Solar wiring diagrams

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Posted on Last updated: January 15, Categories Camper van conversion guide. By: Author Angela and Graham. As an Amazon Associate we earn from qualifying purchases. For more info, please check our disclosure page. This post is one part in our DIY campervan solar system series. The purpose of this post is to share with you our DIY solar wiring diagrams, provide a brief glossary about each component of a solar system and to explain a little of the theory behind our diagrams. Before you decide what size solar system to install in your campervan, we highly recommend calculating your needs first, then matching those needs with solar panels. You can check out our complete set of electrical calculators for RVs and campervan conversions to help size your entire solar setup. How much a solar panel can power depends on a number of variables including the time of year, the weather, your location and the type of charge controller you install. To give you a visual idea of what you can expect to power from different size systems, check out this image below. While this is of course only indicative, it does illustrate that to be in with a chance of living completely off solar generated energy in a van , you need a minimum of w of solar panels. Need more advice and support on a specific part of your campervan electrics? Join our new Facebook Group to connect with a growing community of like-minded van builders. Solar panels harvest sunlight, converting it to electricity. Solar charge controllers regulate the current from the panels to a safe level so it can charge the batteries. Check out our complete guide on how to select the right solar charge controller for your setup. If you need to know what size to get, use our interactive solar charge controller calculator. Deep cycle batteries are sized in amp hours or Ah. The higher the amp hours, the more energy is stored. Different types of batteries perform in different ways so ah of one type of battery is not equal to ah of a different type. You can read more detail about them in our post on campervan batteries and see why we recommend choosing Gel or Lithium-ion. Solar panel mounting brackets allow you to fit the solar panel to your van without needing to drill holes in the roof. Solar panel cables or solar wires are rated to handle the current from the panels, connecting them to the charge controller. By increasing using bigger cables, you can minimise voltage loss between the solar panel and the charge controller. Choosing the correct campervan wiring sizes is critical for safety and efficient performance of a solar power system. A solar panel gland seal is a weather proof seal to plug the hole needed to run the solar cables into the RV. Fuse holder sits between the solar charge controller and the battery cut off switch, holding the fuse to protect the battery. Choose a cut off switch plenty big enough to cope with the entire amp hour capacity of the batteries with wriggle room for future expansion. Wire Lugs or battery terminal eyes allow you to connect the solar panel cable to the battery. Solar kits are pre-packaged configurations including most of the components need to install an RV solar panel system. Just click the link to go straight to the wiring diagram for the size closest to your chosen system. A watt solar set up is an ideal starter size or for small campers with little energy demand or roof space. And with the right sized components, it will be cost effective to scale up in the future when your budget allows. With careful use, w of solar is enough for living in a van full time in fair weather conditions, perfect for sun chasing van lifers. At watts, a solar system is capable of supporting a the energy demands of a couple or even a small family in a medium sized RV. With careful use and monitoring, this is pretty close to year round living without the need for other energy sources like driving or hook up. In a medium sized campervan this is luxury and will support off grid living year round - if you have the roof space for the panels and storage space for the batteries. For a complete step by step guide check out our detailed guide on how to install solar panels on RVs, campervan and motorhomes. Some of the tools can be quite expensive. Unless you expect to get a lot of use out of them in the future, try to borrow them where possible. The one thing we do encourage you to invest in is the multimeter. Check out our complete guide for how to use a digital multimeter in your camper. This site uses Akismet to reduce spam. Learn how your comment data is processed. Hey there! Join Campervan Electrics Facebook Group. Each wiring diagram provides: a detailed wiring diagram for the given size â€" both series and parallel , what you can reasonably expect to power with a system of that size, tips for future scaleability, a complete shopping list of parts needed for a DIY installation and where available, pre-configured solar panel kits. A watt solar set up gives a little more luxury in small campervans. This is goal zero! A whopping w of solar power should be enough for even the largest of RVs and campervans. This is our idea of heaven! Click here to cancel reply. Looking for something? Search for:. Let's Connect! Now that you have reached the solar wiring diagrams section of this website, you are finally ready to learn how solar panels and batteries are wired together. We are going to start with showing you some smaller solar systems arranged in different ways to produce different results and move on to bigger solar systems arranged in different ways to produce different results. Each arrangement has it's own solar wiring diagram, so you can see exactly how it's done. Remember, you don't need to start off by making all the energy you'll ever need, right away. You can get your feet wet by setting up

