

Death Of A Trojan

This article is about 'Trojan' batteries. Our place is off-grid for over twenty years, using wind and solar to charge batteries in order to keep the lights on. I've dealt with all sorts of batteries for radio and engine room use. Having wasted a lot of cash on 'Trojan' batteries I was miffed enough to put pen to paper to warn about 'Trojan' batteries.



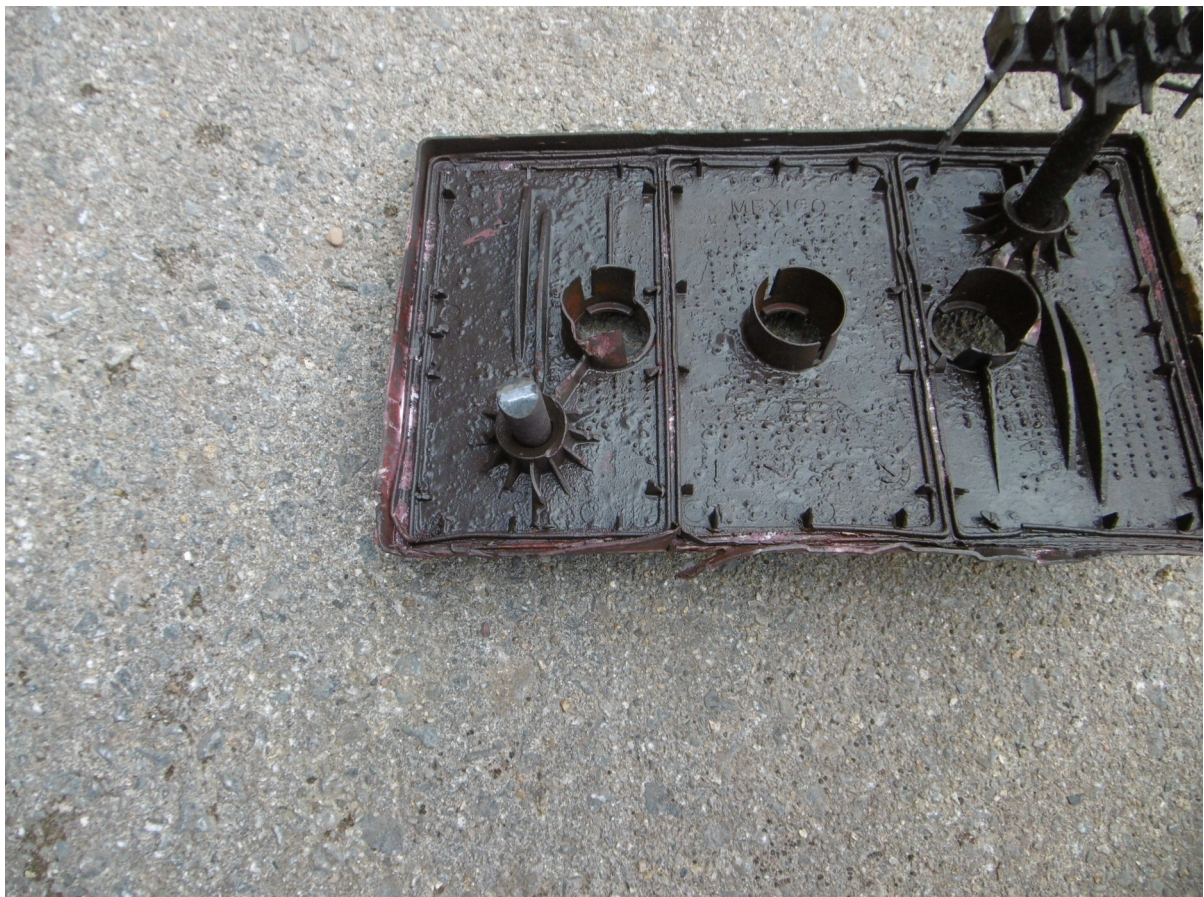
Of a dozen of those large 6Volt/390Ah cells, none survived. I stripped down a cell that failed - a potentially dangerous and messy business, wanting to know how I incurred such a heavy financial loss - a killer when operating off-grid.



Before prising off the lid, separating the cells and sliding out one set of plates for closer inspection the battery was carefully drained. Then the plates and casing were repeatedly washed out with a warm bicarbonate solution. This is dangerous - do not try this at home. If you must: protect eyes and skin. You're clothes will likely be for the bin afterwards.

