

Battery Safety, Servicing & Testing

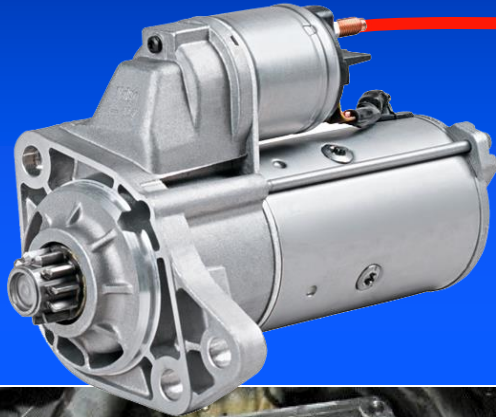


Slideshow Contents

- ✓ battery function & related information
- ✓ safe battery handling procedures
- ✓ battery service
- ✓ battery testing
- ✓ alternator testing
- ✓ how to safely charge a battery
- ✓ jump starting a vehicle

Purpose of the Battery...

- provides the electrical power needed to start the engine
- powers the starter motor and ignition & fuel system



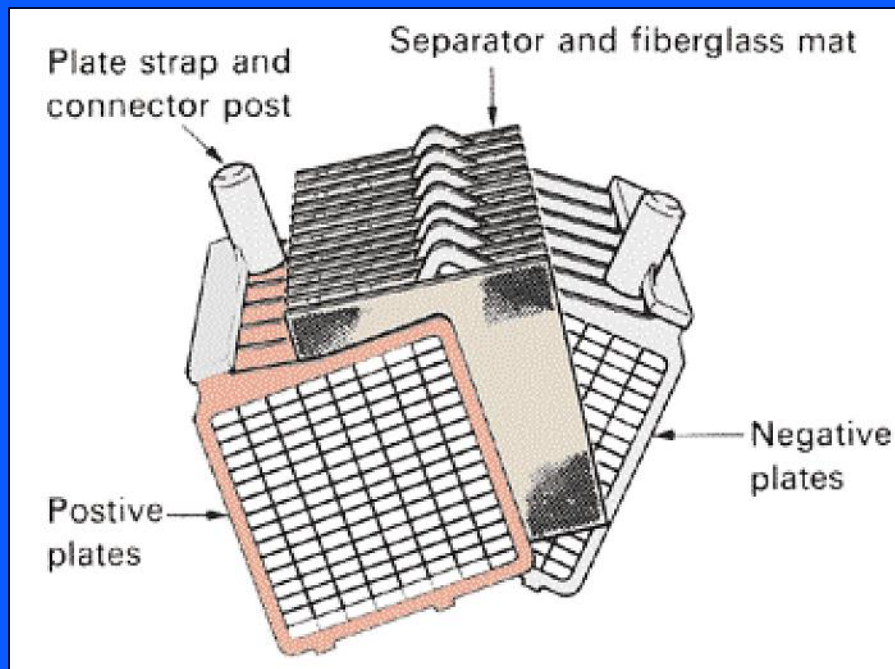
Purpose of the Battery...

- once the engine is running, the **alternator** (generator) provides the electrical energy for the ignition system, computers, lights, radio, horn and other accessories
- alternator converts mechanical energy (belt-driven pulley) to electrical energy



