

REMOTE CONTROL

In the last of his series on extreme conditions, **Gary Rolfe** takes a look at technology, and how to make it work in the wilds.

Life is hard. Serious adventure is formidable. Long-haul expeditions are complicated and success doesn't just happen. Before, during and after my journeys it's necessary to communicate and disseminate critical information, efficiently. To turn a plan into action requires insanely detailed databases, emergency procedures, spreadsheets, news and stored digital images. And this calls for seriously innovative mobile gear.

Believing in the power of technology, I'm always thirsty for the latest advances, and looking for ways to integrate them into my lifestyle. But despite the relentless march of progress it can still be hard to find advice on what to do when you leave the power grid behind. What follows is a summary of the system I've developed to deal with operating in the wilderness. So whether you're thinking of taking a laptop to Yosemite or are simply confused about rescue beacons for Greenland, then read on.

SOLAR POWER

Whatever electronic gear you choose to travel with the only solution to an independent power source is solar energy. Solarcentury UK have been instrumental in developing systems specific to each journey I make, comprising of a solar panel, battery and inverter.

The panel charges the battery and the inverter converts the DC electricity into AC enabling mains appliances, such as a laptop or satellite phone to be powered or recharged. There are no 'typical' scenario solar power systems, since component choice is determined by what is needed to be powered, and where. Sitting down with Solarcentury UK,

we work out the energy necessary to power gear, the operating voltage and sunlight predictions for the journey. The more sunlight the cheaper and smaller the system will be. For my system to be efficient and complete I select electronic devices that power and recharge on the least wattage.

FLEXIBLE PANELS

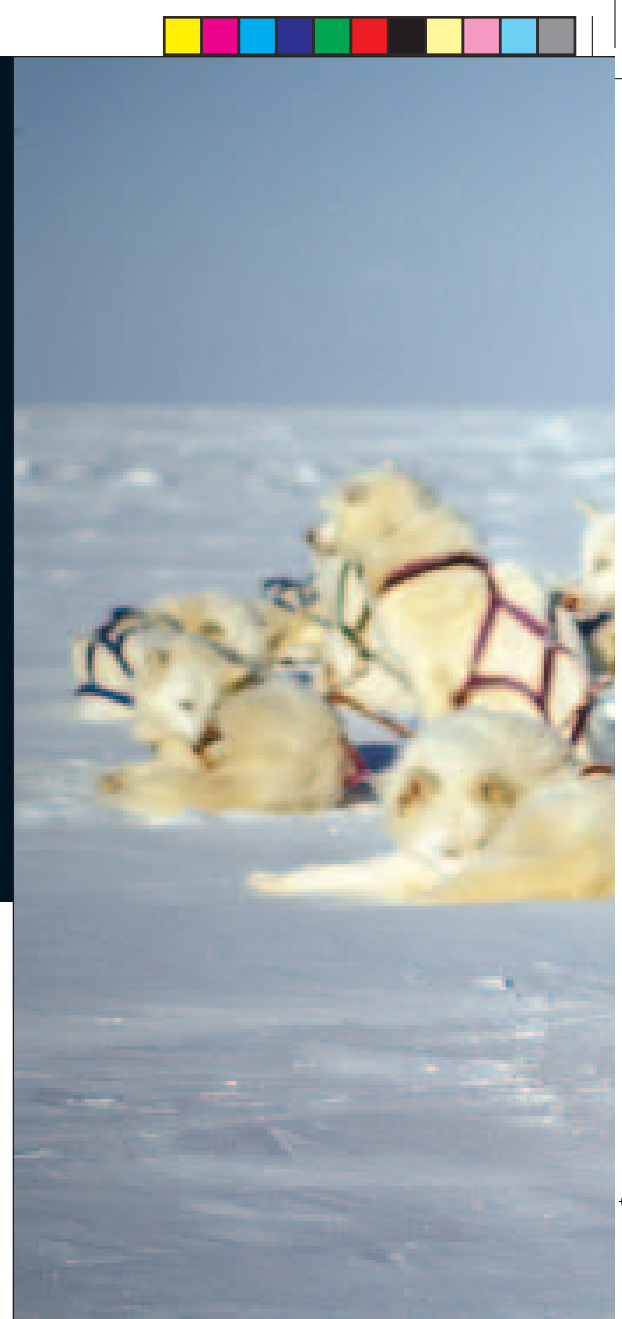
Built to rough it, the Unisolar panels I use don't contain glass and are coated with a surface similar to non-stick frying pans. To charge, direct sunlight is preferred though not essential and there are no moving parts to maintain. Most solar panels are compatible with 12V batteries and a diode is mandatory so the battery doesn't overcharge or drain. During 24-hour Arctic summer sun I use a 10-watt panel, hooked easily to a backpack with bungee cords. During spring sun, at 40°C below zero and fewer daylight hours, Unisolar 20-watt panels are used. These remain flexible and are spread over the sled to charge. The panels are customised with temperature resilient cables and junction boxes so they don't become brittle. But don't be tempted to reduce weight with thinner cables, since anything less than 4mm will become a fire hazard.

