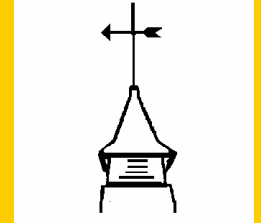


# RAY W.HERRICK LABORATORIES SCHOOL OF MECHANICAL ENGINEERING



PRESENTS



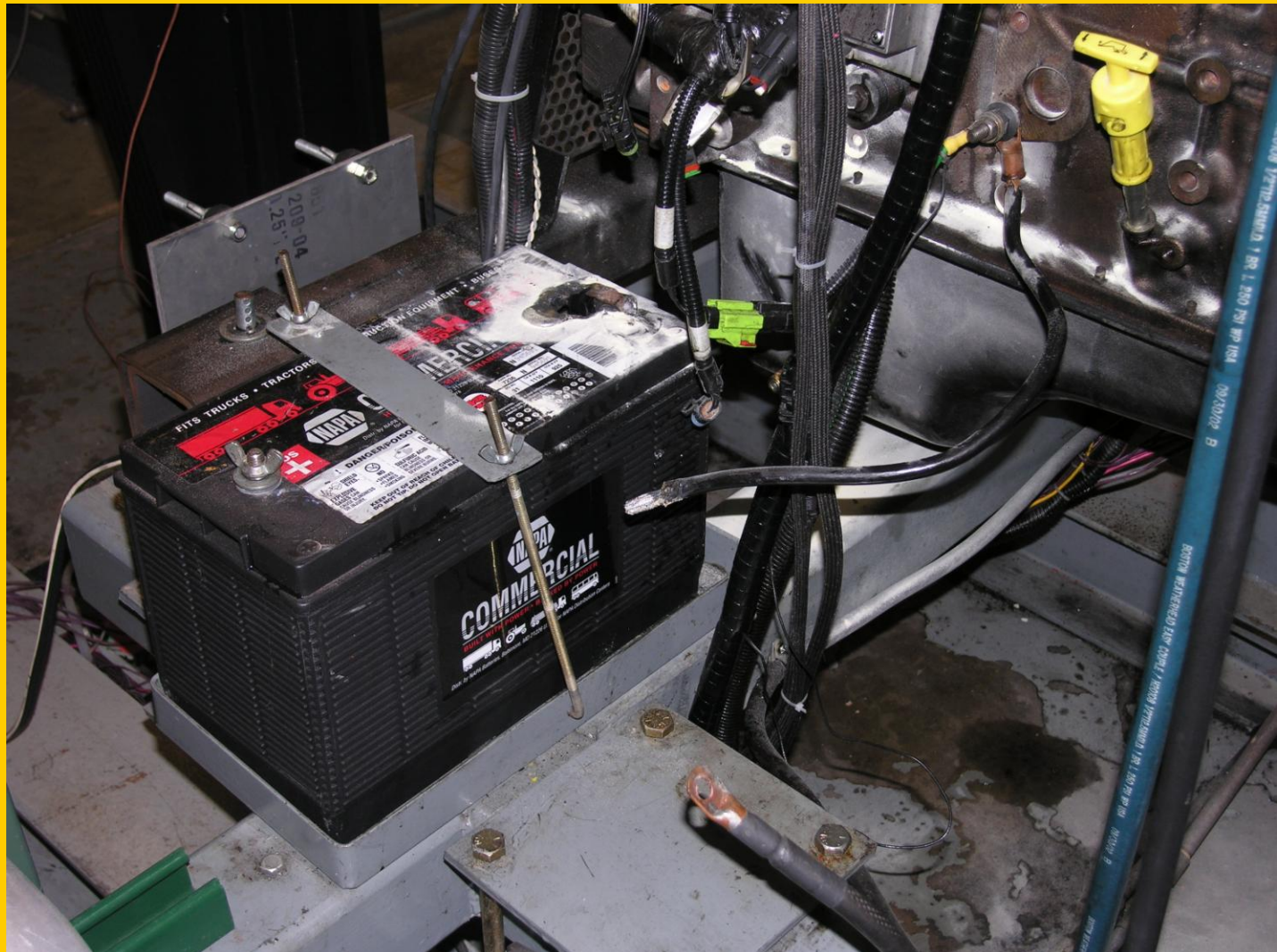
*Student Individual Learning Package*



F.E.Peacock



# Battery Safety



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# Basic Battery Safety

## Lead Acid Storage Batteries

### Hazards of Lead Acid Batteries

- Chemical burns (sulfuric acid)
- Arc flash / burns
- Shock
- Explosive gas (hydrogen)
- Fire
- Weight



INSTALL ON FLYWHEEL

COOPER'S PATENT

391685

WATER PUMP TYPE

SEE IN THE SERVICE MANUAL FOR THE CORRECT WIRE COLOR



# Sulfuric Acid Safety

## PPE requirements

- Safety glasses
  - Rubber gloves
  - Face shield
  - Rubber apron
- (Provide an eyewash within 10 seconds of battery charging/cleaning areas)

