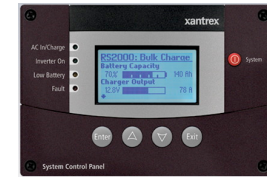


3000 Watt off-grid Cabin set up:

- 14 x 6V batteries rated 220 Ah @ 20h discharge (1540 Ah)
- System is wired for 12V
- Copper buss bars offer versatility for future expansion
- Cat5e and AC electrical cables trenched from garage (location of batteries and inverter) to cabin 40 feet away.
- 810W of solar panels

Victron Energy BMV 600s Battery Monitor

linked via 100 feet of ethernet cat5e weatherproof shielded cable, buried between cabin and garage.



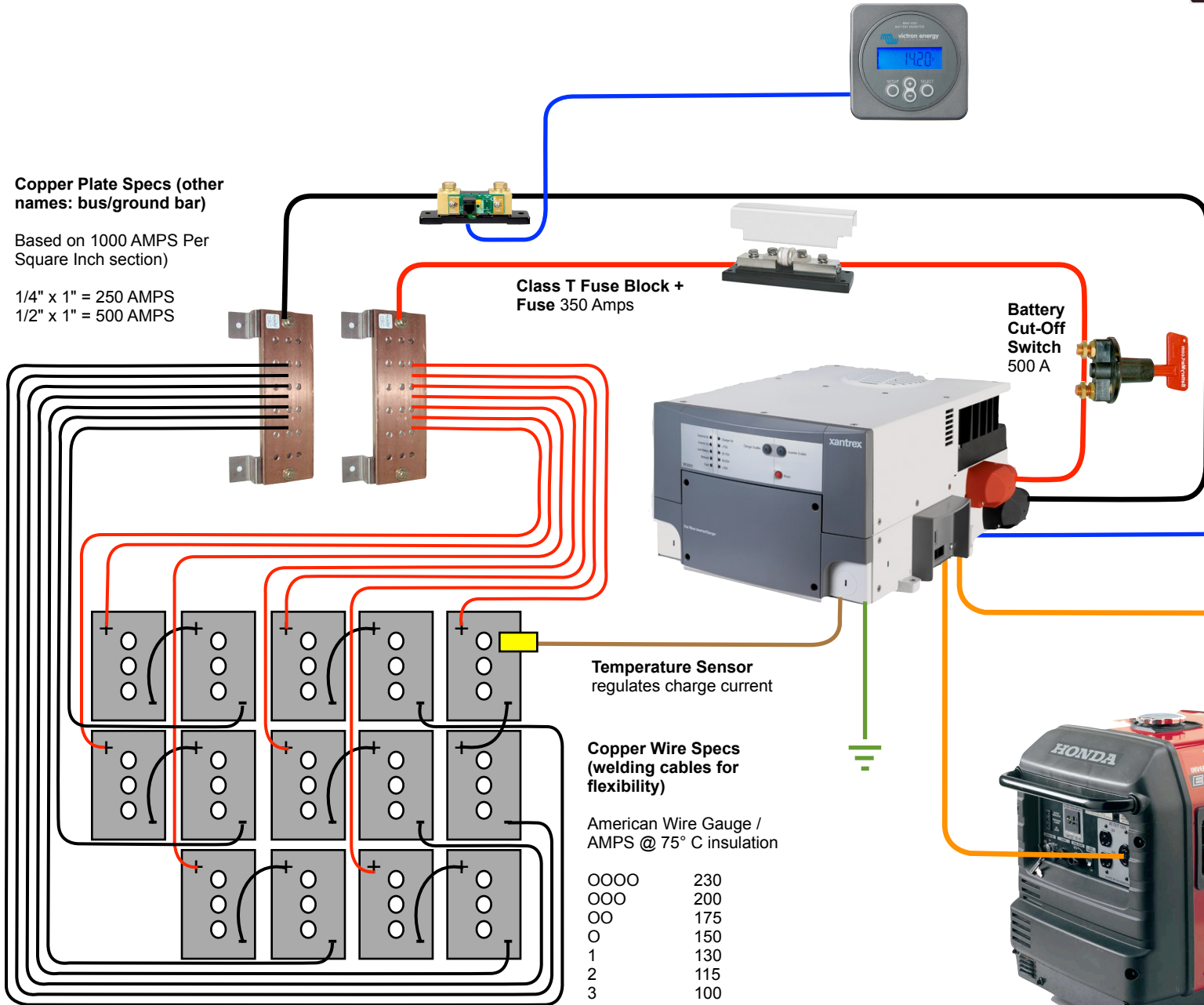
Xantrex MS3000 Inverter with optional Control Panel

linked via 70 feet of ethernet cat5e weatherproof shielded cable, buried between cabin and garage.

