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and also has an aluminium body which disperses heat quickly via its inbuilt cooling fan. This prevents the charger from overheating and causing damage to the battery. The battery charger comes with a full one year warranty and is small and compact measuring just 167mm (length) x 103mm (Width) x 50mm (Height). Fast chargingReverse polarity protectionInbuilt FanLong Term Battery MaintenanceDeep Discharge Recovery 5 year warrantyCompact size Mypipol is a brand that has been around for several years, and this battery charger is fully automatic and is compatible with an extensive range of vehicles and batteries (1.2Ah 192Ah capacity (Lead acid & AGM)). The battery charger has nine stages of charging, and the unit automatically detects the current condition and voltage of the battery. It then will diagnose, charge and recondition the battery while it also has an LCD which shows charging information. Additional features include reverse polarity, short circuit and open circuit protection plus the unit is also wall mountable. The charger is also suitable for start/stop vehicles, 9 stage charging cyclodiagnosis, charge and reconditionsSuitable for cars, 44s, vans, caravans, motorhomes and tractors.Suitable for batteries 1.2Ah 192Ah in capacity (Lead-acid & AGM)LCDReverse polarity ProtectionWall mountableShort circuit and open circuit protection The Noco battery charger gives you the ability to charge and maintain an array of vehicles, including cars, boats, trucks, RVs, and Lawnmowers. It is compatible with all types of 12-volt and 6-volt lead-acid batteries including gel, AGM & wet. The battery charger has monitoring and maintaining feature, so you dont have to worry about your battery being overcharged. You can just plug it in and return when you can. The battery charger also has spark-proof technology and reverse polarity protection. Also included is a five-year warranty and has an Intuitive visual diagnostic tool which can detect issues such as reverse polarity, low-voltage or damaged batteries. Maintenance mode to prevent overchargingCharges 6V & 12V lead-acid batteries (including AGM) and 12V Lithium.Intuitive diagnosticsEnergy-saving capabilitiesCompact sizeFive-year warranty Looking to buy a leisure battery charger for your caravan or motorhome? Here are some of the factors to consider. Its essential to consider the amp rating of the battery charger before making a buying decision. The peak amps is a measurement of the highest number of amps that a battery can produce within a single millisecond. This means that chargers that have a higher peak amperage can pull in more substantial levels of electrical current at a time without damaging itself. In summary, the higher the peak amperage this indicates that the charger is of greater quality. However, this doesnt signal the speed of the charging. Regardless of whether youve been using a battery charger for years or youre about to use your very first unit, youd still favour a charger that is quick and easy to operate. You must ensure that your unit comes complete with a user manual guide or at least has online videos that you can use to help. If youre a beginner, then it can be challenging to set up without these resources. The size of your chosen battery charger will be dependent on your expected use. For example, if you plan to transport it and have it with you at all times, then youll want to choose a compact and lighter version. However, if you plan just to keep it at home, then a larger version wont be a problem. In the past, the size of the charger was often a fair reflection of how much power it could produce. Times have changed, and technology has progressed massively, so even the smallest battery chargers can generate a large amount of amperage. If your battery charger has the jump-starting ability, then this can be a great addition. This feature allows you to jump-start your battery when its fully run out of power meaning there isnt enough power to cause the crankshaft to rotate, which then helps to start the engine. Generally speaking, the larger your vehicle engine, the higher the number of cold cranking amps your battery charger needs to be. Colder conditions can make it more challenging to jump-start your batter so a larger burst of electricity will be required. The best caravan battery chargers will have an automatic shut off feature so when the battery is fully charged it will automatically send a trigger than cuts the charge to stop overcharging. Overcharging can cause damage to the battery, and an inbuilt microprocessor controls the automatic shut off. This microprocessor can initiate multi-stage charging which ensures that the battery charges efficiently every time. Its essential to check whether your chosen leisure battery charger has this feature as it will extend the overall life of your caravan or motorhome battery. If youre on the move in your caravan and your battery dies, then you need a quick charge. Different batteries require different charging periods which can range anywhere from 2 to 12 hours. You also need to check compatibility with your chosen leisure battery monitor. High-quality chargers will charge your battery significantly quicker whereas portable chargers will usually be slower at charging because theyre smaller in size. So although smaller chargers are easier to transport, their charging output may be slower. The best leisure battery chargers often have numerous charging settings