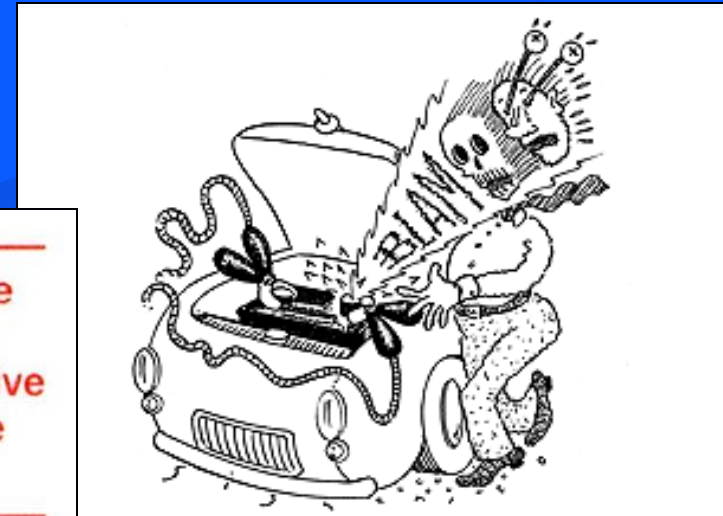
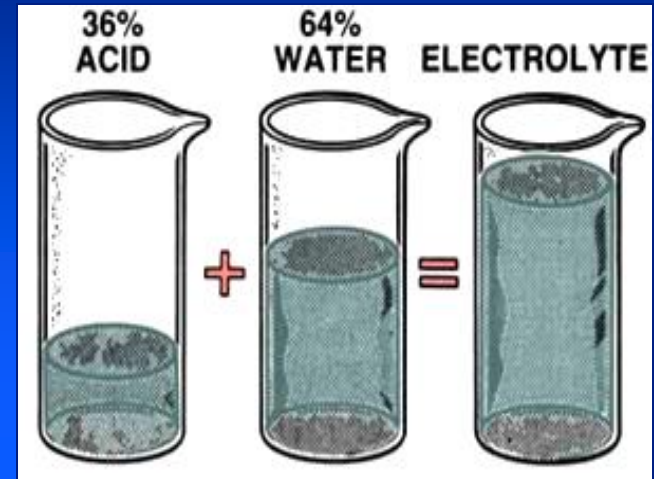
Important info about automotive batteries...

- they convert chemical energy into electrical energy
- they produce 12.6 volts
 - 6 individual cells produce 2.1 volts each
- they cost approximately \$60 to \$120
- battery warranties range from 3 to 6 years
- average battery life expectancy is 3 to 6 years
- battery power is rated in cold cranking amps or CCA's



Battery Safety

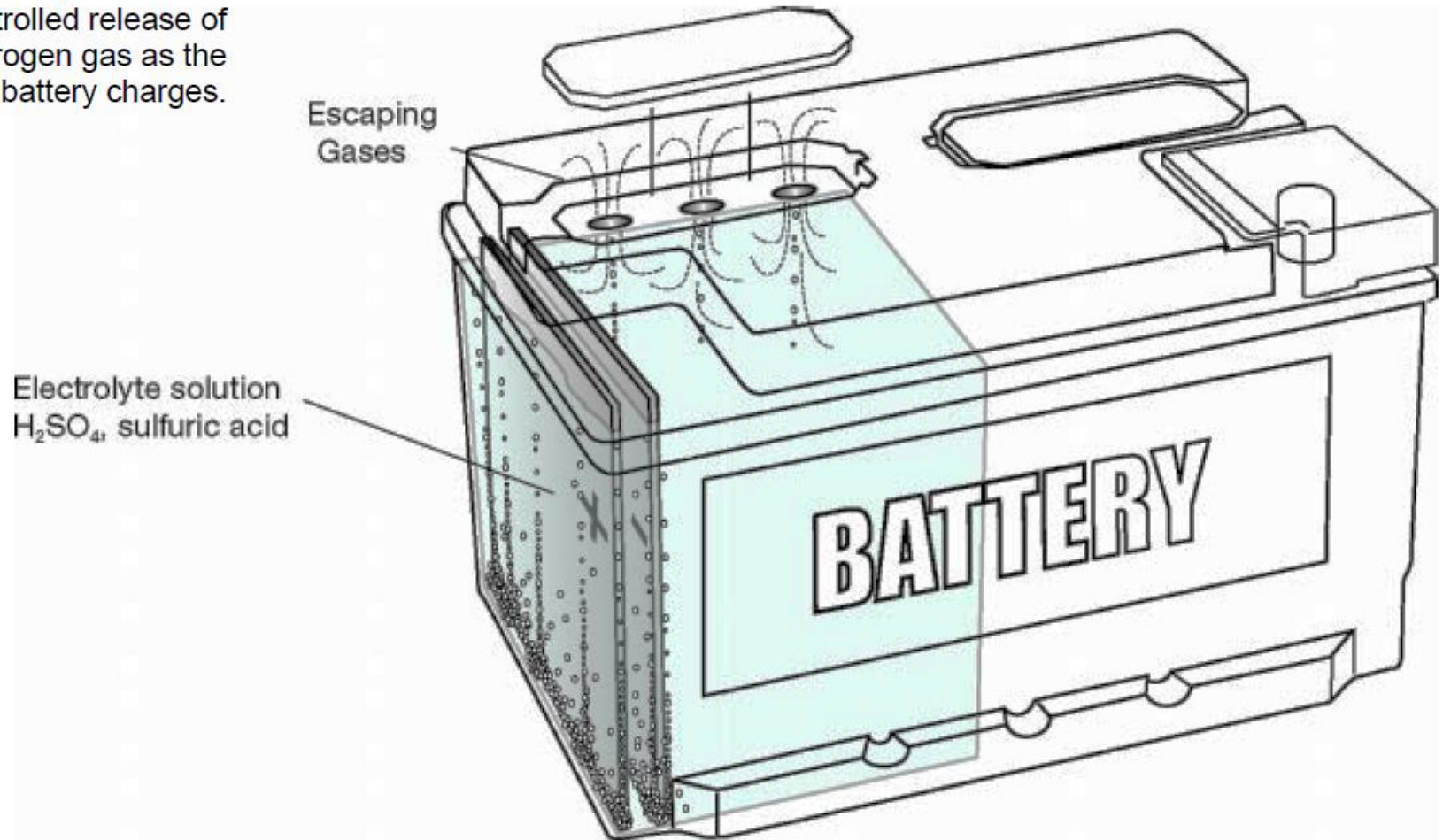
- Batteries contain a liquid called **electrolyte** which contains **sulphuric acid**
- You must be careful not to splash the electrolyte in your eyes or get it on your skin!
- Batteries give off **hydrogen gas**
- Keep sparks & flames away from the battery!!!