Copper Plate Specs (other names: bus/ground bar)

Based on 1000 AMPS Per Square Inch section)

- 1/4" x 1" = 250 AMPS
- 1/2" x 1" = 500 AMPS



Garage breaker and distribution panel



Honda EU 3000 Generator

Housed in an enclosure inside the garage, vented to the outside with two 100+ cubit ft / minute AC muffin fans directly plugged into generator

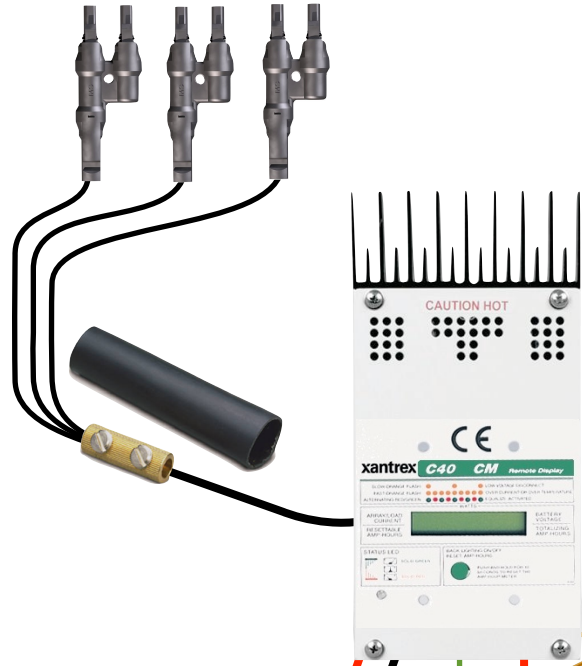
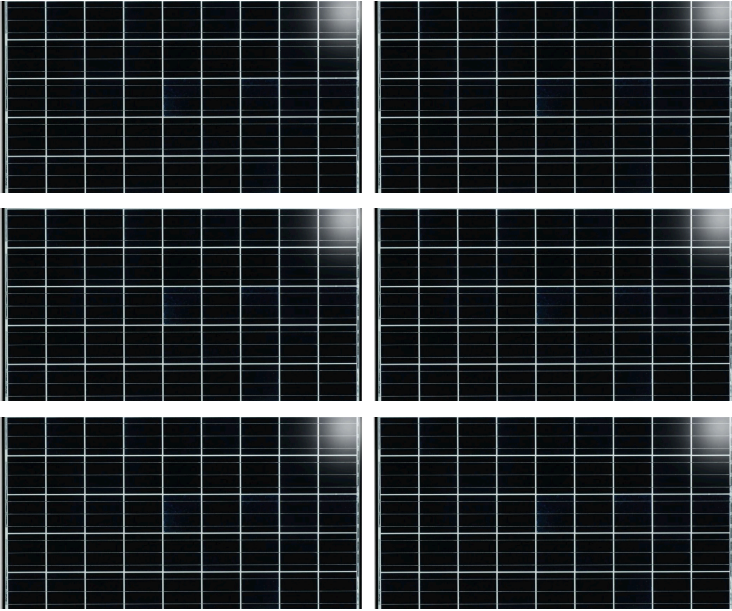
enclosure is completely lined with cement board in case the generator would overheat



810 PV Watts for a 12V system

Mounted on a 6" schedule 40 metal pole
 PV rack is grounded via bare copper cable, which
 is strung through inside of metal pole to a
 grounding rod pounded 5 feet deeper than the
 bottom of the concrete foundation.

Each set of MC4 connectors is plugged into
 an adapter, then the remaining 3 lines are
 spliced together at the top of the pole



Xantrex C60
 Solar Charger
 with optional
 Integrated
 Faceplate DVM
 for C-Series
 and Xantrex
 Battery
 Temperature
 Sensor

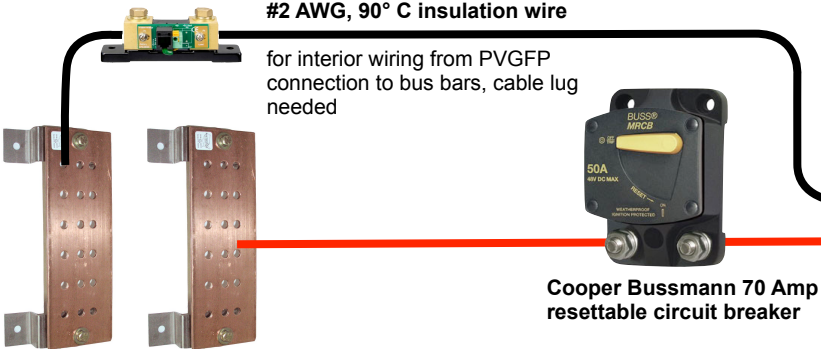
Breaker Box for GFP

135 GX-LPU Kyocera 12 V Solar Panels
 maximum power: 17.7 V & 7.63 Amps

72.4" - connect, 29.9" + connect (male)
 dimensions: 59.1" x 26.3"
 MC4 latching cables