depending on your current needs. For example, if youre in an emergency where you need to quickly charge, then you can switch to its fast-charging setting. Although it isnt good to continually use the fast charging setting, it has its uses. Of course, ideally, youd always use the slow charge but if youre stuck on the side of the motorway then added charging functionality can save you a lot of hassle. The first thing you should consider is whether your chosen battery charger is compatible with your type of leisure battery. Some battery chargers can only be used with a specific type of battery depending on the voltages. Using the wrong charger can lead to a range of problems including faults, non-charging or slow charging. The simplest way to find out if your battery is compatible is by reading the instruction manual or checking on the battery/charger itself. Electronic goods are made with hundreds of components, and all it takes is for one of these components to develop a fault, and the whole unit may stop working. You need to ensure that you check whether your battery charger is supplied with a warranty as this will provide you with both peace of mind and product support if the unit becomes faulty. Warranty length varies from product to product but generally speaking, they will be no shorter than one year and can be valid up to a lifetime. It can often be more cost-effective in the long run to buy a more expensive charger that has a more extended warranty vs a cheaper charger with no warranty. Consider investing in a leisure battery box to protect both your battery and chargers. Buying a caravan leisure battery charger used to be an expensive outlay; however, with the advancement in technology this has done two main things; increased the number of features & decreased the prices. Even the best battery chargers will cost under 80-90 and have all the added features that you need to quickly and effectively charge your battery. Hi, Im Chris. About Me The leisure batteries in caravans or motorhomes perform a very important role. Whether you like to only use caravan sites with mains power or you go off-grid wild camping, you need your leisure battery to be performing well. You also need to think about winter. In the winter, you will likely be using your caravan or motorhome less or not at all. A portable battery charger for the leisure battery in your caravan or motorhome is an essential piece of kit. A good quality leisure battery charger for your caravan or motorhome is an essential piece of kit. Image Amazon.co.uk Disclaimer: Hey! By the way any links on this page that lead to products on Amazon or Caravan Guard are affiliate links, and I earn a commission if you make a purchase, with no additional cost to you! When I meet our guests, we often discuss various issues they have been having with their caravan or motorhome and how they addressed them. Something that is very evident is if you have a caravan motor mover, you really want to keep your leisure battery in tip-top condition. A good quality portable charger can assist with leisure battery maintenance and even recovery. With this post, Ill discuss the aftermarket built-in leisure battery charger options you could consider and portable leisure battery chargers. You can use the table of contents below to jump to a particular section: Want To Visit Horton Common? Book Here First, its probably a good idea to discuss the differences between the on-board battery charger in your caravan or motorhome and a portable leisure battery charger. The video below from practical caravan provides a good brief overview of the differences. This quick video from Practical Caravan explains the differences between onboard/built-in and portable battery chargers for caravan and motorhome leisure batteries. To quickly summarise the points made in the video above, a built-in leisure battery charger provides a maximum power of 13.8V, whereas portable leisure battery chargers will potentially provide up to 15V of power. Built-in leisure battery chargers have to provide power to the battery while 12V appliances are potentially in use. Therefore, built-in chargers dont provide an excessive amount of power which may damage those 12V appliances or lights. Whereas a portable leisure battery charger can provide more power to the battery. However, they should only be used when the battery is isolated from the 12V appliances. Quick Note: Recently, I also became aware of caravan fridge problems while towing related to battery charging from some Euro 6 engine vehicles. Before we discuss the various portable and built-in leisure battery options, we need to discuss how you actually check when your battery needs charging. Most caravans and motorhomes have either an analogue or digital voltage meter as part of the master control panel. However, you can also use a portable voltage meter to test the state of charge. The voltage reading the battery returns will indicate the state of charge. [table id=1 /] Now, ideally, to get the most accurate reading on the leisure batterys state of charge, you need to separate the battery completely from your caravan or motorhome. The reason being, even if you believe all your 12V appliances are off, there may still be something pulling power. For instance, security trackers do have their own small 12V batteries. However, when these batteries are empty or fail, they pull power from the main leisure battery. Therefore, ideally, before you test the voltage and state of