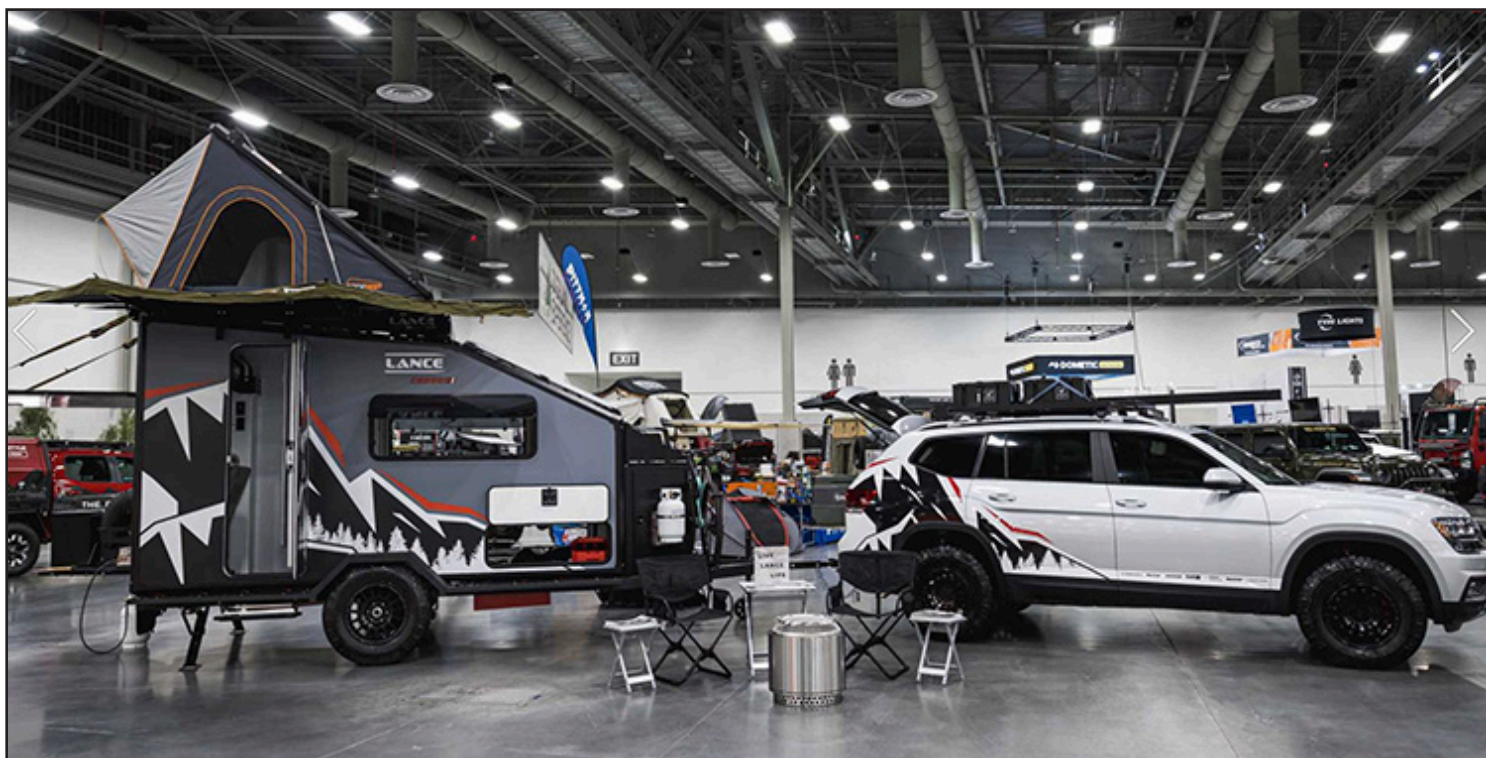
That doesn't mean that you can't learn — quickly — what happens there.



The SEMA Show attracts upwards of 120,000 attendees annually — and about 3,000 of them are media folks reporting on what they saw among the

2,000 or so exhibitors.

As these writers and photographers and the companies themselves quickly documented, a number of RVs and



Lance Camper's "Adventure Pass" display revolved around a specially outfitted Volkswagen Atlas crossover and the Enduro, a prototype concept camper.



Fully outfitted for off-grid camping, the Lance Enduro boasts a rooftop tent, twin 100-watt solar panels, bike rack and a lot more.

“Overlander” vehicles were on display in November as the concept of getting away from it all continues to gain traction. They ranged from a custom camper crafted out of a military-issue 1964 Jeep M677 to an EarthRoamer LTi boasting a vacuum-formed carbon fiber “house.” There also was a full exhibit in the West Hall dedicated to the “Overland Experience,” with dozens of customized vehicles on display along with products from rooftop tents to portable kitchen systems.

Closer to home — and, perhaps, closer to production — was the Lance Camper display of the company’s “Adventure Pass” prototype and Toyota’s “Tacozilla” concept vehicle. And when you want to make an announcement heralding a new boondocking partner-

ship the likes of that between Grand Design RV Co. and Volta Power Systems, you could do worse than make it on the biggest performance stage in North America.

#### Lance ‘Adventure Pass’ Prototype

Lance Camper perfected the concept of creating big, livable spaces in small environments long before the company entered the travel trailer arena — the Lancaster, Calif., builder initially developed its reputation as a truck camper builder — so it’s not surprising that the company revealed an “adventure trailer” prototype at the 2021 SEMA Show.

What is surprising is that it’s new “Enduro” concept trailer is not already in production.

The Enduro was one half of a com-

plete package Lance exhibited in Las Vegas — the other part of the company’s ‘Adventure Pass’ display was the vehicle it was hitched to, a well-massaged Volkswagen Atlas.

For its part, the off-grid-worthy Atlas was outfitted with H&R coil-over suspension and load-leveling support from Firestone Ride-Rite air bags; it’s shod in aggressive 265R70/17 Maxxis RAZR A/T tires mounted to 17-inch Black Rhino forged aluminum off-road wheels. Performance mods to the 3.6L Volkswagen engine include an aFe Power cat-back exhaust and cold air intake. Interior modifications include Kicker Audio system enhancements, with mobile mounting solutions sourced to RAM Mounts and a Grey Man Tactical MOLLE webbing system. Outside, a Front Runner Outfitters’ Slim Line II rack was mounted to the roof and fitted with Pelican cargo cases, while KC HiLites Flex Era fog lights were added to improve nighttime visibility. Exterior accessories also include Toccoa fly rod cases, MaxTrax recovery boards and Front Runner Outfitters cub storage packs and a stainless-steel camp table. The unique vehicle wrap was installed by Daley Visual.

Likewise sporting an off-road-themed wrap, the Lance Enduro concept trailer is an off-grid capable, lightweight overlanding-oriented travel trailer that measures 18 feet in length and weighs just 2,700 pounds — thanks to its 100% composite construction — allowing it to be towed by most crossovers and small SUVs. The Enduro has improved off-road clearance courtesy of Timbren independent suspension and Maxxis RAZR AT Tires mounted to Black Rhino forged aluminum wheels.

Inside, the Enduro trailer features a U-shaped dinette, queen-size bed, twin dropdown bunks and is capable of sleeping up to six people when outfitted with an optional RoofNest rooftop tent. Fully self-sustainable, the Enduro features two 100-watt solar panels, a 100Ah lithium battery unit, 45-gallon freshwater tank, 25-gallon grey water tank, interior shower, cassette-style toilet and an outdoor galley-style kitchen. Additional comfort comes from a 12-volt DC Zero Breeze Mark 2 air-conditioner and Truma Eco Combi+ Air & Water heating system. For added off-grid functionality, the Enduro also features a No Dirty Water MRX water purification system, weBoost cellular signal booster and a 23Zero Peregrine 180 awning.

When will it show up on [lancecamper.com](http://lancecamper.com) — or at your local dealership? Good questions. We can only hope.



Tucked behind an oversize rear door, the outdoor galley includes a sink, LP-gas-fired griddle, Truma portable refrigeration unit and even a 12-volt DC TV.



*Designed and fabricated at the Toyota Motorsports Garage, Tacozilla's beige-to-brown graphics harken back to Toyota-based mini motorhomes popular in the 1970s.*



*Based upon a 2022 Toyota Tacoma TRD Sports pickup, the interior of Tacozilla features a full bath, galley and plenty of seating. Floor is teak, and the dining table doubles as backlit wall art when not in use.*

### **Toyota Debuts 'Tacozilla' Camper**

Truly longtime RV enthusiasts no doubt can remember — with a bit of prodding — the myriad Toyota-based campers of the 1970s and '80s. Known as “micro-mini motorhomes” because of their diminutive stature, these affordable little campers were oftentimes surprisingly spacious inside. Unfortunately, they also were oftentimes way overweight — such aspects as gross axle weight ratings (GAWR) weren't on many campers' radars 50 years ago — a situation that contributed to their eventual demise.

One of the better “builds” at the time was the Toyota Chinook — and Toyota resurrected that fiberglass-housed look at the 2021 SEMA Show with the introduction of Tacozilla. Only this time, things like GAWR, too-little clearance and not enough horsepower have gone by the wayside.

Designed and built by Marty Schwerter and his team at the Toyota Motorsports Garage, the custom overlander-ready ride is based upon a Toyota Tacoma TRD Sport pickup. “Our goal,” said Schwerter, “was to build a

vehicle that is engineered correctly but also made to look really cool.” And it wasn't easy; according to Toyota sources, the team didn't want to just attach a flat door to the flowing, tapered lines of the cruiser because the result would not look as integrated. Instead, they spent more than 100 hours designing the rear door alone.

To fully frame the project, the Tacoma's bed was removed and a house designed that extends below the frame with a taper; a similar narrowing of the top allows for a 6-foot person to stand inside while the overall shape still allows for traversing trails and avoiding branches. They did add 2 inches of clearance to the TRD Sport suspension, along with TRD billet upper control arms.

Inside, Tacozilla features teak flooring, a full bath and fully functional galley. The table, which converts to a backlit piece of wall art when not in use, was 3D-printed. Complete Customs in McKinney, Texas, added the exterior tones, which harken back to Toyota campers of yesteryear. If you want to see more, check it out here: [youtube.com/watch?v=Isi4NyszFII](https://www.youtube.com/watch?v=Isi4NyszFII).

Will Tacozilla go into production? It's hard to say. Right now, it's what's known in the automotive arena as a “concept vehicle” — but automakers have been known to respond favorably when the public wants to see such design studies at their neighborhood sales lots.



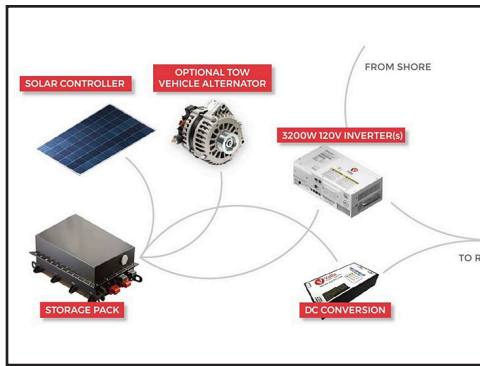
*Toyota engineers managed to increase road clearance by two inches compared to a stock Tacoma TRD Sports pickup; the suspension incorporates billet TRD upper control arms.*

## Grand Design RV, Volta Power Systems Partner

Like the idea of venturing off-road, but don't want to forgo the creature comforts of your big fifth wheel? Grand Design RV has tapped Volta Power Systems for its newest offering of off-grid towables — and the first available to mass market RV buyers. Integrated with the Momentum fifth wheel (and others), the systems offer up to 18kWh in energy storage, which can run overnight air-conditioning, entertainment systems and other high-draw appliances.

Volta and Grand Design debuted their partnership with an Adventure Without Limits demonstration at November's SEMA Show. The demo included a Grand Design Momentum fifth wheel toy hauler connected to a Dodge RAM tow vehicle; the display also included a TOMCAR TX4 electric ATV. A secondary 9,000-watt alternator on the RAM charges a 40-kWh storage system on the rig while driving or idling. In turn, the trailer is upfitted with exportable power to recharge the TOMCAR. Topping off the demo is a massive 2,250-watt solar array from Future Solutions, which maintains an eco-friendly charge and can extend runtime for hours or days.

Grand Design is now taking pre-orders for Volta-equipped towables with deliveries in early 2022. Standard options begin with 6kWh of storage and 3,200 watts of AC power, which can run lighting, entertainment and refrigeration. Advanced systems top off at 18kWh with 6,400 watts of AC power for additional amenities like all-day air conditioning (or several days, depending on weather). The base units charge from



*This simplified schematic illustrates the various components of the Volta system and how they are used. The FLEX energy storage pack (seen in cutaway) includes the latest battery-management system for enhanced battery monitoring; it also includes integrated heating solutions that use internal energy to heat the system for improved cold-weather performance.*



*Grand Design RV uses the phrase "Adventure without limits" to describe its partnership with Volta Power Systems. Displayed on a Momentum toy hauler, the boondocking system generates up to 18kWh of power.*

*The Grand Design display also included a TOMCAR electric ATV.*

shore and an MPPT solar controller. Interested customers can also work with an approved retrofit dealer to upgrade their tow vehicle with the NITRO secondary alternator charge system or their trailer with L1 or L2 charging for EV toys. And, no, we didn't ask how much it's going to cost. **RVE**

# Pickup Truck Overview 2022



*Our RV-focused guide to the newest, coolest, most capable tow vehicles for the new year*

By Chris Hemer

Forget about cars. For the bulk of the North American market, trucks and SUVs are where it's at. If you don't believe us, check the Ford website, where you can choose from either the lonely Mustang...or one of *eight* crossovers/SUVs. You'll find a similar story on the Chevy website, with choices limited to a ho-hum Malibu or diminutive Spark, but a total of seven crossover/SUV models. Toyota still offers several passenger

car models — but its top selling car, the Camry, has taken a back seat to the RAV4 SUV in total sales.

When your budget only allows for one family vehicle, it all makes sense — a truck or SUV can accommodate a family, haul cargo, tow a trailer and travel competently off-road. Combine these benefits with a higher seating position for better visibility, available 4WD/AWD and the perception of greater crash worthiness, and it becomes clear that a

crew cab pickup or SUV is the one vehicle that can do it all for most families — especially those that enjoy RVing. With that in mind, we're presenting this guide to the most noteworthy offerings for 2022. By that, we mean we're only going to cover the trucks and SUVs that are either new or significantly changed; if it's not on this list, revisions for 2022 are limited to appearance and/or content, such as trim, packages and the like.



*The 2022 Chevrolet Silverado ZR2 — like its cousin, the GMC AT4X — maintains a 1,400-pound payload capacity and an 8,900-pound tow rating while being infused with off-road capabilities.*

## Chevrolet/GMC

With the introduction of the Chevrolet Silverado ZR2 and GMC AT4X, it is apparent that buyers have not lost their appetite for a truck that can confidently handle a Zombie Apocalypse. Though not as gonzo as the Ford Raptor or Ram TRX, these trucks bring new equipment levels and other upgrades that make them a solid choice for week-end warriors.

Along with a standard 6.2-liter V-8 churning out 420 horsepower wrangled by a 10-speed automatic transmission, both models receive dual electronic locking differentials and racing-derived Multimatic 40-mm Dynamic Suspensions Spool Valve (DSSV) dampers which, when combined with uniquely tuned springs, increase front/rear suspension travel compared to the already competent Chevy Trailboss and GMC AT4. Offering an aggressive appearance as well as off-road functionality are 33-inch mud-terrain tires on 18-inch wheels, a unique skid plate package and a new steel front bumper with an improved 31.8-degree approach angle. At the rear, the dual exhausts terminate before the rear bumper, protecting them from damage on steep uphill transitions. Also included are “specific” off-road chassis and suspension calibrations, according to GM, and a new Terrain Mode, which allows one-pedal rock-crawling capability. Even with all this off-road-specific gear, both trucks maintain a 1,400-pound payload capacity and an 8,900-pound tow rating.

Another welcome change for the

2022 models are revised interiors, which incorporate new materials (LT and above on Chevy; SLE and above on GMC) and a fresh layout designed to give the cabin “a spacious and more premium feel,” according to GM. Getting in line with its competitors, both the Chevy and GMC are equipped with a 13.4-inch-diagonal horizontal touch-screen and a 12.3-inch diagonal digital configurable instrument cluster. New



*GMC's upscale 2022 Denali Ultimate includes Super Cruise hands-free driver assistance technology that can also be used while trailering.*

available colors, seat designs and more premium materials are used throughout.

The upscale Chevy Silverado High Country and new GMC Sierra Denali Ultimate models will also be available with Super Cruise hands-free driver assistance technology for use on more than 200,000 miles of compatible roads in the U.S. and Canada — and yes, it can even be used while trailering.

The base 2.7-liter Turbo High-Output DOHC inline four-cylinder and 3.0-liter Duramax I-6 turbodiesel also receive upgrades that enhance capability. The 2.7-liter engine benefits from a new, more rigid engine block and a 30% stiffer crankshaft, which has enabled a claimed 20% increase in torque compared to the previous engine (GM estimates 420 lb-ft at press time) and quieter operation. In addition, its eight-speed automatic transmission benefits from shift-scheduling enhancements designed to improve refinement and quicken downshift time. Who would've thought that one day a four-cylinder pick-up could tow up to 9,600 pounds? In 2WD trim, this one can.

While GM isn't quite so specific as to the 3.0-liter Duramax upgrades, it does allow that trucks equipped with this engine have undergone chassis upgrades that allow the inclusion of the Max Tow Package, which yields a max tow rating of up to 13,300 pounds — a 4,000-pound improvement over the 2021 models.



producing 440 horsepower and 510 lb-ft of torque, the Timberline boasts real trail capability thanks to 10.6-inches of ground clearance (Ford claims best-in-class), wider track and improved approach/departure angles. Trail Turn Assist, the same system used on the new Ford Bronco, can tighten the turning radius on twisty trails, while 33-inch Goodyear Wrangler AT tires, a two-speed transfer case and F-150 Raptor underbelly shielding help

*Ford expanded its 2022 Expedition lineup with the new Timberline (shown) and Stealth Edition Performance Package.*

## Ford

As the company's largest SUV offering, the Expedition has always been a competent people-mover — but this year Ford expands the lineup with a new Stealth Edition Performance

Package and a Timberline model. While the Stealth Edition is limited primarily to blacked-out trim and 22-inch wheels, the Timberline offers features campers can really use. Powered exclusively by the high-output 3.5-liter EcoBoost V-6

navigate the rough stuff. The Expedition Platinum, meanwhile, debuts Ford's BlueCruise hands-free highway Driver-Assist Technology. Expedition tows up to 9,300 pounds when equipped with the Heavy-Duty Trailer Tow Package.



*The 2022 Grand Wagoneer and Wagoneer have made the leap into the true luxury full-size SUV category while offering a choice of three 4x4 systems, increased clearance and a generous 10,000-pound maximum tow rating.*

## Stellantis/Jeep

GM has the Escalade, Suburban, Tahoe and Yukon. Ford has the Expedition and Lincoln Navigator. But until now, Stellantis (formerly Fiat Chrysler, formerly Daimler Chrysler, formerly Chrysler Corp.) didn't have a true luxury full-size SUV. That changes with the all-new 2022 Wagoneer and Grand Wagoneer — full-size SUVs so outland-

ishly luxurious and capable, Stellantis bills them as a "premium extension of the Jeep brand." In fact, you'll find no "Jeep" badging on them.

Unlike its competitors, however, the Wagoneer and Grand Wagoneer must promise more than luxury and refinement; being associated with the original Wagoneer that bowed in 1962 as a successor to the Willys Jeep Station

Wagon, these new models have a reputation to uphold and some big shoes to fill, Jeep badging or not. With that firmly in mind, these SUVs were built to be as capable as they are comfortable, with a choice of three 4x4 systems (Quadra-Trac, Quadra-Trac II and Quadra Drive II), active low range, a rear electronic limited slip differential, a crawl ratio of 48:1 and Selec-Terrain traction management system. The Quadra-Lift air suspension not only delivers a smooth ride, but up to 10 inches of ground clearance — and contributes to the vehicle's claimed 24 inches of water-fording capability.

Wagoneer is powered by the venerable 5.7-liter V-8 rated at 392 horsepower and 404 lb-ft of torque, boosted by a standard 48-volt eTorque system, while Grand Wagoneer ups the ante with a 6.4-liter V-8 producing 471 horsepower and 455 lb-ft of torque. Both are matched to an 8-speed automatic transmission. A generous 10,000-pound maximum tow rating and Trailer Hitch Line-up Assist with active grid lines and camera zoom should find favor with RV-ers. Of course, both models are loaded with luxury and safety features, as well as beautifully crafted interiors that can seat up to eight passengers.



*Toyota Tundra TRD Pro comes exclusively with the i-FORCE MAX hybrid powertrain and special off-road features, and a tough, industrial-looking interior.*

## Toyota

Marketing teams have a propensity for calling a vehicle “all-new” when it simply looks like it is. Updated sheet metal, interior revisions and more power are all welcome — but they don’t make a vehicle all-new. At least, not when the same frame, engine, transmission and suspension are retained. The 2022 Toyota Tundra, on the other hand, is all new — the company left no stone unturned in an effort to make its full-size truck better in every measurable, tangible way.

Let’s start with the engine choices. Technically, there’s just one — an i-FORCE 3.5-liter twin-turbocharged V-6 — but it’s offered in three variations. In base SR grade, it is tuned to produce a respectable 348 horsepower and 402 lb-ft. of torque; in higher grades, it kicks out 389 horsepower and 479 lb-ft of torque. Choose the i-FORCE MAX, and you’ll get the higher-output engine paired with a hybrid system that generates a total of 437 horsepower and a whopping 583 lb-ft of torque at just 2,400 rpm. All engine combinations



*All Tundra models benefit from a new multi-link rear suspension (pictured), chassis and double-wishbone front suspension.*

will be matched with a new 10-speed electronically controlled automatic transmission with intelligence (ECTi). In i-FORCE MAX applications, the transmission will be paired with a motor generator and clutch assembly located within the transmission bellhousing; engine start-up, EV driving and energy regeneration are accomplished through the parallel hybrid components. A newly developed Power Control Unit works with a 288-volt sealed Nickel-metal Hydride (Ni-MH) battery located underneath the rear passenger seat. Toyota claims that the electric motor will do most of the heavy lifting at low speeds, but once above 18

mph and while in Tow/Haul mode, the engine will be in continuous operation.

An updated, high-strength steel frame structure features a widened rear section to improve stability. Frame crossmembers are more than doubled in size to provide additional reinforcement and rigidity, while aluminum is used in strategic areas to reduce weight. In the rear, a new multi-link suspension system replaces the leaf spring arrangement, which improves ride quality and allowed engineers to move the shock absorbers outside of the frame rails for improved roll damp-

ing. The new system also provided the flexibility to add optional load-leveling air suspension on certain models.

Up front, a new front cross member was constructed for the steering gear box, which adds rigidity for enhanced steering input and handling dynamics, according to Toyota. Additionally, the chassis features a newly developed double-wishbone front suspension and electronic steering system, plus the availability of Adaptive Variable Suspension, which is designed to adjust damping force based on prevailing road conditions.

