Battery University

BU-302: Series and Parallel Battery Configurations

BU-302: Configuraciones de Baterías en Serie y Paralelo (Español)

Learn how to arrange batteries to increase voltage or gain higher capacity.

Batteries achieve the desired operating voltage by connecting several cells in series; each cell adds its voltage potential to derive at the total terminal voltage. Parallel connection attains higher capacity by adding up the total ampere-hour (Ah).

Some packs may consist of a combination of series and parallel connections. Laptop batteries commonly have four 3.6V Li-ion cells in series to achieve a nominal voltage 14.4V and two in parallel to boost the capacity from 2,400mAh to 4,800mAh. Such a configuration is called 4s2p, meaning four cells in series and two in parallel. Insulating foil between the cells prevents the conductive metallic skin from causing an electrical short.

Most battery chemistries lend themselves to series and parallel connection. It is important to use the same battery type with equal voltage and capacity (Ah) and never to mix different makes and sizes. A weaker cell would cause an imbalance. This is especially critical in a series configuration because a battery is only as strong as the weakest link in the chain. An analogy is a chain in which the links represent the cells of a battery connected in series (Figure 1).

Figure 1: Comparing a battery with a chain.
Chain links represent cells in series to increase voltage, doubling a link denotes parallel connection to boost current loading.

A weak cell may not fail immediately but will get exhausted more quickly than the strong ones when on a load. On charge, the low cell fills up before the strong ones because there is less to fill and it remains in over-charge longer than the others. On discharge, the weak cell empties first and gets hammered by the stronger brothers. Cells in multi-packs must be matched, especially when used under heavy loads. (See BU-803a: Cell Mismatch, Balancing).

Single Cell Applications

The single-cell configuration is the simplest battery pack; the cell does not need matching and the protection circuit on a small Li-ion cell can be kept simple. Typical examples are mobile phones and tablets with one 3.60V Li-ion cell. Other uses of a single cell are wall clocks, which typically use a 1.5V alkaline cell, wristwatches and memory backup, most of which are very low power applications.

The nominal cell voltage for a nickel-based battery is 1.2V, alkaline is 1.5V; silver-oxide is 1.6V and lead acid is 2.0V. Primary lithium batteries range between 3.0V and 3.9V. Li-ion is 3.6V; Li-phosphate is 3.2V and Li-titanate is 2.4V.

Li-manganese and other lithium-based systems often use cell voltages of 3.7V and higher. This has less to do with chemistry than promoting a higher watt-hour (Wh), which is made possible with a higher voltage. The argument goes that a low internal cell resistance keeps the voltage high under load. For operational purposes these cells go as 3.6V candidates. (See BU-303 Confusion with Voltages)

Series Connection

Portable equipment needing higher voltages use battery packs with two or more cells connected in series. Figure 2 shows a battery pack with four 3.6V Li-ion cells in series, also known as 4S, to produce 14.4V nominal. In comparison, a six-cell lead acid string with 2V/cell will generate 12V, and four alkaline with 1.5V/cell will give 6V.

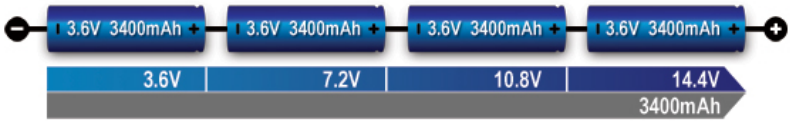

Figure 2: Series connection of four cells (4s).
Adding cells in a string increases the voltage; the capacity remains the same.
Courtesy of Cadex

If you need an odd voltage of, say, 9.50 volts, connect five lead acid, eight NiMH or NiCd, or three Li-ion in series. The end battery voltage does not need to be exact as long as it is higher than what the device specifies. A 12V supply might work in lieu of 9.50V. Most battery-operated devices can tolerate some over-voltage; the end-of-discharge voltage must be respected, however.

High voltage batteries keep the conductor size small. Cordless power tools run on 12V and 18V batteries; high-end models use 24V and 36V. Most e-bikes come with 36V Li-ion, some are 48V. The car industry wanted to increase the starter battery from 12V (14V) to 36V, better known as 42V, by placing 18 lead acid cells in series. Logistics of changing the electrical components and arcing problems on mechanical switches derailed the move.

Some mild hybrid cars run on 48V Li-ion and use DC-DC conversion to 12V for the electrical system. Starting the engine is often done by a separate 12V lead acid battery. Early hybrid cars ran on a 148V battery; electric vehicles are typically 450–500V. Such a battery needs more than 100 Li-ion cells connected in series.

High-voltage batteries require careful cell matching, especially when drawing heavy loads or when operating at cold temperatures. With multiple cells connected in a string, the possibility of one cell failing is real and this would cause a failure. To prevent this from happening, a solid state switch in some large packs bypasses the failing cell to allow continued current flow, albeit at a lower string voltage.

Cell matching is a challenge when replacing a faulty cell in an aging pack. A new cell has a higher capacity than the others, causing an imbalance. Welded construction adds to the complexity of the repair, and this is why battery packs are commonly replaced as a unit.

High-voltage batteries in electric vehicles, in which a full replacement would be prohibitive, divide the pack into modules, each consisting of a specific number of cells. If one cell fails, only the affected module is replaced. A slight imbalance might occur if the new module is fitted with new cells. (See BU-910: How to Repair a Battery Pack.)

Figure 3 illustrates a battery pack in which “cell 3” produces only 2.8V instead of the full nominal 3.6V. With depressed operating voltage, this battery reaches the end-of-discharge point sooner than a normal pack. The voltage collapses and the device turns off with a “Low Battery” message.

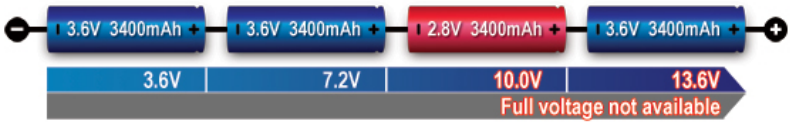

Figure 3: Series connection with a faulty cell.
Faulty cell 3 lowers the voltage and cuts the equipment off prematurely.
Courtesy of Cadex

Batteries in drones and remote controls for hobbyist requiring high load current often exhibit an unexpected voltage drop if one cell in a string is weak. Drawing maximum current stresses frail cells, leading to a possible crash. Reading the voltage after a charge does not identify this anomaly; examining the cell-balance or checking the capacity with a battery analyzer will.

Tapping into a Series String

There is a common practice to tap into the series string of a lead acid array to obtain a lower voltage. Heavy duty equipment running on a 24V battery bank may need a 12V supply for an auxiliary operation and this voltage is conveniently available at the half-way point.

Tapping is not recommended because it creates a cell imbalance as one side of the battery bank is loaded more than the other. Unless the disparity can be corrected by a special charger, the side effect is a shorter battery life. Here is why:

When charging an imbalanced lead acid battery bank with a regular charger, the undercharged section tends to develop sulfation as the cells never receive a full charge. The high voltage section of the battery that does not receive the extra load tends to get overcharged and this leads to corrosion and loss of water due to gassing. Please note that the charger charging the entire string looks at the average voltage and terminates the charge accordingly.

Tapping is also common on Li-ion and nickel-based batteries and the results are similar to lead acid: reduced cycle life. (See BU-803a: Cell Matching and Balancing.) Newer devices use a DC-DC converter to deliver the correct voltage. Electric and hybrid vehicles, alternatively, use a separate low-voltage battery for the auxiliary system.

If higher currents are needed and larger cells are not available or do not fit the design constraint, one or more cells can be connected in parallel. Most battery chemistries allow parallel configurations with little side effect. Figure 4 illustrates four cells connected in parallel in a P4 arrangement. The nominal voltage of the illustrated pack remains at 3.60V, but the capacity (Ah) and runtime are increased fourfold.

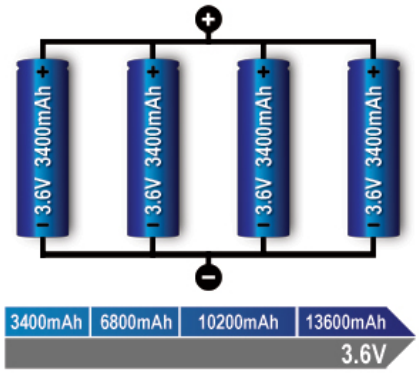

Figure 4: Parallel connection of four cells (4p).
With parallel cells, capacity in Ah and runtime increases while the voltage stays the same.

Courtesy of Cadex

A cell that develops high resistance or opens is less critical in a parallel circuit than in a series configuration, but a failing cell will reduce the total load capability. It's like an engine only firing on three cylinders instead of on all four. An electrical short, on the other hand, is more serious as the faulty cell drains energy from the other cells, causing a fire hazard. Most so-called electrical shorts are mild and manifest themselves as elevated self-discharge.

A total short can occur through reverse polarization or dendrite growth. Large packs often include a fuse that disconnects the failing cell from the parallel circuit if it were to short. Figure 5 illustrates a parallel configuration with one faulty cell.

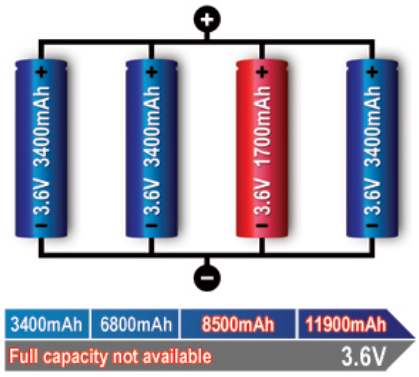

Figure 5: Parallel/connection with one faulty cell.
A weak cell will not affect the voltage but provide a low runtime due to reduced capacity. A shorted cell could cause excessive heat and become a fire hazard. On larger packs a fuse prevents high current by isolating the cell.

Courtesy of Cadex

Series/parallel Connection

The series/parallel configuration shown in Figure 6 enables design flexibility and achieves the desired voltage and current ratings with a standard cell size. The total power is the sum of voltage times current; a 3.6V (nominal) cell multiplied by 3,400mAh produces 12.24Wh. Four 18650 Energy Cells of 3,400mAh each can be connected in series and parallel as shown to get 7.2V nominal and a total of 48.96Wh. A combination with 8 cells would produce 97.92Wh, the allowable limit for carry on an aircraft or shipped without Class 9 hazardous material. (See BU-704a: Shipping Lithium-based Batteries by Air) The slim cell allows flexible pack design but a protection circuit is needed.

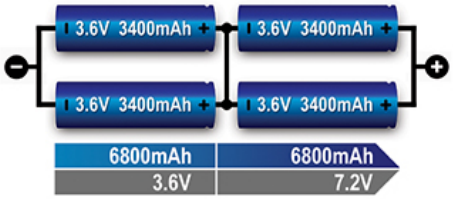

Figure 6: Series/ parallel connection of four cells (2s2p).
This configuration provides maximum design flexibility. Paralleling the cells helps in voltage management.

Courtesy of Cadex

Li-ion lends itself well to series/parallel configurations but the cells need monitoring to stay within voltage and current limits. Integrated circuits (ICs) for various cell combinations are available to supervise up to 13 Li-ion cells. Larger packs need custom circuits, and this applies to e-bike batteries, hybrid cars and the Tesla Model 85 that devours over 7000 18650 cells to make up the 90kWh pack.

Terminology to describe Series and Parallel Connection

The battery industry specifies the number of cells in series first, followed by the cells placed in parallel. An example is 2s2p. With Li-ion, the parallel strings are always made first; the completed parallel units are then placed in series. Li-ion is a voltage based system that lends itself well for parallel formation. Combining several cells into a parallel and then adding the units serially reduces complexity in terms of voltages control for pack protection.

Building series strings first and then placing them in in parallel may be more common with NiCd packs to satisfy the chemical shuttle mechanism that balances charge at the top of charge. “2s2p” is common; white papers have been issued that refer to 2p2s when a serial string is paralleled.

Safety devices in Series and Parallel Connection

Positive Temperature Coefficient Switches (PTC) and Charge Interrupt Devices (CID) protect the battery from overcurrent and excessive pressure. While recommended for safety in a smaller 2- or 3-cell pack with serial and parallel configuration, these protection devices are often being omitted in larger multi-cell batteries, such as those for power tool. The PTC and CID work as expected to switch of the cell on excessive current and internal cell pressure; however the shutdown occurs in cascade format. While some cells may go offline early, the load current causes excess current on the remaining cells. Such overload condition could lead to a thermal runaway before the remaining safety devices activate.

Some cells have built-in PCT and CID; these protection devices can also be added retroactively. The design engineer must be aware than any safety device is subject to failure. In addition, the PTC induces a small internal resistance that reduces the load current. (See also BU-304b: Making Lithium-ion Safe)

Simple Guidelines for Using Household Primary Batteries

- Keep the battery contacts clean. A four-cell configuration has eight contacts and each contact adds resistance (cell to holder and holder to next cell).
- Never mix batteries; replace all cells when weak. The overall performance is only as good as the weakest link in the chain.
- Observe polarity. A reversed cell subtracts rather than adds to the cell voltage.
- Remove batteries from the equipment when no longer in use to prevent leakage and corrosion. This is especially important with zinc-carbon primary cells.
- Do not store loose cells in a metal box. Place individual cells in small plastic bags to prevent an electrical short. Do not carry loose cells in your pockets.
- Keep batteries away from small children. In addition to being a choking hazard, the current-flow of the battery can ulcerate the stomach wall if swallowed. The battery can also rupture and cause poisoning. (See BU-703: Health Concerns with Batteries.)
- Do not recharge non-rechargeable batteries; hydrogen buildup can lead to an explosion. Perform experimental charging only under supervision.

Simple Guidelines for Using Secondary Batteries

- Observe polarity when charging a secondary cell. Reversed polarity can cause an electrical short, leading to a hazardous condition.
- Remove fully charged batteries from the charger. A consumer charger may not apply the correct trickle charge when fully charged and the cell can overheat.
- Charge only at room temperature.

Last updated 2019-06-18

*** Please Read Regarding Comments ***

Comments are intended for "commenting," an open discussion amongst site visitors. Battery University monitors the comments and understands the importance of expressing perspectives and opinions in a shared forum. However, all communication must be done with the use of appropriate language and the avoidance of spam and discrimination.

If you have a suggestion or would like to report an error, please use the "contact us" form or email us at: BatteryU@cadex.com. We like to hear from you but we cannot answer all inquiries. We recommend posting your question in the comment sections for the Battery University Group (BUG) to share.

- Shipping Lithium-based Batteries by Air
- How to make Batteries more Reliable and Longer Lasting
- What causes Lithium-ion to die?
- Safety of Lithium-ion Batteries
- Recognizing Battery Capacity as the Missing Link
- Managing Batteries for Warehouse Logistics
- Caring for your Starter Battery
- Giving Batteries a Second Life
- How to Make Batteries in Medical Devices More Reliable
- Possible Solutions for the Battery Problem on the Boeing 787
- Impedance Spectroscopy Checks Battery Capacity in 15 Seconds
- How to Improve the Battery Fuel Gauge
- Examining Loading Characteristics on Primary and Secondary Batteries

Language Pool

- BU-001: Compartir conocimiento sobre baterías
- BU-002: Introducción
- BU-003: Dedicatoria
- BU-104: Conociendo la Batería
- BU-302: Configuraciones de Baterías en Serie y Paralelo

Batteries in a Portable World

- Change-log of “Batteries in a Portable World,” 4th edition: Chapters 1 - 3
- Change-log of “Batteries in a Portable World,” 4th edition: Chapters 4 - 10
- Close Part Three Menu

Comments (474)

On November 6, 2010 at 10:22am

aamir liaqat wrote:

if two batteries are connected in parallel and they have different voltage ,so which one voltage will be shown on AVO meter, and merits and demerits

On November 12, 2010 at 4:00pm

Jason wrote:

I wish there was a way to quickly identify a bad cell from a laptop battery pack. Often it is only 1 bad cell causing a laptop battery to only charge to 80% or 85% or whatever. Sadly they are always spot-welded together in parallel groups of 2 or 3 forcing you to destroy the nickel sheets holding them together if you want to find the faulty cell.

On November 24, 2010 at 4:16pm

Larry wrote:

Dear Sir.,
I wonder you can help me in the below query.
Given a DC circuit with two 5-volts batteries and two resistors ,1 and 2 ohms respectiverly
araanged in series' in which the 1 ohm resistance is connected between the two batteries. What is the total resistance and emf of the araangements
Thanls
Larry

On November 28, 2010 at 10:55am

Mike TerWisscha wrote:

I have a hunting shack that I power with a 12v deep cycle battery. Would it help conserve power if I have a disconnect switch at the battery to stop leakage from wires when I turn the lights off at night? Is it better to drain one deep cycle first than hook the next one up or hook both up at same time?
Thanks
Mike

On November 29, 2010 at 7:28am

Sandy wrote:

Aamir - The voltage would be the lower of the two, as current would flow from the battery with the higher potential to the one with the lower potential. This would in fact “charge” the second battery. For this reason if you are using non-rechargeable batteries it is important to replace all cells at once.

As for the one battery at a time or both at the same time, my answer to Aamir may help… If the two batteries are fully charged and at the exact same voltage, then there's no difference. But if one's a little lower than the other then some energy will be wasted while the batteries equalize. It's not much but if you're trying to squeeze everything out of the cells as you can, it's something to think about.

In my mind your answer comes down to a matter of convenience vs knowledge… If it's a pain to wire these in then do it once and get it over with. If not then I'd do it one at a time this way once the first battery's dead you know you're on the second battery. Think of it as a primitive fuel gauge.

On December 9, 2010 at 10:30pm

Bhargava wrote:

I have my car battery, which is reading only 10V. Can I supplement this with another battery of 2V (of same rating) in series with this 10V battery, and continue using it? Is it feasiblible for a moving vehicle? and If it is possible , please suggest any specific measures to be followed.

On December 10, 2010 at 8:03am

ryan wrote:

no you can not. you will blow the battery up. charge the battery with a 20 amp car charger and read it then if it still reads 10 volts, get a new battery. but the car should be able to start with voults above 10v. so ide say to charge it first.

On December 10, 2010 at 8:07am

ryan wrote:

@jason: you can spot if you have a bad cell. voltage meter on the 2 ending terminals on the battery. one on the left terminal, one on the right. you can only spot IF you have a bad cell battery.

On December 11, 2010 at 6:29am

moin wrote:

best site

On December 17, 2010 at 10:35am

Dana du Toit wrote:

I have a question for you. If i have a 24v system with 4 12v batteies (series and then in parralel to get 24 v) with a load of 18watts. will it be worth wile to run 4 12 v batteries in parralel to get more amp hours out of the system? the load can handle voltage from 12-60 volts.

On December 22, 2010 at 4:07am

rasoul wrote:

Hi I am an Iranian student project I made for my university needs to build a car battery charger circuit (car) Vjryan output voltage display on the LCD please help me I can just fast Batshkr site Khvbtan 22/12/2010 Email me najafkhanirasoul@yahoo.com

On December 22, 2010 at 4:12am

rasoul wrote:

Hi I am an Iranian student project I made for my university needs to build a car battery charger circuit (car) Vjryan output voltage display on the LCD please help me I can just fast Khvbtan Batshkr site today 22/12 / 2010 is my email najafkhanirasoul@yahoo.com Those who are on this site to me they have requested. D John Please anyone who can help you love

On December 26, 2010 at 4:46pm

Rich wrote:

I have a small radio transmitter that sends brief pulses twice a second. It's in a limited access space. It currently runs on a 300 mah, 3v lithium primary coin cell which gives a lifespan of two years. I need to up the lifespan to 5 years minimum, but I don't have room to put in a thicker coin cell, nor go to a cylindrical battery. But I do have room to add more 300 mah primary cells. Theoretically I can put three of the 300mah, 3v coin cells in parallel, and achieve over 5 years of battery life by doing so. Is there any reason that wouldn't work or any other factor I should take into account?

On January 13, 2011 at 1:25pm

scott wrote:

I'm thinking of putting three 6 volt baterys together will i be abole to get 12 volt.If not what can i do to get more running time from my battery bank.

piyush shekdar wrote:

if two batteries are connected in parallel and they have different voltage ,so which one voltage will be shown on multimeter

On January 27, 2011 at 7:26pm

Jakal wrote:

Can 2 deep cell batteries (12v) of different amperage (say 100 and 80) be connected in parallel and charged with a solar panel in a camper? If your answer is no, what is the rational of why not?

On February 3, 2011 at 11:28pm

Kolin wrote:

Great Site,
I will be building a 12v battery pack, I have 20 new matched Powerizer 4500 NiMH cells.

I was thinking I would place 10 in series and then 10 in parallel to produce a battery system with 12v and 45,000 mAh.
Is my math correct? Ten 4500 mAh in parallel would be 1.2 v 45,000 mAh, but if I add the second set of 10 in series, would I also add the 4,500 mAh from that set to total 49,500 mAh?

Many Thanks

On February 14, 2011 at 3:53pm

otmishi wrote:

What about the coverning formulas. I thik for series it should be like nV=I(R+n.r)/n and for Parallel nV=I(R+n/r). Is this orret

On February 26, 2011 at 11:27pm

krishna wrote:

if we are connected battries in parallel,the life time is some of two r one.

On February 28, 2011 at 2:43pm

Dickson Hatia wrote:

This site is the best place to be. Thnx

On March 10, 2011 at 2:44am

Peter wrote:

Is it possible to connect 6 12 volt batteries so as to deliver 48 volts output? Can you have two sets of two in parrallel, then connect these parrallel connected ones in series with the other two and thus get 48 volts total, or will this wreck the charging and discharging rates of the two standalone ones?

On March 12, 2011 at 10:07am

Brian wrote:

@Kolin

No, that's not right at all.

20 batteries @ 1.2V and 4.5 A
To get to 12 V you need 10 in series giving 12 V @ 4.5A
Do this twice and place the two sets of 12 in parallel, you get 12V @ 9A.

You overall battery capacity Wh, can not exceed the sum of the individual pieces.
20 batteries @ 1.2 V and 4.5A = 5.4 Wh per cell or 108 Wh total.
The same above, 12V @ 9A = 108 Wh.

On March 15, 2011 at 3:50am

Lawrence wrote:

I was wondering if anyone could clarify this. If you had a 10v battery in parallel with a 5v battery. what would be the voltage of the circuit.

On March 23, 2011 at 7:40am

Can i connect 12V and 24V ups with two 12V batteries connected in series, as we do get 12 volts and 24 volts when two batteries are connected in series.

On March 28, 2011 at 3:33pm

BWMichael wrote:

There is a mistake at the end of this article. It says

“Remove fully discharged batteries from the charger. A consumer charger may not apply the optimal trickle charge and the cell could be stressed with overcharge.”

I think this is meant to say “Remove fully CHARGED batteries from the charger….”

On May 5, 2011 at 5:33am

annette wrote:

this is a good site. very informative.

On May 9, 2011 at 10:56am

rohit wrote:

sir
Its equivalent ckt

On May 11, 2011 at 11:28am

Heza Mahmoud wrote:

if i’ve four cells in serie connection, how is it possible to measure the voltage or monitor each voltages where there are no the same grounded point?

On May 11, 2011 at 5:44pm

Lance Edwards wrote:

Hi, can two 12vdc batteries of different Ah, (110ah / 50ah), be connected in parallel for increased Ah capacity (160). To be charged by 100W Solar PV panel via 15A solar charger regulator for leisure use, ie caravan. Many thanks, Lance.

On May 14, 2011 at 10:43am

Iqbal wrote:

Any one can help me to configure a battery bank for solar power system. With 2V each battery what is best way to get required 8500AH. I mean number of battery and each battery AH ?

On May 28, 2011 at 9:40pm

Chuck wrote:

If I have 2 RV deep cycle 12V batteries in parallel, can I place a charger on one of them, and get adequate charging on both?

On May 30, 2011 at 10:46pm

tanmay sengupta wrote:

how i get 12v dc using 3.7v li-on cells.what will be the connection.

On June 5, 2011 at 8:16am

anne wrote:

Can I use 4 rechargeable batteries and i non-rechargeable one in a 5 battery recorder?

On June 6, 2011 at 1:58pm

Clinton Wilson wrote:

Hey, just wanted to say thanks! Great information. I’m glad I found this site.

On July 10, 2011 at 9:21pm

I have two 12v deep cycle batteries in parrell. Doe one drain before the other or do they both drain equally?

On July 13, 2011 at 8:30am

Benedict wrote:

I just want to know if what happens if one cell(Battery) in placement is reversed in series and parallel?

On July 15, 2011 at 3:17am

ihab wrote:

we want to buy 400 Battery 1.25V , 5A/H ,NI/CAD , Dimentions : 35mm . 35mm . 82 mm

On July 21, 2011 at 11:32pm

Julius wrote:

I have 8 12v deep cycle batteries to be connected to an 24V inverter. I know that I need to connect 2 together (+ -) to get 24V. What would be the correct way to connect these 4 cells to the inverter.

On August 1, 2011 at 2:26am

David wrote:

I have 3 12v X 16aH batteries i want to connect? Since i want to increase the wattage and amperage, can i connect these 3 batteries by series and parallel?

On August 12, 2011 at 4:28am

navneet gupta wrote:

can i add eight 7volt lithium batteries of cameras to get 56V?? what be the result?? is it risky to try that? i need a 50v source for my project… pelase help..

On August 18, 2011 at 5:52am

ferd wrote:

There should be a disclaimer warning that this article is overly simplified and does not account for many problems that can occur in the field. Some of the statements are wrong if taken literally. “On charge, the low cells fill up before the strong ones” is not true if the low cells have high internal resistance. “most battery-operated devices can tolerate some over-voltage” needs to be more clearly defined - while a few tenths of a volt might not matter, tens of volts could fry things. “A higher voltage has the advantage of keeping the conductor size small” is misapplied: for a particular power output, higher voltages allow smaller current flows which in turn allow smaller conductors (ignoring start-up surges and increasing current draw as batteries lose voltage as they deplete). “Parallel/connection with one faulty cell A weak cell will not affect the voltage” actually the weak cell can draw enough current from the good cells to lower the overall voltage of the connection. “The serial/parallel configuration shown in Figure 5 allows superior design flexibility” but also increases complexities of battery management and system troubleshooting immensely.
The article then jumps to tips about household batteries without explaining the difference between primary and secondary batteries, nor this section’s relevance to the previous discussion.

I realize that you are attempting to present technical information to a lay audience, but please be careful. The confusion shown in the comments proves that this article hasn’t achieved its goals.

On August 22, 2011 at 8:50am

stephen wrote:

all cells will drop performances after certain cycles of charging and discharging. If you use cells from same produciton lot, it is likely that no particular one single cell will break down while others still working in very good condition, however, It is also likely that each cell will drop performance slightly different as time gone.
As a result:
1. one cell totally fail while others still working properly seldome happen;
2.. it is certain that each cell will have slightly different capacity after certain time.

As a result, in series will give better engineering result than in parallel.

On August 22, 2011 at 12:22pm

Virian Bouze wrote:

I would like to know just how volitile the lithium polymer battery is and how can i process the use of this kind of battery. thanks Virian

On September 2, 2011 at 11:04pm

a new type of lithium cell that is flat (not round) with the two contacts sticking up on top. How are these flat cells physically connected together? I think we may be able to assemble batteries with these flat cells that will save space.

On September 3, 2011 at 1:09am

BWMichael wrote:

Lynn: You would connect them in the same way (spot weld tags onto the contacts)
I hope this helps

On September 9, 2011 at 12:10pm

joe wilson wrote:

I run 2 interstate 4d deep cycle batteries in parrallel, via, power invertor to power machinery in my work van. recently the power invertor as well as the batteries, crapped out, i tested the batteries and they were shot. the power invertor was sparking and smoking, so i replaced that. It's a 2500 watt invertor. replaced one battery so far, the other is on order. however the alarm on the invertor goes off immediatley and i'm unable to run machinery. is keeping the old battery connected in parrallel with the brand new one causing this? i went for six years, no problems then the batteries died(which i expected) the invertor crapped out and now i can't seem to get it running again.

On September 12, 2011 at 4:16pm

Richard Maier wrote:

I need to run 4 twelve volt batteries in parallel. is there a way to connect a battery charger and charge all the batteries at once without disconnecting them?

On September 13, 2011 at 2:21pm

mike sharpe wrote:

I am interested in this "4S2P, meaning 4 cells are in series and 2 in parallel." mentioned in the beginning of the article.

This is my understanding, please help me fill in the blanks though.
(A) if I run 4x1.2v 1800 mah in series I get 4.8v 1800 mah.
(B) if I run 2x1.2v 1800 mah in series I get 2.4v 1800 mah.
(C) if I run (A) and (B) in parallel I will get 3600 mah, and I hope 4.8v (?)

