Portable Electricity by Gerald Fitton

Many years ago during my adolescence I lived in a small cottage on the edge of Dartmoor. Drinking water was gathered daily from a nearby spring; sewage was buried in a hole. Mains electricity was something which existed at school but not at home. All our electrical requirements were met by batteries.

Although I was introduced to batteries at a very early age, this article is not about 'The Old Days' during which I built 'wet' 1.5 Volt Leclanche cells using recycled old zinc carbon batteries—I can assure you it is really good fun. No! It is about a type of battery which meets more modern requirements for a source of portable electricity, the lead acid battery.

Bangs for Your Buck

When it comes to rechargeables I think the 'king' must be the Li-ion battery. If you can afford them then there is no doubt that for laptop computers and cellphones these must be the best type of battery to use. There is a snag. They do come a bit expensive if you want to run motor car electrics or a portable refrigerator such as the Evercool.



The Clarke Jump Start 900 12 Volt Battery

My personal view is that if you require a high capacity or a high discharge current and, like me, your funds are limited then your choice must be a lead acid battery.

In this article, although I shall restrict my detailed comments to a particular battery, my more general comments are applicable to almost all modern 12 Volt lead acid batteries.

Capacity

Capacities of batteries are measured in Ampere Hours (Ah). Typically a cell phone battery will have a capacity of around 1 Ah and a car battery will have a capacity of about 40 Ah.

If you connect a car battery to a portable refrigerator such as the Evercool (which takes 4 Amps) then a 40 AH battery will discharge after 10 hours use. If your car battery is in poor condition then you might discharge it after just a couple of hours. Unless you are confident of your car battery I suggest that this is not the way to a successful picnic!

The Clarke 900 weighs 8 kg. The 12 Volt lead acid battery in it has a capacity of 18 Ah.



The Clarke Jump Start 900 Control Panel

Battery Voltage

There are two types of lead acid battery.

The 'wet' ones which have to be topped up regularly with distilled or deionised water and the more modern 'dry' ones which can be turned upside down without risking any damage from spilt acid. My choice for portable applications is the more modern dry type.

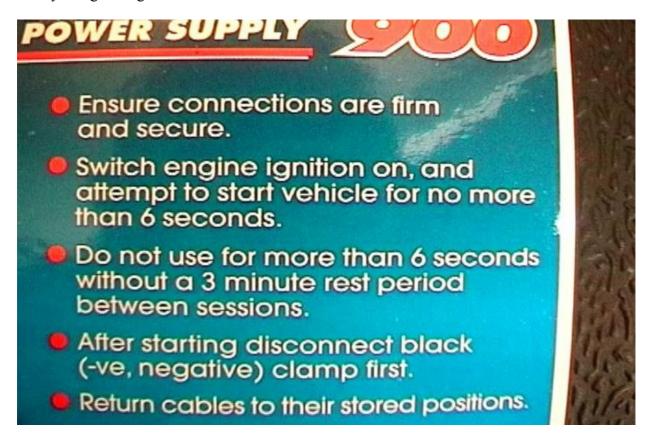
The usual recommendation is that 'wet' batteries (sometimes referred to as 'standard') should be charged until the voltage across the terminals of the nominal 12 Volt battery is 15.3 Volts. If you keep charging after this then the electrolyte (water) will be decomposed into hydrogen and oxygen (referred to as 'gassing')—a very explosive mixture!

The usual recommendation for 'dry' batteries (sometimes referred to as 'gel' batteries) is that they should be considered fully charged when the voltage is 14.3 V.

The 18 Ah Clarke 900 battery is of the dry (gel) type. It can be charged with the supplied 500 mA mains adaptor which plugs into the "Recharge" socket. You can see this socket towards the bottom right of the control panel under the "Test" switch.

This Test switch connects the battery to the voltmeter (see the control panel picture). It is spring loaded; you can not leave the voltmeter connected permanently. I don't know why this feature is built into the unit but I suspect that it has something to do with the action of the solid state relay which I describe in the next paragraph.

Perversely the meter on the control panel moves from the green "Battery Charged" to the section marked "Battery Charging" as the voltage rises. When the voltage reaches a value close to 14.3 Volts a solid state relay trips and charging stops. The red LED (just to the left of the Recharge socket) goes out. After a few minutes the pointer drops back into the "Battery charged" region of the voltmeter. This I measured at about 13.8 V.



Using the Clarke Battery to Jump Start a Car

Starting a Car

The Clarke Jump Start 900 is intended for emergency use when your car has a flat battery.

My neighbour had left her car internal lights on all night and when she came to start the car in the morning the battery was flat. Instead of coupling up my car battery to hers I used the Clarke 900 and the car started right away.

You will see from the instructions on the unit that you can't use it indefinitely as you might do with the larger 'wet' battery usually fitted in a car. You have six seconds; in my view this is a long enough time to know if the car will start or not. If it doesn't then the chances are that the engine has 'flooded' and the recommended three minute wait can be patiently endured whilst the engine dries out. Then you can try again.

Other Uses

A 12 Volt light (about 3.6 Watt) is built into the unit (to the left of the meter) and controlled by a switch which you can see at the top of the control panel. This is useful if you want a low powered light to see in the absolute dark—3.6 W can not be called bright.

I have a 12 V electric pump which I use for blowing up what are called 'large inflatables' and flat tyres. It is useful to take the 8 kg portable battery and pump to the inflatable rather than have to pump up the inflatable near the car (outside) where it might be raining!

A much more interesting series of uses will be available to you if you invest in a wonderful device called an Inverter. I shall tell you more about this gadget (which I bought from Maplins) another day! The inverter is plugged into the 12 Volt cigar lighter socket on the side of the Clarke 900 and it produces 230 VAC! Mine is rated at 300 Watts of 230 VAC.

You are going to think I spend all my time in the summer having picnics when I tell you that the inverter will drive a 300 watt electrical kettle for cups of tea and coffee! It can be used with many different 230 VAC low power devices such as a cellphone charger or a portable CD player. In an emergency I have used it to power both a 150 Watt Xenon floodlight and a 100 Watt radio transmitter at the same time!

My most popular use in the summer is to power the Evercool portable refrigerator. The Clarke 900 is 18 Ah and will run the 4 A Evercool for more than 4 hours before the voltage drops into the yellow zone.

Portability

The Clarke 900 weighs 8 kg. It has a shatter-proof hard wearing black plastic case. This case includes a moulded handle which I find very comfortable. The heavy duty leads which carry the few hundred amps required by a car starter motor are stowed neatly (see picture). The unit comes complete with a 12 volt cigar lighter socket and lead. It can be stowed vertically or horizontally; the battery is of the gel type and doesn't leak acid.

Servicing

The 18 Ah battery is easily accessed by removing a plate a the back of the unit. Connections to the battery are standard spade terminals. It will be easy to unplug a worn out battery (say every two to five years) and plug in a replacement.

Maintenance

Unlike Ni-Cd batteries it is unnecessary, indeed it is undesirable to fully discharge a lead acid battery regularly. Ideally, for long life, the battery should be kept fully charged. If it is used then it should be recharged as soon as reasonably possible. It can be partly charged from a car battery in an emergency but this does not charge it fully.

The charging system does not restart automatically after the solid state relay has tripped. I have tested this by switching on the light and waiting in vain for the charger to trip back in.

The mains supply has to be switched off and on again. In order to effect this without too much supervision on my part I have plugged a timer into a 13 A socket and plugged the charger unit into the timer. The timer switches on (and off) once a day. When it comes on the battery is charged up to the voltage at which the solid state relay trips out. The battery is topped up with juice daily so it should have a long life, probably around five years.