Maximum tow capacity increases to 12,000 pounds (a 17.6% improvement versus the outgoing model), while payload increases to 1,940 pounds, a gain of more than 11%. The additional capacity also comes with a host of new towing features. First, there are two Tow/Haul modes — standard Tow/Haul for smaller trailers and Tow/Haul+ for larger travel trailers, box trailers and boats. New camera systems can display multiple exterior angles that are viewable from the available 14-inch touchscreen or an available rearview camera accessory that mounts on the back of the trailer. Of particular interest



*Aggressive-looking interior includes a 14-inch touchscreen that will display views from an all-new camera system.*

to RVers is the available Panoramic View Monitor (PVM), which uses cameras to display a top-down “bird’s eye” view of the truck on the available 14-inch monitor for added visibility. Views include the rear truck bed to check on cargo, a rear split view to show what’s nearby on each side of the trailer and a hitch view to assist with connecting. Trailer Back Guidance aids in overall maneuvering of the trailer, while a Straight Path Assist feature is designed to ensure the truck and trailer will back up in a straight line. When connected with Toyota’s integrated trailer brake

controller, the standard Blind Spot Monitor can recognize blind spots for the truck as well as the trailer.

Also available are new power extending and folding tow mirrors for an improved view of the trailer, thanks to a taller profile and revised mirror curvature. The mirrors are heated, feature an integrated turn signal and Blind Spot Monitor (BSM) notification and house the cameras for the available PVM and Multi-Terrain Monitor (MTM) systems. LED trailering lights, controlled via a button inside the cabin, direct light toward the trailer during nighttime or low-visibility situations.

As before, the Tundra will be avail-

able in SR, SR5, Limited, Platinum, 1794 Edition and TRD Pro Grades, and are offered in Double Cab (6.5- or 8.1-foot bed) or CrewMax (5.5- or new 6.5-foot bed) with available TRD Sport and TRD Off-Road packages on certain models. With the trend of off-grid camping today, we predict the TRD Pro model will be a popular choice, with its standard i-FORCE MAX powerplant, 2.5-inch diameter, remote-reservoir FOX internal bypass shocks, electronic rear differential lock, Multi-Terrain Select and Crawl Control hardware. Also included are a front skid plate, underbody protection and unique Falken Wildpeak all-terrain tires. On TRD

Pro or models with the TRD Off-Road package added, the aforementioned Multi-Terrain Monitor allows the driver to check the immediate surroundings for potential obstacles by simply pressing a button for front, rear and side-camera views on the display.

Toyota Safety Sense 2.5 (TSS 2.5) is standard on all models and includes features such as a pre-collision system with pedestrian detection, dynamic radar cruise control, lane tracing assist, automatic high beams and a rear seat-belt reminder. Other standard safety features include Blind Spot Monitoring and Rear Cross Traffic Alert.

## The Volts Are In

We've heard about them for years now — electric trucks that will accelerate, handle and tow as much (or more) than their fossil-fuel powered brethren and offer technologies and benefits yet unseen in the truck market. Developing these trucks and bringing them to market, however,

has proven more of a challenge than initially anticipated, but make no mistake, they are coming — and you can put one in your garage next year. What follows is a brief overview of what will be available and what features they offer for RVers.



*The Ford Lightning is quicker than an F-150 Raptor and comes with standard 4x4 and independent rear suspension, plus a power “frunk” and enough power to run your campsite or home for days.*

### F-150 Lightning

When Elon Musk presented the now infamous video of Tesla's Cybertruck dragging a Ford F-150 in a staged tug-of-war contest back in 2019, he awakened a sleeping giant. Ford is not one to shy away from competition — and was not about to be embarrassed by a newbie in the truck game. Soon after, Ford displayed its electric F-150 towing... ahem...a train, and put the world on notice that it was serious about

bringing an electric truck to market.

Billing it as “the smartest, most innovative truck Ford has ever built,” the F-150 Lightning targets 563 horsepower and 775-lb-ft of torque, good enough for a 0-60 mph sprint in the mid four-second range when equipped with an extended-range battery, according to Ford. A max payload of 2,000 pounds is projected in the standard-range model with 18-inch wheels, along with a 10,000-pound maximum tow rating

on XLT and Lariat trucks with the extended-range battery and Max Trailer Tow Package.

Since what you're hauling can affect range, the truck's Onboard Scales feature — which uses the truck's sensors to estimate payload and tell customers how much they're hauling — is integrated with Intelligent Range to help ensure F-150 Lightning gives an accurate estimate of how far you can go. F-150 Lightning also debuts an available Pro Trailer Hitch Assist, which automatically controls steering, throttle and brake inputs to make hitching trailers even easier. Ford's Power-Up software updates will be available to improve the performance of the Lightning, deliver upgrades, update existing features and add all-new functions and capabilities to the truck in under two minutes, according to Ford. Power Up can also fix issues without a trip to the dealership — something that usually can't be done with a gas or diesel engine.

Speaking of engines (or lack of same), Ford makes use of the vacant space under the hood with its “frunk,” a portmanteau of “front” and “trunk.” The dedicated storage space is secure, lockable and accommodates up to 400 liters of volume and 400 pounds of payload. That's plenty enough to haul a large generator — but you probably won't need one, because the available Ford Intelligent Backup Power feature can offload 9.6kW of juice to power up anything you need, and for extended periods. Based on an average 30kWh of use per day, Ford claims the F-150 Lightning with extended-range battery provides full-home power for up to three days — or as long as 10 days if power is rationed — with varying results based on

energy usage. Pro Power Onboard, meanwhile, supplies built-in electrical outlets to directly power a variety of tools, electronics and appliances when you're away from home.

Admittedly, the shortcoming of an electric truck from an RVer's perspective is range. The Lightning's standard-range lithium-ion battery

is projected to yield 230 miles of EPA-estimated range, while an available extended-range battery can stretch that to 300 miles. Obviously, these figures will drop considerably when towing, but Ford reports that its customers will have "seamless access" to North America's largest public charging network through

FordPass with more than 63,000 charging stations (and growing) across the U.S. On a 150-kilowatt DC fast charger, the extended-range F-150 Lightning is targeted to get up to 54 miles of range in 10 minutes and charge from 15% to 80% percent in about 41 minutes.



*Available as a pick-up or SUV, the GMC Hummer EV will have GM's all-new Ultium batteries and be propelled by the company's Ultium Drive EV drive units. GM predicts 1,000 horsepower and 11,500 lb-ft of torque — which should be interesting.*

### **GMC Hummer EV**

Comparatively little is known about the GMC Hummer EV from an RV-ing perspective — GM has not yet released payload or towing capacity figures — but with up to 1,000 horsepower and up 11,150 lb-ft of torque from its three electric motor combination, we're expecting figures that should at least be competitive with other manufacturers.

What we do know is that the Hummer EV should be fun, especially off-road. Features will include e4WD, 4 Wheel Steer featuring CrabWalk

(allows the front and rear wheels to steer at the same angle at low speeds for additional maneuverability), adaptive air suspension, 35-inch Goodyear Wrangler Territory MT tires and UltraVision, which incorporates front and rear underbody cameras to help drivers negotiate extreme terrain without a spotter. Indeed, GM reports that the Hummer EV will offer up to 18 camera views.

Powered by a 24-module, double-stacked Ultium battery propulsion system, the truck will be capable of 0-60 mph runs in the three-second

range and will offer 800-volt DC public fast-charging compatibility of up to 350kW. The industry-first technology, according to GM, mechanically switches the batteries from parallel to series mode during charging, which makes the Hummer EV compatible with the fastest 350kW DC fast chargers. That means drivers can juice up nearly 100 miles of range in just 10 minutes of charging, according to GM.



*The Rivian R1T is a competent performer on or off road, with its quad motor system and 24 inches of ground clearance. The truck's Gear Tunnel offers 11 cubic feet of storage, and the doors double as steps or seats. You can also opt for the Camp Kitchen, which slides out of the Gear Tunnel.*

### **Rivian R1T and R1S**

Rivian isn't exactly a household name — yet — but has made significant inroads in a very short period of time. It recently inked a deal to provide electric delivery vans for Amazon, and its R1T pickup and R1S SUV have both garnered critical acclaims.

To start with, the R1T is the smallest EV truck offering to date; its overall length and wheelbase are more than a foot shorter than a Chevy Silverado Crew Cab, for example. This bestows it unexpected on-road performance and handling, as well as off-road capabilities that have thus far impressed even hardcore trail-beaters. Looking like a shiny toy alongside the likes of a Ford Raptor or Ram TRX, the R1T offers 24 inches of ground clearance and three feet of water fording capability, plus a tow rating of up to 11,000 pounds. Its quad-motor, all-wheel-drive system enables 0-60 mph sprints in as low

as three seconds flat, and independent air suspension should provide a comfy ride on any surface.

It's also got some thoughtful features that RVers are sure to love, like a Gear Tunnel (think pass-through storage) located between the cab and bed that can stow up to 11 cubic feet of stuff. The Gear Tunnel doors also have storage compartments in them and each can support up to 250 pounds, so you can use them to step up into the bed or load things on a roof rack. What's even cooler is the availability of a Camp Kitchen, which slides in and out of the Gear Tunnel.

Designed to be

the Camp Kitchen includes a 1,440-watt two-burner induction cooktop plus a four-gallon water tank, pump, collapsible sink and spray faucet. And just in case you want to whip up a smoothie or enjoy a hot cup of Joe with breakfast, there are four 120-volt AC power outlets, plus two 12-volt DC outlets.

Meanwhile, the truck's structural composite bed is an exercise in utility. A relatively short 4.5-foot space expands to seven feet with the tailgate down — and there's weatherproof, lockable storage in the bed floor that, with its integrated drain plug, can double as a cooler. An integrated air compressor port includes a hose long enough to reach all four wheels, and two weatherproof, lockable tonneau options are available.

Available in Launch Edition, Adventure Package and Explore Package, the Rivian R1T has an EPA-estimated range of 314 miles. Specs for the R1S SUV are similar, but with a lower 7,700-pound tow rating and 14.9 inches of ground clearance. The nationwide Rivian Adventure Network of DC fast chargers (capable of adding 140 miles of range in 20 minutes) is expected to reach 3,500 chargers at 600 locations by the end of next year. You can learn more about ordering yours at <https://rivian.com/experience/purchasing>.

moved and set up by one person,



*The R1S SUV offers the same powertrain, but with a lower tow rating and less ground clearance than the R1T.*



The angular 2022 Tesla Cybertruck will offer the highest payload capacity (3,500 pounds) and tow rating (14,000+ pounds) of any e-truck.

### Tesla Cybertruck

Arguably the one that started the electric truck movement, the Tesla Cybertruck offers some real innovation if you can get over its polarizing, angular looks. Its much publicized cold-rolled stainless-steel exoskeleton and Tesla armor glass promise strength and durability, underscored by the highest available payload capacity (3,500 pounds) and tow rating (14,000+ pounds) in the electric truck game thus far.

In its top-tier, three-motor configuration, Tesla maintains the Cybertruck will go 0-60 mph in under three seconds and have up to a 500-mile range. Other interesting features include adaptive air suspension, which allows the user to raise/lower the suspension up to four inches in either direction for easier loading/ingress/egress; a lockable “magic tonneau cover” that is tough enough to stand on, and onboard power and compressed air.

There has been a lot of speculation that the Cybertruck will not look as radical once it reaches production, but don't count on it — this is Elon Musk we're talking about, and he's no stranger to raising eyebrows. If you want one, you can order it today for \$100 (fully refundable) at <https://www.tesla.com/cybertruck>. The site maintains that personal configuration can be completed as production nears in 2022. RVE

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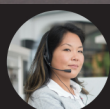
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# Skirting the Issue



## *Preventing heat-robbing breezes from flowing under your fifth wheel is one key to a warmer, less expensive winter*

By Bruce W. Smith / Photos by the author and Larry Walton

If the professional weather prognosticators are correct in their predictions for the U.S. 2021-2022 winter, the jet stream that carries storm fronts in from the Pacific Ocean and the Arctic will be dipping deeper into the Midwest this season — and bring with it colder-than-average temperatures across much of the country.

At the same time, natural gas prices — of which propane is a natural byproduct — continue to rise. By some esti-

mations, the cost of natural gas has increased by more than 180% compared to just a year ago. These two factors don't bode well for anyone who continues to enjoy the RV lifestyle once the snow starts flying. But there are ways to "survive" quite easily in cold-weather conditions.

### **RV Skirting Reduces Heat Loss**

One thing full-timers living in fifth wheels can do to help reduce the monthly heating bill is to "skirt" the trail-

er. Skirting an RV has one purpose: To retain interior heat by preventing cold air from flowing under the trailer.

To be clear, the typical heavy vinyl or fabric RV skirting adds nothing to the R-value like increased insulation. Instead, think of it like a windbreaker that you would wear over a sweater; on its own, it would not keep you warm — but by preventing cold air from pulling heat away from your body, it retains heat, and that keeps you warm. Skirting does a good job of helping retain more of



*The installation of RV skirting is becoming more popular as full-time RVers face rising heating/cooling bills. A properly installed skirting helps reduce such costs and keeps the interior more comfortable as well.*

the heat produced by the RV's furnace and any secondary heat sources.

RV skirting really plays a big role in preventing vulnerable water pipes from freezing, and can also yield a potential savings of up to 40% in propane use, according to a representative at Custom Canvas Unlimited in Murray, Utah. Even if your fifth wheel has a four-season thermal insulation package, the added wind barrier the skirting provides helps keep the cold outside wind from sucking away valuable heat from the underbelly area.

In regions of the country where sub-freezing temperatures during the day can persist for weeks on end, you can build a wood framework under your RV out of 2 x 2-inch wood sections and attach rigid insulation (foam) board to it. Place and attach the framework pieces around the RV. Rigid insulation

like this provides an R-value of about R5 per inch of thickness, so when the vinyl skirting is installed around the rig, with the extra insulation you now have a reasonably insulated area underneath your RV.



*Most RV parks have strict rules as to what types of skirting is allowed. Vinyl and fabric skirting is approved everywhere you travel to or call home.*

## Types of RV Skirting

There are many types of RV skirting available. What you use to block wind from flowing underneath your RV is predicated on many variables depending on budget, time, skills and cost.

Some RVers use straw or hay bales stacked around the perimeter. Cheap. Easy. Messy. Good for farm animals. Bad because they attract rodents and other critters. OSB (oriented-strand board) is another option some RVers



*If wood is your choice for skirting your fifth wheel, T1-11 is the best product as it's designed for outdoor use. Just make sure the bottoms of the panels don't contact the ground. You'll need to find some way to block the air flow between the ground and the T1-11.*

use; OSB is cheaper than plywood, but unfortunately doesn't fare well when exposed to sunlight or water.

Other RVers build skirts out of T1-11 plywood siding. If one has the wood-working skill set and time to properly make the framework and prep/paint, this type of skirting is okay for a trailer that's going to be parked in the same place for a long period of time. (This is a common skirting on mobile homes.) Wood used for sheathing or siding isn't supposed to touch the ground, so that's another factor to deal with when applying it as skirting.



*Fiberglass and aluminum designed for RV siding is also a good alternative to vinyl or fabric skirting if you aren't planning on moving your trailer for a long time. Installation requires some form of framework to hold it in place like T1-11 and other hard panels used in skirting a trailer. (Photo by Larry Walton)*

Then, of course, other options include aluminum, fiberglass or vinyl [siding](#) for skirting. These materials are better than T1-11 because they are lightweight and more suitable for use on RVs. Installation still requires some sort of framework to hold each piece secure and tight against the bottom of your RV and the ground. The siding is usually available in many different patterns and colors, so you could closely match your RVs looks.

### The Best RV Skirting

The most common RV skirting is made from canvas, fabric, or a [heavy-duty vinyl](#) like that used in the trucking world to protect valuable loads and withstand the elements and extremely cold weather. These skirting materials typically attach to the lower edge of the RV with snaps that are riveted in place, or “no-drill” industrial-strength hook-and-loop fasteners that use [adhesive backs](#) to stick to the sidewalls. The bottom of such skirting is kept slightly loose so it “floats” on top of the surface the RV is parked upon.

There are many types and sources for these types of skirting. Some fabric versions, such as those offered by RV [Wind Skirt](#), come in long panels and attach with hook-and-loop fasteners so there’s no drilling required for attaching snaps. These are good for DIYers on a budget.

The benefit of vinyl/fabric skirting is it’s easy to remove and store when you need to move your RV. Just unsnap/unfasten the pieces, roll them up and put them in one of the RV’s storage compartments or toss them in the bed of the tow vehicle. Once at the new location, the pieces are easily put back in place. These types of skirting materials can be



*Airskirts are new to the RV world. These inflatable bags come in a variety of sizes and kits specifically designed for different trailers from Airstreams to fifth wheels. Airskirts can be installed under the trailer in less than 15 minutes, according the manufacturer. (Photo courtesy of Airskirts)*

customized to fit the profile of the RV and exterior compartments to provide a good wind barrier, even when the RV is parked on uneven ground. These are also the types of skirting allowed in nearly all RV parks.

Air-inflated skirts are a new wrinkle. The air bags, which vary in size depending on the trailer layout, slide under your RV and don’t require any framework, snaps, drilling of holes or other methods of attachment. Air pressure holds them tight against the frame/floor. They set up in minutes, according to [Airskirts](#). Just position the inflatable bags under the trailer and inflate with the supplied air pump.

The trapped air space adds to the insulating value, whereas vinyl just stops the wind. The prices for these inflatable skirting kits range between \$1,900-\$3,500 depending on the size of the trailer, which is about what you’d pay for having vinyl skirting installed by a pro — but you will have to set up and install them yourself.

### How Vinyl Skirting Is Installed

Blocking wind from going under your trailer isn’t rocket science. It just needs to be done properly to do its job. Most RV skirting needs to be well thought out, parts sourced, assembled and installed. If you are comfortable with doing all of those aspects, then installing skirting on your RV just requires patience (along with an investment in money and time.)

Time and patience, however, are not my strong points. I also want the skirting to complement my trailer while doing its job, fit nicely and be functional for necessary access points. To that end, this is why many full-time RVers like me believe it’s worth the extra cost to have a pro do a skirting installation.

There are probably professional installers within easy driving range of where you live; you just have to know how to find them. A call to your nearest RV dealer is a good starting point because it typically works with someone that installs RV skirting. A search on the internet will also bring up RV skirting suppliers and installers, which can sometimes be associated with companies that do custom boat covers and awnings.

Since my fifth wheel is set up in southwestern Idaho, a quick internet search brought up multiple choices from a number of suppliers of generic skirting sections and fasteners. I also found a local RV skirting supplier in Twin



*One advantage to having a custom vinyl/canvas skirting installed is the skirts can be tailored to accommodate all types of contours and special needs, like having an opening for the hitch receiver and MORryde rear stabilizer setup on this fifth wheel.*



Kevin Jorgensen (kneeling) has been making and installing RV skirting in southwestern Idaho for 20 years. Larry Jones helped install the skirting on my 39-foot Sprinter fifth wheel. It was a three-day job, with a third of that spent taking precise measurements.

Falls, Idaho, called [Jorgensen Fabric Products](#). Owner Kevinn Jorgensen has been making custom 18-ounce vinyl RV skirting for nearly 20 years. He and his wife incorporate the same heavy-duty vinyl, thread, zippers, stake loops and snaps used for boat covers, trucking tarps and business awning applications into the RV skirts.

“Whether you are installing RV skirting as a do-it-yourselfer or having us do the install,” said Jorgensen as he and helper Larry Jones installed the snaps along my 39-foot fifth wheel, “there’s a normal routine that should be followed when installing vinyl skirting: Mark and install the snaps, measure every inch of

the trailer, and make a detailed sketch of how the skirting will layout in sections.”

That seems easy — but it’s a tedious process. It took a couple hours for the two experienced installers to get the needed measurements and install the first round of black snaps that were riveted in place around the perimeter. A couple days later they returned with the black vinyl fabric, now stitched and cut into multiple panels that were easily positioned around the trailer’s four slides and curved front cap. This day was spent installing the female part of each snap on the vinyl as it was stretched taut until the piece was in place. Then

the first snap on the adjoining panel was clicked into place and every snap on the trailer side marked and the remaining snaps installed. This time-consuming process was repeated about 10 times on my rig.

During this part of the installation, Jorgensen also was marking and measuring each vinyl panel for where it had to be cut to curve around cargo doors, have an opening for the hitch receiver and create convenient access points like those to the tank valves and self-leveling control panel. Then all the panels were removed once again and taken back to the shop for final cutting and sewing.

Jorgensen and Jones spent a third day on the final installation. In places where an extra snap was needed (like tight curves around hatches or the tight corners between adjoining slides), the spot was marked, snaps were installed and they made sure the fit was clean and tight.

They then usually smooth out the skirting and tuck-and-roll the excess vinyl under the trailer. However, because my trailer sits on slightly uneven ground and the street side faces a prevailing westerly wind that can get it’s speed up when storms roll across the high desert mesas, I wanted the bottom edges of the panels anchored to prevent the wind from pushing the panels deeper under the trailer. I used 16-inch, powder-coated Bimiti metal tent stakes to hold the panels secure. That way the winter winds would keep the skirts tight. If I were parked on a slab in an RV park with less direct wind, the having the vinyl panel ends tucked under the rig would proffer a nice, clean look.



Attaching vinyl skirting to your RV can be done using a variety of methods from hook-and-loop fasteners to twist locks to snaps. The latter is the preferred method by many pro installers like Jorgensen because they are easier to install — and less expensive — than twist locks. Installing the vinyl skirting properly requires laying out the places for the fasteners to attach. He likes to place them about 16 inches apart, and just inches apart around the cargo doors and other corners.



2

Installing snaps requires drilling into the RV sides as close as possible to the bottom edge. An inch-long 1/8-inch bit is the ideal size for drilling the holes. Our DeWalt 20V Max XR cordless drill got a real workout on this installation.



3

Jones installed the male end of the black snaps on this trailer using 1/8-inch x1-inch aluminum rivets and an old-school hand riveter.

### RV Skirting Makes a Difference

Even though winter hadn't fully arrived where I live as of late October, it was cold. I immediately noticed the difference the custom skirting made: The floor is notably warmer with the skirting than without, and the propane usage has decreased although outside temperatures were 10-15 degrees cooler at night than they were before the installation.

I also noticed the pass-through storage compartment and open space under the fifth wheel stays warmer. So it's obvious some of my trailer's radiant heat from the ducting is staying put

rather than being blown away by freely flowing wind.

Was the cost of my custom skirting installation, which came to about \$1,700, worth the investment? In the long run, yes. I'm not worried about freezing pipes and the floors are warmer, the interior heats up a little quicker and the furnace and electric heater aren't staying on as long. That means my winter heating bill is going to be less than it would without skirting. There should also be a little electrical savings in the summer because all the skirting companies claim skirting helps keep an RV a little cooler during the hotter

months.

Will my RV skirting result in a 40% savings in propane use, as one skirting supplier suggests? Unlikely. However, it all depends on where you live and what type of skirting you have installed. But even if my propane costs drop by 20% in the dead of winter, over the next five years or so the savings will have paid for the skirting installation — and when the time comes to getting back on the road, the vinyl skirting can be easily removed and snapped back into place when I drop the landing jacks at the new location.



4

Jorgensen says one trick he uses to accurately measure and mark the curved front ends of fifth wheels like this Sprinter is to place a snap at one corner and attach a thin web strap pulled tight around to the other side.



5

Length isn't the only critical measurements when installing vinyl skirting. Height is also important. Jorgensen likes to leave at least a foot of material on the ground so the bottom of skirting can be secured with weighted material (sand bags, pavers, 2x4s, etc.) or staked into the ground.



6

Jorgensen and Jones measured every inch of the trailer and transferred those measurements to a floorplan he made of my rig so they knew exactly how long to make each vinyl panel and the location of doors, hatches and power cables are taken into account.



