

## #33\_2022\_January\_Newsletter

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Mon 1/10/2022 10:55 AM

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Thank you for signing up to receive my newsletters. I hope you've found the previous editions informative and helpful for your vehicle-supported adventures. I trust you will enjoy this month's newsletter. If you have comments, please email me: Bob.Wohlers@discoveroffroading.com. You can access, download, and read previous newsletters on my website by clicking [HERE](#). Look through the Newsletter Reference for a topic that may interest you, or download them all!



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**Scroll Down to Read About My Year-Long Experiment with LiFePO4 Batteries in the Remote Backcountry**



## 2022 Tour Schedule Update

As a valued newsletter subscriber, you know that this year I decided to handle the announcement of this year's tours a bit differently. Before allowing my partners to market my tours (primarily Four Wheel Campers), I announced the sale of



my tours first to my *Death Valley FWC Adventure Tour.*  
newsletter subscribers.

I organized the sale of my tours this way so you would have the first opportunity to grab a spot on a tour prior to it filling up.

As of this date, none of the tours have completely sold out, but some are really close. Four Wheel Campers will announce the tour information in one of their newsletters this week. So, if this year is like the last two years, the tours will sell out right after they announce the who, what, when, and where. Last year the tours sold out 2.5 hours after Four Wheel Campers published their January newsletter.

## **New Tours for 2022**

Due to demand, I've added two tours for short wheelbase vehicles – Jeeps, Land Rovers, Toyotas, Broncos, etc. These two tours are for vehicles that do not sport a Four Wheel Camper.

### **Death Valley Miner's Cabin Tour**

Basecamp Tour

October 21 to October 23. \$520.00 per vehicle. This is a BASECAMP tour, meaning we return to the same camping spot each night. This is not a true overlanding tour where we camp at a different location each night. In other words, you may haul your 4WD vehicle to the campsite with a trailer or motorhome. This tour includes three days of exploring the largest National Park in the lower 48 States. Over 80-percent of this beautiful park can't be seen from the pavement – you must venture off-road. We will visit several old miner's cabins (shhhh... secret locations), challenge our vehicles on some of the park's more narrower and rocky trails, and travel to some of the park's iconic locations. During this tour you will visit several Adopt-A-Cabin structures.

### **Camp Baja Beaches – December Mexico Adventure**

Overlanding Tour

December 3 to December 10. \$1300.00 per vehicle. This seven-night overlanding-style tour begins in Calexico, California and ends in Tecate, Mexico. The tour follows an easy route (some off-roading) through exceptionally scenic landscapes. You will visit San Felipe, Bahia San Luis Gonzaga, and Bahia de los Angeles on the Sea of Cortez side. The tour then crosses the peninsula to Hwy 1 and travels through Catavina, Punta Banda, and Ensenada. Camping during this

tour is mostly on remote beaches.

For tour details and how to reserve your spot, click [HERE](#).

If you have questions after reading all the course and tour information on my website, please call Bob at: 909.844.2583.



For more Adventure  
Tour information,  
[CLICK HERE](#).

*Black Rock Desert Hot Springs.*



*Camp on Baja Beaches Adventure Tour*



*Rimrocker 2021 Tour*



*Mojave Road Tour*

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## **2022 4WD Safety Course Update**



*Happy Students!*

Off-Road Safety Academy is again offering two 4WD courses for recreational explorers. The Discovery Course is an introduction to 4X4 off-roading. Although the curriculum for this course is designed for beginning off-roaders, seasoned backcountry explorers will also find this training very useful.



*Learning Rock Crawling & Hill Climbing.*

The Total Approach to Recovery Course focuses on the skills outlined in the book “The Total Approach to Recovery Off-Road – 4WD Self-Recovery & Vehicle-Assisted Recovery.” This book is required reading for this course. For more

information about these courses, click [HERE](#).

