



Voltage drop

With **Collyn Rivers**

If you want to keep your battery properly charged, there are a few things you should know.

Undercharging and overly discharged batteries are the bane of camper trailer and caravan users. Few charge beyond 70 per cent and many battery makers advise that 65 per cent is more realistic. This limits time away from a source of recharging, and kills batteries mainly because the charging regime of a standard alternator is far from ideal for auxiliary batteries.

The alternator supplies a vehicle's running needs, which require a substantially constant voltage. The alternator must also recharge the starter battery, but that takes only a minute or two because starting only uses about the same amount of energy as a sidelight burning for 10-15 minutes.

Recharging works by applying the voltage required for the vehicle's electrics to the battery under charge. This brings a starter battery to safe restarting level within minutes and ensures it cannot overcharge even after long, continuous driving. It does this automatically because the constant charging voltage (pressure) results in the charging current (amount flowing) constantly falling. Charging drops to a trickle by 70 per cent charge and continues to fall.

Starting is designed to work at this level of charge, but that same system charges auxiliary batteries the same way – rarely beyond 70 per cent in typical usage. That percentage is even less so for a trailer battery, as the connecting cable's resistance loses some of that voltage (heavy cable reduces the losses).

Increasing the alternator size helps only marginally because the alternator's associated voltage regulator rigidly enforces the charging regime. Upgrading the alternator increases the initial charging rate but will not extend charging beyond 70 per cent or so. The battery simply gets there sooner.

Fortunately there are solutions. None is cheap, but all have varying degrees of effectiveness.

AGM/GEL BATTERIES

These batteries charge more rapidly and from a lower voltage than do conventional deep-cycle batteries. Adequate interconnection cabling is still required but AGM and gel cell batteries (up to 120Ah or so) are then likely to fully charge after a day's driving, and will at least charge faster and deeper than traditional batteries. They are heavier and more costly, but that is partially offset by their attaining closer to full charge. Both types are further assisted by using the basic Arrid or Redarc DC-DC converters described below.

DC-DC CONVERSION

This technique compensates for the voltage drop in the interconnecting cable (assuming that the cable and connectors are otherwise sound). The DC-DC (direct current to direct current) unit is located close to the trailer battery and the more basic ones convert whatever comes down that cable to a constant 14.4 volts (some can be pre-set to marginally higher voltage).

In its basic form this is not a total fix because charging retains the limitations imposed by the alternator, but it does overcome voltage loss in the cabling. These units are made by Arrid, Redarc and others.

More sophisticated (and pricey) versions made by Sterling (UK), Ample Power Company (USA), etc., sit close to the alternator and in effect charge at the maximum voltage and current that is safe for the battery (and alternator). They are programmable for battery capacity and type. They typically bring a battery to 100 per cent charge (or close) within a few hours. They charge starter battery and auxiliary battery/ies each in their optimum way.

Installing these units requires some electrical knowledge. It is best done by a

marine electrician as he/she is likely to know about them.

SMART ALTERNATOR REGULATORS

These have been used extensively on cruising yachts since the 1970s (I had one of the 140 amp Bosch alternators in my OKA for 10 years). They are normally add-on devices that modify the alternator output such that its voltage rises as the charged battery's voltage rises, thus keeping the charging rate constant. The down-side is that, unless they're designed accordingly, they also feed everything else at that rising voltage – which may reach 15 volts.

The (US) Xantrex company has a range of adaptors that can be used with some of the more commonly-used alternators.

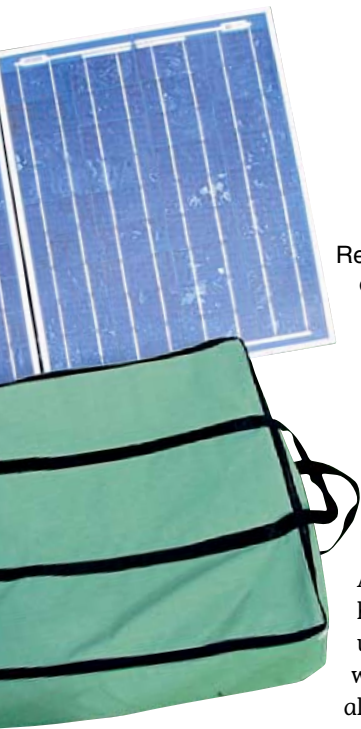
SOLAR

Solar helps to charge auxiliary batteries and, given enough solar capacity, can supply all such charge. Solar works well with camper trailers that have realistic electrical needs.

Complications may arise when using both solar and alternator charging because the different bits from different makers must work together and don't always do that well. This is usually further hindered by instructions translated by someone with seemingly inadequate English.

Far from all auto-electricians know about solar, and even fewer solar technicians know anything about auto electrics. Those who do are mainly in Qld (e.g., Springer Low Voltage Electrics in Strathpine).





Left to right: The Redarc BMS 1215 is a one-stop solution for 12V management on your camper; solar panels are a great way to keep batteries topped up.

COMBINATION UNITS

Ample Power (USA) has long provided units that cope with both solar and alternator inputs, but

there still remains the need to charge the trailer battery from the mains supply from time to time – e.g., to keep the battery comfortably fed when the rig is not in use. All of this has now been addressed in one main unit launched as recently as July 1, 2009. It is described below.

The all-Australian-designed and built Redarc Battery Management System (BMS 1215) includes a 12 volt DC-DC converter

that provides fully optimised constant-current alternator charging of all types of remote batteries (the starter battery is charged separately). Solar is handled by an inbuilt regulator. No manual attention is required: the unit automatically switches between charging sources.

Also built in is a very clever 240 volt battery charger with two separate modes: one for touring and another for long-term battery maintenance. Having the two modes is (as far as I am aware) unique. It ensures the battery is fully charged (and equalised to get rid of any inconsistencies between individual cells) and then switches off automatically until it senses that recharging is needed.

There is also a large, remote-reading energy monitor that shows all energy going in and out, battery temperature readings, problem messages and solutions and lots of other things, plus a 30-day log of that.

The BMS 1215 is intended to be located in the trailer, or at least at the very rear of the towing vehicle with a short, heavy cable to the front-located trailer battery. It

automatically compensates for voltage drop – down to an extraordinary 9 volts, yet will then still fully charge.

At around \$1600 (RRP) this unit is not for everyone, but it is ideal for the more ambitious camper trailers and caravans, etc., as it virtually solves all the charging and metering problems in one go. It is the cleverest bit of RV electronics I recollect ever seeing. That it is also Australian-designed and made simply has to be a bonus. It seems all-but certain that it will become standard usage in the more up-market camper trailers.

Disclaimer: Collyn Rivers has no financial or other interest in any of the companies named, but did provide minor (free) advice on some aspects of the BMS 1215's specifications.

A great deal more about the above and related topics is included in the author's The Camper Trailer Book and his associated book, Solar That Really Works. His website is www.caravanandmotorhomenbooks.com



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