

# Patented Pulse Technology

Today's vehicles and equipment are more technologically advanced, yet they still rely on basically the same lead-acid battery technology developed almost 100 years ago.

There is actually enough reactive material in lead-acid batteries to keep them operating reliably for eight to 10 years or more, but they don't. The average life of a battery, depending on usage, is 6 to 48 months but, according to a recent study, only 30% of all batteries actually reach the 48-month point.

The primary reason for battery failure is a series of problems caused by sulfation buildup on the battery plates.

Our patented high-frequency pulse technology works to actually reduce the buildup of sulfation on the battery plates resulting in the battery working at peak efficiency.

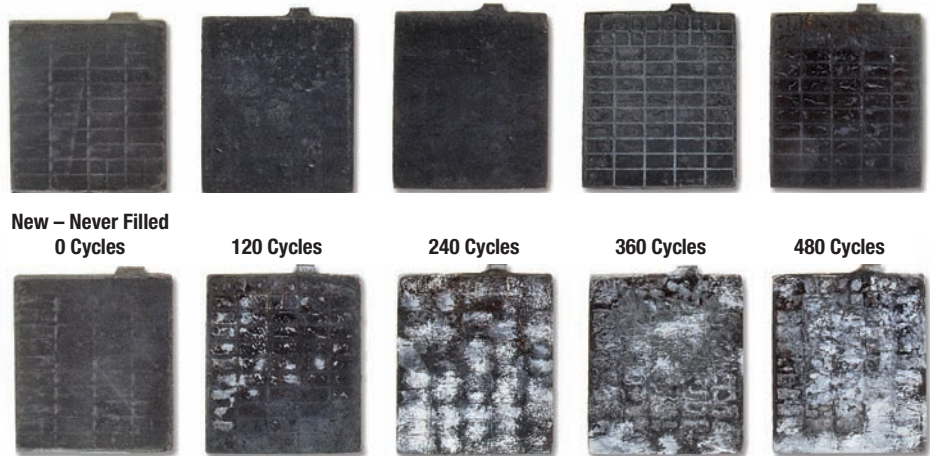
For over a decade the U. S. military has been using our patented pulse products on their vehicles and equipment all over the world!

## Visual Proof of the Benefits of Our Pulse Technology

The pictures shown are from an independent study comparing pulse technology to conventional charging. Photos are actual battery plates after various charge and discharge cycles, which reveal the benefits of pulsing and charging versus charging alone.

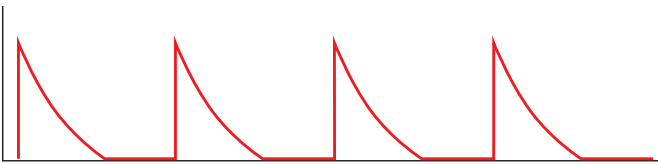
The top row shows plates from actual batteries charged with the Xtreme Charge®. The second row shows plates from batteries charged with a competitor's conventional charger.

Even after hundreds of cycles, the batteries charged with the Xtreme Charge have no sulfate accumulation, ensuring that the batteries will still perform at their maximum peak capacity.



## Pulse Waveforms

### PulseTech's Patented Pulse Waveform



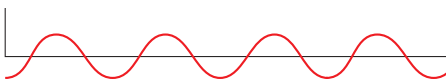
With the proper training and use, our test, charge and maintenance products have consistently achieved a 70-80% reduction in battery consumption. PulseTech's patented waveform is simply the most effective method to remove damaging battery sulfation and to enhance battery performance available today!

Our **patented**, high-frequency pulse waveform is precisely controlled by microprocessors and is of a specific amplitude and frequency. It rapidly rises in less than one microsecond to its maximum amplitude and gradually returns to zero. There is no abrupt stop and no battery drain. Make no mistake – our patented conditioning process is NOT pulse charging or a burst of high voltage provided within the charging regimen! Instead, the low-voltage, high-frequency conditioning pulse is introduced into the battery via a separate circuit independent of the charging circuit. This precisely-controlled waveform has proven to be the **best at removing sulfation from the battery plates and returning lead sulfate back to the electrolyte solution.**

### Compare Typical Competitors' "Pulse" Waves

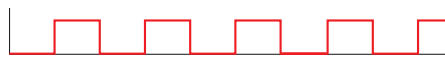
Other chargers using *pulsing* technology traditionally use one of 3 pulses: Sine, Square and Negative Pulse waves. There are significant problems associated with each type of wave:

#### Sine Pulse Wave



This wave fluctuates gradually between positive and negative charge. This pulse is too "soft" to affect the crystal growth. In addition, the upper voltage limit must be carefully controlled to prevent overcharging and gassing the battery.

#### Square Pulse Wave



The square pulse has a relatively long dwell time at maximum voltage and is limited in effect because the voltage at the top of the wave must be limited for the safety during charging.

#### Negative Pulse Wave



This wave has similar limitations to the square wave pulse plus the added concern that the charge is restricted during the down cycle of the pulse, which has a negative impact on charging.