7

The majority of the female half of the snaps are installed at the shop. But during the preliminary fitting a few more were needed for the correct fit in some tighter places like between adjoining slides. Again, an old-school snap installer was called on to handle the job.



8

Jorgensen brings out the "pre-finish" vinyl panels and fits them around the fifth wheel, one section at a time to ensure the length, height, snaps, and fit around the compartments and slides are exactly where he wants them. Any place adjustments or customizing are needed is noted.



9

Custom skirting manufacturers/installers like Jorgensen Fabric Products in Twin Falls, Idaho, do all of their own sewing in-house. The final sewing and attaching of tie-down loops along the bottom edge of each panel are done at the Jorgensen shop. Then the panels are taken back to the jobsite and installed.



10

Another cool trick when installing vinyl skirting is using large binder clips to hold the vinyl tight against the sharp corners of the slides.



11

When you start researching or buying custom skirting, make sure any doors or other openings that require zippers use “molded-tooth” and not “coil-style” zippers. Molded-tooth zippers are far more durable and up to the job in RV skirting applications.

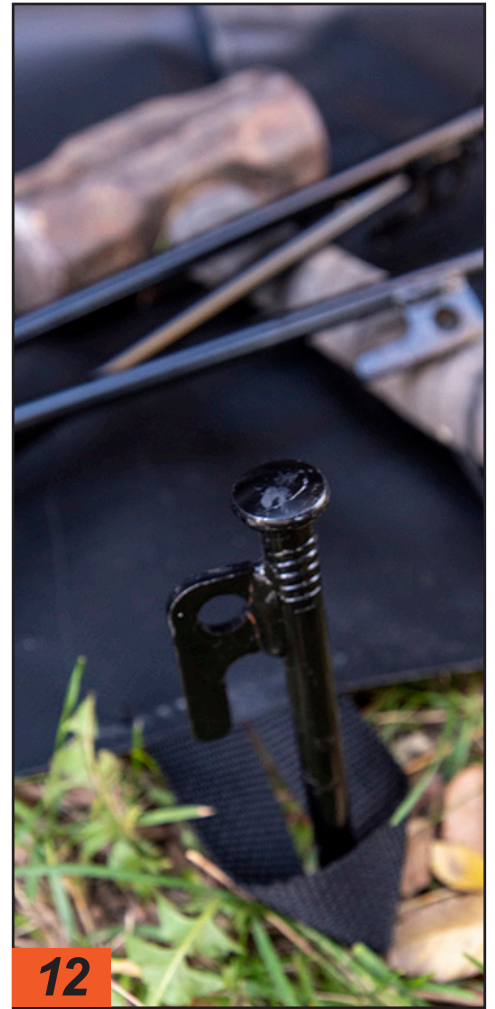


13a



13b

Professionally installed skirting complements the RV and does an excellent job keeping wind from robbing heat from under the trailer. “Every skirting installation is a little different and no two RVs are exactly the same,” according to Jorgensen. **RVE**



12

If your RV is going to be parked on terra-firma instead of asphalt, gravel or concrete, and the skirt needs to be anchored, these 16-inch steel tent stakes from [Bimiti](#) are the ticket.

## Sources:

**Jorgensen Fabric Products**  
(208) 293-7370

[jorgensenfabricproducts.business.site](http://jorgensenfabricproducts.business.site)

**Airskirts**  
(860) 485-7283  
[airskirts.com](http://airskirts.com)

**Extreme Covers**  
(208) 695-1740  
[extremecoversidaho.com/](http://extremecoversidaho.com/)

**Custom Canvas Unlimited**  
(801) 671-7775  
[customcanvasunlimited.com/rv-canvas-skirting.php](http://customcanvasunlimited.com/rv-canvas-skirting.php)

**Idaho Canvas Products**  
(888) 395-7999  
[idahocanvas.com/id267.htm](http://idahocanvas.com/id267.htm)

# Down the Drain



*High-pressure flushing of the holding tanks on an annual basis prevents waste build up and reduces odor*

By Bob Livingston / Photos by the author

Dealing with the sanitation system in an RV requires a little more “up close and personal attention” than in a stationary home. Whereas the attention to a typical residential system ends with the flush of a toilet, good holding tank health in an RV requires owners to act proactively — and constantly — in order to prevent unwanted holding tank and dumping issues—not to mention noxious odors.

Proper dumping procedures can mitigate problems with holding tanks, and many RVs these days are fitted with a flushing system that can rinse away much of the contents and attempt to keep the monitor sensors clean. That said, water under standard spigot pressure can do only so much — leaving more residue than desired on the walls and floor in the tanks — and the overwhelming majority of RVs are not equipped with a flushing system for the gray tank(s). Counter to conventional thinking, build up in the gray tank(s) can actually be dirtier than the black, lead-



*To illustrate the effectiveness of high-pressure tank flushing, the black tank on two fifth wheels were dumped, flushed with water for 30 minutes, filled with clean water and dumped twice — until the water was running clear.*

## Simple Tips for a Cleaner RV Sanitation System

ing to odors emanating from sink drains that are hard to treat. The solution: Have the tanks pressure cleaned at least once a year by a company like RV Flush, which specializes in holding-tank cleaning and sanitation-system restoration.

While RV Flush is located in Southern California, there are a number of similar service companies throughout the country. We've engaged RV Flush's services for the last five of its 28 years in business, having the holding tanks in our fifth wheel cleaned annually, the suggested timing for preventing unwanted — and nasty — problems.

When it comes to dumping and cleaning holding tanks, water is your friend. Every time we dump the black tank, we allow the internal flushing system to do its work for at least 15 minutes, followed by filling with clean water and dumping the tank twice. While this invites scrutiny from environmentalists who can argue that we waste water, the overall amount of water used as full timers is infinitesimal when compared to the consumption in a stationary home. To circumvent the lack of flushing systems for the two gray tanks, wastewater is allowed to fill most of the tank before dumping. Even with this rigorous dumping procedure, the monitor still remains erratic and unreliable.

To illustrate the value of power tank cleaning, we set up two tests: One a two-year-old fifth wheel lived in five months a year by snowbirders, and the other our full-time fifth-wheel home. The black tanks in each fifth wheel were dumped and flushed for 30 minutes, then filled with clean water and dumped twice. At this point, the water running out of the black tanks was clear; the gray tanks were allowed to fill near capacity and they, too, were running clear. The uninitiated owner would consider the tanks squeaky clean, but a big surprise was on the way.

Before pressure flushing, the dump valve was removed from the black tank on the full-time rig and the inside inspected using a flashlight. A year's worth of use revealed pretty gross sidewalls — and the monitor was kaput. Since we're veterans of this type of service, we expected to see a lot of "muddy" water coming out during the actual flushing process, and we were not disappointed. The owner of the other fifth wheel, on the other hand, was astounded by the amount of waste being flushed out even though he was almost fanatical about flushing the tank after dumping. When he saw the amount of crud coming out of the gray tanks, he just shook his head in disbe-

When asked how to prevent poo-pyramids and bad odors, the experts at RV Flush shared a number of tips that will help keep tanks cleaner and flow more forcefully while reducing (or eliminating) odor.

Although adding a good RV holding tank-treatment after dumping the tank will break down the contents and control odor, water is actually the best cleaning agent. Most owners drain the tank almost completely, but do not then add enough clean water to "charge" the tank, which is necessary to keep contents moving freely. The RV Flush folks recommend "recharging" the black tank with 15 to 20% of the capacity. That can mean adding 8-10 gallons of water and a good toilet chemical. There are many chemicals on the market; we've used Thetford products for many years (currently using Thetford's Aqua Max). The bottom of the tank must have enough water to suspend the contents, which will aid in content breakdown and limit build-up.

It's also important to use the right toilet paper (see "The Great Wipe Off" in the June 2021 issue of *RV Enthusiast*). One-ply toilet paper is best, but not pleasant to use; two-ply RV toilet paper has just enough strength and will break down readily. Never add

anything to the black tank except body waste, toilet paper and appropriate chemicals: Home "brews" can have an adverse reaction with commercial toilet chemical, leading up to the point of an explosion — and that's not a pretty sight.

Boondockers might resist adding 8-10 gallons to the tank for recharging, since they want to get as many days as possible before dumping and refilling the freshwater tank. Full-timers and snowbirders, for their part, usually don't move around every few days, and that poses a problem inside black tanks. Traveling agitates the contents more effectively, making it more difficult for waste to build up and become more solid — and creating a nasty clog. Any RVer who relies on portable tanks and/or honey wagons will not be able to rinse the tank adequately, which will also lead to build-up. For boondockers, the best practice is to dump and thoroughly rinse the tank as soon as possible after leaving primitive camp sites. Use the onboard tank rinser when water is available — and consider supplementing the dumping process with a Camco Swivel Stik (<https://amzn.to/3nq0em5> for the flexible model) to remove additional waste.



RV Flush has been in business for 28 years and will dispatch a van to your site within its service area. Obviously, the company is regional, but there are other companies offering similar services and are based in a number of areas across the country.



None of the equipment needed to flush the tanks is exotic, but care is taken to make sure no contents are spilled on the ground during the flushing process.

lief. Ironically, the gray water, which is free of body wastes, was dirtier than the water exiting the black tank during the power flushing process.

After the flushing process was completed on both fifth wheels, the monitor panels functioned again, but we don't expect that to last very long. The internal sensors get covered with waste quickly, making a strong case for using a monitor with external sensors like the See-Level RV Holding Tank Monitor (<https://amzn.to/3kLCTcM>).

The pressure flushing process takes about an hour, depending on the number of tanks and the level of build-up. RV Flush, like most similar companies, dispatches a mobile van, so the cleaning can be done at your site. Cost for cleaning three tanks is \$245, but that number is fluid (no pun intended), again depending on the number of tanks and condition. It's the best \$245 you'll spend on preventative maintenance to control build-up, clogging, valve damage and, of course, odors. Most repair centers charge dearly when it comes to holding tank repairs caused by lackadaisical

maintenance, for obvious reasons.

### How Do They Do That?

Although there's nothing exotic about pressure flushing holding tanks, it does require specialized equipment and a technician with a strong constitution; this is not a job for sissies. The flushing process starts with disconnecting the sewer hose bayonet fitting and adding a special clear adapter configured by RV Flush (other companies no doubt use similar systems). The sewer hose is attached to the adapter and, at the other end, the dump inlet. From here, the technician inserts a long wand with a custom nozzle at the end into a hole in the adapter and "snakes" it into the holding tank. The tanks are cleaned one at a time, so the respective valve is opened while the others are closed. Getting the hose and nozzle into the tank takes some finesse but it will eventually reach its destination.

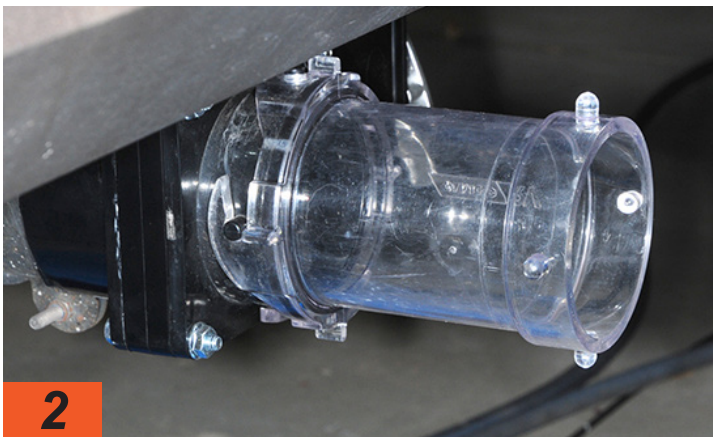
The hose is connected to a pressure unit in the van that produces a water stream at 3,500 psi. This is a mighty spray, which will clean the top, bottom

and sides inside the tank, dislodging the contents clinging to the surface as the wand and nozzle are flung around inside. This may seem like a simple process, but the technician, after doing this procedure countless times, has developed a knack for nozzle placement inside the tank for the best results. The flushing process continues until only clear water flows out of the tank.

### Surprise, Surprise

As mentioned earlier, the water flushed out of the gray tank can actually be dirtier than the contents in black tank. This can be attributed to soap scum, body hair and dirt flushed down the drain while showering, and from owners who wash oil, food particles, grease and even coffee grounds down the kitchen sink when washing dishes, utensils and pots/pans. It's best to pre-wipe all items with paper towels before washing — and use a lot of water. Obviously, this can be problematic when dry camping, but pre-treating the kitchenware really helps in the long run. A common practice is to leave the gray tank open while on an RV site with hookups, but this promotes a build-up of contents as the majority of the liquid is removed, allowing the contents to stick to the sidewalls and floor of the tank. Most owners don't add chemicals to the gray tanks, but doing so will promote better break-up of contents and control odor. After the cleaning process was completed, the monitor panel worked again, but went back to its pre-flush condition in a short while.

It's unlikely you'll ever find an RVer who will admit he/she enjoys dumping holding tanks; it's just part of RV ownership. Keeping the tanks as clean as possible takes the stress level way down and will help remove fodder when sharing it-really-happened-to-me stories with fellow RVers.



A new clear adapter was attached so that we could watch the contents during the flushing process.



A new elbow fitting configured by RV Flush to accept the hose and nozzle was fit into place. The clear plastic elbow provides the best possible view of the process. This type of observation is not for everyone.



4

The nozzle has a number of holes, which directs the water — under 3,500 psi of pressure — to all areas inside the tank. The technician is able to maneuver the hose and nozzle strategically in order to remove caked-on contents.



5

A long hose, connected to a robust pressure washer mounted in the van, is routed through a hole in the fitting into the tank. Tanks are flushed individually with only the respective valve open.



6a



6b

A towel is used to “plug” the hole in the fitting while the hose is moved in and out. A strong odor eliminator and disinfectant is sprayed on the towel many times throughout the process, necessary to stay safe during the flushing process.



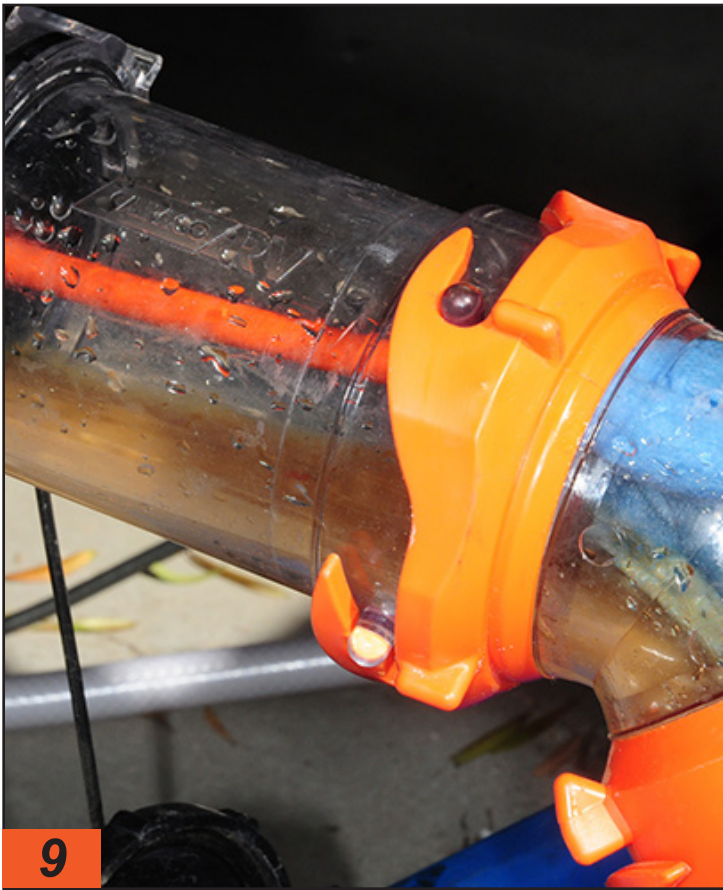
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Right from the get-go, it was obvious that there was plenty of waste still inside the tanks, even after rigorous flushing before the RV Flush technician arrived.



8

The initial flushing process continued until the water running out of the black tank was clean. This process took about 20 minutes.



9

Once RV Flush began power-washing the interior of the tank, crud from the gray tank almost immediately began flowing into the sewer hose. Most people are really surprised to see how dirty the gray tanks are, and figure out quickly why many sink drains give off foul odors.



10

As the clear water flow indicates, the gray tank is finally clean. All the holding tanks should be pressure-flushed annually. **RVE**

Source:

RV Flush - (800) 517-6977  
[www.rvflush.com](http://www.rvflush.com)

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# Furnace on the Fritz?



*Furnace models with an outside access door are much easier to inspect and service. When it comes to blowing out debris, compressed air is your friend.*

## *Understanding the top 10 reasons why furnaces fail — and how to rectify them — will help keep your interior toasty warm during colder weather*

By Bill Gehr / Photos by the author and Bob Livingston

Winter can be a special season to travel in an RV — and when the temperature drops, modern comfort heating systems will keep the interior cozy. Granted, there are a number of ways to warm up the interior, but most RVers rely on their LP-gas furnaces. Everything is copesetic when they work, but when something

goes awry, it can be a challenge to keep occupants comfortable inside the RV. That's why it's important to have at least a basic understanding of what can go wrong and how to mitigate the situation — even when on the road, far from service centers.

Most owners will never become an ace furnace repair person, but having

the solutions to the following 10 common maladies (in no particular order or importance) in your “pocket” could make the difference between a nice trip and being sidelined, shivering under a blanket. The following applies to typical furnaces found in RVs. Hydronic and Truma models are not covered here.

# #1

## LP-gas Pressure

Inadequate gas pressure will cause short cycling or a faulty ignition. Test the system for proper LP-gas pressure using a manometer (most people use

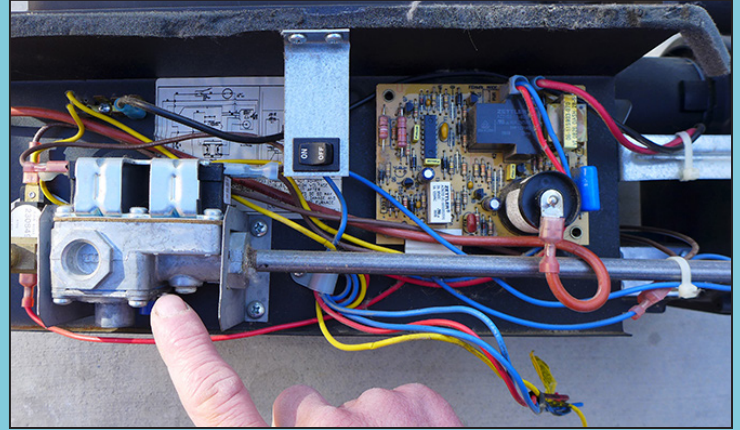


*Inadequate LP-gas pressure is one of the more common maladies affecting furnace performance. Pressure should be checked if you suspect a problem with ignition; a dial manometer is the most convenient tool for checking LP-gas pressure — and regulator integrity.*

a dial manometer), which should be 11 inches water column with all the appliances off. While testing the gas pressure, start the furnace ignition procedure to verify that the pressure does not completely drop out, which will indicate that the pressure regulator is defective and needs to be replaced. It's a good idea to replace the regulator every five years, regardless of whether or not it's

working.

If you find yourself far from a service center and do not have access to a manometer, a quick way of checking for a drop in gas pressure is to ignite the burners on your stove and turn the furnace on; if the burner flames drop considerably in size or completely go out, the pressure regulator is likely defective.



*This is a typical gas valve used in most older furnaces, especially Suburban models. There is a tap at the bottom of the valve allowing you to diagnose low pressure problems with a manometer.*

# #2

## Home Sweet Home — for Bugs

Mud daubers love the smell of propane and will nest in the intake or discharge pipes, creating a blockage. (Of course, debris can also cause a similar problem.) Using a bright flashlight, look into both pipes to detect any blockage. If the blockage is deep into the system — normally a problem caused by a mud dauber nest attached a blower wheel — you will not be able to see an obstruction from the outside. If you suspect there is a mud dauber nest inside the blower wheel, it will be necessary to remove the furnace and dismantle the blower assembly.

Another possible blockage could be traced to bug screens attached to the

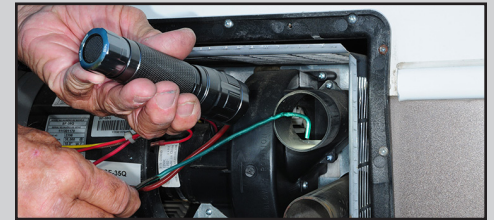


*The exterior panel on this Suburban furnace can be removed easily, providing access to the components.*

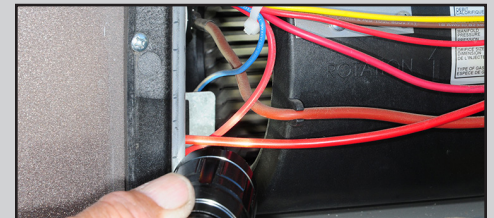
outside of the furnace at the intake and discharge ports. Manufacturers do not recommend this as it can impede air intake and discharge if the screens are allowed to plug up. If you insist on using these screens, make it a point to inspect the surface for blockage on a regular basis.



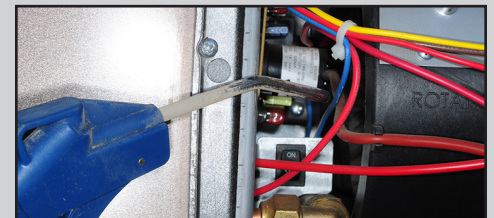
*Carefully pull the access panel away from the sidewall, exposing the intake and exhaust tubes. Mud daubers love the smell of LP-gas and will hang out in the intake and exhaust tubes, restricting airflow, which leads to performance issues and possible furnace failure.*



*Use a bright flashlight to inspect the intake and exhaust tubes for insects and other debris. These obstructions can be cleared with a wire hanger after bending a makeshift hook in the end.*



*A flashlight can also be used to inspect a portion of the fan, which can be bombarded by mud daubers and other debris.*



*An air gun with a long nozzle can make short work of clearing debris and dust from most of the furnace components, including the circuit board. Cleaning is more difficult in furnaces without an outside access panel.*

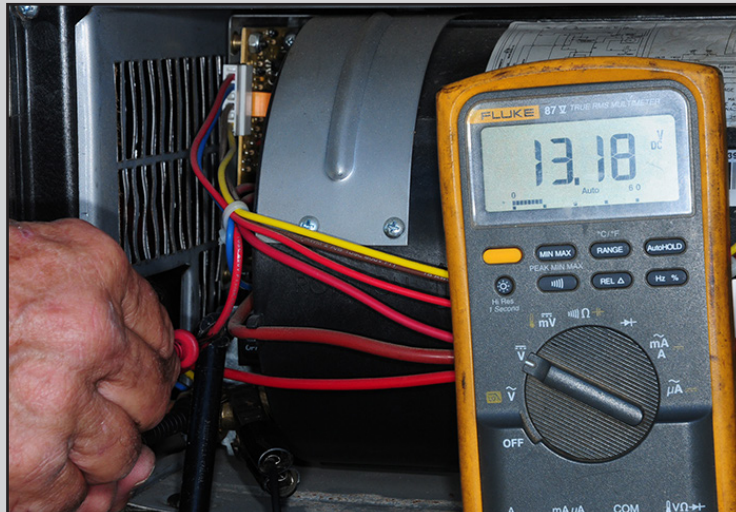
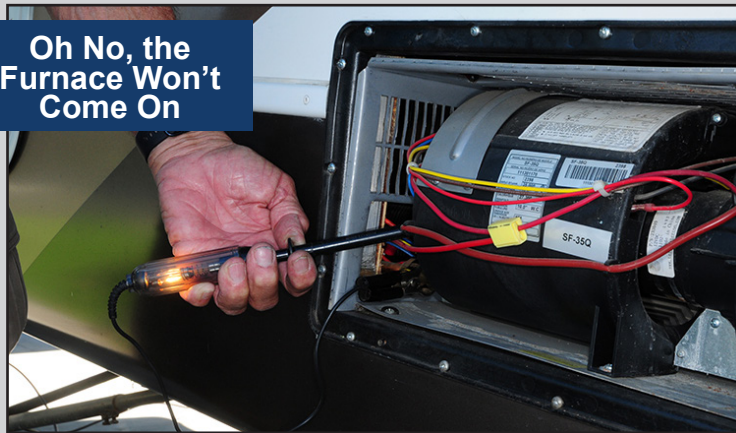
# #3

## Oh No, the Furnace Won't Come On

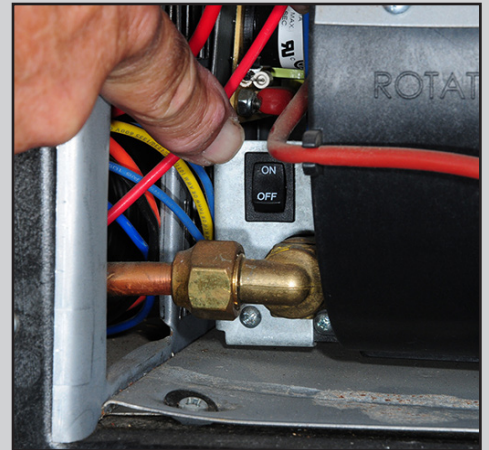
The obvious first check is for a blown fuse. If it's good, make sure you have adequate voltage at the fuse and the furnace. Voltage can be verified using a multimeter and probes. There should be no less than 10.8 to 11 volts DC for the furnace to operate, but keep in mind that if voltage is that low, don't expect the furnace to run very long. Nominal voltage with a fully charged battery should be more than 12 volts DC. At this point, you'll need to evaluate whether the charging system — be it via the converter, inverter-charger or solar panels — is functioning properly.

