

# LAB – Battery Service

Students: 1. \_\_\_\_\_  
 2. \_\_\_\_\_  
 3. \_\_\_\_\_



Fill in each box with the appropriate information.  
 Each team member may need to answer questions to receive credit for this lab.  
 STOP when it says STOP - this is to ensure everything is done SAFE and CORRECT



## LAB CREDITS

ALL BATTERIES: 1 LAB

## BATTERY IDENTIFICATION

MAKE:		Model/Part#:		Cold Cranking Amps (CCA):	
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## SAFETY

**DO NOT REMOVE THE BATTERY YET**



- Your safety is important.
- Always wear eye protection – acid will burn!
- Where is the closest emergency eyewash?

ANSWER:

- Batteries provide more current than most welding machines
- Batteries give off **HYDROGEN**
- **Avoid ALL SPARKS**
- **NEVER rest tools on the battery!!**

- **NEVER TRUST CABLE OR CLAMP COLOURS**
- **DISCONNECT NEGATIVE (-) FIRST**
  - Negative will connect **DIRECTLY** to the metal chassis/frame/body
- **RECONNECT NEGATIVE (-) LAST**
- **NEVER CONNECT THE BATTERY BACKWARDS**
  - **VERY EXPENSIVE MISTAKE**

(NOTE: Some old British cars run POSITIVE to ground....)

**STOP!!!**

**INSTRUCTOR'S INITIALS:**

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**DO NOT REMOVE THE BATTERY YET.**

**YOU CANNOT TEST A LOW BATTERY - LET'S CHECK THE STATUS**

**GET and CONNECT THE BATTERY TESTER**

Red Cable to POSITIVE, Black Cable to NEGATIVE. Give the clamps a wiggle to make sure they are biting into the metal.

Read the RIGHT-SIDE GAUGE, in the MIDDLE "CHARGE" BAND. Is the needle in the GREEN?



[Y] [N]



If the battery is not charged, you will need to charge it. See your instructor about charging the battery.

**FOR GIGGLES, GET A VOLTMETER**

Use a VOLTMETER to record the highest voltage between ONE post and the DIRT on the battery (Ideal = none):



**Battery Condition**

\_\_\_\_\_ V

If there is ANY voltage here, this is the voltage that is being drained off through the dirt, with the battery just sitting doing nothing.

Battery top, terminals and clamps free of corrosion? (circle) (*Corrosion is white and powdery – it is also acidic: don't touch it. Ideal = clean*)

What condition is the Battery Hold-Down in? (*Ideal = secure and solid*)

Circle:  
[Secure] [Corroded] [Rusty] [Missing]

*You will find lots of cars with no hold-down at all. This is neither good for the battery (vibration), nor safe in a collision (projectile, sparks, fire, acid). Always run a battery hold down.*

## BATTERY REMOVAL

**TAKE A PICTURE OF HOW THE BATTERY SITS IN THE CAR BEFORE YOU TAKE IT OUT!**

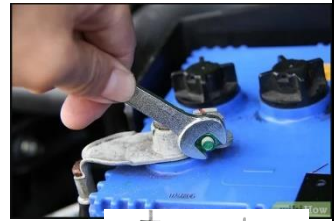
Use a WRENCH to disconnect the NEGATIVE terminal from the battery FIRST

*(if the wrench slips and touches the fender AND the negative post, no "voltage difference," no spark, no problem.)*

Now disconnect the POSITIVE terminal

Now remove the battery hold-down and remove the battery.

Carry the battery to the shop sink for washing (water will not hurt it).



## CLEANING

With the battery in the shop sink, wash thoroughly with a Baking-Soda/Water mix (*Baking Soda neutralizes the acid*). Do not use up ALL the mix. RINSE OFF.

Clean the battery posts with the Bottom of the Battery-Post-Cleaner (*it's like a wire brush on the inside*). Sandpaper or even a wire brush works if that's all you have.



