

# COMPACT LIGHTWEIGHT TACTICAL SOLAR SYSTEM

**ACMEzombieSUPPLIES.COM**

*“Everything will be all right, as long as the sun keeps working...”*

**Off-Grid Emergency Solar Power & Charging Kit**

**Kit component inventory & functional item descriptions.**

**Deployment & operational guide.**

**Basic low voltage electrical theory & application suggestions.**

## **OWNERS MANUAL**

**Basic Tactical Solar Kit realized by the ACME division of P&A Consulting.  
Available exclusively online at:**

**[www.acmezombiesupplies.com](http://www.acmezombiesupplies.com)**

AcmeZombieSupplies.com is proud to make available the most portable solar kit ever conceived. It is unlikely that anyone will outdo this kit for quite some time, as it is so simple and configurable. And it is the most comprehensive portable kit in the world!

It is offered with a waterproof case that holds over 100watts of solar panels plus the kit components, yet it is the size of a large lunchbox fully loaded. Weighing as much as a large lunch loaded.

The components and modules that comprise the kit utilize the most common DC connector ever produced, the 2.1mm x 5.5mm DC connector. This connector is the basis of the system's versatility; each module and component is equipped with the ability to connect to each other. It is also one of the smallest most reliable DC connectors available. This keeps the kit compact, functional, lightweight, dependable, and very versatile.

The kit can charge and/or provide power for a plethora of devices that operate from 1.2volts up to 30volts DC. It is equipped with adjustable regulated power supplies, voltmeter, and much more. Everything you need to have power in the worst or most remote situation. All of the kit components are waterproof, and rugged enough to be dropped, stepped on, and even immersed. (Not to be operated wet or underwater). It is designed to be an emergency power source for all needs, it is understood that emergencies are messy and usually involve rough treatment and things must operate when they are needed without question.

The ACME solar kit is not only for power outages and related emergencies. It is certain that your new kit will become an indispensable tool whenever camping, at remote jobsites, or whenever tailgating. This kit is so compact, rugged, and lightweight that you will most likely make it your regular travel companion.

## STANDARD KIT ITEM INVENTORY:

<b>Qty:</b>	<b>Description [Weight]:</b>
1ea	Polarity Indicator/Tester (Green=OK) [0.1oz]
1ea	CLA Plug to USB Supply (2A output).
1ea	Step-Up Converter 100w Adjustable Output to 30volts. [4.0oz]
1ea	Step-Down Converter 90w Adjustable Output to 24volts. [4.0oz]
1ea	Inline DC-Plug/Jack LED Volt Meter (3.5 to 30volt). [0.4oz]
2ea	1-to-4 way DC-Jack Splitter Cable.
3ea	Female-to-Female DC-Jack Barrel Adapter.
2ea	DC-Jack to CLA Socket (Female). [0.8oz]
2ea	DC-Jack to CLA Plug (Male). [0.6oz]
1ea	DC-Plug to DC-Plug Patch Cord (Male-to-Male). [1.25oz]
1ea	DC-Jack to DC-Plug Extension Cable (Male-to-Female).
1ea	DC-Plug to Alligator Clips (Red/Black).
2ea	Pair of Mating DC-Plug/Jack [Screw-Terminal] Power Connectors.
1ea	Inline DC-Plug/Jack LED Light (12v 1.25w).
2ea	Jumper Clip Leads. (assorted colors)
1ea	DC-Jack to 9v Battery Current Limiting Charging Adapter. [0.2oz]
1ea	10xAA Battery Holder Equipped with DC-Jack. (Batteries not included) [1.5oz]
1ea	1xAA Powered Flashlight.

## OPTIONAL KIT ITEMS:

<b>Item:</b>	<b>Description:</b>
AMMETER	Inline DC-Plug/Jack Digital Amp Meter (0 – 5A).
UPC-KIT	Compatible Laptop Universal Power Kit with Adapter Tips.
UPC-ADAPT	Laptop Universal Power Adapter Tips Only (set of 8).
CRANK12V	Crank Generator (12v 12w max).
FAST4CHG	AA/AAA Fast Charger (12v Powered, Quad Channel w/Display).
DUAL4CHG	AA/AAA Standard Charger (Dual Powered, Quad Channel w/Display).
AA-AAA	Pack of 4x AAA to AA size Battery Adapters.
2AA-D	Pack of 4x “Dual AA” to D size Battery Adapters.
4PK-AA	Pack of 4x AA Rechargeable Batteries (low self-discharge).
4PK-AAA	Pack of 4x AAA Rechargeable Batteries (low self-discharge).
1PK-9V	9v Size Rechargeable Battery (low self-discharge).
LIION-PK	Portable Li-Ion Rechargeable 12v Battery Pack.
MINIKIT	Small Electrical Tool Kit (screwdrivers & pliers).