Most furnaces will have an on/off switch, which must have power across it. This switch is accessible via an outside door, but those furnaces without such access

will have to be removed to check for power. If there is power at and through the switch, the next check is at the time delay relay, if so equipped. Replace as



*Incoming 12-volt DC power is checked with a simple test light. At this point, you are only checking for the presence of power, not exact voltage. Voltage to the circuit board is verified by using an accurate multimeter. A furnace will actually work when voltage dips to 10.8 to 11, but don't expect it to run for long. If voltage is low, suspect poor battery charging, or even bad batteries and/or converter.*



*On/off switches are provided in most furnaces. While it may seem over simplified to suggest that the switch must be in the "On" position to operate, this step is overlooked more often than expected.*



*If the furnace fails to start, the first step is to check power at the fuse panel.*

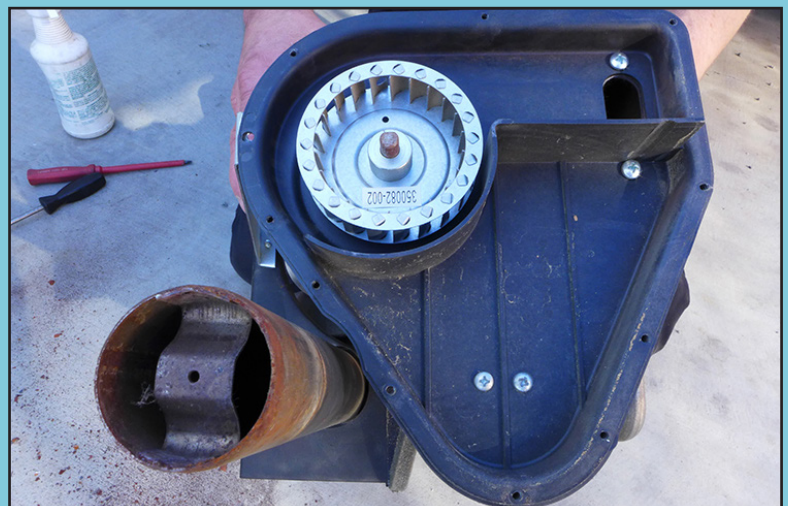
necessary after testing. While checking these components, be aware that a loose connection can also cause a no-start problem.

# #4

## Where's the Air?

If the blower motor fails or is functioning erratically, the furnace will not ignite. The first step is to determine if there is adequate voltage to the furnace (see No.3). Does the motor sound like it's running too slowly? If so, the brushes may be worn and not making proper contact on the motor windings. A mud dauber nest can also prevent the blower wheels from turning at top speed. Some furnaces may give you an audible hint that the motor is about to fail: If you hear squealing from inside the furnace upon start up, the chances are the motor is toast. If the blower motor tries to start and then stops, check the

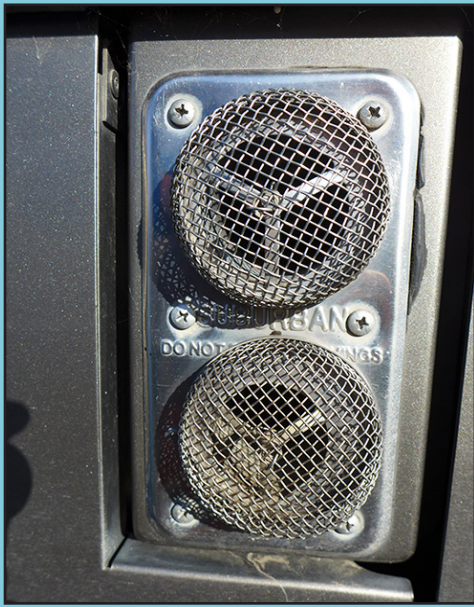
voltage at the blower motor. The furnace board determines that the fan is running and providing adequate air flow by using a sail switch which closes when enough air hits the sail to activate the switch. These fail frequently; some RVers will carry extras in their toolbox, just in case. (See No. 7 for more.)



*This image shows the typical configuration of an intake blower in a Suburban furnace. Not all intake blowers are accessible without removing the cover. Nests or other debris can create an improper air-fuel mixture.*

# #5

## Keeping the Air Flowing



Although furnace manufactures suggest otherwise, many owners cover the intake and exhaust ports with screens available in RV supply stores. These screens must be inspected frequently and cleaned of any obstructions to prevent furnace disfunction and overheating.

Blocking the return air vent and/or heat registers is a no-no. For example, it's not uncommon for towels or other items to fall out of drawers and/or cabinets and block the return air vent. Manufacturers require a certain amount of space (in square inches) around the return air vent and a certain number of heat registers to properly evacuate heat from the furnace.

Floor registers can collect an unbelievable amount of dirt over time — including pet hair, which can cause a serious problem by blocking the air flow through the ducting. If you have pets that shed and are concerned about the integrity of the floor registers, remove



Floor registers are susceptible to blockage caused by dog air and other debris. While these registers can be covered with screen material, airflow must not be impeded. Frequent inspection and cleaning are in order.

them and apply a coarse screen material that will not impede the airflow, but will keep pet hair and debris out of the ducting — and inspect/clean frequently to make sure airflow is not impeded. Some fifth wheels have a return air vent in the basement, which can be blocked unintentionally by nearby stored items. Become familiar with the return air configuration and take measures to keep the vent clear at all times. If the return air vent is located in the galley, remove it and check periodically for anything that could have been dropped out of a drawer and possibly impede airflow.



Shown is a typical direct discharge type of furnace common in small trailers. As you can see, simple access makes it easy to clean and inspect for wayward materials (think towels, etc.) that may block airflow.

# #6

## Don't Overlook the Thermostat

Most modern thermostats are very reliable, but they are still made by humans, so a failure is not impossible. Diagnosing a thermostat problem requires that it be taken off the wall to inspect all the connections for integrity.

In the old days, wall thermostats were basic with an on-off switch and a lever to set temperature. For these models, normally there are two blue wires coming from the furnace, which must be connected. Mechanical thermostats are still around but are not super accurate; owners learned to adjust the set points based on trial-and-error and interior comfort. If you suspect that the thermostat has failed, it can be removed from the wall and a jumper wire can be placed across the two terminals to test-activate the furnace. Keep in mind that every furnace has a fan-control board or time-delay relay and you will need to wait 20 or 30 seconds for it to start, and up to three minutes for the fan to shut off after the flame ceases.

Modern digital thermostats that

control the air-conditioner(s) and the furnace are a bit more complicated. You can remove them to check for loose connections; testing is accomplished using an accurate voltmeter. In many cases, the blue furnace wire will go to the air conditioner control board and not the thermostat.

Thermostats integrated into touch-



Although it seems elementary, don't discount a failed thermostat when the furnace fails to function. In its simplest form, two (usually) blue wires control the furnace, and can be checked for continuity. More exotic thermostats that need attention will require the services of a trained technician.

screen control panels are more complicated and require testing by a trained technician, although many resets and testing can be accomplished right from the screen. Companies like Thor Industries, which includes a touch-screen panel to control systems in many of its RV lines, provide excellent support over the phone and online.



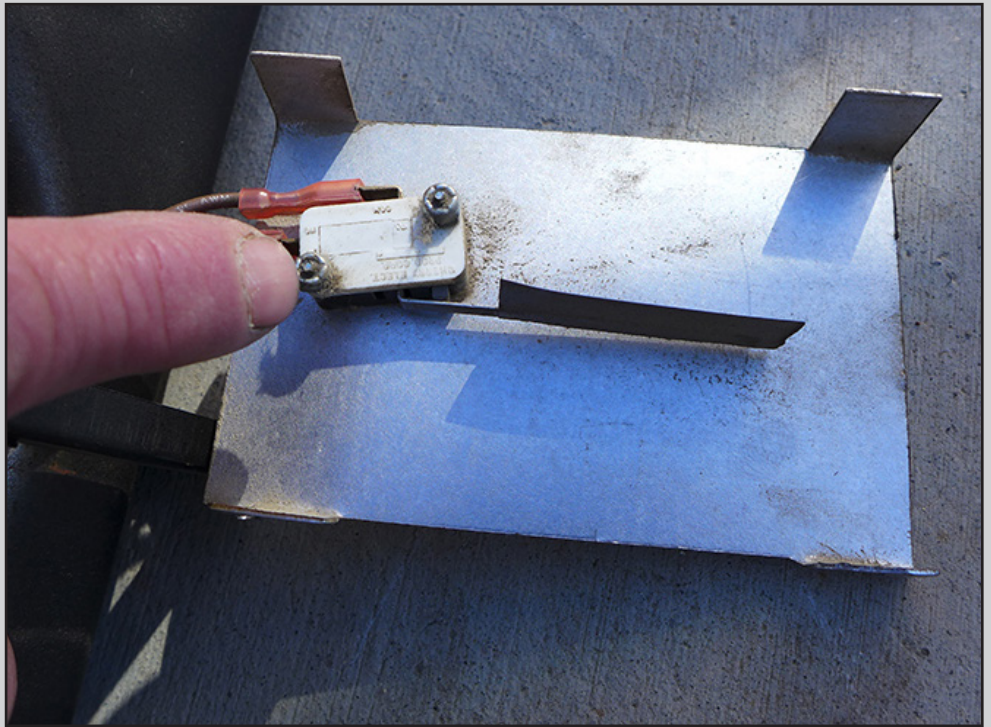
In this example, the two blue wires are for the thermostat, the red is the 12-volt DC positive wire and yellow wire is the ground — typical wiring schematic on most forced-air heating systems in RVs.

# #7

## Uncooperative Circuit Board

Depending on the age of your RV, the circuit board may or may not have an indicator light to let you know if this electronic component has failed. If the blower motor comes on and you hear no flame ignition, the circuit board and/or the sail switch may be an issue.

Gaining access to the circuit board and sail switch is fairly easy on units with an outside access panel, but units without this feature require complete removal. Test for voltage flowing through the sail switch to the circuit board if the indicator light on a circuit board is not lit. If you have an older-style PC board without an indicator light, you can test the voltage at the circuit board that comes from the sail switch or from the limit switch, depending on the model of your furnace. The limit switch is a thermal disc that will shut the furnace off when the burner heat exceeds set limits. The sail switch closes the circuit when the air flow from the fan is strong enough to move the flat portion on the switch arm. This is a safety device that will prevent flame ignition if there is not enough air moving through furnace. Should the combustion chamber overheat, the limit switch will shut down the power to the circuit board so that the flame goes out and allows the furnace to cool down. This usually only occurs when there's a problem with venting



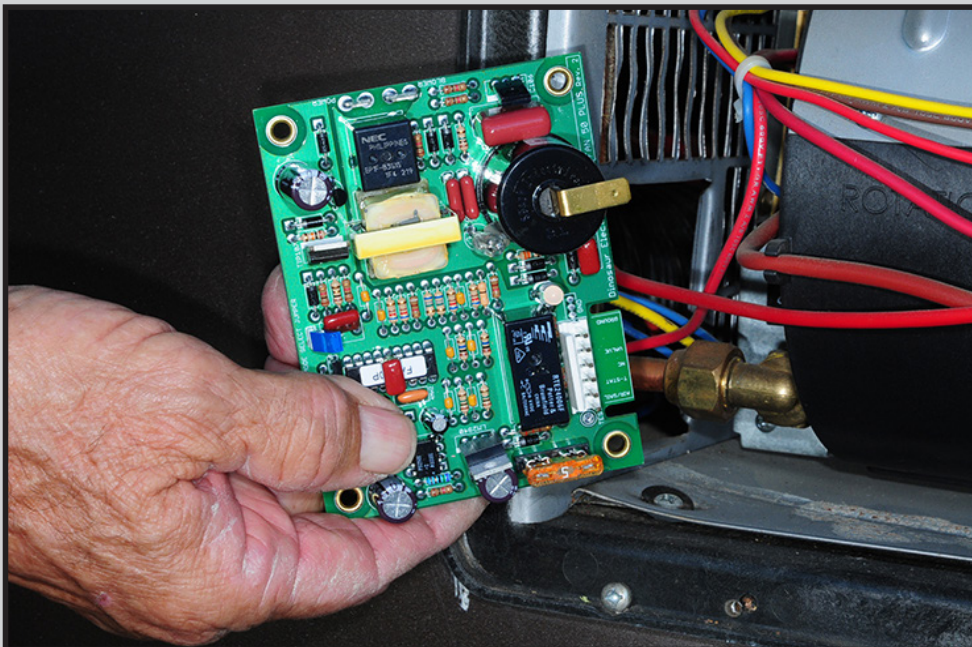
*This is the type of sail switch used in all models of forced air furnaces. If the blower motor slows down below the recommended RPM, the sail switch will shut down the flow of LP-gas, preventing overheating. The integrity of the switch can be checked with a multimeter, although this switch does not fail that often.*

(see No. 5). It's fairly rare to find a limit switch that has failed.

Subsequent furnace models morphed to the use of a Fan 50 Plus circuit board, which was designed to eliminate the time-delay relay (see No. 10) and control the fan motor when there was a lack of ignition. Manufacturers transitioned to the current fan control circuit board, which is found on all furnaces

today.

Most modern circuit boards can be tested with a tool utilized by RV dealerships and repair centers. You may be able to take the board to the local shop and ask if its technicians will test it. The best replacement circuit boards are made by Dinosaur Electronics ([www.dinosaurelectronics.com](http://www.dinosaurelectronics.com)).



*Circuit boards control furnace function and can be tested at most RV repair centers that have the proper equipment. This replacement board by Dinosaur Electronics includes fan control, so the time-delay relay is not used. Dinosaur Electronics boards are considered the best in the business.*



*The limit switch (models will vary) prevents the combustion chamber from overheating to the point where safety could be compromised. This is one of the checkpoints for tracing voltage to the circuit board or the sail switch.*

# #8

## The Right Flame

Soot appearing on and around the furnace vent indicates that there's an issue with the air/fuel mixture. Proper ignition is affected by LP-gas pressure, air intake/discharge integrity, mud dauber nests or debris in the burner tube. This is usually indicated by a flame that



With the front cover removed from this older Suburban T-Series furnace, you can see there is access to a sight glass to determine whether the flame is in good condition. Too much air causes a big yellow flame, which can cause an improper heating.



It's not uncommon for rust to build up over the years in a forced-air furnace. Rust is created by condensation caused by intense heating through combustion and cool down. Rust building up over time will affect the air-fuel mixture, leading to an erratic flame—and in some cases, no flame.

is yellow and dancing around the top of the burner. Once the soot has begun to show up, it will only get worse until the problem is solved.

Remove the furnace and find a suitable bench or location to clean all the parts in the combustion chamber. Cleaning soot from the furnace will require a large volume of air pressure, not to exceed 200 PSI. The tricky part is removing the burner from the furnace for cleaning. Keep in mind that rust can be an issue with some older burners, closing the slots (in the burner) over a

period of time and causing an improper flame. Blow air through the intake and discharge vents and through the front of the furnace after removing the electrode assembly to gain access to the combustion chamber. This is very messy, and black dust will go everywhere; wear a mask.

Extreme cases of improper ignition could be traced to the burner orifice; seek professional help if you are not familiar with this procedure. Another cause of improper ignition could be LP-gas pressure (see No. 1). Use caution when working with combustion systems; it can be very dangerous.



The Suburban NT 30 Series furnace has an access panel that can be dropped down to inspect the flame and gain access to the electrode so it can be removed and cleaned.

# #9

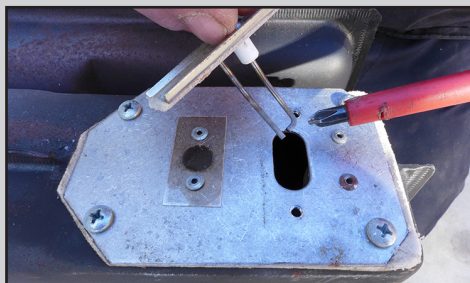
## Loosey Goosey

With all the vibration and movement RVs endure while on the highway — and wires running everywhere — it's



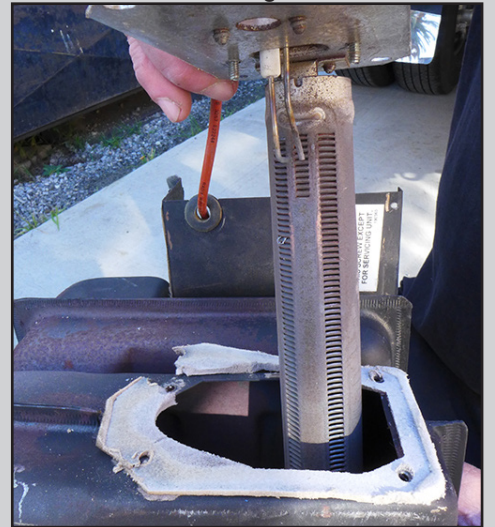
This is a typical view of the electrode assembly mounted in the front of a Suburban T-Series furnace; a sight glass allows you to visually check the flame for proper air/fuel ratio.

not uncommon to find a loose connection or a wire that has been compromised. Loose connections can be found just about anywhere from the fuse panel to the furnace itself; sometimes bad connections are obvious, but more often you'll need to use a voltmeter to identify the culprit. One overlooked item is the ignition wire from the electrode to the circuit board. Built-up corrosion or a loose terminal can create enough re-



Electrodes used in all direct-spark-ignition forced-air furnace can become inoperative if the gap is not correct (specs are provided for all furnaces). The gap between the ground and the electrode is somewhat critical, as well as the gap between the electrode and the top of the burner.

sistance to cause ignition failure. If you suspect a loose connection, you will need to check the 12-volt DC, thermostat and internal wiring.



Here, the electrode is placed in position above one of the slots in the burner assembly. When inspecting an electrode, be sure that the slots are clear of rust and debris below the electrode assembly for proper spark and ignition.

# #10

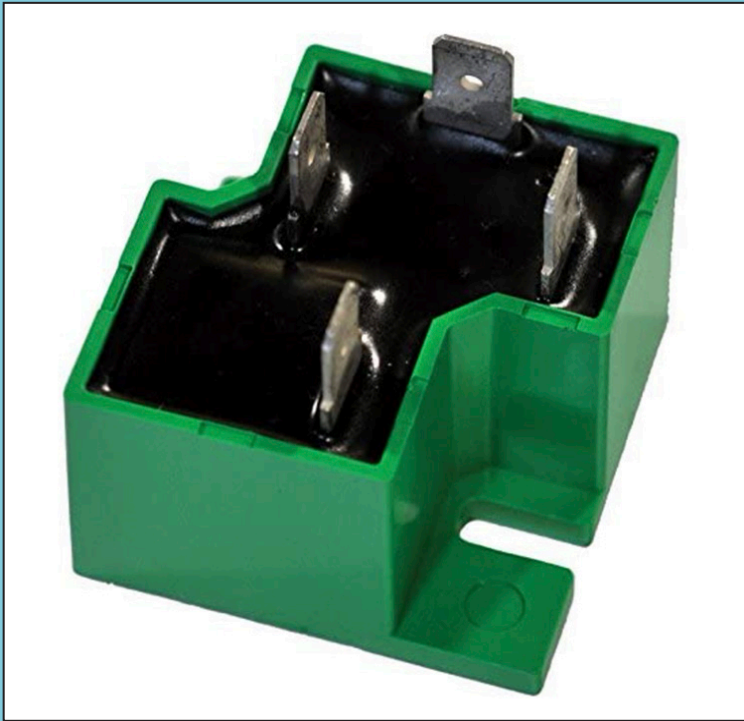
## Patience, My Friend

Older model furnaces use a time-delay relay, which delays the blower wheel

from coming on — and, most importantly, allows the combustion chamber to cool down before shutting down the furnace. This is important because of the intense heat in the combustion chamber; repeated shutdowns without cooling the combustion chamber would ultimately lead to furnace failure.

Normally, a defective time-delay relay will not allow the furnace blower motor to come on. There are instances when the blower motor will cycle

several times before remaining off or on. The time-delay relay functions by sensing voltage via a signal from the thermostat. If you suspect the time-delay relay is defective, use a voltmeter to check power coming into the relay and to the thermostat side of the relay. If it has power at both terminals, then the relay could be defective, providing you already confirmed that the ground to the relay is adequate. The ground on the relay is usually a short wire running to a ground block and can be checked visually. When replacing the time delay relay, be sure that you get the proper one for the particular furnace; they are not interchangeable.