your first solar system successfully, save a little bit of money at first, then do it over and over again as many times as you want! The first solar power wiring diagram arrangement we'll look at consists of only one solar panel and a battery bank with one battery in it. Although the system above wouldn't provide an awful lot of power, certainly not enough to meets all your needs , it could be used to supplement some energy, save you a little bit of money and provide some limited convenience. An arrangement like this would typically be used in a portable application powering appliances with low power ratings, like those often used in trailers and RVs. For instance, if you have a certain appliance you would like to power like a laptop by the pool or a tv in your back yard shed or gazebo, then this type of solar application would provide a good affordable but limited energy solution. Watts - The reason why this arrangement is limited is because with only one panel you can only produce up to 63 watts per hour maximum under optimal sunlight conditions. Battery - With only one battery, you can only store one battery worth of power. Since your battery can store amp hours amps total in the period of one hour worth of energy, you'll have to spread those amp hours out according to the amp ratting of your appliance for as long as you can. If you stick to small appliances with small power loads you should be able to get some minimal energy savings with this system in optimal sunlight. That might seem great but if you started adding more appliances and power loads, you would likely run out quick. As a result, this limits your available power even more. Amps - Furthermore, your system would only have 3. Volts - And with only 18 volts panel and 12 volts battery bank , you would only be able to charge appliances with a lower voltage rating, like 12 volt but not 24 volt or higher. But don't get too discouraged, this solar arrangement is still useful and practical, as long as you don't expect too much out of it. The second solar power wiring diagram arrangement we'll look at consists of two solar panels and a battery bank with two batteries in it. With a two panel solar arrangement, we have a few more options in terms of wiring. By this I mean that we now have the choice of wiring our two panels and batteries using series wiring or parallel wiring. Series wiring is when you connect your panels or batteries positive to negative, negative to positive, etc and it is used to increase the overall volts. Parallel wiring is when you connect your panels or batteries positive to positive, negative to negative, etc and it is used to increase the overall amps. Here is an example of the same two panels wired in both series and in parallel. Although the two solar arrangements above don't offer the most power or storage capacity, certainly not enough to meets all your needs , they do give you more to work with. For instance: With the "series" arrangement above, you could now power a 24 volt appliance and wouldn't have to stick only to low voltage appliances commonly used outdoors in trailers or RVs. However if you are using appliances with low voltage ratings anyway like if you're in a camper then you might prefer the "parallel" arrangement because you'll be able to charge your batteries faster and store more energy per available daylight hours. Watts - Since we are now working with two panels, this solar system will output w of power per hour maximum under optimal sunlight conditions. Still not the most power, but much better than the one panel system in our first example. Watts remain the same with both series and parallel wiring. Battery - With two solar panels and two batteries wired in series, your battery's storage capacity stays the same: amp hours - so your battery can store amps total in the period of one hour. This is a low storage capacity. Amps - With two solar panels and two batteries wired in series, your amps remain the same at 3. Volts - With two solar panels and two batteries wired in series, your panels' volts increase to 36 volts and your battery bank's volts go to 24 volts which means you'll be able to power up to 24 volt appliances. Watts - Since we're now working with two panels, this solar system will output w of power per hour maximum under optimal sunlight conditions. This gives you better storage capacity, but the trade off is your battery bank's voltage remains small at 12 volts. If you stick to small appliances with small power loads, you should be ok. Amps - With two solar panels and two batteries wired in parallel, your amps increase to 7 amps which means you'll be able to charge your battery bank faster and take better advantage of available daylight hours. Volts - With two solar panels and two batteries wired in parallel, your volts remain the same at 18 volts panels and 12 volts battery bank so you will only be able to charge a 12 volt battery bank and thus power up to 12 volt appliances. If you are only supplementing some of your home's power or using your system to power RV type appliances than this arrangement allows you to pick a balance that can be more practical to your needs. The next solar power wiring diagram arrangement we'll look at consists of four solar panels and a battery bank with four batteries in it. With four panels we clearly have enough of them to arrange them using a combination of series and parallel wiring. We do this because it provides a better balance of volts and amps, instead of tipping the scales only to one side like with just straight series or straight parallel wiring. Here is an example of four panels wired in a combination of series and parallel. Now this is a little better. Although the solar arrangement above isn't the biggest, it does provide reasonable amounts of power, load

