

HOW TO REENERGIZE RECHARGEABLE BATTERIES

**A GUIDE ON HOW TO GET THE
MOST OUT OF YOUR RECHARGE-
ABLE BATTERIES**



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INTRODUCTION

UNDERSTANDING THE BASICS OF RECHARGEABLE BATTERIES

Rechargeable batteries, otherwise known as accumulators, are a special type of electrical battery which can be charged and discharged several times. This is an improvement over a conventional battery that comes fully charged and is often disposed of after use. Rechargeable batteries mainly comprise of several electrochemical cells, and they are also called accumulators due to the unique method in which they store energy.

Rechargeable batteries are available in various sizes and capacities. Some of the more common versions include the NiMh, Lithium ion polymer and NiCd batteries as well. In most cases, rechargeable batteries are much more expensive than disposable batteries and have minimal environmental side effects.

This guide will help you understand everything you need to know about these batteries. You will be surprised at how well such batteries can be used in a variety of applications. These are all designed to be strong enough for many general requirements that you may hold but you can always get more out of one of these batteries if you understand what to get out of them.

CHAPTER 1 – THE BASICS OF HOW SUCH BATTERIES WORK

Although there are many different types of batteries, the common factor shared is that these things have similar functionalities. In fact, when a device is connected to a battery, a unique chemical reaction starts to produce electrical current. This particular reaction is known as an electrochemical reaction, and it was the Italian Physicist Count Alessandro Volta who first documented such a procedure in the eighteenth century.

Batteries have evolved over the years to become important aspects of our day-to-day lives. We can't even begin to estimate the significant impact that batteries have made for portable, convenient and reliable sources of power. For power stations, flashlights, handheld devices and various other tools, batteries are the common factors that keep them all working. It would never have been possible to start your automobile with just a simple twist of the ignition key.

APPLICATIONS FOR RECHARGEABLE BATTERIES

All types of rechargeable batteries are good for something. Take the lithium ion option, for instance. There are various types of devices that use lithium ion batteries. These include portable consumer devices, automobile starting mechanisms, and uninterruptible power supplies.

Conventional rechargeable batteries might self-discharge at rapid rates, thereby requiring charges before any use. Some of the contemporary, low self-discharge NiMh batteries can hold a significant amount of charge for several months and will often be sold with some charge to avoid rapid discharging.

Battery power stations require lithium ion batteries for procedures such as storing energy for power outages and renewable energy purposes as well. According to recent studies, the demand for lithium batteries is growing twice as fast as other batteries due to their many benefits. The small lithium ion batteries can be used to power various tools including handheld devices and power tools as well.



INVESTING IN A HIGH CAPACITY BATTERY MATTERS

There is no denying that most if not all batteries have a life span. Therefore, using a spare battery won't last as well as a high capacity battery of the same type. The lifespan of a battery is important when choosing the ideal model for your portable power needs.

You will have to look carefully at the over power totals on your battery to see how well it can work. Even more importantly, you have to look at how the capacity can be reduced over time. This is needed so you can clearly understand what may happen to a battery over time.

HOW SUCH BATTERIES DIE

The active section of the cathode on a battery is designed with a unique atomic structure to provide optimal performance and stability. When ions are transferred over to the anode and re-integrated back on the cathode, the ions should return to the starting spot to preserve the stable crystal structure.

The main complication is that the crystal structure can be compromised during the charging and discharging procedures. The constant movement of ions will cause the electrochemical

properties of the cathode to change over time. As a result, the initial arrangement that was responsible for the battery performance has now been altered. All these factors combined will often cause a battery to die.

UNDERSTANDING THE MEMORY EFFECT

The memory effect refers to the changes that occur in nickel and nickel metal hydride batteries, which is crucial for holding charge capacity. This term is used to describe the unique situation that occurs when batteries lose their maximum charge capacities due to repeated recharging or even after partial discharging. These batteries will often start to `remember` the lower charge capacity, which then makes the battery ineffective.

In other words, the memory effect occurs when the battery is partially discharged several times. As a result, the battery embraces this effect and might never achieve optimal charge conditioning without a reconditioning procedure. However, it is important that you note the differences in between deep discharging and the memory effect.

