

Service Tips from the Pros



The Power Converter is 'Boiling my Batteries'!

How many of you have heard this old wives tale? Do you honestly believe that batteries reach boiling temperatures? What I will agree with is this...batteries can & will gas heavily - i.e. making bubbling noises & possibly lose electrolyte out of the fill caps, when charged too aggressively &/or at high ambient temperatures. A battery case can get very warm to the touch & excessive heat causes internal components to distort & swell too. I will also state that excessive gassing is likely an issue with the battery versus a defective power converter... or inverter/charger... or high output from the chassis alternator. Only proper testing can answer that.

Here are few comments regarding automotive & deep cycle batteries:

- Batteries are a chemical storage device....i.e. they store electrons!
- Batteries have an internal resistance... i.e. less resistance in a discharged condition & an increasing resistance as the battery charge level rises.

- Batteries actually 'accept a charge' based on the internal resistance of the cells.
- Construction materials used to manufacture a battery can vary widely.
- Batteries do not tolerate high temperatures well...without a negative consequence.
- Batteries must be secure & installed to limit vibration / bouncing & cable connections remain clean & tight.

Battery manufacturers build Automotive & Marine batteries with varying electrical capacities, but they are required by the BCI (Battery Council International) to use standardized case sizes...i.e. lengths, widths, & height. These sizes are referred to as Groups.

Here are several groups commonly used in RVs and a few specification ranges...

- Group 24 - Range 75 - 95 Ampere Hours - Typically called 80 AH
- Group 27 - Range 85 - 115 Ampere Hour - Typically called 100 AH
- Group 30 - Range 115 - 130 Ampere Hour - Typically called 130 AH

The battery case size has a direct bearing on the size of the lead plates, but that's where things can change. Cases can be a hard rubber or plastic, and the purity of the lead & the alloys of lead used directly affect the performance & storage capacity of a battery. It also affects costs associated to manufacture a battery.

Diagnosing Power Converters

Parallax Power LLC recently posted diagnostic flow chart information to their public web-site to aid in proper diagnosis of their products. These flow charts are intended for the 'average Joe' and do a fair job in providing basic voltage threshold information, but this may be insufficient information to properly diagnose certain problems. The 'suggestions' listed below are worth some time for review & consideration by an RV technician. Additionally, any technical representatives assisting an RV tech with diagnosing converter performance issues will require very specific & accurate measurements, so it's important to consider the resources available early in the process...i.e. - work smarter - not harder...

For example:

1. First & foremost, if a test is worth taking, it's worth the time to document the results as this substantiates & validate his/her diagnostic efforts.
2. Power Source - Verify the AC power source to the converter - is it 120V AC... perhaps less? Why would this matter? Record your reading.
3. What is the status of the Electrical System - Are the house batteries 'on-line' or 'off-line'? Again, why would this matter? Verify operation of the battery disconnect relay and record the status.
4. What is the Converters status - Is testing performed with the converter connected to the coach or isolated completely from the coach electrical system. Document testing methods & record your readings.
5. Test Points - Should testing / measurements be taken at the batteries... or should testing be performed 'only' at the converters output terminals. Perhaps both! Why should this even be considered?

A True Statement regarding Converter Performance: The operating condition of a power converter is impossible to determine without measuring both the converters output voltage and current.

BCI Group Numbers, Dimensional Specifications, Polarity & Terminals

Group	L"	W"	H"	Lmm	Wmm	Hmm	Figure	Polarity	Terminals
22F	9.50	6.90	8.30	240	175	211	11	R/H-POS	TOP - SAE AUTO
22NF	9.40	5.50	8.90	240	140	227	11	R/H-POS	TOP - SAE AUTO
24	10.30	6.80	8.90	260	175	225	10	L/H-POS	TOP - SAE AUTO
24F	10.30	6.80	8.90	260	175	225	11	R/H-POS	TOP - SAE AUTO
25	9.10	6.90	8.90	230	175	225	10	L/H-POS	TOP - SAE AUTO
26	8.20	6.90	7.80	208	175	197	10	L/H-POS	TOP - SAE AUTO
26R	8.20	6.90	7.80	208	175	197	11	R/H-POS	TOP - SAE AUTO
26 - 70	8.20	6.90	7.80	208	175	197	10 & 17	C-LINE	TOP & SIDE
27	12.10	6.80	8.90	306	175	225	10	L/H-POS	TOP - SAE AUTO
27F	12.10	6.80	8.90	306	175	225	11	R/H-POS	TOP - SAE AUTO
29NF	13.00	5.50	8.90	330	140	227	11	R/H-POS	TOP - SAE AUTO
33	13.30	6.80	9.40	338	173	238	11	R/H-POS	TOP - SAE AUTO