This idea of doubling the output time without having to double the number of batteries is compelling.

Will this be a safe configuration for Ni-MH AA's? would I need some "insulating foil"? How would this portion work?

I really enjoyed the article, and am looking forward to hearing a response to my query.

Thanks.

On September 24, 2011 at 10:53pm

suhas wrote:

I have 800 kva APC ups, what type of rating batteries to be conected and how many nos of batteries to obtain full load, please give formula to calculation .

On September 27, 2011 at 12:50pm

Kiptum wrote:

What will be the electromotive force forTwo battery cells 1.5V each connected in parallel to one cell 1.5V.
Thanx.

On October 7, 2011 at 8:30pm

Jimmy Wilson wrote:

Learning about primary cells atm and they say never to connect cells of different types, why is that and does that rule comply with secondary cells???

On October 13, 2011 at 8:00am

Gurumurthy wrote:

Dear sir ,
I have 1 no of 12 V battery and two solar panel its rating is 17V +17 V . please let me know the connections? sires or parallel connection is use full?

sir there are two batteries one is 5v second is 10v . when we use parellel combination of batteries and connect with a network then it shows inregular circuit why?

On October 19, 2011 at 5:00am

Muhammad wrote:

I constructed a 12v battery charger bt is getting heat too much. What is the problems?

On November 4, 2011 at 9:38am

Lawrence R Crim wrote:

Ok, here's one for you. I need to wire 6 12volt batteries together to get 24volts and triple amps (3 bats. parallelled twice then seriesed together). Easy enough, however, I also need to be able to wire a 12 volt starter to the same system. Anyone got a clue? I've tried the manufacturer's web site (Tronair ground power units) to no avail. I've called and left messages and no calls back. I've tried several configurations, no luck. Anyone?

On November 4, 2011 at 11:23am

Joe wrote:

lawrence have you tried taking a measurement with a voltmeter off of the positive and negative terminals of one battery while all the batteries are hooked together? your setup should be like figure 5 of this page but instead of two batteries down your setup has three down and two across. right?

On November 8, 2011 at 4:35pm

aung wrote:

I have 12V 12AH battery only one.
I want to get 2V 72AH output to load.
Please advise properly connection for it.

On November 9, 2011 at 3:39am

Garrett wrote:

Running an approximately 3HP winch Motor off a 12V Deep Cycle Marine Battery. The winch is being used in a way that it runs for 40 seconds, off for a bit then runs again. We use a rapid battery charger hooked to a portable electric generator. Having problems occasionally where the batteries lose there charge and motors start to overheat. Would I be better to run 2 12V Deep Cycle Marine Batteries in parallel? Are there any drawbacks to doing this? Thanks

On November 19, 2011 at 8:54am

ogbu abraham wrote:

how does the contact points of
batteries connected in series add to the resistant of the circuit.

On December 5, 2011 at 8:22pm

G.Suresh wrote:

Can any one clarify my doubt. If the UPS DC Input is +192 -0- -192, Current at both +ve and Negative limb should be equal or need not. Suppose if we provide Current sensor to measure the discharging Current Do we need to put the sensor in both arm seperately or not?

On January 4, 2012 at 8:36am

CharlieN wrote:

I recently purchased a lot of rc helicopters . 12 of them actually . My friends and I are in the process of weekly helicopter wars . Although we can only fly 3 at once it is a lot of fun ! Problem is , I am eating up 'AA' batteries like crazy . My question is : What is the ac to dc equivalent of 6 AA in series ? I would like to cut out the AAs altogether and use one of my many adapters connected to the + and - terminals on the charger/remote with out damaging the charger/remote and/or the 3.7v 70mAh in the helicopter itself . Any help would save me midnight runs to the drug store to buy AAs . The clerks must think I'm a Smurf !!

On January 10, 2012 at 9:13pm

Andrew Darlow wrote:

flights!). I think you might see as much as 4x more flight time as well based on my tests of compact photo flashes. I can't say for sure if you will get the same performance, but it is definitely worth a try.

Keep in mind that they are heavier than most Alkalines, which may be an issue. You can check the specs on various websites.

All the best,

Andrew Darlow
Editor, The Imaging Buffet
http://www.imagingbuffet.com

On January 11, 2012 at 1:10pm

Bill wrote:

I do night work in the oil field and am trying to build a battery powered light that I can attach to equipment from job site to job site, and charge while in the truck. A 12-18V, 6W LED will serve my purpose. I will have AA batteries connected in series to supply approximately 12V. My question is in regards to charging. Can I simply connect the 12V battery pack in parallel to charge the batteries or will the amperage get too high and cause the batteries to explode? Could I avoid such circumstances by making a battery pack to supply a higher voltage, such as an 18V Li ION or NiMH battery pack. They would never reach an over-voltage during charge, but would they still be subjected to too high an amperage? I realize that they would never reach a full charge, but since it is simply a light that requires 12V I don't think that would matter would it?

On January 11, 2012 at 2:55pm

Andrew Darlow wrote:

Hi Bill:

I personally would just buy AA or AAA LSD NiMH batteries (Eneloop brand are my favorite, though there are others), and a 12v or 120v plug-in charger for them to recharge (they need about 3-5 hours to recharge - avoid 30 min and 1-2 hr chargers since they will limit the life of the batteries).

Then charge them in sets and put 4 AA's or 3 AAA's in a flashlight (depending on model) like this one from Harbor Freight (you can buy 3-4 of them and have a huge amt. of light). The light is very bright.
http://www.harborfreight.com/3-1-2-half-inch-21-led-flashlight-98503.html

or this one sold on Amazon.com that takes 3 D cells:
http://www.amazon.com/AMAZING-95-LED-Aluminum-Flashlight/dp/B000Z7GCRS/

or this lantern:
http://www.amazon.com/Rayovac-SE3DLN-Sportsman-300-Lumen-Lantern/dp/B0018S4XIS/

You can get convertors from D's that use AA's:
http://www.amazon.com/Sanyo-Eneloop-Spacer-Pack-Packaging/dp/B003EJ1QL6

Rechargeable D cells have about 5-10 times the capacity (mAh) of AA's, so check the est. run time with alkalines and divide by about 5-10 to determine how many hours you will get from them.

Hope that helps,

Andrew

Andrew Darlow
Editor, The Imaging Buffet
http://www.imagingbuffet.com

On January 26, 2012 at 9:49am

Bill Heintz wrote:

In Figure 5: Serial/Parallel connection of four cells.

Is there an Advantage/Limitation to connecting the Cells in the middle as well?

For instance if there was a weak Cell in Figure 5, would it make any difference if the was a connector in the middle?

On February 7, 2012 at 7:46am

Ron satt wrote:

I need to charge a separate battery on my motorcycle for nightly use in a campground to power my cpap machine. It would be discharged nightly and needs to be recharged daily thru the motorcycle charging system. Should i connect Series or parallel ? Thx

On February 7, 2012 at 2:47pm

Tiger R. wrote:

I have a question about running multiple 12V batteries in parallel. They are all the same type, brand, voltage, and amperage. 12V @400a If I had 10 of them in parallel that would give me 12V @ 4000a. Since this is DC current what gauge wire is appropriate between each of the battery posts?

Any other useful information is very welcome. Oh, and these are gel-cell PureLead batteries.

On February 8, 2012 at 4:11pm

Andrew wrote:

What causes the battery voltage to rise when you hoo batteries up in series? Does it change the lines of electricity (electric field)?

On February 17, 2012 at 7:44pm

Steve wrote:

HI guys! I have a battery that is totally screwed! It's a 4CGR18650A2-MSL as seen here - http://www.batteries-laptop.co.uk/batteries.php?productcode=951

I'm considering doing a rebuild but i'm confused about the voltage per cell. Everywhere seems to have 3.7v cells but if it's only a 14.8V battery, surely i only need 1.2v cells each?

Which way do i go? Where do i turn? What would you suggest i do if i was to do a rebuild?!!

As you may have guessed, i'm a bit new to all of this so any assistance you can provide me is really welcome and i'm thankful for it

Many thanks in advance, Steve

On February 24, 2012 at 1:59am

Nova wrote:

same doubt as that of Andrew:
What causes the battery voltage to rise when you hoo batteries up in series? Does it change the lines of electricity (electric field)?

On March 4, 2012 at 6:57am

sahil wrote:

thax!!!!!!

On March 4, 2012 at 7:25am

Uganda Safari wrote:

this is a great site for one to be and learn more

On March 14, 2012 at 6:34am

brad wrote:

hello, new to this so bear with me! for an EV kart i have the option of 24, 3V cells at 120Ah in series giving me 72V and 120Ah, costing and weighing a considerable amount more than if i had 24, 3V cells of 40Ah connected in packs of 8 in parallel and 3 packs of the parallel batteries connected in series to give me less cost and weight for the same 72V and 120Ah. does this sound feasable to do? are there any disadvantages to using series/parallel

On March 18, 2012 at 12:12pm

prathamesh wrote:

deer sir i have 5V &0.7A from 9V battery

On March 19, 2012 at 11:45am

Martin Roules wrote:

I am connecting four AA batteries in series to power some LEDs. I need 300 mA, which is LESS than the combined amps this configuration will supply. How do I get to 300 mA? What do I have to put in-line to control the amps?

DashaButts wrote:

Tnx.

On April 2, 2012 at 1:35am

bowgey wrote:

i want to build 7.2volt battery with 2400 mAh. so i need 18battery with spec 1.2volt and 800 mAh. is it true?

On April 2, 2012 at 1:35am

bowgey wrote:

i want to build 7.2volt battery with 2400 mAh. so i need 18battery with spec 1.2volt and 800 mAh. is it true?

On April 6, 2012 at 8:23pm

NobleKattalistt wrote:

I am looking to buy one of the Evolve 2012 Xenons (Tron light bike replica). It runs on an electric motor, fueled by a 96v 120ah LiFE PO4… The maximum operation, per charge, on the battery in the bike is only 30 minutes. If I were to fabricate room for 1-2 extra PO4's, would the addition in current cause damage to the motor? Also, would the charge time incrementally or exponentially increase?

On April 6, 2012 at 8:33pm

NobleKattalistt wrote:

The previous post, of course, refers to me wanting to add the new cells in parallel in order to increase the per charge use of the motorcycle. Sorry, I got completely sidetracked mid-post and forgot that part.

On April 11, 2012 at 12:24pm

Peter Hogben wrote:

I am lloking to construct a battery bank using 12v leisure batteries for my static caravan and have 2 questions
1. The voltage must remain the same (12V) but I would like to increase the overall Amps, I am thinking Parrallel configurstion is this correct?
2. Does each battery have to have the same AMP? I currently have 2 rated @ 120amps each and am looking to purchase 2 more that are rated @110 amp. Is this configuration okay to use?

On April 13, 2012 at 12:40am

zoren wrote:

if you are goin to connect the battery in parallel connection ye sit will increased the overall amps. in my opinion its better to use a battery with the same rating. using battery with different ratings could overheat the other battery with small ratings.

On April 30, 2012 at 12:38pm

Marco wrote:

Hi,
I'd like to make a battery for my ebike (36V10Ah) with li ion cells.
the cells are 3.6V 2.2Ah.
Is it right to make series first and then parallels? So N.5 parallels of 36V2.2Ah or is better N.10 series of 36V2.2Ah?
Thank's to all!

On May 16, 2012 at 8:24am

carston55 wrote:

PLEASE HELP..

I have a 2 12Vs in series to run a 24V motor

I also want to run a stereo and other 12V unit off of these batteries, can i tap into each individual battery and run 24V and 12V system at same time? or will one battery drain at a diiferent rate and is this a problem

On May 16, 2012 at 10:16am

MARK WILSON wrote:

packs to make and of what capacity each. The laptop bats. are 11.1 volts and 6.6 amp hours apiece. The scooter comes stock with one 48 volt/ 12 amp hour bat. that gives me about 12-15 mile range and takes 6 hours to charge. The laptop batteries are stated to have 11.1 volts, but are they likely 14.4 volts in actuality? This information is important as it will help me to decide whether to link 4 of them in series(bringing the pack to 44.4 volts and under the required 48 volts, potentially) or linking 5 of them in series(bringing the pack to 55.5 volts and safely within range of the stock battery voltage without being under). If they are actually 14.4 volts though——4 in series would more than suffice without being too high in voltage @ around about 58.4 volts(which is what the charger puts out,- at 2 amps.. 5 bats linked @ 14.4 volts would be too high a voltage to be fully charged by the charger, I think, but would it still put out the higher voltage but with less overall capacity? That would likely cause me to waste battery potential while adding excess weight to the scooter.—OR——at worst case scenario, damage the electronics and/or the 1000 watt motor due to excessive voltage. Maybe it is time for me to own a multimeter. I loved finding this site!! Good stuff.

On May 27, 2012 at 1:52pm

Tausif wrote:

hello,
i want to make a battery pack from several mobile batteries using Li-Ion 3.7V for my RC CAR that uses 8 AA 1.5v cells.
actully i have few mobile batteries which is of no use so i thought to use it in my RC car.
please help me with this problems,

1)how i should connect those batteries with each other (parallel or in series?)

2)I also have a ac / dc universal adaptor so can i use it for charging, if yes then tell me which current should i use ac or dc?
and my rc car has a charging port in which my adaptor fits perfectly.

please help me with this i shall be really thankfull to you…=)

On June 22, 2012 at 8:58pm

Gorzideudeus wrote:

So, I have two 12 volt, 9.5 ampere-hour rechargeable battery packs. Putting them in parallel would result in more amperage, but still at 12 volts? I am using this to build a stereo system.

On June 23, 2012 at 3:38am

alphalee wrote:

hello I am wondering if I take two cellular phone batteries and take them apart and rebuild them in Parallel will that give me more mah? the batteries in question are http://www.ebay.ca/itm/New-Battery-LG-P990-Optimus-G2X-2X-Extended-Door-T-mobile-3500-MAH-/170854215958?pt=PDA_Accessories&hash=item27c7b47116#ht_500wt_1396 these ones for my phone? will that work or will it just waste the battery and if it does work will it keep the voltage at 3.7 but double my mah?
thanks in advance!

On June 29, 2012 at 7:23am

ajay wrote:

hi i need make 48v , 10 to 15 amp battery pack can i use LiFePo4 batteries 3.2v, 15 cells in series. 1cell has 1200mah. ? if not how many cells and volt and amp i need to use. please replay on my email address thanks.

On July 7, 2012 at 11:30am

winston duffney wrote:

HI YOUR INFO. WAS VERY HELP FULL .QUESTION I HAVE A 750WT WINDMILL AND 60C
CONTROLLER ,A1500 WT PURE SINE WAVE INVERTER 3THEE 4O WT SOLAR PANELS,
WITH INDIVIDUAL CHARGE CONTROLLERS , HOW TO HOOK UP THEM IN SERIES .

1. DO I MAKE THE CHANGE TO THE 12 VOLT BATTERIES TO SIRES ONLY.

2.OR ?

On July 9, 2012 at 11:02am

davecardin wrote:

A lot of people asked questions, but where are their answers?
I was waiting for the question to be answered about the 80AH and 100AH batteries in parrallel. I have the same problem, or no problem.
I bought for my new solar system all the batteries in the city (Nicaragua has little to choose from in DEEP CYCLE battereis), 6 were 105 AH and 2 were 60 AH. That's all they had, so I bought them thinking that they are all 12 V just different hours of output.
I've been told that "IN SERIES" they would burn up the smaller "60 AH" during charging, but "in parallel" it doesn't matter. I don't need 24V so only in parrallel would this combo help me, but I would feel better knowing from a different source, because the next time they get batteries, it could be a 200 AH, which I would prefer, but I don't want to throw away or just inventory the NEW but smaller ones I've already purchased, that's over a $1000 in this 3rd world country.

Amitabh wrote:

@ajay - Your config. will generate 48V theoritically (Open Circuit)... As far as the current requirement is concerned it will depend upon your load, and the C- rating of the LiFePh battery pack u're using.
Generally the continous C rating of Li phosphate batteries is around 20C and it can go upto 40-50C for Burst ratings. Implying that you can safely use it for the range of 10-15 amperes as specified by you.

In short your config should work without any problem.
Hope this helps..

On July 13, 2012 at 12:32pm

Amitabh wrote:

@nova & andrew : Regarding the electric field, if you are asking whether the electric field inside the batteries increase then i don't think so, cause the voltage diff across the terminals of each cell remains the same (actually it will change slightly depending upon the voltage drop across the internal resistances of the cells).. Maybe smne from chemistry background can comment about this better, regarding what actually goes on inside the cell.

As far the overall circuitry is concerned, then yeah the electric field inside the conductor carrying the current, does indeed increase. This is mainly due to the increase in small amount of charge that gets deposited near the surface of the conductors, which in turn guides the flow of the electrons through it.

On July 25, 2012 at 1:14pm

solarguy wrote:

OK here's the problem:

A solar panel puts out 36Volts.

This will charge 3 Car batteries placed in a series, after the regulator.

Now, there are many 12v inverters, 36v inverters are harder to come by.

Can I take the leads from the three 12volt batteries in parallel while they are still hooked to the panels in series, and attach them to a 12 volt inverter?

Would a car voltage regulator for each battery be able to replace a solar charge controller?

On August 5, 2012 at 12:52am

Eddy Jacobsen wrote:

Wooooh!!! Here are so many new things to learn and consider…..
I have just wired up many car and mower batteries (all 12 V, in parallels) for lightening up the house with LED, and also ventilation fans - and now I see that the current increases twice for each added battery.
Question is; Will this be bad for the LED lamps and ventilation fans?

But this is very interesting, and I understand I have a lot to learn; I have always resorted to manuals before as the last resort, but I see now that is a good idea to use manuals/advices in the first place..

On August 9, 2012 at 2:28am

anesh wrote:

if few batteries are connected in series then why one of them get charged earlier than others?

On August 14, 2012 at 7:29am

Johan wrote:

Hi I am building My own bicycle light with 2 powerleds 2 resistants of each 1 ohm. To power My light i have calculated usling 3 R6 in series to get correct voltage. I found a batteryholder with powerswitch for 4 R6. Now to My question… What Would happen if the fourth battery Would be placed in parallell with the 3 in series? Would it add to added Ah? Or Will it not work at all? I could keep 4:th empty…

On August 15, 2012 at 5:20am

Pranabesh Dutta wrote:

Dear Sir,
I have 2 batteries in series and each of them are 7.2 Ah. What is the current rating of each batteries?

On August 22, 2012 at 5:32am

Daniel wrote:

Pranabesh - if you understand what an ampere/hour is then you'll understand what 7.2Ah means.
Your batteries can supply upto 7.2A for 1hr. Halve the current needed to double the life of the battery - 3.6A for 2 hrs, 360mA for 20hrs etc.
Johan - you should be restricting the current flowing through the LEDs, not the voltage across it. Just ensure your resistors are sufficient value to limit the current to the maximum allowed for the LEDs you're using. I'd also say use 4x batteries for greater capacity (life) and adjust your resistor values to only allow for example 20mA to flow through the LEDs for your 6V supply.
Solarguy - that sound's risky like you may end up shorting a car battery - this is a massive no no as a car battery can flash fry any size spanner you have in your tool box, even the big ones!
Yes, I did say flash fry and that's if you're lucky…if you're unlucky, it'll just explode in your face!
I'll respond to more later.

On August 27, 2012 at 2:23am

Johan wrote:

Hi ! Thank you Daniel for your reply!
I Liked this forum, so i fire a new query.
If I Would like to get maximum light out of My powerleds, without geting to much heat…
Could I somehow use a 555 to create a pulse modification faster then the blinc of an eye?
My leds consume 350mA each, powered by 4AA in series, resistants not yet calculated.
Max drive is 500mA, but I was thinking of oscillating 400mA / 0mA to save battery. Would that be doable, or is There a better (and inexpensive) way?

On September 2, 2012 at 4:08pm

Julian wrote:

What's really scary about the serious ignorance shown in many of these comments is not the level of ignorance itself which is understandable, but that nobody seems to know how much they don't know. People have lost the ability to know when they are out of their depth. Is it the internet, does everyone think they can do anything? It's a big worry and I sympathise with those who lay the blame with the post-modernist idea that 'everyone is equal, so everyone's opinion is worth as much as anyone else's regardless of their training, experience or skill'.

Once upon a time people knew that they didn't know about electronics or electrical theory, now everyone just thinks they know enough apart from a few questions they might need to put on the internet.

Most of the questioners here should not touch a battery until they've increased their knowledge a great deal. That's what schools, universities and books are for.

On September 2, 2012 at 10:58pm

Johan wrote:

Dear Julian… I thought this site was Called battery academy… Not electricians ego place. Do you honestly think that people shouldnt be allowed to put a battery and a led together without proper education? People like me Who has a good job and no intentions to start school all over again needs a hobby. I can and will do that with succes after a while, with or without guys like you. Let people who knows and whants to share knowledge post comments in forums. May i remind you about Steve Jobs (r.i.p) WHO dropped out of school and started experimenting. I Would say he succeded fairly well. Before commenting on My bad language skulle… I am from Sweden. Any comments about that I Would prefer in Swedish (yes There are schools for that as well My friend) best regards Johan

On September 3, 2012 at 12:34am

Julian wrote:

I agree with you - I've no problem with people improving their skills and knowledge at all of asking questions on forums, which is why I mentioned books. What I'm saying is that people do need to understand the limits of what they know and choose what they attempt to match their capability. Many of the questions here show people who are so far out of their depth they represent a danger to themselves and others not to mention to the gear they are playing with. Also if you don't know what you don't know you can't learn properly. We should all learn and experiment, but we should also understand and respect what we don't know.

On September 3, 2012 at 2:13am

Daniel wrote:

Johan - A 555 timer or some form of PWM signal to control the LEDs will reduce heat as the LED won't be on 100% of the time…that said, it won't be any brighter either as it's not on 100% of the time.
Perhaps experiment with duty cycles eg 70% on/30%off timing. That might give you sufficient light output without overheating.
Maybe even 90/10 will work…hard to say without experimenting.
Julian - I fully agree that many people don't know they're out of their depth but that said, there's only one way to learn. I'm always happy to help where I can but with something dangerous, I will make sure they know the risks like my comment on a car battery above. I've seen a 13mm spanner vanish into a cloud of smoke and sparks. There wasn't much left of the car battery either…

On September 10, 2012 at 8:51pm

ABDUL SHAHEED M wrote:

I HAVE 2 BATTERIES ONE IS 5V AND ANOTHER ONE IS 10V. IF I AM CONNECTING THESE IN PARALLEL WHAT WILL BE THE TERMINAL VOLTAGE?

In above fig 4 it says the voltage will be 10. but SANDY in fifth comment says it will be lower vpltage?

On September 10, 2012 at 9:05pm

ABDUL SHAHEED M wrote:

I have conducted the experiment using two power supplies it proved that the voltmeter shows the reading of 10 v.(higher voltage)

On September 11, 2012 at 2:17am

Daniel wrote:

Abdul - Regardless of the what you measured, you should never have 2 batteries of differing voltages in series or parallel.
Putting a 10v in parallel with a 5v will effectively force current backwards into the 5v battery risking leaking or possibly it could blow up (chemical composition dependant).
There's a reason on every single pack of batteries and battery powered equipment that they state "never mix 2 different type of batteries or mix new with old" as it's dangerous to your product and mostly to your person.
Using power supplies isn't the same as using batteries for your information as they probably have reverse voltage diode protection…something a battery doesn't, hence why you measured 10V. Use batteries and you'll see around 7-8v (at a guess)...as well as seeing the 5v battery heat up and leak due to the 10v battery effectively charging it.
Stick with the same batteries, same type and same voltage to ensure safety and correct operation.
I hope that helps.

On September 12, 2012 at 10:32am

bigblue1 wrote:

This question is about an electric vehicle.What is the best wiring diagram to meet the cars 240 volt 70 Amp service. If each battery pack has a voltage of 30 volts and 35 amps and there are 16 battery packs. How would I wire the batteries to meet this criteria.

On September 13, 2012 at 2:13am

Daniel wrote:

30v x 8 = 240v so you'd want 8 batteries in series for one bank.
16 batteries will give you two banks of 8.
Simply put those 2 banks of series batteries in parallel with each other.
I'll try and show it in a diagram…B is the battery, - is a series connection, [and] are parallel connections.

```
        [B-B-B-B-B-B-B-B]
terminal 1——[               ]——terminal 2
        [B-B-B-B-B-B-B-B]
```

That's the most efficient method of achieving a 240V output across terminals 1 and 2.
The current required (70A) will simply dictate the duration the batteries will last for…although if it's for an electric vehicle, you won't be using it until the batteries are flat so working out the useful duration might be easiest by simply building and testing it.

I hope that's clear enough. Text based diagrams are't great

On September 17, 2012 at 7:19am

Bruce Jenkins wrote:

If I have a 60ah vehicle battery that has 500 cranking amps and put it in parallel with another one, will the cranking amps increase to 1000?

On September 18, 2012 at 2:32am

Daniel wrote:

In parallel yes it will effectively increase it's cranking amps capability. In theory it should increase it to 1000A but due to losses it might be slightly less than this.
Also depends on battery quality/age/use etc.

On September 18, 2012 at 4:12am

Bruce Jenkins wrote:

Thank you very much Daniel.

On September 29, 2012 at 10:47am

MIKE wrote:

I HAVE AN 05 PRIUS AND A FRIEND OF MINE CAME A APON A USED BATTERY CAN I HOOK THE TWO BATTREIES UP WITH LEADS FROM POS. TO POS. AND NEG TO NEG.WILL THIS GAIN ME MORE BATTERY USAGE AND CAN IT HURT ANYTHING MIKE

On October 1, 2012 at 2:18am

Daniel wrote:

Pos to Pos, Neg to Neg is how to connect a second battery in parallel, which is what you'd want.
However, it's only worth doing ideally if the batteries are of the same manufacturer and model…but same ratings will suffice providing it's in good condition…assuming the original is also in good condition.
Connecting a new battery in parallel with an old one won't damage anything but it will hide the true performance of either battery ie you may not realise one of your batteries needs replacing as the other will still supply power.

Id say connect them up as intended but it might be worth taking them off one at a time say once a year and charge them on a separate mains powered charger with a battery quality/health indicator so you know which battery is going strong and which is failing.

On October 5, 2012 at 12:38am

Aziz Jiwani wrote:

I have few questions, kindly help

1. What is the ideal way of discharging two Li-ion batteries connected in series? Is it okay if I do it with resistor bank or a constant current source is required.
2. I tried discharging batteries (two batteries connected in series) through resistor bank (series combination of four 10 ohm, 5W resistor). Initial voltage on the batteries was 4.15v and 4.18v respectively. After discharging it for two hours, I noticed that one batteries are showing unequal voltage 3.5v and 2.5v respectively.
What can be possible reasons behind this?

On October 5, 2012 at 2:38am

Daniel wrote:

1: I can't answer for sure but I don't see any problem with using a resister network.
2: It sounds to me like one of those 2 li-ion batteries isn't in as good a condition as the other, hence it's lower post-drain voltage.
I'm not that famiuliar with li-ion batteries characteristics but here's something interesting I found on wiki:
Self-discharge rate of approximately 5-10% per month, compared to over 30% per month in common nickel metal hydride batteries, approximately 1.25% per month for Low Self-Discharge NiMH batteries and 10% per month in nickel-cadmium batteries.[47] According to one manufacturer, lithium-ion cells (and, accordingly, "dumb" lithium-ion batteries) do not have any self-discharge in the usual meaning of this word.[35] What looks like a self-discharge in these batteries is a permanent loss of capacity (see Disadvantages). On the other hand, "smart" lithium-ion batteries do self-discharge, due to the drain of the built-in voltage monitoring circuit.
If one of your li-ion batteries is old, then its capacity could be reduced hence why the voltage reduces sooner in one than the other.
Other than that, it could be a setup issue…but from what you describe, I doubt this.

On October 5, 2012 at 2:43am

Aziz Jiwani wrote:

Thanks Daniel for the reply.
I have informed manufacturers regarding the same issue and they feel that something is not correct with the setup. According to them batteries are fine as they have sent me fresh sample batteries.

On October 5, 2012 at 2:57am

Daniel wrote:

Hmm…well without knowing your exact setup (descriptions can only go so far), I don't think I can help.
Apologies and I wish you the best of luck tracking down the issue.

On October 5, 2012 at 2:48pm

Bob wrote:

I have a solar powered LED pole lamp and would like to increase the operating time. Can I wire 2-2500mah 1.2 Ni-Mh AA batts in parallel, and then feed that output into 3 more 1.2V-2500mah 1.2V AA batts wired in series to get 4.8V @5000 mah ?
Or am I asking for a failure ?