*The time-delay relay was used in older furnaces before the advent of fan-control circuit boards. If it's defective, the blower motor will not run. If the blower motor cycles before remaining on, suspect a failing time-delay relay. Shown is a replacement time-delay relay from Dinosaur Electronics sold on Amazon (<https://amzn.to/3DnaMI5>).*

It's not possible to have an effective HVAC system without a source of heat. Murphy's Law suggests that a furnace will only fail when it's needed the most. Keeping an eye on internal components and knowing what to look for when a furnace fails — or becomes erratic — can make a big difference in whether you'll be shivering inside a blanket or enjoying the interior space in comfort. **RVE**

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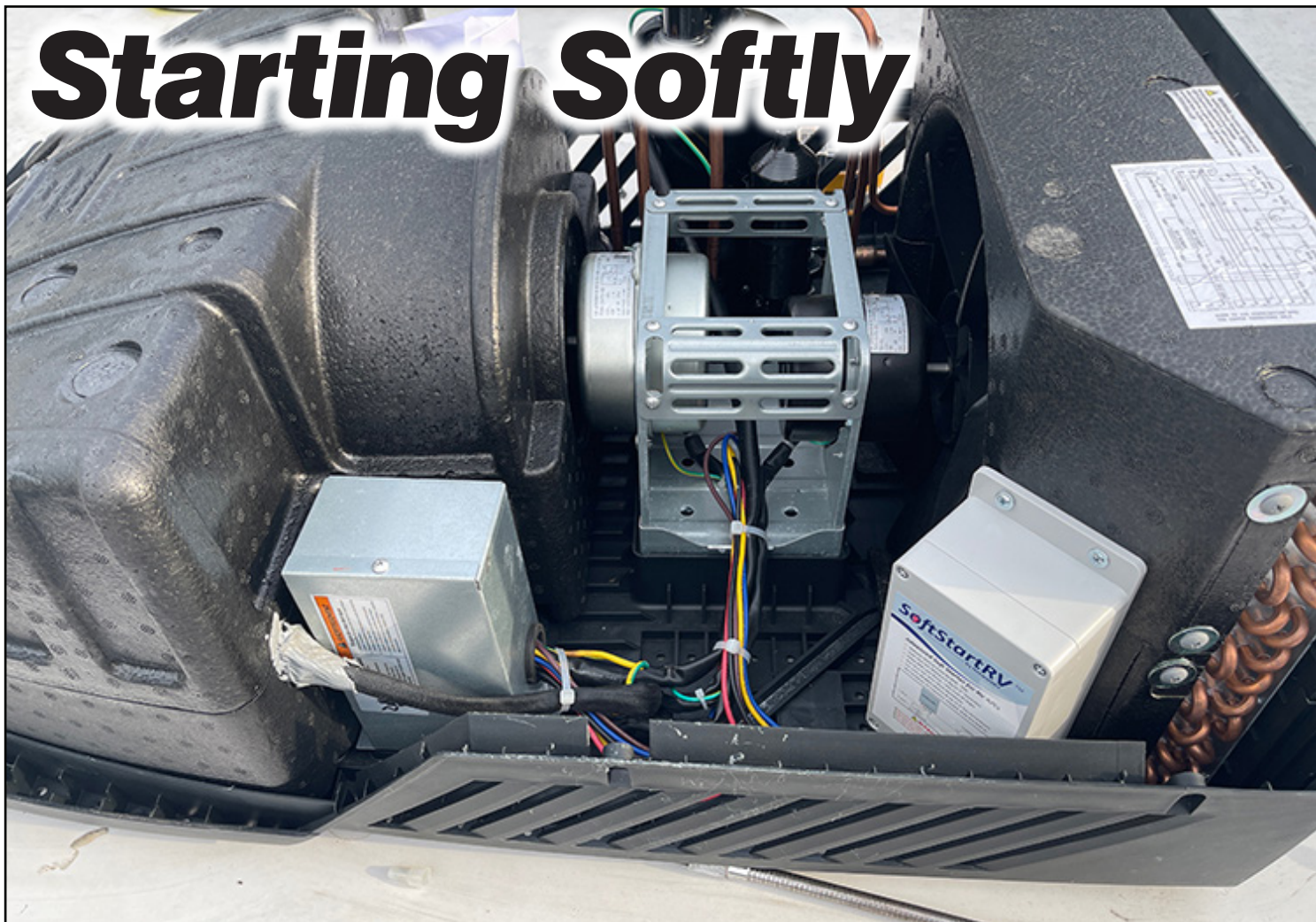
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# Starting Softly



The use of a SoftStartRV unit can dramatically reduce the initial start surge of an RV air-conditioner, allowing for its use with a portable generator producing just 2,500 watts of power.

## Reducing the power requirements for running a roof-top air-conditioner with a SoftStartRV device adds off-grid versatility by making it possible to employ smaller portable generators

By Chris Dougherty

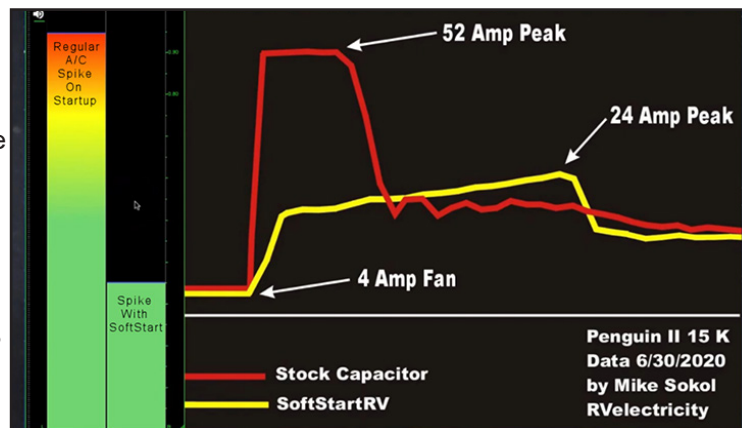
Given the surging popularity of boondocking, it's not surprising that sales of portable generators have likewise jumped of late. After all, camping off the grid doesn't always mean camping without life's comforts — especially air conditioning. Unfortunately, some RV enthusiasts have found themselves with a fairly expensive genset incapable of keeping things cool in the dog days of summer...through no fault of their own.

Picture this: You bought a new 2,500-watt generator for your RV travels that you believed should be able to provide enough power to operate an air-conditioner. After all, it provides 20 amps of current, and the A/C only requires 13 amps to run. Piece of cake, you think to

yourself; "If I need the A/C I just won't run anything else."

Famous last words. You start the generator, hook up the RV, and all is good — until you turn on the A/C and the generator gives up the ghost.

What happened? Two words: Start surge — which is much higher than the generator's run-power requirement. And that's if absolutely everything else



SoftStartRV Peak Comparison by Mike Sokol

This chart from Mike Sokol shows the difference between a 15,000-Btu air-conditioner starting with its own capacitor versus with the SoftStartRV. The start surge is more than double without the SoftStartRV.



**1** Once the cover of the air-conditioner is lifted off, the starter/junction box is removed and/or opened, depending on the brand and model of air-conditioner, and the soft start wires are routed into the box.

in the RV, which also tax the system, is turned off.

An air-conditioner has two or three electric motors, which are inductive loads. The electrical energy creates a magnetic field that converts the power to mechanical energy. There also is a refrigerant compressor and one or two fan motors in an RV rooftop air-conditioner. In order to start the motor, there has to be enough force to turn it over, as it is under some load (depending on pressure, weight, etc.). This is the start surge, which is momentary, but can be quite high. All air-conditioners have a rating on the compressor called locked rotor amps (LRA), which indicates the maximum amp draw the compressor requires if locked.

This surge literally lasts for only 1/6 of a second — but it's enough to cause a generator to stall out. All single-phase air-conditioners, like those in RVs, have a start capacitor, which provides an inrush of amperage to kick-start the compressor, and a spike of power to recharge the capacitor. Unfortunately, this

momentary inrush and recharge will cause an under-rated generator to stall or a borderline shorepower provision to trip a breaker.

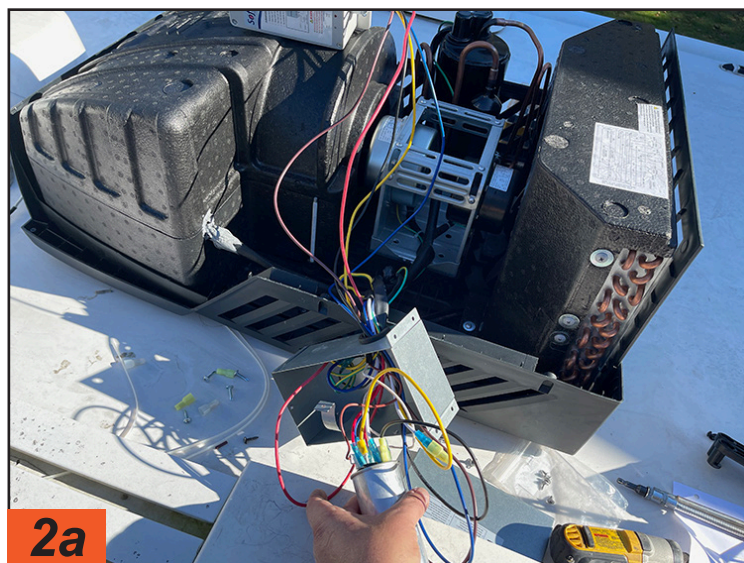
Does that mean the aforementioned 2,500-watt genset is relegated to running the coffee-maker while you sweat out the afternoon in a primitive campsite? Well, it used to. Fortunately, this is where SoftStartRV by Network RV comes into play. This relatively new technology substantially reduces the start surge — which allows an RV air-conditioner up to 15,000 Btu to start

on as small as a 2,500-watt genset, or a couple of roof airs to run on a 30-amp shorepower connection.

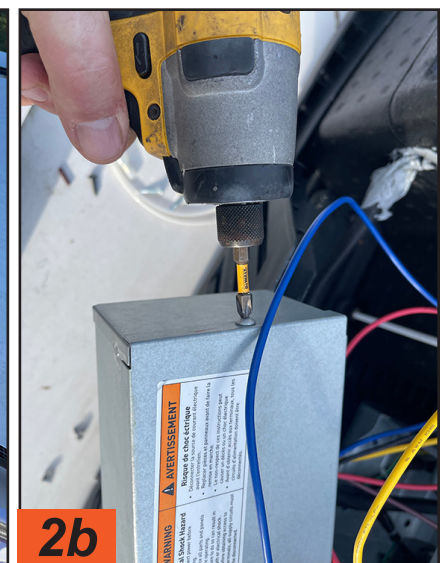
The SoftStartRV electronically ramps up the compressor over a longer period of time (about 1/3 of a second), substantially reducing the current required. *RV Enthusiast* contributor Mike Sokol tested the SoftStartRV on a Dometic Penguin 15,000-Btu air-conditioner (<https://www.youtube.com/watch?v=i-JqijovoMW0&t=3s>) and, with his recording equipment, was able to visually demonstrate how the technology works. In his example, the air-conditioner spiked at 58 amps stock — and just 24 amps after the SoftStartRV was installed. That's 6,960 watts without, and 2,880 watts with the SoftStartRV.

We recently installed the SoftStartRV on a Furrion 14,500-Btu CHILL air-conditioner mounted on a Lance truck camper with a 2,500-watt LP-gas inverter-generator. In our practical test, we found the generator couldn't start the new Furrion unit, whereas the legacy Carrier Air-V 13,500-Btu model could be started (although the generator would bog down substantially). After installation of the SoftStartRV, not only would the Furrion start on the genset, but the generator would barely bog. From fan only to starting the compressor was a smooth, quiet transition, unlike the clunking or rattling experienced with many air-conditioners. Not only will the SoftStartRV help prevent the annoying noises, but the lower starting requirement reduces strain on the compressor, which increases longevity, according to the company.

The installation is straightforward for any do-it-yourselfer — it only takes minutes to complete the job. SoftStartRV



**2a** The capacitor and wiring changes are made inside the box. Directions for each specific brand and model are available on the website, but some capacitor-top terminals will be changed and a couple of splices are made with solderless connectors. Once done, resecure the capacitor inside the box and the cover.



**2b**

also offers videos and relatively clear instructions for all brands of RV A/Cs and can provide a live call with a technician to walk you through the installation. Installation kits have everything needed for the installation; you'll need a screw gun with bits, wire strippers, a wire crimping tool and, for the Furrion, a long bit extension to remove the wiring box inside the A/C.

The SoftStartRV box is sealed from the factory. Three LEDs on the front indicate run, start and self-test modes. The unit can be mounted pretty much anywhere inside the air-conditioner where there is room and a way to secure it, out of the way of moving parts. We tucked it into a corner by the condenser fan and attached it to the foam fan shroud using the included VHB tape and screws.

Once installed, there is nothing further to do; just run the air-conditioner. The main unit is a one-size fits all design; install kits are available online if you want to move the device to another RV.

This technology has revolutionized RV air-conditioning and manufacturers are integrating these devices into some of their models, providing 65-70% startup power savings right from the factory. While the \$329 Amazon

price (<https://amzn.to/3nT0zOn>) isn't anything to sneeze at (there is a 5% coupon bringing it down to \$312.55 with Prime shipping), the ability to run a roof air-conditioner off a generator or inverter, as well as make the compressor last longer, is a huge benefit.



*The starter box is reinstalled in the pan, the wiring dressed and the SoftStartRV device mounted in a suitable location. Before replacing the shroud, we tested the air-conditioner and ran it through its paces.*



*Here, device is secured to the foam shroud with VHB tape and screws in an out-of-the-way place that also allows users to see the status LEDs from outside the air-conditioner. RVE*

## Source:

**SoftStart RV**  
(954) 606-6886  
<https://www.softstartrv.com/>

**BattleBornBatteries.com**  
**info@battlebornbatteries.com | 855-292-2831**

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# Conquering Darkness



*The diminutive light mounted to the skirt lip above the holding tank termination pipe/valve projected an amazing amount of bright white light. This image was taken when the area was pitch black.*

*A fun exercise to illuminate the holding tank termination pipe/valve area with an inexpensive LED daytime running light provided unexpected results.*

By Bob Livingston / Photos by author

**D**umping the holding tanks or routing hoses and TV cable at night can be clumsy — and sometimes frustrating — due to the lack of lighting. It's one area that manufacturers seem to have ignored when it comes to otherwise installing strategic lighting fixtures around an RV. Sure, a flashlight will work, but unless you're wearing a headlamp you'll find yourself running out of hands.

Searching for some type of inconspicuous lighting fixture that could be mounted on the skirt above the holding

tank termination pipe/valve turned up a real unexpected find: daytime running lights. While perusing Amazon, we discovered small LED lights that are marketed as—are you ready? — YUK 10x 12SMD 12W Eagle Eye DRL LED Rock Lights for Jeep ATV Off Road Truck Under Trail Rig Lights White (<https://amzn.to/3FCb9PY>). You've got to love overseas manufacturers for their descriptive names for products.

And, they were really inexpensive. Anytime you can buy 10 lights for \$13, you're taking a flyer whether the product is any good — and when you read

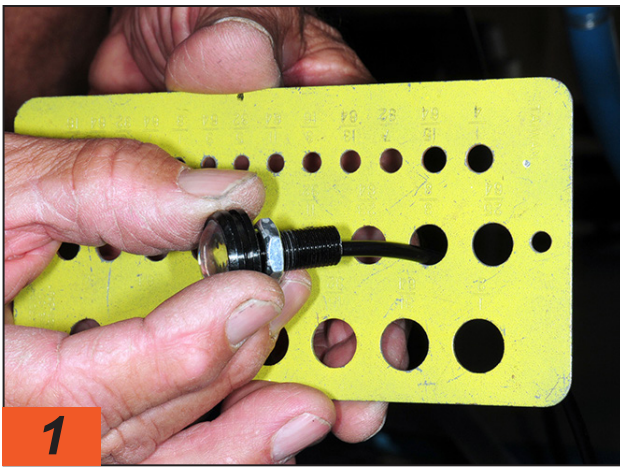
the reviews, you'll wonder. But these lights are actually pretty nice, and so far they are still working. But who cares? Even if the light only lasts for one season, you have nine more waiting in the wings.

Once the location for the light was pinpointed, its shaft diameter was measured with a drill size guide. We simply drilled the appropriate size hole using bits in stages to make sure the opening was consistent and smooth. These lights have a threaded aluminum alloy shaft and a steel retaining nut. The wiring pigtail is first routed from the outside, the retaining nut slides over the wire and the light fixture is tightened in place. It doesn't get any simpler than that. When done, the light fixture is barely noticeable as it's flush mounted against the lip of the metal skirt that terminates beyond the sidewall.

Picking up a 12-volt DC power source and installing some type of on/off switch takes the most time. We found a new lighted rocker switch in our box of spare parts that fit the bill perfectly. There are hundreds of similar switches on the market, and Amazon probably sells most of them. If you're more touchy-feely, you can visit a local automotive parts or hardware store; just make sure the switch is not momentary and is rated at 12-volts DC.

The rear wall in the molded plastic box in the storage compartment — located in the utility area — made a perfect place to install the switch. An appropriate size hole was drilled through the plastic and a round file used to make final cuts to accommodate a notch in the switch body. Since the switch terminals were destined to reside outside and be subject to moisture and dirt, they were covered with silicone sealer.

Picking up power in the fifth wheel we "enlightened" was easy, since at the time the solar system was installed, we routed a 12-volt DC, 12-gauge wire cable (and fuse) from the lithium battery bank to give us the option of connecting portable accessories outside. It should be fairly routine to find power in the utility compartment from a light fixture or switch; just make sure to incorporate an inline fuse rated for the light. Wire size is dependent on the length of the run, but 16-gauge automotive wire should do the trick. In this case, the light is



1

The threaded aluminum alloy shaft is measured with a gauge to determine the right size bit for drilling the hole in the metal skirt

rated for 15 watts. Once the light is wired to the switch, you're done.

The light is waterproof and dustproof (IP67 rating for 100% protection). It's said to last 50,000-100,000 hours and should outlast the RV. Again, that's provided the light doesn't break prematurely (common when buying cheap electronics from overseas). The light gives off a very bright and wide pattern. As a matter of fact, the level of illumination and reach was much better than expected — and we're now searching for other

places to mount these lights. Don't expect these lights to be available at all times; it's the nature of the beast when buying online parts. One day we checked Amazon and the lights were not available; a week later they were. So, we looked for an alternative and found the Eagle Eye LED Chip Car Fog White Light DRL Bulb 9W 18mm 5730 Reverse Backup Parking Signal 10 Pcs 6000K lights (<https://amzn.to/3nC-C7Rm>).

We soon found ourselves asking why we didn't do this years ago. No more fumbling in the dark — and an unexpected benefit is the ability to illuminate the inside of the clear bayonet fitting while dumping the holding tanks during the day.



2a



2b



3

After feeding the wiring pigtail through the hole, the threaded shaft is put into position.

The perfect spot for installing the light was right above the termination pipe/valve. The location was marked for drilling. Once pilot holes were drilled into the skirt, the final size bit was used to make sure the hole was big enough to accommodate the threaded shaft. We had just enough room to drill without damaging adjacent parts; an angle-head drill motor might be necessary.

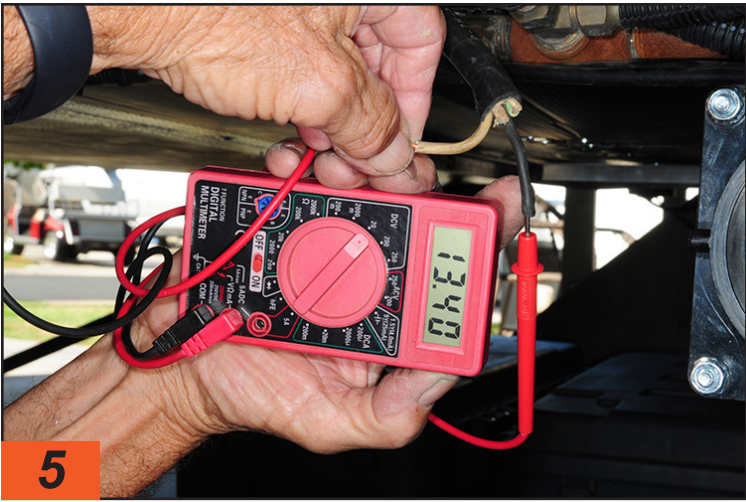


4a



4b

The metal retaining nut is run up the wire to hold the light in place. It can be a little awkward to maneuver the wrench to seat the retaining nut due to the skirt lip angle and surrounding hardware/components. Using a metal nut on aluminum threads could lead to galling, which would make removal difficult. Our worries were short lived, since the thread tolerances are rather sloppy (but still close enough to secure the light without wiggling).



**5**

Pre-existing wiring from the lithium batteries in the front compartment of the fifth wheel was terminated in the vicinity of the new light and checked for polarity with a multimeter. Wiring from a 12-volt DC source can usually be picked up from a nearby utility area. Make sure an appropriately sized fuse (based on light output) is placed inline, near the battery(ies).



**6a**



**7**

A perfect location for the switch was in the molded storage bin in the exterior storage compartment. The rocker switch was already in our box of spare parts; there are hundreds of inexpensive 12-volt DC on/off switches available online and at auto parts/hardware stores.



**6b**

Wiring is secured with cable ties and then connected to the light pigtail with terminals that have heat-shrink seals to resist water intrusion.



**8a**



**8b**

A step drill bit was used to make the hole in the molded storage bin to accommodate the switch. It was necessary to notch out the hole for the switch using a round file. This step is often necessary when the switch base is not perfectly round or needs a notch to accommodate a small extrusion.



9

Three terminals are required for connecting lighted switches; one is the ground, one the positive wire and the third is switched hot.



10a



10b

Electrical tape was wrapped around the three wires and silicone sealer was used to water and dust-proof the terminals, which were exposed to the outside elements.



11

The lighted switch is within easy reach inside the exterior storage compartment housing the utilities. **RVE**

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Part # 50050

# PLANES, TRAINS and AUTOMOBILES



All images throughout courtesy of the specific museums featured

*Part 2 of our odyssey across America reveals many of the most stunning transportation museums yet!*

By Bruce Hampson

America seems to have a love/hate relationship with history. While historical architecture falls all too often beneath the wrecking ball in pursuit of the “next best thing,” we nonetheless try to preserve our past in museums — sometimes successfully, sometimes not.

It's not for a lack of effort — or for want of subject matter. Simply input “museums” and any state into an online search engine and the wealth of topics can be overwhelming. You can find the National Hobo Museum in Britt, Iowa, the Boot Hill Museum in Dodge

City, Kansas, the Mob Museum in Las Vegas, the New Hampshire Telephone Museum...even the Historic Voodoo Museum in New Orleans, Louisiana.

There are two categories, though, that American museums really take to heart: music and transportation. For example, venture into Mississippi — long considered the birthplace of the blues — and you can find information on the Gateway to the Blues Museum, the Rock and Blues Museum, the Highway 61 Blues Museum, the Mississippi Music Museum, the Grammy Museum Mississippi, the B.B. King Museum and Delta Interpretive Center, the Delta

Blues Museum and Elvis Presley's Birthplace & Museum and the Blues and Legends Hall of Fame. And no, this isn't all of them.

And then there's transportation — specifically, planes, trains and automobiles (okay, and motorcycles). While only air travel can be claimed as a U.S. invention, all have impacted — and continue to impact — state populations across the country. From steam locomotives that ran the rails of the first transcontinental railroad across the United States to the sight of a restored Douglas DC-3 — the first “backbone” to homespun air travel — or the lines

of a 1933 Duesenberg SJ or a 1963 split-window Corvette, America's contributions to transportation are legendary.

As we illustrated in Part One of our homage to transportation museums across the country that you can drive to (see the November issue of *RV Enthusiast*), the evolution of such transportation vehicles is chronicled to an amazing degree in these institutions. They are places where we can view their progression — and, sometimes, yearn for yesteryear. Last issue, we brought you along on a trip of discovery that stretched from Alabama to Missouri. Here, in part two, our travels to highlight

America's top transportation museums begin in Montana and won't end until we cross the Wyoming state line.

And, again, we had to make hard choices when making our selections. Certain states (are you listening, New Hampshire and New Jersey?) have a dearth of suitable museums, while others like Nevada and New York have a wealth to choose from. Las Vegas, Nevada, for example, offered such interesting venues as the Hollywood Cars Museum and the (Carroll) Shelby Heritage Center. Neither made the list. In New York, we had to forego the Saratoga Automobile Museum, the Himes

Museum of Motor Racing Nostalgia, Newburgh's Motorcyclepedia Museum and others.