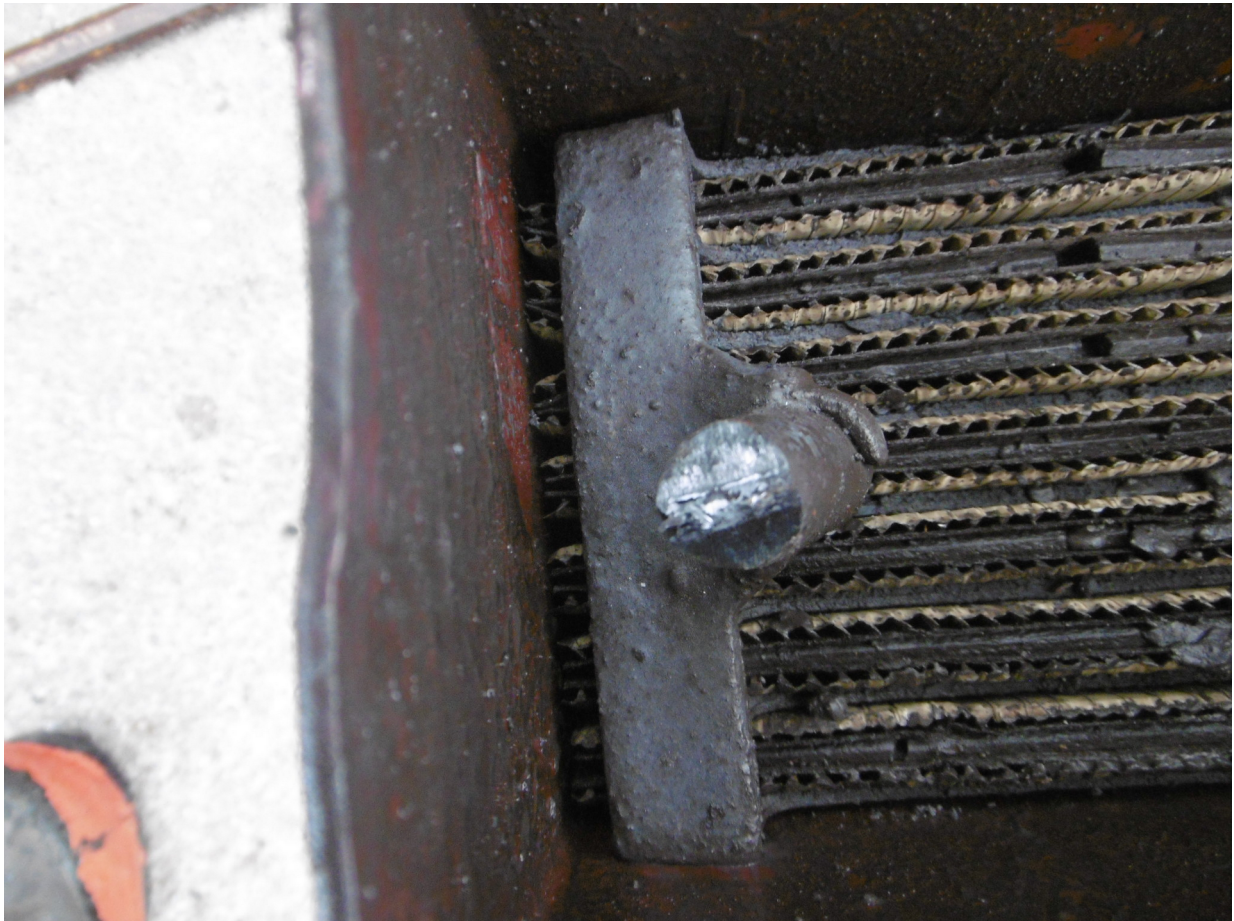


The lid came off surprisingly easy - but I expected as much as I noticed beads of electrolyte around the lid from day one. The seal is incomplete and weak, not good for a battery marketed for floor cleaning equipment.