On October 6, 2012 at 6:08am

Bob wrote:

OK, no comments yet, so maybe I figured it out myself ?
I think I will need to connect a total of 8 AA batteries, that is to say, 4 pairs , with each pair connected in parallel as well as in series with the other pairs
so the total voltage stays at 4.8V but the current rating will go up to 5000 mah

Sound better ?

Daniel wrote:

I only reply to this site when i'm at work. I don't work weekends…apologies.
Mixing up batteries in series and parallel can be very risky.
It's often considered a better method to stick with either series or parallel and ensure one of your requirements is more than you need.
SImply wiring 4x 1.2v in parallel will give you the 4.8v you need. As each of them is 2500 mAh, your total will capacity will be greater than 5000mAh meaning the light will stay on longer.
It's never an issue to have more capacity than you need as the device you're powering will simply last longer.
As 4.8v is achieved and greater capacity…it's a win-win situation.
Any questions?

On October 8, 2012 at 2:50am

Daniel wrote:

No ignore that…monday morning is never good…
4x 1.2v in series is 4.8v
If you must…run (4x series) - in parallel with a second 4 in series

On October 8, 2012 at 5:16am

Bob wrote:

Thanks Daniel. Would I simply tie the outputs (+) to (+) and (-) to (-) from each (parallel and serial) together or is there a different way?

On October 8, 2012 at 5:43am

Daniel wrote:

I don't fully understand what you mean.
+ to + and - to - for a parallel connection.
+ to - for series.
Wire it like this if this makes sense:

(- 1.2v + / - 1.2v + / - 1.2v + / - 1.2v +)
- connector { } + connector
(- 1.2v + / - 1.2v + / - 1.2v + / - 1.2v +)

"- 1.2v +" is one battery

I hope that makes sense.

On October 8, 2012 at 7:29am

Bob wrote:

Check me on this please: both rows of serial connected batteries (4 per row outputting 4.8V each row of 4 , that is 1.2+1.2+1.2+1.2=4.8V) and the last + of each row (at that 4.8V output) gets connected together to make the final positive pole (also totaling 4.8V), while the last - of each row get connected together to make the final negative pole ? Or do I cross-connect either row & if so, how ? Just not understanding the - connector and + connector you show in the middle between the 2 rows.
Sorry for being dense.
Love the site.

On October 8, 2012 at 7:58am

Daniel wrote:

You're correct in the first instance.
Make a 4.8v "battery" by wiring 4x 1.2v in series.
Take each 4.8v "battery" and connect the end terminals of the same polarity together, + and +, - and -.
Don't cross connect any of the middle connections as that will mess things up.
The - and + connector I showed above was a poor attempt at showing the "master" connections where one bank of series batteries is connected to the next bank of series batteries but only at the ends…not in the middle.
Showing a circuit diagram using just text isn't easy

Also…it's not my site…I just help where I can. I also found it useful and full of good information.
I read through this list of questions and decided to start helping those who need help/guidance etc.
Batteries can be dangerous if you don't know what you're doing.
Admittedly it's only really big lead acid batteries that pose a real threat but certain Li-ion ones can explode if mistreated.

Anyway…I hope this time that makes sense

Bob wrote:

just like connecting 2 battery packs together, red to red, black to black.
Yikes! An unpaid moderator…we are all very appreciative Daniel.
Thank you!

On October 8, 2012 at 9:29am

Daniel wrote:

You're very welcome.

On October 9, 2012 at 6:19pm

Bob wrote:

Ok, you've got my curiosity up now Daniel.
Can you tell me if any of these designs has any advantage over the others with respect to battery life, and also if the bottom figure calcs are correct..ie 7500mah?
4S2P
4.8V |+{===]-+{===]-+{===]-+{===]-| @2500ma cell capacity=5000 total
|+{===]-+{===]-+{===]-+{===]-|

4S4P
4.8V |+{===]-|+{===]-|+{===]-|+{===]-| @2500ma cell capacity=5000 total
|+{===]-|+{===]-|+{===]-|+{===]-|

4S3P
4.8V |+{===]-+{===]-+{===]|+{===]-| @2500ma cell capacity=7500 total
|+{===]-|
|+{===]-|

On October 10, 2012 at 2:23am

Daniel wrote:

I'm having your trouble with working out what's meant
What does 4S2P etc mean?

I assume 4 Series, 2 Parallel…but is that 4 in series x2, each in parallel…or 4 in series with 2 in parallel to those 4? Or something else
In terms of battery life…the more batteries you have in parallel, the better. That's the short answer.
In terms of voltage, the more you have in series the better…for information sake.
Does that help?

On October 10, 2012 at 5:37am

Bob wrote:

Good morning.
Your assumption is correct. The top config is 2 parallel connections , at each end of the batteries in series (at #1 and #4 battery ends)and there are 2 rows of 4 batteries, with each row connected in series. The 2nd config is 4 parallel connections, at each battery end, also 2 rows of 4 batteries, each row connected in series, and of course the 3rd image is 3 parallel connections with 3 batteries connected across their + and - terminals., and a single row of serial connected batteries to make 4.8V .

The designations don't mean much really, its the way they are connected I'd like to get feedback on please if you can. Are there pros and cons or is one a standout ?

Hope this clears up my examples.

On October 10, 2012 at 6:44am

Daniel wrote:

Firstly the last config isn't a good idea.
If you have 3 batteries in parallel and force that through any in series…the series batteries will either restrict the maximum current flow or worse…you could be charging the series batteries which could cause them to fail/leak/explode.
It's NEVER a good idea to have any batteries in series with a parallel set.
Here's my suggestion…which may be what i've already said above…
You need 4.8V…so connect 4x 1.2v in series to achieve that.
Once you've got your required voltage…stack enough of those series groups in parallel to achieve your current requirement. 2 rows will do but a 3rd/4th will provide a greater current capacity.

On October 10, 2012 at 9:30am

Bob wrote:

Yeah, I thought that last one might be out of balance. Appreciate the input. Thanks again.

On October 18, 2012 at 8:31am

Zoli wrote:

Please help me!
I build a NI-MH battery pack as follows…..8x AA 1.2v 2500mAh in series so is 12v 2500mAh, and I have 4 of these in parallel so is must be 12v 10000mAh! If I am right and I discharge it with 4500mA is must be run at least 2hour! I did monitoring the voltage and is cascading down nice and slowly, but after 1 hour one cell is starting warming up and shorting out the other battery's! What is happening??? I changed the faulty cell and test it again…but the replaced cell is blow out again, but only that battery pack from the 4 is having the problem every time! I changed the wiring and the cells again, but the same result! Is must be work….no? What can be a problem?

Thanks Zoltan

On October 18, 2012 at 8:57am

Daniel wrote:

This problem is mentioned several times above.
Firstly…8x 1.2V isn't 12V. 10x 1.2V is 12V…
Heres my suggestion:
You want 12V and 10,000mAh correct?
I'd use 10x 1.2V in series to give 12V.
I'd then take 4 sets of these and wire them in parallel to maintain 12V but increasing your mAh capacity to your requirements.
ONLY CONNECT THE FIRST AND LAST OF EACH SET TO THE PARALLEL CONFIG…DO NOT CONNECT INTERMEDIATE BATTERIES IN PARALLEL!
Also ensure every one of the batteries you're using is of the same quality as each other..ideally all brand new.
The one cell warming up could be because it's more "used" than the others and no longer has its rated 2500mAh capacity….it gets warm because the other batteries are effectively charging it.
This may all occur because you're running a 12V system from 9.6V (8x 1.2V) putting extra stress on the batteries and potentially pulling more current than expected which in turn would cause even more stress on the batteries.

I hope something I mentioned will help you but be aware, if a Ni-MH battery gets hot, it can explode if you're unlucky and just leak nasty chemicals if you;re lucky.

On October 18, 2012 at 9:11am

Zoli wrote:

Thanks Daniel,
Sorry I just miss type it! I want it to say 10aa in series and 4x 10 parallel! Sorry to confuse you with the numbers! The battery's is all brand new from maplin! I checked the data seen of the battery and the diagram showing the discharging algorithm, what is allowed me to discharge the 2500mAh battery even with 5000mA for 1/2hour! What is say to, must be fast charged the battery for this capacity! Can be a slow charge creating uneven charged cell in the packs and putting that cell for a big stress a make it die?

Thanks Zoltan

On October 18, 2012 at 9:22am

Daniel wrote:

I'm not certain what the problem is then…it sounds like everything is balanced.
I'm not certain what's causing one cell to become weak but over stressing a battery will certainly show the problems you have.
I'd look very closely at the wiring around that particular cell.
Perhaps also try your experiment at 2500mAh for 4 hrs…It may be that a slower discharge doesn't show the problems indicating that a fast discharge is causing the issues.
Alternatively…the battery voltage when half the current capacity has been used won't still be 1.2V…hence why after 1hr you're seeing problems.
If you need 4500mA for 2hrs minimum…it may be beneficial to have 5 sets in parallel, not 4. An increased current capacity will have less of an effect on the voltage and also saves you from deep cycling the batteries…something I'm not certain how NI-MH react to.

On November 1, 2012 at 3:14am

Doc Connick` wrote:

I want to loop several car batteries in a series to allow a wind turbine i have constructed hold and supply electricity to my house. How do I go about connecting these batteries? do I need to check voltages on each individula battery?

On November 3, 2012 at 11:14am

Neel wrote:

From the figure of series/parallel connection given above, wont there be a backflow of electrons if the 1st battery gives comparatively low voltage or current output than the previous? Or should we just add the v and I, without considering their positional values to get the final output???? pls reply soon.

On November 4, 2012 at 11:42am

Dano wrote:

I have an backup equipment that requires 24V to start.
I have connected two 6volt (155Ah) batteries together with a 12volt(100Ah) all in series.
What will be the resultant voltage & current if i connect another 6volt(155Ah) battery in parallel with this circuit?

On November 5, 2012 at 3:28am

Daniel wrote:

Doc: I assume you want to run house lighting etc from 12V and not anything higher?
If so, you want to wire the batteries in parallel, + to +, - to -.
If running them in series, it's far less forgiving if the capacities are different. If you need a higher DC voltage than 12V, series is the only real option and just make sure your batteries are all the same capacity, ideally the same manufacturer/model.
Neel: There won't be a backflow if the first is dead…but the circuit will try to charge it and balance them out. This is not desirable though.
Dano: Adding 6V to an already 24V supply will give you 30V. Why add more if you need 24V and have 24V? Sorry for my confusion. Also, ideally the batteries should be the same voltage/capacity as well but this isn't as critical for parallel connections.

On November 18, 2012 at 6:55am

Ujang Sumarwan wrote:

I enjoy reading the article because it met with my objective to know how to build batteries with combination series and parallel connection. My question is how to make power bank with a number of NiCd or NiMH cells for 19.5 V and about 18000 mAh. Thank you. Ujang Sumarwan, Lecturer Bogor Agricultural University Bogor Indonesia

On November 26, 2012 at 1:23am

James wrote:

is it correct connecting 12V, 80AH with 12V 120AH series to get 24V for 250kVA DG starting

On December 25, 2012 at 9:13pm

Bart wrote:

What am I missing? I soldered a 20 gauge copper wire across the positive terminals of two 1.5V, 2.0 amp AA batteries from the same package and a wire across the negative terminals of the same batteries for a parallel configuaration. The voltage is 1.5 but the amperage is only 2.5.
I thought the amperage should approach 4.0. It looks to me like I've introduced some serious resistance in this circuit. Is it possible the solder I used is adding significant resistance? Would 18 gauge wire make a noticable increase in the amperage?
Thanks in advance for any ideas you can offer.

On December 26, 2012 at 11:02am

Bart wrote:

Whew! Looks like spell checker and I parted company.
In my previous post about batteries in parallel and amperage "configuration" and "noticeable" were misspelled.
Sorry 'bout that.

On December 27, 2012 at 12:26pm

Lynn wrote:

Sorry I don't know why the amperage isn't going up in your circuit but please don't use the word battery when you mean cell.
You are connecting two AA CELLS.
Connecting CELLS together in either series or parallel will create a battery.
Yes, I know we say battery when buying CELLS at Walmart but here in a more technical setting we should use words more preciselyl.

On December 28, 2012 at 11:42am

I have a lot of 1,2V AA NiMH 2000mAh Akkus and a “Multi-Charger”.
Typical Charge: 200mA for 15h.
Q1: When I want to charge 4 in Series, the current is 200mA (at 4,8V)
Q2: When I want to charge 4 in parallel, the current is 800mA (at 1,2V)

Thanks!

On January 16, 2013 at 4:34am

Mohit wrote:

hi,
I want to give more current to a dc motor, but without burning the motor driver board. How can i connect extra battery ? Series or Parallel ?

On January 24, 2013 at 11:25pm

Jay wrote:

Many year’s ago, I took my parent’s mobile, “bag” phone on a school trip. Though it was made for a cigarette lighter plug putting out 12V (14v?) I found that it would turn on with a 9V battery. (I guess it was enough to power things.)

So knowing that I would need more amperage, I remember creating a rather large bank of parallel 9V batteries. (I recall using pieces of decent-guage wire run across the leads and holding everything in place with electrical tape.)

The bag sat on the bus all day long and when I got back to it at the end of the day, the 9V battery pack, which I purposely left disconnected from the phone, was EXTREMELY HOT! (I remember being very alarmed, thinking that I could have blown up our bus or something) and ripped the battery pack apart immediately.

What had occurred to me was that though the batteries were in parallel, one or more of them was letting the electricity pass through causing a closed circuit (short) and they heated up.

It always stuck in my mind that though parallel batteries would increase amperage and allow a device to work, the pack itself would dischage and heat up if left alone because it would self-short out through the cells. However, there are plenty of battery packs (and this article) that cotradict my new belief….

...So I wonder why did this pack heat up and short out? Was it a bad 9V battery ot two in the pack? Can anyone share some thoughts onto why this might have happened? Thank you very much!

Jay

On January 25, 2013 at 3:14am

Daniel wrote:

I’d say it was either a dodgy battery or 2 as you say, or perhaps just a partially discharged battery which would cause an offset in the balance of power between all the batteries in parallel. Either that or one or more batteries were wired the wrong way around.

On January 25, 2013 at 7:45am

Bart wrote:

I think Daniel’s reply nailed it. I’m no battery (cell) expert but I found similar comments to Daniel’s on other forums.

I’d go with the “bad cell” theory.

On January 25, 2013 at 8:02am

Daniel wrote:

Mohit - Any current going to a motor will flow through its control board. You’re limited by the current capacity of said board. Increasing the number of batteries will either have no effect as it’s limited by the driver board, or it will blow the driver board up.
I’d buy another driver board which is rated higher than the one you currently have.
Think of it like this: Adding more fuel in the tank of a car doesn’t make it go faster as it’s limited by the engines capabilities.

On January 25, 2013 at 9:20am

Jay wrote:

Thanks for the replies!
When it first happened, I thought that despite the battery having polarity, it still may have allowed some electricity to flow in the opposite direction, creating a “closed cicuit” (For instance, I knew that if you had series cells and placed one backwards, the voltage would drop but the bulk of the electricity would continue to flow).

The first time I started wondering what really happened was later when I bought an Energizer flash light that had 2 “barrels” for batteries… 4 AA’s in each barrel - the 2 barrels in parallel (obviously to make the light last longer). I wondered why those batteries didn’t get hot like mine did. I had chalked it up to a theory that the switch must have been DT disconnected the batteries from each other as well as the bulb when turned off. Of course, I’ve encountered several battery packs with parallel cells, since, so my mind always went back to this incident and why it happened.

the tops of the terminal clips.

Myr first thought when I found the untouchable pack was that one of my leads (or perhaps 2) was inadvertenly touching the body of the battery, causing a short. I kinda remember looking for this and not seeing it, but that doesn't mean I didn't overlook it.

So inconclusion, if there are no defects, you SHOULD be able to create a higher-amperage battery pack by simply putting cells in parallel and NOT get hot, drained batteries?

And if you did have one slightly weaker cell, does it stand to reason that the other cells may deplete somewhat, as shown above (though that bad cell), but once all the cells "equalize" there should no longer be any drain? Or would one weak cell always kill a parallel battery pack?

Thanks again for your input!

Jay

On January 25, 2013 at 9:38am

Daniel wrote:

Jay - I wasn't suggesting you were wrong, I was just trying to figure out the possibilities.
A single dodgy battery in a set of parallel batteries "shouldn't" cause any issues in theory.
In practise this isn't always the case.
What you say is right in that the batteries should equalise out but to have that heating effect you saw, something must have been wrong.
My only other thought is that you may have had something in your bag which may have shorted the connector…although you'd most likely see melting of wires etc, something you didn't mention above so I don't know if this happened or not.
Was it a hot day? Was the battery pack maybe resting on the floor above the exhaust or something? Other than that, i'm at a loss for ideas.

On January 25, 2013 at 4:15pm

Jay wrote:

Hey Daniel,

I didn't think you were suggesting I was wrong Anything is possible… I have always been into electroncis, so my initial thought went immediately to the obvious - musthave shorted the batteries. I just remember not finding a short so I was perplexed. (Obviously I have been losing sleep over this for 15 years! Ha ha - actually I just happened to find this site yesterday and thought I'd pose the question.)

Knowng that the batteries SHOULD have been OK in parallel, I am going to have to assume that there was a short that I didn't notice. It was certinaly not the temperature of the bus or anything… I remember these batteries were literally too hot to touch.

(I remember that I really was kinda stressed over it - thinking that I could have inadvertenly set the bus on fire or something - oops. - Glad I just had a dead battery pack and a useless "Bag Phone")

Thank you again for your input.

J

On January 29, 2013 at 11:48am

M.Sohail wrote:

how to joint two unequal volt batteries

On February 21, 2013 at 3:36pm

Michael wrote:

Hello- i have a question, i prefer to not correpond in amnner where the dialougue is visible to others— Would you mind getting touch and I can outline the circustance?

Thank you so much-

Micahel Murphy
Torrent EMS
(716) 725-8977 mobile

On February 26, 2013 at 3:30am

Daniel wrote:

M.Sohail - Connecting 2 batteries together of differing voltages, as mentioned in several places above, isn't a good idea. All details as to why you shouldn't do it can be found in the above articles.

Michael - I'm intrigued by your request but I have no idea which country that mobile number is for. I'll post one of my email addresses here for you to contact me directly on.
emc_danny@hotmail.com
NOTICE TO OTHERS - PLEASE DON'T CONTACT ME VIA MY EMAIL FOR QUESTIONS WHICH SHOULD BE ASKED ON THIS PAGE. I WILL NOT RESPOND.

Godwin wrote:

how to connect batteries to get 24 volts DC and a amperage of 3amps

On March 7, 2013 at 2:17am

Manuel.M wrote:

Hi, I have a question: If I connect 2 LiPO battery (with the original factory protection circuit inside every one), I can without problems or I must replace every protection circuit with only one that serve all two batteries?. I ask this, because I have connected the batteries with its original protection circuits and , after some months, one of two is inflated and damaged. This is happened to many devices with same configuration.
Very compliments for the website.

Best regards

On March 7, 2013 at 3:19am

Daniel wrote:

Goodwin - that depends on the voltage of your batteries as well as current capacity.
If you can tell me what batteries you want to use, I can point you in the right direction.
Manuel - Keepiong the individual protection circuit shouldn't be a problem. I may be you're taking too much current or not charging them properly if it's "inflating and damaged". I'd look into how you're using the batteries and see why they may be overheating and warping.
Maybe also check the protection circuits to ensure they've not failed.

On March 9, 2013 at 11:18pm

bob gill wrote:

Hello. I purchased a 1000 lumens led bulb for a radio controlled airplane. when I hook the bulb up directly to two, non-rechargeable, 123a lithium batteries, the light shines brightly for a minute or two, and then the batteries discharge to a really weak state.
im totally new to battery power and electronics. can someone tell me why the batteries work fine in a flashlight, but drain drastically when hooked directly to a 1000 lumens led bulb? please reply to: rjgillcorp@yahoo.com.
I really need the help. best regards…thank you.

On March 12, 2013 at 8:49am

Uttam thakur wrote:

Why does mobile battery get charged up with charger, as current of charger is lower than mobile battery?

On March 12, 2013 at 9:14am

Daniel wrote:

You're looking at it the wrong way.
The current output of a charger dictates how long a battery will take to charge.
The current capacity of a battery (ampere/hours) dictates how long said battery will last for with a given current being drawn from it.
If a charger had a greater current capability than the battery it was charging, the battery would….at a guess…explode. It's like forcing 300 litres of water through a pipe in 30s, yet the pipe can only carry 200 litres in 30s. Any more and it goes bang.
To be perfectly honest and I mean this with all due respect, this is a primary school question. So as a matter of personal safety, I suggest you learn the basics of electricity before blowing something up and injuring yourself.

On March 14, 2013 at 12:54pm

Mary wrote:

I have a science team parallel wiring 2 sets of 10lights christmas lights which ran off 2 C batteries each and 4 small lights which run off 2 AA each all to one switch and one battery. They wired it and it worked. They used a 12v battery and after turning the lights on and off several times during the course of 10 minutes only one light worked. They checked them and they had all burned out but that one. Each bulb was dark. They have decided the battery was two powerful but do not know what type of battery to use. Can anyone give us any information. Thankyou

On March 15, 2013 at 4:21pm

Jay wrote:

Hi Mary,

Considering that the original light strands ran off of 2 C Batteries, and the other set off 2 AA batteries, I am assuming that bulbs are designed for 3 Volts. (As you found out, 12v is way too much.)

It is the AMPERAGE (and not the voltage) that needs to be increased in order to supply power to all of the lights.

As I do not know the wattage of the bulbs, I am going to guess and say that 2 D batteries might do the trick (D's have the same Voltage but more Amperage than C's and AA's). They will likely light all of the strands (after you replace all the dead bulbs) but I can't say for how long.

If they do not power the lights for a long-enough period of time, you might consider wiring multiple groups of 2 D batteries in PARALLEL. (Again, the goal is to keep the Voltage at 3 Volts and increase the Amperage)

I hope this helps.

J

On March 19, 2013 at 2:51am

debarshi biswas wrote:

if i add 10 equal cells in series and one of them gets out of order then what is the voltage that e will get at each terminal of the damaged cell?

On March 19, 2013 at 3:18am

Daniel wrote:

90%
I can't give you an exact voltage if you don't provide one.

On April 12, 2013 at 1:20am

Mike P Brophy wrote:

My truck runs on a 24 volt system using 2 x 12 volt batteries. I want to connect a 12 volt winch into the system.How do I do it???

On April 12, 2013 at 11:04am

Lynn Ellsworth wrote:

3 ways.
1st way: Just connect the 12 volt winch to one 12 volt battery.
2nd better way: buy a 24 volt input to 12 volt output transformer. Obviously connect the input to both batteries and connect the 12 volt output to the 12 volt winch.
3rd way: check your cigarette lighter voltage. There is a good chance your truck already has a transformer that reduces the voltage to accessories such as the cigarette lighter and the 12 volt winch could be plugged into the cigarette lighter. (use a volt meter to make sure which is the plus and minus output of the lighter if this is necessary for your 12 volt winch)
Truck stores and Fry's Electronics type stores should sell transformers and wiring adapters for the lighter.
Always keep something plugged into your cigarette lighter so you will not be tempted to smoke:-).

On April 28, 2013 at 9:56pm

suhas wrote:

I have 3 Li batteries each of 3.7V 2600 mAH. I wanna make a Battery Management system by connecting them in parallel configuration of one series three parallel (1S3P)(B B B). so plz suggest me any IC that will work best to charge the battery pack of 3.7V,7800mAH.

On April 29, 2013 at 7:41am

Lynn Ellsworth wrote:

To begin with you do not have 3 batteries - you have 3 cells. When you connect your cells together then you have a battery.
You describe connecting 3 cells in parallel and 1 cell in series. This makes no sense. Do you have 4 cells? Even if you have 4 cells your connections make no sense.
When you connect cells together in parallel the voltage remains the same but amperage increases. When cells are connected together in series the voltage goes up but the amperage remains the same.

There seems to be a difficulty on this site understanding that any cells or any groups of cells (batteries) you want to connect in parallel or series MUST BE ABSOLUTELY IDENTICAL!

NO, do NOT connect 3 cells together in parallel and then add 2 cell in series.

In your case it sounds like you want to connect 3 identical cells together in parallel but then connect 2 of the cells together in series. FORGET IT! You will be connecting 7.4 volts (3.7v x 2) volts to 1 cell of 3.7 volts. What the hell are you thinking!?

2 IDENTICAL cells in parallel (3.7 volts - 1 battery) could be connected to 2 IDENTICAL cells in parallel (3.7 volts - 1 battery) in series to create ONE battery of 4 cells equaling 7.4 volts.
OR
The two 3.7 volt batteries could be connected together in parallel to make ONE 4 cell 3.7 volt battery.

On May 6, 2013 at 10:05am

that there is a 1v difference between the two. Would the 12.5v battery discharge to 11.5v through the internal resistance of the other battery?
Carrying on that thought, the following scenario: the voltages of 2 batteries in parallell are identical but the discharge rates are different and they are being used, so that one voltage decreases faster than the other voltage…and then would the theoretical 2-voltage discharge problem appear again…so I am thinking that connecting up batteries in parallel causes inefficiencies because it causes the combination's voltage to lower to the value of the lowest battery?

On May 11, 2013 at 11:01pm

jack wrote:

it depend on what type of battery you are talking about.
but for 2 battery with different potential connect in parallel, current will flow from the higher potential to the lower potential.
you may want to check the internal ESR rating of both of the battery and the maximum Current allow for the cell.
another way is to discharge both of the cell to the same voltage level and charge them up together.

do you mean the amount of current draw from each cell?
the compensation will actually ensure both cell will reach 0% soc at the same time(if they are the same type of battery)

On June 25, 2013 at 9:25am

Jay wrote:

Hi all, I am looking for some advice…
I've been designing a portable power pack to use for an application I need. I want the pack to be based on a 12V battery, have a 5V USB charger built in, a power inverter built in and direct connection to the 12V available… I plan to build these into "road-case" style cases. I want to build between 4 and 8 of these setups. (I realize that I could buy something similar off-the-shelf, but what fun would that be?)

Ideally, I would like to have one charger that can charge half or all of these at the same time. (Not unlike a charging rack for portable radios or on-premise pagers or something.)

I've been learning a lot about battery chemistries… I'm leaning towards SLA, but NiCad or NiMh are close second choices. I'm thinking SLA because they are cheaper, and can sit longer between uses (these won't be used that regularly) but I think I would need larger batteries because of the discharge curve depending on the draw.

NiMh would be my second choice, because they (from what I understand) can give more of their capacity at higher current draw than equivalent SLA – but they discharge on their own if not charged regularly. NiCad would be my third choice mainly because they are similar-enough to NiMh, and cheaper. Their memory effect, however may be a problem. (in the long run, I think NiMh would still be a better investment than NiCad).

Charging:
As I said, I would ideally like to have a single charging unit for all 4 or 8 setups. But with all the research I am doing, I am nervous about which battery-type would be best for this purpose and if it would be safe to do it. I have owned paging devices in the past that had really simple charging racks. – Each pager had a dual-AAA-sized NiCad pack inside and the charging rack contained a simple circuit board with 8 sets of terminals in parallel (with no other circuitry in line). Charger was an external power-supply type. Multiple racks could be strung together with jumper wires – in parallel.

That design is basically what I want to create; but with all that I am reading, I am worried parallel charging higher amperage batteries (looking at 2.5 Amps for each setup) could be dangerous and / or damage some of the packs.
My latest brain storm is to build a charger circuit into each box and simply connect them in parallel to an external "power supply" (I would like to input low-voltage for the power supply… I prefer not to have any live AC inside the box – save for the inverter, but that would be a self-contained unit.) – This will, of course add some cost and complexity to my project.

Can anyone offer advice on the following:
A) What batteries sound most ideal considering what I've laid out?
B) Is parallel charging doable for this design without building in individual charging circuits?
C) If I can parallel charge the batteries, would picking a charger be as simple as finding one that could charge the total amperage (say 2.5 Amps x 4 setups) in a given amount of time? (I'm fine with overnight recharging.) (Example: 10 Amps total per rack… use a 1amp charger to charge the group in 10 hours – ignoring inefficiencies for now.)
Furthermore, would this charger, if only charging, say one setup at a time, charge it faster or over-charge? (Can I find a smart charger that can adjust its output based on the battery pack draw?)

Thanks in advance for the advice!

