

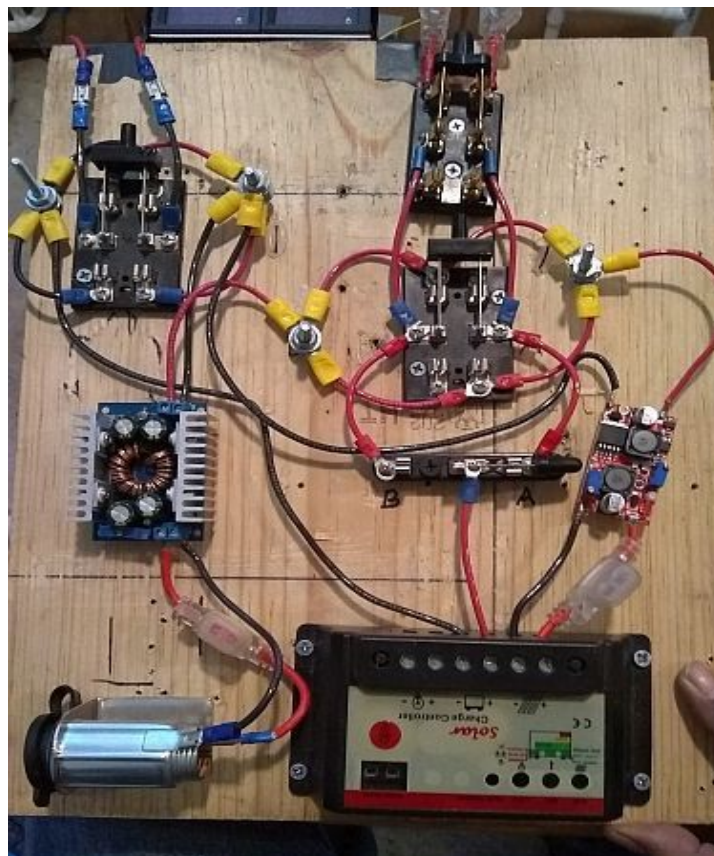


Benitez-8 Modification Diagram and Layout - Larry Winfield, Magnetofunky

The inspiration for the device came from the patents of Carlos F Benitez, a civil engineer in Guadalajara MX. His device used conventionally available technology circa 1910-1920. His wiring method used batteries working together connected in series, switched backwards and forwards using a commutator. My modification significantly changes that by having only one battery working at a time while the other battery is passively charged. I eliminated the use of a spark gap and a full wave bridge rectifier by using contemporary DC-DC Boost and Boost-Buck Converters and a solar charge controller.

The switching system itself was modified for contemporary use by Peter Lindemann, D.Sc., an engineer with over 35 years experience teaching, researching and developing alternative energy technologies.

Because of my modifications where one battery charges another, I don't claim that this device will keep batteries forever charged; they will occasionally require 'topping off' to full charge via solar or an AC charger, but I do believe it will prolong the life of the batteries.



