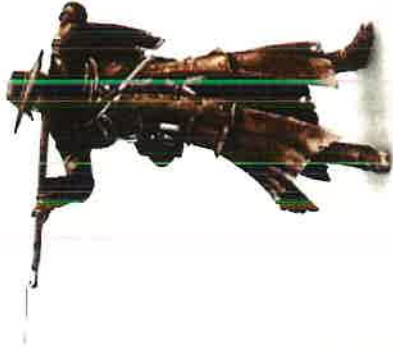


The  
Battery Assassins  
Who or what kills all  
types of batteries?



There are four commonly accepted battery assassins



**Overcharge**  
(Olly)

**Undercharge**  
(Udi)

**High Temperature**  
(Hannibal)

**Vibration**  
(Vladimir)



The four battery assassins are all able to be discovered by:

- Analysis of an external test
- An internal examination of the battery.



Armed with this information it is possible to identify:

- Manufacturing faults
- Misapplication
- Faulty or abusive operating conditions

The majority of issues can be arrested and cause no further harm into the future.





This presentation will principally feature internal examination and its relationship to the operating environment.



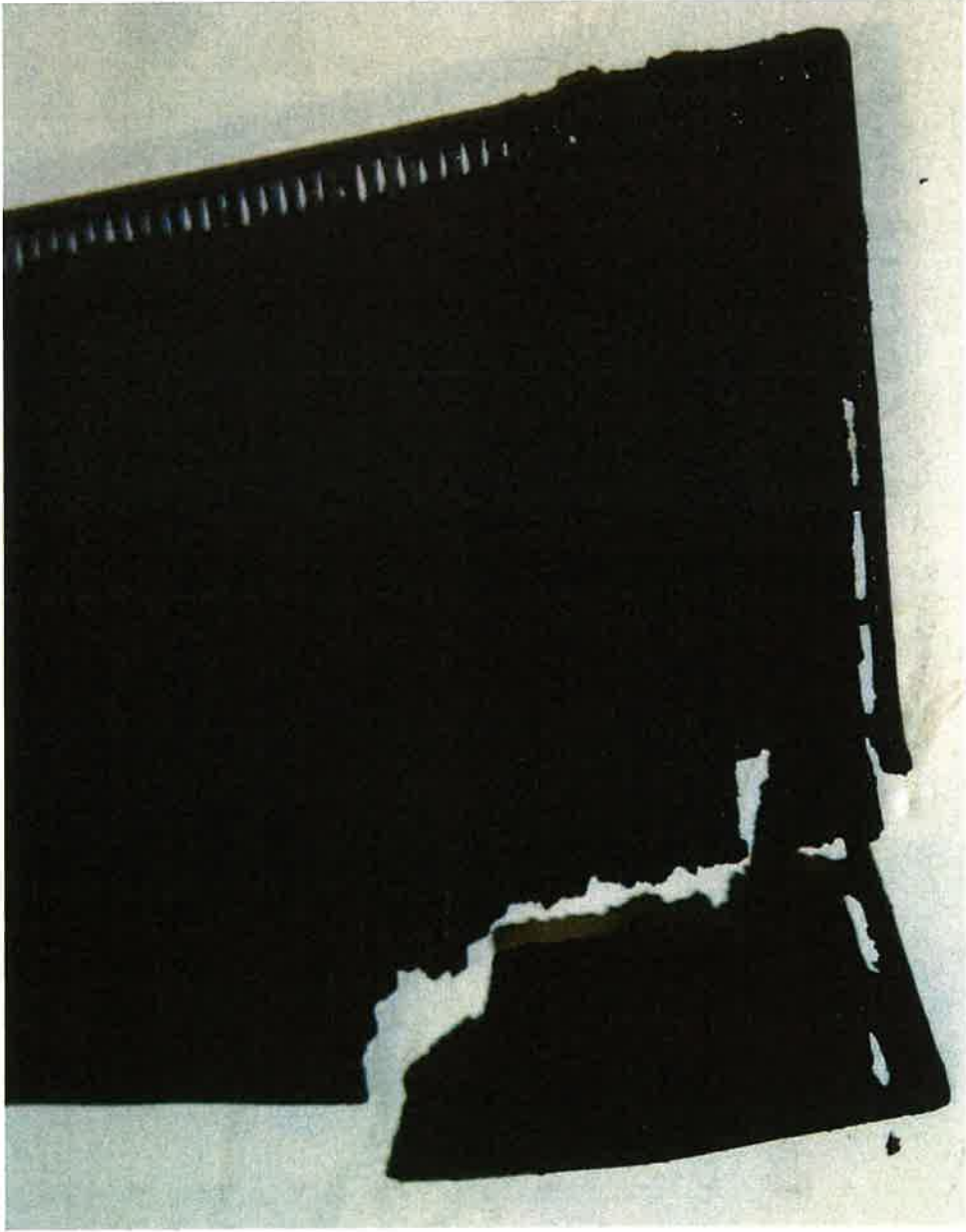
## OVERCHARGE

### *Evidence*

- Easily broken positive plates when subjected to a mild bend test.
- Grid wires severely corroded (or non-existent), brittle grid frames.
- Excessive water loss or dry-out.