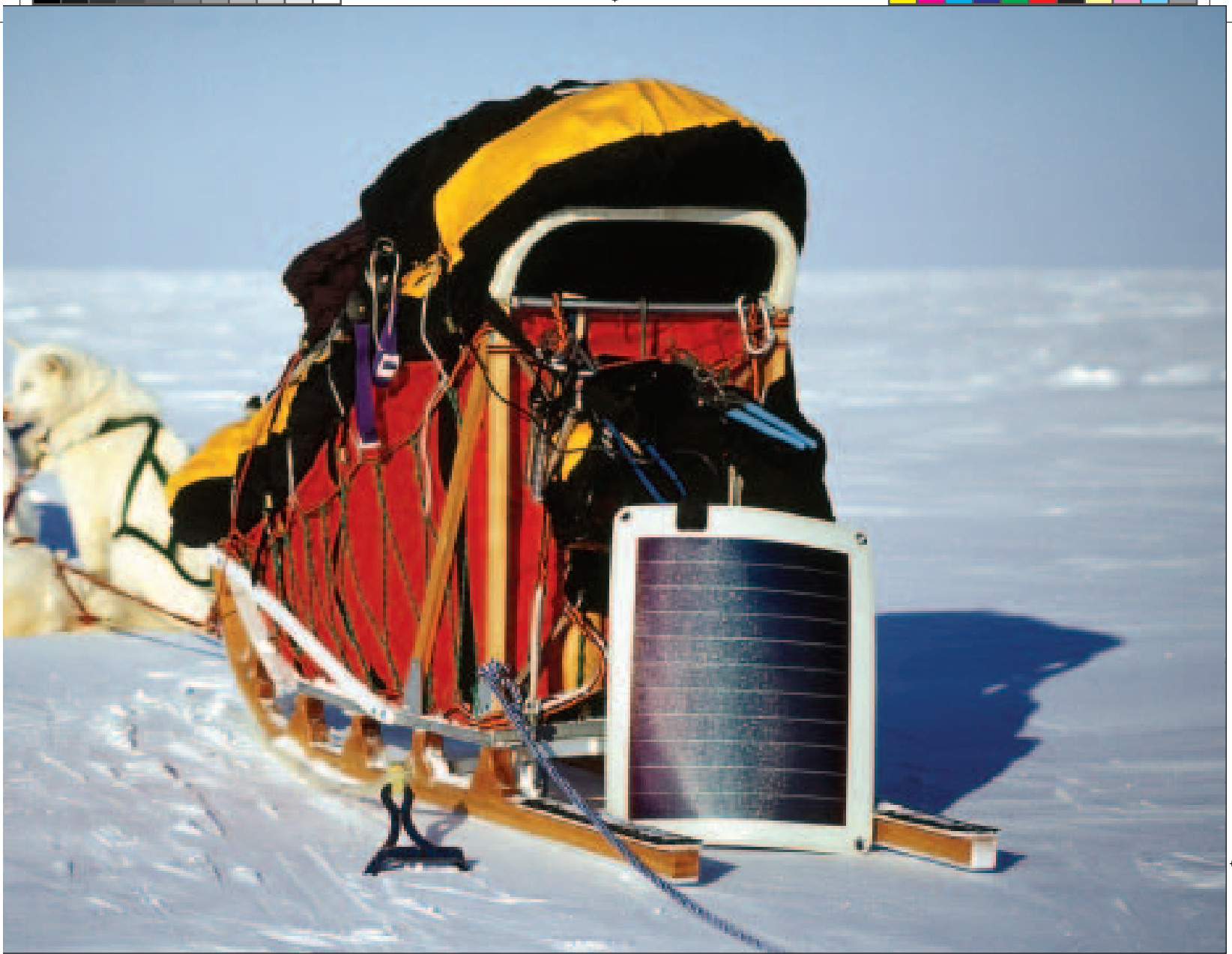
BATTERIES

A battery stores charge and sets the voltage for my system. To work, most mobile devices require 12V. I use a 12V 10Ah. These brick-like rechargeable batteries are the most effective owing to their lead quality content. Go with anything less and you'll regret it, despite the weight. Because my batteries are deep cycle I never discharge by more than 50% before recharging. Manufacturers quote battery voltages for systems operating at 20°C, so I apply a temperature compensation figure and add 0.024V for every degree centigrade when I'm operating below 20°C. In the cold, a freshly charged battery is disconnected and bundled into a dry bag before bringing it inside the tent. When I'm satisfied everything has warmed through I check the charge using a tiny multimeter.

INVERTORS

Once happy that the battery is strong I connect it to one end of my Switched Mode inverter. The other end attaches directly into any manufacturer's power adaptor, ensuring the quality of AC power entering the appliance is exactly as intended. Plugging directly into the back of, say, a laptop will almost certainly invalidate any warranty.





RUGGED LAPTOPS

Most high street consumers understandably aren't that interested in crossing either sea ice or rivers nor altitude climbing with IT gear. Consequently rugged laptops are a specialised item but don't take it for granted they'll all deliver and survive. Moisture often results in the kiss of death to IT kit. Coaxing laptops in the past used to be absolute agony and fear of condensation shorting a system had me eating my fists. Water forming on defrosting equipment would short out and cause irreversible damage if ever I was tempted to turn it on too soon.