Whichever museums from those presented you choose to visit in your travels, be sure to call ahead to ascertain days and hours of operation. Also, the admission prices cited are the highest we found; most locations also offer reduced fees for children and groups, so take the family. Make sure you have a good supply of snacks and drinks on board, and buckle up: it's going to be another long, fun ride.

## Montana *Old Montana Prison and Auto Museum Complex, Deer Lodge* [pcmaf.org](http://pcmaf.org)



What does a prison and automobiles have in common? If you said "license plates," you've never visited the Old Montana Prison and Auto Museum in Deer Lodge. First established as a territorial prison in 1871, the site operated as a state prison until 1979, when the Powell County Museum & Arts Foundation was established to preserve and protect it. Today, the unique location (once listed as one of the Top 10 car museums in the country by *USA Today*) includes a cache of more than 160 automobiles on display. Exhibits include a replica of an 1889

Benz — said to be the first successful internal combustion engine — to the musclecars of the 1960s and '70s. The 9-acre site also includes Yesterday's Playthings (a doll, toy and railroad exhibit) and Frontier Montana (highlighting views of life in the old west). \$15.

•Also worth a visit: **Miracle of America Museum, Polson** ([miracleofamericamuseum.org](http://miracleofamericamuseum.org)): As the name suggests, this repository is dedicated to all things Americana — from soda shops to vintage firearms — and transportation ranks high on the list, including everything from a 1927 T racer to a '63 Rambler with a Camp'otel teardrop trailer. \$10.

•Where to stay: **Indian Creek Campground, Deer Lodge** ([indiancreekcampground.net](http://indiancreekcampground.net))

## Nebraska *Speedway Motors Museum of American Speed, Lincoln* [museumofamericanspeed.com](http://museumofamericanspeed.com)



Founded in 1992 by "Speedy" Bill and Joyce Smith, the museum now covers more than 150,000 square feet across three levels. Exhibits — of vehicles, engines, people, toys and more — are divided into specific rooms. Vehicles, for example, are separated into 17 displays ranging from land speed and open wheeled to Model T's and "Bill's Garage" — then are often divided further. Among the 14 vehicles in the Show Car exhibit, for example, are the Lil Coffin car originally created by Dave Stuckey

and the Red Baron designed by Tom Daniel; both have been immortalized by Monogram in model car kits (the Red Baron, in fact, "grew" out of the model). The museum was voted No. 1 Best Attraction for Car Lovers in the 2021 *USA Today* "10 best readers' choice travel award contest." \$15.

•Also worth a visit: **Strategic Air Command & Aerospace Museum, Ashland** ([sacmuseum.org](http://sacmuseum.org)): With 35 aircraft on display — ranging from a B29TB Superfortress to an F-117 Nighthawk — this museum also includes a spacecraft room and numerous temporary and permanent exhibits such as Doolittle's Tokyo Raiders and The Korean War & Aviation. \$14.

•Where to stay: **Camp A Way, Lincoln** ([campaway.com](http://campaway.com))

# Nevada *National Automobile Museum,* Reno [automuseum.org](http://automuseum.org)



Also known as “the Harrah Collection” originally curated by gaming pioneer Bill Harrah, the museum was opened in 1989 when Holiday Inns — which acquired Harrah’s operations after his passing, including an estimated 1,400 vehicles — donated 175 of them. The museum currently has 209 vehicles on display — including 14 celebrity vehicles and five movie cars. Vehicles are segmented into such exhibits titled “Turn of the Century,” “Roaring Twenties” and “Cars of the Stars” and include such rarities as an 1892 Pillion (steam) Road Carriage, the only 1938 Phantom corsair ever built and the 1961 Ed Roth “Beatnik Bandit” custom. There’s also a blacksmith shop, hardware

store, service station and more. \$15.

•Also worth a visit: **Don Laughlin’s Classic Car Collection**, Laughlin ([riversideresort.com/don-laughlins-classic-car-museum/](http://riversideresort.com/don-laughlins-classic-car-museum/)): Another extensive collection owned by a gaming icon, this assemblage of nearly 100 vehicles is housed in two areas at the Riverside Resort Hotel & Casino. The First Floor Showroom exhibits desert racing machines, while the 30,000-square-foot Classic Auto Exhibition Hall includes decades of street vehicles. \$3.

•Where to stay: **Sparks Marina RV Park**, Sparks ([sparksmarinarvpark.com](http://sparksmarinarvpark.com))

# New Hampshire *North East Motor Sports Museum, Loudon* [fountainheadmuseum.com](http://fountainheadmuseum.com)



Located adjacent to the New Hampshire Motor Speedway, it’s not surprising that the North East Motor Sports Museum features cars, motorcycles, trophies, helmets, engines and vintage racing attire — all with a New England background — spread across its 10,000 square feet of display space. Opened in 2017, the museum also boasts an extensive library as

well as a theater that shows footage of early racing in New England. There’s even a Soap Box Derby display, slot car track and iRacing Simulator. \$10.

•Also worth a visit: **Aviation Museum of New Hampshire**, Londonderry ([aviationmuseumofnh.org](http://aviationmuseumofnh.org)): New Hampshire’s only working museum dedicated to aviation history in the Granite State, the museum is housed in a 1937 Art Deco airport terminal. Displays include warbirds, vintage flying machines and aviation engines. \$10

•Where to stay: **Cascade Campground**, Loudon ([cascadecampground.com](http://cascadecampground.com))

# New Jersey *NAS Wildwood Aviation Museum,* Cape May [usnasw.org](http://usnasw.org)



Located inside a real WWII hangar, the NAS Wildwood Aviation Museum runs the gamut from propeller-driven aircraft to supersonic jet fighters (“NAS” stands for Naval Air Station). Exhibits include everything from an F6F-3 Hellcat to a Gruman F-14 Tomcat, Bell UH-1 Iroquois (“Huey”) helicopter — even

displays of engines such as the GE90 turbofan jet engine from a Boeing 777. Displays also include lifestyle artifacts from the WWII era, and visitors can climb inside a real air-traffic control tower. \$14

•Also worth a visit: **Vintage Automotive Museum of New Jersey**, Point Pleasant ([vintageautomuseum.org](http://vintageautomuseum.org)): Said to be the only public car museum in the Garden State, this automotive repository leans towards the classics of each era, from a 1917 Ford Model T to a 1972 Mercury Comet with a nice mix of vintage race cars thrown in. It’s small, but free.

Where to stay: **Holly Shores Camping Resort**, Camp May ([hollyshores.com](http://hollyshores.com))

# New Mexico

## Lewis Antique Auto & Toy Museum, Moriarty [facebook.com/Lewis-Antique-Auto-Toy-Museum](https://www.facebook.com/Lewis-Antique-Auto-Toy-Museum)



Owned by Archie Lewis, this repository encompasses both indoor and outdoor exhibits spread across eight acres — and while we haven't figured out if it's a museum or, well, a graveyard of antique vehicles, if you're a gearhead it's a must-see site. An estimated 700 old cars and trucks can be viewed in various states of disrepair — from a Mack wrecker from the '40s to unrestored Crosleys and Packards — along with an indoor

display of original vehicles along with toys (estimated at more than 6,000), jukeboxes and more. Free.

•Also worth a visit: **War Eagles Air Museum, Santa Teresa** ([war-eagles-air-museum.com](https://www.war-eagles-air-museum.com)): The War Eagles Air Museum is dedicated to historic aircraft of the World War II and the Korean Conflict eras — but there's more. Along with about three dozen vintage aircraft, you'll also tour at least that many automobiles, as well as exhibits of military equipment. \$11.

•Where to stay: **Happy Trails RV & Campground, Moriarty** ([happytrailsnm.com](https://www.happytrailsnm.com))

# New York

## Buffalo Transportation Pierce-Arrow Museum, Buffalo [pierce-arrow.com](https://www.pierce-arrow.com)



Established in 1997 by Jim and Mary Ann Sandoro in a building that once housed a Mack Truck showroom and repair shop, this museum leans towards vehicles that once made Buffalo and western New York a center of automotive design and manufacturing — including the Pierce-Arrow Motor Car Co. The collection of historic automobiles, bicycles, motorcycles and more includes such standouts as a 1903 Pierce Stanhope and 1909 Thomas Flyer 6-40 Flyabout — as well as a one-of-a-kind installation of a unique fuel station designed by Frank Lloyd Wright but never built until the Sandoros had it construct-

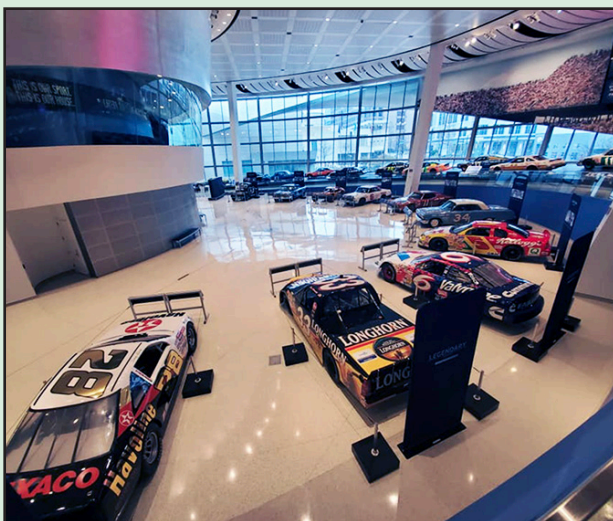
ed within the museum. \$12.

•Also worth a visit: **Glenn H. Curtiss Museum, Hammondsport** ([glennhcurtisismuseum.org](https://www.glennhcurtisismuseum.org)): Aviation and automotive pioneer Glenn H. Curtiss was born in Hammondsport, and this museum bearing his name touches on early aviation, automotive and motorcycle history. Exhibits include more than two dozen Curtiss aircraft, autos from 1904 to 1931, bicycles from the late 1800s — and a number of Curtiss motorcycles dating back to 1904. \$13.50.

•Where to stay: **Branches of Niagara Campground Resort, Grand Island** ([branchesofniagara.com](https://www.branchesofniagara.com))

# North Carolina

## NASCAR Hall of Fame, Charlotte [nascarhall.com](https://www.nascarhall.com)



As a hotbed of stock-car racing, North Carolina has a lot to choose from: Richard Petty, Richard Childress, Hendrick Motorsports and others all have museums. The biggie, though, is the NASCAR Hall of Fame: The 86,000-square-foot high-tech venue celebrates the history and personalities of the sport through exhibits and interactive displays (try your hand at being a pit crew member!). Read of the 58 men voted into the Hall, create a scrapbook of your visit, buy mementos at the gear shop, try your hand in one of eight stock-car replicas fitted with race simu-

lators — but mostly, immerse yourself in the amazing displays, from Heritage Speedway to Glory Road Champions. \$25.

•Also worth a visit: **Wheels Though Time, Maggie Valley**, ([wheelsthroughtime.com](https://www.wheelsthroughtime.com)): Called "the world's premier collection of rare American motorcycles," the displays at this 38,000-square-foot facility are arranged in garage-like settings and range from "Home Made America" to "The Chopper Graveyard." One, in fact — the WTT Service Station — is used to service many of the bikes on display. There are a few vintage cars, as well, including the massive 1915 Locomobile. \$15.

Where to stay: **Carowinds' Camp Wilderness Resort, Charlotte** ([carowinds.com/resorts/camp-wilderness](https://www.carowinds.com/resorts/camp-wilderness))

# North Dakota

## Fargo Air Museum, Fargo [fargoairmuseum.org](http://fargoairmuseum.org)



Said to be North Dakota's premiere aviation destination, the Fargo Air Museum is home to aircraft of all eras — from the modern MQ-1 Predator unmanned drone to the “most accurate recreation of a Wright Brothers' flyer the Smithsonian Institute has ever seen.” A “flying” museum, many of the airplanes also occasionally take to the sky. Archived within two hangers, the museum also includes an extensive library, flight simulator lab and ongoing restorations; there also are

exhibits of vintage motorcycles and military vehicles and memorabilia. \$10.

•Also worth a visit: **Dakota Territory Air Museum, Minot** ([dakotaterritoryairmuseum.com](http://dakotaterritoryairmuseum.com)): Founded in 1986, the Dakota Territory Air Museum includes a huge outdoor exhibit that includes the Spitten Kitten display — three aircraft types flown by the 5th Fighter Interceptor Squadron — as well as numerous hanger exhibits featuring such machines as a replica of the Wright Flyer, iconic WWII aircraft, a restoration hanger and more. \$10.

•Where to stay: **Governor's RV Park & Campground, Casselton** ([governorsinnnd.com/governors-rv-park/](http://governorsinnnd.com/governors-rv-park/))

# Ohio

## National Packard Museum, Warren [packardmuseum.org](http://packardmuseum.org)



There are actually two fine museums in Ohio dedicated to the Packard (America's Packard Museum and National Packard Museum) said to be the first car to use a steering wheel, front/rear bumpers, four wheel brakes, interchangeable wheels, and more. We went with the “national” — Warren was home to the Packard brothers — with its Legacy Hall and Great Hall exhibits that include some amazing restored vehicles, from a 1903 Model F Runabout to a 1937 Model 1507 Twelve 2/4 rumbleseat

roadster. There's also an extensive motorcycle display, changing exhibits and even displays of American musclecars. \$8.

•Also worth a visit: **Snook's Dream Cars, Bowling Green** ([snooksdreamcars.com](http://snooksdreamcars.com)): We have a soft spot for old gas stations — and this one has a museum attached to it. This collection of automobilia includes an operational four-bay mechanics' area, 1930s general store, 1950s diner — and a huge showroom of “dream cars” from the 1930s through the '70s. \$8.

•Where to stay: **Kool Lakes Family Campground, Garrettsville** ([koollakes.com](http://koollakes.com))

# Oklahoma

## Stafford Air & Space Museum, Weatherford [staffordmuseum.org](http://staffordmuseum.org)



With more than 3,500 artifacts on display, this 63,000-square-foot homage to aviation and space flight covers everything from the Wright Flyer to the moon. Exhibits range from early aviation (from the Wright Glider to the Spirit of St. Louis and even a recreated Hindenberg airship) to modern aviation (from the Bell X-1 through supersonic warcraft). Additional exhibits include those dedicated

to space exploration, rocket engines and a Gen. Thomas P. Stafford gallery. \$7.

Also worth a visit: **Darryl Starbird's National Rod & Custom Hall of Fame Museum, Afton** (<http://www.darrylstarbird.com>): Darryl Starbird was one of the premier car customizers of the 1950s-'60s — and he's continued to customize such machines as his “Cristina Mark IX,” a 1941 Lincoln Continental. This 40,000-square-foot houses more than 40 of his creations, along with those of other hot rod- and custom-car builders. \$15.

Where to stay: **Wanderlust Crossings RV Park, Weatherford** ([wanderlustcrossings.com](http://wanderlustcrossings.com))

# Oregon

## Western Antique Aeroplane & Automobile Museum, Hood River [waaamuseum.org](http://waaamuseum.org)



Housed within indoor hangars covering more than 3 ½ acres, WAAAM is a “living museum” — the museum states that its collection of airborne and wheeled vehicles is fully functional. That’s saying a lot, because there’s a lot here: more than 100 cars, trucks and tractors from a 1900 Locomobile Steam Car Runabout to a 1981 Avanti. It’s roster of airplanes and gliders is nearly as long — ranging from a 1910 Curtiss Pusher

to 1970s and ’80s gliders — and then there are the motorcycles (more than a dozen) and military vehicles. \$19.

•Also worth a visit: **Evergreen Aviation & Space Museum, McMinnville** ([evergreen-museum.org](http://evergreen-museum.org)): If you wondered where Howard Hughes’ H-4 Hercules — the Spruce Goose — ended up, you’ll find it here, along with more than 150 other aircraft, exhibits and displays. You also can watch the restoration team in action as they bring back historic aircraft to their original state. \$20.

•Where to stay: **Gorge Base Camp RV Park, White Salmon** ([gorgebasecamp.com](http://gorgebasecamp.com))

# Pennsylvania

## Simeone Foundation Automotive Museum, Philadelphia [simeonemuseum.org](http://simeonemuseum.org)



Assembled over 50 years by Dr. Frederick Simeone, this museum is said to house one of the world’s greatest collections of racing sports cars. Significant cars include those from Ferrari, Alfa Romeo, Bugatti, Mercedes, Jaguar, Bentley, Porsche, Aston Martin, Corvette, Ford and more — many assembled within exhibits such as LeMans, Bonneville Salt Flats and Mille Miglia. The cars include such marque builds as a 1937 Cord 812

Supercharged, 1964 Shelby Cobra Daytona coupe, 1926 Bugatti Type 35 and many others. \$12.

•Also worth a visit: **Barry’s Car Barn, Intercourse** ([barryscarbarn.com](http://barryscarbarn.com)): Focused on American musclecars of the ’50s, ’60s and ’70s, this museum is fronted by a replica Gulf service station. Inside are more than 50 restored autos and 10 motorcycles belonging to founder Barry Baldwin, along with an amazing number of vintage pumps, neon signs and other memorabilia. \$12.

•Where to stay: **Philadelphia South/Clarksboro KOA, Clarksboro, NJ** ([koa.com/campgrounds/philadelphia-south/](http://koa.com/campgrounds/philadelphia-south/))

# Rhode Island

## Newport Car Museum, Portsmouth [newportcarmuseum.org](http://newportcarmuseum.org)



How can you not love a museum that dedicates an entire exhibit to those fabulous “Fin Cars” of the Fifties? That, though, is just one of the exhibits within this private collection of 85-plus automobiles tracing seven decades of automotive design and engineering. Others include Corvettes — with every body style represented — Ford/Shelby, Mopars, American Muscle and World Cars (Jaguar,

McLaren, Lamborghini and others). Located within a former missile-manufacturing facility on seven acres, there’s also a gift shop with an eclectic assortment of things for the car lover. \$18.

Also worth a visit: **Audrain Automobile Museum, Newport** ([audrainautomuseum.org](http://audrainautomuseum.org)): Located in a Bruce Price-designed 1903 building almost as fascinating as the cars inside, the Audrain displays a changing roster of 30-some vehicles from a collection of 200 vintage machines, often curated into special exhibits from A History of GM Design to Sweet Rides & Summer Fun. \$12.

•Where to stay: **Melville Ponds Campground & RV Park, Portsmouth** ([melvillepondscampground.com](http://melvillepondscampground.com))

# South Carolina

## North Charleston Fire Museum, Charleston

[northcharlestonfiremuseum.org](http://northcharlestonfiremuseum.org)



Home to the largest collection of professionally restored American LaFrance fire apparatus in the country, the 20-plus vehicles in the collection date back to the 1780s — and all the pieces still run and can fight fires. The massive lobby, with 20-foot ceilings, is designed to resemble a classic fire house. Exhibits — many of them interactive or allowing hands-on experiences — include

firefighting equipment and artifacts, as well as theater presentations (some with live smoke). \$6.

•Also worth a visit: **Wheels of Yesteryear, Myrtle Beach** ([wheelsofyesteryearmb.com](http://wheelsofyesteryearmb.com)): This 100-plus vehicle collection, owned by car enthusiasts Paul and Carol Cummings, revolves around their love of American-made cars and trucks. Rare musclecars tend to dominate, including a 1971 Plymouth Hemi 'Cuda convertible, 1969 Mercury Cyclone CJ, 1963 Corvette split-window coupe. \$10.92

•Where to stay: **Lake Air Campground, Hollywood** ([lakeairrv.com](http://lakeairrv.com))

# South Dakota

## Motion Unlimited Museum, Rapid City

[motionunlimitedmuseum.com](http://motionunlimitedmuseum.com)



This 18,000-square-foot museum houses an array of restored and original antique and classic cars, from a 1921 Cadillac Touring Car to Corvettes. Other displays include a 1941 Lincoln Continental coupe (one of 1,250), a '39 LaSalle sedan, 1940 White Horse milk truck and a 1962 Dodge Dart with a 440 Magnum that owner Bill Napoli (and his wife, Peggy) rescued from the crusher and restored. There's also pe-

al cars, toys, oil and gas memorabilia, neon signs, even a row of classic and antique car engines. \$5.

•Also worth a visit: **Pioneer Auto Show, Murdo** ([pioneerautoshow.com](http://pioneerautoshow.com)): An eclectic collection of vehicles and, well, "stuff," the Pioneer Auto Show encompasses more than 275 classic cars and trucks, 60 tractors, 60 motorcycles — and literally tons of automobilia — housed within 40 buildings. There's also a 1930 service station, old toys, business equipment, antiques...like we said, eclectic. \$12.50.

•Where to stay: **Rapid City RV Park & Campground, Rapid City** ([rcrvpark.com](http://rcrvpark.com))

# Tennessee

## Lane Motor Museum, Nashville

[lanemotormuseum.org](http://lanemotormuseum.org)



One of the few U.S. transportation museums to specialize in European cars, Lane Motor Museum occupies 40,000 square feet in a Nashville landmark, the former Sunbeam Bakery. Arranged within galleries, museum exhibits include "Oil and Water" — dual-purpose amphibious vehicles such as the Amphicar 770 designed to both drive and boat — "RADwood: A Celebration of the '80s and '90s"

and "Stretched to Fit," an exhibition of fabric-covered cars. And then there's "Wingless Wonders," propeller-driven vehicles from the early 1900s through the late '70s that, for some reason, never quite took off. \$12.

•Also worth a visit: **Hollywood Star Cars Museum, Gatlinburg** ([starcarsn.com](http://starcarsn.com)): Lights, camera...you know the rest. This museum features more than 40 cars, trucks and motorcycles appearing in movies and TV, from a Batmobile seen in the original TV show in 1966 to a whole host of vehicles from the Fast & Furious franchise. \$14.99.

Where to stay: **Nashville KOA Resort, Nashville** ([koa.com/campgrounds/nashville/](http://koa.com/campgrounds/nashville/))

# Texas *Haas Moto Museum & Sculpture Gallery,* Dallas <https://www.haasmotomuseum.com>



From late 19th century motorcycles that were little more than bicycle frames with attached engines and gas tanks to ultra-modern road warriors, the 20,000-square-foot Haas museum displays more than 230 motorcycles — and a premier array of metallic sculptures — in an ultra-modern facility made to house them. From its “History Hall” to the “Race Track,” “Avant-Garde Avenue” and “The Custom Shop,” the viewer-friendly galleries trace the evolution of two-wheelers and the people who made them. There’s even been a documentary made — “Leaving Tracks” — showing how museum founder and

curator Bobby Haas went about creating one of the world’s premier custom motorcycle museums. \$10.

•Also worth a visit: **Austin Rock and Roll Car Museum, Austin** ([austincarmuseum.org](http://austincarmuseum.org)): Specializing in historical race cars, movie production vehicles and music-related memorabilia, the museum exhibits range from Indy cars to musclecars and a “Ghost Buster” Cadillac — with guitars, carousel horses and motorcycles thrown into the mix. Free.

•Where to stay: **Shady Oaks RV Park, Dallas** ([rvparkdallas.com](http://rvparkdallas.com))

# Utah *Hill Aerospace Museum,* Roy <https://www.aerospaceutah.org>



Tucked away on the northeast corner of Hill Air Force Base, this 30-acre museum features more than 90 military aircraft, missiles and aerospace machines, along with thousands of artifacts. Displays are grouped into five eras, from The Beginnings to Keeping the Peace. The stars of the museum — the aircraft — range from attack units and bombers to surveillance aircraft and trainers and include many model types made famous in the two world wars, including such iconic machines as the P-51D Mustang,

P-38 Lightning and the SR-71C Blackbird. You can also immerse yourself in a virtual A-10 Warthog flight check mission. Free.