J

On June 25, 2013 at 11:56am

Mike Michelson wrote:

I have a 6 volt DC system on an antique boat. I would like to operate a 12 volt DC GPS device at the same time I am operating the boat. How can I safely hook up two 6 volt batteries, in series, to achieve the 12 volts for the GPS (Global Positioning System) and, at the same time, connect the electrical system of the boat to one (or more) of the two 6 volt batteries to operate the boat?
Thank you for any guidance you can provide.
Mike

On June 25, 2013 at 1:48pm

Jay wrote:

Getting 6Volt and 12Volt at the same time is not that difficult

can be connected to the positive terminal on one battery and the negative terminal on the other. (I would make sure that your ground (negative) is the common connection… though I am fairly sure that a boat does not use a chassis ground like a car, there is a high likelihood that somewhere along the line the grounds may be connected together.

CHARGING, however, would be the problem…
If your boat's other systems will be running off only one of the 6V batteries, that battery will discharge faster than the other which is only being used for 1/2 of the GPS's power.

If the boat has an onboard charging system (alternator, etc.) you could not charge both batteries at the same time. (even If it were a 12Volt charging system, you would have an issue with one battery being charged more or less than the other.) If you plan to remove the batteries and charge them separately as 6 Volt batteries, you would be OK.

J

On June 25, 2013 at 1:51pm

Jay wrote:

One other thought for simplicity sake… You could go with a 12Volt Battery and a 12Volt charging system and then use a 12Volt to 6Volt voltage converter to run the rest of your boat's systems. (The regular 6V systems get wired to the converter's output and the 12V GPS connects to the battery before (or in parallel with) the converter's input.

J

On July 1, 2013 at 7:10pm

Frank wrote:

I saw this question asked twice but no specific answer. Again, can batteries of equal voltage but of different amperage be safely connected in parallel??? And if yes, will the total amperage be cumulative or will it defaulf to the lowest denomination:
I.E. three 12v/32A batteries with two 12v/35Ah batteries all in parallel
(3 x 32Ah) + (2 x 35Ah)
= 96Ah + 70Ah
= 166Ah total output??
My current situation: three 12v/32Ah battery bank, all in parallel. Charged by one 100watts, 17.5v/6.5amps solar pannel & a 12v/25amp charge controller.
Trying to accomplish: add two 12v/35Ah batteries all in parallel to current bank (vendor did not have 32Ah batteries avail) Add one 100watts, 17.5v/6.5amps solar pannel also in parallel with current pannel & the same 12v/25amps charge controller.
A reply will be greatly appreciated, either in this very educational website or to my email: fm1950@peoplepc.com

On July 11, 2013 at 1:48pm

riya wrote:

i need 48 volts—12 ah battery connection service..
so can i do 4 pcs 12 volt 7 ah battery in serial connection (it provides 48 volts and 7 amp) and 1 pc 12 volt 5 ah in parallel (total is 48 volts 12 ah)
connection?

is it right?
please tell me is it right or not…

On July 11, 2013 at 3:27pm

Jay wrote:

Hi there, this is not right… if you made your 48Volts up from 4 12Volt batteries in series, you will get the voltage you are looking for, but at the average amperage of the batteries in the series: (7Ah) - exactly as you have stated.

But, to get the additional amperage you are looking for, you would need a second 48volt power source in parallel with the first. (Another 48volts at 5Ah).

[4 x 12volts @ 7ah in series] paralleled with [4 x 12volts @5ah in series]

J

On July 14, 2013 at 6:22am

error23 wrote:

if i need a battery whose motor requirment are 100V and 200A continuous and 750A peak. and i have cells of rating 3.3V and 50A continuous and 120A pulse. how should i design the required battery? please help

On July 14, 2013 at 8:28am

cynthia robetson wrote:

I HAVE TO KNOW WHAT IS TH CURRENT PASSE THROUGH A BATTERY OF 1.2 VOLTS IN A SOLAR LAMP BECAUSE WHERE I'M WORKING I HAVE SOME PRODUCT WITH THIS TYPE I WOULD LIKE TO KNOW MORE

On July 26, 2013 at 3:36am

ryan wrote:

to anyone out there asking if you can connect three 12v batteries to make 24v it most certainly can be done if the first and second cell are connected in parallel and then the second cell is connected in series to the third cell. The first and second cell will act as one cell of equal voltage and raising the amperage. When cell two and three are connected cell one and two were already one cell there for the series connection did not know the difference. If this could not be done then there is no way large batteries could be ran in series seeing as some large batteries are only two series connected in parallel. I have been running a set up like this for five years and have had no problem at all. Running cells together in this manner would not be for the begginer however.

On August 27, 2013 at 9:21am

Kirk wrote:

I want to install some solar panels. The 8 panels have an ouput of 2080 watts (260 per panel). Can I connect 8 auto batteries in series to store and then utilize the power? I have a 3K watt voltage inverter.

On September 1, 2013 at 1:21pm

John the engineer wrote:

One thing that is not covered is that in a series string the battery with the lowest capacity will obviously fall in voltage first but then if the load current continues the voltage on the cell will fall to 0V and will reverse so it will attempt to charge in the 'wrong' direction which causes it even more harm. (To show this clearly replace the failed cell with a resistor and then draw the voltages across it and the adjacent cell). This is why you have to be very careful on how low a voltage you discharge a series battery too. The higher the voltage of the battery the more difficult it is to detect the first cell going flat.

On October 11, 2013 at 12:05pm

Donald J wrote:

Isn't there a problem with connecting cells or batteries in parallel?
In practice no two cells are the same, causing an imbalance. Won't the cells discharge into each other?

On October 18, 2013 at 10:19pm

kefas wrote:

hi! i have a 5kw/48v solar inverter from I-PANDA that has different charging parameters including CC/CV with adjustable charging current so i decided on using a LiFePO4 48v/600ah battery from Hipower group china. I want to have a 50%DOD so i chose to connect two of this battery in parallel to get 48v/1200ah. What will be my charging current and voltage in 10hours through solar, i live in Nigeria normal temperature is 30-40 "C. Thanks

On October 19, 2013 at 12:12pm

mark wrote:

connecting LifePO4 batteries in parallel is NOT recommended for various reasons involving the BMS electronics used in each pack. connecting them in series is not an issue.

On October 19, 2013 at 12:14pm

mark wrote:

the connecting LifePO4 batteries in parallel is NOT recommended for various reasons involving MS electronics used in each pack. connecting them in series is not an issue.

On October 23, 2013 at 5:36am

vaiju wrote:

I want to design a grid scale battery storage. the batteries need to feed 11 kV AC bus and load is 200 MW. How can get this much voltage and what will be the battery rating , Ah, kWh rating?

On October 25, 2013 at 6:59am

John Fetter wrote:

vaiju - You are looking at a very dangerous, very expensive technology. A 40MWh installation was operated at the Chino substation near Los Angeles from 1987 onwards. Eight strings, each of 1032 submarine-type battery cells rated at 3250 A-h, connected via 18 pulse inverters, transformers, to the grid, to perform load-leveling. My company subcontracted to Exide to design, manufacture the automatic watering, gas filtering, flame arrestor equipment. Personnel were locked out of the battery room when the battery was on charge. The battery delivered 3000 deep cycles.

On October 25, 2013 at 7:53am

Thanks John Fetter, actually I want to know how can I calculate rating of battery , no series parallel connection , inverter, transformer rating if the battery has to supply a 11 kv bus, the load rating may be less.

On October 25, 2013 at 9:14am

John Fetter wrote:

vaiju - It appears you are talking about 200 megawatts. You cannot simply connect cells in series until you reach a voltage to match 11 kilovolts, three phase. You can go up to 2,500 volts DC safely. You are obliged to use transformers that can provide at least 24 pulse inverter operation to keep the harmonic distortion down.
If W=VI, then 200,000,000 = 2,500 X I, therefore I = 80,000 amps. There are no cells that can deliver 80,000 amps. You might need more than USD100 million to build this thing.

On November 3, 2013 at 11:23pm

Janaka wrote:

hi i have a philips shaver which consists only one AAA battery but its goes of on one shave some times the battery is not enough for the cut.

I am thinking adding another battery to the system ,Currently it runs with a AAA so should i add another battery and should add that parrell.

On November 15, 2013 at 11:32am

Ahmed wrote:

Thanks, this is great information.

On November 25, 2013 at 11:28am

mahmoud hasanloo wrote:

Hi,
The scenario which I'll explain is not a real one but I want to know that can we do this or not???
Suppose we have 6 cells which specification of them are as follow: two of them have 1.2v and 200mA (big cells) and four of them have .6v and 100mA (small cells) characteristics. I want to connect two of small cells in serial then connect with one of the big cells in parallel to form a bank cell with 1.2v and 300mA. In this manner we have two such banks. Now I want to connect two banks in serial to form a battery with 2.4v and 300mA.
Now I want to know is it possible to have such a connection??? In other words I want to know can we connect different cells in serial to have a bigger cell then connect them in parallel to have a cell bank with the requested current and finally serially connect them to form a battery with requested voltage and current.

On December 17, 2013 at 3:17am

sachin wrote:

if 4 batteries connected in series between charger and load at same time. is the perfomance of batteries decrese

On December 18, 2013 at 10:30am

Jay wrote:

Mahmoud: the scenario you presented should work. If you have any weak cells in the setup the other cells will likely balance it out lowering the overall voltage (I believe there's in on this at the top of the page), but if all is perfect, you should end up with 2.4v at 300mah

J

On December 27, 2013 at 11:46am

Victor Villasenor wrote:

Is there a way to double or increased the discharge rate (c) with two lipo battery.
I have two lipo batteries 3cells each, 3000mah, 25c, my Rc jet requires a higher c.
Known facts: If I connect two batteries in parallel, the current adds up.
If two batteries are connected in series the voltage adds up.
You can reply to my e' mail and post your answer. thank you.
Have a nice day Vic.

On January 1, 2014 at 9:09pm

Awesome wrote:

is it possible to connect 2 batteries of the same make in one tablet to increase runtime?

Weiji wrote:

If the cells with identical size and capacity are connected in series and they have different initial state of charge, will the cells always be charged equally during the charging process? If not, how is the total charged energy distributed among all the cells? Which factor affects the energy distribution?

On January 12, 2014 at 12:10pm

shelby wrote:

I am looking to run a serial/parallel configuration all 12volt must the amperage mach exactly or can the amperage vary from battery to battery?

On January 23, 2014 at 4:21am

Santosh wrote:

I have rechargable battery power supply DC 55 v for my cd palyer which I use.
I have another battery power supply with the same make but the DC voltage is 40 v.
Can I connect the second battery power supply in parellel to increase the current handling.
Since the DC voltage is not the same will the cd player get the same voltage of 55 v.
I would appreciate your response

On March 6, 2014 at 11:52pm

Mark wrote:

Shelby and others - you can think of a batteries like this:imagine them as kegs of beer, and whatever you connect to it, uses some of that beer. Now VOLTAGE is how fast the beer wants to come out of a particular keg. If you pump it up, you increase the Volts, and the beer comes out faster. And AMPERAGE is how wide the keg and nozzle are.

So if one could stack kegs on top of one another (in series), then their speeds add. It doesn't matter what the individual speeds are, they always add. But their widths do not - the narrowest one (lowest Amps) has less beer in it, so as you draw from the series, the small one will empty first - and the other batteries will "push" more beer into that one to keep the flow going - possibly in the reverse direction - which is very bad.

And if you could set kegs of differing speeds next to each other and tap them all with one tap (parallel), then you ruin into the opposite problem - the "faster" ones will be spewing beer into any slower ones - until all equalize at some identical speed. Here, it doesn't matter how wide any of them are; they all are the same speed. So their widths add here, and the speed equalizes.

So in summary…
In series, battery Volts ADD. Keep the AMPS the same for each battery.
In parallel, battery Amps ADD. Keep the VOLTS the same for each battery..

So Santosh, no you can't connect a 55V and 40V supply in parallel. The 50V one will try to push electricity into the 40V one, possibly damaging it. If it did work at all, you'd see something less than 50V but more than 40V reaching the CD player.

On March 7, 2014 at 8:56am

Jon wrote:

Wow…I can't believe how long this thread has been going on. Here is my issue.

I have a 110V solar panel connected to 2 - 12V Diehard Platinum PM-1 deep cycle batteries through a regulator. I am powering a 12V sampler and pump. I understand the difference between voltages doubling and amperages doubling between series and parallel setups. The answer I can't seem to find is which setup will cause the batteries to last longer. With the large capacity of the batteries I would think increasing the amperage draw down would yield the most efficient setup but I am not sure. I don't need 24V so series doesn't seem to make sense.

Please let me know what you think. Thanks. Jon

On March 7, 2014 at 9:55am

Mark wrote:

"Deep cycle" lead-acid batteries are nothing more than regular lead-acid batteries… with more lead in them. They last longer, because there is more stuff inside to be consumed. And these are chemical reaction batteries - they are destroyed slowly during use.

Watts, is Volts times Amps. When using power from a battery, it supplies some amount of power (watts.) When recharging, those "used" watts are replaced, along with some extra watts for losses. Using this battery's power, and replacing it, is what wears them out. So long story short, it doesn't matter if the volts are higher or the amps - using any combination of the two causes wear.

What WILL reduce wear, is using less watts from this battery, and keeping it as "full" as possible. Wear INCREASES as these batteries approach empty. If you completely discharge one of these each time, it may last 400 cycles. But if you only discharge it 10% each time, it may last 10,000.

On March 7, 2014 at 10:05am

Mark wrote:

Jon, your best bet to reduce wear would be to hook up more batteries in parallel. This adds their amps, and will divide the daily wear between them.

/index.php?page=arduino-ppt-solar-charger

On March 7, 2014 at 4:01pm

John Fetter wrote:

Mark - There were 11 billion US dollar's worth of motive power batteries in use in the world in 2010, that are deep cycle batteries, that have a life expectancy of 1500 cycles at 80% discharge.
There are batteries on the market that are described as deep cycle but are actually regular batteries with thicker plates.
There are also batteries on the market that are described as deep cycle that have positive plates with special alloy grids and special separators, that can achieve 800 cycles based on 2X18 hole golf duty per day.
The difference between a so-called regular and a deep cycle is more than merely the amount of lead that is put into the battery. The plates are different, the grids are different, the separators are different.

On March 8, 2014 at 11:16am

Mark wrote:

Technically, yes… but the point is, they are consumed as they are used. They are a chemical way to store energy, and will wear out - no matter how "good" they are designed. When it comes to the wear though, the wear increases for all lead-acid batteries as they approach the discharged state, deep-cycle or not. "Deep cycle" is an abused buzzword, making buyers think these can be completely discharged 1000's of times, and that simply isn't true. 80% discharged is a lot different than 90% discharged, and no lead-acid battery will survive even dozens of complete discharges.

On March 8, 2014 at 4:51pm

John Fetter wrote:

Mark - I find it interesting that you are suggesting that wear increases for all lead-acid batteries as they approach the discharged state. You might like to explain that in more detail.
You say deep cycle is an abused buzzword. Is it possible you may be reacting to misleading information that perhaps a battery distributor may provide in order to get a sale?

On April 8, 2014 at 6:36am

Bob Kennard wrote:

I am trying to power SMD 5050 LED modules inside a lightbox. My challenge is, there in no AC power. I need some type of battery soloution, but they must last as long as possible. The lights are located in convenient/gas stations in the middle aisles where there is no power. I'm open to rechargeable, but original charge needs to last as long as possible. (I don't see the everyday employees changing out the batteries as needed). It will end up being a rep which is in the stores maybe once a month.
Look forward to your comments.

Thanks,

Bob Kennard
Bark Project Management
630-964-5876
bob.kennard@barkpm.com

On April 16, 2014 at 4:52pm

shawn elliott wrote:

can you charge a 4 lead acid batterys in Serial with a wind turbind and Parallel with a solar system
wind turbind charging at 48 v
solar system charging at 24v

just thinking if you can discharge a 48v pack as a 24v pack why cant you charge it that way as well

On April 16, 2014 at 4:55pm

shawn elliott wrote:

or same set up with nife cells in place of the lead acid

On April 21, 2014 at 5:53pm

Joe Cosgrave wrote:

is it possible to create two circuits, one 6V and one 12V with two 6v car batteries?

On April 21, 2014 at 6:02pm

John Fetter wrote:

Yes - but the batteries would likely not remain in balance due to unequal charging/ discharging..

On May 13, 2014 at 7:25am

mubashir wrote:

thanks for inform

On May 23, 2014 at 5:00am

ankit dubey wrote:

hi
i have two lipo battery
(1) 3s1p;2200mah;25C
(2) 3s1p;4200mah;30C both have 1 cell dead. i want to make a combination of battery for my Quadcopter (maximum 110amp current required for four motors) from these batteries i.e 2cell of 4200mah in series with 2 cell(parallel,becomes 4400mah;25C) of 2200mah battery.
maximum current output for 2200mah=4400mah×25C=110 amp.
maximum current output for 4200mah=4200mah×30C=126 amp.
is it possible to make such combination. please help me.
thanks.

On June 7, 2014 at 10:24am

jahangir wrote:

if i have four 12Volt 100AH, i want to connect for 24volt then what will be the power?
please suggest

On July 3, 2014 at 12:45pm

Alistair wrote:

V.helpful site - many thanks.

I have been looking for an answer to this question but can't find anything reliable on the net that deals precisely with my question.

I have an isolated property with no mains power so I had installed a solar/battery system 8 years ago with 12 x 2v 750A/100h lead/acid deep cycle batteries in series producing 24v nominal. Solar charging with proper controller and Victron inverter/charger/transfer switch with generator backup.

I have been having some odd power outs recently and having begun to understand the technology (say 5%!) I got hold of a specific gravty measuring device for lead acid batteries and checked all the cells SGs when they were resting (no significant load or charge) and near fully charged. All 2v cells were at acceptable SG level and about the same SG except one at the end of the series which had a much lower SG than the rest.

From what I have read I am beginning to understand that this might happen because the first (or is the last?) in a battery bank series is subject to much greater demand/stress and so ages more quickly.

My questions are:
1.Is my understanding correct?
2. Should I switch the order of the existing batteries, placing the weakest (presently the end of series) to the middle of the battery bank? or
3. Should I replace the weak battery, accepting that it's life will come to an end at the seame time as the remaining batteries in the bank? I believe there may be 4 years+ life in the remaining batteries.
4. Same as 3 but is there a difference in SG that determines the necessity of replacing the weak battery?
5. Finally, shoudl I switch the order of the batteries say each year to achieve a more even 'wear' of the cells?

A response would be greatly appreciated and I thank you in advance.

Alistair

On July 3, 2014 at 4:24pm

John Fetter wrote:

Alistair - The cell with the low SG is probably not going to survive much longer. It is unlikely its position has anything to do with this. Have you been equalizing your cells? What I mean by this is this. It is impossible for all the cells to have identical characteristics and their state of charge will get out of step over time. The solution is to give all the cells a periodic gentle overcharge, (C/20), after they have been brought to, what appears to be, full state of charge. If the battery is not equalized the lowest cell(s) could become reverse charged during a deep discharge and suffer permanent damage.

On July 3, 2014 at 10:33pm

Thanks John. Interesting how I can pick up the wrong information, despite best research efforts.

Last June (2013) the batteries started behaving erratically with voltage collapsing only a few hours after they seemed to be fully charged. They were showing much lower capacity than usual.

What you have explained resonsates with me because I discovered last June that the solar array did not have sufficient power to put the solar battery charger into equalisation mode frequently because of the regular demand on the batteries.

I ran the generator with its charger at equalisation voltage a few times leaving a week or so between and then when charged to the max I performed two capacity tests using first a 500w lamp and then a 1,000w lamp.

The batteries showed an 8-9kw/h capacity which I thought was pretty good for them.

I then doubled the size of the array and bought a Tristar MPPT which has a logging and webpage feature that showed me that equalisation was happening for about 3 hours every month.

Despite all this, with the batteries fully charged, the first cell in seres is showing an SG of 1.150 whilst the rest are at 1.250-1.270 at 23ºC.

I conclude from your comments that there is nothing to be done about the defective cell and the best thing to do is to replace it with a new one of identical spec because it will collapse soon. Although the replacement cell will only be useful for the remaining life of the battery bank, at least it will allow the remaining cells to be useful for their normal lifespan.

I would appreciate confirmation that I have understood crrectly.

Alistair

On July 3, 2014 at 11:19pm

John Fetter wrote:

Alister - Yes.
However, it is not necessarily the battery user's fault. Cells do occasionally fail prematurely. It is this kind of uncertainty that people find frustrating about batteries.
It is important to equalize the batteries periodically and check the SGs. Adjust the equalization so that the SGs come up but don't overdo it. Overcharging causes positive grid corrosion.

On July 4, 2014 at 6:54am

Alistair wrote:

Thanks again John. Its great to have confirmation of these things. I will double check the equalisation and other charging parameers to make sure that the solar controller and generator battery charger are set up correctly.

In anticipation of your response I checked to see whether there might be any potential snags with replacing a single cell in a 2v x 12 battery bank. I was surprised to find an article in the trojan website, http://www.trojanbattery.com/tech-support/faq/ (Item 11) that states unequivocally that this is a dangerous thing to do. Are they oversttaing the risk, i.e. not taking into account of situations where all the other existing batteries are in good condition, good SGs and with plenty of life left in them?

I promise to leave you in peace after this last question!

On July 4, 2014 at 7:37am

John Fetter wrote:

Alistair - There are thousands of cell replacements in forklift-truck motive power batteries world-wide every week, performed by professionals, to keep the batteries going. If the service people try replacing the entire battery every time, they find themselves out of a job. Their customers know from experience that a single new cell among partially worn cells constitutes no problem.

On July 4, 2014 at 8:17am

Alistair wrote:

Nothing like a bit of common sense. Odd that Trojan should make such claims. Or perhaps not. Now looking for the supplier to order repacement cell.
Your advice has been absolutely terrific, thanks again.

On July 4, 2014 at 4:01pm

John Fetter wrote:

Alistair - I read the Trojan info.
I find what manufacturers say and what they do not say significant. Undercharging is a very common problem. It causes batteries to become sulfated. Accidents with batteries are less common.
There are (legal) warnings on batteries concerning explosion hazards and acid corrosion burns, no warning advising users to keep battery charged.
What you might find is that the new cell will have a higher voltage than the others with the battery near full state of charge. It may begin to gas earlier than the others and may use more water.

On August 29, 2014 at 4:18pm

Khairil wrote:

Hi, this is a very useful website. Thanks for creating this website.

I have two 12 volt 17AH sealed lead acid battery which has already “dead”. No matter how long I charge it the open voltage cell is becomes 10.8 volt after a while without any load. I’m planning to further drain the voltage of both of the battery to 6.9 volt. After that I intent to configure it in series to get a nominal voltage of 13.8 volt. For charging I will use a 12 volt battery charger to maintain the voltage of 13.8 volt. Can i do this? In a sense that I took advantage of a “dead” 12 volt battery and use it as a 6 volt battery.

On August 29, 2014 at 5:38pm

John Fetter wrote:

Khairil - No. It won’t work. Lead-acid cells will not have any significant charge below about 2 volts. You’ll probably try it anyway.

On August 29, 2014 at 11:28pm

Khairil wrote:

Thanks John.

On September 2, 2014 at 6:33am

DK wrote:

@Mike You can pick up a charge regulator at Canadian Tire for around $30. It allows you to charge one battery while discharging the other. I’m not sure if it will also use one battery then switch to the other if neither of them is charging.

On October 10, 2014 at 3:04am

chencho dem wrote:

why the cell voltage is showing higher than the rated voltage,where as our rated cell v is 2.2 and most of the cell are showing 2,5v,what could be the reason and how can we maintain the voltage.
Actually am from a Hydro Power plant and we are having 2 battery Banks with 108 cells each.Exide Battery,1820 AH

On December 20, 2014 at 12:08pm

Josep Morancho wrote:

I have in my solar system 2 AGM battteries connected in serial, 130Ah each, and I have been using them for 2 years. Now I need to increase the capacity by adding in parallel anew serial block of 2 batteries.

I have seen that for the new serial block I should use batteries of same technology and capacity and if possible from the same manufacturer.

Correct?

My second doubt is:

Should I connect together the new batteries in the new serial block or mix in every serial block one of the new batteries with one of the old ones?

Thanks

On December 29, 2014 at 2:25am

Ruparathna Amuwala wrote:

what is the advantage of gel battery

On January 22, 2015 at 2:23am

Joseph Quarcu wrote:

what will be the total voltage when a 12v and 14v battery is connected in parallel

On January 22, 2015 at 2:31am

Joseph Quarcu wrote:

I,m charging a 12v battery with 14v supply..and i have connected a voltmeter across the terminal. I want to know the value of the voltmeter will read when the battery is fully charge…
Thanks

Nick wrote:

Ruparathna: It would be easier to list the disadvantages of Gel batteries:
1) Higher initial costs
2) generally heavier
3) Cannot replace water inside if overcharged constantly
4) must use a temp sensing charger
5) There is a tight charging range to extend battery life. generally ~13.8 to 14.1Volts

There are many advantages to using Gel batteries. Here is a good reference: http://www.mkbattery.com/content_container.php?page=downloads-and-technical-reference-faq

On January 24, 2015 at 9:22pm

nathan wrote:

I need to replace 12 volt 2 amp transformer with battery cell configuration. It must be light to carry. I am willing to use a step up transformer or step down transformer if small enough. Help the me build a magic peop.

On February 6, 2015 at 10:56pm

Dan wrote:

I have just started reading into this and very rusty, alas. I am looking to create a particular series/parallel configuration. Lets say I have access to all typical household batteries and my desire is to create a series/parallel configuration that will as closely as possible supply 15V and 7A DC. How do I calculate this without testing 100 configurations and wiring possibilities? Your support is greatly appreciated.

On February 20, 2015 at 1:19am

Sanjay Khatana wrote:

I have 4 Sony 2100mah AA cells around two years old but I have not used them much.
Can I use 4 new cells same make same capacity(4 x Sony 2100mah AA) in parallel with the older ones in my Fenix TK41
Thanks

On February 20, 2015 at 4:10am

Dan wrote:

Hi Sanjay - absolutely! Just check the hold voltage of the older batteries and compare with new. If older batteries are significantly different you may need to replace.

On February 21, 2015 at 3:17am

Sanjay Khatana wrote:

Thanks a lot Dan. After charging them for sometime (not fully) I put them in the flashlight and after 24 hours all the new ones are having 1.37 Volts at rest and two of the older ones have 1.37 volts also but two of the old ones are holding 1.39 Volts and 1.41 Volts. Should I fully charge them and then compare ? I do not use the flashlight regularly and only use it for a minute or two. I plan test for a few weeks and will monitor the voltage regularly. In case the difference remains the same should I replace the two with different voltage ?

On February 24, 2015 at 3:49pm

Edwin Medina wrote:

If I have (2) 12v batteries, with the two positives terminals connected like in parallel to a device, but only one of the negative terminals connected to the device. I know that I'm only going to have 12v, and the ah of the battery with the two terminals connected to the device, but the question is: does that configuration, may damage the battery that is just connected on the positive terminal?

On February 24, 2015 at 4:09pm

John Fetter wrote:

Edwin - No. Connecting one terminal of a battery or not connecting one terminal has no effect on the battery.

On February 26, 2015 at 3:27pm

Edwin Medina wrote:

Thanks John Fetter! What are the negative effects of connecting two 12v batteries, one 7ah and the other one 10ah, in parallel or series?

John Fetter wrote:

Edwin - It is never a good idea to connect batteries in parallel. This is because they must have identical characteristics and must remain matched over their working life, something that is unlikely. Batteries can be connected in series. They must have the same ampre-hour ratings. If they get out of step, they can be given an equalizing charge - a low amperage gassing charge to bring all the cells to 100% state of charge.

On March 1, 2015 at 8:56am

Joshua Woolridge wrote:

Hello, i was wondering if two of the same battery in parallel would double their amp limit as well as mAh. Say i have two samsung inr18650 2500mAh 20A continuous amp limit batteries. Will my overall specs now be 5000mAh with 40A continuous drain? Thanks in advance.

On March 8, 2015 at 7:12pm

John wrote:

I have 4 new, 6 volt Golf Cart Batteries. I have a trolling motor 40 amps. The Batteries say 215 20HR CAP / 105 mins @ 75A

My trolling motor has a rocker switch from 12 volt to 24 volt. and it has 4 speeds no matter which of the two volts I choose.

When the rocker switch is on 12 volts it would be using my #1 and #2 batteries then on 24 volts it would use all 4 batteries.

About how long will the motor run with the switch on 12 volt and 24 volt.

How about if I wired all 4 batteries to make a 12 volt bank. and the motor would only work with all 4 batteries in a 12 volt battery bank?

I am looking on getting the longest amount of time on the lake before I have to paddle. Ha Ha… I understand speed #1 would achieve that but lets assume #4 since that is the 40 AMP setting.

On March 12, 2015 at 12:35am

Woody wrote:

Would the scenario be possible to 2s2p using 3 equal cells?