## Your Instructor

I am the only fulltime professional off-road educator in the USA with multiple published books on “how to” safely off-road and overland. As John C. Maxwell once famously said, “You never really know something until you teach it to someone else.” Writing books to teach a subject has allowed me to further focus on important topics and their priorities within a course. This subject-matter expertise coupled with my Masters Degree in Instructional Design has allowed me to produce the most effective and efficient 2-day 4WD courses in the nation. My courses focus completely on your needs, based on the way you wish to off-road.

## 2022 Schedule

Below are the 4WD courses scheduled at this time. More courses may be added as the year progresses.

- January 22-23 – Discovery Course – Intro 4X4 Off-Roading
- January 29-30 – The Total Approach to Recovery Course
- March 5-6 – Discovery Course – Intro 4X4 Off-Roading
- March 12-13 – The Total Approach to Recovery Course
- October 8-9 – Discovery Course – Intro 4X4 Off-Roading
- October 15-16 – The Total Approach to Recovery Course

**To sign up and pay for any of these courses click [HERE](#)**

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# Say Goodbye to Low-Energy Camping - PART ONE

**Building a  
Dedicated  
Lithium Iron  
Phosphate**



## Battery Camping System

Let's focus on your 12-volt energy needs while camping. For your dedicated camping "house batteries," I suggest you forget about lead acid flooded, gel, and yes even AGM batteries. Say it with me, "I need LiFePO<sub>3</sub> (lithium iron phosphate) batteries."



In late 2020, I decided to swap out my fully functional and still young AGM (Absorbent Glass Mat) batteries in my camper and install LiFePO<sub>4</sub> batteries. Why did I do this? Power baby. Mucho 12-volt power.

I see lots of truck-camper combinations, off-road trailers, and overland vehicle set ups on my tours, in my classes, and at overland events. While in the remote backcountry, I have seen many house battery failures or hear folks starting their engines early in the morning to charge their house batteries while camping. These occurrences signify weak batteries and/or a flawed house battery charging system.

To proactively avoid 12-volt electrical problems in the backcountry, I removed my dedicated AGM house batteries in both my Four Wheel Camper and my 2013 Jeep JK Rubicon. For my Four Wheel Camper, I built my own LiFePO<sub>4</sub> battery box from scratch. In my Jeep I purchased already made Battle Born batteries for its house batteries. As a side note, I retained my Odyssey brand AGM engine starting batteries in both vehicles. At this point in time, I believe the Odyssey high cold-cranking durable batteries are still best for engine starting and off-roading. (Forget Optima-brand engine starting batteries – long story.)

## Why LiFePO<sub>4</sub> Batteries for

## Camping?



At this point in time, LiFePO4 batteries are by far the best solution for dedicated camping solar energy systems. Here's why:

- Safety. LiFePO4 batteries are safe. These are not the dangerous Lithium Ion batteries you

read about spontaneously catching fire. LiFePO4 batteries use a different chemistry than lithium ion batteries.

- Lasts Longer – Cheaper Long Term. Although LiFePO4 batteries cost more than AGM batteries up front, in the long run they are much less expensive. Since LiFePO4 can reach 100 percent depth of discharge (DOD), you don't have to worry about destructive draining of your LiFePO4 battery. This means you can use it longer than AGM batteries. AGM batteries should never be drained below 12-volts. If you take REALLY good care of your AGM batteries, you may get four years out of your AGM batteries. If you aren't vigilant at keeping your AGM batteries charged when not in use, expect to replace them every one to two years. Replacing AGM batteries that often gets very expensive – far exceeding the initial cost of LiFePO4s. Fact is, you can use quality LiFePO4 batteries for many years beyond other battery types. Therefore, most commercial LiFePO4 batteries are warranted for up to ten years. LiFePO4 batteries are rated to last about 5,000 charge cycles – that's 10 years or so. AGM batteries can only last about 400 to 500 charge cycles. A battery "cycle" means one charge and discharge. This means that over time, the average cost of a LiFePO4 battery is much less expensive.
- Less Weight. Pound-for-pound and amp-for-amp, LiFePO4 are significantly lighter than AGM batteries. Lighter "anything" is always a good thing for overland vehicles.
- Charging is Faster. AGM batteries charge notoriously slow. LiFePO4 charge four times faster than AGM. LiFePO4 batteries also recovery more quickly than AGMs. All of this means that LiFePO4 batteries charge better with solar panels.
- Low Maintenance When Not in Use. If you take your camper off your truck and let it sit, LiFePO4 batteries don't need to be maintained by keeping them on a float charge like AGMs. Storage without a trickle-charge is a rather quick death sentence for AGMs.