**NOTES:** “DC-Jack” is a term used to indicate 2.1mm x 5.5mm Female DC Jack.  
“DC-Plug” is a term used to indicate 2.1mm x 5.5mm Male DC Plug.  
“CLA” is a short term for “Cigarette Lighter Adapter”.  
(CLA is the standard DC power connector found in automobiles).

## KIT COMPONENTS & MODULE PHOTOS:

(For reference –actual appearances may vary with improvements.)

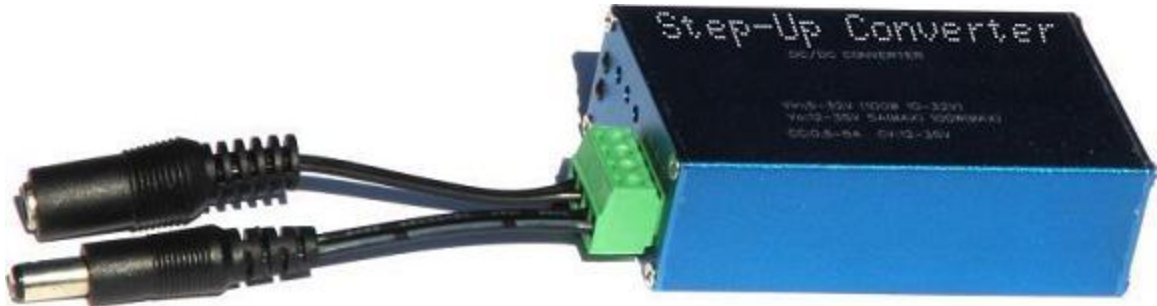
### Polarity Indicator/Tester:

FOR POLARITY INDICATOR INFORMATION/PHOTO, PLEASE SEE THE SECTION TITLED: “**VERY IMPORTANT WARNINGS**” UNDERSTAND ITS USE BEFORE ATTEMPTING ANY “OUT-OF-KIT” CONNECTIONS!

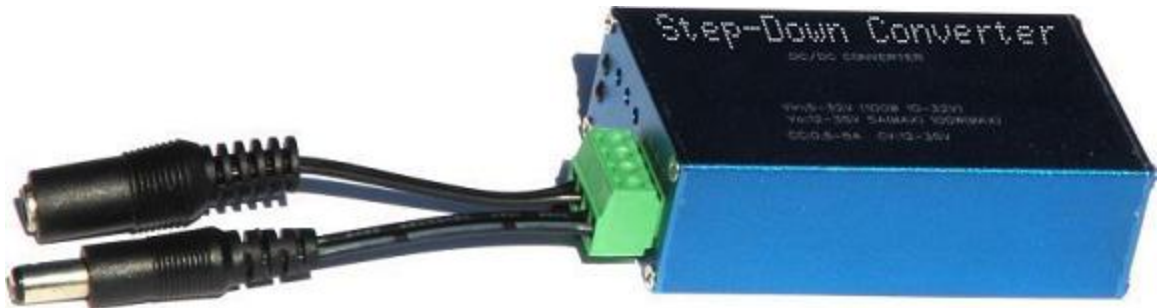
### CLA Plug to USB Supply:



### Step-Up Converter 100w Adjustable Output to 30volts:



### Step-Down Converter 90w Adjustable Output to 24volts:



### Inline DC-Plug/Jack LED Volt Meter (3.5 to 30volt): (only one in kit)



**1-to-4 way DC-Jack Splitter Cable: (TWO are included in kit)**



**Female-to-Female DC-Jack Barrel Adapter: (THREE are included in kit)**



**DC-Jack to CLA Socket (Female): (TWO are included in kit)**



**DC-Jack to CLA Plug (Male): (TWO are included in kit)**



**DC-Plug to DC-Plug Patch Cord (Male-to-Male):**





**DC-Jack to DC-Plug Extension Cable (Male-to-Female):**



**DC-Plug to Alligator Clips (Red/Black):**



**Pair of Mating DC-Plug/Jack Power Connectors: (TWO PAIR are included in kit)**



**Inline DC-Plug/Jack LED Light (12v 1.25w):**



**Jumper Clip Leads: (TWO are included in kit)**



**DC-Jack to 9v Battery Current Limiting Charging Adapter:**



**10xAA Battery Holder Equipped with DC-Jack: (Batteries not included)**



**1xAA Powered Flashlight:**

No photo is necessary to identify this item.