On March 12, 2015 at 9:26am

John Godwin wrote:

Woody, What do you mean 2s2p using 3 equal cells?

On March 15, 2015 at 8:22am

Jeff Gresham wrote:

where can I find the answers to the above question?

On March 27, 2015 at 12:13am

Tom wrote:

it seems pack builder making 18650 packs configure the series first. For example if the pack will be 10s5p they build the series and then parallel 5. Others suggest it's best to construct 5p1s and then connect 10 of those to end up with 10s5p. which is better?

On April 3, 2015 at 9:17am

Hmmmm wrote:

I have a Li-ion datasheet that says the max discharge for one cell is 2.2 A but the max discharge for the pack of 7 in series is 4.0 A. Is this nonsense? The current through a string of cells is the same as the current through a single cell.

On April 7, 2015 at 4:01pm

Jason Hillger wrote:

More of a ? Then a comment I have 2 12 volt batts both 750 CCA I want to run them parallel but was concerned will they draw power when the vehicle is off??

On April 7, 2015 at 6:01pm

Woody wrote:

Btw, sorry for not responding sooner.

Thanks for the response
-W-

On April 8, 2015 at 8:24pm

Edward wrote:

of course, the #3cell have to afford twice current than #1and #2 cell

On May 21, 2015 at 8:55am

Shumaim wrote:

what would happen if i connect 2v 960Ah battery with 10V 100Ah in series. What will the output and what will be the impact

On May 21, 2015 at 9:35am

John Fetter wrote:

Shumaim - If both are fully charged before you connect them, you have a 12V 100Ah battery. If you discharge this arrangement you run the risk of fully discharging the 10V 100Ah and then reverse charging it from the 2V 960Ah. This will ruin the 10V battery. If you are careful and don't fully discharge, sooner or later the 2V 960 Ah will end up discharged through self-discharge, because you will not be able to keep it sufficiently charged without overcharging the 10V 100Ah battery
Not a good idea.

On June 17, 2015 at 4:27am

Simon wrote:

Here is a question that's really baffllling me…

I have 2 x 12V 80Ah Batteries. I have them setup up in Series to handle my INPUT from a 24V Charge Controller. Effectively giving me 24V @ 80Ah. My load is a 24V DC to AC inverter.

I have a 12V DC pump. I can connect the 12V pump to the first battery + and -.

QUESTION (before I blow up): Can I connect the 2 x batteries in BOTH Series and Parallel to get 12V 160 Ah on the first battery + and -.

Great forum guys!

On June 17, 2015 at 5:22am

John Fetter wrote:

Simon - You have two 12V batteries in series fed from a 24v charger. The batteries feed into a 24V inverter. So far, so good. You must not connect the batteries to the charger, nor the inverter if you have them in parallel. You must not connect a 12V load to only one of the batteries. The word BOTH makes your question ambiguous. Let me guess. You are planning to disconnect both batteries from the charger and the inverter. Then, after they are disconnected, you want to parallel them and drive the pump. That will work and it will drain your batteries. If you leave the charger connected you might damage it. Depends on its design.

On June 17, 2015 at 5:39am

Simon wrote:

Hi John,

Thanks for the quick reply…

I can explain further…
I have 24v Solar panels connected to the 24v charge controller.
I have a connection from the 24v charge controller feeding the 2 x 12v batteries setup in series.
I have a connection from the 24v + and - to the 24v DC to AC inverter. ALL OK.

I can run the 12v pump no problem just using + and - on one of the 12 v batteries. But I am trying double the run time to get 160 Ah at 12v.

I have drawn the schematic for the BOTH series and parallel on only 2 x 12v (looks complicated) and I cannot find any other resource on the internet where someone else has done this with ONLY 2 x Battery. Every other configuration using BOTH series and parallel consist of 4 x batteries.

My plan was to leave everything connected and just connect the pump on only one battery + and - as and when needed.

On June 17, 2015 at 7:26am

Simon - You will shorten the life of your batteries because one will become permanently undercharged and the other permanently overcharged.

If you can, I suggest you build a simple 24V in - 12V out power converter. A transistor, (probably an FET) switch with a permanent 50% on, 50% off duty. The switching frequency can be a few hundred cycles. You need a freewheeling diode across the motor. You can feed the motor directly with the square-wave. The motor will make some noise but that does not matter.

On June 17, 2015 at 8:57am

Simon wrote:

Thanks John, for your sound advice, just looking at 24v to 12v DC converters now!

I really appreciate your sound knowledge in this regard!

Keep up the good work!

Regards

Si

On June 22, 2015 at 4:31am

raymund richie moises wrote:

Hi..
I have a battery car 12v…and im not sure in there ampere?my battery is 3sm MOTOLITE.CAN somebody answer me?tnx..

On June 22, 2015 at 5:15am

raymund richie moises wrote:

I'm trying to build a power supply using 12volts battery(4d-motolite truck master) and connected to my power inverter (1500 watts12v dc to 220v ac).
The dc voltage drops to 10-11volts..and ac voltage drop to 135volts..
When i try to use a power drill that have specs(220v,700 watts,3.1 amps.)
Can someone explain what just happen?can i use 2 12 volts battery paralleled?

On June 22, 2015 at 5:42am

John Fetter wrote:

raymund - It would seem that your battery can't handle the drill's starting current, causing its voltage to fall, in turn causing the drill to struggle, in turn drawing more current. It is also possible your inverter over-current protection is kicking in, causing the drill to struggle, in turn trying to draw more current. Try using two 12v batteries in parallel. If this does not help, you will need an inverter with a higher peak current rating.

On June 22, 2015 at 7:51pm

raymund richie moises wrote:

Thanks john..is it possible to parallel 2 pcs 12vs battery (size: N150/4D, AH: 70 , RC: 270).it will not over heat or explode?

On June 22, 2015 at 11:06pm

John Fetter wrote:

raymund - I am not a battery salesman and I don't walk around with battery type numbers in my head. You can parallel identical batteries.

On June 24, 2015 at 1:46am

Yves Landon wrote:

Dear John,
I would very much appreciate your input or that of the experienced members to advise me whether I can proceed with series/parallel connection for the following equipment, and to let me know if there would be any risk of battery explosion if such series/parallel is implemented for the following scenario:

Current Situation
- 1 x 8 KVA INVERTOR/UPS
- Input voltage: 96v
- Output: 220v
- 22A max

The equipment is currently connected to 8 x 12v lead acid batteries of 200 AMP each, in series in order to supply the 96V input power.
No parallel connection so far meaning that I only have 200AMP storage out of the 8 batteries which is a bit a waste of resources and certainly a huge cost.
Knowing that the invertor is connected in offline mode to the grid, it provides a backup power of around 8 hours per day. The batteries are now 2 years old and during the 1st year I used to

built in charger and it used to take 12-16 hours to fully charge the batteries.

Question 2: if I can proceed with the series/parallel connection to the maximum available amperage (8x200=1600AMP) without any risk, I would replace the batteries with a lower amperage for example 50 AMP to obtain a total of 400AMP (8x 50) and I can still double the power time with much less cost, can you advise me of such set up, and would there be any risk of whatsoever?

Sorry for the long message, I would very much appreciate your feedback and thanking you in anticipation for your hard work.

Best regards,
Yves Landon

On June 24, 2015 at 1:53am

Yves Landon wrote:

Typo correctio
Invertor corrected into inverter

On June 24, 2015 at 5:42am

John Fetter wrote:

Yves - Connecting batteries in parallel is not simply a matter of connecting the same voltage and the same ampere-hours. They must be an identical type of an identical age. Battery performance is never identical. They might seem to work fine for a while but then some will start falling out of step with their partners. This will get progressively worse. The self discharge rate and the end of charge voltage will change more for some than for others. You will find that the charge present in individual batteries will drift apart. There is no easy solution. It is highly likely you will regret using batteries in parallel. You will end up juggling their position, trying extra charging on some, spending endless frustrating hours on an avoidable mission.
When batteries are connected in series, they also start falling out of step but this can be fixed by giving the whole string a periodic light current overcharge called an equalizing charge.

On June 24, 2015 at 8:57am

Yves Landon wrote:

Thank you very much John for your prompt feedback. I guess I have to stick to the simple series connection. BTW, all batteries are of the same type, age and brand. But we are never sure how each cell will behave therefore being of the same type and voltage doesn't seem to guarantee equal operation.
Cheers,
Keep up the good work.

On June 25, 2015 at 5:39pm

Mark Berlou wrote:

Problem: My camera takes 2 AA batteries. I want to take time lapse and motion detection photos while camping. This requires more battery capacity than 2 AA's will provide and I'll have no recharge available.

Solution: Make a battery pack of 4 parallel sets of AA's in series. (2AA's in series)x4 in parallel for 3 volts and 10800mAh. One set of AA's will be inserted in the camera wired to the other 3 sets externally.
My plan is to hike in, set up the camera, plug in the battery pack and let the camera run for an extended period. All batteries will be alkaline Duracells.

Question: could I use C or D cells for the external pack? Example: (2 AA's in series) wired in parallel to (2 D's in series) for a total of 3 volts and 14700 mAh, then the 2 AA's would be inserted in the camera.

On June 28, 2015 at 2:12pm

llamudos wrote:

Hi all,

Firstly great site!

Now the nitty gritty. I'm building an ebike from scratch as a project as im bored and need some advice on a couple of things i dont fully understand yet.

I'm going to get a 48v 1000w hub motor and need a battery that wiil provide enough power to last a while. My thought is building a 13s14p cell pack using 2600ah li ion cells 3.7v. (13*3.7 =48.1v) - (2.6a*14=36.4ah). This would theoretically provide me with a 1747.2watt battery pack. From what i have read an ebike run at full throttle should use 20w per km. So that would mean i could use this battery for 87.3 km roughly. Please adivice if this is wrong. My question is about the amperage. Should i purchase a 60amp controller and a bms that can handle 60amps as well? My thoughts was to have double tolerance for safety. As im not an electrician and new to this i want to get a complete grasp on the theory. Also if the battery cells only have a 2c rating will this cause issues with safety when at top speed going up hill?

On June 30, 2015 at 1:16pm

Tom wrote:

You be far better off posing you question on endless-sphere.com A hangout for those building eBikes and battery systems. That's one huge battery to haul around on a bike.

Michael wrote:

What would happen if you used a serial/parallel configuration, but one of the batteries was installed backwards?

On July 2, 2015 at 5:15pm

Dr Jack wrote:

Hi Michael

You have done this, made a mess and now you want to know why you made a mess???

On July 2, 2015 at 5:46pm

Michael wrote:

Dr Jack,
No mess. I haven't actually done it. Just worried about a potential mess in case someone does. If you switched polarity the 11.1V terminal and a 3.7V terminal would be right next to each other. I assume that means that the 11.1V would try to charge the 3.7V and the 3.7V would get very hot. Does that make sense?

On July 5, 2015 at 5:42pm

Mark McDonald wrote:

I am looking for information on when you parallel batteries (I learned that it increases my Ah.)

Li-Ion batteries for example. If I am looking for a certain Discharge Rate (C-rate), of lets say 50Acont. and 100Amax. When I start putting batteries in parallel, of lets say 40Acont and 80Amax Discharge Rate, does putting batteries in parallel increase my Discharge Rate? Does it double it?
I can see how when you parallel, the "streams or pipes" add up, so in my mind I would say the Discharge Rate would just keep adding up, more and more, the more you parallel batteries.

Any help would be appreciated. Thank You

On July 8, 2015 at 4:14pm

Dr Jack wrote:

Surely you are just messing around? No one in his/her right mind asks these kinds of questions.

On July 8, 2015 at 4:51pm

Thomas Jaszewski wrote:

Kinda n00b questions but we learn by civil answers…

On July 8, 2015 at 5:22pm

Dr Jack wrote:

The answers can be found at the top of this page. Surely we amount to more than a torso, a head, two arms and two legs?

On July 8, 2015 at 5:32pm

Thomas Jaszewski wrote:

The information is overwhelming to someone new. At least point it out. Being helpful is OK. Sadly I'm not far enough along to directly address..this thread is awful. Poorly organized too.

On July 9, 2015 at 12:02am

Dr Jack wrote:

If my response had provided all the requisite technical information, I would effectively have chosen the high road. I chose the low road in order to find out if someone might jump in to berate me - or chose the high road and provide the requisite technical information.

Michael, Do not connect the batteries in the way you described. Your suggestion will cause a massive current surge and perhaps an explosion.
Mark, Connecting batteries in series is easy. Connecting them in parallel requires special care to make sure they are precisely matched.

On July 9, 2015 at 7:41am

Thomas wrote:

Dr Jack wrote: " I chose the low road in order to find out if someone might jump in to berate me"

Mark, there are a lot of variables in your question. You don't mention which batteries, how you are building the pack, what your configuration is, voltage goal, and more.

Try being a bit more forthcoming in providing information. I can also direct you to better places for assistance if we know ore about what exactly you are trying to do.

On July 9, 2015 at 7:58am

Michael wrote:

Wow, that got a little out of hand. Let me get more specific. I have a design where I have 4 lithium ion batteries in series/parallel. I don't have a mechanical feature that prevents installing one of them backwards, so if one is installed backwards that would put them in series, but 3 would be positive and one would be negative. I'm just trying to confirm my assumptions that the 3 batteries (11.1V) would try to charge the one battery (3.4V) and cause the 3.4V to heat up and eventually catch fire. To fix this I put a diode on each series leg of the parallel circuit. What do you think about that solution? Would using 4 series NiMH be better?

On July 9, 2015 at 12:57pm

Mark McDonald wrote:

Well I found the information I needed elsewhere. RC Forums.

The C-rate (cont. & max) are the same, they cannot be change within the battery.
However the total Amperage cont and max of the outgoing "stream" does increase.
So in my example 40/80A, would be 80/160A (cont./max)
There is no need to give out voltage or configuration info, as this is basic circuit knowledge. But I am either using Li-Ion or LiFePO4, at 72V and 10Ah packages. I will parallel them to increase the range. My RC Lipo with high discharge blew up and caught fire on July 1 Canada day and almost burned down my house. Highly discharged battery, below spec, and charged too fast. They expanded, expelled gas and within 5 minutes 2 packs burst into fireworks catching the other 4 batteries on fire. RC Lipo is very dangerous, very. DO NOT USE LIPO BATTERIES. THEY HAVE BEEN KNOWN TO BURN DOWN HOUSES!!!!!!

But yeah, I believe you need to keep the chemistry, V and Ah the same when paralleling. But I dont think its the end all be all. I believe there is some lee-way.

On July 9, 2015 at 4:30pm

Dr Jack wrote:

Four batteries in series parallel implies two in series, another two in series, the two series connected pairs then connected in parallel. Reversing the polarity of one battery in one series connected pair reduces the voltage generated by that pair to zero - equivalent to a short circuit. Placing this arrangement in parallel with a pair of series connected batteries causes a short circuit current to flow. Connecting a diode in series with each series connected pair allows a discharge current to flow but prevents the batteries being charged. This applies to all types of batteries. I mean no disrespect but I really do find it disconcerting that people can operate a device as complicated as a computer, yet cannot reason out a simple thing like this.

On July 16, 2015 at 9:01am

Thomas Jaszewski wrote:

Sadly, Dr Jack, some of us have no backgrounds even remotely related to electronics and electrical setuos. I'm able to identify bacteria under a microscope but for whatever reason get totally befuddled by battery layouts. I need pictures and diagrams to sort it out. Having had a series of TIA's and a stroke made it nearly impossible to sort verbally. But with help I'm learning to build packs that are safe and work. But again I usually need to ask someone to help me "map" out the wiring of the balance leads and BMS. I have a similar experience when I instruct someone in horticultural techniques. It seems second nature to me but then I have 45 years of experience and knowledge gathering.

C rate is another totally confusing concept for me. Thanks to those who are patient and understand that not everyone has the same skills, I'm learning

On July 16, 2015 at 5:45pm

Dr Jack wrote:

Thomas, you're right about experience. However, if one crosses into another discipline, surely it is that very experience that teaches one that preparation is essential and that jumping into something new and crying for help when things don't work out would not be the right way to do it. It assumes entitlement and an obligation on others.

On July 27, 2015 at 1:26pm

Shawn wrote:

I just purchased a SeaDoo Seascooter (underwater scooter) that has a 12v 12mAh sealed lead acid (SLA) battery. I was thinking of constructing my own battery to get slightly higher speed (voltage) and distance (mAh). I realize that motor is designed for a 12 volt battery, but slightly higher voltage (around 14 volts) would probably be acceptabel.

Example of what I was thinking: 4 x Lithium Ion AA 3.6 volt batteries in series = 14.8 volts and then 5 parallel groupings to equal a 14.8 volt and 15 Ah battery back. This would give me a slightly faster scooter and longer range. Would something like this work?

On July 27, 2015 at 5:48pm

Mark Mcdonald wrote:

Ion (~3S or 4S), or LiFePO4, or a123 cells. Remember to also buy a charger for it. Most chargers need a DC power supply.

On July 27, 2015 at 11:38pm

John Fetter wrote:

Shawn - Your focus is on batteries but your idea will create problems with the motor. The torque developed by a propeller that is running at optimum speed in water will rise with the square of the speed. Motor speed is proportional to motor voltage. Motor torque is proportional is proportional to motor current. The motor can undoubtedly handle the extra speed but it is highly unlikely it can handle the extra current. It will most likely overheat.

On July 30, 2015 at 2:24pm

Chrisc wrote:

I am looking for a definitive answer please on serial and parallel battery connection.
Is it possible to series and parallel 16 x 100AH AGM batteries achieving 48V and 1600AH - 76.8kWhr's of storage??
Some say yes some say no. Help Please.

On August 26, 2015 at 12:10pm

Capt.Waris Shaheen. wrote:

Dear Chrisc,
You have not mentioned the voltage of AGM 100Ah battery, if I assume it to be a 12V DC 100Ah AGM battery, then it is not possible to get 48V DC 1600Ah because we can only get 4 parallel strings of 4x100Ah batteries connected in series thus giving us 48V DC 400Ah only.
If I assume the voltage of AGM 100Ah battery to be 48V DC, then it is possible to get 48V DC 1600Ah 76.8KWh by connecting all 16x100Ah batteries in parallel.
Energy output = 48x1600 = 76.8KWh

On September 2, 2015 at 9:43pm

Ruby wrote:

What's the difference between voltage and current?

On September 29, 2015 at 7:01am

jj wrote:

is it possible to charge a NiMH and NiCD that is conneted in series ??

On October 6, 2015 at 8:54pm

Michael wrote:

Hi,

I'm working on a project. I have 4 lithion recharged batteries 3.7v each with 5000 mAh .. if I concet them in series i will get 14.8V at 5Amp how do I lower it to only 1.4Amp ?

Thanks

On October 8, 2015 at 12:41am

Capt.Waris Shaheen wrote:

Dear JJ,
Yes you can charge both the batteries when connected in series if:
1- Both are of same voltage and amps capacity.
2- Charging source voltage should be sum of the voltages of the two batteries.
Regards

On October 8, 2015 at 12:44am

Capt.Waris Shaheen wrote:

Dear Michael,
This not possible/advisable because individual battery is 5Ah.
Regards

Jim wrote:

Nice site! I've read elsewhere that exceeding 3 parallels in battery banks has greater risk of fire or explosion. I'm trying to get 4 banks of 8 6V batteries (so, each bank is 48V) charged, then fed to an inverter. I'm pretty sure with virtually any MPPT chargers currently on the market, I will need two chargers, each charging two of these banks. My question then is, can I safely input the four 48V banks to a single inverter (8kw) which takes 48V input, by putting all 4 banks in parallel, to this one inverter? The math works out, but this requires tying 4 banks in parallel, even if right at the inverter input bus, The reason I'd rather avoid using two or more inverters is the cost (especially as I need 240V, so they must be matched/bonded), or to be safe, must I just accept the necessity of using two inverters so as not to exceed two battery banks feeding each inverter?

On October 16, 2015 at 8:54am

Jeff wrote:

My portable has rechargeable aa 1.2v 2300mah batteries.
Can I replace them with a 2400mah or greater for longer life?

On October 27, 2015 at 11:28pm

dhananjay wrote:

yes u can replace it Jeff but be sure the voltage should be 1.2v only.

On October 27, 2015 at 11:49pm

John Fetter wrote:

Jim - It is a bad idea to parallel deep cycling batteries. They are unlikely to have identical characteristics to begin with and will get out of step with each other within a few months. Some will end up overcharged, some will end up undercharged. Battery life will be reduced. This line of business has become highly competitive. The technically challenged among the competitors will will say it is OK to parallel. It has nothing to do with fire, explosion. There are inverters on the market that you can safely parallel.

On November 8, 2015 at 7:42pm

Connor wrote:

I understand the basics of this but I had a question about a project I want to do. If I have a bank of batteries with 12v and 80Ah and I connect it in parallel to another bank with 48V and 20Ah would I get one bank with 48V and 100Ah.

Thanks, Connor

On November 11, 2015 at 4:48pm

John Fetter wrote:

Connor - It is a very bad idea to parallel batteries that obviously have different ampere-hours and therefore have different characteristics. It is not about numbers but about battery characteristics. The batteries are likely to react differently to a load and to charging and are likely to get out of step.

On November 15, 2015 at 7:59pm

Luke wrote:

Need a little help. I have 6 3.7v batteries hooked up in parallel series to make 11.1v so it 3 in series connected parallel. Positive wire to negative. How do I set the charger? Here my options For 7.2/7.4V 2-cell pack, set switch button 8.4 position on the charger For 10.8/11.1V 3-cell pack, set switch button 12.6 position on the charger For 14.4/14.8V 4-cell pack, set switch button 16.8 position on the charger* here is my charger http://www.amazon.com/TLP-2000-Tenergy-Universal-Charger-3-7V-14-8V/dp/B001BEXDRQ

On November 17, 2015 at 8:37am

chawki kulmie wrote:

what are the disadvantages of cennecting batteries in series/parallel

On December 27, 2015 at 7:17pm

muhammad wrote:

which electric circuit element can induce magnetic flux and why

On December 28, 2015 at 6:38am

sanaullahshuaib wrote:

Two 2100mah batteries would produce 4200mah for long time voltage transmission

On December 28, 2015 at 10:53am

navin lessing wrote:

what is the charging voltage and current for a 12v 7.2Ah Li-Ion battery

On January 3, 2016 at 11:45am

Richard wrote:

If one lithium battery at 12 volt has 100 amp recommended charge rate, does 2 of the same in parallel charged together have 200 amp charge rate?

On January 11, 2016 at 7:25am

T.N.Sheshadri wrote:

I have done 3KW solar power generator for home. Battery getting charged by 2.30 -3.00 pm everyday. I have used 48 v system with 12V 200Ah 4 batteries in series combination. In night, I want to charge my REVA Electric Car and battery is going to Low cutoff value (10.8V/battery) and power is switching off in night. I plan to increase capacity from 48V 200Ah to 48V 300 Ah in Series and Parallel combination and improve the power discharge REVA car consumes 3-4 KWh units of electricity every day.
Please suggest any alternative for my requirement. How much battery to be discharged every day for long life of battery? Can I use 7.5 Kilo watt Tesla battery? Please suggest remedy.

On February 10, 2016 at 12:15am

ray wrote:

I am trying to build a battery pack for an e-bike conversion, the motor uses 1000W and is a 48V system. I want to use some salvaged lithium batteries I have been collecting from work. Target battery pack size is 20Ah / 48V DC. The battery packs which I am getting from work are designated as 14.8v dc, 6.15 amps, and 91.02Wh. I have already opened up a pack and know there are 12 18650 lithium cells inside…....unfortunately no info is written on the cells. I measured them and all are at 3.65v dc. If I do the math with the above pack parameters then each cell would have a capacity of 2000mA and a nominal charge of 3.7v. To get to 20Ah for the battery I would need 9 serial strings in parallel, I think the annotation is 13S9P, 13 serial and 9 parallel strings. 121 batteries total…....does that sound correct? Is there a test I could do to really determine the Ah capacity of a cell rather than rely on the documentation on the pack?

On February 13, 2016 at 12:28am

MK wrote:

If We have two groups of batteries in parallel ,each group consist of 9 batteries in series .
the system is 110 Vdc.

because of one defected battery in the second group & the non-ability to disconnect this group from the battery dis-connector.we will disconnect the battery only from the group & keep its circuit open.also open the loop in many another points .

But finally we will keep the positivist connected to the first battery
the negative connected to the last battery & all in between open.

is this right,what is the side effect to the second working group,...

On March 7, 2016 at 3:07am

NabuN wrote:

Hello to all,

For Ray :
1. I had one e-bike with AGM 3x12V 10Ah defective battery, 36V system.
After long tests, I upgraded the battery box in dimensions, voltage
and capacity with AGM 4x12Vx (2x7Ah) + 1x6V (2x7Ah) = 54 V 14Ah, batteries
for UPS, high rate. My chinese controller supports 60V with no problems,
after I changed all electrolytic capacitors to 100V (and Power FET to 80A/100V).
Now, I have 4 years of use for my e-bike and the 350 W hub motor (only..)
can push me to 35 Km/h. The range is ~ 30Km, because I like speed
[I am from Romania and the bike was made in Hungary, I presume].
So, in your case, I do the math : 48V / 3,7V = 13 cells in series
20Ah/2Ah = 10 cells in parallel
You ~right, you need 130 good cells 18650 Li-Ion, it is a 13S10P battery.
It goes OK with 12S10P=120 cells, or 13S9P=117 cells, but range is reduced.
12S10P it gives more range compared to 13S9P, but lower maximal speed,
in my opinion. Maximum voltage after charging is 4,2V x 13 = 54,6 V (for 13S10P).
The range and life for battery is affected by the Voltage disconnect of the controller,
of course. The controller accept 60V with no problems, so looks OK to me.
2. Until 2012, I tested my batteries by discharging ~ 50% with a 12V 21…55W halogen
bulb from car, a clock and an ammeter. Then, I get one “Watt’s up meter” for RC
hobbysts which ease the measurements with my old bulbs !

On March 29, 2016 at 2:01am

Amin wrote:

In figure 3 and fig 4 , can charge it? Even one of those are not equal to each other batteries.

On March 29, 2016 at 10:48pm

Shola wrote:

I have a series/parallel battery pack made up of 6 12V 200AH/10HR batteries (2S3P setup). My questions are as follows what will be the ideal charging current for the setup, secondly will the charging current be the same at each +ve terminal and finally is it true that one set of batteries will get fully charged/discharged before the other or they get fully charged/discharged at the same time. Thank you in advance for your enlightenment.

On March 29, 2016 at 11:51pm

John Fetter wrote:

Shola - Batteries that are connected in series automatically always carry the same current, (at each positive terminal), regardless of whether they are being charged or discharged.
They will have slightly different ampere-hour ratings due to tiny differences in materials, in processing, and so on, incurred in manufacturing. They will also possess slightly different self-discharge rates for the same reason.
They will get out of step very slowly, over time. Hence some will become discharged while other still carry some charge.
It is something that is easily overcome by giving the entire string a low current overcharge from time to time. This is called an equalizing charge. The first to become fully charged will gas until the last becomes fully charged. After that all the batteries will be in step again, at least for some time.
Sealed batteries either cannot easily be be equalized or cannot be equalized at all, hence their cells become hopelessly unbalanced, hence they have relative short lives.

On March 30, 2016 at 1:58am

NabuN wrote:

Amin wrote: In figure 3 and fig 4 , can charge it? Even one of those are not equal to each other batteries.
Yes, you can ! With some extra work, of course. □
Like humans, batteries are not identical each other. I consider in this case only batteries of same capacity, voltage and mark, in state of order. This means their real capacity is over 80 % of marked capacity and they have different state of charge .
In series, the charge current will bring at full first the weakest battery, theoretically. For safer charge, you must monitoring the battery/cell with the highest voltage, (the voltage to not overcome the upper limit recommended). “The weakest element of the system will give the strength of the system”. So, you must remove the weakest element to not have complications and problems in next future, and to ensure a good performance of the string.
In parallel it’s easier, the strongest battery will help the weakest. They would last longer. Before connecting in parallel, it’s fine to verify each battery for self discharge or even internal shorted battery, to not deplete the good ones (defective batteries/cells).
In my solar system, from 2011, I use over 50 batteries mixed connected, usually in parallel when I need 30V and 10A….30A for lighting and 1,2 kVA inverter & UPS , and in series, 180V DC, (for circular saw and tools at 230V with universal motors, enough to work satisfactory). Since 2013, each year, 1…2 batteries, the oldest, had to be removed, which is quite normal, I think.

charged/discharged at the same time. Thank you in advance for your enlightenment.