# OVERCHARGE



## OVERCHARGE

### *Common causes*

- A faulty voltage regulator.
- Unsuitable external battery charger or its incorrect operation.



### *Prevention*

- Replace or repair regulator, check output voltage is correct.
- Check charger is suitable for the battery size and type.
- Review operation for current, time, maximum voltage on charge.





## UNDERCHARGE

### *Evidence*

- Hard light brown positive plates
- Light coloured negative plates
- White deposits on separators



# UNDERCHARGE



## UNDERCHARGE

### *Common Causes*

- Low alternator output or low regulator control voltage
- Insufficient running time to restore charge
- Alternator too small to support all vehicle loads
- Prolonged periods of idleness without refreshing charge

### *Prevention*

- Check charging system
- Review operation of vehicle, o/night float charging
- Determine all loading, review alternator size and speed
- Establish a maintenance schedule with suitable charger





## HIGH TEMPERATURE

### *Evidence*

- Excessive water-loss
- High tide mark(s) on positive plates
- Shrunken negative material (Lace curtain appearance)
- Shrinkage or curling of separation
- Premature positive grid corrosion with slimy plate surface





# HIGH TEMPERATURE



## HIGH TEMPERATURE

### *Common Causes*

- Radiation from exhaust systems
- Charge voltage too high with high discharges on a regular basis
- Lack of ventilation around battery
- Excessive boost charging

### *Prevention*

- Move battery or fit a heat shield between source and battery
- Review charging conditions and battery size improve ventilation
- Improve position, could add a fan
- Use correct boost charging



## VIBRATION

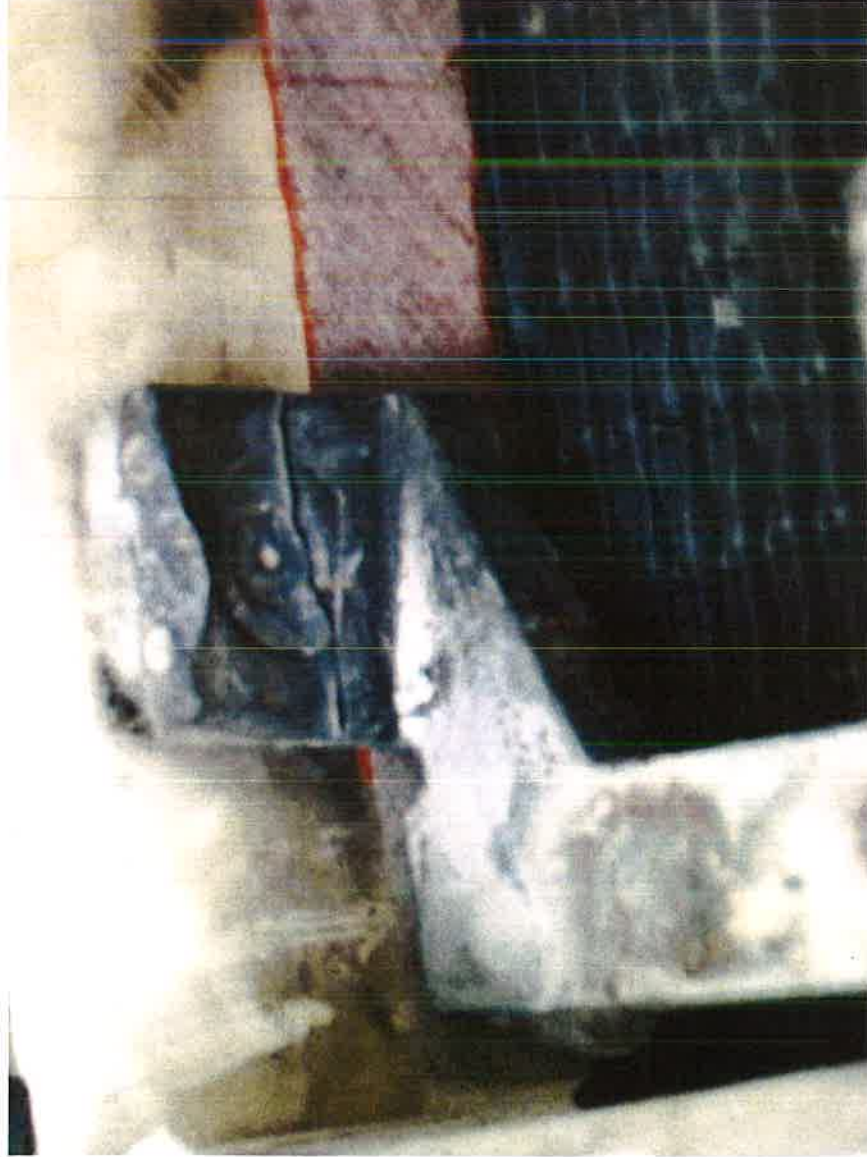
### *Evidence*

- Broken plate straps or interconnects
- Cracked cases
- Acid leakage on underside of battery
- Positive material shedding as individual whole pellets
- Plates with broken or compressed lower portions