This changed for me last February on Canada's frozen Mackenzie River when I used a Panasonic Toughbook. The Toughbook CF-18 fired up effortlessly in less than two hours after being warmed up from a tingly - 51°C. The hard drive warmed itself too if the operating temperature dropped inside my tent. At 2kg the CF-18, with its full magnesium alloy casing, is 20 times more durable than your regular ABS laptop plastic. Another consideration is altitude. At 15,000 feet computer hardware begins to falter but I do know that the Panasonic team were responsible for enhancing a Toughbook to work effectively on top of Everest last year.

My tent life is cramped with laptop taboos. They're all there; condensation; dog hair; the cold; and copious amounts of food and hot drinks. Gear jostles for space and accidents happen. In the past these haven't been pleasing moments. Hermetically sealed laptop keyboards are useful for people like me who tend to drop what they eat and dribble drink. To seal out tent detritus, protect serial ports by looking for a laptop designed with rubber hatches.

LCD SCREENS

As anyone who's left a mobile phone out in the cold will know, LCD screens become sluggish at low temperatures. LCD screens are a sandwiched layer of liquid between two layers of glass, the liquid becoming solid and displaying colour when an electric current passes through. As the display becomes colder, the electrical properties of the liquid change, making it work less efficiently, fading and slowing, although the information will still be there. The most efficient laptops balance their backlight screen's clarity fast and automatically, even with a head torch light flitting on and off screen.

DIGITAL PHOTOGRAPHY

Love or hate it, digital will soon be everything in cameras. I used to carry enough film to shoot 36 exposures every four days. These days I favour SLR digital cameras capable of capturing RAW files. At 6MB per image (160 images per GB) the RAW files capture as much data as digitally possible. With the flick of a switch I can change 400 ISO to 100 without wasting unexposed film and being able to immediately see the results I can reshoot until I'm happy. Taking pictures of the northern lights was always an exposure guessing game, but digital has solved this.