Ideal charging configuration it's the 2 groups in parallel (12V), because all batteries will have the same voltage. But it's not easy to change the connections with thick wires and screws two times at every cycle, I believe…

So, you have 2 groups connected in series of 3 batteries in parallel, each.. In accordance with the manufacturer's specifications, recommended charging current will be, I suppose, 10% of the battery capacity. For 2S3P setup, the bulk charge current will maximum ~60A, and voltage will not overcome 28V, usually. A smaller current will be fine, 40..50A.

As I said at the beginning of my post, the two branches currents will be close, should not differ by more than 10%, let's say 24A and 26A it sound OK for 50A charging.

When charging, especially during equalization, batteries will reach almost the same voltage each. The lead and NiCd batteries have this feature.

When discharging, the weakest group of 3 batteries will have the lowest voltage, so you need to stop discharging at a voltage higher than the limit, let's say 11,8V under maximum 60A load. It's good to not discharge more then 30..50 % of battery capacity to achieve a long life. Read the manufacturer's recommendations, I learned a lot from these datasheets. □

Have a good work !

On March 30, 2016 at 2:48am

John Fetter wrote:

Shola, NanuN - If batteries are connected in parallel, they will get get out of step and will progressively get more out of step. Some of them will fail prematurely, regardless how the entire group is charged and/or discharged. The only viable solution is to disconnect, give each series string an individual equalizing charge, and do this on a regular basis.
Connecting batteries in parallel is a very bad idea. Solar vendors will cheerfully sell these configurations because the competition is fierce and they automatically look for the cheapest batteries to sell. There is a bigger turnover in smaller batteries, hence these batteries are less expensive in parallel than unparalleled bigger batteries. I have a solar backup and use a high ampere-hour non-paralleled string, which I purchased regardless of what the salesman was trying to sell.
A proper solar controller will automatically seek the maximum power point, and then charge the batteries in bulk mode (at maximum power), then absorption mode (voltage limited), and finally float (reduced voltage). It is a good idea to limit bulk charging to C/5.
NabuN - Batteries/ battery cells on equalizing charge never develop the same voltage during or immediately upon completion.

On April 10, 2016 at 2:09pm

Neel wrote:

Great info thnx guys.

I have a solar system with 24v charging using 2 x 12v 100ah batteries in series. One connected to an inverter, the other to lights. They have different discharge rates and are at different voltage levels at times. Is it good set up or do we have a problem.

On April 10, 2016 at 2:29pm

John Fetter wrote:

Neel - Very bad idea. You are destroying your batteries.

On April 17, 2016 at 11:29pm

nate wrote:

hi there just wondering if its a good idea to connect a motorcycle battery and a car battery in parallel to increase the life time of the battery pack I build, thanks in advance

On May 3, 2016 at 10:19am

GEORGE COBBINAH wrote:

Hi, I will be very grateful if I can be educated on whether batteries in a parallel connection will continue to loose charge even when not in use.
Thanks in advance

On May 3, 2016 at 4:46pm

John Fetter wrote:

George - Batteries connected in parallel do not loose charge when not in use. There is nowhere for the power to go. I personally would never connect batteries in parallel. Batteries are never identical. They get out of step. If they are connected in series, they can be equalized. If they are connected in parallel, they cannot be equalized.

On May 4, 2016 at 1:10am

GEORGE COBBINAH wrote:

I have some questions to ask and will be very happy if the knowledge gurus will assist me, thanks

1. Why do parallel cells get exhausted easily when not in use?
2. Why does the same amount of current flow through each individual resistor in series
   but a different amount flows through all in parallel?
3. Why does the voltage differ across resistors in series but the same across all in

On May 4, 2016 at 2:38am

John Fetter wrote:

George - 1, 2 & 3. Vide supra. The answers are on this page. On the other hand, you may be doing something irregular with your batteries - the batteries don't like it - you are looking for explanations.

On May 14, 2016 at 4:56am

Nikola Raskovich wrote:

Hello. I understand the series addtion of volts and the parallel addition of amp hours but my question is what happens to the resultant continuous current or max current that a battery can handle in the following configuration example:

If a single 12v lithium 80ah battery has a continuous current rating of 80 amps what would happen to the continuous current and max current ratings of the new resultant battery where 6 of these are connected in series to have 72volts and another 6 are added in parallel to have a total of 480 ah? Do the continuous and max current ratings also go up and would it be 480 amps?

Thank you in advance.

On May 25, 2016 at 10:42am

fahad wrote:

I have installed off grid solar system at home. Its 24v system. After two years all of a sudden battery backup time reduced to 40 min. I checked the voltage of both batteries . battery B voltage drops quite quickly during on load condition. While on full charge condition both batteries have the same voltage. One if my friend was saying that after changing these batteries switched off the whole system for 3 t 4 hrs and let batteries to settle or balance. Please help me in this situation , what should I do with AGM batteries

On June 13, 2016 at 5:40am

B Wolfe wrote:

I have a Asus tablet that quit charging, my husband checked the battery, the volts are supposed to be 3.7 but it tested 3.2. Could this influence the tablets ability to charge?
I would rather replace a $40 battery than pay a $200 service fee.

Thanks, Brenda

On July 5, 2016 at 12:50am

Frederick wrote:

I have 7 battery is it possibla to connect all of them in serial

On July 6, 2016 at 10:49am

Frederick wrote:

I HV 7 batteries of 12v can they be connected in series

On July 11, 2016 at 10:04pm

NabuN wrote:

@ Frederick
Sure you can. But…why you connect them in series?... You need to take precautions when use over 48V DC voltage. Like I wrote upper, I use 30 V DC at our off grid country house and 2…3 times by week I need 180 V DC. I had some issues, especially when the standard switch used for 230 VAC has burned out at the disconnection of a 2 KW leaf blower. Then, I mounted some suppression circuitry.
In your case, for charge and equalize all batteries in the same time, you need to put them in parallel, like I do since 2011. It requires 7 times less attention concerning monitoring charge voltage.
@ Brenda
Your Li-Ion battery seems to be OK if the voltage is higher than 2,8…3 V. So, first, I suspect the external AC adapter / connector of the tablet. The ability of internal charger did not depend on battery voltage, it's monitoring the voltage and current thru battery. Second, maybe your battery is defective, I understand it's removable. Try to change one by one with somebody who have same model tablet.
@ Fahad
Battery B seems to be defective. If you let batteries few hours free, the voltage will drop a little and you can measure SOC voltage. But this does not help the end-of-life battery B. From my experience, I prolonged the life of weak AGM batteries by watering them. But I did not gain much time, sometimes a week, maybe one month. The corroded cell(s) / bridge will heat, reduce the external power supplied and make smell and boiling bubbles sounds when you connect 20..30A load to this battery. I even tried to make 10V battery removing / shorting the defective cell and I learned it not worth to do this. Usually, flooded and gel batteries have a longer life.
You need to buy a new pair of batteries for the solar system, same model, mark, date of production. The low cost solution, at your own risk: measure the real capacity at discharging of battery A and buy just one AGM battery of this capacity….and monitor both frequently and attentively at charge / discharge. If the capacity of A battery is lower than 85..90% of marked capacity (Ah) this solution don.t worth to be implemented, because battery A will soon be defective, like her "sister", B.
@ Nikola

If you want a 480 Ah battery with 480A (!!) maximum rating current from these 6+6 batteries of 12V, you configure them in 2 groups in series, each group containing 6 batteries in parallel. So you'll have only 2*12V= 24V.

On July 17, 2016 at 12:30am

shL wrote:

I have the state space equation of the 2V lead acid battery and I want to connecting 6cells in series. How can I determine the new state space equation?

On August 3, 2016 at 9:58pm

Abdul wrote:

(a) A unit Li-ion cell/battery has average discharge voltage (3.8 V), resistance (75) and capacity 5 Ah. Integrate as many Li-ion cell/battery required for developing a Li-ion battery module which can produce 120 V and 150 Ah.

On August 31, 2016 at 2:40am

prady wrote:

i have to to use a maximum of 48v, cell may be one or more then one,
for the maximum power what should i do &how; should use them

On September 1, 2016 at 10:27pm

Anthony wrote:

hello, need some help.
I have an outdoor motion light in my drive way. it's using 4 C battery's, and would like to get a wall adapter. What voltage adapter should I get? I can get one that change from 3, 5, 6, 8, 10, or 12.
Thank you in advance.
-Anthony Mendonca

On September 10, 2016 at 12:05am

NabuN wrote:

Anthony : 8V seems to be OK; you must verify the voltage on all 4 batteries in series (the pack)
to not raise over 1.6 V / cell (6.4 V- the pack) AND the charging current must be lower then
~ 4000mAh/4 hours charging = 1 Amp. , with ~(8V-6V)/1A= 2 Ohms power resistor. Of course, 4000
mAh is the cell capacity.

On September 10, 2016 at 9:46am

Robbo wrote:

Anthony
Your question does not really give much info. 4 x 1.5V can be 6.0v in series or 1.5V in parallel. You will need to check how they are configured
If the light unit is equipped with an external jack it should have on it the voltage and which part of the jack is negative.
If you need to replace batteries, you can simply buy a set, and replace them when dead.
If this frequency is too often then go hard wire as it seems an over kill to run a charger cable to the light for charging batteries instead of hard wiring the light, direct

Robbo

On September 14, 2016 at 10:29pm

Veng Mazwi wrote:

Hi, can two 12vdc batteries of different Ah, (150AH / 200AH), be connected in parallel for increased Ah capacity (350). To be charged by 2x150W Solar PV panel via 30A solar charger regulator for lights and entertainment, in an off-grid set up? I use a 900VA Inverter.

On September 15, 2016 at 3:05pm

Pete wrote:

hello,

I want to stack 4 car batteries on top of eachother in order to put them in a case. Is that even possible?
Cheers

Robbo wrote:

@ Veng…….mmmmmmmm Yes you can but they wont last long
options
A) get another battery that exactly matches the old even to the state of Decay, or get 2 new is best
B) get another solar array and split your unit in two

@ Pete…..... Never seen anyone STACK batteries, weight is one issue and air space of 50mm around for ventilation and cooling may be a problem. Battery boxes are normally made with this space allowed for as on hot days the batteries are even hotter, which increases the resistant which increases the heat the list goes on. In RVs the box needs to be constructed strongly to stop batteries flying around and arcing out(High Amps BIG sparks) and have 3/8 rubber pad for reduced vibration heat ransfer, and have a screw down frame on each battery, so as NOT to pull out terminals. Batteries are heavy and create high forces especially if the vehicle rolls or crashes. You dont want 100Kg batteries flying, then the Acid.

Batteries need to be inspected regularly, even maintenance free must be checked monthly (Excide Aircraft Gel types stipulate logging each cell and checking torque of terminals each month for warranty, how many of us do it. BTW Solar is more EFFICIENT on a cooler day often with scattered cloud, although the unit wont create as much power it does not have to as fridges in particular are not working so hard.
I had experience of a large system that ran out of puff on days over 44C due to near melt down

Have a look at a Cat D9 battery box takes up the whole space under operators seat. They are a work of art, but really needed for safety and hold batteries secure against all odds

Robbo

On September 21, 2016 at 7:41am

Veng Mazwi wrote:

Ohk! Thanx Robbo

On September 22, 2016 at 4:17am

NabuN wrote:

@ Veng:
Without wishing to argue with anyone here, in my experience over 40 years with lead batteries of 12V and 6V and degree in electrical engineering, I can say that the parallel connection of two batteries the same type and not necessarily the same capacity or age, is certainly better for their (remaining) lifetime compared to serial configuration for several reasons:
1. Capacity is larger of the assembly (equal to their sum of real capacity…) and currents of charging/discharging smaller than if would be used only one of them.
2. SOC of the batteries are quasi-identical, due to terminal voltage which is the same for both batteries.
3. It is easier to monitor and correct the voltage of one battery than the voltage of 2 (3 ... n) batteries, and if a battery have cell(s) shorted, it will be seen as the terminal voltage drops and can intervene timely. Usually, most defects are with internal interruption/increase of internal resistance (in the ratio of 10 ... 20/ 1 face of internal shorting).

In your case, for 2 solar panels with 36 solar cells maximum charge current will be ~2x150W/18V = 16.5 A, supportable by any individual battery, the better of the two in parallel. The currents will be divided thru batteries in reverse proportion to their internal resistance, in the first approximation ~9A for the 200Ah and ~7A for the other. In 8..9 hours of one sunny day they will be charged with an energy of ~ 1.6kWh (35..40% of maximum).
If the inverter is for 12V, the load current will not exceed 900VAx0.6/11V=45A and is divided into ~26A through 200Ah battery and ~19A through 150Ah battery. The autonomy at maximum power will exceed 6 hours, if the batteries were loaded to full capacity.
Take care to have thick and good connectors / screws to terminals and same length of cable from “output” of the 350Ah battery to each component battery.

So, it can be done without much expenses, with care and attention!

@ Pete:
I stored SLI batteries/auto one on top of another, but only for short-term (1…3 weeks),I even put three pieces on a vertically stack. For stationary applications I put only two batteries one of top of another, for reasons of mechanical resistance (to not crack the plastic case, in time), with spacers from rubber/plastic acid resistant, bands of 1-2 cm thick and took care to NOT cover the vent plugs. SLA and AGM batteries need a small amount of ventilation, so I simply put an expanded polystyrene between batteries. After 5 years I have no problem with them, they are NOT in a box. In a closed box it's better to insulate all the interior walls to achieve a good thermal isolation of batteries from external medium and reduce mechanical shocks.

So, can you try 3 batteries (not heavier than 20 Kg each) one on top of another with some precautions ... at your own risk…and let us know about ? 

On October 5, 2016 at 6:54am

Andrew wrote:

Hi . I am working on a project to make a custom solar charger with 80/100waatts panel to support 3 led lamps of 5w and 3 chargers for smartphoe or tablet devices . Could someone who has knowledge guide me what type of batteries i will need and how i can combine them to support this structure ? Thanks in advance !

On October 14, 2016 at 6:50am

johnjanos wrote:

Hi, i want to change the old batteries on my vacuum cleaner and there is only room for 3 18650. I want to ask if i can conect 2 of them in parallel and the third in series with the other 2?

On November 7, 2016 at 11:41pm

Veng Mazwi wrote:

@NabuN thank you so much for taking your time to explain. Though its too technical, I could still make some sense out of it. I will monitor the system.

Regards!

On November 8, 2016 at 7:12am

Veng Mazwi wrote:

@NabuN, thanks for the clarification. Though its a bit too technical, I managed to comprehend it. Will continue to monitor my system. Regards!

On November 20, 2016 at 8:10am

fazz wrote:

please help me….
What happens to the voltage when batteries are connected in series, in parallel and in anti series respectively?

On November 25, 2016 at 4:01pm

Oliver Hill wrote:

I've replaced a failing set of cells in a battery pack for a pair of equine clippers rated at 12v with 10 Ni-Mh AAs in a parallel configuration. This seems to work ok. My question is…is it safe to charge the batteries in the same parallel configuration using the charger that came with the original battery pack…or do i need to remove the batteries and charge them in a standard charger in series. I guess i could try it and monitor the temperature of the cells….

On November 26, 2016 at 3:29pm

John D. wrote:

I want to replicate an ac circuit that is 1500 W, and I believe under 15 A. I want to make a portable unit so that when I don't have power, I can still do a limited amount of work. The array of batteries would have to deliver this current for about 2-3 minutes. First, is this possible with current lithium ion batteries, and if so, what would the general configuration setup look like?

On December 13, 2016 at 9:25am

Braiden wrote:

While this is the general rule there would be certain exceptions. When running in series one can for example use a 2 cell and a 3 cell to easentially have a 5 cell lithium battery. I.e. A 2s 50c 5000mAh battery in series with a 3s 50c 5000mAh battery will be the same as if purchasing one single 5s 50c 5000mAh lithium battery. Im not suggesting mixing brands or an old cell with a new cell however starting with two new cells of like batteries you are essentially working with the same construct of internal material. Checking Internal Resistance and using said batteries together for the life of the batteries you will be fine in this particular situation. We do this all the time in the Hobby world and see like IR ghroughout the life span and voktage drain is consistent across all the cells. If one were to use different manufactures or qualities of batteries you may find one will discharge faster than the other. Keep it simple and match the cells and brand and you wont likely have any issues.

On December 27, 2016 at 1:51am

Maheen Majeed wrote:

Is there any problem if batteries connected in parallel have same voltage but different current

On December 29, 2016 at 5:31pm

ryan Jarnutowski wrote:

as they should be. What would be the best way to wire these. everything i know about electricity and current i have read online. i was thinking about trying to do a series and parallel setup to power the entire thing. i need a total of 2880 watts at 12V. to power the entire thing but im being cautious because i dont want to have them blow up on me.

On January 1, 2017 at 10:26am

premrishi wrote:

if i connect panasonic 18650 batteries in the configuration of 3s4p then what will be my total voltage and ah

On January 18, 2017 at 8:10am

NabuN wrote:

@ John D.:

OK ! Of course, you need a 1500W or 2000W (better) true sine wave inverter at 24V input voltage. I recommend a 24V inverter because the currents at 12V will exceed 1500W/12V/0.9 ~ 140 A and the conductors will be very thick, heavy and hard to work with them : AWG4 (~ 20 mm.sq.).
In 3 minutes, the energy consumed will be 1500W/0.9 x 3/60 = 83.3 Wh.
So, you need a Li-Po battery (more resistant and tolerant than Li-Ion) having 24V/3.7V ~ 7 cells in series and 25C (discharge rate) x capacity > 70 A.
The capacity is 84Wh/24V = 3500 mAh, if you discharge 100% the battery (ideal).
For safety temperature and acceptable lifetime of battery, it's better to discharge 50% the pack. So, I think a 7S2P battery containing 2 x 7 cells, 3.6V 15C..25C =3500mAh each will do this task quite well.
After studying the offers and prices, I realize that it's difficult to find and connect 7 cells in mixed mode, so the battery pack can be 8S2P, composed by 2 groups in parallel of 2 x 14.8 V 3000…3500 mAh 15c…25C (in series).
The battery cost will be somewhere at 120 US$. The battery pack weights ~ 1.5 Kg, life cycles will be ~ 60 and the charger is expensive.
Almost any 24V inverter accept 29,6V input voltage with no issues, at full load the voltage will decrease to 22…23V.
Concerning batteries, if you use two high rate 12V AGM batteries in series, like CSB HR1290W, you'll have over 4 min. at 1500W (50% discharge rate).
The batteries weight ~13.6Kg !, the cost is ~90 US$, life cycles will be over 100 and the charger is cheap : you can put the batteries in parallel to a 12V charger.

So…good luck !

On February 2, 2017 at 3:20pm

drich5 wrote:

I am trying to connect 8 12v 155ah agm batteries in parallel to achieve a perfectly balanced charge and draw. Where might I find a wiring diagram?

On February 6, 2017 at 2:07am

Mihai Toma wrote:

Your pictures and explanation for parallel connections are misleading. Capacity (mAH) is increased fourfold and NOT "current handling". Do not confuse capacity (mAH) with current drawn (mA). Need to update your pics / article to make it clear. Other than that your post is very helpful. Here a good video about the difference: https://www.youtube.com/watch?v=cxkVxi9P0EA

On February 25, 2017 at 12:39pm

Saleem wrote:

Can i contact 165amph new and 90amph old battery in my off grid soler system to improve output

On March 25, 2017 at 9:38pm

Lakish Meher wrote:

I have 48v 30a 16s cell Bms Circuit so Kindly suggest me which capacity battery i use for this also suggest me its diagram.

On May 7, 2017 at 8:12pm

Ami wrote:

some says that LG battery is the best among all battery it that true?

Thank you.

On May 8, 2017 at 11:10am

Corey Fleischer wrote:

Great site and discussion. I just started a company with an energy storage and generation product and have secured my first customer. Functionality, reliability and cost are some of its hallmarks. I'm seeking a way to charge three or four 12V 200Ah AGM batteries that are connected in parallel which is connected to an inverter. Short of switching individual batteries in and out of a system to accomplish this, is there a way to use a marine or automotive battery charger to directly charge the system? Thank you for your help in advance

Corey Fleischer
Founder
GMI
corey@greenmachinesinc.com
(310) 387-2400

On May 20, 2017 at 8:53am

Lucas buzek wrote:

I am trying to figure a solution for my problem. Connecting 8 12V batteries for 24V charge and dual 24V and 96V outputs. Would diodes on the terminals of each battery cell be sufficient to prevent short circuit?

Current configuration is 4 batteries connected in parallel for higher capacity and then connected in series for 24V charge and output.

And I'm thinking of adding another layer of wiring to connect all 8 batteries in series (with one-way diodes to prevent short circuits) to achieve 96V output.

Is something like this possible or should I just use a voltage booster?

On May 21, 2017 at 5:43am

Madhuri wrote:

Hello,

Can you please send me the picture of cell arrangement of Marathon Nickel Cadmium battery with 36H120 cells in it for model TMA-5-20C.

Thank you

On June 17, 2017 at 10:12am

WILLIAM MARINI wrote:

if I have 2 12 volt batteries and wire them in parallel to jump start a another car will I have more kick?

On June 22, 2017 at 4:52pm

Bob Sundeen wrote:

Had my RV trailer worked on 6 months ago. The shop replaced my 2 - 12 volt batteries with 2 - 6 volt batteries. Just took the RV out for a long weekend and the batteries kept blowing the 30 amp a/c fuse or the trailer.
After testing, the new batteries are the problem.
When tested, both have reversed polarity?

On July 4, 2017 at 10:07pm

Mohit wrote:

Very well written and explained in a great manner.

On July 5, 2017 at 2:13am

Louis wrote:

I have a 240 watt Solar panel (7.85Amp), 2x102 Amp Deep Cycle Batteries and Two 1500 Watt Inverters. I need to run 2 (perhaps even three) computers for 9 hours per day from them. What is the best way to wire and do my setup so that I will not run out of power within the 9 hours of each day. We have 5.5 hours of Solar ideal sunlight per day.
Is this possible or should I get another battery and connect my 80 Watt Panel up as well?

We are in South Africa.

Robert Taylor wrote:

Hi People. Does anyone know what is the most 12vdc AGM abateries that can be connected in series? I sould ideally like to connect 20 or more to get 240VDC. Is this possible. Traditionally we get 24, 48 0r 96VDC banks connect to an invertor , which uses a transformer with setup up of 10, 5 or 2.5 to one to give us the desired 240 out. . A 240VDC rail would eliminate the wasteage of windings

Thanks in advance
Robbo

On July 19, 2017 at 10:19pm

Steve wrote:

I have a golf trolley battery with 2 x battery packs of I believe if my calc's are right of 16 x 18650 batteries @ 1600 mah with one pack each side linked this makes 14.4 v @ 12800 mah. my question is how would these be wired ?? both individually and then together?

On July 23, 2017 at 11:44am

Brian wrote:

Steve if you are raising both voltage and mah you will need to run both in series and parallel. Parallel raises mAh and series voltage. It's done all the time for example with two 12v 5000 mah run parrelal to make 12v 10000mah and then run in series to bring from 12v to 24v 10000mah. This would require 4 batteries to achieve these results.

On July 29, 2017 at 3:21pm

Sierra Marson wrote:

I'm trying to run a dc12-2amp stereo off a battery pack with 4 5"-5" speakers and was wondering how big does the battery pack need to be to run say 5…6 hours on a single charge if you use AA 2A 3000mAh 1.2 V Ni-MH rechargeable batteries?

On October 7, 2017 at 11:51am

Jon wrote:

Brilliant! This was just the information I was looking for. Thanks!

On October 16, 2017 at 4:27am

lior wrote:

I have 10 batteries and I want to connect them to a home solar system, each battery is 12V 100A.
How do I connect all 10 batteries that I'm just getting a 24V 500A?

On October 19, 2017 at 1:00pm

dreamtech wrote:

Hello, I also came up with a question:) Is it OK to connect several series of cells in paralel? (for example, I connect two 3s2p packs in paralel)

On October 24, 2017 at 9:57pm

robbo wrote:

I have 10 batteries and I want to connect them to a home solar system, each battery is 12V 100A.
How do I connect all 10 batteries that I'm just getting a 24V 500A?

Easy .. just parallel 2 strings of 5 x 100Ah in each string. What you want is two separate batteries connect in parallel then couple the !2vdc positive (+) on string (A) to the negative(-) of the second string (B). String A will have the (-) negative pole and string (B) will have the (+) pole
Just look at how they series 2 x 12V to give 24V in a truck

Output=Discharge. Batteries when measured in Ah is a rating of how many amps are produced, Example, a 100Ah battery gives 10 amps for 10hours a 0.1C. or 100amps a 1C for 1 hr A 100Ah battery has a C or capacity rating of 1C=100Ah. using 5 x 100Ah in parallel then series to 24Vdc gives 50amp discharge @ 24Vdc for 10 hrs @0.1C.

Charging 0.1C to 0.3C ~ 50 to 85 amps @ 24Vdc
Solar panels .... should be 1,5 to 1 above the voltage of the bank and in your case 36V is ideal. string 10 x 300W in parallel. Note : the solar charge controller should be double the desired capacity as heat build up on hot days actually deducts from the said output once everything gets cooking. If you still have to purchase a charger again make sure its a MPPT as they are 30% more efficient than the older PWM (pulse width modulation)

If you have NOT got a 24Vdc inverter yet go for the most efficient use of 10 x 12Vdc batteries which is a 120Vdc input inverter. Check that its maximum power point to point transmission (MPPT) with inbuilt charger 150Amp in your case.Check that it is at least IP65 (or better) encapsulation for weather dust ants insects etc. The fan cooled models blow all sorts of debris around as dust and a lot of that dust is conductive and/or corrosive.

This partly answers myprevious post when I asked what is the maximum voltage batteries can give in series. Some units even double this input
http://golden-electric.en.made-in-china.com/product/FCzQsKnPhrcx/China-High-Efficiency-5-Years-Warranty-Solar-Grid-Tie-Inverter-3-Phase.html

Hope this answers the question and not raise more.

Cheers
robbo

On October 25, 2017 at 10:23pm

robbo wrote:

Louis wrote:

I have a 240 watt Solar panel (7.85Amp), 2x102 Amp Deep Cycle Batteries and Two 1500 Watt Inverters. I need to run 2 (perhaps even three) computers for 9 hours per day from them. What is the best way to wire and do my setup so that I will not run out of power within the 9 hours of each day. We have 5.5 hours of Solar ideal sunlight per day.
Is this possible or should I get another battery and connect my 80 Watt Panel up as well?

The solution is in the last line .....hook up the 80W panel to a 10Amp controller and the second inverter. Simply split the system. Given that your 240W panel gives 7.8AMp that makes it a 30V panel, which is ideally matched to your (Calculated 240/7.8 =30 V) so just check that your 80W panel is the same voltage.

For a good deal on batteries with free shipping go to http://yangtze-solar.en.made-in-china.com/product/RCKEQsZOZmkG/China-3-Years-Warranty-Free-Shipping-12V-Lead-Acid-Storage-Solar-Battery-200ah.html. Have just ordered 8 pieces and including handling costs they are under $US200 ea

Clarification AGM = Absorbent Glass Mat, which use Sulfuric Acid Thixotropic Gel as electrolyte. These batteries are still sometimes referred to as lead acid, but dont produce as much gas and have safer handling

Remember…….the poor man buys twice

Cheers
robbo

On October 25, 2017 at 10:37pm

robbo wrote:

Sierra Marson wrote:

I'm trying to run a dc12-2amp stereo off a battery pack with 4 5"-5" speakers and was wondering how big does the battery pack need to be to run say 5…6 hours on a single charge if you use AA 2A 3000mAh 1.2 V Ni-MH rechargeable batteries?

Sierra DO the math.
12vdc@ 2 amp draw for 5 or 6 hours equal 10~12 Ah.
The average car fridge draws 2.5amp and are traditionally wired to a second 100AH battery.
Cheapest solution is go to the wreckers and get a half decent small car battery for $20 or a six pack for one of the guys, and a six pack for my tip

Cheers
robbo

On October 25, 2017 at 11:21pm

robbo wrote:

On February 2, 2017 at 3:20pm
drich5 wrote:

I am trying to connect 8 12v 155ah agm batteries in parallel to achieve a perfectly balanced charge and draw. Where might I find a wiring diagram?

Ahhhhh to paint a picture in words

Question 1……..why would you need to parallel 8 x 12V batteries
Answer better to keep higher efficiency and go 96Vdc series. this will give the batteries a better life and if you intend to hook them to an El cheapo 12V inverter with a stepup transformer of 20 to 1 you will need all of 1,240AH to last a night..

Wiring……..you dont state the draw/discharge you require. but a 155AH AGM have a peak discharge of 2250Amps and realistically 155Amps for 1 hr . as a guide 150Amp welding machines use 35mm squared cable for a 2 meter earth cable.
Put simply buy the connector or bridging cables rather than DIY., its cheaper.