# STANDARD KIT ITEM DESCRIPTIONS:

**DC-Polarity Indicator/Tester** – This tester is for use to determine the polarity of unknown power sources before connection to any kit components. ALL kit components are CENTER POSITIVE, if the polarity tester indicates GREEN this is safe polarity, an indication of RED is REVERSE, and ORANGE indicates AC POWER. Only a GREEN indication is safe to use with components of this kit. FOR MORE INFORMATION CONCERNING THE POLARITY TESTER: See “VERY IMPORTANT WARNINGS”

(In layman terms: This will determine if power sources “outside the kit” are usable/correct.)

**CLA Plug to USB Supply (5w output)** – This adapter converts 10-15volts to USB output (5V fixed at up to 1A). It is useful when a CLA Jack is available, or with the “DC-Jack to CLA Socket (Female)” to adapt for use with 2.1mm systems.

(In layman terms: It is similar to above, but for use with auto type CLA jacks.)

**Step-Up Converter 100w Adjustable Output to 30volts** – This module accepts an input voltage from 5-24volts into the DC-Jack (in) and will “step-up” the voltage to the adjustable set-point (up to 30volts). This module is equipped with a Current Limiting adjustment (CC adjustment) that is useful if you are not as concerned with voltage as you are current, most applications will not use this function. Adjust the “CC” control fully clockwise until it “clicks” to disable this function. The input voltage MUST be lower than the output set point for this module to regulate properly. WARNING: Always confirm proper output with voltmeter before connecting this module to any device to be powered. Failure to observe proper voltage can cause permanent damage to devices! (INPUT AND OUTPUT ARE NOT INTERCHANGEABLE!)

(In layman terms: This module makes voltages HIGHER on it’s output side – So be careful with it!)

**Step-Down Converter 90w Adjustable Output to 1.2volts** – This module accepts an input voltage from 4.5-60volts into the DC-Jack (in) and will “step-down” the voltage to the adjustable set-point (as low as 1.2volts & up to 30volts). The input voltage MUST be higher than the output set point for this module to regulate properly. WARNING: Always confirm proper output with voltmeter before connecting this converter to any device to be powered. Failure to observe proper voltage can cause permanent damage to devices to be powered! (INPUT AND OUTPUT ARE NOT INTERCHANGEABLE!)

(In layman terms: This module makes voltages LESSER on it’s output side.)

**Inline DC-Plug/Jack LED Volt Meter (3.5 to 30volt)** – This module can be connected to any DC-Jack and/or DC-Plug to read voltage present at connection point. Either male or female connector can connect it. It can also be connected using both male and female connector operating “inline”. It will display voltage from 3.5v to 30v. WARNING: The meter will be destroyed if used with AC power or with reverse polarity; it is only intended for use with modules and components supplied in this kit.

(In layman terms: A mini digital meter that plugs directly to the DC plugs/jacks in kit - to read volts.)



**1-to-4 way DC-Jack Splitter Cable** – Two of these are supplied in each kit, to facilitate connecting more than one device/solar panel together in a daisy chain fashion. When used in conjunction with the “Female-to-Female DC-Jack Barrel Adapters“ it can be configured for reverse gender. This cable can also be used as a male-to-male adapter.  
(In layman terms: A four-way “Y” adapter.)

**Female-to-Female DC-Jack Barrel Adapter** – Three of these are supplied in each kit. They are used to connect cables/modules that are equipped with male DC-Plug(s) together when such needs exist. They are also useful in connecting multiple solar panels into the “1-to-4 way DC-Jack Splitter Cable” for higher wattage requirements.  
(In layman terms: It makes connecting two male DC plugs possible.)

**DC-Jack to CLA Socket (Female)** – Two of these are supplied in each kit. This adapter allows adding a CLA (cigarette lighter adapter) Jack to any DC-Plug, making it possible to create a CLA “Y” adapter using two of them, or connecting one directly to a panel for direct charging of CLA type device. They may also be used with “DC-Jack to CLA Plug (Male)” to create the functionality of a “Female-to-Female DC-Jack Barrel Adapter”  
(In layman terms: Turns a DC-Jack into a “Cigarette lighter” socket.)