With all of this in mind, you need to understand what you can do in order to recondition your batteries properly. To start, you need to take a look at the equipment required for the process.

CHAPTER 2 - SUPPLIES AND EQUIPMENT FOR RECONDITIONING THE LI-ION BATTERY

You will require various supplies when conducting a reconditioning your Li-ion battery. Broadly speaking, if you want to recondition your batteries, you will need an electrical multimeter, alligator clips, and safety gear as well. These items are highly affordable and are important for safe results each time.

Besides that, you will also need items such as the capacitor and smart charger when reconditioning the NiCd or NiMh batteries. The added benefit of using a smart charger is that it regulates the entire charging procedure.



CRITICAL TIPS AND TRICKS

- Ensure that you conduct the reconditioning procedure occasionally to rejuvenate the capabilities of your battery.
- Consider investing in a smart charger that you can use to perform reconditioning procedures.
- Only use the battery until it loses power partially, draining the battery might compromise its overall functionality.
- If the battery is a NiMH or NiCd battery, consider discharging it as low as possible before conducting the charging procedure to control the memory effects.

CHAPTER 3 – SAFETY PRECAUTIONS

Batteries are tools that are capable of producing electrical currents. Furthermore, these are electrochemical tools that can have dangerous side effects without the proper care. This chapter is all about understanding what you have to do when handling batteries like these.

The energy generated in a battery is created by special conductors that include nickel, lead and cadmium. These are heavy metals and can pose a significant threat to the environment without the proper disposal methods.

In car batteries, the electrolytes that produce energy are in most cases sulphuric acid that is mixed with pure water. Although the sulphuric acid is a standard element for battery functionalities, it is harmful to your health in all forms. In fact, sulphuric acid can damage your eyes and skin, so ensure that you wear the appropriate protective gear.



Here are a few pointers that must be used:

- ☑ Ensure that you embrace high safety standards when working with your tools. For instance, wear gloves, eye gear and overall clothing if possible. You should protect your skin and eyes from any contact with the acid since it might cause an injury
- ☑ In addition, you must see that your goggles and your clothing cover your skin has no spaces or openings that may allow harmful substances through. Anything that appears worn should be discarded immediately.
- ☑ Remove your jewelry, or any loose clothing that might compromise the entire procedure. Some metals may cause reactions that will not only damage those metals but also ruin the batteries.
- ☑ Check on the overall specifications of any battery that you are aiming to recondition. This is to see that you understand what comes with a particular battery before trying to work on it.

CHAPTER 4 – STEPS FOR RECONDITIONING THE LI-ION BATTERY

As time passes, all batteries will start to lose their original capacity levels. This is especially true for laptop batteries that have been exposed to heat or various charging and discharging cycles.

In some cases, reconditioning the battery might only require a deep discharge to correct the complication. This might mean replacing individual cells to achieve the best results.

With this in mind, you have to look at the following steps when getting the most out of managing your batteries.

1. Perform a full charge on the battery.

You should ensure that the battery is well installed as a failure to confirm this might lead to complications. These includes reduced operational times and inconsistent charging patterns as well. For instance, if the battery stops charging after a few minutes, then this might be a telltale sign of a compromised battery.

2. After this, fully discharge the battery.

You will be inclined to cut off the power supply and use the battery until it drains out.

3. Charge the battery to full capacity again.

You might consider doing this when the device is on to

achieve fast charging results. After a few hours of charging, you want to ensure that the battery has achieved optimal charge capacity.

4. Double-check that the battery has achieved maximum capacity by using a multimeter.

If the multimeter indicates that the battery has achieved optimal charge capacity, then it is time for the next step.

5. Once the battery is at full capacity, ensure that you unplug the power cable and ensure you drain all the power out. Re-use the battery again until it loses all its power.

6. After this, give it a full charge again. So plug the device that has the Li-ion batteries into the source of energy

and leave it to charge again fully.

7. If you notice a slight improvement in performance, then you can repeat the procedure again.

This part of re-training the battery can make a real difference. It improves upon how well the charging process works, thus increasing the potential for the lifespan of the battery to increase over time.