I decided to delay writing this newsletter until I had a chance to torture my LiFePO4 batteries under a variety of driving and camping conditions. I wanted my new batteries to vibrate on miles of washboard and rocky trails. I wanted to use them when camping at both freezing and blisteringly hot temperatures. I can now attest that I'm completely satisfied with my batteries and my redesigned 12-volt set ups. I've had zero problems. None. In fact, I'm very impressed with the 12-volt set ups in my camper and my Jeep. I'm convinced that I will never again be wanting for 12-volt energy in the backcountry while overlanding.

Here's an interesting note, since I installed the LiFePO4 battery box in my Four Wheel Camper, I've rarely turned off my high-drain Isotherm refrigerator. For the most part, my refrigerator has been on 24/7; through summers and winters (and boy, do the summers get warm in the California Central Valley). The Isotherm has been on while camping, driving around town, and when parked at my home. This is where you ask, "Is it because of your newly installed LiFePO4 batteries that you can keep your refrigerator on full time?" The answer is "Not entirely." I teamed my new batteries with redesigned 12-volt SYSTEMS in my truck-camper combo and my Jeep JK. With this answer, you should sit up straight in your chair and read the rest of this newsletter very carefully.

## Disclaimers and Important Notes

Before I launch into the details of my redesigned 12-volt camping system, here are a few important disclaimers and notes.

1. First Disclaimer. I purchased everything I talk about in this newsletter. As I've said in past newsletters, I never want to be beholding to a company, so I rarely take free-stuff. If I do take something for free or at a reduced price, I tell you. I'm not a "fan-boy" and as most of you know, I'm not beholding to any one company or product. I only work for you, my readers, and students. I want to give you my honest and unbiased opinions.

2. Second Disclaimer. It's not possible to cover every detail about my redesigned LiFePO4 12-volt system in this newsletter. If you decide to build and install a 12-volt house battery system in your overlanding vehicle, you'll need to do more research than I provide in this newsletter. If you are not familiar with 12-volt systems, then I would strongly suggest lots of study time or, better yet, take your vehicle to an expert and let them do all the work. See the list of experts below. All those listed in this newsletter are 12-volt system install experts I personally know and trust. For the record, I'm no 12-volt "God," but I am a good researcher and a

quick study. I did all my own work on my camper and Jeep. So far, my system has worked flawlessly.

3. Safety Note: The LiFePO<sub>4</sub> 12-volt dedicated camping system described in this newsletter can really help you live more comfortably in the remote backcountry by providing you an almost endless supply of electrical energy. That said, any incorrectly installed 12-volt system can kill you. “Kill” you say? Yes. Vehicle fires are a very real possibility when a 12-volt system isn’t set-up or installed properly. An extreme fire may not kill you directly, but losing all your food, warm clothing, water, and survival items in a completely burned out vehicle can.

4. Third Disclaimer. If you are not willing to go the distance and upgrade your entire 12-volt camping system, don’t even start. For example, don’t just replace your AGM house batteries with LiFePO<sub>4</sub> batteries. You’ll be disappointed, and you may even “fry” your vehicle’s alternator (or worse). A LiFePO<sub>4</sub> battery upgrade demands a 12-volt system redesign. It’s not simply about swapping to a new type of battery.

