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SUMMARY OF RESULTS

OF THE RESEARCH ABOUT THE EFFECTS OF PULSED SIGNALS WITH THE MEGAPULSE – ANTI SULFATION SYSTEM ON LEAD ACCUMULATORS.

The research has been conducted using 12 volt starter batteries with grid plates (different alloy types). Test carriers were old batteries from the automotive industry with capacity between 20-120 amps.

The test carriers where analyzed and according to the criteria listed below classed in 2 categories. Accumulator with short circuited cells were generally not accepted.

Category 1: Medium damage with a rest capacity > 40% and a measured cold start current > 75%

Category 2: Severe damage with a measured rest capacity in the range of 20% to 40% and a measured cold start capacity > 50%

The research has been conducted on a statistically representable amount of test batteries, approximately 80 batteries. During the tests, approximately 10.000 different data have been collected from the test batteries. All test batteries have been taken from the recycling chain.

TESTING:
The test batteries were connected to the MEGAPULSE .
For the function of the MAGAPULSE necessary energy is directly taken from the battery which is to be pulsed. At the lower scale of the limited current, the MEGAPULSE (12.8volts as per manual) capacity is 0.08 amps. To achieve a adequate amount of energy, this current is fed additionally into the battery via a external source.

Duration on the test batteries was 15 days. Following the programme, the test batteries were charged with a conventional battery charger.

Researched were the changes of the electric and chemical parameters before and after as well as during the charging process. 48 hours after completing the charging process, the parameters were taken again to establish the results of the stationary condition.

RESULTS:
Following the use of the MEGAPLUSE on 12 volt batteries in both categories, a significant increase of the electric and chemical parameter has shown.

Discussion Category 1, medium damage:
The time related increase of the cold start parameters is linear, which means the relevant data increase during this period equally. After finishing the 15 day pulsing, the result was already 84.7% which means the battery is classed as de-sulfatised and fully useable. The active mass on the test batteries is able to take charging again. Following charging (a further decrease in the sulfate layer), is the value 97% of a new battery.
The increase in capacity during the pulse process is statistically an average 15%. The following charging process increased the capacity to 87.5 % of the parameters of a new battery.

Discussion Category 2, severy damage:
The changes of the cold start parameters on the test batteries is to be differentiated in 2 areas. First, a linear increase of the parameters has shown over the first ten days ,after that, an exponent increase. The following data are basically identical to Category 1.

This shows that with severe damage, the effect of pulsing from a time related perspective effects a swelling value. From an electro/chemical view, in this phase the hard to loosen lead sulfate layer is loosened locally. This is caused by an increase of the internal acid density caused by the device emitted electric pulse and the following possibility to equalize the internal/external acid density in the static phases which are generated by the device.

The tuning of the parameter on the MEGAPULSE is selected so that an efficient reduction in the sulfate layer is achieved while being easy on the battery at the same time. The described process causes therefore a reduction in the difficult to dissolve, large cristalized lead sulfate layers into its initial composure (electrolyte and plate material – active mass) and enables subsequent charging of the battery.

The behaviour of the capacity is basically similar to the process described in Category 1. The difference is, that in the following charging process absorbed energy in the test batteries of Category 2 is significantly higher than on the ones in category 1. This is explained to the deeper discharge on the more severe damaged batteries to the batteries with only medium damage.

In closure, it can be said that in all with the MEGAPULSE pulsed batteries the ability to be recharged has been re-achieved.

The duration of the increased capacity by pulsing the battery with MAGAPULSE is dependent on the grade of damage the battery has sustained. On the test batteries (scrap batteries) was a duration of 7 days in category 1 and 14 days in category 2 necessary to achieve function and recharge capability. Research to determine the relevant durations on serviceable car batteries is currently in progress.
The efficiency of the MEGAPULSE – process can be seen on the net-increase in capacity and cold start current (see table)

The especially careful treatment by the MEGAPULSE of the batteries has shown from the fact that 86% of the tested scrap batteries have regained their function.
97% of the batteries in category 1 and 75% of the batteries in category 2 are following completion of the MEGAPULSE process again in accordance with the parameter they were originally intended to i.e. the batteries could be used again without limitations in automotive applications.