•Also worth a visit: **Land Cruiser Heritage Museum, Salt Lake City** ([landcruiserhm.com](http://landcruiserhm.com)): The Land Cruiser is held in awe by off-road enthusiasts, and it’s this museum’s goal to acquire and display one of every model ever produced. It’s well on the way, with facility vehicles augmented by loans from private owners. There’s also more than 1,000 models and memorabilia. \$15.

•Where to stay: **Lagoon RV Park & Campground, Farmington** ([lagoonpark.com/park-info/camping/](http://lagoonpark.com/park-info/camping/))

# Vermont *Shelburne Museum,* Shelburne [shelburnemuseum.org](http://shelburnemuseum.org)



Vermont has a lot of museums — but none are dedicated to cars, motorcycles, railroads or aircraft. We very nearly had to pass it by. The Shelburne Museum, however, does have a collection of horseless carriages. In fact, Electra Havemeyer Webb’s decision to create the museum was a response to the 1946 gift of 28 carriages from the estate of Dr. William Seward and Lila Vanderbilt Webb.

Included is a rare 1890 Million et Quiet Berlin Coach featuring brass and leather details. Immerse yourself in what founder Webb described as a “collection of collections.” \$25.

•Also worth a visit: **Vermont National Guard Library and Museum, Colchester** ([vt.public.ng.mil/About-Us/History/Museum/](http://vt.public.ng.mil/About-Us/History/Museum/)): The Vermont National Guard museum does have an F-4D Phantom jet fighter as well as several helicopters and tanks on display, along with a wealth of support vehicles such as the tracked small-unit, memorabilia, weapons (including missiles) and even a WWI field kitchen. Free.

•Where to stay: **Lone Pine Campsites, Colchester** ([lonepinecampsites.com](http://lonepinecampsites.com))

# Virginia

## Keystone Antique Truck & Tractor Museum, Colonial Heights

[keystonetractorworks.com](http://keystonetractorworks.com)



Encompassing more than 125,000 square feet, the Keystone Antique Truck & Tractor Museum is, as its staff notes, “cool, combative, and guarantees to take you on an exhilarating walk down memory lane.” More than 150 restored farm tractors are in this museum, dating back to 1917 — including one each of the 28 John Deere two-cylinder models. There also are more than 60 antique trucks — but we aren’t talking about Fords and Chevys. Owner Keith Jones founded Abilene Motor Express with his brothers, so the museum features *big* trucks, from Diamond T’s to Kenworths. There’s also a diner (The Keystone Grill), gift shop, lots of memorabilia

and even a few restored fire trucks and muscle cars. \$10.

•Also worth a visit: **Virginia Museum of Transportation, Roanoke** ([vmt.org](http://vmt.org)): Originally focused on Roanoke’s rail heritage, this 45,000-square-foot museum now also encompasses automotive, aviation, transit and related artifacts. Features run the gamut, from steam locomotives to model railroads, while the facility displays nearly three dozen autos and an impressive “Wings Over Virginia” air gallery. \$10.

•Where to stay: **Picture Lake Campground, Petersburg** ([picturelakecampground.com](http://picturelakecampground.com))

# Washington

## LeMay - America's Car Museum, Tacoma

[americascarmuseum.org](http://americascarmuseum.org)



Harold and Nancy LeMay amassed the largest privately owned automobile collection in the world, and set about enshrining it in a museum in 1997. The stunning 165,000-square-foot facility opened in 2012, and has been called one of the top 10 automotive museums in the world. More than 250 vehicles are on display at any time, with others grouped into amazing galleries (you also can visit the nearby LeMay Collection at Marymount, from which this mu-

seum was seeded). There’s also a store, Full Throttle Café, artifacts spanning more than 100 years of automotive history and usually about 100 other vehicles on exhibit loan from private collections. \$18.

•Also worth a visit: **Museum of Flight, Seattle** ([museumofflight.org](http://museumofflight.org)): The largest independent non-profit air and space museum in the world, the Museum of Flight features more than 175 aircraft and spacecraft, thousands of artifacts, millions of rare photographs, dozens of exhibits and a world-class library. \$25.

•Where to stay: **South Prairie Creek RV Park, South Prairie** ([southprairiecreekrvpark.com](http://southprairiecreekrvpark.com))

# West Virginia

## Heritage Farm Museum, Huntington

[heritagefarmmuseum.com](http://heritagefarmmuseum.com)



As we discovered with Vermont, transportation museums in West Virginia are, well, non-existent — at least, those with actual vehicles in them. However, you will find an extensive collection of turn-of-the-century transportation memorabilia at the Heritage Transportation Museum, although that’s only part of the reason to visit. The museum is one of seven on the grounds of Heritage Farm — which, together, dedicate more than 25,000 square feet to Appalachian artifacts — though the “farm” includes so much

more on its 500 acres, including artisan workshops, a petting zoo, log church, working sawmill, Appalachian food favorites and more. \$15.

•Also worth a visit: **Cliff’s Museum of Car Memorabilia, Harrisville** ([cliffvwatthebuilding.com](http://cliffvwatthebuilding.com)): Cliff’s is presented as a mid-1940s car dealership with WWII-era auto-related memorabilia. The 13,000-square-foot building houses mostly West Virginia collectables, including the most complete collection of state licenses. Open “by appointment or by chance” — don’t chance it. Call first. Free.

Where to stay: **Huntington/Fox Fire KOA Holiday, Milton** ([koa.com/campgrounds/huntington/](http://koa.com/campgrounds/huntington/))

# Wisconsin

## Wisconsin Automotive Museum, Hartford [wisconsinautomuseum.com](http://wisconsinautomuseum.com)



The largest automotive museum in Wisconsin, this repository boasts well more than a hundred vehicles on exhibit throughout its Art Deco-inspired building. Galleries include 27 Hartford-assembled Kissel automobiles (they were built from 1906-1931), including the two-passenger “Gold Bug” Speedster model that was a favorite of celebrities of the day. Nash, which began life in Kenosha, Wisconsin, when the Thomas B. Jeffery Co. was acquired by Charles Nash in 1916, has dedicated space inside the building, as does the Southeastern Wisconsin Short Track Hall of Fame. There’s also a working steam

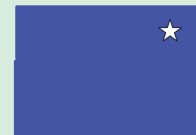
locomotive — and a reproduction of a 1949 Lionel train showroom layout. \$10.

•Also worth a visit: **Harley-Davidson Museum, Milwaukee** ([harley-davidson.com/us/en/museum.html](http://harley-davidson.com/us/en/museum.html)): You’d be remiss if visiting the home state of Harley-Davidson and missing this museum. With an unrivaled collection of H-D motorcycles and memorabilia on a 20-acre campus, the museum galleries include “Clubs & Competition,” “Custom Culture,” “Engine Room” and even a hall dedicated to fuel tanks. \$22.

•Where to stay: **Lake Lenwood Beach & Campground, West Bend** ([lakelenwood.com](http://lakelenwood.com))

# Wyoming

## Frontier Auto Museum, Gillette [frontierautomuseum.com](http://frontierautomuseum.com)



This 13,000-square-foot museum is set up as two separate vintage “towns” — each created in the style of buildings of the 1900s-1950s and decorated with memorabilia. The rooms are filled with neon and porcelain signs, gas pumps and globes and automobilia and are as much of an attraction of Americana as the cars, which lean towards restored Hudson automobiles (and others). There’s also an indoor “drive-in theater” that displays classic movies and commercials, a mining room with

model railway, working soda fountain/pharmacy, pinball machines and music from vinyl records. \$10.

•Also worth a visit: **National Museum of Military Vehicles, Dubois** ([nmmv.org](http://nmmv.org)): Established in 2020, this 140,000-square-foot museum is home to more than 475 tanks, Jeeps, trucks, motorcycles, landing craft and other military vehicles — only the U.S. armed forces owns more rolling stock. Displays also include more than 200 historically significant firearms. \$15.

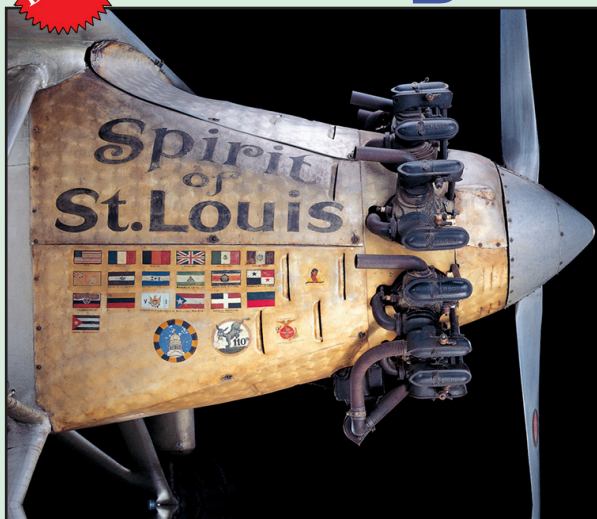
•Where to stay: **All Seasons RV Park, Rozet** ([allseasonscampground.com](http://allseasonscampground.com))

# Washington, D.C.

## Smithsonian National Air & Space Museum [airandspace.si.edu](http://airandspace.si.edu)



BONUS!



One of the most popular museums in the world, the cavernous Smithsonian features literally thousands of aircraft and spacecraft, including “The Spirit of St. Louis” Ryan airplane Charles Lindbergh used to cross the Atlantic; “Glamorous Glennis,” the Bell X-1 piloted by Charles Yeager to first break the sound barrier; the B-29 Superfortress “Enola Gay” that dropped an atomic bomb on Hiroshima...there are too many to list and number in the hundreds. Current galleries include “Boeing Milestones of Flight,” “Time and Navigation” and others revolving around the Wright Brothers and

the Space Race. Just be sure to visit before March 2022, when it temporarily closes for renovation. Free.

•Also worth a visit: **National Museum of American History** ([americanhistory.si.edu/collections/subjects/transportation](http://americanhistory.si.edu/collections/subjects/transportation)): Yes, this museum covers just about everything that’s happened in America — but one area you don’t want to miss is dedicated to transportation. You’ll find it here, from the days before the Model T to modern race cars — with a wealth of accessories, to boot, from streetlights and traffic signals to gas pumps and goggles. Free. **RVE**

•Where to stay: **Cherry Hill Park, College Park, Maryland** ([cherryhillpark.com](http://cherryhillpark.com))



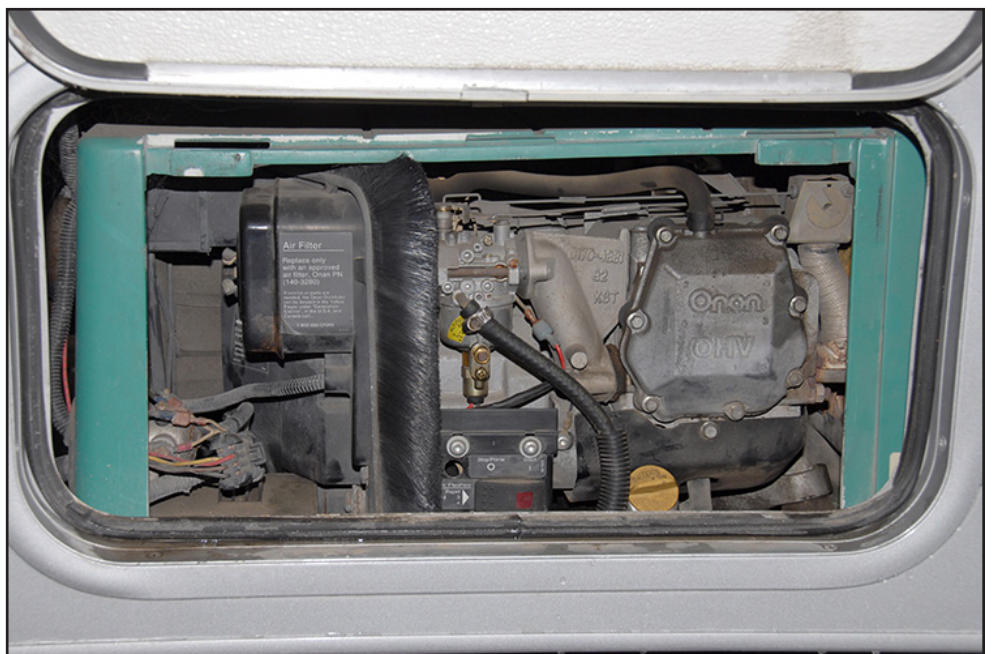
## *When your motorhome's generator finally calls it quits, installing a factory replacement is usually the best solution*

By Chris Hemer / Photos by the author

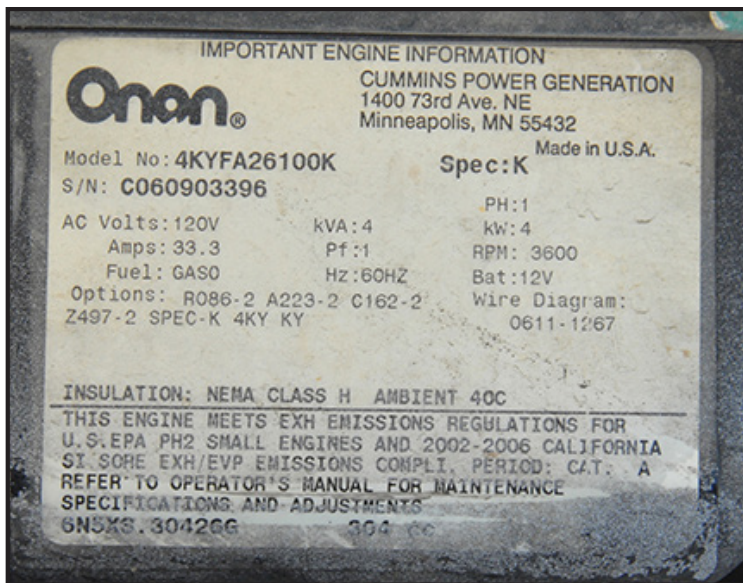
**T**hink about the last time there was a power outage in your area — and the number of times you inadvertently flipped a switch, expecting the light to go on. After the third or fourth time, you likely chuckled to yourself, feeling silly for not remembering that the situation has not changed.

This is how dependent we have become on good, reliable power — we take for granted that it will always be there. In our homes, we usually don't have to suffer without power for too long before the local utility company comes to the rescue, but if you're boondocking in an RV and the power goes out, it's a different story. A non-functioning AC generator can mean anything from an inconvenience to a potentially life-threatening situation.

A generator's reason for being is to run frequently under load to create 120-volt AC power for appliances like the air-conditioner, microwave, hair dryer and coffee maker. Its enemy is



*This Onan MicroQuiet 4000 generator had 1,456 hours on it, or roughly half of its normal life expectancy. Years of neglect finally took its toll, however, rendering the unit inoperable and unreparable.*



Replacement generators are readily available through Cummins-Onan. This tag, located on every Onan/Cummins-Onan generator, will tell the company everything it needs to know to provide you with the correct model. In this case, the original gasoline-powered MicroQuiet 4000 would be replaced with an Onan QG 4000 generator.

dormancy; to sit unused for months at a time can create numerous problems, from hard starting and rough running to not starting at all. That's why most

replaced for a few hundred dollars, a bad rotor and stator assembly can cost \$1,000 or more — and these expenses don't include labor. If the generator in

generator service professionals recommend that a generator be run at least once a month under load for half an hour or more to make sure it can be relied upon for your next trip.

Quite apart from the costs and time involved with generator repair, at some point the generator may cease to function altogether — at which point it may no longer be worth the investment to repair it. While a gummed-up carburetor can be rebuilt or

question has still got a lot of service life left in it, a re-build may still be a cost-effective solution, but if the unit is old and/or there aren't any qualified generator specialists in your area, a new replacement generator is likely the best option.

While not inexpensive (the unit installed here cost around \$3,575) a new generator can be installed with common hand tools and some mechanical/electrical experience. To see how it's done, we visited C&S RV Service in Oxnard, California, and observed as an older Onan MicroQuiet 4000 generator was replaced with a newer Onan QG 4000 model in a 2006 Fleetwood Tioga that had been purchased used. The previous owner had neglected to maintain the generator to the point that it had seized, but the motorhome was in otherwise like-new condition. The project was completed by a professional in about four hours, but your results will obviously vary depending on the generator, the motorhome and your skill level. And remember, always call a qualified RV repair center if you're not comfortable completing a job like this yourself.



The first step is to pull out the Weather Pack connector to the remote-control unit, which allows remote starting from the switch inside the motorhome. Next, the battery power cable is disconnected.

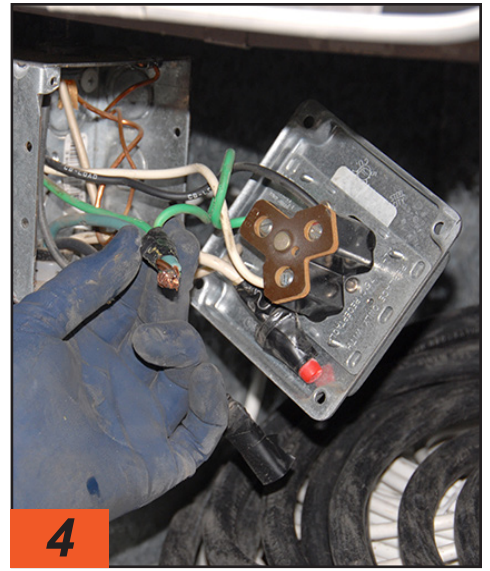


Moving underneath the motorhome, disconnect the ground cable followed by the rubber fuel line. In most cases where the generator is several years old the fuel line will be brittle and difficult to remove, so it will likely be easier to cut it off. The technician used an old spark plug in the line after it was cut to prevent fuel from dripping.



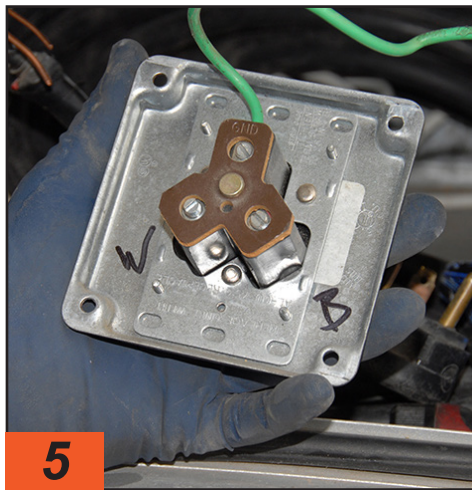
3

This older motorhome was not equipped with an automatic transfer switch, so the next step was to disassemble and remove the junction box in a cargo compartment adjacent to the generator.



4

Removing four screws releases the cover, revealing the wiring inside. Use a screwdriver to release the white and black wires from the cover.



5

A useful tip is to mark the inside of the cover so you know where the wires go upon re-assembly: "W" for white, "B" for black; the green ground wire remains attached.



6

Next, the exhaust pipe was removed.



7

A common floor jack and a square piece of plywood is used to support the generator prior to removal of the mounting brackets.



8

How the generator is mounted at the factory will depend on the motorhome, but in the case of this 2006 Fleetwood Tioga Class C, it is seated in a metal pan that is secured on both sides by a mounting bracket and two bolts.



9

Next, the mounting brackets themselves are removed from the sub frame, and the generator can be lowered to the ground.



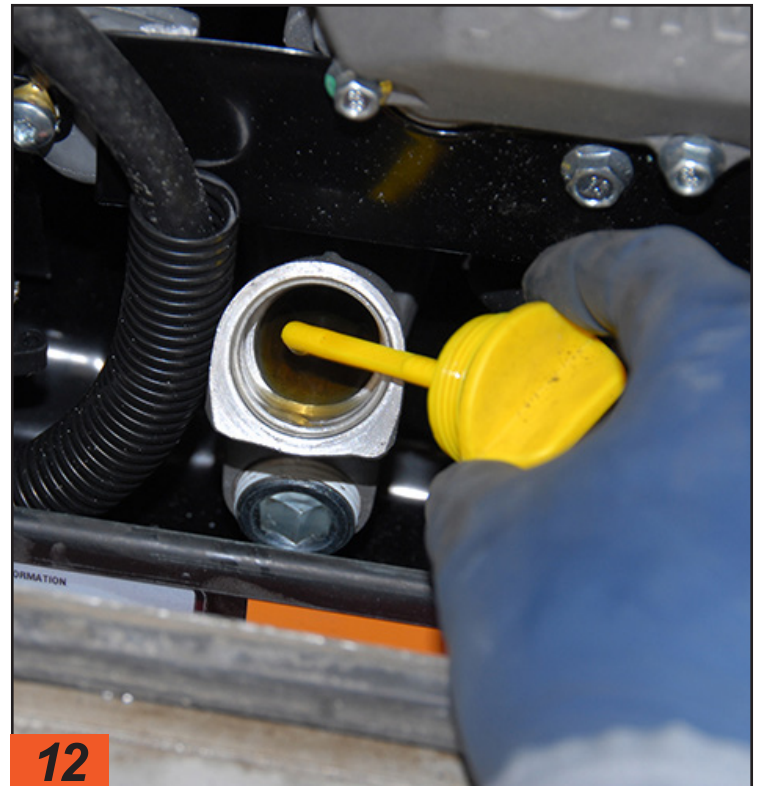
10

Because the new generator does not come with wiring conduit and its attendant hardware, they are removed from the original unit. The 90-degree fitting is removed first and the conduit slid off. The wires from the new generator are then taped together, fed through the conduit and the fitting replaced.



11

The floor jack is once again employed to lift the new generator in place, and the disassembly procedure is reversed.



12

A new Onan generator should come from the factory filled with oil. However, it's a good idea to check the dipstick before running, just to be sure.



13

Next, this rocker switch is used to prime the fuel pump, after which it is clicked to the right to start the generator.



14

After the new generator was installed, it was discovered that the original exhaust pipe bracket was broken. If not properly supported, vibration will eventually cause the new pipe to crack and fail, so the old bracket was replaced with a new rubberized one.



15

Finally, a circuit tester is used in a 120-volt AC outlet inside the motorhome to make sure the generator was installed properly and is working correctly. **RVE**

### Sources:

Cummins Power Generation  
[power.cummins.com](http://power.cummins.com)

C&S RV Service Center  
(805)-982-9900  
[www.candsrv.com](http://www.candsrv.com)



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[parts.revgroup.com/store](http://parts.revgroup.com/store)



# RV

# ENTHUSIAST

NORTH AMERICA'S PREMIER HOW-TO RV RESOURCE

***Created by – and for – hands-on  
RV enthusiasts!***

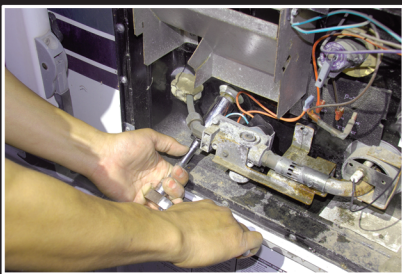
**RV Enthusiast** magazine was developed to take the mystery out of RV maintenance, repairs and upgrades, as well as providing how-to tips to make RVing better. We get it: Things happen as time and untold miles of bad roads will take their toll on your RV. But we also know that you don't have to be a mechanic to be able to confidently deal with problems that may crop up. All you really need is truly accurate information you can rely on — fully illustrated every step of the way and written in a friendly, conversational manner you can understand.

As this issue shows, each monthly edition of **RV Enthusiast** will be filled cover-to-cover with the kind of information and instruction you need to continue to enjoy your RV for years to come. In fact, there are nearly 50 pages of 'how-to' stories in this issue — just imagine the wealth of topics to be covered and the knowledge gained in a year's time!