Schematics of hook up…..... row up all 8 batteries in a single line, that about 2.2M, Preform all cables so they are NOT under tension when installed. Connect all the positives together from left to right, ditto for negative.Use quality silicone heat and electrically conductive silicone paste between terminals and connectors/bridging cables.Use torque wrench for correct settings and DO NOT over tighten Now you should a a single Now you have a single1240Ah 12V battery.

A word of CAUTION the SHORT CIRCUIT amperage is 90,000amp. (12x7500Amp) an explosive force you dont want to experience. Use insulated tools, its only one spanner so buy if you dont have. Worst case shrink wrap socket extension bar and torque wrench, use electrician glove and approved safety glasses

terminals are on the same battery a huge drop in performance is noticed.

Maintenance>>>>>>>>>>>>>>> torque terminals once a month to manufacturers specs. Check and log each Batteries SOC (state of charge) and if lower than average remove from string and give a de-sulphate charge

Myself I am a series man Volts over Ah any time.

Hope this answers something

Cheers
robbo

On October 26, 2017 at 12:26am

robbo wrote:

On June 17, 2017 at 10:12am
WILLIAM MARINI wrote:

if I have 2 12 volt batteries and wire them in parallel to jump start a another car will I have more kick?

Wiilliam

If you have a lot of cars and want to make a permanent setup for both cars and trucks
do what they do in Smiths, car/truck auctions in Perth WA, where cars trucks earth movers all end up with dead batteries. One of the employees says it must be a battery grave yard where they come to die.

The big Cats and Komatsus take a lot to kick over so they built a hand cart with solar panel as a jump starter kit with 24V @ 250Ah. The leads are 90squared cable, about the thickest welding cable around and a solenoid to make and break once the leads are on. As the yard boss explained its not so much the AH but with the solar charging the batteries are always topped up to 28.8V.

When starting cars and 4WDs ather than reconnect to 12V they simply get you to turn the key then they hit the solenoid and bingo. All the power goes direct to the starter and doesnt do any damage

I have an old SR5 Toyota as a beach bomb with a dead alternator thats $1200 to replace, so I charge it of the solar. I notice that when fully charged it starts in a second, instantly. But as the battery get lower it still cranks over but takes longer and longer to start. A HUGE difference in cranking speed between 13.2V and12V.

Word of Caution>>>>>>Never connect Aligator clamps to a bare lead terminal as if by accident the polarity is wrong you will blow off the terminal or worse have the battery explode in your face with a shower of acid over everything , always use battery clamps to protect the terminals.and use silicone paste when installing battery terminals to stop dry joints

Yep 2 x12v batteries will give more grunt but only if both are over 12.6V

Cheers
robbo

On October 26, 2017 at 1:09am

robbo wrote:

Lucas buzek wrote:

I am trying to figure a solution for my problem. Connecting 8 12V batteries for 24V charge and dual 24V and 96V outputs. Would diodes on the terminals of each battery cell be sufficient to prevent short circuit?

Current configuration is 4 batteries connected in parallel for higher capacity and then connected in series for 24V charge and output.

And I’m thinking of adding another layer of wiring to connect all 8 batteries in series (with one-way diodes to prevent short circuits) to achieve 96V output.

Is something like this possible or should I just use a voltage booster?

Lucas
The first problem to overcome is how to charge 96V, that is 12x8 in series. Series connections prevail over parallel anytime.
Second you do not say what you are running at each voltage

The easiest way is to to series to 96V and tap off at 12V and 24V and keep the power swirling around with 4 x 30V solar panels and a 96Vdc controller . I know the purist wont agree but this is economics ..

I had a 48V 800Ah system a few years back and tapped in at 12V to run my stereo, ran it 2.1 config, 2 bridged 700W pioneer car amps for left and right and a third 700W for dedicated base. Could hear it kilometers away (the advantages of living in the bush where the closest neighbor is 50K south) All the purist said it would not work but did for a few years anyway. Started out using it as a homing beacon whilst metal detecting for gold. The speakers took up most of the room on the truck.

The second option is to get DC /DC converters to do the job and again depending on the draw and budget

Keep me posted on how the diode thing progresses

Remember , need is the mother of creation

Cheers
robbo

On November 30, 2017 at 3:52am

Gary wrote:

If you run two batteries in parallel in a motorhome, where does the earth lead go?

On December 17, 2017 at 10:42pm

Muhammad Mudasir wrote:

can i connect two batteries having different voltages in parallel and connected with opposite terminals

On January 17, 2018 at 5:58pm

Daniel wrote:

I have 4x 12v AGM battery connected in series for a total of 48V. I would like to be able to switch off the circuit using a 12V 30A switch. How much voltage would be accross that switch in the off/on position if I was to install it between the first battery + and second battery - ? Is it possible at all?

- + Switch - + - + - + Load -

On January 24, 2018 at 8:17pm

robbo wrote:

Daniel wrote:

I have 4x 12v AGM battery connected in series for a total of 48V. I would like to be able to switch off the circuit using a 12V 30A switch. How much voltage would be accross that switch in the off/on position if I was to install it between the first battery + and second battery - ? Is it possible at all?

Daniel
Volts can be cosidered as pressure (in a hydraulic system) a 12 v hasless insulation than a 48V switch or solenoid

have a look here at the main circuit breakers as used golf carts
follow the link below . Most trucks use the ignition key to activate a HD solenoid and a loud thunk can be heard when the solenoid engages. They are commonly called 4 wire i.e., 2 wires for power and 2 wire to activate. IMHO connect the switch at the 48V + terminal
Golf Cart Solenoid | eBay
www.ebay.com/bhp/golf-cart-solenoid

48 Volt Golf Cart Pre-Charge Solenoid Resistor | For 48 Volt 400 Amp Solenoids. $8.50. Buy It Now
.
DC Battery Disconnect Switches - WhisperPower
www.whisperpower.com/au/4/24/products/battery-switches.html

On January 30, 2018 at 5:51pm

Micheal Kinney wrote:

Great article, there's a lot of information out there that's just confusion because they don't read in plain English. The illustrations/diagrams were also very helpful to visualize the parallel vs series circuits and helps to visualize and realize the benefits of a hybrid system. I just wanted to leave a comment and say I wish I came across more information written this way and I'll use this article to educate my son.

Thanks a bunch!

Micheal

On February 2, 2018 at 12:32am

Yujin An wrote:

really helpful article! Can u help me?.. I'm student in mechanics.
so I don't know well about the battery and else things..
I have some question for u.
I want to charge lithium ion battery pack
(28 coin cells of 3.5Ah, 3.7V
and configuration is 4*7*1 = T*W*L)
than how to cinfigurate the circuits of charging..?
I have to charge in 30 minutes… :(

On February 7, 2018 at 7:52am

switch on then my robot is not a full running…..it's torque and speed both very less…..I don't know what is reason ...plyz reply me for this solution…tq

On February 7, 2018 at 10:53am

Micheal Kinney wrote:

@Yujin An

I guess my last response was lost or something. I'll keep it simple though.. you might want to consider using 26650 cells instead.. it be smaller than 28 coin cells and way less complicated. 1x would offer 3.7v at ~5Ah already. Not an endorsement, but I'd recommend EBL brand for the price and reliability. I'd imagine it cost less too, there's no parallel/series charge issues and would require no BMS technically, etc.

Best of luck!

On February 7, 2018 at 11:46am

Micheal Kinney wrote:

@Yujin An

Per my last comment, I left out charge time details. Technically you might be able to charge 28 coin cells faster than a larger single cell, but at a cost of complexity and balancing issues (don't expect it to last long as a power pack).

Furthermore, 28 coin cells would be like 90cm x 5.8cm, whereas an 18650 is 18mm x 65mm and a 26650 is the same length but 26mm wide.

I think this is about the best you can do, and it's my recommendation to either use 18650 or 26650 cells, but make sure your gauge wire can handle the amps without getting hot:

26650 Specs: 3.7v @ 5.2 Ah = 19.98wH
5v @ 3 Amps (assuming discharge of ~50%) = ~40 minute charge

18650 Specs: 3.7v @ 3.0 Ah = 11 wH
5v @ 3 Amps (assuming discharge of ~50%) = ~23 minute charge

Please note that actual charge time may vary, but this is an estimate based on capacity.

Hope that helps and send you on the right direction.

Thanks

On February 20, 2018 at 6:42pm

faizan wrote:

Hi!

I had a small 9V solar system with a battery bank. I am using two 18650 batteries in series and they are being charged by solar panel and also gives back up power to my device which needs 6V 110mA atleast. But, after couple of hours of running second battery goes dead while first battery remains ok. and also solar panel does not produce enough voltage either where as it should be producing.

what could be the problem? can anyone tell me? batteries can last about one and half day on full charge but they just gone bad. infact second one gone bad totally then the first one.
Please help me

On February 21, 2018 at 7:30pm

robbo wrote:

@faizan

Go to ebay there are dozens available for under $20US

Here is one that may be veery useful as it is bare bones (you can easily see how it works and get an understanding)
Also included are a single 18650 battery holder, a USB lead, and a phone charger lead. These alone would cost more to buy at the corner store if sold seperate
Chimole 3.5W 5V Solar Panel Charging For 18650 Rechargeable Battery+Solar Cell power bank Portable solar charger for Smart watch

https://www.aliexpress.com/item/3-5W-5V-Solar-Panel-Charging-For-18650-Rechargeable-Battery-Solar-Cell-power-bank-Portable/32812373464.html?src=google&albslr=225178492&isdl=y&aff_short_key=UneMJZVf&source;={ifdyn:dyn}{ifpla:pla}{ifdbm:DBM&albch=DID}&src=google&albch=shopping&acnt=494-037-6276&isdl=y&albcp=1001718710&albag=52375743834&slnk;=&trgt=349475913279&plac;=&crea=en32812373464&netw=g&device=c&mtctp;=&gclid=EAIaIQobChMIzNSg7bK42QIVxwgqCh1WvwTgEAQYASABEgK0WPD_BwE

It isalso available for under$12.00 from
https://www.banggood.com/3_5W-5V-130165mm-Solar-Panels-Charge-With-18650-Battery-Case-p-1167475.html?gmcCountry=AU&currency=AUD&createTmp=1&utm_source=googleshopping&utm_medium=cpc_elc&utm_content=zouzou&utm_campaign=pla-au-ele-acs-dk-pc&gclid=EAIaIQobChMIvMTPqLu42QIVV4C9Ch36zwF_EAQYASABEgKOv_D_BwE&cur_warehouse=CN

You can still tell your freinds you put it together

The other option is to get some chips 7809, op amps,comparator chip,a timer, make a circuit board,install resistors and caps,solder on the headers, make the boxes and viola. 6monts later after hundreds of hours tinkering you either have something that works or a load of shite that ends up in the bin!

robbo

On March 25, 2018 at 5:28pm

djay wrote:

I need your help. I have 8, 6 volts, 450 amps battery. I need to get 48 volts and 450 amps or 950 amps. please help me with the wiring.

On April 11, 2018 at 10:06am

lior wrote:

Hello
I have a home solar system and I have two solar panels of 300W and my system is 24V.
In addition I have 10 batteries of 12V and 100A each battery.
I wanted to ask how to connect my panels to MPPT which means plug them into 36V or 72V?
I want to use most of the electricity at night
Thank you

On April 12, 2018 at 1:30am

robbo wrote:

@ djay wrote:

I need your help. I have 8, 6 volts, 450 amps battery. I need to get 48 volts and 450 amps or 950 amps. please help me with the wiring.

Hi Djay
its simple maths 8 batteries @ 6Vdc =48 Vdc connected in series positive to negative
Wire sizes should be proportioned according to load 90sqm cables or (super duty welding leads would suffice @ 450A and doubled for 900amps You 8s2p or another 8 batteries to get 900A…….....What is the end use??? the batteries would only have an intermittent discharge before overheating.~5/10% on cycle 90/95off cycle

Use tinned welding cable that is soft and pliable, with professional crimps or soldered ends. Apply silicone grease to poles and conducting surfaces of lugs. Tension to recommended torque and check often, as they “hum” of this high discharge rate will shake and vibrate leads loosening the bolts/lugs.

Thats a lot of power and if needed continuously a1200A Lincoln Sub Arc welder feeding from a 125A 415V

Nelson Studs are spot welded onto bridge deck beams using a pulse welder with programmable amps and time and produce 2000amps +.. Oddly they have 1 x 90sqmm positive lead and 4 x 90sqmm earth leads. the whole machine runs red hot and the leads are often seen smoking They use big rivet looking studs to 25mm dia in a gun with a cermic ring that holds the instant arc and molten metal in place & drop the stud end into this molten bath until it solidifies Takes about 5 seconds as opposed to 6 x 4.00mm welding rods to give the same fillet size Gutsy machines but need a 250A 415V feed and or stand alone transformer

On April 12, 2018 at 1:54am

robbo wrote:

Hi Lior

10 x12Vdc = 120VDC @100A 12000W which is a good overnight storage to run a small house and one/two freezers. about the same size as a small Tesla battery It wont store enough for high load AC or huge heaters but but will run them for a few hours as needed U should still be able to boil the kettle in the morning
Look on the web for an inverter 120VDC to 110/220V 5KVa or better and hook <20 x 300w @36V to give 5kw charge @150VDC to your inverter. Go series NOT 12V parallel
Rule of thumb is panels should have a voltage about 25% above the battery bank voltage. Battery capacity is normal >2.5 /4.0 times the rated output of cells
Solar is a necessity batteries are a luxury
Batteries cost the money more so than panels

PS if U dont want the batteries send them here, plenty of panels batteries hard to find and expensive still
robbo

On April 24, 2018 at 6:58am

Mathew Sosa wrote:

For the Series/Parallel Connection, I don’t think the math adds up. If Figure 6 has 2 cells in series and its voltage doubles, and 2 series connections in parallel so its amperage doubles, then how does the Energy of four cells come out to 12.24 Wh? By my math:

3.6V * 2 cells = 7.2 V;
3400mAh * 2 = 6800 mAh;
Power = Voltage * Current = 7.2V *6800mAh = 48.96Wh

On April 27, 2018 at 7:12pm

Theo Veeren wrote:

I have a mobility scooter powered with 3 AGM batteries 12v 28 ah, I can do only 10 to 12 Km. I live in a hilly suburb, if I want more distance and be prepared to buy an additional 3 batteries, of say 80 ah each so when I run out of power I can switch to the other bank. Could you please give me some advice how to connect those aditional batteries to get the required 70a for my scooter controller and have more distance I require to visit my local shopping centre, I don't need speed just the wire connection of the 3 batteries to get the most ah.
Thank you.
Theo,

On May 7, 2018 at 2:11am

Michael wrote:

Hello to whoever reads,

I need a low self-discharge battery (Lithium Thionyl Chloride) to power a microcontroller (somewhat like Arduino). It can handle 3.9 - 12V and needs about 1800mA current in pulses.

The Li-SOCl2 batteries I've been looking at is at 3.6V with 35000mAh capacity and can give a maximum continuous current of 450mA. If I put 2 of these batteries in parallel would I get twice the maximum continuous current (900mA) as the capacity also becomes twice the size?

Sorry if this is a stupid question, but i'd rather find out here than to spend a bunch of money and realize it doesn't work

Thanks in advance,
Michael

On May 7, 2018 at 4:59pm

Theo Veeren wrote:

How do I get that information I ask for in my recent email of April 27 2018?
Thank you,
Theo Veeren veerent@bigpond.com

On May 8, 2018 at 5:18pm

robbo wrote:

@ Theo
I have a mobility scooter powered with 3 AGM batteries 12v 28 ah, I can do only 10 to 12 Km. I live in a hilly suburb, if I want more distance and be prepared to buy an additional 3 batteries, of say 80 ah each so when I run out of power I can switch to the other bank. Could you please give me some advice how to connect those aditional batteries to get the required 70a for my scooter controller and have more distance I require to visit my local shopping centre, I don't need speed just the wire connection of the 3 batteries to get the most ah.

Hello Theo
the math says it all,
Your scooter draws 70 amp and you batteries supplies a total of 84 a/h, or just over one hour @ peak .
Installing 3 x 80a/h would supply 240a/h or nearly 3 times the capacity and distance.
If you install a second sett of batteries you would need a charging splittter as used in 4WD with twin batteries and a battery switch for A & B banks (it gets complicated) so stick with the new80a/h batteries

On May 8, 2018 at 10:43pm

Karl JOHANNESSEN wrote:

I have a homemade solar setup. I use 4 identical 12 volt deep cycle marine batteries in parallel to power the inverter. I want to add capacity. I understand that it is important to use the same type of battery. Can I safely add 2 more batteries? Can I add 4 more? Is there a limit to how many batteries I can safely wire in parallel? Thank you in advance for your help.

On May 15, 2018 at 4:36pm

robbo wrote:

@ Karl

Series is the only way to charge batteries over an extended period. I have tried all sorts of ways to charge 12V batteries in parallel and long story short it is a waste of time . Often one battery is dead flat and others fully charged and are drawn down to the lowest voltage

If you have GOOD batteries hook them in series and buy a new inverter of that voltage

I did have a 6kw 12 V inverter (transformer type) running of 6x800Ah 2vPoe Batteries it worked well and could boil an electric jug in the morning

Go series

Robbo

Teresa wrote:

Hello,
Could you please offer some advice. I'd like to know if there is a single cell battery that would be equivalent in size and voltage to a series stack-up of 4x AG3. I'd much prefer a single cell rather than fussing with four tiny batteries. Thank you.

On June 27, 2018 at 9:59pm

Timothy wrote:

I have a main circuit board in a machine that over a year or two eventually drains a 3.6v lithium AA size down to 1.4V.
This battery has a wire soldered at each end which is then soldered to two points on the circuit board and is used to maintain data when the machine is shut down so it is there upon startup.

I would like to use a parallel 4 battery holder that connects by soldering directly to the main board in place of the single battery and that the batteries can be removed from individually and easily without having to deal with soldering.

My reason for this is that if the battery voltage drops down to the point that the machine no longer retains data then it takes about a half hour to reprogram the machine after changing (unsoldering and resoldering) the battery. I am hoping that by having multiple batteries in parallel they can be removed one at a time and be replaced without worrying about loss of data since it is still providing enough voltage.

My concern is what I don't know, which is if there are any adverse effects of having more than one battery even if in parallel. The battery I will use four or at least more than one if there are no problems is
SAFT LS14500 Size AA 3.6V 2600mAh Primary Lithium (Li-SOCl2) Battery. This is the same type of battery that is wired singly to the circuit board now.

I appreciate the help of those that are much more knowledgeable about this than me.

On July 18, 2018 at 2:47am

Ajay wrote:

Hii, I have 24V battery system (Two lithium-ion batteries connected in series) connected to a smart charger and inverter system. The batteries have a BMS of their own whose data can be accessed through Bluetooth. There are some DC loads on the battery system running on 24V. Now I charged both the batteries(in series) till 100% (checked from BMS of both of them) and then started discharging the system. Today when I checked, one of the batteries were at 68% and another one at 94%. Both had the same discharging current and voltage as per BMS. So my question is what could be the reason behind unequal discharge. Both the batteries are new, same brand, same capacity. has anyone seen similar cases before.

On August 24, 2018 at 1:22am

Jerry wrote:

Can you reduce DC Ampere using resistors?
serial or parallel.
eg. (12V 11Ah DC) + Resistor >> (OUTPUT 12V 1AhDC)

On August 27, 2018 at 1:24pm

Nathan wrote:

I plan to use two 12V 100aH batteries connected in series to create a 24V 100aH battery bank to power a 24V inverter. The bank will be charged by a 24V solar charge controller.

1. Do both batteries in the series configuration discharge at the same rate? Or does the upper battery discharge first and then the lower battery?

2. Will the 24V charge controller charge both batteries back up to their full charge? Or do I need to have two separate 12V controllers, one on each battery, in order to get both fully charged?

On September 14, 2018 at 2:04am

Michael McGinn wrote:

Has anyone tried out a hydralight fuel cell? salt and water powered battery? Wondering if they would make a good solution for setting them up with many cells to power a house in a no power post hurricane emergency situation. Also wondering if anyone has tested them side by side with a normal d-sized 1.5 volt flashlight battery to see which lasts longer.

On September 30, 2018 at 10:49pm

gseattle wrote:

In 4d and 8d batteries, what does the 'd' stand for?
What is the difference between 4d and 8d?

On October 3, 2018 at 7:12am

Iannis wrote:

I have 6 (18650) li-ion batteries that i want to use for lead acid replacement for my motorcycle. Can i connect 3in Series and 3 in Parallel to achieve 14.4V ? How do i connect the 3inSeries with

On October 29, 2018 at 5:27pm

ron wiita wrote:

do batteries (ie 12 v) have to be the same CCA when used in parallel for instance using
a 500 CCA battery with a 875 CCA battery?

On November 1, 2018 at 10:02am

John wrote:

Hello
I have a battery/inverter set up in my garage comprising the following items.
1) One 5kVA RCT-axpert inverter, 48 VDC input, 220 VAC out.
2) 16 X 105 A/H, 12V Enertec Deep Cycle silver calcium batteries. Configured in 4 parallel banks of 4 batteries in series. These were installed about 3 years ago.
This morning, I noticed a strong pungent smell in the garage area and found that one of the battery bank string was extremely hot which prompted me to disconnect it immediately.
I suspect that one batteries in the hot bank could have developed an internal short.
The batteries are constantly on maintenance.trickle charge, as provided by the inverter.
Could you provide an opinion concerning this overheating incident.
Thank you

On November 20, 2018 at 4:51am

mush wrote:

Hello All ,

I have 14 batteries 1.2V 4000mAh NiMh connected in series to get 16.8V pack.
the pack has one PCB which i think to protect the batteries during the charging and usage. is there ready made similar PCB as mine is damaged and need to replace it.

any advise on best way to overcome this.

On November 26, 2018 at 3:06pm

Dalton Adamson wrote:

Is there a way to pull 60 amps out of a NiMH battery

On November 26, 2018 at 3:59pm

Dwight Johnson wrote:

ANTIQUE ELECTRIC CAR

I own a 1919 Milburn Electric car and would like to purchase lithium LIFePO4 batteries instead of the using the original lead acid batteries.

The motor is a 76 volt 33amp DC GE motor from the era. The original system voltage was 84 volts (42 cells in 2 modules or 21 cells each)

The manual controller with 12 brass contact fingers is organized as follows :

“gear” 1 slowest speed, wheels beginning to turn, most ‘torque’
the motor is energized at 42 volts with the 2 modules in parallel and a resistor in place

“Gear” 2 slightly faster and ‘torque’ still required to gain speed
The motor is energized at 42 volts with the 2 modules in parallel and less resistance

“Gear” 3 medium speed
The motor is energized at 84 voltswith the 2 modules in series and even less resistance

“Gear” 4 high speed least amount of ‘torque’
The motor is energized at 84 volts with the 2 modules in series and no resistors

In “off” mode the lead acid cells were placed in series and the charger provided 84 volts.

I have been talking to a lithium cell supplier who is willing to supply sufficient LIFePO4 120amp cells in 2 seperate and equal modules to provide nominally 42 volts each and a BMS for each

These modules are recommended to be wired in series only for 84 volts and that they stay that way

He does not recommend that they be connected alternately in parallel for 42 volts 240 amps.

I am assuming that there is a concern that the 2 lithium ion modules will become out of balance with each other and risk fire and explosion

A consistent 84 volt system will not work in this car

Any suggestions that would lead to successful usage of lithium cells in 2 equal but separate 42 volt modules?

Thank you

jr 23 wrote:

long old thread. but one recurring question in led acid batteries regular flooded,deep cycle type. when using multiple they need to be same age,capacity and type for best results. series to increase voltage parallel for capacity. and more than 4 batteries theirs better ways than just for example 3x 12 series then 3 in series joined parallel than just + and -
search hooking up many 6 or 12 v batteries simple wiring change keeps batteries balanced . and banks of flooded cells need balancing every so often.
lithium cells especially large amounts need a bms system and a way to fuse
remember too lead acid 50% max lithium 70% usage and read more than 1 article

On January 15, 2019 at 9:15am

Cesar wrote:

Hi,
I am building a solar system for my home and I wonder what will be the best way to obtain the most efficient system ..... I use many home appliances but initially I only have some basic ones like digital Samsung fridge, toaster microwave TV internet and cable (No heater or air conditioner) ..... so If I set my batteries in series I will only increase the voltage but I think I will be much better to maintain the 12 volts and increase the Watts Hour by setting all in parallel that way I can maintain better use of the power ???????.... Am I correct with my assumption ?????
Appreciate your help

By the way my batteries are Trojan Deep cycle at 170WH
Thanks a lot
Cesar

On January 15, 2019 at 9:51am

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Appreciate your help

By the way my batteries are Trojan Deep cycle at 170WH
Thanks a lot
Cesar

On January 29, 2019 at 9:14am

Robert wrote:

I have several batteries in a bank, all different producing 12 volts. They are different ages and amp hour rated. If I take each battery to a common buss, will that cure the problems described with multiple batteries in parallel

On January 30, 2019 at 12:59am

Robbo wrote:

@ Ceasar
You dont actually say the max draw/demand .. Rule of thumb double it
!12V is good forrunning a couple of leds and a phone chargerbut if you want to be able to boil the billy in the morning you will want 6x800AH in 2 banks.. I know as I was sold a12V sys years ago
Disadvantages of lowvoltagestorage
1. enormous cables 90mm sq
2, 20:1 transformer windings =20Amp in gives less than 1 amp out
3. loss of conversion during charging and huge heat build up

Suggest using 48V min even then look @ 420AH PoV expensive but last years verycommon and proven AVOID car batteries they are woftam (WASTE OF TIME AND FUXXXING MONEY)
Also suggest a split sys,,get a 2nd Hand roof top upgrade with Grid tie in and use this as you DAYSHIFT Freezer,and high draw 240V..Build a skeleton 48Vsys for night shift

Hope this helps

@Robert

You have the perfect WOFTAM, and a perfect recipe for failure and heartbreak
Tell us a bit more about this common bus.. it sounds more than the negative rail???
one band aide approach would be to have each battery with its own dedicated charging system and standalone discharge system
Might look like Dr Who and the inside of the T.A.R.D.I.S. but it might just work

Many Public Utilities cast out 2nd hand batteries once they reach 3 years oldbut they still have a 8/10 years ahead ..this is a cheap option if the PRICE is RIGHT i.e., below 30% of new price

robbo

Cesar wrote:

Thanks for the response and I do not have any heave draw only a new Samsung inverter fridge ,,,,cooking with Gas and no Aircon or heaters needed only some power tools like grinders and small drill ... mainly use for lights TV internet ans cable ....I am creating a sample system to run TV, Internet, Cable TV and maybe microwave and toaster ...I will start with 4 (maybe 6) Trojan 8V 170AH each from Golf Carts, set up as 2S groups then 2P to get 16V and 340AH .... and maybe about 300 Watt Mono PV ??? then I will increase the batteries and the PV step by step until I get the best performance .... I have a 3000/6000 Watt inverter to start ... Step 2 will be 3S groups to get 24V then 3P to get 510 AH ???? will see ...Thanks for your help good advice

On January 31, 2019 at 4:16am

Karthi wrote:

Hello

I have connected 5 numbers of 3.7 V, 3400mAh 18650 batteries in parallel to get 17000 mAh battery capacity. I'm measuring more than 10 A from the output of parallelly connected batteries. I need to know is that normal? Thank you for your reply.