Date and Signature

Attachment 1 Table of measured results:

MEGAPULSE CATEGORY 1 (medium damage)

% values in relation to % of new accumulator

	Before	After	Total (pulsing and charging)
Capacity:	61.6%	78.7%	87.5%
Cold Start Current:	77.3%	84.7%	97.0%

Increase in % before and after pulsing

Capacity:	0 %	34.3%	50.5 %
Cold Start Current:	0%	13.6%	30.5 %

MEGAPULSE CATEGORY 2 (severe damage)

% values in relation to % of new accumulator

Capacity:	36%	53.8%	59.0%
Cold Start Current:	50.2%	68%	77.8%

Increase in % before and after pulsing

Capacity:	0 %	62.6 %	82.8 %
Cold Start Capacity:	0 %	38.9 %	60.9 %

GRAPHS:

MEGAPULSE 1: Average increase of capacity in percent related to batteries before Pulsing with MEGAPULSE.

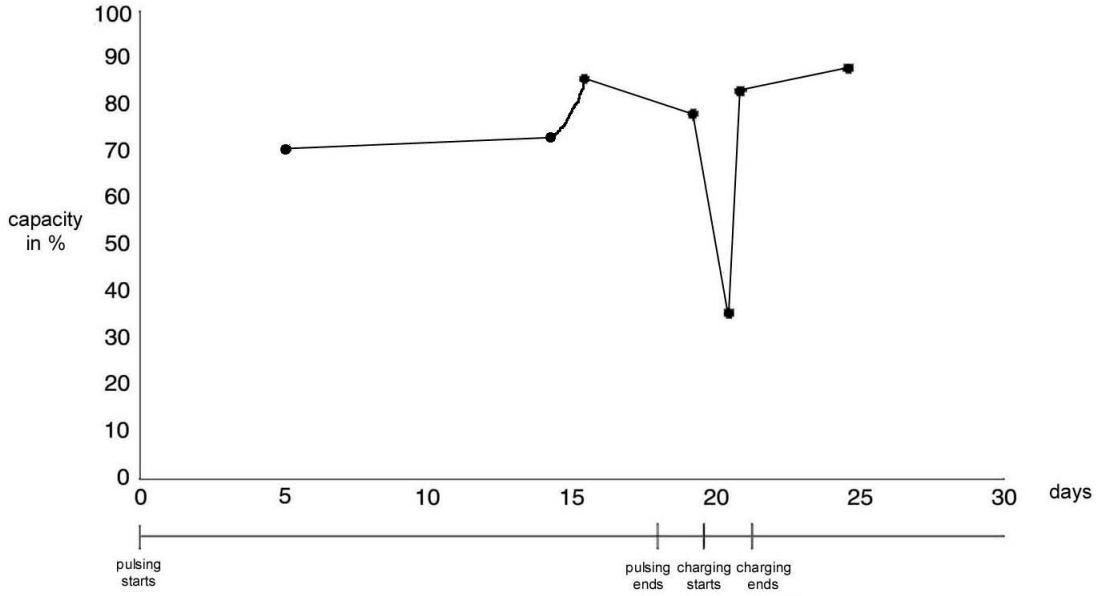
Vertical : Capacity in %
Horizontal: Duration of pulsing and subsequent charging.

MEGAPULSE 1: Average increase of capacity in percent related to new accumulator.