charge, you will isolate the battery. Also, in an ideal world, youll want to check the state of charge once a month. Youll also be removing the leisure battery and using a suitable portable battery charger around once every six weeks. The most important points to remember are to not leave the leisure battery at a low state of charge as it can lead to damage. In the winter months, particularly, a leisure battery at a very low state of charge can even freeze! If that does happen, the leisure battery could be permanently damaged. Depending on the type of technology used in the leisure battery, the number of cycles it can withstand before failure varies. Furthermore, how deep the cycles typically are (how discharged the battery gets during use) will also dictate its usable life. Again as previously referenced, my post on leisure batteries covers cycle life and deep cycles. However, as a general rule, with the most common lead-acid leisure batteries, you dont want to let it discharge below 50% as this will cause damage (sulphation). Depending on how old your caravan or motorhome is, it will dictate how efficient and capable the onboard charger is at keeping your leisure battery in a healthy state of charge. Some people dont really regard the charger built-in to caravans and motorhomes as true chargers, as they rarely will take a leisure battery to its full state of charge. Typically older caravan and motorhome onboard built-in chargers will take the battery up to a maximum of 13.8V. More modern intelligent onboard built-in chargers will go higher, closer to 15V. Leisure battery technologies have advanced considerably over the last couple of decades. Therefore if you install a modern gel or lithium battery into an old caravan or motorhome youre probably not getting the best out of that battery. On the left is a typical example of an old onboard analogue dial battery charger which will go up to around an 80% state of charge. The example on the right is a more modern full digital onboard charger, which will go up to around a 90% state of charge. Image C&CC Therefore it is regarded as good practice to periodically connect the leisure battery in your caravan or motorhome up to a portable battery charger designed specifically for caravans and motorhomes. This will be able to take the battery up to its full state of charge and also indicate the condition of the battery. The first thing to mention with portable battery chargers, as referenced in the video above, is that different types of leisure batteries (standard lead-acid, AGM, Gel etc) prefer different rates of charge. Always check the rate of charge recommended by the battery manufacturer. If youre considering purchasing a new leisure battery, you can read my post on the different leisure battery types and their pros and cons. Check the manufacturers instructions for the recommended rate of charge for your specific leisure battery, as different battery technologies require different rates of charge. Depending on how much you are willing to spend, there are different types of technologies used in portable chargers for leisure batteries. Purchasing the cheapest charger for your caravan or motorhome leisure battery may be a false economy as it could lead to overcharging and damaging the battery. Open-cell lead acid leisure batteries are particularly vulnerable to overcharging, and it will lead to excessive off-gassing. If overcharging continues for an extended period of time, it can actually lead to whats called boiling dry. This is pretty much what it sounds like, where the water content of the batterys electrolyte leaves the battery. The plates of the leisure battery are then exposed, potentially leading to irreparable damage. Its also worth noting that while gel and AGM leisure batteries are valve regulated (VRLA) and do not vent off-gases to the same extent as an open-cell lead-acid battery, they will vent in an overcharging situation. Also, with a VRLA battery, its not possible to top them up with distilled water. Hence, the point is, overcharging any battery is a bad idea. The cheapest portable leisure battery chargers are typically categorised as unregulated chargers. Here the voltage can reach as high as 15V as the leisure battery reaches full charge. Being unregulated, there is nothing to drop the voltage as the battery approaches full charge, potentially leading to damage. So if you are going to go for basic unregulated battery chargers, you need to keep a close eye on the voltage of the battery and turn off the charger as soon as 12.6V (full charge) is achieved. The next step up from basic unregulated chargers is semi-automated products. This type of portable leisure battery charger monitors the state of charge. Therefore, once the set voltage is achieved, a semi-automated battery charger will turn itself off. Depending on the model and make, you may be able to set the turn-off voltage. For a standard open-cell leisure battery, the manufacturer may recommend charging up to 15V, for low-maintenance VRLA batteries (Gel and AGM), this may be lower at around 14V. Again, you should check the manufacturers recommendation for whichever leisure battery you have fitted to your caravan or motorhome. So the best and likely most expensive portable battery chargers for the leisure battery in your caravan or motorhome are fully automated products. Fully automated chargers are also sometimes referred to as multi-stage chargers. You can leave this type of charger permanently connected