I use Scandisk's Ultra CompactFlash 256MB cards. These digital media cards, sometimes called digital film, remain stable in extreme cold. A 2GB card may be an attractive option but shooting RAW files on a 2GB card is the cost equivalent to a decent mobile hard drive. There are two types of media cards; Type 1 and Type 2. Type 1 cards capture camera data quickly, leaving minimal

(TOP) Even at 40 below zero on the Arctic Ocean the Unisolar FLX 11 efficiently charges Gary's battery. Credit: Gary Rolfe.



Sledge dog Timber relaxes on the frozen Mackenzie River in Canada's Northwest Territories last February. Credit: Gary Rolfe.

delay for image transfers. Type 2 cards are slower, have moving parts and are prone to failure if dropped.

A stash of cards and a 40GB mobile hard drive weigh less than bundles of film and allow me to back-up crucial files. Smaller than a cheese butty and weighing considerably less, the FlashTrax mobile 40GB hard drive, with its high-speed transfers, can safely store over 6,000 6MB RAW files from my media cards. It also gives me the option to see what I've taken on its 9cm screen. Battery life? I get a solid two hours to download 6GB of data and recharge on the move. Journey over, I plug it in to the laptop, sort the images and burn my keepers on to a CD.

If in the market for a camera, take your time before buying. Handle as many as possible, practice with your purchase, envisage exactly what you're trying to capture, and enjoy it. Be encouraged. Think of the most compelling photographs you've ever seen and I bet it's been nowhere near technically perfect. Not one. If your adventures take you to cold places practise every aspect of camera work with gloves on. Go for the best tripod and head you can afford, preferably made from tough lightweight carbon fibre and wrap adhesive moleskin around constantly handled metal camera parts.

PROTECTION

Not all protective or dry bags are the same. The cold makes some difficult to fold, and zips can foul up. In debilitating cold they can become brittle. I'm fussy about zips. A tent zip let me down on the Beaufort Sea at forty below once. A nocturnal jet stream began to rage. This legendary weather

"Broken, the zip had me screaming out for the mercy of God."

phenomenon generates colossal power in the Arctic and hit as the sun set. The atmosphere cools, air sinks and warm air sits on top creating a rapid change in wind speed. This isn't a unique weather system confined to the polar Arctic regions; on the Central Plains of the US they call them tornadoes. Broken, the zip had me screaming out for the mercy of God.

I trust Lowepro's zipped protective bags to cradle my cameras and IT delicacies, neatly. I loathe clutter. Unnecessary straps I razor off. Packed on my sled, in winter and spring, cameras remain frozen in brutal cold. Before I bring them inside to the warm of my tent they go inside waterproof dry bags. Inside my tent water condenses on the outside of dry bags until everything thaws. Dry bags from Outdoor Designs work well and they're the lightest I've used.

SATELLITE PHONES

Reliable communication means using a satellite phone. Iridium provides the only complete continuous worldwide satellite communication coverage of voice and data. The latest 9505 model weighs only 375g. £120 will buy a 200-minute SIM card. Punch this in, you'll be identified on the network and bingo, away you go with calls charged at 60p per minute. A single battery lasts for four hours of continuous use without charging.

Inmarsat communication satellites cover about 98% of the world's landmass. Fine if you don't intend using a phone in Antarctica, the high Arctic, the entire Arctic Ocean or the northern aspect of Greenland. Globalstar are a viable alternative to Iridium if you're not heading to either polar region, most of Africa or chunks of mid-ocean regions. The Thuraya system covers northern, central and western Africa, the Middle East, Central Asia and the Indian subcontinent. Their dual-mode GSM system enables you to flit from satellite to land mast communications.

Thrane & Thrane and Nera units have varying degrees of coverage more suited if you have mobile support, i.e. they're heavy. If fax options are important to you both the Thrane & Thrane and Nera units incorporate this feature.

GPRS

GPRS (General Packet Radio Service) has nothing to do with the military GPS system, it's a new non-voice service that allows information to be sent and received across a mobile telephone network. The very latest rugged laptops have GPRS capabilities. Costing less than other mobile phone networks and because there's no dial-up, connections are instant and information can be sent or received immediately. This is a good option if satellite phones aren't necessary for you. Most Arctic settlements have their own telecommunication masts that dish up satellite TV and Internet providers. Mobile phone services extend to several miles outside of each community and laptops with a GPRS feature work without a mobile phone in range of a mast.