delivery and storage capacity. Watts - Since we connected two groups of two panels together in series and parallel, this solar system will output w of power per hour maximum under optimal sunlight conditions. This is an ok amount of power and you should start to notice some better energy savings now, however this set up still has it's limitations. This is a better storage capacity. Now we'll look at the same four panel solar arrangement as above, expect we will wire the panels and batteries together only in series. Although this system is not necessarily one that many would use most would likely prefer the previous more balanced system because more balance extends battery life , the main reason for somebody choosing this arrangement would be to increase the volts high enough to power 48 volt appliances. Of course, you will be sacrificing some amps charging speed , and amp hours storage capacity , but if powering up to 48 volt appliances is want you want, you will accomplish this. Here is an example of four panels wired in series. With the series arrangement above, you can now power a 48 volt appliance, but you'll charge your batteries slower 3. Watts - Since we connected four panels together in series, this solar system will output w of power per hour maximum under optimal sunlight conditions. This is the same wattage as the previous 4 panel system and has an ok amount of power. You should start to notice some better energy savings now, however this set up has it's limitations. While this four panel series arrangement helps to tilt the scales in the voltage favor, it also decreases some other very important factors, that you may not want to give up. The choice is yours. The next solar power wiring diagram arrangement we'll look at consists of eight solar panels and a battery bank with eight batteries in it. With eight panels we clearly have enough of them to arrange them using a combination of series and parallel wiring. Here is an example of eight panels wired in a combination of series and parallel. Ok, now were making some better energy production. Our power is up, our load delivery is good and our storage capacity is good. Watts - Since we connected two groups of four panels together in series and parallel, this solar system will output w of power per hour maximum under optimal sunlight conditions. This is a good amount of power. This is a pretty good storage capacity. The next solar power wiring diagram arrangement we'll look at consists of sixteen solar panels and a battery bank with sixteen batteries in it. With sixteen panels we clearly have enough of them to arrange them using a combination of series and parallel wiring. Here is an example of sixteen panels wired in a combination of series and parallel. The is a great power reserve. Watts - Since we connected four groups of four panels together in series and parallel, this solar system will output w of power per hour maximum under optimal sunlight conditions. This is a great amount of power. This is a great storage capacity. You can now begin to enjoy some real energy independence. Now we'll look at the same sixteen panel solar arrangement as above, expect we will wire the panels and batteries together only in series. Although this system is not necessarily one that many would use most would likely prefer the previous more balanced system because more balance extends battery life , the main reason for somebody choosing this arrangement would be to increase the volts high enough to power volt appliances. Of course, you will be sacrificing amps charging speed , and amp hours storage capacity , but if powering up to volt appliances is what you want, you will accomplish this. Here is an example of sixteen panels wired in series. With the series arrangement above, you can now power volt appliances, but you'll charge your batteries slower 3. Watts - Since we connected 16 panels together in series, this solar system will output w of power per hour maximum under optimal sunlight conditions. This is the same wattage as the previous sixteen panel system and thus has a great amount of power. While this sixteen panel series arrangement helps to tilt the scales in the voltage favor, it also decreases some other very important factors, that you may not want to give up. But that's not all, we can now try grouping them differently, so we'll start by using four groups of eight. This arrangement will provide a better balance of volts and amps, instead of tipping the scales only to one side like with just straight series or straight parallel wiring. Here is an example of thirty two panels wired in both series and in parallel. Now were making some energy! Our power is good, our load delivery is up and our storage capacity is up. Watts - Since we connected thirty two panels together in series and parallel, this solar system will output w of power per hour maximum under optimal sunlight conditions. This is a pretty good amount of power and should be able to meet most of your energy needs. The only drawback is that you can't power volt appliances. If this is important to you, you'll have to use the next arrangement. The next solar power wiring diagram arrangement we'll look at consists of thirty two solar panels and a battery bank with thirty two batteries in it. We do this to raise the volts, this way we can power volt appliances. Unfortunately, this will reduce our charging speed amps and storage capacity amp hours. Although this type of wiring may put a little more stress on your solar system, the benefit is often worth it. After all, you can't get anything without a little bit of sacrifice. Here is an example of thirty two panels wired in series. Ok, that brought our volts up. However it slowed down charging speed and decreased our storage capacity a little. This is an acceptable storage

capacity. However due to the fact that we have a lot of panels to work with, the sacrifice is not that drastic. As a result, you get great power, pretty good charge speed and acceptable storage capacity, along with some true measure of real energy independence. Now that wasn't that hard, what is? Remember, if you use bigger solar cells to build your solar panels you can effectively raise most of the above values drastically and thus won't require such a big solar energy system to meet your specific power needs. This bigger your solar panels' output is, the less of them you have to join together. Now that you have reviewed every solar arrangement above and have some idea of how to build the size of solar system you'll need, click here to go back to the Wiring Solar Panels section in the exact spot you left off or just click your browser's back button. Related Posts:. Is it possible to have an off grid system that takes the ac directly from the inverter for use and also powers the charge controller to the batteries? This way you are only drawing off the batteries as