to your caravan or motorhome leisure battery without the risk of overcharging damage. Fully automated multi-stage chargers start with three stages, with some products having up to 8 stages. The first stage provides a constant current with a rising voltage up to the batterys maximum state of charge (Bulk Stage). Then the voltage remains constant while the current is steadily lowered (Absorption Stage). In the next stage, the voltage is dropped slightly, and the current is held steady (Float Stage). Now some chargers also have a Pulse Stage (more details on that below). A fully automated leisure battery charger for your caravan or motorhome will go through various stages up to a full charge. Image C&CC The best fully automated chargers will monitor the temperature of the leisure battery in your caravan or motorhome. The charger will frequently adjust the charging rate accordingly. For instance, using a lower current and voltage during colder conditions when the battery is more vulnerable to damage. During warmer temperatures, the charger will feed higher currents and voltages to the limit the user sets depending on the type of leisure battery. During pulse charging, both the voltage and current are frequently raised and dropped. Pulse charging can provide a couple of benefits. First, it can stop the self-discharge of the leisure battery. It can also help to prevent what is called stratification. Stratification is where sulphuric acid, which is part of the electrolyte in the leisure battery, sits idle at the bottom of the battery. This leads to corrosion issues within the battery. Pulse charging can effectively agitate the electrolyte to stop this separation from taking place. Along with pulse charging stages, some fully automated chargers also have stages referred to as soft-start and reconditioning modes. Sulphation occurs when lead sulphate forms on the battery plates during discharge. Now, if you leave a lead-acid battery in a discharged state for several weeks or months, this can cause lead sulphate crystals to form on the leisure battery plates. This will reduce the capacity of the battery and its usable life. The benefit of pulse charging a lead-acid battery is to destroy sulphate crystals which can aid in increasing usable battery life. Just to clarify, there are chargers with a pulse charging mode and pulse maintaining mode. Some chargers only have one of these modes, other portable chargers have both. Pulse charging uses higher currents and voltages than the pulse maintenance mode. The onboard built-in charger in your caravan or motorhome has its limits. Therefore, to take your leisure battery up to its full state of charge, you will need a portable charger. Another scenario where you will need a portable battery charger is when your caravan is in storage during the winter months. Some choose to have two leisure batteries which they alternate. They keep one at home, which they use a portable charger on while the second battery sits in the caravan. If you have a security system and tracker, you will need to have a leisure battery in the caravan or motorhome will go through various stages up to a full charge. 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They keep one at home, which they use a portable charger on while the second battery sits in the caravan. If you have a security system and tracker, you will need to have a leisure battery in the caravan or motorhome will go through various stages up to a full charge. Image Amazon.co.uk It currently benefits from a 4.5 out of a 5-star review on Amazon from 599 reviews. However, at only 1.2A its going to take quite a while to get a leisure battery up to charge. A typical 100Ah battery fitted in caravans and motorhomes in a low state will take around 100 hours. Currently, quite a popular product on Amazon, the Numax 12V 10A leisure battery charger is promoted as connect and forget. Therefore, referring to our discussion above on the different charger types, the Numax appears to be a fully automated charger. With stated features such as Fast Cycle Charge, Deep Discharge Recovery and Battery Maintenance modes. The Numax leisure battery charger appears to be quite a popular choice for caravans and motorhomes: Image Amazon.co.uk Reviewers on Amazon appear generally pretty happy with the chargers performance. Some specifically note the Numaxs ability to recover batteries. One review states the battery was recovered after it had been left idle for 2 years! Numax recommends their 12V 10A charger is best used for leisure batteries between 50Ah and 135Ah. It comes with a standard 12-month warranty. So in line with the title of this post, I think the CTEK MXS 10 is the best portable battery charger you can currently get for your caravan or motorhome. Its a fully automated 12V 10A charger. If you point a bit of research, youll see that CTEK are our established brand in the battery charger world. The MXS range is compatible with a wide range of different battery technologies and has dedicated reconditioning modes. Its pretty hard to argue against the CTEK MXS 10 not being the best portable battery charger currently available for leisure batteries: Image Amazon.co.uk CTEK claim that frequent use of the MXS 10 can extend a leisure batterys life by up to three times. Also, unlike the other chargers shown above, the CTEK comes with a 2-year warranty. Now, the CTEK MXS 10 is not the cheapest option, as you will see from the link above. However, they do also offer cheaper