

Defensie Materieel Organisatie



# Survey Starter batteries

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Some changes made by EnerSys for US audience

# Problem:

**High attrition rate of 110 Ah  
vented lead acid battery**

# Vented Lead Acid Battery

9,000 units were returned to battery workshop each year

6,000 of the above number of units could not be recovered and needed to be replaced each year

**An extraordinary amount of batteries are failing each year ! ! ! !**

# Causing:

- Vehicles not available for use
- Extreme gassing when there is a defect with the battery charger, possibly causing explosions
- Extra labour costs, defective batteries need to be replaced
- The MOD has to purchase each year 6,000 batteries to replace the scrapped ones  
Cost up to €950,000 per annum

Total \$1.5 million, \$250 for vented battery

# Why such a high attrition rate?

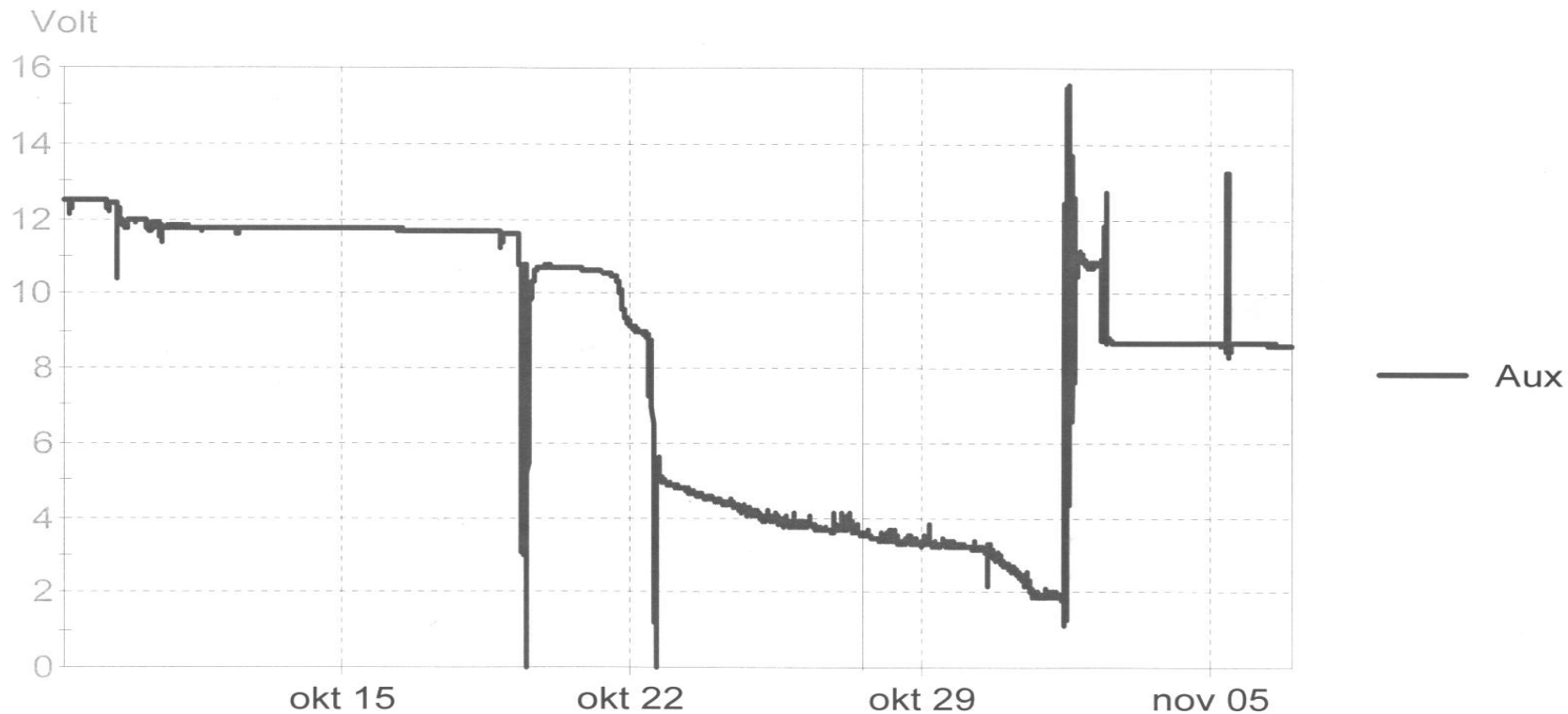
Army vehicle battery applications are different!