CHAPTER 5 - PROPER STORAGE OF YOUR LI-ION BATTERY

The most important thing you can do for your batteries is to store them at room temperature conditions. This includes a spot where the temperature will not suddenly change without much notice.

The best temperature level for storing your battery averages is between 15 and 25 degrees Celsius or 60 to 75 degrees Fahrenheit. The effects of high temperatures can be exacerbated when the battery is full, due to the increased chemical reaction in the cells. Therefore, avoid placing your battery in direct sunlight since heat will compromise the capabilities of the battery. Don't forget to avoid keeping your battery in wet or humid conditions. Excess moisture might cause such a battery to weaken.

CHAPTER 6 – THE NICKEL-CADMIUM (NICKD) BATTERY

The Nickel Cadmium battery consists of cadmium electrodes and nickel oxide hydroxide. The acronym NiCd is the acronym for these types batteries. Such batteries have been in used since the nineteenth century. However, the introduction of the NiMH and Li-ion batteries caused a significant decrease in the use of NiCd batteries.

The NiCd batteries will provide a terminal voltage during discharge that averages at 1.2 volts, and it might drop as the battery gets close to the discharge. The NiCd batteries are available in various capacities and sizes, including the portable sealed batteries to the large and ventilated cells that provide excellent standby power solutions.

Furthermore, the NiCd batteries provide excellent life cycles and performance even at low temperatures. More so another significant advantage of these batteries is that they can provide excellent capacity levels and high discharge rates as well.

The sealed types of NiCd batteries were once a common

powering solution for photography devices, flashlights, and portable power equipment. Crystalline formation might occur if a nickel battery is left on the charger for several days or is perhaps repeatedly recharged without a systematic discharge procedure. Since most battery uses involve this type of pattern in discharging, the NiCd batteries might require systematic discharging to achieve optimal battery life.



WHAT MAKES AN NICKEL CADMATE BATTERY DIE?

While the NiCd batteries don't exactly die, it is the accumulation of sulfur crystals that compromises their functionality. This buildup of crystals can be attributed to:

- ◆ Overcharging the cell
- ◆ Leaving the cell in the discharge mode for a long duration
- ◆ Memory effects
- ◆ Exposure to high temperatures

After the crystallization starts inside the cell, the effects will eventually reach both of the battery terminals. This might lead to shorting of the cells which reducing the charging capacities of the batteries. The added benefit is that you can easily eliminate the effects of sulfur crystals by delivering a high electric current through the terminals.

METHOD ONE FOR RECONDITIONING NICKEL CADMIUM BATTERIES

The rechargeable batteries do not die, but they become ineffective in performance. This is due to the notable memory effects, self-discharge complications, and even high temperature as well. By passing a high voltage current on the dead NiCd batteries, you can easily revive them back to achieve optimal functionality. Reconditioning is one of the main methods of eliminating the effects of sulfation and poor battery performance.

1. Using a DC power supply, direct a current to the NiCd batteries

While some people might use car batteries to revive their NiCd batteries, it is often a delicate procedure that requires caution. This is because Cadmium is a toxic compound and when the batteries are exposed to high current, the risk of damage is significant.

2. Next, you need a capacitor since it helps you deliver a high voltage discharge on the batteries.

One of the prevalent capacitors available today are the ones that are found in disposable cameras. Ensure that you charge the capacitor to achieve to a voltage that is more than three times the average of the cell you are using.

Following this, connect the battery to the capacitor and ensure that you confirm the polarities.

3. Once the pulse charge flows through the battery and the Sulphur crystals are eliminated, implement the conventional recharging or recondition procedure for your battery.

METHOD TWO FOR RECONDITIONING NICD BATTERIES

When a NiCd battery dies, it will often fail to accept a charge and no current in the connections. This might be an excellent indicator of shorting by the accumulation of crystal dendrites. One method of rejuvenation the battery would be to zap the shorted crystals by using the immense power acquired for a tool such as a welder.

1. Charge the battery for some few hours and ensure that it can hold a sufficient charge.

If you suspect that the charger is damaged, you should consider repairing, replacing or perhaps performing a trickle

charge procedure by using a different voltage.