5. Charging Note. It’s possible to charge your LiFePO<sub>4</sub> batteries three ways: 1) Shore Power – changing AC to DC electrical current through a “converter” (typically built into campers). 2) Engine Power (alternator). 3) Solar Power (your most important charging source). LiFePO<sub>4</sub> batteries like an absorption charge of 14.4 to 14.6 volts to get them 100 percent full. If whatever method you use to charge your batteries cannot put out voltage that high, it will not charge the batteries to 100 percent. Getting your batteries to 100 percent is optimum. For this reason, it’s important to establish a large “pipeline” (large wire cables) from your engine starter battery and alternator to your house batteries if you want engine power to be effective. Also, you need a DC-to-DC charger to safely get your batteries to 100 percent using engine power. More about large wire cables in a bit. For the record, I have never plugged my Four Wheel Camper into shore power. Unless you visit RV parks frequently while camping, this charging option really doesn’t exist.

## **12-Volt Install Experts That Can Help\***

Here’s a short list of folks I personally know that can help you install the kind of 12-volt system I am outlining in this newsletter. (Click on the company names to go to their websites.)

- **Zero Declination.** 204 Edison Way, Reno, NV. 541.215.4661
- **Oregon Adventure Trucks.** Bend, Oregon. 541.238.8400
- **AT Overland.** Prescott, Arizona. 877.661.8097

- OK4WD. Stewartville, New Jersey. 908.866.8986

\*Four Wheel Campers will customize a build-to-order camper with a 12-volt system that will include a LiFePO4 batteries using REDARC components.

## The Pieces/Parts I Used to Build My System

Here's a list of what I used to make my 12-volt house battery system perform to my satisfaction.

### LiFePO4 Batteries

For the reasons previously stated, these batteries are the best by far for camping solar energy systems. Unlike other types of batteries, LiFePO4 batteries require some electrical "management" – particularly a component we call a "Battery Management System" or BMS. Other components, such as a temperature sensor, may be required as well depending on the 12-volt system's use. All these components are added to the battery box. Regarding the batteries themselves, you have two paths to choose from once you decide to upgrade to LiFePO4 batteries.

Do-It-Yourself (DIY) Battery Box. This is the cheaper choice, but a LOT MORE work. If you are up for a challenge and are patient, building your own battery box can be fun. I built my own battery from four 3.3-volt Grade A prismatic cells (3.2 x 4 = 12.8-volts). My LiFePO4 battery is 280 AH (amp-hour). My old AGM batteries were only 132 AH. That alone is a huge increase in energy capacity. You can even get the same batteries I purchased on Amazon; click [HERE](#). More on building your own battery box in a bit.



*Pictured is the unboxing of one of my four purchased 3.2-volt, 280 AH LiFePO4 batteries. Four times 3.2 = 12.8 volts.*



*The beginnings of my battery box build.*

## **Purchase Assembled Battery Boxes**

LiFePO4 batteries such as Battle Born, Lion Energy, etc. come complete. No

building necessary. This is the easier but more expensive choice. Click [HERE](#) and [HERE](#) to see these batteries.



*Pictured is a Battle Born LiFePO4 battery box. If you were to take the outer box apart, you'd find several batteries and a certain amount of circuitry – namely a Battery Management System (BMS).*

## Solar Panel(s)

You will need at least a 160-watt panel permanently mounted on the roof of your camper, topper, vehicle, or roof-top-tent. I say the more panels the better. Most experts recommend you have at least 210-watts of solar panel(s). Your total solar set up could be, for example, 160 watts on your roof, and then the ability to add a suitcase-style portable or roll-out flexible solar panel when stopped at a campsite. Vehicle-specific solar panels can be obtained from many sources – too many to list here. Choose wisely so your panels will last while your drive, camp, and exposed to the weather. I've owned panels from Overland Solar and Go Power.