## Hazards

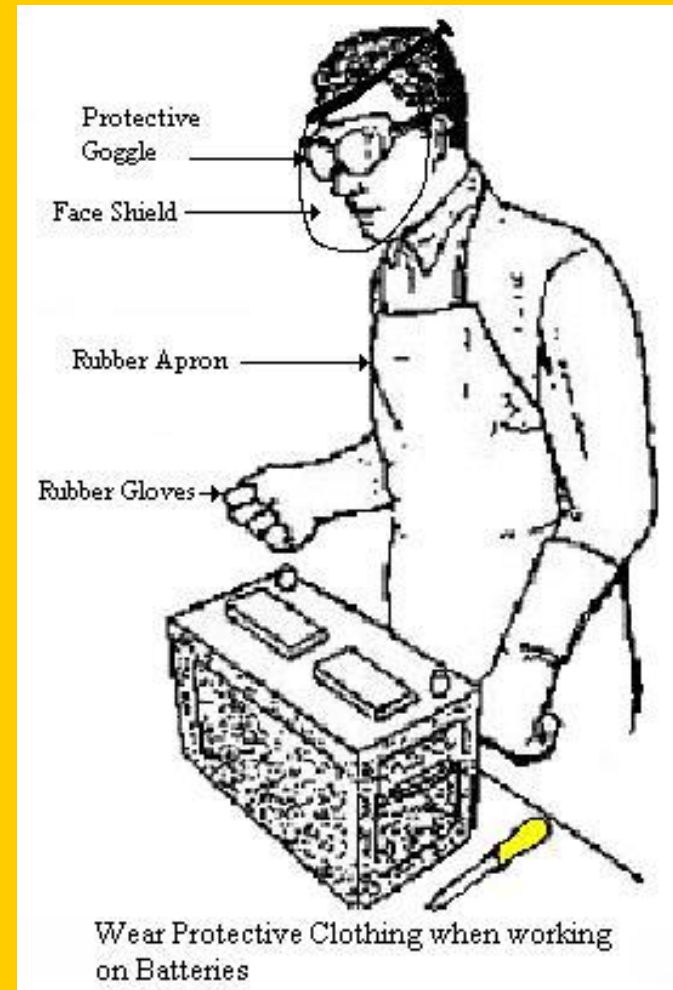
- Ph <7
- Corrosive material
- Burns to skin
- Burns to eyes
- Never open the battery caps with your face directly over the battery



# PROTECTIVE CLOTHING Requirements for Electrolyte Handling

## PPE Requirements:

- Safety Glasses/ goggles
- Rubber Gloves
- Face Shield
- Chemical Apron
- Boots





# Shock / Arc Flash / Burn Safety

- Never touch both battery terminals with your bare hands at the same time!
- Remove rings, watches, and dangling jewelry when working with batteries. The metal in the jewelry can cause shock and/or burn if they contact the battery terminals.
- Only use insulated, non-conducting tools to remove cell caps or when connecting or disconnecting jumpers.
- Never lay tools or other metal parts on top of A Battery





# Electrical Hazard



- Worker lost control of a wrench while working
- Battery Ground was not removed first.
- Event resulted in severe arcing and potential for injury to worker
- Battery could have

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# Hydrogen Safety

- A by-product of the battery's charging/discharging process.
- Lighter than air.
- Flammable in nature.
- Explosive mixture at 4 – 74% by volume of air.
- Can not taste or see the gas vapors.
- You can smell the acid in the battery if it heats up.



# Fire Safety

- Do not smoke in battery charging areas.
- Prevent open flames, sparks, or electric arcs in battery charging areas.
- Charge batteries in a well ventilated area.
- Do not strike the sides of the battery with any spark producing item.
- Keep tools and other metallic objects away from uncovered batteries.
- Have an ABC dry chemical fire extinguisher in charging areas or readily available when servicing a battery.



# Weight / Handling Safety

- Industrial batteries used on board passenger cars are heavy. Example: A truck sized battery weighs over 100lbs
- Use appropriate equipment to load/unload batteries.
- Ensure you are trained in using the loading equipment.
- Ensure the battery is securely fastened down and battery box covers secure prior to movement.
- Do not attempt to catch a battery if it starts to fall.



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# Charging Batteries

- Don't overcharge. This leads to boiling of electrolyte, creating excessive heat and hydrogen gas. Shortens battery life.
- Follow manufacturer's recommended charging voltages, varies by battery type and chemistry.
- Beware the possibility of unregulated charging of batteries when jumping a car from another vehicle.
- NEVER connect different voltage batteries together!
- Assure proper polarity when connecting battery chargers or jumping. Severe damage to equipment or explosion is possible.
- Incorrect polarity can reverse charge a battery.