2. Ensure that you don't overcharge the unit and use some lights in series mode to ensure that the current stays below one amp. When the battery accumulates sufficient

charge, confirm the voltage levels using a multimeter.

3. Using a multimeter, ensure that the welder can supply DC and ensure the gun on the gun in the clamp reads both polarities. In some cases, welders sometimes supply AC, which is opposite to what is required.
4. Control the knobs to determine the average voltage range that the welder can deliver when no current is flowing. Zap the batteries by using the positive and negative leads of the welder on the corresponding terminals.

You may notice some sparks flying and ensure that none of the materials are welded together. Be cautious when getting this to work in the charging process.



CHAPTER 7 – THE NICKEL-METAL HYDRIDE BATTERY

A nickel metal hydride battery is a particular type of battery that comprises of nickel cadmium as the positive electrode and nickel oxide hydroxide as the negative terminal. Having said that, the negative terminals come with a hydrogen absorbent structure that allows sufficient passage of current rather than cadmium.

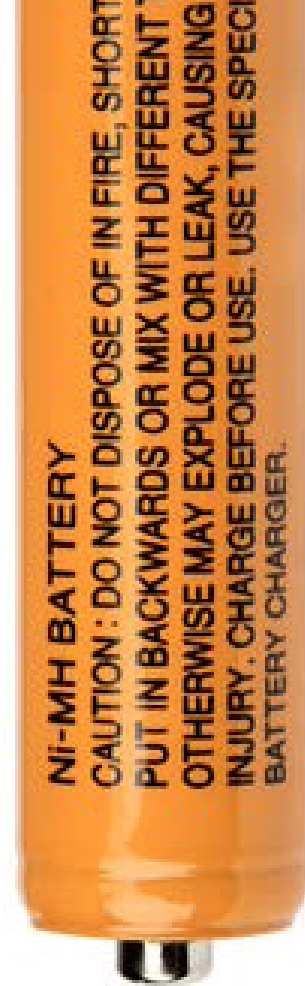
The NiMh batteries can provide as much as two or three times the capacity of NiCd batteries, and the energy density is similar that of what you find on Li-ion batteries. These batteries have evolved over the years

to become essential in powering the various technological devices today.

For instance, the NiMh batteries can be used to power hybrid electrical automobiles and cell phones. These batteries were introduced as nickel-hydrogen batteries that were initially meant for aerospace purposes.

Due to their superior life cycles and reasonable energy density levels, the nickel-hydrogen batteries were particularly perfect for aerospace activities. However, the batteries were heavy and often

tough to use in many conditions. NiMh batteries were then produced by using the metal hydride hydrogen storage materials as a battery electrode. More so, these batteries have been improving in functionality over the years and have become important for various applications.



RECONDITIONING METHOD ONE

There are two main methods of reconditioning NiMh batteries.

While these batteries tend to have a longer lifespan than the NiCd batteries, they are still prone to memory effects even after a small duration of use. Dismantling the battery is not feasible, but one can still reset the memory effect.

1. Charge the NiMh battery to achieve optimal capacity and then let it charge for an average of 60 minutes to achieve optimal results.
2. Drain the batteries by using them on an electronic device until all the power runs out. Ensure that you drain out all the power by confirming three times with a voltage reader. Use a high capacity device that will drain the battery quickly.
3. Recharge the batteries again and put them in the device to ensure all the power runs out. This time round, ensure that you switch off the device when the power runs out and wait for a few minutes.
4. Following this, turn the device on again, and it should now have achieved optimal functionality. In some cases, it may be slow in performance, or it may even die immediately. When all the power runs out, confirm that the device runs out of power by turning it on.
5. Place the batteries back in the charger and recharge them back to full capacity. If the batteries are still good, then they should hold sufficient charge.

RECONDITIONING METHOD TWO

There are few methods of refurbishing Ni-Mh battery packs that can be applied, and the most effective solution is to replace the dead cells.