Warning: The sulfuric acid in electrolyte can cause severe burns. Avoid contact and wear protective clothing. A battery will sometimes release explosive hydrogen gas as part of its chemical action. Do not smoke or create any sparks or flame near a battery, Figure 16-7.

Battery Vent Caps

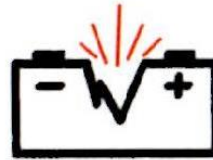
Vent caps allow the controlled release of hydrogen gas as the battery charges.





Caution: Batteries contain Sulfuric Acid which can cause severe burns

Batteries contain sulfuric acid. Avoid contact with skin, eyes, or clothing. In the event of accident, flush with water and call a physician immediately.



Caution: Batteries Produce Explosive Gases

Always shield eyes and face from battery. Cigarettes, flames, or sparks could cause battery to explode. Do not charge or use booster cables or adjust terminal post connections without proper instructions and training.

Figure 16-7. Typical warning label placed on batteries. Use extreme care whenever you are handling or near batteries. Severe burns to skin and eyes, as well as battery explosions are possible.



Battery Service Overview

Visual Inspection

A visual inspection can reveal easy-to-correct problems with the battery and conditions that will require battery replacement.

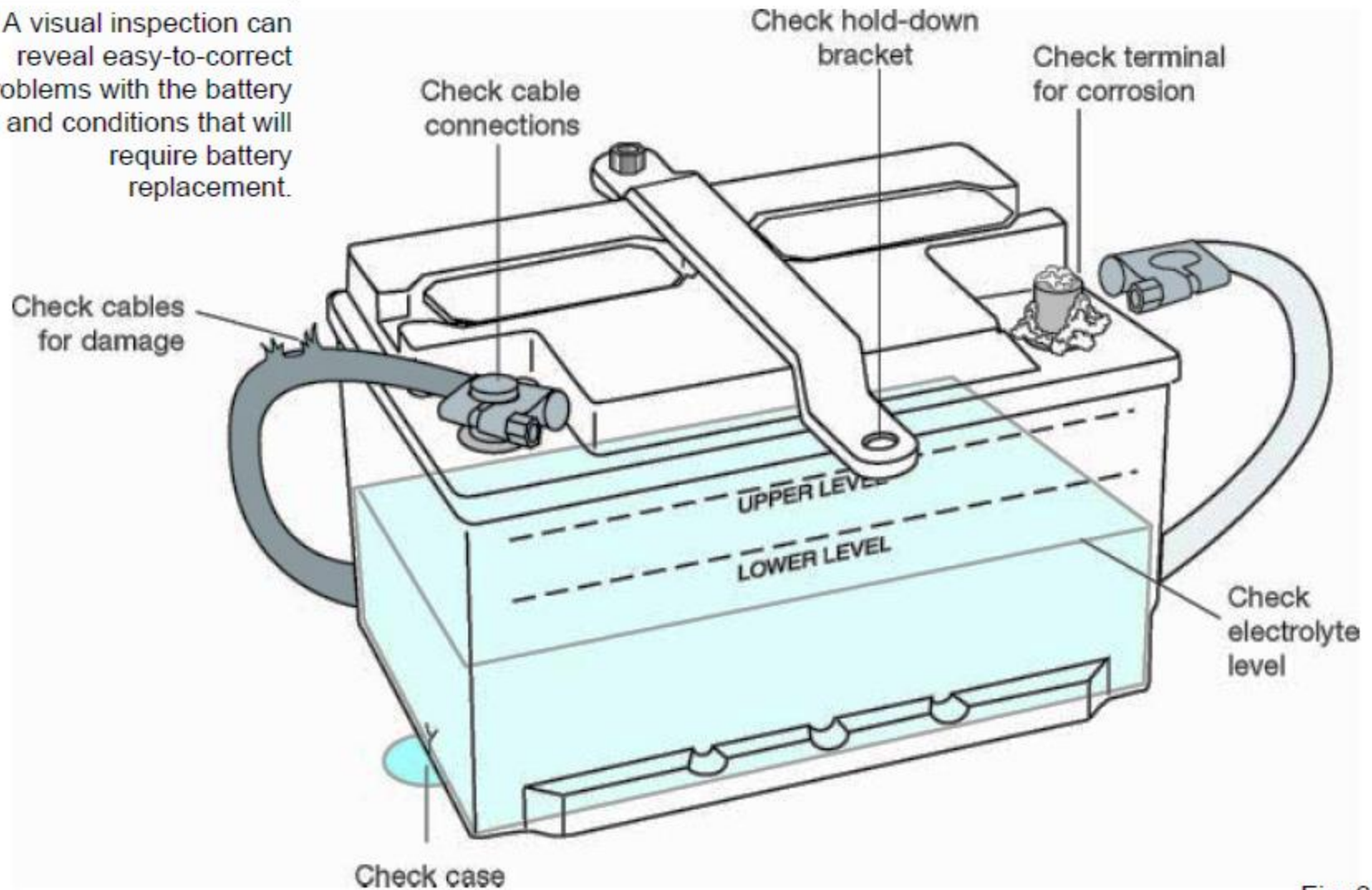


Fig. 3

Servicing & Safe Battery Handling

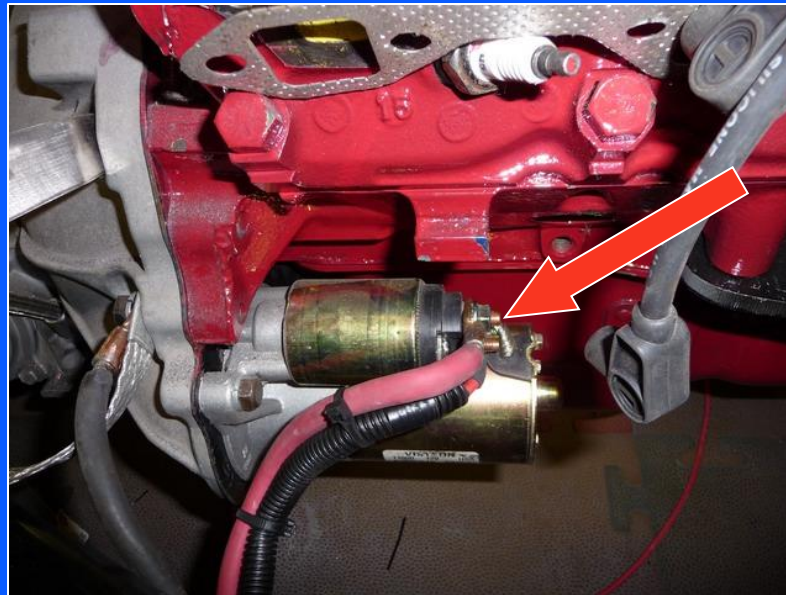
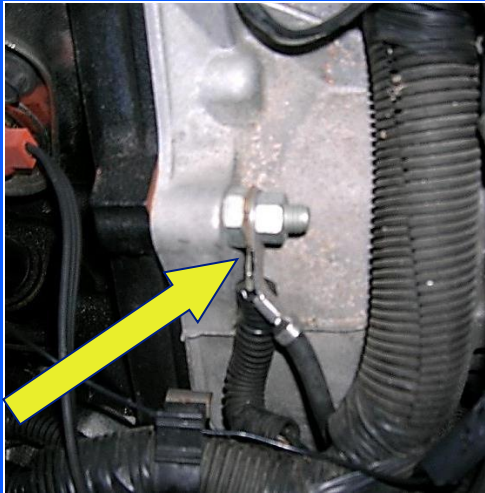
First step in a battery service...