BODY BAG RESCUE

A friend quipped the best way to attract media attention would be to die on the end of a recorded phone conversation. If this is your goal, go for what some satellite phone companies call 'remote location determination services'. This unit integrates a GPS. The instant a call is made navigation co-ordinates are relayed. If you did die on the phone this thoughtful feature would enable a body bag rescue to find you.

My routine with a satellite phone is less dramatic, I update base with essential progress by relaying position co-ordinates, weather and travel conditions, the time for my next call and the co-ordinates I'm heading for. I also say how the dogs and I are doing. From these conversations I write specific details on my tent walls. This gives me a sense of progress when often very little else matters. If necessary a rescue party can be forewarned of medical and landing conditions with precise co-ordinates. By talking directly to the pilot, medic and rescue team, critical information could be relayed. Hooked up to my laptop, I can pick up new live maps of weather and ice conditions every hour from satellite-linked websites.

Disadvantages? Solar storms can cause satellite communication systems to briefly shut down. But this is rare. To buy? My phone is third hand so you too might want to consider refurbished models or even renting. With a solar charger another advantage with my satellite phone is, even without a modem I can use it to send and receive email up to 100 characters long.

HF RADIOS

HF (High Frequency) or trapper radios are OK. They're free to use and you can use an instant digital messaging option that's simi-

lar to Yahoo Messenger but this is the only option that remains secure. Everyone else with an HF radio can hear your conversation. The advantage of this is at least a telephone message can be relayed if you're in trouble. There's no way of predicting propagation cycles and trying to talk through a show of northern lights on an HF radio is hopeless; it sounds all wobbly.

RESCUE

A decade ago someone was discovered alone with his dogs in the western Arctic. They'd been overdue on their estimated time of arrival, a search was soon on its way and he was quickly found, with his dogs. The dogs had survived. He had not. He'd fallen through the ice and perished. The ice around him set fast and there he remained. The dogs had survived by eating him head first, down to his trunk where, with encroaching ice, they continued to claw away at his frozen body. If I decide to pull the plug on a journey, what are my rescue options?

EPIRB'S AND PLB'S

In some cases it may just be a simple satellite phone call to civil air rescue such as local private aircraft or local air charter companies. Many lives are saved this way every year without draining local resources. But if you intend using rescue beacons instead of a satellite phone consider this;

EPIRB's (Emergency Position Indicating Radio Beacons) or **PLB's** (Personal Location

Beacons) are devices that can be activated manually or automatically in cases of dire circumstances. They transmit a coded distress signal and rescue is initiated by the military. In Canada C-130's and crews are scrambled from Ottawa without knowing what they'll find but prepare for the worst.

Flying at 500ft in pristine weather conditions an aircraft crew can observe both sides for approximately half a mile. EPIRB's operate on 406 MHz and PLB's on 121.5 MHz. At 406 MHz location accuracy is about 2 miles/3km. That leaves a search area of 12.5 miles²/28km². At 121.5 MHz the location accuracy is about 12 miles/20km. This leaves a search area of 452 miles²/1,260km². That's probably why PLB's are not permitted in Canada.

Beacons are not ideal. EPIRB's and PLB's operate continuously for only 24 hours on batteries that aren't rechargeable and whilst some link up with GPS to fix a position, some don't. With satellite phones an exact rescue location and medical situation can be relayed, and phone batteries can be recharged. One final sobering monetary detail, if you flick that PLB or EPIRB switch without a life threatening reason, expect to foot a \$US 50,000 bill. This could have you eating your fists, even if the IT gear doesn't. ||

Gary Rolfe lives in Canada's Western Arctic. He is currently backpacking alone with two huskies for two months along the Amundsen Gulf Peninsula.



The gear that Gary uses has to endure the extremes of polar travel. Credit: Gary Rolfe.

FURTHER INFORMATION

Gary's website:	www.garyrolfe.com
Rugged laptops:	www.panasonic.co.uk
Solar panels:	www.uni-solar.com
Carbon fibre tripods:	www.manfrotto.com
Mobile hard drive:	www.smartdisk.com
Refurbished satphones:	www.ouffittersatellite.com
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