1. The first step is to recharge the battery to full capacity by using your charging station. Once the batteries are full, remove them from the charger and let them sit for some few hours.
2. The next step is to put on the appropriate gear and consider the safety precautions that were mentioned previously. Conduct this project on a stable platform that is stable such as a workstation.
3. Use a screwdriver to pry open the battery pack. Once you complete this, you will come across the Ni-Mh batteries.
4. Using a voltmeter, test each cell and evaluate for any performance inconsistencies in the cells. Avoid connecting the terminals to the cells during this procedure. If the volt measurement averages in between 1.1 and 1.3 voltages, then this is still a good cell.

Any measurement under 1.1 is a damaged cell, and it should be disposed of.

5. Remove the damaged cells from the battery pack and replace them with new ones. Once this procedure is complete, ensure that you charge the battery back to full capacity.

A good recommendation for maintaining the lifespan of your battery is to make sure that it only undergoes partial discharging rather than full discharge cycles.



CHAPTER 8 - INVESTING IN A SMART CHARGER

Smart battery chargers are perfect for maintaining the overall performance of your battery, especially if you hope to achieve long-term performance results. If you have a battery that needs reconditioning then a good place for you to start would be with a smart charger.

Such a charger can be plugged into the main electricity source and connected to the terminals of your battery directly. Besides that, these charges can be used to power a battery that is running low or to simply conduct a performance upgrade for an unused battery. Choosing a smart charger is a worthwhile investment for your charging and battery maintenance needs. These chargers will automatically detect the fastest charging method and will alternate to trickle charge when the battery achieves optimal capacity. In this way, there is no risk of damaging or perhaps overcharging your battery.

Similar to the conventional types of chargers, a smart charger should provide the following benefits:

- Maintenance charging- this is also referred to as trickle charging, and it involves sending a small amount of electricity to the battery to maintain its performance levels.
- Conventional charging- this involves sending power to the battery to increase its capacity from a low amount to a large amount of power. It often takes 6-24 hours and an overnight charge cycle to achieve the best results.
- Engine start capabilities- this is similar as jump-starting the vehicle since it's a process that utilizes more energy that is found in the conventional chargers.



When choosing the best smart charger, you should also consider the following:

- Device capacity- what is the capacity rating of your device? A larger device will often require a larger battery, which in turn requires the use of a large capacity smart charger to achieve the best results
- Battery type- this is important since it using a low capacity or high capacity charger than for the unique rating of your battery might compromise its overall functionality.

CHAPTER 9 – WHY BATTERIES NEED TO BE RECONDITIONED

When you first procure your rechargeable device, it often provides the ideal charge performance for a significant duration of time. Depending on the device you are using, the battery type and the frequency level of use, this battery might soon start showing signs of discharging.

This wearing out of batteries often comes up as reduced operations times and power storage. In some cases, users may be forced to discard the batteries and settle for new ones. The decreasing capacity of the battery is often caused by what is known as the memory effect. The type of battery that is most susceptible to these effects are the NiCd batteries. The NiM batteries are affected, though not as much as the NiCd batteries while the Li-ion batteries are almost resistant to memory effects.

With the proper reconditioning methods, your battery might be restored to optimal functionality with a short duration of time and by using DIY procedures. One of the main causes of the memory effects is when users allow the battery to drain all its power. However, a bet-

ter solution for controlling this effect would be only to allow the battery to discharge partially. In this way, the battery remembers this effect, and it is capable of holding much more charge.

The accumulation of crystals otherwise known as sulfation can also compromise the capacity of your battery. This process can be reversed and the functionality of your battery restored. Another important factor to consider is to observe the proper care methods for your battery. Batteries are conditioned every once in a while to ensure that all cells are working at optimal capacity levels. More so, most batteries tend to have a measurable lifespan and to perform a reconditioning procedure may help salvage some more time as you invest in a new battery for your needs.

There are many types of reconditioning procedures and the one that suits your battery is dependent on various factors. These include the type of battery and the level of age it has suffered through its life span.



CHAPTER 10 – TESTING PROCESSES

This chapter is all about understanding the many testing processes that can be used when getting your battery to work well enough.