**DC-Jack to CLA Plug (Male)** – Two of these are supplied in each kit. This adapter allows adding a CLA (cigarette lighter adapter) Plug to any DC-Plug, making it possible to charge a car battery directly from the auto CLA socket (socket must be unswitched for this to work), by attaching a panel. They may also be used with “DC-Jack to CLA Plug (Female)” to create the functionality of a “Female-to-Female DC-Jack Barrel Adapter”  
(In layman terms: Turns a DC-Jack into a “Cigarette lighter” plug.)

**DC-Plug to DC-Plug Patch Cord (Male-to-Male)** – This is simply a cord with DC-Plugs on each end, it can be used to connect any items together that are equipped with female DC-Jacks. If two of these are needed, you can achieve the same functionality by using only two male ends of a “1-to-4 way DC-Jack Splitter Cable”.  
(In layman terms: A power cable with male DC-Plugs on each end.)

**DC-Jack to DC-Plug Extension Cable (Male-to-Female)** – This is simply an extension cord for DC power connectors, it allows for remote placement of devices/modules.  
(In layman terms: A power extension cable.)

**DC-Plug to Alligator Clips (Red/Black)** – Clips for connecting to terminals such as a battery. May be used to charge or to operate devices/modules from battery.  
(In layman terms: Alligator clip ends on wires with a DC connector.)

**Pair of Mating DC-Plug/Jack [Screw-Terminal] Power Connectors** – These are useful when creating custom charging cables, and can be used to repair DC Jacks/Plugs that may need repairing. They require no soldering, and only a small screwdriver is required for use. They can be used with an ordinary “cut” cords to create extensions or custom ends. **WARNING:** When using these terminals it is critical to ensure proper polarity to avoid damaging components!  
(In laymen terms: DC plugs & jacks that accept bare wires connected to screw terminals.)

**Inline DC-Plug/Jack LED Light (12v 1.25w)** – A very compact and efficient LED light source, it operates at 10-15v and will shorten its life span to operate with higher voltages. It is equipped to be used “inline” or can be powered from connecting either DC-Jack or DC-Plug. For dimmer operation, use a step-down converter. This LED cannot be used to indicate or determine reverse polarity conditions.

(In laymen terms: A mini LED light with both Male & Female DC connectors.)

**Jumper Clip Leads** – There are two standard jumper clips included in kit. These are useful for connecting dual batteries, or special needs connections. They may also be cut and spliced into the “Pair of Mating DC-Plug/Jack [Screw-Terminal] Power Connectors” for adapting a battery or “clip-on” terminals to a DC-Jack or DC-Plug connection.

**DC-Jack to 9v Battery Current Limiting Charging Adapter** – Extremely miniature charging adapter for use with 9v batteries. DC-Jack will accept 12v or direct connection to panel to charge a 9volt battery. Charge rate is about 30mA@12v, or 50mA@18v.

(In laymen terms: A 9v battery end-cap that charges from its DC Jack.)

**10xAA Battery Holder Equipped with DC-Jack** – Battery pack holds ten (10) AA size batteries. It is equipped with direct connection to DC-Jack for use as a 12volt battery pack. (AA Rechargeable Batteries Typically Are 1.2volt each [ $12 \times 1.2v = 12v$ ]). This “pack” is suited for charging directly from solar panel input, but it is primarily for using the batteries to provide 12vdc power whenever needed. If one cell fails, the entire pack will be affected. For this reason it is suggested to use a proper charger that can detect faulty cells, and carry spares. **WARNING:** This pack must contain batteries of the same type or damage to cells can result from charging. **ALSO** note that if non-rechargeable batteries are used, the pack output voltage will be 15volts instead of 12volts!

(In laymen terms: Battery holder for ten AA size batteries – with standard DC jack.)

**1xAA Powered Flashlight** – A kit flashlight is included that operates from a single AA battery. If kit is to be stored for a long time, it is suggested to pre-install a lithium cell.

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## OPTIONAL KIT ITEM INFORMATION:

Please refer to the documentation that is included with each optional item purchased. The operational guide for each optional module is included with module upon delivery.

### CAUTIONS AND WARNINGS:

It is greatly suggested that only persons who possess a basic understanding of electronics and battery systems utilize this system. Improper use can destroy kit modules as well as the devices to be powered from it! With that being said, please refer to the following basic electronics lesson for a quick-start-guide and usage scenarios. If you still do not feel comfortable with operation and setup of this kit, consult a local technical advocate, most technicians will be able explain its operation once they understand its purpose. Once it is demonstrated, it is easier to understand. (Consult training VIDEO for a demonstration.)

