systems can be every bit as deadly as mains AC in certain circumstances (risk of fire due to high currents in small cables, battery explosions from short circuits, etc.).

1.4.2 Equipment

1.4.2.1 Generators

Some field sites may provide an irregular power supply via an existing fixed generator. This is characteristic of some mission or trade stations which usually require some kind of power infrastructure. If such power is available, then the main concern is to make sure that the supply does not damage the equipment. Simple precautions include disconnecting equipment before shut-down and only re-establishing connections once the generator has stabilized after startup. A UPS provides further protection both against variability in line quality and inadvertent power outages.

p. 47 It is worth considering connecting a large battery to the generator and charging this as well. This provides some capacity for either running or charging the equipment when the main generator is off. The best arrangement perhaps would be to only use this battery, i.e. never to run equipment directly from a generator. This would obviate the need for a UPS (which, like a battery, is heavy) and provide the best protection for the equipment. Some generators will offer a direct 12V DC outlet; otherwise a transformer type car battery charger would also be needed.

If no fixed generator exists and solar power is not an option, a portable generator running on diesel or petrol will most likely be the next best option. The same precautions should be taken regarding protecting the equipment.

1.4.2.2 Solar power

Solar panels are a good option in many situations—they certainly cannot be beaten for quiet operation. However, there are a number of complications.

The first is where to mount them. Obviously sun orientation needs to be considered, but also factors like accessibility, and protection from animals and missiles. We were allowed to mount panels on an iron roof, which was in many ways ideal. Connecting the panels to our battery was tricky, however: long wires are a problem with low-voltage systems because of resistance losses, so we had to find the shortest route and the thickest electrical cable for the job. This is where a multi-meter is invaluable, as it allows one to check whether one's non-optimal solution is actually functional or completely useless.

Another complication is the wiring itself. Solar panel generators need voltage regulation and blocking diodes—the former to protect against overcharging, the latter to prevent current running in reverse and draining the battery at night. Some designs have this circuitry built in, but otherwise you must wire-in dedicated components, which should be sized according to panel area (which equates to output current). Getting the balance right between panels, regulators, battery, and equipment takes a bit of calculation. Some of the panel suppliers give rule-of-thumb guides—at least for matching regulators to panels.

Solar panels can be rigid, flexible, or foldable. The rigid type is the most reliable and durable but also the heaviest and most awkward to transport. We have had quite good experience with a flexible model, which could be rolled into a large cylinder that just fitted in a suitcase. It was vulnerable, in that crushing or folding would have ruined it: careful packing and padding was necessary. Foldable types are light, compact, and very tempting but apparently less reliable: several people have reported that the cells failed despite good maintenance.