HOW TO TEST YOUR BATTERY WITH A VOLTMETER

- ★ The first step when testing your battery is to ensure that you have the appropriate gear on.
- ★ Next, you need to set up your test equipment and ensure that the battery has no other connections.
- ★ Touch the black leads on the multimeter to the negative terminal and connect the red lead to the positive end of the battery. If you get the leads backward, you might notice a negative measurement rather than a positive one. This is often a reminder that you need to recalibrate the machine to obtain the correct measurements.

- ★ Following this, you will then have to recalibrate the multimeter to the DC volts setting. The sine wave measurement is often an indicator of AC voltage. However, AC settings tend to be for the high capacity devices such as the washing machine.
- ★ You will then have to read the results and confirm the voltage reading on your screen. If the voltage of the battery averages in between 11.9 and 12.7 volts, then this might be a battery that still has juice left in it. The voltage reading of a battery is also affected by the average temperature levels.

If the average voltage is more than 12.5 volts, then the battery has achieved optimal capacity. However, if the voltage is less than this amount, then it should be recharged and tested by a qualified professional.

Remember that the state of charge does not indicate whether the battery is in good condition or not. Rather, it helps to indicate the current rate of charge and a low state might still hold some battery power. A good battery should hold sufficient charge.

After this is all done, you can charge the battery. If the battery has a low state of charge then it might be time to conduct the recharge procedure. This can be achieved by using a smart or portable charger or perhaps charging your battery by using a customized alternator.

HOW TO TEST YOUR BATTERIES WITH A BATTERY TESTER OR MULTIMETER

Using a battery tester to evaluate the performance of a battery provides different information as when compared to using a multimeter. This is because the battery tester only measures the useful charge remaining in your battery. In this way, users can determine whether

the batteries can still provide functionality or they need to be disposed.

Testers are nowadays a common occurrence when reconditioning rechargeable batteries. In fact, smart devices such as laptops and cell phone come with in-built testers that can de-

tect the amount of charge remaining in the device. Typically, this shows up as an interface on the screen that acts as a visual indicator for the next charge cycle.

The rotary dial in the central section of the multimeter is important since it helps you choose the metrics that

you want to measure. There are two measurements that can be obtained and this includes the voltage and resistance metrics. These metrics are often referred to as no load, which means that these are measurements that are obtained when the battery is not in functionality, and no current can be obtained from the connection. Multimeters will provide useful information for your unique battery testing needs.

Such a tool will work by measuring the voltage while applying a load simultaneously on the connection. For the inbuilt battery testers that are common in laptop PCs, the device is typically on when you receive recharge information, which means that it is drawing the load from the battery.

For free-standing battery testers, the correct resistance is applied during the testing procedure such that the entire connection is tested under load. A significant portion of battery testers will only work with specific batteries, while others are dynamic enough to work with cells of different types.

Using a battery tester is a straightforward procedure. All you need to do is to connect the cells appropriately and in relation to the unique size of your battery. This may work better than a voltmeter but either choice will be useful for your demands no matter what they might be.

Here's a more specific look at how to use one:

1. The first step is to move the selector dial to suit the measurements that you want to obtain.

In most cases, the multimeter is capable of measuring both DC and AC volts, amperage and resistance levels as well. For this reason, the multimeter features several measurement ranges to allow for the measurements of the several metrics. When measuring the DC voltage or amp levels, ensure that you connect the positive leads to the positive terminals and repeat the same for the negative terminals.

2. To achieve the most precise readings, hold the tips of probe correctly by ensuring they are in contact with the leads. Avoid touching the metal sections of the entire connection when taking the measurements since your body also emits a certain amount of electricity. This may impact the reading and it could even lead to an electrical shock.

3. Before you make resistance reading, ensure that connect the pair of leads to restore the power back to zeros. The multimeter comes with special settings that will recalibrate its measuring capabilities. This ensures a more accurate readout if used right.

CHAPTER 11 – HOW TO RECONDITION A BATTERY WITH A BATTERY ANALYZER

Working with a battery analyzer might be the best solution for your needs when reconditioning a battery. This would require a few steps to make it work well enough.

1. Ensure that the battery is discharged to about 90% of the normal capacity.

On average, this would be at least 1 volt per cell for the Ni-Cd and Ni-MH batteries. The best method for reducing the nominal voltage is to test the battery.