units using the same technology with either a 3.8, 5 or 7 amp output. The CTEK offers the best technology, and its also supported by over 2,000 reviews at 5 stars. Hence its hard to argue that the CTEK MXS 10 is not the best charger for leisure batteries currently available. So now we have covered portable battery chargers, its time to discuss battery-to-battery chargers. Currently, while towing, your leisure battery will receive a very minimal charge. Really, the car will just maintain the state of charge in the battery. It will add very little, if any, additional charge. If you want to upgrade the rate of charge, you will require a battery-to-battery charger. Youll also need some additional (thicker) cables which run from the car to the caravan battery-to-battery charger. More details in the video below: If you like to go off-grid wild camping where mains power is not provided, you could consider upgrading your onboard charger to a battery-to-battery charger A popular Battery to Battery charger is the BB1230 produced by Sterling Power Products (as seen in the video above): Image Amazon.co.uk So, in conclusion, I would recommend going for the CTEK MXS range of portable chargers. If you can afford the 10 amp version, that will give you the fastest rate of charge. However, CTEK also offers lower-priced/lower-amperage units. Whichever battery charger you use is important to follow the manufacturers instructions on the rate of charge. Sometimes, motorhome leisure batteries are located within the living space. If that is the case, before charging, make sure the battery is vented properly for off-gassing. I hope you found the above useful and that you learnt something new today about leisure battery chargers. I also hope, at some point in the future, you consider a visit to use our fully serviced pitches here at Horton Common. Want To Visit Horton Common? Book Here The service life of a leisure battery depends on how frequently it is discharged, how deeply it is discharged and how soon it is recharged. A battery kept in a good state of charge will last much longer than one left standing for weeks or months on end with a low state of charge. This Expert Guide will take you through the options for charging your battery and offer advice and guidance on care. The chargers generally fitted in caravans and motorhomes are not really battery chargers but power supplies designed to run the 12V equipment on board. As such they are not ideal for fully charging a leisure battery although the so called intelligent chargers introduced in the last few years are much better in this respect.Removing your leisure battery periodically and charging it with a good leisure battery charger will help keep it in tip top condition. The important thing with any rechargeable battery is to know when to recharge it, how fast to do so and for how long.Most leisure batteries use lead acid technology very similar to that used for car batteries. In time we may see the emergence of lithium-based batteries for this role but they are beyond the scope of this guide.It is also worth noting that lead acid batteries discharge through internal leakage, even when no load is applied. Some types are more resistant than others to this phenomenon but, as a rule of thumb, batteries in storage and not in circuit should be charged every three months or so.A lead acid battery will not perform well if it is completely discharged. Indeed to do this is likely to result in irreversible damage in the form of reduced capacity and in the battery's ability to hold on to a charge. Some types of lead acid battery (notably gel types) stand up better than others to this type of treatment but, as a rule of thumb, 50 per cent should be seen as the maximum level of discharge before recharging. In practice this means when the battery voltage level has fallen to about 12.4V as measured at the terminals with no load applied.Sulphationis a lead acid battery discharges lead sulphate forms on the plates. If a long time (i.e. many weeks or months) elapses before recharging the lead sulphate can begin to crystallise. This is bad news as it is difficult to reverse and can lead to a permanent reduction in the capacity of the battery. The effect is known as sulphation. Some battery chargers have modes that can avoid this and may be able to recover minor sulphation damage, see Pulse Charging below for more information.Some chargers can reverse minor damage caused by sulphation inside a lead acid battery.Leisure batteries are designed to provide low currents for long periods of time and then to be recharged relatively slowly. This is the opposite of a car battery which has to provide a very high current to start the car and then is very quickly recharged by the cars alternator.The rate at which a leisure battery is charged is therefore important. If time is not an issue, a charger rated at 4 or 5A should prove sufficient. It might take a day, or even two, to charge the battery fully, but generally speaking low slow charges are more beneficial than short fast ones. What is more, if you choose a fully automatic charger (sometimes known as a smart charger), you can leave it connected to the battery permanently without causing any damage.Before charging a leisure battery it is important to disconnect it completely so as to remove the possibility of something interfering with the charge.How long you charge a leisure battery will depend on its level of discharge and the type of battery. You can think of