# What's different in the army?

- Tracked vehicles (extreme vibrations and deep discharged batteries due to long silent watch periods)
- Batteries are often discharged down to 9 volts and there is always limited time for recharging.
- Result: Severely undercharged batteries

# Example of a deep discharged battery in YPR (Dutch Army Vehicle)

YPR KY-60-38 opnemer 2



Name:MYNAME

S/N:192

AD:1 Type:00U0



# New test procedures and specifications required for:

- Extreme vibration resistance
- Fast recharge times
- Deep discharge recovery (volts  $< 9$  V)



# Comparisson tests carried out using:

Brand A	Vented	110 Ah
Brand B	Vented	125 Ah
Brand C	Vented	110 Ah
Hawker Armasafe	AGM/Sealed	120 Ah

# Deep discharge test

- A 14 days load with 1 Ohm resistor
- Then 14 days no load
- Then attempt to recharge the battery

# Results of the test

<u>Brand</u>	Residual capacity in % after test
Brand A	83
Brand B	89
Brand C	8
Hawker Armasafe	95

# Conclusions:

- Deep discharge test must be part of battery specification
- We need to carry out a field test to compare vented batteries to Hawker Armasafe Batteries (AGM/sealed)

# Results of Field test

April '03 - November '04

	Put in service	Returned	Defective
Vented	200	92 (46%)	59 (30%)
Hawker	200	46 (23%)	2 (1%)

There was not a concerted effort to recover the 2 defective Hawker batteries, since the number was so low

# Advantages of sealed batteries type:

- Little gassing
- Reliable, long design life
- Very low self discharge
- No maintenance
- Air transportable

# Disadvantages of sealed batteries:

- 1.5 up to 2 times more expensive in comparison to vented lead acid batteries

# Upgrading existing Battery chargers:

A new Battery Conditioner  
Charger was developed.

The principles of the Conditioner Charger are all included in the Technical Bulletin issued by TACOM for recovery of Hawker Armasafe Plus batteries



# Specifications Battery Reconditioner Charger

- Recover sulphated batteries
- Testing the recovered batteries
- Suitable for use with all types of sealed batteries (AGM)
- User friendly

# Process reconditioner:

- De-sulphating (max. 36 hours)
- Discharge (max. 20 hours)
- Charge (max. 25 hours)
- Measure capacity (20 hours)
- Charging (25 hours)

# Results through the use of newly developed Battery Reconditioner:

60% of the reconditioned batteries have a minimum of 90% capacity of the original C20 Capacity

# Number of sealed batteries put into service:

From early 2005 up to July '07 13.000  
HAWKER ARMASAFE batteries have  
been put into service.

# Period Apr '07 - Dec '07:

750 HAWKER ARMASAFE batteries were returned to the battery workshop.

Through the CTM-reconditioner 576 batteries were successfully recovered

The remaining 174 batteries were deemed unusable because they had remained in a deep discharged state for an unknown long period. In the US, EnerSys has been able to recover batteries discharged to 4V and stored for up to 6 months,

# Expectations Dutch MOD:

The attrition rate when using HAWKER batteries instead of the vented batteries will be reduced by a factor 10

The number of batteries that need to be replaced in a given period will be reduced by a factor 20

Predicted cost saving: € 750,000 per annum (exclusive cost for labour)

The predicted cost savings are \$1.2 million at 1.6 \$/€