# BASIC ELECTRICAL UNDERSTANDING:

First of all, to understand the scope of the kit, it is important to know the difference between voltage and current. This is easily explained by comparing electricity to water flowing in pipes, such as in a house. The water has two properties we are concerned with: Pressure (Voltage), and Flow (Current). With no pressure (voltage) there can be no flow (current). You do not want to exceed pressure in either case (or even pipes will burst)! Gravity does not affect electrons, so we will ignore the fact that water runs out of pipes and onto the floor, we will also ignore other factors that are not required for the basic understanding needed to operate this kit properly.

To fill a swimming pool with water quickly, you want to use a large flow (current) and highest pressure (voltage). If the pipe is larger (as with larger wire) it can handle more flow (current) as opposed to a small pipe with flow (current) restriction, it could take days to fill it up. Think of the swimming pool as a battery. The pipes carrying water to and from it are akin to wires, the size of the pipe will determine possible flow (current), and the pressure (voltage) [i.e. a pump] is required for the flow to happen. You can have a lot of pressure in a small pipe and achieve the same end results (within physical limitations); this is also true with DC electricity.

This is where the term “WATTS” comes into play; it is a way to measure the actual “amount” of electricity that has moved. The same “wattage” (work/energy) would be required to “fill the pool” by either high flow (current) at low pressure (voltage), or great pressure (voltage) with less flow (current). The “quantity” is the same either way resulting in equal amount of “work” being accomplished, with different specifications.

Now the “difference” between voltage and current should be somewhat clear, as with the relationship with wattage. The wattage (W) is equal to voltage (V) multiplied by current A (measured in amps). So a 12W solar panel can provide 1amp at 12volts, but could also be 12amps at 1volt, or 120volts at .1amps. ( $1A \times 12V = 12W$ , or  $120V \times .1A = 12W$ ). These are all examples of 12watts, so we know the “force of work” the panel can achieve, but we need to know more before we can connect and power up things.

In the ACME kits, all panels are 15.5volts. (Up to 20volts “Floating” - with no load). If your panel was purchased from ACME, this will be true. If your panel was NOT purchased from ACME, you must find out the voltage of it by connecting a voltmeter (observing proper polarity). In our example, if your panel is 10watts- (ASSUMING FROM THIS POINT FORWARD that your panel voltage is 15.5volts.) then your panel should be able to provide a maximum of about .6amps. For example, if your solar panel measures 7.5volts (it is likely a 6v panel) and it is a 10watt panel, your panel will be able to output about 1.5Amps, but it will not charge a 12volt battery without using a “step-up” converter (which will convert 10watts at 6V to 10watts at 12volts, in doing so it will reduce the amperage to .75amp- maintaining the same wattage thru conversion). Most solar panels will have a printed voltage and wattage rating, making this information easily obtained. It is important to know this information before knowing the limitations of the system that will be based on the panels’ ability to produce power.

A solar panel providing .6 Amps at 15.5volts (as in the previous “10w example”) can be “converted” to 2 amps output at 5volts. The “amps” are being stepped up by converting the excess voltage into current. This is possible with a “switch mode” power converting supply. This may at first seem like magic, and many chargers do not operate in this manner, and simply would cut/clip the voltage down to 5 volts while maintaining the supplied “thru-current” of the panel. This would yield only .6amps and the result would be only 3watts output from a 10w panel! (Not the panel’s fault, but performance would be 1/3 of expected!) 3watts probably would not initiate the charging process of a “smart phone”. This is an example of a current/voltage relationship that makes the difference between a working system and total failure, if you understand the concept and use the proper equipment; it is easier to get the most out of your system.

Understanding the current/voltage/wattage relationship will help you get the most out of your system, especially during times when sunlight is less than optimum. If you purchased the optional current (amp) meter, you will be able to monitor actual current from any point of the system, either charging current or load current. This meter is optional because it is not required except for advanced user configurations. Advanced usage would include using the current limiting functions of the converter to charge batteries based on current instead of voltage, this is strictly for users with advanced electrical knowledge!

Deploying solar panels is very basic, you simply face them toward the sun, and keep them as cool as possible to achieve greatest output. NEVER focus a magnifier of any kind on a solar panel, it will burn and destroy the panel instead of increasing its output. If you have a fresnel lens included with your kit, it is only for starting fires, cooking, burning, or actions that do not involve the solar panels. Once the panels are deployed you should connect the devices/modules to be powered from it. A voltmeter is useful to determine best placement of the panels, it will indicate “floating voltage” if not used with a load. When used with a load (such as a battery being charged) you will be able to adjust the panel for the highest voltage – this is the best placement. (If current meter is used, position panel for highest current reading).

