MODULE 05 FIELD EXERCISE

Salvage, Test, and Bank Your Own Power

TASK: Salvage at least two batteries (lead-acid/AGM and/or a LiFePO4 pack), test each for condition and true capacity, build a bank at your system voltage, and prove it delivers a computed runtime under a measured load.

CONDITION: Given salvaged batteries, a multimeter and a clamp meter (or a known load), fuses and holders with wire sized to the current, and the notional med-site load or a stand-in load you can measure. Work only with batteries you have every right to take, and charge lead-acid only in a ventilated space.

STANDARD: The product is the tested bank plus a dated record: each battery's measured resting voltage, its tested capacity under a real load, the measured load in watts (V x I = W, from your own meter), and the computed-versus-observed runtime to your planned depth of discharge. The bank is fused at every battery-positive branch, its charge source is set to the bank's chemistry profile before connection, and the build is Quiet: no generator, no exposed light, no heat or interference tell. Solar charging is taught in Unit 06 and is not required to complete this exercise. The completed field exercise worksheet, dated and carrying every reading, is the record a later run is measured against.

SAFETY FIRST

A charging lead-acid battery generates hydrogen gas, explosive from 4.1 percent concentration in air: charge only in a ventilated space, and make and break every connection away from the battery posts so any spark happens away from any gas. Nothing metallic crosses the posts; rings and watches come off before the wrenches come out. A 12-volt block cannot shock you, but it delivers hundreds of amps into a short, so every branch is fused at the battery positive. Electric-vehicle traction packs (200 to 800 volts) are excluded from this exercise entirely.

RESOURCES

Module 05, Units 03 and 04: the sourcing bench: the UPS, junkyard, scooter, and scrubber lead-acid finds, and the LiFePO4 pack tier with its own voltages

Module 04, Salvage: the survey, teardown, and test method every battery pull runs through

Power budget bench: the sizing arithmetic run on your own numbers: daily watt-hours, usable capacity, days of storage (lightfightermanifesto.org/tg/interactives/power-budget.html)

NREL PVWatts: your location's peak sun hours, if you extend the exercise to solar charging (pvwatts.nrel.gov)

Task 1 · Measure the load

1. Set the multimeter to DC amps and put it inline on the load's positive lead the way Module 02 taught, or close the clamp meter around the positive conductor.
2. Read the current while the device does its real job; a radio gets a receive reading and a transmit reading, and a device with a starting surge gets read at start and at steady state.
3. Compute watts: the measured current times the system voltage (V x I = W). Multiply by the hours a day the load runs, add a quarter for margin, and record the daily watt-hour budget.

Task 2 · Salvage and inspect the batteries

1. Source at least two batteries from the tiers Units 03 and 04 teach: a UPS pull, a junkyard block, a scooter or scrubber deep-cycle, or a LiFePO4 pack.
2. Inspect before anything connects: reject a cracked case, a bulged side, or a leaking post on sight, and identify each find as starter or deep-cycle, lead-acid or LiFePO4.
3. Read each battery's resting voltage with the multimeter. A healthy 12-volt lead-acid block at rest reads about 12.3 to 12.75 volts; a 4S LiFePO4 pack near 13.2 volts is sitting at 3.3 volts per cell. Record every reading, dated.

Task 3 · Test the true capacity

1. Charge each battery fully on a charger set to its chemistry's profile, in a ventilated space for lead-acid.
2. Put your measured load (or a known resistive load) on one battery at a time, note the start time, and log the terminal voltage every hour.
3. Stop at your planned depth of discharge (50 percent for lead-acid planning) and compute the capacity actually delivered: the load's watts times the hours it ran. This tested figure replaces the label in every later plan.

Task 4 · Build and fuse the bank

1. Pick the system voltage and the batteries that share it: one bank, one chemistry, one age class; a lead-acid block and a LiFePO4 pack never share a bus.
2. For a parallel bank, confirm the blocks read within a tenth of a volt of each other at rest before the jumper lands.
3. Fuse every branch at the battery-positive end: branch draw divided by 0.75, next standard size up, and below what the wire can carry. Land every negative on one common bus, then tug-test every joint.

Task 5 · Prove the runtime, Quiet

1. Compute the expected runtime: the bank's tested usable watt-hours divided by the load's measured watts.
2. Run the real load on the bank, log the voltage every hour, and record the observed runtime to your planned depth of discharge.
3. Check the build against the Quiet standard from outside: no generator, no exposed light from LEDs or displays, no heat tell, no interference on a radio beside the bank. Set the charge source to the bank's chemistry profile, connect it, and confirm charging. Date the completed sheet.

Task 6 · Field notes

Keep the whole record together: each battery's source, chemistry, resting voltage, and tested capacity; the load's measured draw and the daily budget; the bank's wiring and fuse sizes; the computed and observed runtime with the hourly voltage log; and the charge source and its profile setting. The dated sheet is what the next run of the same bank is measured against.

Bank record

This is the bank's record: what each battery tested at and what the bank delivered on this date. A later test of the same bank is measured against it.

Item	What you record	This test (date)	Next test (date)
Battery 1, measured voltage	Source and chemistry, and the resting voltage read before anything connects		
Battery 1, tested capacity	The watt-hours actually delivered under the timed load, to the planned depth of discharge		
Battery 2, measured voltage	Source and chemistry, and the resting voltage read before anything connects		
Battery 2, tested capacity	The watt-hours actually delivered under the timed load, to the planned depth of discharge		
Measured load	The running draw from your own meter, V x I = W, with the daily watt-hour budget		
Runtime, computed vs observed	Usable watt-hours divided by load watts, against the runtime the log actually shows		
Quiet check	No generator, no exposed light, no heat tell, no interference beside the bank		

#	Task	Setting	Expected	Your Result	Pass / Fail
1	Measure the load	`Meter inline`	running draw in W daily budget in Wh		
2	Inspect + resting voltage	`Multimeter, DC volts`	chemistry and build identified resting voltage recorded		
3	Capacity test	`Timed load`	tested Wh per battery hourly voltage log		
4	Build the bank	`Fused branches`	voltages matched every branch fused		
5	Runtime + Quiet	`Real load`	computed vs observed runtime Quiet confirmed		