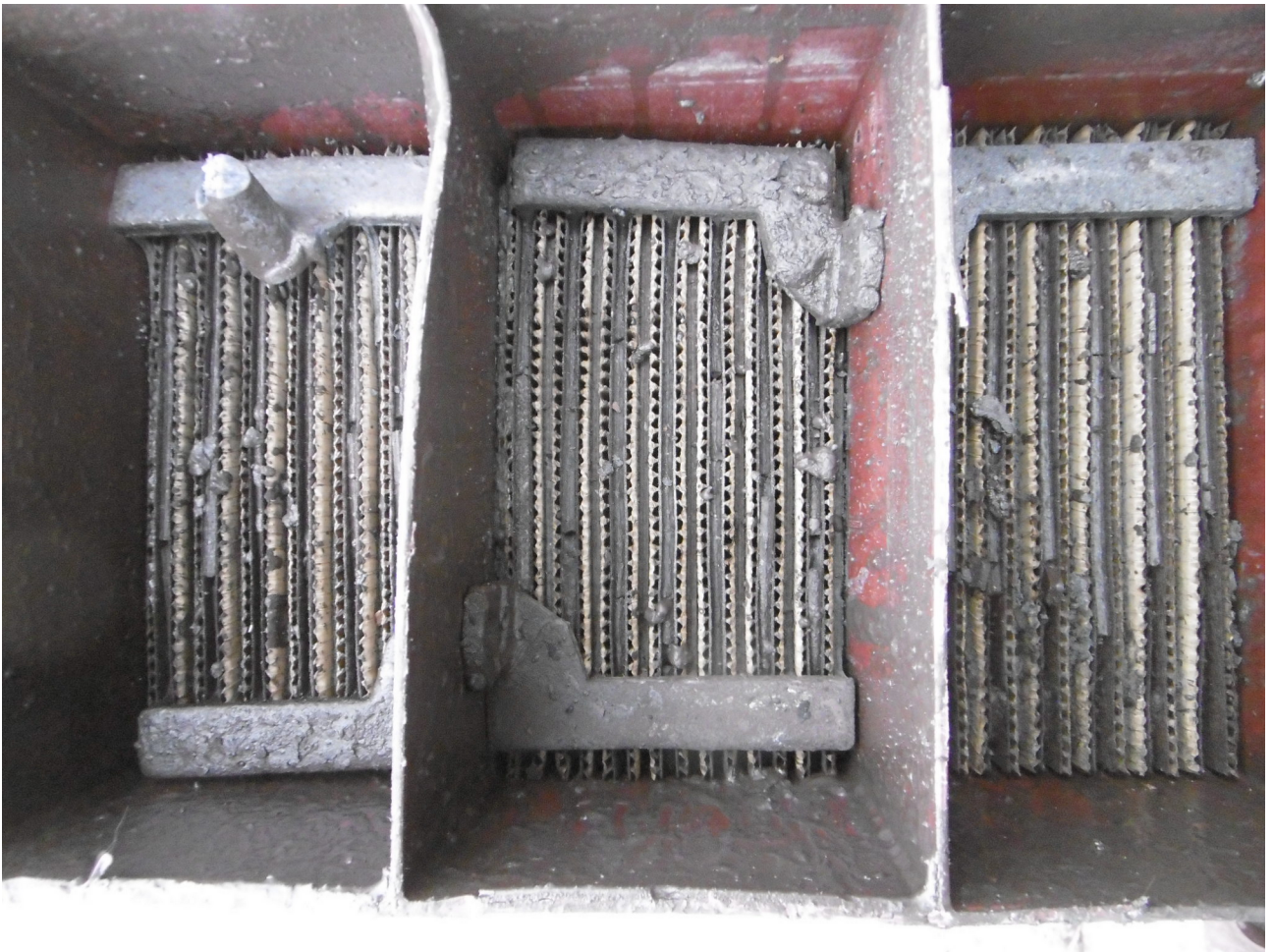
Each bank of batteries were 4 x 6 Volt in series. One set were charged with a set of 4 MPPT regulators, the second set was charged with a 60 amp 'Xantrex' controller. The third set was charged with a simple on/off controller based on a raspberry pi with an ADC converter, measuring what goes on, driven by a few lines of 'c' code. For a radio experimenter a simple on/off regulator is the only useful type anyway, the pulsed chargers cause rfi.

There are numerous battery banks here, powering the house, lights, heating pumps, the radio shack, a deep well pump - but only the trojan batteries caused troubles from day one. I also bought a set of 12 pieces of used 'Trojan' 180amp 6volt cells from a non-technically minded seller who gave up on off-grid power. All of them failed well before their expiration date.