If you like what you see, don't miss an issue. It's less than \$1 a month! Go to our website — [www.rventhusiast.com](http://www.rventhusiast.com) — click the "subscribe" icon risk-free and simply follow the prompts.

## ***Coming in the January issue:***

When all you want to do is get away from it all and enjoy the outdoors, a little snafu can ruin an otherwise great weekend. Our next issue takes a look at many of the ailments that can plague an RV — and how to recognize and rectify them. And since the best time to replace worn components is when you aren't using your rig, we'll also show how to maintain or replace an air-conditioner, upgrade a refrigerator — and a lot more. Available January 15.



## New Stuff!

### RVibrake Releases the Shadow

Traditionally, permanently installed braking systems for dinghies can take 6-8 hours for professionals to install. RVibrake's new Shadow — which works with all towed vehicles — is a plug-and-play design that, said company reps, can be installed even by a DIY enthusiast in less than two hours without need for crimping, soldering or disassembly. And, with its Tow-Mode Detection technology, it recognizes when you are towing. Shadow also includes a built-in, on-demand battery charger capable of charging up to 10 amps when there's a high parasitic drain on the battery — and comes with RVibrake's Command Center tablet that allows operators to monitor when the brake performs, while sending instant alerts and automatically activating the Shadow should a tow bar failure happen resulting in a breakaway. For more information, visit [rvibrake.com](http://rvibrake.com).



### Xponent Power Solar Awning

Solar is the hottest trend in RVing today, but there's only so much room on the roof of an RV. Xponent Power engineers, on the other hand, saw the wide expanse of awnings as a prime location — and the company has introduced the first commercially available retractable solar awning for the market. Deployed at the push of a button, the awning provides shade — and simultaneously generates more than 1,200 watts of solar power. Compatible with most RVs, the Solar Awning uses high-efficiency, glass-based solar panels and, said company sources, has undergone rigorous tests to ensure its robustness. The awning also features built-in intelligence to automatically retract when it senses adverse weather conditions. For more information, visit [xponent-power.com](http://xponent-power.com).



### Sudbury Debuts RV Care Products

Sudbury, a familiar name in the marine industry for its cleaning and maintenance products since 2009, has launched a series of 14 new products formulated specifically for the RV market. Designed to provide RV owners exceptional results, they're said to be easy to use and environmentally responsible. The Sudbury RV line includes soaps, general and specialty cleaners, waxes, and items for tire and outdoor fabric care. For inside the camper, products are available to clean bathrooms, sinks, carpeting and upholstery, as well as eliminate mildew. Rounding out the offerings are toilet and holding tank chemicals. For more information, visit [sudburyboat-care.com](http://sudburyboat-care.com).



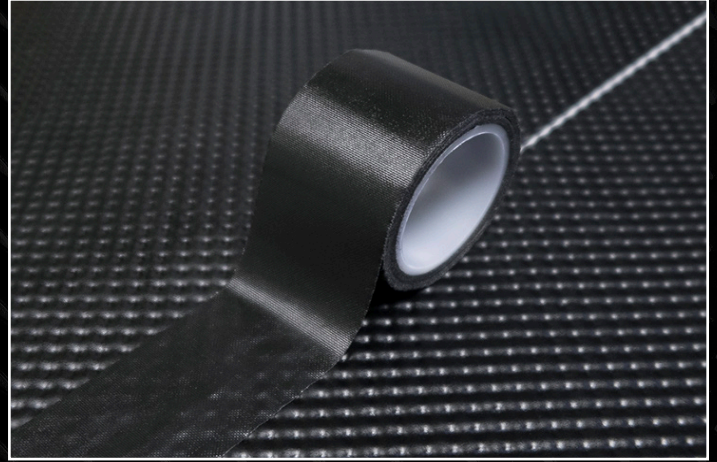
### Hellwig Helper Spring Kit for ProMaster-based RVs

Since its introduction in 2014, the RAM ProMaster van has arguably become one of the most popular vehicles for Class B conversions. But while the 2022 edition carries up to a 9,350-pound GVWR, the weight of heavy loads can still cause the van to sag in the rear, reducing driver control and safety. Hellwig Suspension Products has released a new helper spring kit for the 2014-2021 RAM ProMaster that, said company reps, will help restore a level ride height, leveraging weight back to the front tires and resulting in better braking and steering and balanced tire wear. The specially designed kit includes a single underslung adjustable-rate leaf spring (for each side) rated up to 1,500 pounds. The kit contains all necessary mounting hardware, including polyurethane bushings, and features Hellwig's signature powdercoat finish. Available for ProMaster 1500, 2500 and 3500 models. For more information, visit [hellwigproducts.com](http://hellwigproducts.com).



### Coleman-Mach's New Climate-Control Accessories

Coleman-Mach, an Airxcel brand, has released a suite of Climate Control Accessories for new and existing Coleman-Mach air-conditioners and air conditioners with heat pumps. The line includes Merv 6 Replacement Air Filters, add-on Electric AirSpace Heater Kits and the iWave-M Ionic Air Purifier. The woven Merv 6 filter — an upgrade to the standard mesh filter — better traps lint, household dust, pollen, pet dander and mold spores. The AirSpace heater can be easily installed from inside the coach to an existing Coleman-Mach A/C unit and boosts an RV's existing system by delivering intermediate temperature increases for more even heat distribution throughout the living space. The iWave-M Ionic Air Purifier, installed within a Coleman-Mach A/C unit, operates when the fan is on and helps to remove pet and cooking odors, and kill airborne mold, bacteria and many virus spores. For more information, visit [airxcel.com](http://airxcel.com).



### DEI's Black Seaming Tape

Design Engineering Inc. (DEI), known for its lines of heat control and sound-deadening panels, has introduced a Black Seaming Tape designed to be a universal solution on wood, steel, aluminum, plastic and fiberglass. Made with a glass fiber scrim, high-temperature adhesive and durable black finish, the tape is said to be solvent-resistant and adheres in environments up to 311 degrees F. Designed for edge and seam sealing for DEI's Black Floor and Tunnel Shield, it also works as a universal black tape solution for wrapping and protecting wires, cables, fuel lines and more; the company notes it can be used on wood, steel, aluminum, plastic and fiberglass. Available in 1.5-inch by 15-foot lengths. For more information, visit [designengineering.com](http://designengineering.com).



### Samlex Intros New NTX Series Inverters

Many RVers are familiar with the PST Series of pure sine wave power inverters. Now, the company has taken that proven performance and incorporated it into a simplified and more affordable design. Available in four models ranging from 1,000 to 3,000 watts, the lightweight, compact NTX Series was developed for small- to mid-sized RVs and commercial applications. Each NTX unit comes with the NTX-RC remote included for straightforward operation of the inverter and features Hypersurge technology to support surge for longer periods and a single load-controlled variable-speed fan for quiet operation. Weighing just 5.4 to 12 pounds, the NTX inverters carry a two-year warranty. For more information, visit [samlexamerica.com](http://samlexamerica.com).



### Shurhold Dual-Action Polisher

The combination of UV rays, blowing dirt and accumulated grime can leave a camper or motorhome's fiberglass and paint dull and chalky. According to the folks at Shurhold, restoring the high-gloss finish is easy with its "World's Best Dual Action Polisher." The Dual Action Polisher has a 5-inch oscillating head that's effective yet safe in the hands of DIYers. Speed can be adjusted from 2,500–6,500 orbits per minute to match the work needed — whether cleaning, buffing, waxing, polishing or removing paint defects — and the quick-change backing plate makes switching pads fast and easy. Features include a removable handle that fits on either side of the polisher and a counterweight that helps eliminate vibration from the oscillation. For more information, visit [shurhold.com](http://shurhold.com). **RVE**

continued from page 11

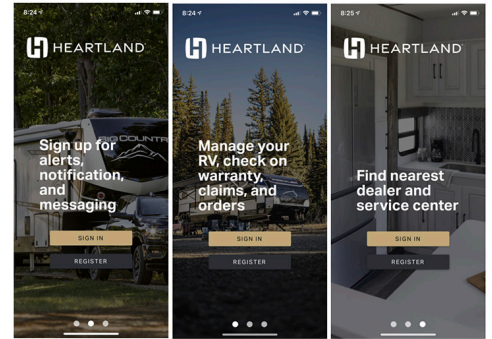
injection molded components at each joint in the system. In testing, the lab saw average airflow increases of more than 20%.

In November, the lab launched an upgrade to the system, combining air filtration with even greater noise reduction levels. Rechristened “Blade PURE,” the system adds MERV 9 air filtration to the engineered ducting and unique

vent design. It now filters out dust, pet dander, pollen and mold, providing a respite for campers who suffer from asthma and allergies. The new Blade PURE system combines with a Coleman-Mach Q Series air conditioner, which reduces noise levels by 10-15 decibels as compared to traditional air conditioners.

The new system is available on Keystone’s 2022 Montana, Montana High Country, Alpine, Avalanche, Cougar, Arcadia, Sprinter and Outback models.

## Heartland RV Launches Mobile Consumer App



Few things in an RVer’s life can be as frustrating as waiting for your rig to come back from the dealership after repairs. Now, you can find out answers on your own — well, at least Heartland RV owners can.

Heartland RV has launched a new mobile app, MyHeartlandRV, to help consumers oversee their RV. MyHeartlandRV is mobile app that allows the customer to enter their VIN# and monitor warranty information, sales and parts orders. Owners’ manuals and warranty information are readily accessible on the app, along with a dealer directory.

The app also includes a growing library of “how-to” content, checklists, and provides instruction on vital operational and maintenance tasks. Based on customer preferences, they can opt in for push notifications — which will alert them of their parts shipping, when their warranty claim has been processed (information is updated daily), or even a local rally in their area. For more information, [visit heartlandrvs.com](http://visit.heartlandrvs.com).

## ARVC, KOA Parks of the Year



The Willcox/Cochise KOA Holiday was named “Rising Star Campground” at the 2022 KOA Convention and Expo.

Wondering where to travel to next summer? You might take your lead from the outdoor hospitality industry and visit an award-winning RV park. Every year about this time, the campground sector’s largest campground associations and franchisors stage annual conventions. Among the educational seminars, camaraderie and business taken care of, each names its “Campground of the Year” — oftentimes, an honor bestowed on several locations based upon park size.

At November’s Outdoor Hospitality Conference and Expo staged by the National Association of RV Parks and Campgrounds (ARVC), Park of the Year awards were given in four categories to ARVC member-parks said to deliver an extraordinary guest experience as a result of all-around excellence in operations, professionalism, marketing, customer service and industry involvement.

•ARVC Park of the Year — Small Park Category: Aspen Grove RV Park, Tremonton, Utah ([aspengrovervpark.com](http://aspengrovervpark.com)).

•ARVC Park of the Year — Medium Park Category: Yogi Bear’s Jellystone Park Camp-Resort, Quarryville, Penn.

([jellystonepa.com](http://jellystonepa.com)).

•ARVC Park of the Year — Large Park Category: Santee Lakes Recreation Preserve, Santee, Calif. ([santeelakes.com](http://santeelakes.com))

•ARVC Park of the Year — Mega Park Category: Clay’s Park Resort, North Lawrence, Ohio ([clayspark.com](http://clayspark.com))

At about the same time,

Kampgrounds of America (KOA) held its annual Convention and Expo, during which the Indianapolis KOA Holiday ([koa.com/campgrounds/indianapolis/](http://koa.com/campgrounds/indianapolis/)) in Indianapolis, Ind., was named the KOA Park of the Year for 2022. Additionally, the Willcox/Cochise KOA Holiday ([koa.com/campgrounds/willcox/](http://koa.com/campgrounds/willcox/)) in Wilcox, Ariz., was honored as the KOA Rising Star Campground for 2022.

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## Going Back in Time

*Arizona's Canyon de Chelly, once home to ancient native American tribes, offers spectacular views of a holy land — and a history lesson through amazingly preserved “rock art.”*



*A masonry dwelling known as Mummy Cave is a large cliff dwelling with a three-story tower, occupied from 300-1300 AD.*

The state of Arizona is home to 22 Native American tribes, each living on their own tribal lands (reservations). The largest of these reservations is the Navajo Nation Tribal Land, located in the northeast corner of Arizona. On this reservation lies one of the Navajo's holiest sites, Canyon de Chelly (pronounced de-shay) — a canyon that exudes a quiet magic and spirituality. This area was carved out over the course of millions of years by water flow from the Rio de Chelly in addition to years of land uplifts, which created the colorful sheer cliff walls. The canyon cliffs glow pink, yellow and orange and offer breathtaking scenery.

This Navajo holy site is one of the longest continuously inhabited landscapes in North America. Evidence of the first settlers, the Anasazi Indians (more recently called Ancient Puebloan people), who lived in pit houses in the canyon around 1150 A.D. Later, the Anasazi moved from pit houses to building homes in the caves and alcoves

of the canyon walls. The remains of numerous multi-storied masonry dwellings can still be found in the sandstone cliffs of this canyon. By the mid-1300s, the Anasazi people left the canyon and moved elsewhere because of drought conditions. The Hopi tribe then moved into the canyon and planted crops of corn and peaches. Hundreds of years later, the Hopi also left the canyon and moved to the mesa tops. The Navajo tribe later moved into the canyon, created farms on the floor of the canyon, planted crops, raised livestock and built dome-shaped hogans as their homes. To this day, the canyon is still inhabited by Navajo families.

History shows that the canyon was explored by many different groups during the 1800s, but the Spanish were amongst the first non-Native Americans to discover this canyon, followed by the first Anglo-Americans of the Walker Expedition in 1847. In 1863, the U.S. government ordered the relocation of the Navajo tribe to New Mexico. Colonel Kit Carson led army troops into the canyon to relocate the Navajo, killing 23 Indians

and destroying their homes. Scientific explorations were later conducted in the 1880s to study the ancient ruins found in Canyon de Chelly. Reports of these scientific studies were published in magazines, bringing awareness to the general public about these ancient ruins. Unfortunately, visitors soon started coming to the canyon, looting and damaging the ruins.

President Herbert Hoover established Canyon de Chelly National Monument in 1931 to preserve the archeological



*A view down into Canyon de Chelly from one of the overlooks on the South Rim drive.*



*From the Spider Rock Overlook on the South Rim drive, visitors can clearly see the double-column spire that stands 800 feet from the canyon floor. The Navajo believe that Spider Woman, who taught the people how to weave, lives on top of the tallest sandstone spire.*

resources in this canyon dating back more than 4,000 years. The canyon is considered a sacred outdoor “museum” of the Navajo nation. This National Monument Park covers almost 84,000 acres, all of which is on Navajo Nation Land. Canyon de Chelly National Monument is managed by a partnership of the National Park Service and the Navajo Nation, but the land is still owned by the Navajo Tribal Trust.

Canyon de Chelly actually encompasses the floors and rims of three major canyons, including Canyon de Chelly, Canyon del Muerto and Monument Canyon. Canyon del Muerto, which means Canyon of the Dead, got its name when an ancient burial ground was discovered. The 84,000-acre can-

yon area offers breathtaking views and has several prominent unique features. The most distinctive geologic feature in the canyon is Spider Rock, a spire of sandstone that rises about 800 feet from the canyon floor at the juncture of Canyon de Chelly and Monument Canyon. This is one of the more sacred spots in the canyon; according to Navajo beliefs, a Spider Woman lives on top of this spire. The Navajo believe that Spider Woman was the one who taught their ancient tribes to weave. Another prominent feature in the canyon is White House ruin, built by the Anasazi Indians around 1060 AD. More rooms were added during the next 200 years, totaling up to 80 rooms and four kivas during its most heavily used period. The

White House ruin is the largest of the ruins in Canyon de Chelly, and visitors can tour the ruin with a Native guide. One other notable prominent feature in the canyon is Mummy Cave, a large cliff dwelling with a three-story tower. Researchers found that this dwelling was occupied from 300-1300 AD.

Canyon de Chelly contains more than 2,500 archeological

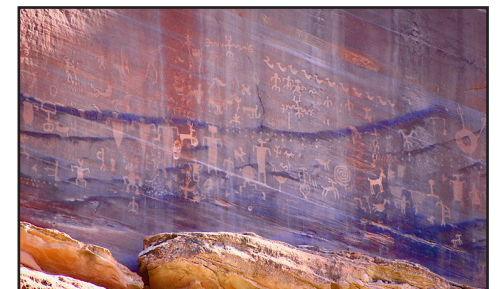
sites. In addition to the numerous masonry cliff dwellings that have been found in caves and built into recesses in the canyon walls, a great amount of prehistoric rock art — more than 100 locations — can be found on the cliff walls throughout the canyon. Amazingly, these ancient pictures have withstood the elements and weather over thousands of years, and can still be viewed today.

Most visitors to Canyon de Chelly National Monument stop first at the Welcome Center, located in the nearby town of Chinle, Arizona. Here you will learn of the ancient inhabitants of the canyon and view exhibits explaining the history of the area. While in Chinle, visitors can also stop at the Thunderbird Lodge, which was built on the site of an old Indian trading post. In addition to lodging, the Thunderbird Lodge offers an all-day cafeteria, which serves traditional Native American food. From here, visitors can travel to the National Monument Park, which is free of charge; it is technically not owned by the National Park Service or federal government. Access to the canyon floor is restricted, so most visitors view it from the rim of the canyon. Two scenic rim drives are available, encompassing nine overlook areas. The North Rim Drive is an 18-mile drive that follows around the rim of Canyon del Muerto. The South Rim Drive is a 16-mile drive with stops at the Tseyi Overlook, Junction Overlook, Spider Rock Overlook and White House Overlook. At the White House Overlook, a steep one-mile trail is open for visitors who would like to take a closer look at the White House ruins. This is the only access into the canyon available to the general public.

In order to see the many ancient cliff dwellings and rock art “up close” you need to arrange a tour with a Navajo guide. Native guides are required to ensure the privacy of the 40-plus Navajo families that currently live on the canyon floor and to ensure that their native sacred space is respected and protected. Horseback riding tours



*The White House ruin is the best-known cliff dwelling in Canyon de Chelly. This ruin had up to 80 rooms and four kivas during its most heavily used years and is the largest ruin in the canyon. These masonry cliff dwellings were built by the Anasazi.*



*Canyon de Chelly is home to more than 2,500 archeological sites and 100 rock art locations. This panel of rock art is one of the largest in the canyon.*



*These rock art images are actually in color, and depict various animals in the canyon. They are thought to have been drawn at a later time than the simple drawings primarily done in white.*

or hiking tours are offered, as well as Jeep tours, sometimes called “Shake ‘n Bake Tours” due to the bumpy roads and the summer heat. We reserved a three-hour Jeep tour several days in advance, and our native guide shared stories of his ancestors while showing us several of the ancient cliff dwellings and rock art throughout the canyon. The fee for the tour (approximately \$60 for two people) was quite reasonable and was money well-spent. You can go to [www.canyondechellytours.com](http://www.canyondechellytours.com) to find a list of authorized tour operators for any of the Navajo Tribal Lands.

There are no campgrounds within Canyon de Chelly National Monument Park. The closest campgrounds are located in the town of Chinle. Cottonwood Campground, managed by the Navajo Parks and Recreation Department, is located ½ mile south of the Canyon de Chelly Welcome Center and offers 90 sites with no hookups. There are restrooms (toilets and sinks only) throughout the campground and a dump station is located in Loop 1. This campground can accommodate RVs up to 40 feet and the fees are \$14 per night. A second campground, Spider Rock, is located on Navajo Highway 7



*This panel of rock art, found on one of the canyon walls, clearly shows many human and animal figures. Other unknown symbols and what appear to be handprints can also be seen.*

in Chinle and also has no hook-ups; the cost at Spider Rock Campground is \$16 per night. For more information, call the Navajo Campgrounds at 928-674-2106 or e-mail: [cdc@navajonationparks.org](mailto:cdc@navajonationparks.org). I would highly recommend spending a few nights at one of these nearby



*A look at the red canyon walls in Canyon de Chelly gives evidence of years of mineral deposits and erosion. The staining of these walls is known as “Desert Varnish.”*



*This unusual rock formation, often referred to as “2 Dog Formation,” is in Canyon de Chelly*

campgrounds in order to give yourselves enough time to do one (or both) of the rim drive tours, as well as going into the canyon on foot, horseback or Jeep with a native guide. You really can’t see the rock art or many of the cliff house dwellings without being down on the canyon floor. Once you’ve had the opportunity to “relish in the paths of the ancient ones” you will have a better understanding of this sacred place and why the Navajo people say: “Hozh’o for future generations.”



*Another archeological site within Canyon de Chelly is a masonry cliff dwelling with a very large rock art image painted to its right.*



*In this photo, you can clearly see “steps” or a staircase carved into the wall to the left of the cave. These steps were carved out by ancestral people, perhaps wanting to reach the mesa top for farming. **RVE***

## Suzanne Strauss



**Suzanne Strauss** and her husband, **Rich**, have been full-time RVers for about four years.

They started out camping on weekends in a pup tent; eventually, they bought a small single-axle travel trailer to “test the waters” and fell in love with RVing. Now living full-time in a motorhome, they ply the roadways in search of interesting and “off the beaten path” places. She can be reached at: [RStrauss22@gmail.com](mailto:RStrauss22@gmail.com)

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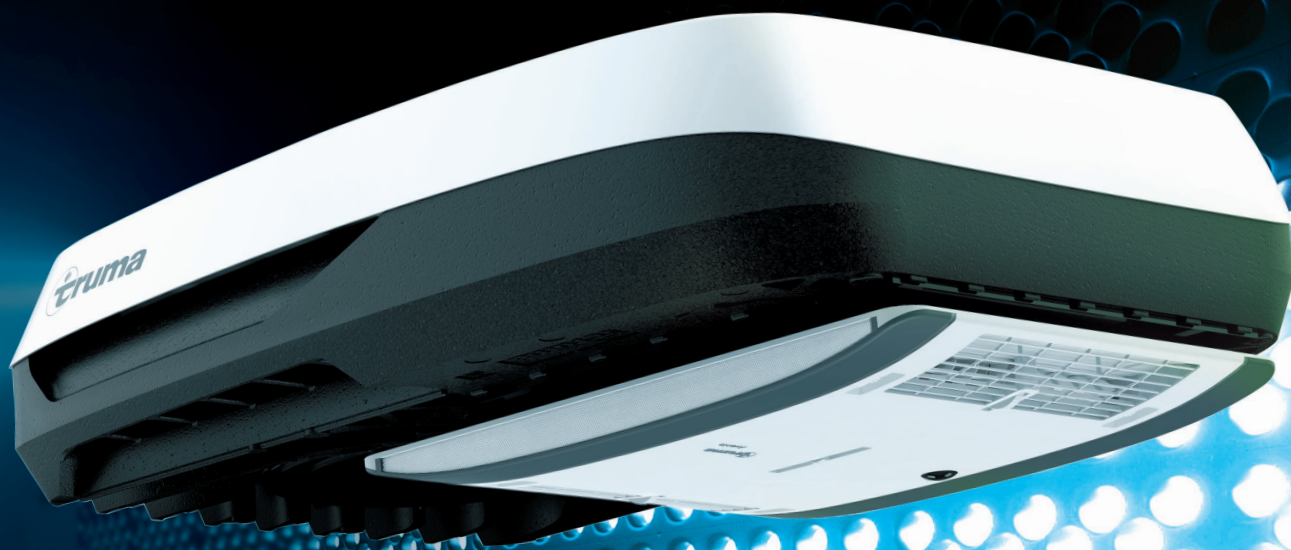


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