To create a long extension cord for solar panel deployment, simply cut any ordinary AC extension cord, strip it’s wires, and CAREFULLY observe proper polarity when connecting the wires to the “Pair of Mating DC-Plug/Jack [Screw-Terminal] Power Connectors” (Incorrect polarity is a disaster in itself!). If done properly you will have created an extension cord with a DC-JACK on one end, and a DC-PLUG on the other, suitable for operation at considerable distances from solar panels. Extension cords are useful when operations are in a shelter and panel placement is rooftop. This item is not included in kit because of the weight, however it is easily fabricated in the field with items in the kit and any cord/wire. Proper polarity is the ultimate concern – This cannot be overstated. Polarity is indicated on the “Pair of Mating DC-Plug/Jack [Screw-Terminal] Power Connectors” by a “+” and “-“ at each screw terminal. USE POLARITY TESTER to confirm proper operation of wiring before connecting any active components! For polarity tester usage information, please refer to the “VERY IMPORTANT WARNINGS” section of this document.

# APPLICATION SCENARIOS:

There are several basic categories/types of devices you may want to power. Each type offers it's unique challenges; they are highlighted below in such a way to hopefully classify devices by the method of connecting the kit in order supply power to them.

## CHARGING LEAD ACID BATTERIES:

The majority of solar kit usage will be charging batteries to use during off-solar times, and the largest common battery you will normally encounter in emergency situations is a car battery. A car battery makes an excellent power source for long-term off-grid usage, and every car will have one under the hood unless someone else beat you to it. They are easy to remove. If battery clamps are too tight to remove, simply cut the cables to remove it. (Yes. Stealing a battery is illegal, even in a disaster situation).

The battery category includes "Powerpack" type "emergency auto booster units" as well as auto/marine batteries. To charge "open" batteries (a battery with terminals exposed), simply use the alligator clip cable and link directly to panel observing proper polarity. However to ensure that battery is not damaged, use a charge controller or down-size the solar panel so it's output current does not exceed the allowable charge current of the battery to be charged. A gel-cell type sealed lead acid battery can accept charge currents close to it's "AH" rating (Amp per/Hour) in emergency charging situations. If the battery is rated at 1.5AH it has the capacity to operate a 1.5amp load for one hour (or a .5amp load for three hours, etc.) Same basic calculations apply whenever charging, so it will take the same amount of power to charge in one hour by supplying 1.5amp. However this is not suggested due to overheating/cooking the battery. To preserve proper (non-emergency) battery life you should not exceed 1/3<sup>rd</sup> of this AH rating amount when charging, in this example it would be about 1/2 amp (.5amp). This is a general rule of thumb, and actual values and charge rates will vary between battery types and manufacturers.

A typical "DC Powerpack" car booster device contains a SLA (Sealed Lead Acid) Battery with a 16-20AH rating. So following our math it "can" be charged with up to 7.5amps without damage (taking up to 3hrs to charge), or it can be charged with 1amp, taking up to 20hrs to charge). It can be charged from it's normal "AC adapter input" Jack (suggested for long term charging) if the proper voltage and polarity are observed, but may also be charged using CLA male adapter connected to a solar panel, and inserted into the "Powerpack" DC port. This will feed power into the "Powerpack" without dealing with adapters (bypassing the internal charge regulator). This method can also be used to charge an automobile battery without opening the hood. (Be certain the DC jack is "live" and not switched in order for this to work).

A car battery can accept charges of >100watts in emergency charging situations, however for *long term* maintenance and charging it should not exceed 1 amp (or 15watts) unless using a charge controller. A charge controller will sense the battery voltage and react accordingly to prevent damage by overcharging or "cooking" the chemistry. This guide is meant to be a quick basic reference, and not to be a technical reference for designing systems. Battery science is quite complicated, and this information is not nearly everything there is to know.



## CHARGING CONSUMER TYPE BATTERIES:

Including AA, AAA, 9V, CR123, and other types of rechargeable cells. ACME can supply “kit compatible” chargers for most any type of consumer type battery charging need. The ACME Basic Kit includes a reliable emergency method for charging AA and 9v batteries. However it is suggested to have on hand a proper charger with independent charging channels. Because if/when one cell fails, a proper smart charger will reveal the bad cell. When used in a pack, the faulty cell will affect the performance of the entire pack and it can be quite difficult to isolate the bad cell(s) without the proper charger/tester to help locate the offending cell.