2. Complete the testing procedure by entering all the information relating to the voltage, battery type FOR future references. You might need to alter the test amps and test cutoff voltage levels to obtain the most accurate reading.

3. The test amp should be customized in between 0.1 and 0.2 of the battery capacity rating.

For instance, if the rating on the battery averages 2000mAh, divide this amount by 1000 to obtain 2.0

Amp hours. Therefore, 0.1×2 and 0.2×2 are the average test amps of the battery, which are 0.2 and 0.4 respectively.

4. Set the test cut off voltage to be 33% of the normal voltage of the battery.

In this example, a pack of 5 NiCd batteries that is classified at 1.2 volts should have a normal voltage of six volts. Therefore, the test cut off voltage will be 33% of 6 volts, which averages at two volts

5. You can then start the reconditioning process as the battery will be discharged to suit the test amp rate that you had initially set. This process will continue until the voltage of the cell is similar to the test cutoff voltage levels.

6. At this point, the battery should have undergone a full recharging procedure and then test it to confirm the new capacity level. If necessary, the reconditioning procedure can be allowed to occur well over two times to achieve the best results.

CHAPTER 12 – HOW TO REVERT A REVERSED CELL

In some cases, just once of the cells in the battery pack is damaged while the rest of the cells are working. Such a problem might reverse the polarity of the cell. As a result, the terminal that positive terminal is switched and becomes negative and vice versa for the other terminal. This might occur when the battery discharges to a low level, and the battery obtains a charge from the cells in the counter direction.

To determine the complication, ensure that you pry the battery open and then evaluate the average voltage amount of each cell. If any cell has a negative polarity when you connect it to the red lead to the positive terminal and the black lead on the negative terminal, then this cell has undergone what is known as a reversed polarity. The best solution for reversing this complication would be to deliver a shock charge that averages 4.5 volts to a cell of 1.2 volts will correct the polarity.

After correcting the polarity of the cell, put the battery back together and recharge the cell to full capacity. Ensure that you never allow the battery to discharge to a

low level to avoid causing the weak cell to undergo the polarity change.



CHAPTER 13 – KEY CARE CONSIDERATIONS FOR ALL BATTERIES

Broadly speaking, reconditioning a rechargeable is a process that entails exposing battery cells to deep discharges.

Let's summarize the process quickly. It is clear that the simplest method to accomplish getting a battery recharged is to use the device until all the power runs out. If it is a power tool, ensure that you only recondition it without placing a load on the discharge section of the cycle.

After this, charge the cell to full capacity since this procedure can be repeated for an average of two times. If the battery does not achieve optimal condition after this procedure, then you should try performing a rejuvenation procedure. Besides that, you can take the battery through a deep discharge cycle procedure.

This should work well for all kinds of rechargeable batteries. These include NiCd batteries that provide great capacity, NiMh batteries that can handle the memory effect better and Li-ion batteries that are easier to maintain.

NICD CARE

NiCd batteries are prone to the memory effects such that all care procedure should primarily target to mitigate the effects. Use a device that is powered by NiCd batteries until all the charge completely drains before starting the recharging procedure.

Perform a deep discharge procedure on the Ni-Cd batteries every month by using your devices until it loses all its operating power. Following this, you must recharge the battery to full capacity.

It is important to note that the first three discharge sessions for the Ni-Cd batteries typically include when it is first used should be deep discharge cycles. Leaving the battery on the charger for more than one day can compromise the overall

functionality of the battery. Simply put, ensure that you remove the charger when the battery is full and overcharging might compromise the lifespan of your battery. Use a good charger that is compatible with your battery and ensure that it does not deliver current to the battery even after charging to full capacity.



NIMH CARE

The main benefit of the Ni-Mh batteries is that they are not as prone to the memory effects as the Ni-Cd batteries can be. Having said that, these batteries might discharge at a rapid rate when not in use, and it is therefore important that you proceed with caution.

Never leave the battery in a device that is on even after the battery runs down. Any additional drain on the discharged battery for several weeks can lead to polarity reversal, which might finally damage the other battery cells.