On February 13, 2019 at 7:06am

Robbo wrote:

@ Dwight

here are some charger manufacturers drop them aline about batteries
https://danlcharger.en.made-in-china.com/product/lvCnLHgjYzRE/China-84-Volts-14-AMPS-Smart-Battery-Charger-1500W-Suit-for-Li-ion-and-LiFePO4-Battery-Types.html

for a better quality suit in-built app
https://danlcharger.en.made-in-china.com/product/YBNJxahdvLUQ/China-Waterproof-Battery-Charger-72V-15A-Worldwide-110-230VAC-with-Pfc.html

cheers robb

On March 4, 2019 at 3:04am

Chris wrote:

I have a selection of 18650 cells all around 2100ah
I want to make a pack at 12 volts at 10000ah for my scooter project
my question is how many cells and in what configuration 3s means a nominal 10 volts so i am thinking going 4s is a better option
so how many for a 3s 10000ah
and how many for a 4s 10000ah

On May 22, 2019 at 8:15pm

Chandrashekhar A.Nemade wrote:

Dear Sir
I am working on the project of @ 1000 km running of vehicle with single charge
pls let me know the commercial availability of 48 V, 30 amp MPPT charge controller for combination of Lithium iron Batteries/Life4 Batteries and Generator/solar combination

Regards

C.A.Nemade

On May 27, 2019 at 11:41pm

Robert Taylor wrote:

@ CA
Popular 50A 12V / 24V / 36V / 48V MPPT Solar Charge Controller—Foshan Top One Power Technology Co., Ltd.

https://oneinverter.en.made-in-china.com/product/XyAELYzcYeVU/China-Popular-50A-12V-24V-36V-48V-MPPT-Solar-Charge-Controller.html

60 AMP Solar MPPT Charge Controllers for LiFePO4 Battery—Wenzhou Xihe Electric Co., Ltd.
https://xihe-solar.en.made-in-china.com/product/BSKELQWwMNhv/China-60-AMP-Solar-MPPT-Charge-Controllers-for-LiFePO4-Battery.html

Search Made in China
https://www.made-in-china.com
/productdirectory.do?word=48+V,+30+amp+MPPT+charge+controller+&subaction=hunt&style=b&mode=and&code=0&comProvince=nolimit&order=0&isOpenCorrection=1

These are 2 of Chians biggest solar gear manufactuerers,,, Huge is sizebut still supply a 1 only quanties, as opposed to others who need FCL

On May 28, 2019 at 8:20pm

Chandrashekhar A.Nemade wrote:

Thanks for your Quick response and useful information

Surely with your information I can able to take a step forward towards green energy

I will surely disturb you If any further information is required.

Regards

C.A.Nemade

On June 2, 2019 at 3:43pm

Chandrashekhar A.Nemade wrote:

Dear Sir

need your guidance for sourcing of simultaneous charging and discharging controlling device for battery in electric vehicle

Regards

C.A.Nemade

On June 10, 2019 at 9:20am

jim tolonen wrote:

I have 4 3.2v 18650 batteries connected in series to power a 12v motor. Can I make a second 6v output from 2 of those 4 batteries and power both the motor off the 12v and say an Arduino off the 6v simultaneously?

On June 11, 2019 at 11:35am

Vincent Cheyenne Bajec wrote:

Hi Guys and Girls

Could someone clarify for me the best configuration for an 18 x 48100ah Shoto Lithium Ion Battery Setup please?

3 Cabinets each with 6 units is what we're looking at. Are there any suggestions regarding the monitoring softwares?

Any extra Inforation would be highly appreciated.

THANKS!

On June 17, 2019 at 8:43am

jim tolonen wrote:

I have a LiitoKala Lii-402 battery charger. The input is labeled 5V2A. How is this thing able to charge 4 3.7V Li-ion batteries in just a few hours? I purchased a BMS charger that wants something like 15V input to charge the same 4 batteries.

On July 13, 2019 at 6:13am

John Fisk wrote:

For an electric vehicle, I am looking at Nissan Leaf Gen 2 batteries. I am planning to use 48 Leaf modules at 8v and 66 ah. If I put the all in series, I will get 384v and 66 ah, I think.
If I want more current, I go with 45 modules is series and 3 in parallel, do I get 360v and 198 ah or do I lose something along the way?

John

On July 15, 2019 at 9:40am

Tej wrote:

i want to 60 v 25 Ah battery pack by using 3.7 v 2.2 A lithium ion cells ...how can i connect them to get better efficiency .. is their any better way to connect them .. i mean S ans P connection tricks

---

On July 27, 2019 at 7:43am

zahid wrote:

how to best connection in power bank (Series Connection cell or Parallel Connection cell)

Kindly write easy answer!

I want to make a battery with 26650,500mah. I need 14.8v. How would I make a 4s 2p. I see the drawing for the 2s 2p. But you can say I am slow.
Thank You for your help and time

On August 12, 2019 at 12:01pm

Adam wrote:

The free Android app “Battery Package Calculator” can help you calculate the parameters of battery packets.(up to 9999s 9999p)
https://play.google.com/store/apps/details?id=pl.freshdata.batterypackagecalculator

On August 23, 2019 at 2:56am

Shoeb wrote:

Does single battery (e.g, LA, SLA, L-ion) better or multiple battery (in parallel) with same capacity (same AH) is better?

On September 3, 2019 at 4:24am

owen wrote:

great imformation

On September 21, 2019 at 7:51am

suraj singh wrote:

Need help friends.
two 12 v, 70AH battery connected in series with charger of 24v. this batteries are UPS batteries for control system. i check this battery voltage every week. one battery voltage is dropping by 0.10v and other battery voltage is increasing by 0.10v and overall battery voltage is around 25.45v. i already replaced one set of battery and it is happening same with new battery. i checked charger output voltage after disconnecting from battery and it is giving 25.50 v, charger is showing float charging and no alarms.
can anybody suggest what else i should check for?

On October 1, 2019 at 11:20pm

Ollly wrote:

Hi everyone.

I just bought a high capacity 7800mAh replacement battery for my laptop (Dell Inspiron 1545). As I’m also using a non-OEM replacement power pack the laptop doesn’t “understand” the power pack and won’t charge the battery. It’s a common problem with copyright protections etc., but the laptop obviously still runs on the power pack, just doesn’t charge the battery. So I have to use an alternative charger like my radio-control airplane lithium charger, which works just fine with some careful attachments to the battery pack.

Now to my question, because I have to carefully program the charger:

Although the battery pack is rated at 7800mAh with 9 cells (S3P3 @ 11.1V), opening the pack I see 9 cells (18650) in S3P3 configutation, but each cell has 1800mAh printed on it, which looks like this:

```
|-{1800}+-{1800}+-{1800}+|
|-{1800}+-{1800}+-{1800}+|
|-{1800}+-{1800}+-{1800}+|
  |      |      |
 3.7V +  3.7V +  3.7V   =  11.1V
 5400    5400    5400   =  16,200mAh
```

If I’m right and according to your diagrams in this article, each set of 3 in parallel make 5400mAh, correct..?

Then the entire pack would make 16,200mAh instead of the nameplate rated 7800mAh on the cover, or have I gone wrong somewhere?

If not, why would they rate the capacity at just 7800mAh, unless what’s printed on the batteries is somehow wrong (+FP1 18650 1800mAh 170529-)? Cells are a mid-green colour.

On October 4, 2019 at 1:07am

Nabun wrote:

@ Olly

Correct, this replacement battery has 11,1V x 5,4 Ah ~= 59.9 Wh, in the best case. The answer is simple, chinese batteries are over valuated for some extra money…This is not right.

On October 4, 2019 at 3:19am

Nabun wrote:

1. Before float charge did you tried to equalize them at 14,5…15V / piece ?
2. In my real experience it's not a big problem 0.1 or 0.2 V difference in float for lead batteries. In my 28V (12V+12V+4V) / 200Ah solar system they stays over 90% of time in float (from 2013). In the evening I use 10…20 Ah for lighting the house and 230V inverter. Every season I balance them manually. If I can't balance a pair, I use unbalanced batteries from another pair to obtain a "new" pair or even remove from system, to recover or recycle in worst case.
I admit a 0.1 ..0,2V unbalance between 12V batteries in float state.
But when the batteries gives high drain currents it can be an issue.
The weakest battery may enter in deep discharge and the lifetime will be reduced.
If you monitor them and stop or reduce drain current when the weakest achieve 9.6 - 10.8V, (9,6V for high currents), the problem above disappears.
Of course, they need to be recharged immediately after use.
To manual balance them use 12..24V car lamp / bulb, in power range of 5W..21W, coupled few minutes, from time to time on the battery with higher voltage and monitor both batteries to have same voltage each. This is time consuming process
...an electronic balancer (active or passive) is a better option

On October 4, 2019 at 2:32pm

Ollly wrote:

@Nabun

Thanks for that. It seems my battery pack nameplate is overrated compared to what's inside. They advertised 7800mAh pack when it's just 5400. I'm not that bothered as it only cost $28 AU (e-bay) and a 9 cell replacement (likely honestly rated too) from Dell is $110+ AU. I think I did okay. I just need to replace the 1800mAh cells with 2600 or better.

On October 5, 2019 at 2:18am

Nabun wrote:

I forgot to mention that my last message was for Suraj Singh…if it's not obvious.

On November 10, 2019 at 7:05pm

Sajith Edirisinghe wrote:

How many lithium iron batteries are needed in parallel and series wise for 12v , 60A per hour for 8 hours ?

On November 17, 2019 at 1:13pm

Teufellager wrote:

Or just use an old fashioned rheostat. And next time get lithium magnesium phosphate batteries and parallel series some of that…it's much safer.

On November 18, 2019 at 6:04pm

robbo wrote:

@ Sajith

60Ah x 8.00Hrs = 480AH Drain so 600 AH capacity should do the trick.
You don't say if this for a home solar battery array??
8 hours is an odd figure as solar are normally 12 to 14 hours standby before the sun shines again
Dont frall into the trap of having batteries in parellel as they are a nightmare to charge and maintain
you would be better getting 24 pieces POV 2V Batteries and running 48VDC Bank
,The problem with 12V systems is that the draw is 4 times more than 48V to produce the relevant supply,. 12 V systems need 4 the AH rating and also draw 4 times as much power, 4 times as heavy cable, and are not as efficient as a higher voltage. 48VDCsystems
I know I had a 12VDC system with 5000W 12V inverter, supplied from 6 x2V 800AH POVs and it required 70mm squared cable to handle paek and spikes

Soalr is an investment and the wise man buys only once

On December 11, 2019 at 3:26am

oliver wrote:

Hi!
I Have 54 battery (2.2 volt and 250AH) connected in seri, and 15 of them are under 2 volt.
May I change these 15 battery with battery (2.2volt and 300 AH)?

On December 27, 2019 at 10:25pm

robbo wrote:

@ Oliver
I Have 54 battery (2.2 volt and 250AH) connected in seri, and 15 of them are under 2 volten
Batteries get out of whack and can be charged by a secondary charger whilst still operating. Just hook them up in series to a 12v Charger (6 pieces) or 12 pieces to a 24V charger

.
May I change these 15 battery with battery (2.2volt and 300 AH)?
Not a good idea to have 250Ah and 300Ah in the same string as charging will not work properly, keep same Ah rating
May these 15 battery have any damage while they are working
2V most likely means these battries are out of whack and need to bee charged to back to 2.4V allowed to cool and recharged again, then measure voltage again after 24Hrs

Battery chargers and solar are funny things and dont seem to be governed by any rule or laws.The best are those that have an equalisation charge where the device looks at each basttery on ots own. This means that these chargers , charge each battery individually and each battery then has its own earth so the charger looks at a 2.0V load. Alternatively I have had luck with doing a power outage at night and swapping the batteries around. I even had a 250BT Diesel Lincoln Welder calibrated by a sparky friend for charging 12 pieces 800Ah batteries. These welders give the amps but make sure it is regulated to 28.8V max, for a 24V string

PS a 54 piece battery bank is not all that common. 24,48, 96 are more common. Also we tend to round out the voltage @ 2.0V rather than 2.2V. Same in a car battery they are rated @12V but require 14.4v Max to charged Do you have any temperature monitoring in place and are the batteries outdoor or indoor. Remeber the cooler the temp the more effiecent they are. On a hot sunny day in summer there is less battery storage at sun down than a cooler winter day as every thing is so hot, higher resistances hit sink that can fry an egg.
robbo

hope this helps

On January 1, 2020 at 11:38am

Frank wrote:

Hello all,

I have 4*4 (yes, 16)12 Volt 200Ah deep cycle batteries.

Configuration is the standard, 4* parallel and 4* series to get 48 Volts array.

Left up is negative right down the positive connection.

So far, so good.

During discharge the first batteries discharge the most.
The one that have the negative connection and the one that have the positive connection.

While the middle batteries still have 12.4 volts, the first and last can be as low as 8.5 volts!!

Now I've always learned that lead acid below 10.5 volts is a dead battery.
Not able to recover, need to replace.

When I disconnect the load, slowly the voltage is rising, up to 10.5 and higher in time.

If I wait several hours, it's turns out to be about 12 volts, officially nothing to worry about.

But still….
8.5 volts??
That doesn't seem right to me.

It is not difficult to have the leads from the 4 batteries ro connect to one point, not Daisy chain.

That would be more balanced discharge, as 4 batteries are used at the same time
(4 at the negative connection, 4 at the positive connection, and the 8 in the middle)

It have to do with resistance, as the first connection have the lowest resistance, that one gets the heavy load.

So, why do all the lead - acid setups advise to Daisy chain and make the connection to one battery and not all 4 at the same time?

(Cables need to have the same length to get the same resistance, so all are charged/discharged at the same time)

I can't understand why I should abuse the first connection batteries.

If someone could explain why it is a good idea to daisy chain instead of star, please inform me!!

The batteries are charged with solar panels, normally enough to have them charged (80%) at noon again.
From 80 to 100% takes longer time.

Having the 8.5 volt reading worries me!

Normally I don't discharge below 40% to extend lifetime
Battery room have own air conditioning to keep temperature about 20 degree.
(Thailand hot season is +45degree)
16*200ah is about 4500usd, investment worth to protect.

Why not a star installation??
(With same length cable)

On January 3, 2020 at 3:53am

Haresh wrote:

Hello all and Happy new year,

Required help for battery backup circuit

We are working on AGV and we have use 60Ah li-ion battery pack (18650 cell, 7s24p)

We want to add one small li-ion battery with same voltage level and 11Ah capacity.

Now, When we replace 60Ah battery from AGV at this time we dont want to cut power to the system. we would keep power ON while change main battery.

So what will be suitable circuit or component for that.

On January 11, 2020 at 7:04am

Joseph Galea wrote:

I replaced five Li batteries of a home alarm siren. Although I replaced them all, rather than removing them all and then putting in new ones, I removed and replaced them one at a time. Could I have caused any damage since the system continues to show a low battery alert.

On January 15, 2020 at 6:38pm

Hi Joseph,

I think the alarm need a reboot to reset the low battery alert.

@Haresh
Circuit?
Just add 2 wires and 2 clamps
As long as any of the 2 batteries is connected, power remain.

On January 28, 2020 at 3:23am

NabuN wrote:

@ Frank
Assuming that all the connections are in good condition (clean, uncorroded, unoxidized, well tightened, large section conductors corresponding to the currents required by the load), there are only three variants:
1. The load is to high or duration it is connected to power is too long. For example, 1000W air conditioner can consumes in 8 hours around 12 kWh. Taking into account inverter's efficiency you have over 300 Ah drawn from the batteries !
2. The charge is too weak. 4 x 200Ah=800Ah capacity is charged very slowly if the current is low, let's say 10A (~ 1% of the total capacity). A minimum of 40..50A are required. According to point 1 and simple calculus of energy balance, PPV's should deliver energy at least 8..9 hours / day, 40..50A at 56..60V. This means that at least 4 x 2 = 8 PPV's of 220..250W are required.
An electric power generator of 3000VA + 2000VA (for charger + AC + reserve) = 5000VA would help a lot to keep the batteries charged in cloudy days or emergency issues of batteries.
3. At least 2..4 of the 16 batteries were deep discharged or sulphated or even internally corroded, probably defects. You must select the good batteries and make a smaller block of batteries temporary, for example 2..3 in parallel (and 4 groups in series). All 4 groups of batteries must have same voltage at the terminals, as far as possible, without load and with test load, e.g. a 12V 55W car bulb with the two phases in parallel, for 10 ... 20 sec.
Sulfated / deep discharged batteries must be charged at a low current of 1..5% of C (e.g 200 x 2% = 4A), few days, and the voltage of each battery must not exceed 14.50 V.
In this case, the inverter and the charger required for this operation can be omitted by connecting these 2..3 weak batteries in series (24V ... 36V) to the above mentioned 48V battery block, in series with a diode and 2..3 car bulbs of 21..55W. The diode will allow only the charge and the bulbs will limit the current thru batteries. Of course, the power / energy absorbed from the new 48V battery block will be reduced accordingly, as low as possible (20..30%), to preserve the SOC of 48V batteries block over 25% (49V for AGM).
Some of these idees was aplliyed by myself with no help at our country house since 2011 (I have degree in electric engineering). I go there almost daily, stay 6..10 hours to work on our two acres yard , relax and play with dog and cat. We haven't 230V AC grid there. All the electric power is supplied by a solar system 28V@250Ah having mixed batteries, AGM and NiCd.

On February 6, 2020 at 4:36am

YATHISHA PANCHUMARTHI wrote:

hi sir for example if i have a 48 v ,6 A, 67.6 Ah and 26 cells in a battery pack how should i know that how many cells to be connected in series and in parallel combination.

On March 1, 2020 at 6:38am

NabuN wrote:

@ Yathisha
1. What is 6A? The current required by a load that you have to feed from 48V or the capacity of a cell, in which case it must be in Ah ?
2. Do you really have a (large) 48V battery or do you need to assemble it from a 26 cell battery pack of 48V 67.6 Ah ?!
3. What kind of cells do you have in the battery pack and how are they linked, in series or mixed?
I don't understand…I lose precious time to guess what do you mean…
The "formulas" for calculating the number of cells required for a larger battery are : n.s = U bat. / U.comp. - for voltage and n.p = Q bat / Q comp. - for capacity, where n.s & n.p are the number of cells in series respectively in parallel and U comp. & Q comp. represents the voltage & rated capacity of a component of the battery you are assembling (cells / smaler batteries).
For example, for lead cells, 2 V acid: 48V / 2V = 24 cells in series. If a cell has Q comp. = 6 Ah and you want the new battery to have 66 Ah, then 66 / 6 = 11 cells in parallel. So you will have in series 24 groups of 11 cells in parallel, that is 264 cells in total !
You gave me the impression that you know too little about batteries ... and ask us goofy qestions ... I do not want to criticize you. If you only read on this site you can find answers and you will learn enough to solve simple issues with batteries.
Give accurate and clear informations in your question to get a better answer. No offence !

I have a query on theory explained here about how two battery cells of ‘x’ volts and ‘y’ capacity each when kept in series gives 2x voltage and ‘y’ capacity as a result.

My question here is how Li ions and electron or current flow works in this configuration ?
In this cells arrangement one of the electrodes of one battery cell works as anode and one from another battery cell works as cathode for whole battery pack configuration whereas all individual cells are separated by a insulator?

On April 5, 2020 at 9:50pm

Seung Ho-Kim wrote:

Hello! This is Seung Ho-Kim.

On April 10, 2020 at 4:00am

robbo wrote:

@ FRSNK (4 x4) configuration

Frank this array looks good on paper but would need several chargers and battery management to keep it working
Put simply a fucking nightmare

The easiest would be to run a single string of 16 in Series to give 192 VDC @200 AH .
A total capacity of 38400 AH @192V
Higher voltage inverters have a higher effieceny than low voltage has to step up from 48 to 240 (5 to 1 with high loss high heat)
Where as 192 VDC to 240 Ac is only 1.25. This also means lighter cheaper cabling

There are inverters out there that have an adjustable input from about 120VDC to 240VDC . with capacity of 10KW should do it .
What is your heaviest load
Fridge
freezer
AIR con (heavy continues load

Inverters are cheaper than batteries and two are needed to mgive redundancy , in the case of failure its a simple thing to switch to “B” inverter

If You are interested I can source these direct for you

Remember there is no such thing as “CHEAP” solar , quality costs but lasts

The poor man pays twice
robbo

On April 17, 2020 at 4:56am

nabun wrote:

@ robbo
1 . I must say that you have made a mistake : 16 batteries of 12V 200 Ah have only 200Ah and 38400 Wh energy . You have confounded Ah with Wh…
2. You proposed to Frank to change the inverter to another unit powered at 192 V DC high voltage. This is a supplementary and futile cost since Frank let us understand that he has already an inverter (48V).
3 The solar panel array must be configured for HV DC. Another costs. I say nothing about safety when you work on 192V DC circuits…
4. The problems are with the batteries, not the configuration, if you really understand what he asked from us.
Peace, man !

On May 29, 2020 at 4:47am

gogo wrote:

Hello guys,I really need your help.Can you tell me what kind of lithium polymer battery I need ,if I have a heater element that draws 5 Amps and it is 12V.I only need the heater to work for 20 min.What is going to be the best combination of batteries.?

Thanks a lot !

On June 9, 2020 at 1:10am

nabun wrote:

@gogo:
Let’s solve this problem of Physics (Electricity):
Eu (energy required) = 12V x 5A x 20min./60min. = 20Wh
Qdis. (capacita discharged from battery) = 20Wh : 12V = 1.66Ah
Qcap.(battery’s capacity for 50% D.O.D) = 1.66Ah / 50% = 3.33Ah

So, you need a LiPo battery 3S1P - 3300 mAh or higher, like this (RC type, low cost):
https://www.aliexpress.com/i/32828727983.html
(Stop discharging battery below 9V under the load, to preserve maximum lifetime.)

Regards, NN

On June 13, 2020 at 12:51am

Denzil wrote:

Hi,
As my questions below will confirm, I am a complete novice when it comes to all things electrical. I am considering converting a 1974 VW Karmann Ghia classic car to electric drive, using a 90Kw 3 phase AC induction motor. The specs are as follows:
“90 kW 3ph 4 Pole AC induction Motor.Battery Vdc:240/400; Rated kw s2 1h: 40/120;Rated RPM: 4000/6000; Max RPM:8000;IP: 65; Motor Weight: 80-120kg; Max P(kw):60/180; Max T(Nm):300/500”
After reading “BU-302: Series and Parallel Battery Configurations” on this website, I am wondering if the following would work for the battery pack:
1) Build a module using 20 Li-ion 3.7V 4800mAh arranged 4s5p for a total of 18.5V and .3552 Kwh
My understanding of 4s5p is this diagram:
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__ __ __ __
__ __ __ __

2) Connect 75 of these modules 5s15p to get 35.52Kwh and 277.5V
3) Possibly further connect a second set of 35 modules 5s7p to get 12.432 Kwh and 129.5V
This link is for the cells @ US$1.90 each:
https://www.alibaba.com/product-detail/Cylindrical-3-7V-21700-Li-Ion_62483551652.html?spm=a2700.7735675.normalList.248.12da7ad7IhtmDu&s=p&fullFirstScreen=true

Also on Alibaba is this option for 3.2V 50Ah LiFePO4cells @US$25 each:
https://www.alibaba.com/product-detail/3-2V-50Ah-LiFePO4-Lithium-Battery_62438724672.html?spm=a2700.7735675.normalList.74.12da7ad7IhtmDu&s=p&fullFirstScreen=true

The output for each of these is 3.2 x .05 = 0.16Kwh?
I calculate that for the same Total Kwh and voltage of the previous configuration, I would need at least 240 cells connected 24s10p? Much more expensive.

Does any of the above make sense? I would greatly appreciate feedback.
Many thanks.
Denzil
Auckland
New Zealand

On June 13, 2020 at 12:58am

nabun wrote:

@gogo:
Let’s solve this problem of Physics (Electricity):
Eu (energy required) = 12V x 5A x 20min./60min. = 20Wh
Qdis. (capacity discharged from battery) = 20Wh : 12V = 1.66Ah
Qcap.(battery’s capacity for 50% D.O.D) = 1.66Ah / 50% = 3.33Ah
Number of cells = 12V / 4V = 3
(The heater is not sensitive to voltage, it works well at 3 x 3.8V = 11.4V)
So, you need a LiPo battery 3S1P - 3300 mAh or bigger, i.e (RC type, low cost).
Stop discharging battery below 9V under the load, to preserve maximum lifetime.
(I hope mr. Isidor B. will allow this time my post after I removed the link to this battery…)

Regards, NN

On June 14, 2020 at 1:32pm

Denzil wrote:

Hi,
As my questions below will confirm, I am a complete novice when it comes to all things electrical. I am considering converting a 1974 VW Karmann Ghia classic car to electric drive, using a 90Kw 3 phase AC induction motor. The specs are as follows:
“90 kW 3ph 4 Pole AC induction Motor.Battery Vdc:240/400; Rated kw s2 1h: 40/120;Rated RPM: 4000/6000; Max RPM:8000;IP: 65; Motor Weight: 80-120kg; Max P(kw):60/180; Max T(Nm):300/500”
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The output for each of these is 3.2 x .05 = 0.16Kwh?
I calculate that for the same Total Kwh and voltage of the previous configuration, I would need at least 240 cells connected 24s10p? Much more expensive.

Does any of the above make sense? I would greatly appreciate feedback.
Many thanks.
Denzil
Auckland
New Zealand

On July 3, 2020 at 4:17pm

Imene wrote:

Hi,

Glad to find youe website, I found too many answers to my questions but still have one

I wanted to know, which is better using a battery lithium voltage 3,7V32Ah is better than 12V30,8Ah need to know that I use it for my solar light system, I use a solar panel of 18V and a LED lamp of 12V ?

Thank you in advance because I am wondering about that since a month but I couldn't find an excat answer

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On July 14, 2020 at 4:14am

nabun wrote:

@Imene
I assume that the 12V LED lamp will need around 1A current (12W), like usual LED lamps, so the load is quite small.
1. You will put 3 pcs. Li-Ion cells in series and you can have ~16 hours runtime without charge, discharging this battery @ 50% DOD.
2. If the battery of 12V 30.8 Ah has LiFePo4 chemistry, it can sustain the lamp ~15.5 hours @ 50% DOD.
3. If the battery is AGM lead with 30.8 Ah capacity, it will supply power for lamp ~15 hours, discharged @ 50 % DOD. My opinion is to use a good quality battery because it will last ~1000 cycles in these conditions and the price is under 50% compared to lithium based battery. In addition, the solar controller costs twice times lower for this kind of battery.

Regards,
NN alias Nabun

On July 16, 2020 at 9:26am

Tunde wrote:

My laptop is using 3 cells with capcity of 3200mah each and one got spoilt and i use a battery with capacity of 1000mah would it work and demerits

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On July 26, 2020 at 3:58am

Nabun wrote:

@Denzil
First, let's see the energy and currents requirements for battery for this car VW to be converted to EV: I assumed the mass of the car is 1200 kgs,frontal section is ~1.5sq.m and (maximum) constant velocity 108km/h = 30m/s.The mechanical effective power required is a sum of P_friction.= 0.03 x 1200 x 9.81 x 30 ~ 10.6kW and P_drag_air = 1.3 x 1.5 x 0.31 x ½ x 30 ^ 3 ~ 8.2kW, where 0.31 is the drag coefficient. The sum is 18,8kW.
The current absorbed from the battery will be: 18800W / 0.85 / 270V ~ 82Amps, where
0.85 is the estimated efficiency of motor and gearbox. Considering an ideal Peukert coefficient (=1) , the energy absorbed from battery for one hour autonomy (=108km) is ~ 270V x 82A = 22.2kWh. So, the battery, controller and motor must work well and long time with this current.
Concerning building the battery:
1). A block of 20 x Li-Ion cells of 4.8 Ah in 4s5p configuration has 14.8V @ 24Ah.and 355Wh = 0,355kWh. Too, the diagram of connections need a little correction, because the block will supply large currents:

```
- _ _ _ _      raw 1
 | ...........|    raw 2, 3 etc.
 | _ _ _ _| +   raw n
```

2)A. 15 blocks in series of 5s15p cells will have 277.5V and 72Ah=19,98kWh

525 = 997.5 USD.
C. For only 129.5V you need 7 blocks of 5s15p cells, in total 525 pcs. Energy of battery is 9.32kWh and capacity is 72Ah.
D. 3.2V 50Ah LiFePO4 cells look more convenable for me concerning the work for building EV's big battery containing 174 cells in 87s2p configuration = 278.4V @ 100Ah and 27.8kWh of energy stored. Price can be 25 x 87 x 2 = 4350 USD.
This cells are more reliable, IMHO.
Conclusions: larger battery it's better…and more costly. You must pay more attention to calculations !
And….Yes , everything has a sense in the universe ! ☐

NN

On July 31, 2020 at 12:13pm

Ross wrote:

Hope I could get some clarification on this:
Q1)
3 batteries, each of their specs= 3.7v, 3000mah, 1C

Two of them are in parallel, and one in series to it.
What would the mah be of this configuration?

Q2)
Same configuration as above, but the single battery in series has a mah of 2000.
What would be the outcome?

On August 6, 2020 at 2:55am

Nabun wrote:

@Ross
A1) In series, always the weakest (smallest) element gives the battery's capacity, in this case 3000 mAh.
A2) As I said upper ... : 2000 mAh.
Try to read carefully this page, from the beginning !

NN

On August 10, 2020 at 4:04am

Evert Spies wrote:

I have a camera battery pack 14.4v 4s(18650) .
It would appear as if the controlling board is faulty.
Is is a Sony BP-U30.
All 4 leds (normally indicating the charge of pack) flash when trying to change. I have charged the pack without the controlling board and cells seem to be fine.
Is it possible to replace the controlling board with BMS allowing the pack to be safely charged. A circuit would be appreciated.