charging a battery as being a bit like getting a sponge to absorb water. If the sponge is just damp it will absorb water very quickly but, as it begins to saturate, the rate will drop off dramatically.As a completely dry sponge can struggle to absorb water, so a completely flat battery can struggle to absorb charge. If you are unlucky enough to be in this situation you need to be patient and wait an hour or two. Beware that, if you get the battery to recover, it will never regain its former performance. What happens when the battery becomes fully charged depends on the battery and the charger. If a charging current is still present it can turn the water in the electrolyte into hydrogen and oxygen. It is a process known as gassing and explains why naked flames are a bad idea near charging batteries.Gel and Absorbed Glass Mat (AGM) batteries are able to recombine these gases back into water, provided the charge rate is low enough. If it is not, the gases escape through specially-designed valves. That is why these batteries are known as valve regulated lead acid (VRLA).CO alarms and battery gassingCarbon monoxide (CO) alarms are now installed in many new caravans and motorhomes to detect poisonous CO gas. The sensors in such alarms are also sensitive to hydrogen so an apparent false alarm from a CO alarm for example the alarm sounding when no gas appliances or other potential sources of CO are around could indicate a problem with your battery. Types of Battery Charger The chargers fitted to older caravans and motorhomes only produce an 80 per cent charge in the leisure battery Intelligent chargers such as this one can achieve a 90 per cent charge although without on board kit in use the voltage drops back to 13.8V, as shown here. In time the battery will decay to an 80 per cent charge levelA battery charger is effectively a device that can output direct current at a voltage sufficient to overcome that of the battery such that current flows into the battery rather than out of it. Pushing current into the battery has the effect of reversing the chemical changes that take place as it discharges.InbuiltAs mentioned in the introduction the levelA chargers fitted to many caravans and motorhomes are really more like power supplies than true chargers. To avoid gassing over long periods the output voltage is set to 13.8V. This is enough to give the battery a charge of about 80 per cent. The idea is that the remaining charge can take place during the relatively short time spent travelling. Since about 2010 these chargers have been equipped with a so called intelligent function, which switches the output voltage from 13.8V to 14.4V whenever a set current is exceeded. A common trigger is switching on a water pump. This type of charger can achieve a 90 per cent level or more in the battery but only when the caravan or motorhome is in use. Inbuilt chargers generally have an output in the range 10 to 20A, depending on the rating of the equipment they have to power.Tip! Left in storage for months, albeit with the charger on, the leisure battery will eventually reduce to a charge level of about 80 per cent. That is why it is important to remove the battery periodically during long lay ups and to charge it with a good charger suitable for leisure batteries. Basic chargersThe simplest chargers provide an unregulated voltage that may rise as high as 15V or more as the battery becomes charged. This is too high for low maintenance and VRLA type batteries and may result in damage. Such chargers are only suitable for use under supervision. Many years ago these were the main type of charger available but advances in electronics mean that most chargers are now semi or fully automatic.Semi-automatic chargersThese chargers are designed to cut out once a certain battery terminal voltage has been reached. This voltage is about 14.4V for a low maintenance battery and 15.2V for a standard battery. The voltages are chosen to enable a full charge without significant gassing. Normally there is a selector switch so you can set the charger according to the type of battery. Smart, fully automatic chargersArguably the best chargers are the multi-stage automatic ones that may be left permanently connected without damage. The first stage is typically the constant current phase where a constant current is delivered into the battery until the terminal voltage reaches something in the region of 14.4V. The next stage is known as the constant voltage phase, where the terminal voltage is held at the same level while the current drops. This is normally held until the current being drawn from the charger equates to a figure of .05c or less where c = the Ah capacity of the battery. The best fully automatic chargers will also monitor the temperature of the battery and modify the charging regime accordingly, providing less energy when cold and more when warm, within defined limits. This system also provides overheat protection. When this figure is reached the charger then moves to the float mode where the battery is held at a constant voltage of about 13.6V. This helps preserve the state of charge of the battery.Three-stage chargers stop there but a four- or more stage one will move on to a maintaining mode after a period that may be many days. Here the voltage is allowed to drop and the battery is pulsed when a set level is reached. Short pulses help stop self discharge and also stratification a process whereby the electrolyte becomes denser at the bottom and less