AGM THE LEGEND PREMIUM

BATTERIES



- Battery constructed with dual terminals for a universal top or side terminal fit.
- AGM design provides superior power for starting and reserve power for multiple accessories, electronic loads, and emergency needs.
- Standard SAE post fits most automotive, LTV, and SUV applications
- Advanced Absorbed Glass Mat traps electrolyte for a spillproof and leakproof design.
- Specially-engineered safety relief valve system effectively controls critical internal gas pressure preventing capacity loss from excessive gas seepage.
- Microfiber glass separators have extremely low electrical resistance for higher capacity and faster discharge rates.
- Maintenance-free construction eliminates the need to add water.
- Requires less charging time than conventional batteries.
- Flexible design can be installed in almost any position (upside down is not recommended).
- State-of-charge easily determined by open circuit voltage.
- High freeze-resistance offers longer battery life and more power for dependable cold weather service.
- Tight-packed plate and separator construction resists vibration damage for longer operating time and service life.
- Charging: Use a good, constant potential, voltage-regulated charger. Charge / Absorption / Equalize between 13.8 – 14.6 volts @ 77°F (25°C). Float / Standby between 13.4 – 13.6 volts @ 77°F (25°C). Temperature corrected charging required. Do not charge in a sealed container.
- Over 250 quality control checks ensure long life, maximum performance, and a battery you can trust.

Specific Gravity

Specific Gravity is the ratio of the weight of a given volume of any substance to that of the same volume of some other substance taken as a standard. In the case of lead acid batteries, it's the ratio of the battery acid to the weight of water. Water has a Specific Gravity of 1.0. Specific Gravity is measured with a hydrometer. Worth noting, the temperature of the substance being measured must be measured & factored-in.

The electrolyte in a wet-cell battery is a combination of sulfuric acid & water. As a battery loses its charge, the sulfur reacts / bonds to the plates resulting in a reduced concentration of sulfur in the electrolyte... eventually leaving water. This is why batteries freeze & crack

Charged vs. Discharged Batteries

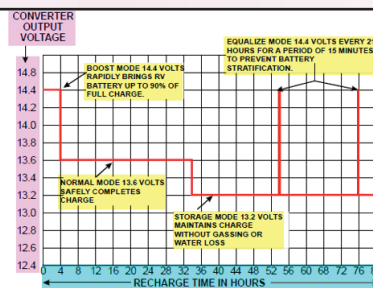
State of Charge	Specific Gravity @ 80F	Battery Voltage 12-volt / 6-volt
100%	1.265	12.7 / 6.3
75%	1.225	12.4 / 6.2
50%	1.190	12.2 / 6.1
25%	1.155	12.0 / 6.0
Discharged	1.120	11.9 / > 6.0

The Progressive Dynamics 9200-Series Power converters are currently being used on 2014 & 2015 products. This information is taken directly from the Owner's Manual:

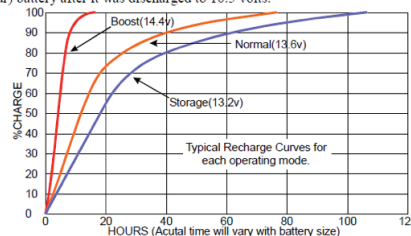
-The INTELI-POWER 9200 series 120 VAC to 12 VDC power converters are state-of-the-art electronic converter / battery chargers. The INTELI-POWER 9200's are UL and CUL (Canadian) listed.

-Their compact size and quiet operation gives greater flexibility in selecting the mounting location for either OEM installation or after market replacement.

-The INTELI-POWER 9200 series converters have the Charge Wizard controlled charging module built in. The Charge Wizard is a microprocessor-controlled device incorporated in Progressive Dynamics 9200 Series Intelli-Power Converters. It constantly monitors the RV battery, and then automatically adjusts the converter output voltage based on its charge status. The Charge Wizard has four (4) operating Modes (BOOST, NORMAL, STORAGE AND EDQUALIZE). Each Mode is automatically selected by the Charge Wizard and ensures a fast yet safe recharge for your RV battery. See chart below for details.



The chart below shows the amount of time it took a converter set to three different output voltages to recharge a 125AH (Amp Hour) battery after it was discharged to 10.5 volts.



14.4 Volts (Boost Mode) - Returned the battery to 90% of full charge in approximately 8 hours. The battery reached full charge in approximately 11 hours.

13.6 Volts (Normal Mode) - Required 40 hours to return the battery to 90% of full charge and 78 hours to reach full charge.

13.2 Volts (Storage Mode) - Required 60 hours to return the battery to 90% of full charge and 100 hours to reach full charge.

The integrated Charge Wizards ability to change the output voltage of the converter will significantly reduce the amount of time it takes to recharge your RV battery. The lower voltage for Storage Mode prevents gassing and reduces water loss during long-term storage.