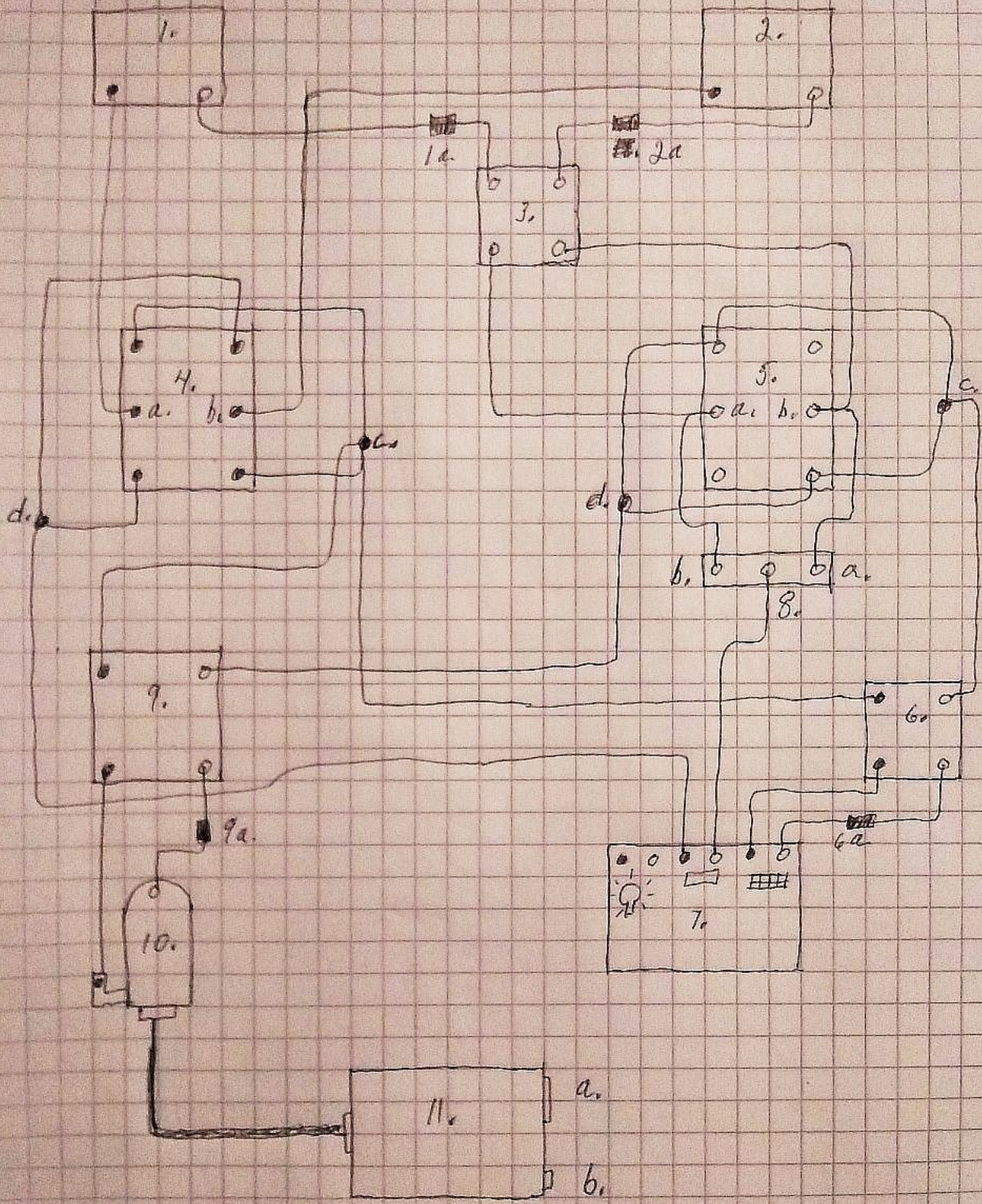
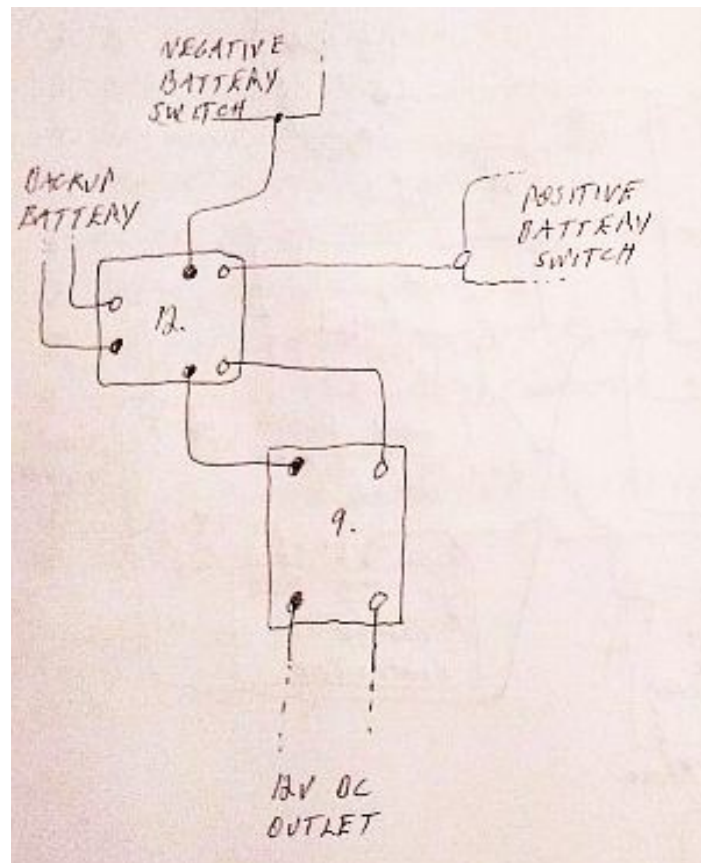
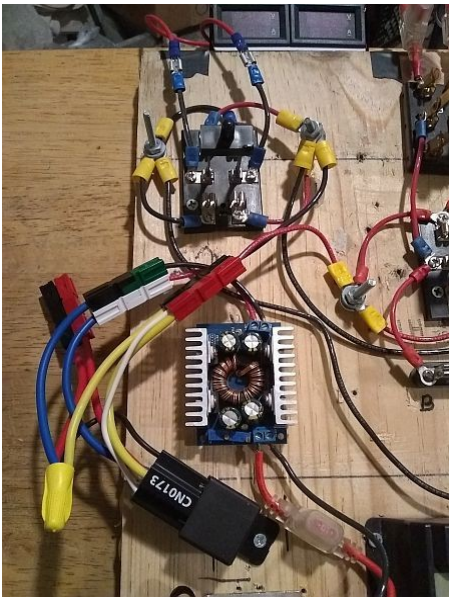


Diagram Legend:

1. 'A' Battery (a=Fuse)
2. 'B' Battery (a=Fuse)
3. DPST Power Switch
4. Negative Battery Switch (a=A Neg; b=B Neg; c=Run Neg Node; d=Charge Neg Node)
5. Positive Battery Switch (a=A Pos; b=B Pos; c=Power Loop Distrib. Node; d=Open Load Distrib. Node)
6. CC CV DC-DC Boost Converter (a=Fuse)
7. Solar Charge Controller
8. Output Control Switch (a=A to B; b=B to A)
9. CC CV DC-DC Boost/Buck Converter (a=Fuse)
10. 12V DC Outlet
11. 150W Power Inverter (a=AC Outlet; b=USB Outlet)
12. Backup Battery Switch



Device Operation

This description only applies to the 100W version of the power plant. The wiring diagram is from the device as built on the project board...

