

# 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
  - DONE THREE TIMES IN THIS SHOP!!***

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

**DISCONNECTING and RECONNECTING BATTERIES CAN BE RISKY**

**KEYFOBS AND SECURITY SYSTEMS CAN "FORGET" REALITY**

**MY WIFE'S INFINITY BRICKED ITSELF DURING AN ORDINARY BATTERY REPLACEMENT (NOT AN OPERATOR ERROR!)**

**CONSIDER USING A BACKUP BATTERY (MEMORY SAVER)**



**STOP!!!** **INSTRUCTOR'S INITIALS:** \_\_\_\_\_

# DO NOT REMOVE THE BATTERY YET

## INSPECTION

Use a VOLTMETER to record the voltage between POS and NEG (A fully charged battery should be 12.6V):



\_\_\_\_\_ V

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

\_\_\_\_\_ V

*World Record in my class: 8V draining through the dirt!*

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

[YES] [NO]

Battery hold down is? (circle) (*Ideal = secure and solid*):

[Secure] [Corroded]  
[Rusty] [Missing]

## CLEANING

## (NOW YOU CAN REMOVE THE BATTERY)

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

A Clean Battery is a Happy Battery

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, and wash thoroughly with a Baking-Soda/Water mix

In the car, clean the Battery terminals, battery hold-down and battery tray with the Baking-Soda/Water mix.

Treat any rust! (*The acid from a leaky battery will eventually eat a hole through the car*). Primer and Paint is best!

I had bought this car →



Battery Carrying Strap



Baking Soda – mix with water



Battery Post & Terminal Cleaner

### BATTERY HOLD-DOWNS

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!*

# INVESTIGATION

Traditionally, car batteries were a "Maintenance Item."

The water in the Hydrosulphuric Acid would evaporate a little bit every day. Over time, the water would need to be "topped up with distilled water."

Today, almost all batteries you get will be "Maintenance Free," which prevent the water from being boiled off and escaping.

## WHAT TYPE DO YOU HAVE?? (CIRCLE)



Maintenance Type  
(Removeable Caps)



Maintenance-Free Type  
(NO Removeable Caps)

Cell  
Condition

*I cannot honestly tell you the last time I even SAW a maintenance-type car battery....*

**If you do NOT have a maintenance-able battery, SKIP this page**

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

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

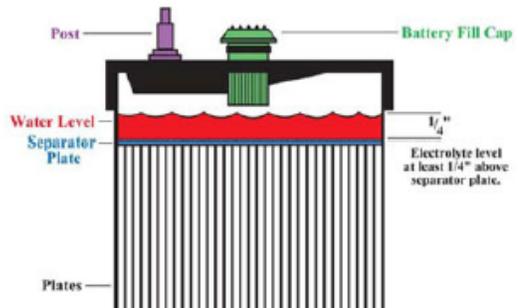


Record the readings below:

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

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

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



**STOP!**

**INSTRUCTOR'S INITIALS:**

# LOAD TESTING

Sure, it might be charged, but is it any good?

**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**



Wellwood's Demo

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

**AVOID ALL SOURCES OF SPARKS - ENSURE GOOD CLAMP CONNECTION**

- Hook up the Batter Load Tester :
  - RED** clamp to **POS (+)**
  - BLACK** clamp to **NEG (-)**
  - the clamps to make sure they bite in

Record the No-Load Voltage:

List Battery CCA rating (on Battery Label):

- Press the **TEST** button for **NO MORE THAN 10 SECONDS** to get a stable reading. This machine **LOADS** the battery (sucks life out of it); **MORE** is **NOT** merrier.
  - SOME** battery testers use a dial to **LOAD** the battery down to **HALF** the **CCA** rating of the battery – do so for **NO MORE THAN 10 SECONDS**

Record load-tested Voltage Reading:  
(We want **NO LOWER THAN 9.6V**)

Record load-tested CCA Reading:

- Does this battery pass?

[ YES ]

[ NO ]



(A **Good**, Fully-Charged battery should be able to provide **HALF** the CCA without dropping **below 9.6V**)

A fully charged battery dropping below 9.6V is a **BAD BATTERY**

Batteries usually only last **FIVE YEARS**

# STOP!

# INSTRUCTOR'S INITIALS:

## REINSTALLATION

Use the internal wire brush of the BATTERY POST CLEANER to clean the posts of your battery.



Use the external wire brush to clean the CABLE CLAMPS on your vehicle.

**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?**

- 1.
- 2.
- 3.
- 4.

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



Wellwood  
BRICKS his wife's  
Infiniti  
\$1065 module  
\$100 Software  
WEEKS of time

**STOP!**

**INSTRUCTOR'S INITIALS:**