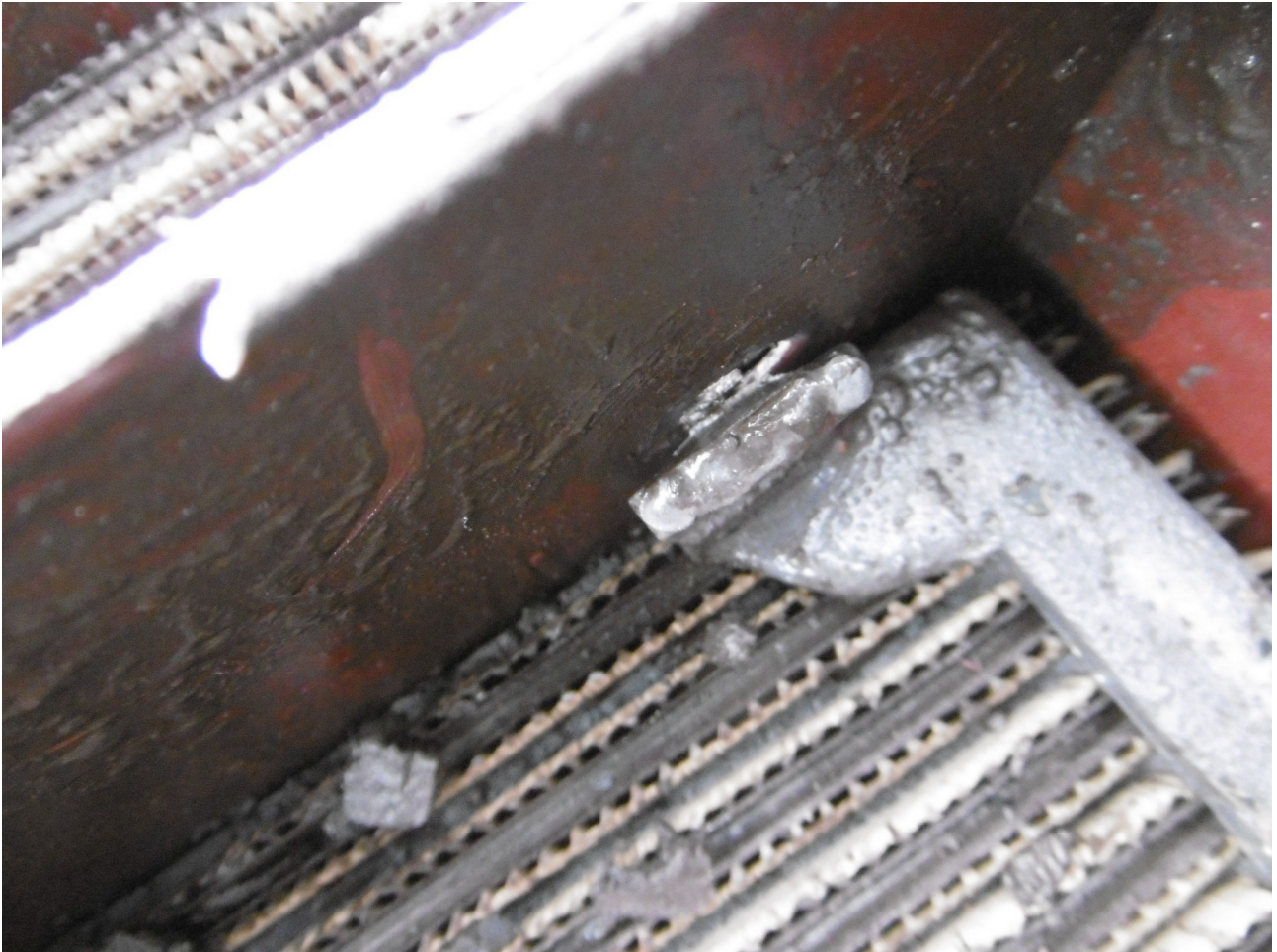


So why did those batteries die? The charge protocols were followed to a dot, frequent measurements, checking the acid, keeping contacts and battery tops clean, no overloading of the batteries with heavy loads, while keeping an eye on the charge currents from a few dozen 24 Volt solar cells dotted around the place, helped by low-power wind chargers that are only used when there's too little sun. Undercharging is just as problematic a overcharging, leading to sulfation of the cells. But examining the cells in the battery mortuary showed no trace of sulfation whatsoever.

I've only used double-distilling water made in a proper distillation stack. Slow, expensive, but definitely worth it: With that truly clean water I maintained over 35 year old batteries without any troubles.



The cells are badly constructed. Proper batteries have the connecting bridges between the cells under the lid, well above the acid level. Here the connections are made about 1 cm above the top of the cells, far too little to maintain enough electrolyte reserve. When following the manufacturers instructions on filling the cells one will inevitably destroy the batteries: the electrolyte from the outer cells will leak into the centre cell. There are no seals in those connecting ports, just a hole, barely sealed by the lead rivets connecting the plate packs. Once there is any level of aging, or mechanical distortion in those soft casings the electrolyte will flow between cells: Game Over.