The batteries (1, 2) are 12V 18Ah sealed lead acid deep cycle batteries, a type normally used in off-grid battery banks. 14 gauge wires lead from the positive terminals to a double pole single throw 15A power switch (3 through 15A inline fuses (1a, 2a). From the power switch the positive wires continue to the 15A double pole double throw positive battery switch (5) contacts for 'A' (5a) and 'B' (5b). 14 gauge wires lead from the negative battery terminals to the 15A double pole double throw negative battery switch (4) contacts for 'A' (4a) and 'B' (4b).

In the UP Power and Battery switch positions:

The 'A' battery is run mode and the 'B' battery is in charge mode. Voltage runs from the positive switch in 'split form' to the Power Distribution Nodes for the power loop side (5c) and the open load side (5d). The power loop side wire runs to the positive input terminal of a 2A 20-25W Constant Current Constant Voltage DC-DC Boost Converter (6). The wire from the negative input terminal runs to the run negative node (4c) of the negative battery switch. The open load side wire runs to the positive input terminal of an 8A 90-100W Constant Current Constant Voltage DC-DC Boost/Buck Converter (9). The wire from the negative input terminal also runs to the run negative node (4c) of the negative battery switch.

The wire from the positive output terminal of the Boost Converter runs through a 5A fuse (6a) to the solar positive input terminal of a 10A Solar Charge Controller (7). The wire from the negative output terminal of the Boost Converter runs to the solar negative terminal of the Controller. The wire from the positive output terminal of the Boost/Buck Converter runs through a 15A fuse (9a) to the positive input terminal of a 12V DC Cigarette Lighter type outlet (10). The wire from the negative terminal of the Boost/Buck Converter runs to the negative input terminal of the 12V outlet.

The wire from the positive battery output terminal of the charge controller runs to the input terminal of the single pole double throw Output Control Switch (8). The switch is thrown to the right (8a) in 'A charging B' position. The wire from the negative battery output terminal of the charge controller runs to the charge negative node (4d) of the negative battery switch.

A 150W Power Inverter (11) is connected to the 12V outlet via a 12V Auto type plug. The inverter has a single 110-120W AC outlet (11a) and one or two USB outlets (11b). 100W and smaller powered AC appliances can be plugged in for safe operation along with a smartphone or other USB device.

In the DOWN Battery and Output switch positions:

The 'B' battery is in run mode and the 'A' battery is in charge mode. All other processes through the circuitry are the same with the exception of the Output Control Switch - here the switch is thrown to the left (8b) in 'B charging A' position. The wire from the negative battery output terminal of the charge controller still runs to the charge negative node (4d) of the negative battery switch.

Backup Switch:

A final component was added to compensate for the brief periods when the device is temporarily turned off in order to flip the positive and negative battery switches from UP to DOWN or DOWN to UP position, and the Output Control Switch from right to left or left to right. A DC Backup Battery Switch (12), normally used in backup power systems for radio broadcast antennas, works by routing main DC power to an antenna, and when the main cuts off, the backup route from a battery kicks in and maintains power until main power is restored.

In the device, the backup switch has the main positive input terminal connected to the Power Distribution Node for the open load side (5d) and the main negative input terminal connected to the Run Negative Node (4c) of the negative battery switch. The secondary positive and negative input terminals are connected to a 12V backup battery of sufficient size to handle the load required for the time it takes to flip the power, battery and output control switches. The positive and negative output terminals of the backup switch are connected to the positive and negative input terminals of the Boost/Buck Converter.

Addendum:

The operating process of the device proved most efficient when run for no more than 30 minutes at a time in A to B or B to A direction. Testing indicated that after a run of 3 hours total at a 30 minute switch rate, little to no drop in voltage in either battery was observed after charging. Additional efficiency testing at the 30 minute rate indicated a consistent COP (Coefficient of Performance) of 2.2 to 3.3 as long as an appliance used at least 20W of power. Of course, I make no claims of 'overunity' with this system and your mileage may vary...

These tests were conducted using two pairs of 12V 4Ah batteries in series giving each side a bank of 12V 8Ah; I speculate that similar to better results may be found using higher capacity batteries, but testing will determine whether that's the case.

This power plant device might be viable in 400-600W and 1000W formats with larger capacity batteries, switches and fuses with higher ratings, heavier gauge wiring and larger DC-DC Converters.

Larry Winfield © 2021
Magnetofunky Podcast
<http://1223studios.com/mfunky.htm>
<http://1223studios.com/mfunky.xml>
mfunkyzone@gmail.com