dense at the top. More sophisticated chargers such as those from CTEK may add other stages such as de-sulphation, soft-start and reconditioning. The one above can also charge different battery chemistry types such as lithium.Typical current and current curves for a multistage chargerPulse ChargingPulse charging uses high-frequency direct-current pulses as opposed to the usual direct current supplied by conventional chargers. The shape and amplitude of the pulses are carefully controlled such that high voltages can be applied without overheating the battery. In a lead acid battery these pulses are said to be able to break down any lead sulphate crystals and so extend battery life. While it is possible to find chargers working solely on the pulse principle, the pulse charging of lead acid batteries is often found as a stage of a multistage charger that will trip in if a sulphated battery is detected. It should not be confused with the pulsed maintaining stage of a multistage charger. This uses much lower frequencies and voltages.Off grid charging optionsThere are various ways you can charge a battery when you do not have access to mains power. These include portable generators, car alternators, solar power and wind power.Portable generatorsMost portable generators have a 12V DC output for battery charging. They can be a quick way of getting some power into a battery when off grid, but the normal lack of instrumentation means you do not easily know what the rate of charge or battery voltage really is.Portable generators are fine for short periods of charging but you may annoy your neighbours if you run them for any length of time due to the noiseA generator output suitable for battery charging Of course you can plug your caravan or motorhome into the 230V socket on the generator and charge the battery using the on-board power supply. However care is needed to ensure the generator has stabilised and is producing a steady output. A small load such as a 60W incandescent light bulb can help here. Failure to observe this may result in damage to the vehicles battery charger. Using your car's alternator One advantage of a motorhome is that you can charge the leisure battery by starting the engine and going for a drive, though this will only top-up the battery as the vehicle wiring only has a limited capacity. It is not quite so easy for caravanners, but you can have a second battery and charge it in the boot of your car as you drive around. To do this you will need to arrange for the battery to connect to the car via a relay which only operates when the engine is running and the alternator is producing power. It is not a difficult job to help you with this, if you would like to see the battery to prevent spillage and under no circumstances should a battery be charged directly into any of the cars 12V sockets. Another vehicle option is a battery to battery charger that will manage and redistribute the excessive charge going to the starter battery to the leisure batteries. They are often smart so can deal with different battery ages and maybe types of batteries. Speak to a battery and charging specialist to get the right combination to suit your needs.Solar Powered ChargersA solar panel can be an excellent source of power when off grid but it is not wise to connect the raw output of all but the smallest panels direct to a battery as overcharging could result. A solar panel designed for use with 12V batteries will be capable of producing voltages up to about 23V. When initially connected, this voltage will be dragged down by the load imposed by the battery but, as the battery charges, a point will be reached where the voltage becomes too high, resulting in damage to the battery. To prevent this, the output of the panel should be fed through a regulator, sometimes known as a charge controller.There are three types of regulator, each with its own level of efficiency. The most basic of these simply switch off when a set battery voltage is reached. Reconnection takes place when a second, lower, voltage is reached. The problem with this on or off arrangement is that the battery will not be fully charged when disconnection occurs as the unrestricted current running in from the panel may raise the battery voltage to an artificially high level. Also by the time the battery voltage has decayed to the lower set level the battery will have discharged somewhat. The bottom line is that the average charge level of the battery is unlikely to exceed about 85 per cent.The next level of solar regulators is that using pulse width modulation (PWM) technology. This solar display panel can show voltage, current, amp hours and other information on its screen. It works in conjunction with the charge controller shown hereThe amplitude, length and frequency of the current pulses are varied according to the level of charge in the battery. One that is low in charge will receive frequent, long pulses but as the charge level increases the pulses become shorter and less frequent. This latter phase acts as a trickle charge keeping the battery topped up during periods of excess solar energy.Better PWM solar chargers over simpler types include higher efficiency and more rapid recharging, together with improved battery performance and life. The most advanced form of solar charge controllers use a technology called maximum power point tracking (MPPT). These devices use complex algorithms to allow solar panels to operate at their maximum power for a given set of