# VIBRATION





## VIBRATION

### *Common Causes*

There are two prevalent types of “vibration”:

- Gross shock loading, intermittent but large G force
- Higher frequency vibration, sustained but much lower G force

### *Prevention*

- Ensure the battery carrier cannot flex or flap
- Fit a vibration absorbent mat under the battery
- Hold-downs must be secure with pads against the battery
- Choose a battery type that has anti-vibration features
- Avoid shock loads wherever possible

**Note: if internal straps or interconnects break or fracture, a battery explosion may occur.**



# OTHER PLAYERS



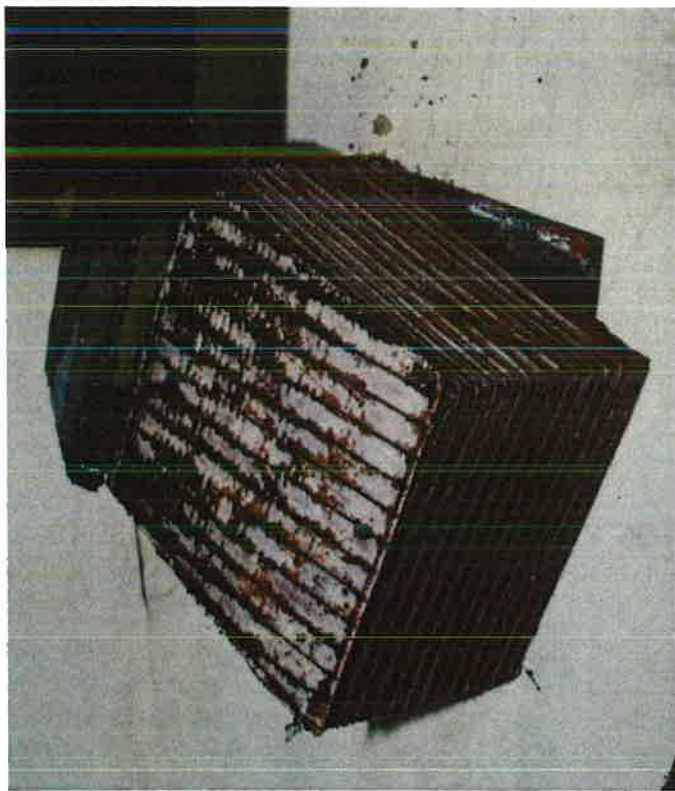
## Self Discharge

All batteries are affected to varying degrees, and lose charge whilst idle. The degree to which this happens depends on a number of factors.

- Faster at higher temperatures
- Leakage through dirt and faulty insulation
- Battery type – e.g. Maintenance Free or Low Maintenance
- Remaining battery life
- Parasitic installation loads



## Self Discharge



### *Evidence*

- White crystallised deposits on separators





## SELF DISCHARGE

### *Prevention*

- By storing in moderate temperatures
- Eliminate dirt and faulty insulation
- Refresh charge at regular intervals
- Factor in parasitic loads for recharging
- Use a recommended type of charger
- Battery type and age should be accounted for



## OVER CYCLING

### *Evidence*

- Partial or full separation of active material from grids
- Excessive sludge found in electrolyte and in bottom of case



## OVER CYCLING (DEEP CYCLE)

### *Prevention*

- Only use batteries specifically designed for this purpose
- Correct amp/hour specification to usage or application
- Batteries to be restored to full charge every 25 cycles
- Try to limit the depth of discharge (DOD) to a maximum 50%
- Keep operation temperature under control, under 50degC



# The MOST COMMON OTHER KILLER





## CYCLING (STARTING BATTERIES)

### *Common Causes*

- Batteries subjected to repetitive cyclic loads
- Original starting batteries left in place when major electric/electronic accessories added
- Tail lifts used in short run delivery vehicles
- Prolonged use of loading lights or beacons at idle or engine off
- High use Electric motors, Fans or Pumps

### *Prevention*

- Use of Full Deep Cycle or AGM batteries
- Fitting of secondary cyclic batteries



# CYCLING (STARTING BATTERIES)



## Summary

**The principal causes of failure can be analysed.**

- The cause(s) can usually be rectified with knowledge and skill
- Follow supplier recommendations for type and size.
- Use correct equipment for testing, charging and handling.
- Observe all safety precautions. Batteries can be dangerous.
- If in doubt, refer to HCB for expert assistance.

**Note:**

**Some of the procedures and equipment used for examinations should be conducted by trained personnel only.**