#2 AWG, 90° C insulation wire

for interior wiring from PVGFP
 connection to bus bars, cable lug
 needed



Cooper Bussmann 70 Amp
 resettable circuit breaker

on positive wire for reverse
 feedback protection

PV Connections (x3 panels) MC4 type

3x F-M-M connectors



3x M-F-F connectors



80' cable (#2 AWG, 90° C insulation)
 to maintain <5 % voltage drop, cut in half to
 make 2 x 40' pieces to route into garage

3x 10' M-F cable
 for combining panels
 (cut ea. in half)



dozens of zip ties

#2 - #8 cable splicer (x2)

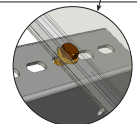
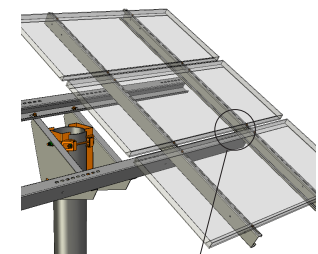
Connector MC4 and cable

Outback Power 80 Amp single pole PV
 ground-fault detector interrupter

customize
 Square D
 breaker box
 for mounting
 GFP inside



Iron Ridge Universal Top-of-Pole
 Mount UNI-TP/08LL



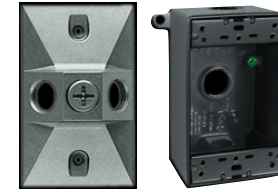


400 lumen 5.6W LED
standard E26 screw in base light
is designed for 12V DC
operation in campers; 3 total

Westinghouse 3 Bulb Fixture
mounted in the cabin kitchen



RAB Weatherproof MR16 fixture
die cast aluminum with
powder finish, "O" ring
sealed, brass and
stainless steel hardware,
180° pivot, ~ \$45 ea



**RAB R14-3B
faceplate + B3B
rectangular box**
three hole face plate
for sensor + spot
lights, ~ \$5 ea

Flexcharge 12V Timer

8 event programmable timer, 15A
resistive, 8A inductive capacity,
mounted in the basement near
the distribution panel



Light Switch
standard 110V AC
light switch used,
DC current < 1.5 A



12V DC Junction Box
mounted in the cabin basement



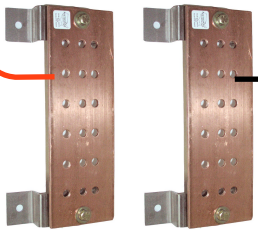
12V DC Junction Box
mounted in garage attic, from
here one line feeds the triple
switch in the garage, the other
runs underground to the cabin



Light Switch
standard 110V AC light
switch used x3, DC current
< 1 Amp for each circuit



Inline Maxi Fuse Holder
use with 5 amp 12 V rated
automotive mini-fuses



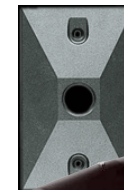
**Brightest SMD MR16 330
lumen LED**

pure white 4.6 watt, 45 degree
spot illumination, -20°C to
120°C operating, ~ \$23



SPT-1 #18/105° wire
usually in 250 foot
spools, ~ \$30

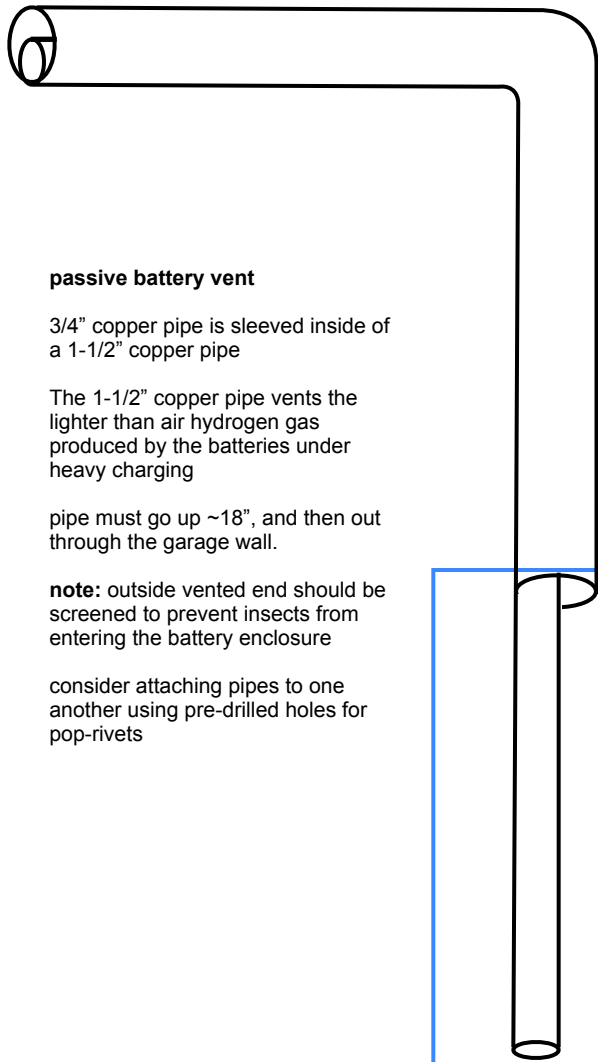
RAB R14-1B
one hole face plate
for spot light over
service door aimed
at cabin + standard
rectangular box