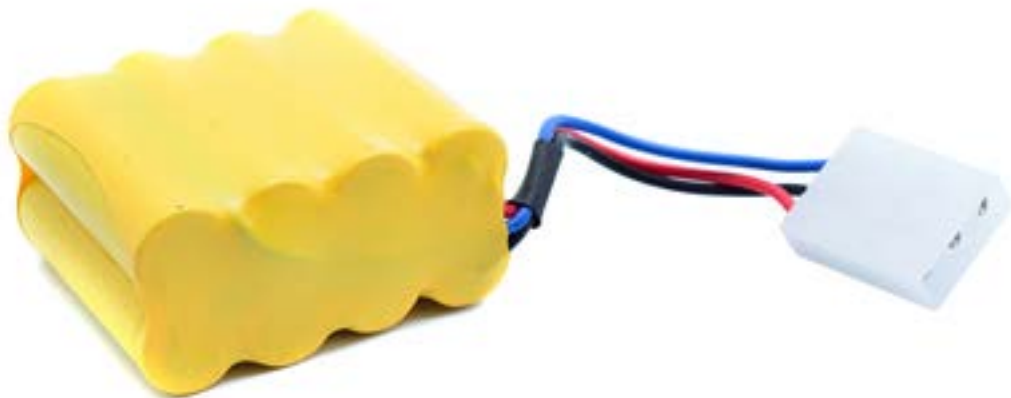
Also, see that you remove the battery from the device you are using if it isn't used for a long time. In fact, if the Ni-Mh battery stays unused for several days, then this might lead to a complete discharge.

Using a good quality charger that is compatible with these types of batteries will increase the lifespan. Ni-Mh batteries are prone to temperature complications than the Ni-Cds. Check that you keep them away from direct sunlight and high temperatures.

LI-ION CARE

Keep your Li-ion batteries on the charger for as long as possible and fully charged has several benefits. This helps to control the effects of discharge cycles, and it improves the lifespan of the battery as well. There is no disadvantage in leaving your Li-ion battery in the charger for a longer than normal duration.

In fact, you might consider conditioning your battery once a month by placing it under full charging each day. Following this, ensure that you operate the device until it drains all the power. The next step is to conduct a recharging procedure, and this can sometimes be referred to as re-calibration of the battery cells. Similar to all types of batteries, it is important that you keep the battery as far away as possible from the effects of heat or even direct sunlight.



CHAPTER 14 - HOW TO REJUVENATE A DEAD BATTERY

This last chapter is about specifically restoring a dead battery. This may work even when the battery appears to have a full charge but isn't starting right.

1. You will need two jumper cables with small alligator clips on either section. Use a dense wire since a thin wire might get hot and melt.
2. Color code the alligator clips such that you don't position the wires in a backward manner. Confirm this connection by evaluating the continuity of each alligator clip.
3. Ensure that you solder the wires to each clip such that you can easily crimp the together. Remove the battery casing carefully; you might

need a Dremel saw.

4. Measure the voltage levels of each cell and ensure that you have the polarities right. If the voltage averages more than one, then this might be a good cell. However, if the voltage is less, then this might be a shorted cell.

5. Note the damaged cells by using a colored marker pen. Now you can use a rejuvenating battery to perform the procedure. If possible, you can use a 12-volt car battery to perform this procedure.

6. Ensure that you touch the positive leads to the positive terminals and repeat the same for the negative leads. This connection should last no more than three seconds. Following this, the cell should now be rejuvenated, and you can repeat the same procedure for the shorted cells.
7. Evaluate the cells using a voltmeter. The cells that provide a normal voltage average can be used, and those that read zero should be discarded.



CONCLUSION

Reconditioning your batteries doesn't have to be a challenge. No matter what types you have, it should be easy to get the most out of your batteries when you simply use the right steps.

Be sure to use this guide often to see what you can get out of these batteries. This is all to keep the memory effect and other problems from being prevalent. More importantly, it is all about making a battery last for as long as possible.

You will be surprised at what will happen with your rechargeable batteries when they are used right. Good luck with getting the most out of your batteries.

