

Dual Battery Systems

These days very few people travel without a portable fridge and camp lighting, and that dictates some form of auxiliary battery power. What do you need?



The typical 4x4 traveller has a fridge in the back, filled with food and beer. Failure to keep beer at the right temperature is disappointing, but failure to keep food at the right temperature can be health-threatening.

The best way to ensure your fridge will run overnight, when the engine isn't operating, is with a deep-cycle battery. If the fridge is connected to the deep-cycle battery all the time, it will keep the power flowing as long as it has sufficient charge.

Dual battery systems are designed to ensure the deep-cycle battery is charged, without the chance of the vehicle's starting battery being discharged.

There are several ways of achieving that, from a simple, manual rotary switch to mini-computerised electronic devices. Before the arrival of electronic dual-battery isolators the state of the art solution was a solenoid device and these are still popular.

The function of an isolator is to disconnect the deep-cycle battery from the vehicle's starting battery when the deep-cycle battery is operating the fridge. It also must maintain that disconnection when the engine starts, until the starting battery is fully charged, after which it allows charging current to flow to the deep-cycle battery until it's charged.

The latest electronic devices take the process a stage further, by monitoring both batteries and adjusting charge rate to suit battery age and condition.

Some dual battery isolators have a function that allows the deep-cycle battery to act in conjunction with the starting battery, to boost starting power should the starting battery drop voltage. That system functions well where cranking loads are small, but a dead-flat starting battery may not receive enough power from the deep-cycle battery to start a large-capacity diesel engine. You can then be stuck with a dead engine and a dead fridge.

Some electronic isolators with override have a block on the dual connection that prevents draining the deep-cycle battery if the starting battery has too little power to effect a dual-battery start.

However, the message is clear: you need some form of backup battery charging with every dual-battery installation, to make sure you won't get stranded in the bush.

Do It Right

Possibly more important than the type of isolator you select is the way the dual-battery system is fitted. Traditionally, a second battery goes into the engine bay, but most of today's engine bays are full of other stuff. Also, today's engine bay temperatures are higher than those of yesterday and batteries hate too much heat.

A deep-cycle battery, or a power pack and most types of isolator can be fitted into the back of a wagon or ute, but don't scrimp on the size of cable connecting the starting battery to the auxiliary, or you'll suffer from voltage drop. You can buy protective cases for deep-cycle batteries that have to be stowed inside vehicles.



All connections, including earth terminals, must be of top quality material and securely fastened with nylock nuts. A small, loose connection will cause big trouble.

If you're uncertain where fuses or circuit breakers should be fitted, you need to consult an auto electrician.

There are several different battery types and the best of them cost plenty: budget \$500. A cheap starting battery won't run a fridge reliably or for long. A lead-acid truck-type starting battery is best for dual-battery winching – not fridge operation. Deep-cycle batteries tolerate overnight drain better than starting batteries, but lead-acid deep-cycles need externally-plumbed ventilation and are high-maintenance.

AGM (absorbed glass mat) batteries with 100 amp-hour ratings are heavy and expensive, but don't need ventilation, can't spill acid, are zero maintenance and tolerate charging abuse better than gel types.

No matter what isolator and deep-cycle battery you choose you'll still need to charge the battery every two days at least. Running the engine isn't usually ideal.

Solar power is useful, if the sun is shining, but can't be relied upon in all locations at all times of the year. However, sunshine is reliable in the desert regions during winter and in monsoon-affected regions during the Dry Season.

A solar panel needs a controller that's compatible with your isolator.

Reducing your power consumption is one way of extending battery charge life.

Our experience is that LEDs use much less power than incandescent or fluoro globes and we find that an LED lantern near the stove and food preparation area, in combination with LED head torches, provides ample camp lighting.

Our camping power supply consists of a Thumper 75 amp-hour, deep-cycle, absorbed glass mat (AGM) power pack, stowed in the back of the wagon and an Odyssey 55AH deep cycle battery under-bonnet.

The Thumper powers our Engel 40-litre fridge and the Odyssey runs the 20-litre. The Thumper uses an under-bonnet voltage-sensitive charger and the Odyssey battery is charged by a Projecta 150-amp isolator. A Projecta 60W solar panel and solar charger can be plugged into both batteries.

If we stop for an extended period we use only the 40-litre fridge after the Odyssey runs out of 'steam' to run the 20-litre and that happens in a day or so. Our Projecta 60-watt solar panel charges the Thumper that runs the 40-litre fridge and the LED lighting, indefinitely, even in partly cloudy conditions.

The backup is a Honda 10i petrol generator.

How Many Amps

It's easy enough to calculate what size battery you need and how long you can expect it to last before recharging.

If we assume four hours of fridge operation each day you'll need 300Watt-hours/day (75W x 4hrs). Two hours of two-fluoro light operation (2 x 15W x 2 hrs) or about three times that of LED lighting is another 60Wh/day. That's about the minimum power consumption a campsite can expect: 360Wh/day.



On the face of it the battery capacity needed is 360 divided by 12V = 30 amp-hours (AH). However, that battery would be dead flat in a day, so to guarantee no more than the 70 percent discharge level recommended by deep-cycle battery makers the AH figure needs to be divided by 0.7 and the result is 43AH. Batteries are only about 90 percent efficient, so the real world AH figure is actually 10 percent higher, at 47AH.

Most dual-battery systems employ at least a 75AH auxiliary deep-cycle battery, which provides up to two days of camping electrical power without recharging.