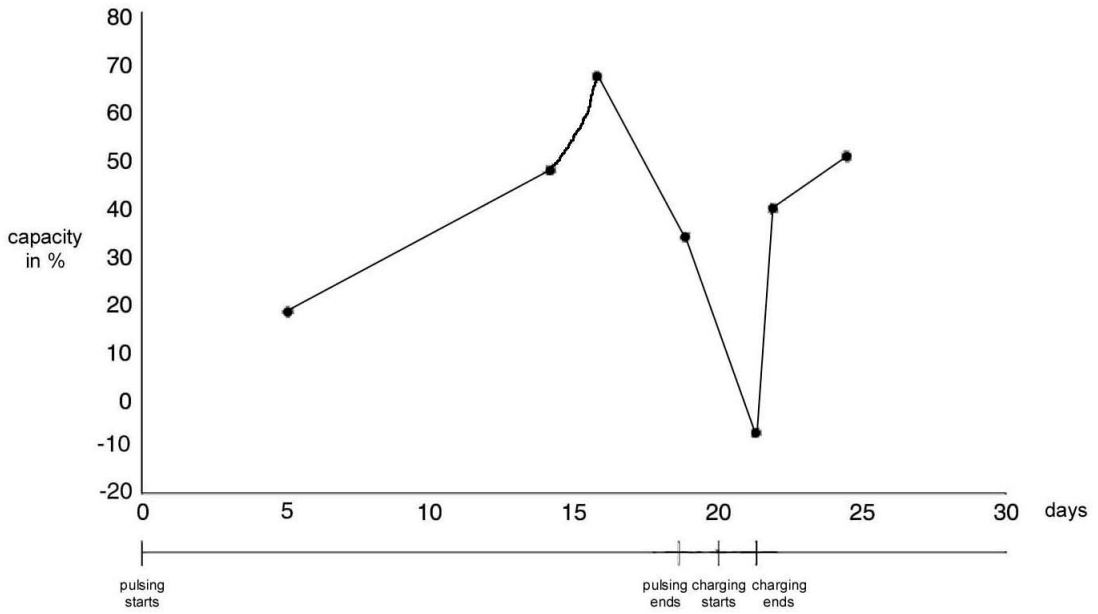
Vertical: Capacity in %
Horizontal: Duration of pulsing and subsequent charging

MEGAPULSE 2 GRAPHS: SAME AS MEGAPULSE 1.

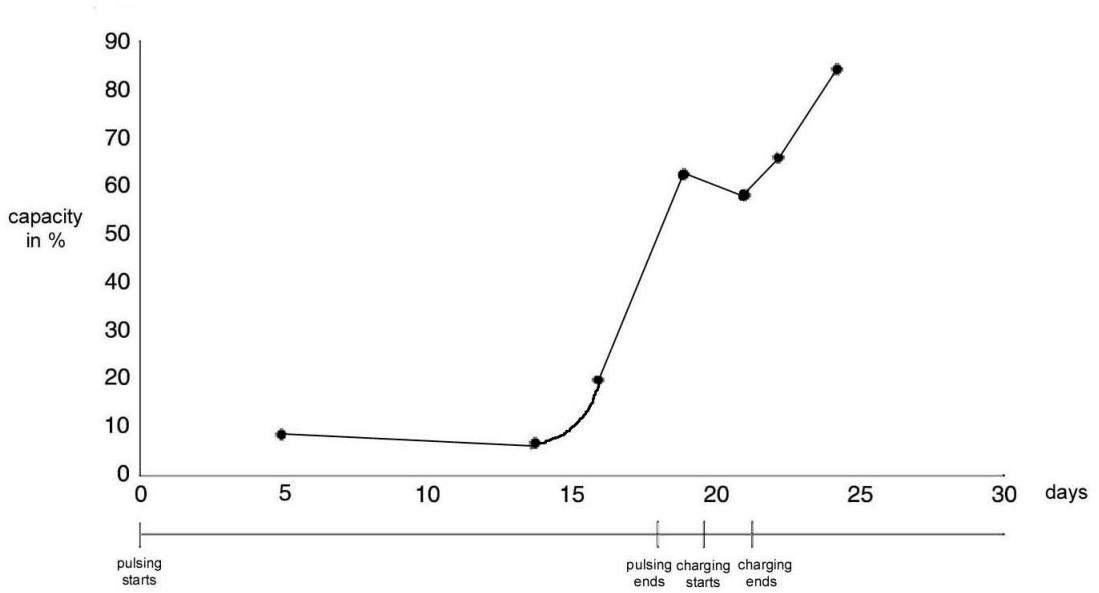
MEGAPULSE 1 - AVERAGE INCREASE OF CAPACITY IN % RELATED TO BATTERIES BEFORE PULSING WITH MEGAPULSE



MEGAPULSE 1 - AVERAGE INCREASE OF CAPACITY IN % RELATED TO NEW ACCUMULATOR



MEGAPULSE 2 - AVERAGE INCREASE OF CAPACITY IN % RELATED TONEW ACCUMULATOR



MEGAPULSE 2 - AVERAGE INCREASE OF CAPACITY IN % RELATED TO BATTERIES BEFORE PULSING WITH MEGAPULSE