temperature and light conditions. This involves transforming power at the voltage best for the panel into power at the voltage best for the battery. In this way they use power that would otherwise be lost. An MPPT based charger can achieve average charge levels of 90 to 95 per cent in the battery. MPPTs are particularly effective in winter and on cloudy days when extra power may be needed the most.Wind PowerThe big advantage of wind power is that it can be available all the year round, both day and night. There is often also more of it in the winter, just when we need it. The downside is that wind is not a reliable source of energy and the equipment needed to harvest a worthwhile amount can be cumbersome to carry around. These make them more suited if you camp near the coast or on high ground.Just as with solar power some form of regulator is needed to prevent battery damage. Again, simple, PWM and MPPT types are available, with some able to handle solar and wind inputs simultaneously.Small multi-bladed wind turbines like this Rutland 504 are quiet and efficient at low wind speeds but are perhaps best suited to keeping batteries topped up rather than powering equipment!The requirements for the simple regulators are however somewhat different. Switching off the power when a set voltage is reached is not an option as removing the load from a wind generator can cause it to rotate at dangerously high speeds. Instead it is normal practice to switch the excess electricity into some form of load such as a resistor. As a bonus this may be used to heat water.Checking a battery charge levelThere are two principal ways of checking the state of charge of a lead acid battery. The first is to measure the voltage at the terminals with the battery disconnected. If you do not want to disconnect it you can try switching off all 12V appliances (do not forget the TV booster) but the chances are that you will not be able to do this. The second way is to measure the specific gravity of the battery acid. This is only possible for unsealed batteries and so rules out the most maintenance free, AGM and gel batteries. The specific gravity may be checked with a simple hydrometer, available from many car accessory shops.The specific gravity of the acid is generally a better guide to the state of charge of the battery and, of course, you do not have to disconnect it to take a reading. By checking each cell in turn it is also possible to see if any cell has a problem, evidenced by having a lower reading than the others. Hydrometer readings should not vary more than 0.05 between cells. A fully charged battery should have a specific gravity of about 1.27. A discharged battery should have a specific gravity of 1.1 or less.Useful tips Check the state of charge of your leisure battery at least once a month Recharge batteries as soon as possible after use Remove the battery for charging with a leisure charger every six weeks or so Always use distilled or de-ionised water for topping up never use tap water as it may contain minerals to contaminate the electrolyte Do not forget that a deeply discharged battery can freeze Always ensure any charger is suitable for the type of leisure battery you have i.e. standard, low maintenance, gel or AGM. Lithium batteries will be permanently damaged if topped up by a charger with a recondition or desulphate mode Read our Expert Guide on Batteries and their careGlossaryAGMAbsorbed Glass Mat. A type of battery where the electrolyte is contained in a glass mat sandwiched tightly between the plates.AhAmpere hours. A unit of measurement based on current in amps (A) multiplied by time in hours (h). It can be used to compare the capacity of one battery with another.Boiling dryA condition where the water content of the battery's electrolyte is lost through gassing such that the plates of the battery become exposed to the air. This typically occurs if a battery is over charged.Cycle lifeThe total number of charge/discharge cycles a battery can sustain before it needs to be replaced.Deep cycleA battery designed to be discharged to 50 per cent of its capacity or less before being recharged.ElectrolyteA liquid or gel which contains ions and can be used to conduct electricity.GassingThe evolution of gas from one or both of the electrodes in a battery. Gassing results from the electrolysis of water in the electrolyte during charging.Gel batteryA type of VRLA battery where the electrolyte consists of a gel, making it resistant to spillage and conferring some other advantages.MPPTMaximum Power Point Tracking. A technology used in some solar panel regulators to maximise the power transfer from a solar panel to its load, such as a battery under charge.PWMPulse Width Modulation. A technology whereby current is switched on and off in a series of rapid pulses of varying lengths. It is used in some solar panel regulators as a means to achieve constant voltage battery charging.Self dischargeA process by which a battery slowly discharges even with no load applied to it. It is caused by chemical changes within the battery.Trickle chargingA type of charging where a fully-charged battery is subjected to a small constant current equal to the battery's rate of self discharge, thus enabling the battery to remain at its fully charged level.VRLAValve Regulated Lead Acid battery. A low maintenance battery where any charging gases should recombine into water but can be safely vented if they do not.

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