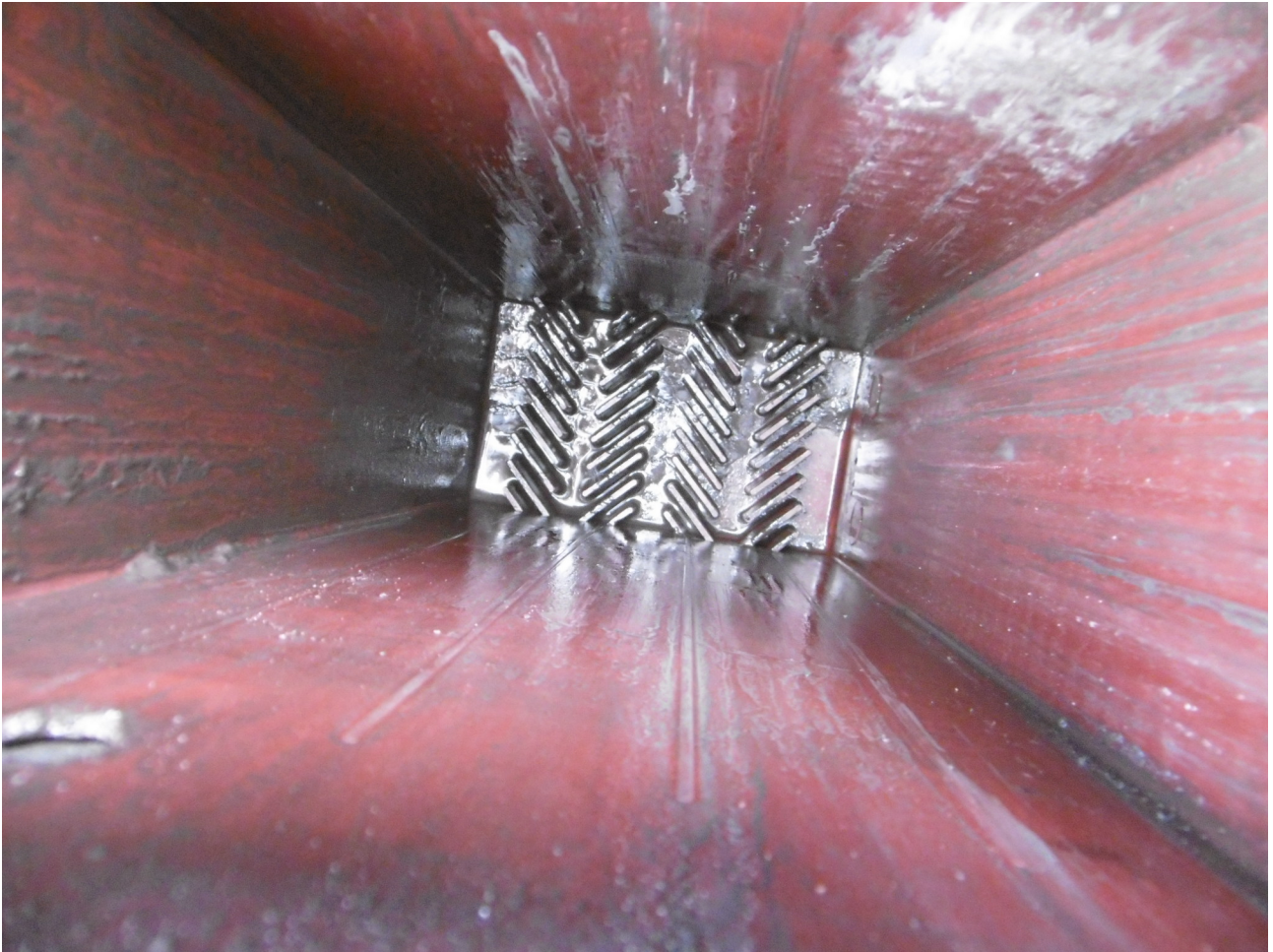


The anode plates disintegrate because the connecting frame is too weak. That explains why it seems impossible to balance the cells, some parts of the plates are simply not connected. The silvery looking cathodes are in a reasonable state, the reddish anodes are just falling apart, with the anode frames partially fractured.



Note that there is hardly any shedded plate material in the reservoir below the cells. It's not shedded material shorting the underside of the cells, as it

happens in old and well taxed batteries. The bulging sides of the soft cases initially made me think that excessive shedding, combined with bad water, caused the rapid failure. The poor mechanical properties of the cases and the hanging plate frames cause fracture of the plates, accelerating the 'Death of a Trojan'.



Conclusion:

Trojan batteries are unsafe, prone to fail due to poor design.
Keep clear of Trojan products.

73 de Stefan Ei4KU