The ACME series chargers either operate from 12v DC-IN jack or from USB power (or both). Connection is made to charger using CLA power, 12v DC Plug, or Solar Panel directly, or with some units USB power (described below).

## PROVIDING USB POWER:

Includes cell phones, GPS units, Chargers, Cameras, and other USB rechargeable devices. Most USB rechargeable/powered devices are designed to charge/operate with .5amp or less. The reason is because most computers can only supply up to .5amp from a USB port. However many smart phones, GPS, and other USB electronics require over 1amp to charge properly, these are typically not able to be charged using a PC port. The USB power adapter in the Basic Kit can provide twice this current output. To use the USB adapter, simply plug it into a CLA Socket, fed from solar panel (or any DC12v source) of 5w or greater and plug the USB device (to be powered) into it.

## POWERING SMALL ELECTRONICS:

Includes radios, handheld devices, cordless tools, instruments, and most DC powered devices. HAM radios, instruments, and devices in this category typically have the characteristics of required a specific voltage at less than 1amp. The actual “charging” regulation functions are managed inside the device, this basically means the power connection is not directly connected to the battery within the device. These are among the easiest devices to use/charge with the ACME kit because you do not need to be concerned with current. Simply use the proper voltage converter (either step-up, or step-down) unless the device voltage is 12-15 volts - in which case you may not need a converter. Cordless power tools may be charged by connecting directly to battery pack terminals, the AC charger is not required to charge in this “emergency” manner. You **MUST** ensure the proper polarity when using these “small electronic” devices, **ALL** devices in the ACME kit are “Center TIP Positive”, if you do not take polarity precautions you will very likely destroy equipment which you intend to operate! **SEE “VERY IMPORTANT WARNINGS” section for information about using the Polarity Indicator.**

You **MUST** use the polarity indicator (included as a standard item in every kit) to ensure any “non-kit” source is compatible with kit before attaching any module/device! Failure to abide by proper polarity will permanently destroy the kit’s electronic components and will void any warranties!

## OPERATING AC POWERED DEVICES:

Small wattage AC powered devices such as aquarium pumps, small tools or instruments that cannot be operated from DC power because they either have no adapter, or require alternating current (or voltages outside of the kit's ability) to operate. For this special functionality, an AC INVERTER (turns DC 12v into AC120v to operate "household appliances") is recommended.

ACME endorses kit-portable pocket inverters to fill the gap of operating/charging these devices. Typical inverters are not kit-portable and require non-portable power sources/batteries. Since most portable electronic devices operate on 120w or less, it is the limit of the inverter systems we support with the mobile kits. These are not able to operate a refrigerator, AC unit, heater, or any motorized appliances.

Many "Powerpack" units have built-in inverters that can achieve the same results, and if the "Powerpack" internal battery is dead or depleted it may still be powered up by clamping it's jumper clamps to a charged car battery and selecting the BOOST switch, this will connect the "Powerpack" to the car battery and allow using the DC Port and Inverter on the "Powerpack" in the event of a defective or dead "Powerpack" battery.

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## VERY IMPORANT WARNINGS:

This is a DC based Kit, and with all DC power you must observe proper polarity when applying voltage. Do not take polarity issues lightly! This is MUCH less forgiving than using an improper voltage, and should be tested BEFORE connecting any kit component/module! ONLY AFTER proper polarity has been confirmed, proceed to use the volt meter to CONFIRM (or adjust) proper VOLTAGE! You must also confirm that POLARITY is correct for the device to be connected, then attach the proper sized adapter plug (if required) and begin charging or powering your device(s). If these steps are followed correctly- the devices will not be destroyed.

If you are not sure you can do this properly, consult a person experienced with electronics (a HAM radio operator, Electronics technician, Hobbyist, Repair person, etc.) to help you prepare for actual "emergency" usage of the device in question. It may require fabricating a special adapter cord/plug to be used with a particular device. Do these preparation steps BEFORE you expect to use the kit in any real emergency!