# Safe Maintenance Practices

- Protect eyes from acid splash when removing cell caps.
- Keep tools and other metallic objects away from uncovered batteries.
- Ensure the battery's water cell levels are maintained.
- Only add water to ***charged batteries.***
- Use baking soda to neutralize spilled acid



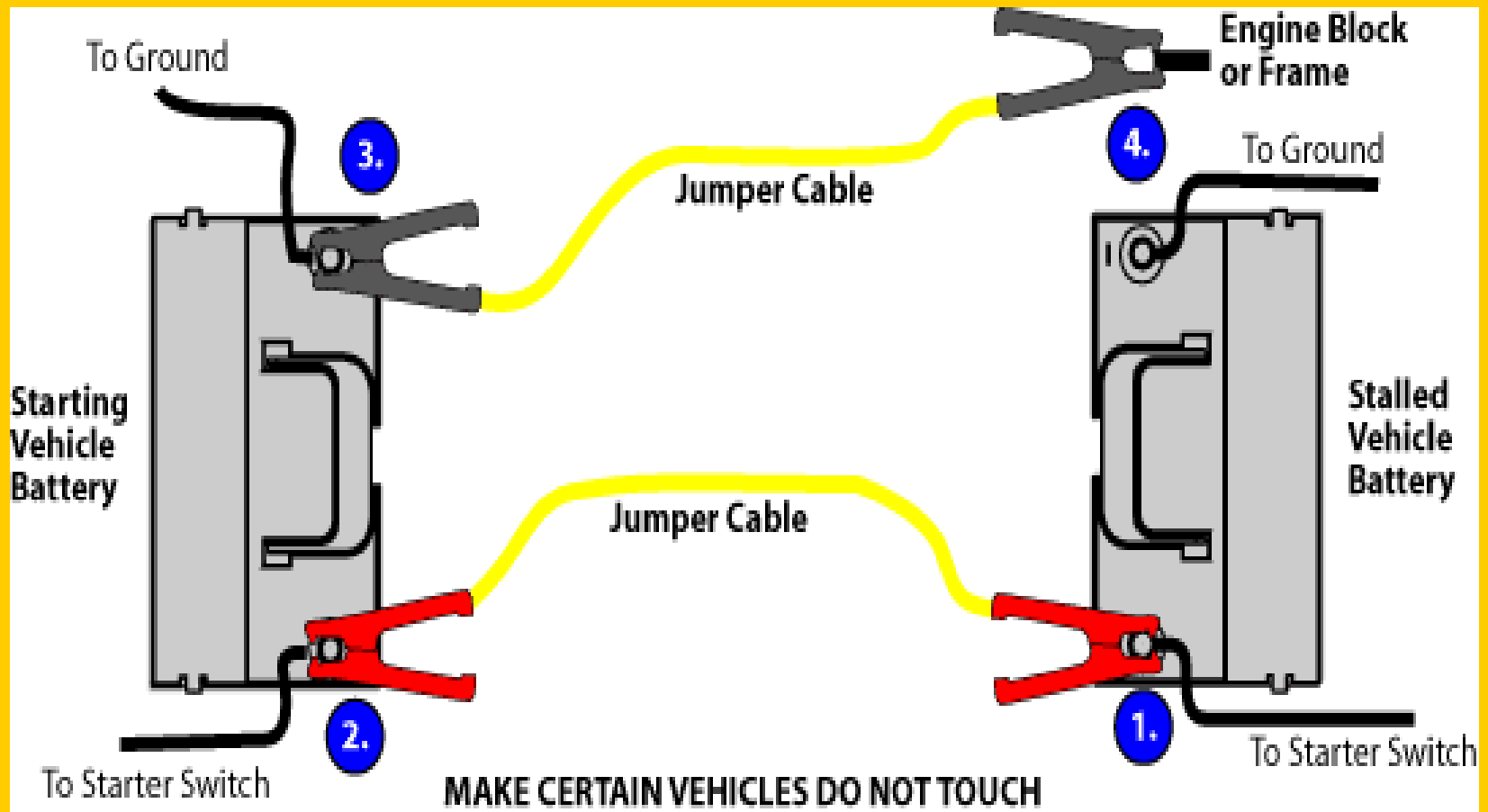
# Maintenance Tips

- Disconnecting leads: Negative (ground ) First.
- Do not leave leads loose on battery can short to other terminals or car body, causing arcing and possible explosion.
- Connecting leads: Positive (hot side) First.
- Assure connections are clean and TIGHT.
- Damage to battery lugs and leads can result when drawing large currents through a loose terminal!
- Do not allow discharged batteries to freeze. Case may crack and cause battery to leak.





# Jumping a Battery





# Battery Jumping Sequence

- Connect positive (+) booster cable to positive (+) terminal of discharged battery.
- Connect other end of positive (+) cable to positive (+) terminal of assisting battery.
- Connect negative (-) cable to negative (-) terminal of assisting battery.
- **MAKE FINAL CONNECTION OF NEGATIVE (-) CABLE TO ENGINE BLOCK OF STALLED VEHICLE, AWAY FROM BATTERY.**
- Start vehicle and remove cables in **REVERSE** order of connections.



# Quick Recap

- Know the hazards.
- Use the required PPE.
- No open flame.
- Follow manufacturer's instructions.
- Keep them clean.
- Keep them charged.
- Keep them watered.