RAB R14-1B
one hole face
plate for spot light
by work bench +
standard
rectangular box



RAB Stealth 12V motion sensor
programmable for 5 seconds to 12
minutes time adjustment, 1 watt
power consumption, 96 watts max
output, ~ \$100



passive battery vent

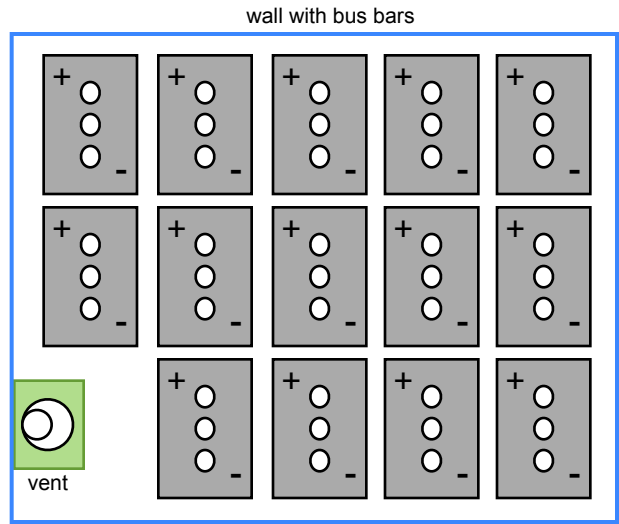
3/4" copper pipe is sleeved inside of a 1-1/2" copper pipe

The 1-1/2" copper pipe vents the lighter than air hydrogen gas produced by the batteries under heavy charging

pipe must go up ~18", and then out through the garage wall.

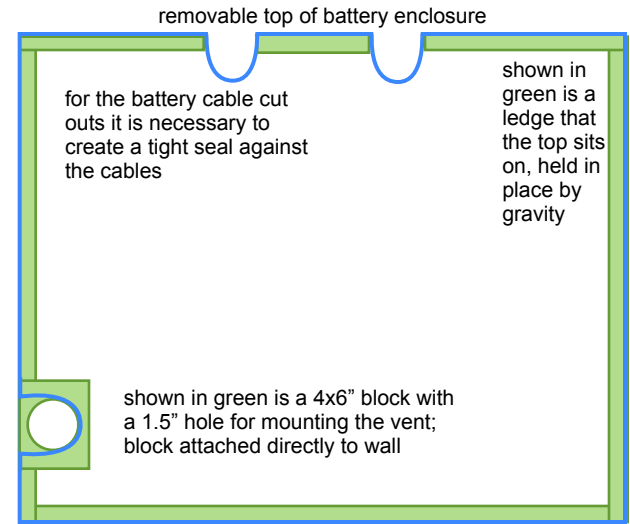
note: outside vented end should be screened to prevent insects from entering the battery enclosure

consider attaching pipes to one another using pre-drilled holes for pop-rivets



wall with bus bars

vent



removable top of battery enclosure

for the battery cable cut outs it is necessary to create a tight seal against the cables

shown in green is a ledge that the top sits on, held in place by gravity

shown in green is a 4x6" block with a 1.5" hole for mounting the vent; block attached directly to wall

Battery Enclosure

How passive ventilation works:

The metal pipes act as a heat sink, which effectively eliminates drafts, ensuring that venting only eliminates the lighter than air hydrogen -- an analogy to illustrate this principle is to imagine a modern vestibule (a typical grocery door entrance with a set of inner and outer doors). A vestibule creates a space of air that is somewhere between the inside and outside temperature. By opening one door, and then the other, a draft is eliminated. But when both sets of doors are opened at the same time, a current of air is produced by the pressure gradient created between heavy cold air and light hot air. By using thermally conductive pipe, a pocket of air is created that bridges two temperature extremes, eliminating the draft. A PVC pipe would not create this thermal gradient, and would actually facilitate the creation of a draft -- which is known to create swirling pockets of air capable of trapping hydrogen.

Note: hydrogen gas will not be created in massive quantities -- but it is more often-than-not better to over engineer, especially when the price of copper pipe compared to PVC is insignificant compared to the overall cost of the system.