**All of the modules and components supplied by ACME are inter-compatible without polarity concerns, this warning applies only when connecting items other than the ones included with kit, such as devices to be powered by kit, or devices that will supply power to the kit components. (External battery and/or apparatus)**

### ***POLARITY INDICATOR USAGE:***

**USE POLARITY INDICATOR LED TO DETERMINE PROPER POLARITY!**

**Green is GOOD... Red is REVERSED!!!**

**DO NOT connect any module in this kit if polarity test is RED!**



**GOOD**



**REVERSED**

“ACME Zombie Supplies” endorses folding solar panels by *Powerfilm*, and *Brunton*. Powerfilm panels are smaller & lighter, yet Brunton are heavier duty. Powerfilm uses a Delco connector at the panel connector (easily adapted to DC-Plug), yet Brunton uses a DC-Plug compatible with the kit modules & components. Other differences are Brunton offers the following sizes; 6w, 12w, & 26w. Whereas Powerfilm offers 5w, 10w, 20w, 30w, &60w. Either brand can be connected to achieve higher wattages. We choose Powerfilm at ACME due to being less expensive, and higher output to weight ratio, making them more suitable for portable use.

Brunton panels come native with compatible DC-Plugs, but Powerfilm panels require a modified adapting cable. If you purchased your panels from ACME with your kit, it is pre-modified to provide the proper DC-Plug for output.

The CLA adapter socket (in kit) (when used with the modified panel cable) will maintain the original functionality of the unmodified panel adapter cable.



The kit is able to connect to batteries for charging at the same time it supplies power to kit modules to provide power in such a way that is considered “off grid” for long term use if needed. This is useful for devices that are to be powered at night.

ACME also offers portable DC powered custom water treatment systems that can be used to provide water disinfectant in emergency or outback situations. The most portable and rugged ozone generator on this planet is offered in a submersible hard-shell case that can operate from AA batteries, or any DC-Input ranging from 5 volts to 30 volts. It is a perfectly matched companion for any solar kit. It is able to operate directly from a 6-10watt solar panel even without a battery.

This process uses no chemicals, and the water is safe to drink immediately after treatment. With treatment times as little as 5 minutes (depending on bubble column and amount of water to be treated) and no filters to clog, this unit is destined to be a real warrior. See documentation for more information about the system and the efficacy of using ozone to sterilize water. If water is treated before filtering, it can prevent even “biofilm/scum” from developing within your filtration system.

## POWERFILM FOLDING PANEL PRODUCT LINE:



**5w Panel:** This panel has 6 sub-panels with output of  $5/6^{\text{th}}$  watt (.83w) each, for a total of 5 watts (15.4 volts at 0.3amp). **5.6oz. / 0.35lb.**

**MODEL: F15-300N**

Folded measures 3.3"x10.3"x1".

Unfolded measures 10.3"x24.4"



**10w Panel:** This panel has 12 sub-panels with output of  $5/6^{\text{th}}$  watt (.83w) each, a total of 10 watts (15.4 volts at 0.6amp). **11.68oz. / 0.73lb.**

**MODEL: F15-600N**

Folded measures 3.5"x10.5"x1.3".

Unfolded measures 21"x23.7"



**20w Panel:** This panel has 12 sub-panels with output of  $1-2/3^{\text{rd}}$  watt (1.66w) each, for a total of 20 watts (15.4 volts at 1.2amp). **20.32oz. / 1.27lb.**

**MODEL: F15-1200N**

Folded measures 6.5"x11"x1".

Unfolded measures 31.7"x30".



**30w Panel:** This panel has 12 sub-panels which output  $2-1/2$  watt (2.5w) each, for a total of 30 watts (15.4 volts at 1.8amp). **28.16oz. / 1.76lb.**

**MODEL: F15-1800N**

Folded measures 9.5"x11"x1".

Unfolded measures 31.7"x41.3".



**60w Panel:** This panel has 24 sub-panels which output  $2-1/2$  watt (2.5w) each, for a total of 60 watts (15.4 volts at 3.6amp). **51.04oz. / 3.19lb.**  
It can be used to operate any laptop.

This is the largest and most powerful of the Powerfilm folding units available.

**MODEL: F15-1200N**

Folded measures 9.5"x11"x2".

Unfolded measures 43"x59".



***These panels operate even if punctured, and are waterproof. (Dry if possible before using.)***

By default, these panels come with a CLA socket (Female) adapter, but when purchased with an ACME solar kit, the panel power coupler is modified to be a proper DC-Plug. Original CLA connectivity is maintained by using "DC-Jack to CLA Socket (Female)" item from within the kit.

...the POWER  
to  
deliver

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when & where  
there **isn't**  
power...

**Now**

THE

**POWER**

**Is**

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