needed mostly at night. It seems most diagrams show all the ac coming off the battery bank at all times. In your suggested scheme, there are two power converters in the path from Solar panels to the batteries, whereas in the other model that you mentioned, one power converter, i. The losses in the second power converter is avoided in the system. When you need AC, you need to make it, and inverter is needed here. Electricity from solar panels is conditioned by charge controller directly and sent to batteries. You ought to be a part of a contest for one of the greatest blogs on the net. I am going to recommend this site! You must have enough solar cells to charge the battery bank in one or two days of good sunlight and ,, I am not sure why you said 2pcs of ah12V battries in series. He needs batteres to supply the w loads for 12hours at night. Any one giving idea what will happen if wire is connected in only one part of solar pannel instead of connecting in 2part?? Regardless if it is connected to the charger. Parallel connecting can be done for a short period like jump starting a car. They can be connected serial and charge with a 24 V charger. Still problematic if one battery is much worse than the other. The best is to have two 12V charge controllers. Both batteries will be charged to their ability. Your email address will not be published. Electrical Technology 15 1 minute read. Show More. Related Articles. Electric Bill Calculator with Examples. I am doing it manually and it is possible that way but a real pain in the butt to manage. Leave a Reply Cancel reply Your email address will not be published. Check Also. What is a Solar Charge Controller? Close Search for. Adblock Detected Our website is made possible by displaying online advertisements to our visitors. Please consider supporting us by disabling your ad blocker. We depends on ad revenue to keep creating quality content for you to learn and enjoy for free. By: Author Nate Yarbrough. There are several options below to choose from. There are varying sizes of systems and this list is constantly changing and expanding to fit your needs. All of the diagrams below feature:. This video will show you how to best use this page. This diagram and parts list is perfect from ground-up electrical installs into campervans, skoolies, or expedition vehicles. This system is most suitable for systems that do not have a pre-existing house electrical system installed. This diagram and parts list is perfect for retrofitting solar and an upgraded inverter into a factory build OEM RV with 30A shore power. This diagram and parts list is perfect for retrofitting solar and an upgraded inverter into a factory build OEM RV with 50A shore power. This system is most suitable for systems that do have a pre-existing house electrical system installed. This diagram also shows how to wire multiple solar arrays through multiple charge controllers into the Lynx Distributor. This diagram also features full system monitoring through the Victron GX line of devices. This diagram and parts list is perfect from ground-up electrical installs into campervans, schoolies, or expedition vehicles. This diagram features high-performance wires, fuses, and fuse holders but chooses more budget-friendly components like Renogy, Aims, Kisae, or similar. This wiring diagram is a full guidebook for all of the 12V branch circuits like likes, fans, 12v outlets, USB outlets, 12V Refrigerators are other such devices commonly used in DIY Campers. This wiring diagram shows a typical 6-circuit V branch circuit wiring diagram that is commonly used in DIY Campers for V outlets, water heaters, air conditioners, and other high wattage devices. Not sure what size you need? Need Personalized Help? Sign up to our newsletter! I have a couple questions regarding the breaker I should use between the panels and the charge controller. Now, also according to your calculator it says that I can expect to see SO, with the potential of Does this seem correct? Thanks for your help. Nate Yarbrough, Interesting. Its five W panels in parallel. Newpowa model on amazon. Perhaps I listed something wrong using your handy calculator? I always shoot to have array amperages under 30A so I can simply use MC4 connectors, fuses, and a single breaker. This will likely mean wiring in series or series-parallel depending on the specific panels and number of panels you are trying to use. Dude I love your videos. That you have a sence of humor is appreciated. Im a dhmbass. Ive watched cou tless videos. Your the best at what ypu do. I just want more than i need if that makes sence. I have 2 currently bu may buy twp more watt panemls. No idea what size charge controller to get. Is amp hrs simply

shown on batteries? Love your channel and blogs! Looking to install my 1st solar system in my 5th wheel. Although I'm somewhat of an amateur, looking for clarification on programing. Currently have 2x 6v wet batterys series but get a little bit lost with "bulk, absorption and float" charging rates. I believe that these values would be different then that of 2x 12v in parallel? Have any in-depth information on this? Hi Nate,

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great write ups on solar. I recently purchased 2x 48v watt solar panels, I want to run on my rv. If parallel, could 10ga wire with mc4 connectors handle the combined panel current of I thinks the wire is rated for 40 amps. Also trying to find a cost effective mppt charge controller. Thoughts on controllers, parallel vs series? It'll be charging 4x 6v batteries in a 12v configuration. Will this be a mistake or problem down the road? I plan on subscribing to your monthly consulting service once the eqpt arrives and weather clears so that I can start building. Thank you! Click Here. Photo Credit: Click here to cancel reply. Nick Tuesday 16th of February Hey Nate, I have a couple questions regarding the breaker I should use between the panels and the charge controller. Nate Yarbrough Tuesday 16th of February Deloy Saturday 13th of February Brodie Friday 12th of February Justin Wednesday 3rd of February David Blood Tuesday 2nd of February Nate Yarbrough Tuesday 2nd of February Search for:.