ICS-201 APPENDIX: POWER MANAGEMENT to run from 12V Batteries

EOC Station Power Requirements

Item	Watts	Duty Cycle	Average Power
ICOM7300 RECEIVE	15	50%	7.5 watts average
Transmit (assume 30 watts output)	15+30+30=75	50%	38 watts average
2x572B filaments	Total 50 watts	100%	50 watts
Linear HV	150 watts out = approx 275 watts in	40%	110 watts
Laptop	20 watts	100%	20
Antenna Tuner	10 watts	100%	10
		TOTAL:	**236 Watts Average**

(Note that this also implies that the amateur radio station in the RV Trailer will be a small portion of the power comsumption, compared to the air conditioning system.)

ONE AGM BATTERY

Assume 12 volts
Assume 75 Ahr
Total watts to 0% state of charge =   900 watt-hours
Can only run down to 50% for longer life of battery: implies useful charge = 450 watt-hours

Thus for each AGM battery connected to a "negligibly wasteful sine wave inverter" we can get 450/236 = 1.9 hours of operation.

PARALLEL BATTERIES to run Sine Wave inverter

Assume we tie THREE batteries in parallel to run the inverter for the EOC station.   Then we will need to change those three batteries every 6 hours of operation.

To charge those batteries back up again will require a total of 110% (roughly) x 236 x 6 hours = 1600 watt hours of charge energy; at 13V this is approximately 120 Amp hours.

Charging Rate	**10 Amps**	**15Amps**	**20amps**	**40amps**
Time needed to recharge 3-battery bank used to 50%	12 hours	8 hours	6 hours	3 hours (likely moe like 4 due to difficulties of charging at this rate)

Charging Technique Available	**Amps of charge Available**	**Comments**
Solar power, each MPPT charger	Max 15 amps per converter, and that is if they are kept COOL Converter information: https://www.amazon.com/gp/product/B071QXGV1Y	Note the MPPT converters I have can handle 24V batteries – can charge 2 batteries in series (24V x 15A = 360 watts ==> likely need either full sun or TWO PANELS to run one converter if used this way Most efficient use may be just 2 batteries / 1 converter / 1 panel – expect 10Amp charge and make two complete sets of this setup. Charge 4 batteries simultaneously at 10A **This technique is required for ONE set of batteries for either Station 1 or Station 2 in order to get at least Five contacts for alternative power credit**
Multiple analog or digital auto chargers	Tend to get 10A out of each one.	Can use automotive chargers to augment charging as long as they are powered by the GENERATOR at the RV Trailer. This technique would not meet the alternative requirement but does meet the EMERGENCY POWER requirement for the EOC station.
Vehicle	Can probably get 30A-40A out of a vehicle if RPMs at 1500 or more	Cost to charge battery 450watt-hours (34 Amp hrs) is probably 1-2 hours of gasoline which is probably about 1-2 gallons or about $7 to charge one battery. Fast and not terribly expensive solution if you have stout battery cables. This technique also doesn't meet the alternative requirement but does meet the EMERGENCY POWER requirement for the EOC station

Conclusion; It is likely that OPERATIONS will wish to use all three techniques and will need to have personnel monitoring these techniques.   Planning ahead for these systems may be useful.

Based on this analysis, we should probably add the following items to our Resource Lists:
– multiple automotive battery chargers
– accurate voltmeter
– heavy duty jumper cables to allow charging from a vehicles
–weight to press accelerator pedal