*For solar power charging of my LiFePO4 batteries, I have a 160-watt Overland Panel on my camper roof (came with my camper from the factory), and an Overland Solar 120-watt foldout panel. I rarely use the foldout panel – only when I camp for multiple days when its cloudy or lots of trees overhead blocking the sun's rays.*

## Solar Controller

You may already own a solar controller for your solar camping 12-volt system. However, the question you need to answer is, “Will your solar controller work with LiFePO4 batteries?” If not, you absolutely need a new solar controller. There are many companies that make solar controllers that work with LiFePO4 batteries. When I upgraded to LiFePO4 batteries, I installed a Victron Energy SmartSolar MPPT 100/15 with Bluetooth. The SmartSolar connects via Bluetooth to the VictronConnect App on your phone (or tablet), conveniently giving you a read out of all solar panel parameters.





*Because I wanted system-wide “networking” via Bluetooth, I replaced the Solar Controller that came with my camper. The added Victron MPPT 100/15 controller was perfect for my needs. This controller can be programmed for LiFePO4 battery charging and it networks with my Victron Energy Smart Sense module. If the camper’s interior temperature gets near freezing, the Smart Sense module will tell the solar controller via Bluetooth to stop charging the batteries. Cold LiFePO4 batteries can be permanently destroyed if they are charged by any source. You must have an automatic method of protecting your expensive batteries.*

## **Victron Energy SmartShunt 500 amp with Bluetooth**

You don’t need this device, but it can be one way to monitor your battery system. The Victron SmartShunt is an all in one battery monitor, only without a display. Via Bluetooth your phone acts as the display. The SmartShunt connects via Bluetooth to the VictronConnect App on your phone (or tablet) and you can conveniently read out all monitored battery parameters, like state of charge, time to go, historical information, and much more. The SmartShunt is a good alternative for a hard-wired battery monitor, especially for systems where battery monitoring is needed but less wiring and clutter is wanted. I purchased mine [HERE](#).

## **Victron Energy Smart Sense**

Smart Battery Sense is a wireless battery voltage and temperature sensor for Victron MPPT Solar Chargers. With voltage and temperature sense in place, batteries will be better charged, improving charging-efficiency and prolonging battery life. For lithium batteries temperature data is used to disable charging when they are too cold: charging lithium batteries near or below freezing causes permanent damage to the cells. I purchased mine [HERE](#).

## DC-to-DC Charger

There are many makes and models of DC-to-DC chargers available. When you switch from an AGM to LiFePO4 battery you must, in my opinion, add a DC-to-DC charger in your battery system. If you do not install a DC-to-DC charger with your LiFePO4 battery system you run the risk of frying the “smart” alternator on your modern vehicle (the alternator begins to smoke – not good). I don’t want to get into a dissertation about smart alternators here, so google the problem or watch this video [HERE](#). This may be a small risk, but I believe we are in the business of eliminating risks where possible. In my PowerWagon and Four Wheel Camper set up I used the Swiss-made IBS Dual Battery Manager (DBM), a 20 amp DC-to-DC charger that can be set for charging LiFePO4 batteries. I purchased mine in the USA from Extreme Outback Products [HERE](#). National Luna and REDARC are two other fine companies that make excellent DC-to-DC chargers. REDARC chargers can be purchased from a variety of 4WD shops. I’ve not personally owned these chargers, but National Luna and REDARC are well-respected brands. Equipt Expedition Outfitters is the USA distributor for National Luna DC-to-DC chargers. Click [HERE](#) to go to Equipt. Having installed a couple of brands of DC-to-DC chargers to vehicles, I can share with you that appropriately “setting” these chargers is one of the more difficult parts of your redesigned LiFePO4 12-volt system. The primary tip I can give you regarding installing your DC-to-DC charger is **READ THE MANUAL CAREFULLY**.



*I mounted my IBS DC-to-DC charger in my engine bay, near my starter battery. Chargers will have multiple wires that need to be connected to a variety of cables under the engine hood.*

## Next Month... PART TWO of my LiFeP)4 Battery Box Build and Install



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