**A Clean Battery is a Happy Battery**

Take the Baking-Soda/Water mix to the car, and clean the Battery terminals, battery hold Down, and battery tray, with the Baking-Soda/Water mix. Clean the inside of the battery clamps with the Battery-Post-Cleaner



*Baking Soda – mix with water*



*Battery Post & Terminal Cleaner*

Side-Post batteries theoretically corrode a lot less. The typical Battery-Post-Cleaner can't really clean these. You can just use a wire brush, or sandpaper.

CLEAN metal connects the best, and 90% of starting problems are a poor connection.



Deal with any rust you find with some sort of primer and paint (*The acid from a leaky battery will eventually eat a hole through the car, just like you see here*).



**INVESTIGATION**

**Cell Condition**

Cell condition is determined by checking SPECIFIC GRAVITY with a BATTERY HYDROMETER

Remove the battery caps (not all batteries allow this – ask your instructor)

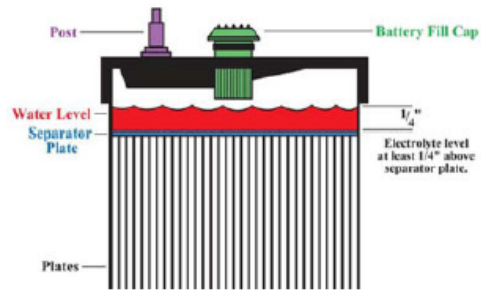
Record the readings below:

Cell #1: \_\_\_\_\_ Cell #4: \_\_\_\_\_  
 Cell #2: \_\_\_\_\_ Cell #5: \_\_\_\_\_  
 Cell #3: \_\_\_\_\_ Cell #6: \_\_\_\_\_

If any cells are low, they should be topped up with DISTILLED water.



100% Charged: 1.280 - 1.260  
 50% Charged: 1.180 - 1.170  
 Dead: 1.070 - 1.080  
 Water: 1.000



**STOP!**

**INSTRUCTOR'S INITIALS:**

**LOAD TESTING**

**CAUTION:**  
 Lead-Acid Batteries generate EXPLOSIVE gasses during normal operation.

**AVOID ALL SOURCES OF SPARKS – MAKE SURE LOAD KNOB IS "OFF" WIGGLE THE CLAMPS to ENSURE GOOD CLAMP CONNECTION**

**PLACE THE LOAD TESTER ON ITS BACK (HORIZONTALLY)**

**RED clamp to POS (+) BLACK clamp to NEG (-)**

Record the No-Load Voltage:

List Battery CCA rating (on Battery Label):

Turn the load knob to HALF the CCA rating and hold for NO MORE THAN 15 SECONDS (you may smell burning) Record the what the VOLTAGE dropped to:



A fully charged battery dropping below 9.6V is a bad battery.

Batteries usually only last 5 years.

**ASSESSMENT**

**A Fully Charged, might not be any good!**

A Good, Fully-Charged battery, should be able to provide half the Cold-Cranking-Amps without dropping below 9.6V.

Does this battery pass?



**STOP!**

**INSTRUCTOR'S INITIALS:**

**REINSTALLATION**

**DO NOT  
DO NOT  
DO NOT  
CONNECT  
BACK-  
WARDS!  
  
(\$\$\$\$\$)**

With the battery location, hold down, and clamps cleaned and ready, place the battery back in the vehicle, facing the right direction.

Reinstall the battery hold-down/clamp.

Connect the **POSITIVE BATTERY CABLE FIRST**, to the **POSITIVE POST**.  
*(Positive usually goes to the starter, negative usually goes to something metal)*

Connect the **NEGATIVE BATTERY CABLE LAST**, to the **NEGATIVE POST**.

Make sure the car still starts.

What are **FOUR THINGS YOU LEARNED?**

What would you **DO DIFFERENTLY** next time?

**STOP!**

**INSTRUCTOR'S INITIALS:**