

Field Day 2021 Alternate Power (Solar Power Charging) Plans / Bonus Points

GLG/June 5, 2021

Introduction:

The Rule:

7.3.8. Alternate Power: 100 bonus points for Field Day groups making a minimum of five QSOs without using power from commercial mains or petroleum driven generator. This means an "alternate" energy source of power, such as solar, wind, methane or water. This includes batteries charged by natural means (not dry cells). The natural power transmitter counts as an additional transmitter. If you do not wish to increase your operating category, you should take one of your other transmitters off the air while the natural power transmitter is in operation. **A separate list of natural power QSOs should be submitted with your entry** [emphasis added.]. Available to Classes A, B, E, and F.

In order to receive 100 bonus points for alternative power, we have to make at least 5 contacts solely with the transmitter powered by a solar-power charged system. In general, we can do this pretty easily with an ICOM 7300 powered by a 12volt car battery, or by one or two "12 Volt" LIFEP04 batteries. The 12 volt AGM batteries we have within the EOC are roughly 100 Amp-hr; the LIFEP04 batteries are approximately 25 Amp-hr and produce a slightly higher rest voltage than the AGMs.

The EOC station or the RV Trailer Station can easily operate the primary transceiver just from such a battery and make the required contacts.

Because we have arranged for a test of the cranking of the EOC Generator, this year we don't have to run the EOC station from batteries for the entire Field Day like we did in 2020....so we have much less need to charge batteries in 2021!

Solar Power Plan

Since we only need to charge a battery enough to cover roughly 30 minutes-1hour or so of operations, at an output RF power level of perhaps 50 watts, 50% duty cycle, we are looking at roughly 12-15Amp current draw x 1 hour x 50% duty cycle = 8 Amp hour of power from a nominal 12V battery.

One typical rooftop solar panel (36VDC / 275-300 watts) if pointed directly at an unobscured sun, will provide a charging current of up to 20Amps. We have inexpensive GreeSonic MPPT controllers that can auto-adapt to either 12 or 24 volt batteries, but have a maximum output current of 10A or perhaps slightly more (both on the spec sheet and in our experience). Therefore we will need about 1 hour of sunlight in order to charge a single 12 volt battery with one GreeSonic MPPT controller.

Alternate options are:

- Use two GreeSonic MPPT chargers in parallel, both connected to the same battery to achieve 20A of charging current. This current can be measured by our high-current-shunt current analog meter, or by an Arduino battery backup system I've built, which

integrates the current over time to give the total charge delivered. This would give us 20Ahr of charge in an hour.

- Use Two batteries in series to make 24V and we should be able to get 10A of charging to the series combination, even from just ONE Greesonic MPPT controller, so we get 20A-hr in one hour. Later, put the two batteries in parallel to operate the 7300. The Arduino based battery backup cannot be used to measure this charge as it works at a maximum of 15VDC, but our high-current-shunt current analog meter will work fine.

Possible issues

The Greesonic may not be able to deliver as high a charge current to the LIFEP04 batteries unless they are fairly discharged. Their resting voltage is a bit higher than that of an AGM battery and I have not tested the Greesonic (set for Gel Cell voltages) with LIFEP04 batteries.

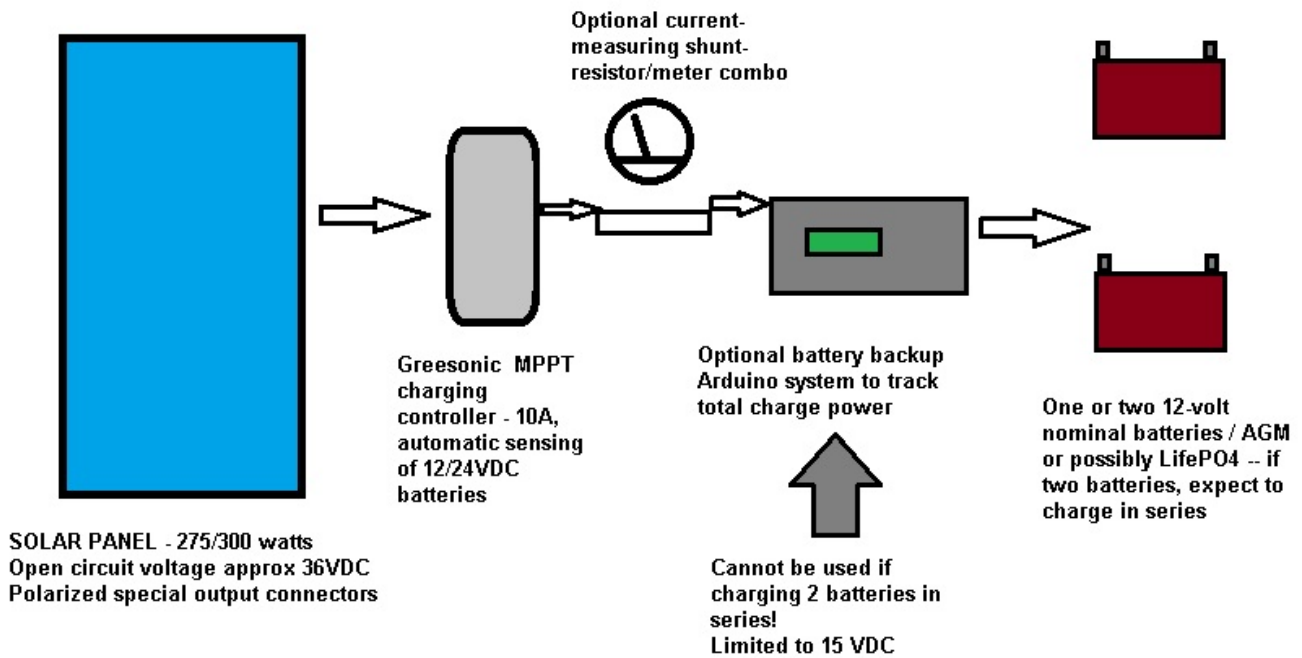


Figure: Drawing of possible solar panel charging connections. Individual + and - wires are not shown.

APPENDIX

SUGGESTED DOCUMENTATION FOR SUBMISSION TO ARRL

BONUS POINT DOCUMENTATION	ALTERNATE POWER (7.3.8)				
Applicable Rule	<p>7.3.8. Alternate Power: 100 bonus points for Field Day groups making a minimum of five QSOs without using power from commercial mains or petroleum driven generator. This means an "alternate" energy source of power, such as solar, wind, methane or water. This includes batteries charged by natural means (not dry cells). The natural power transmitter counts as an additional transmitter. If you do not wish to increase your operating category, you should take one of your other transmitters off the air while the natural power transmitter is in operation. A separate list of natural power QSOs should be submitted with your entry [emphasis added]. Available to Classes A, B, E, and F.</p>				
Photograph of Solar Power Charging Setup	[insert photograph]				
Amount of solar power charging	[Present data on the solar power charging carried out. Be certain that it significantly exceeds the power required for the claimed contacts.]				
	Item	Measurement	Comment		
	Batteries connected		Indicate series / parallel as appropriate		
	Charging current typical throughout charging period		Amperes @ a known voltage		
	Total Charging Time		Hours		
	Calculated Amount of Solar Power Charging		Amp-hours & Watt hours of charging carried out.		
List of natural-power Contacts carried out.	[Insert list of contacts carried out by solar power-charged batteries.]				
	No.	Time/Date	Station	Technique	Exchange Rcvd
	1				
	2				
	3				
	4				
	5				
6					

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