Wear eye protection!!!

1. Disconnect & clean battery terminals and posts

a) always remove negative first, then positive

- ❖ Negative is usually black or marked with – and it connects to ground
- ❖ Positive is usually red or marked with + and it connects to the starter motor or starter relay



terminal puller tool

Preserving memory presets...

- to retain your radio station presets & ensure there aren't any security system related difficulties following the battery service, you can use a...
 - memory saver



- Replace damaged bolts, nuts, terminals or cables...



Installing replacement battery terminals...

1. Strip Cable End



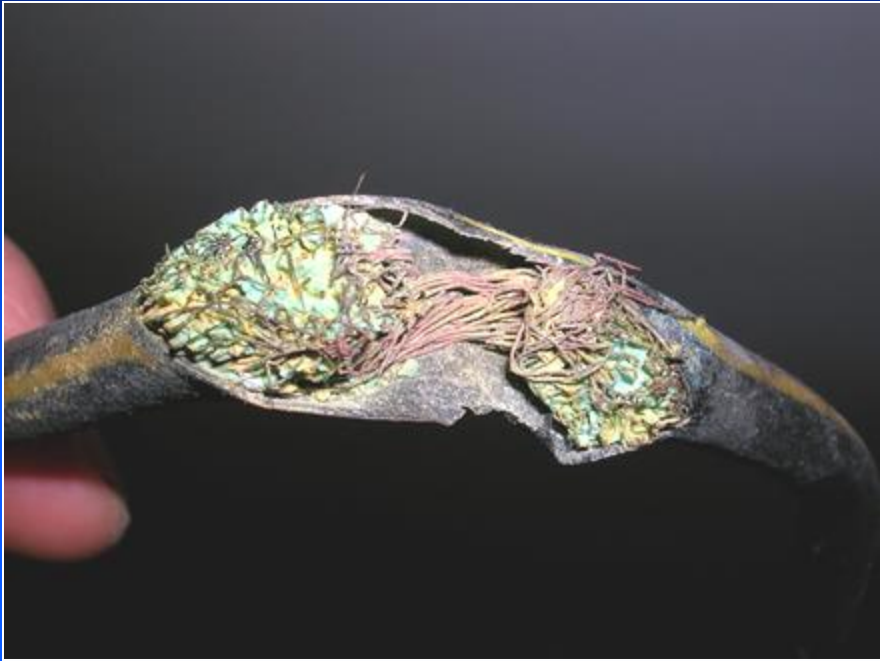
2. Loosen Cap Screws



3. Insert Cable and tighten Cap Screws

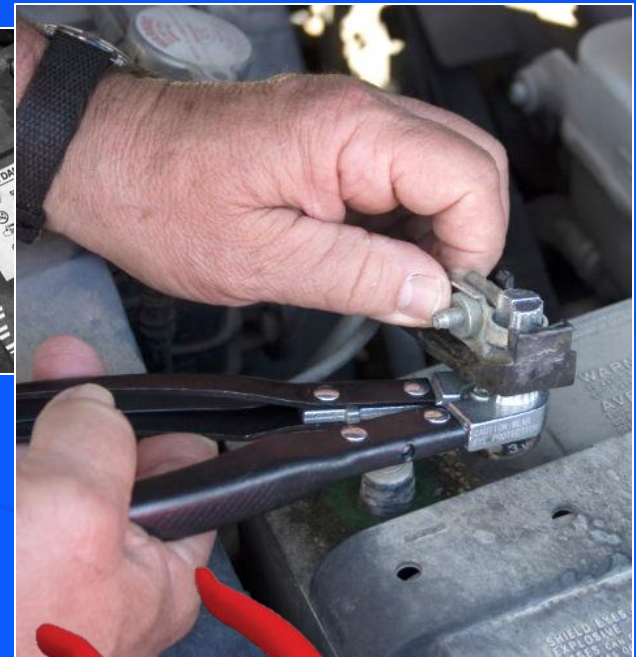
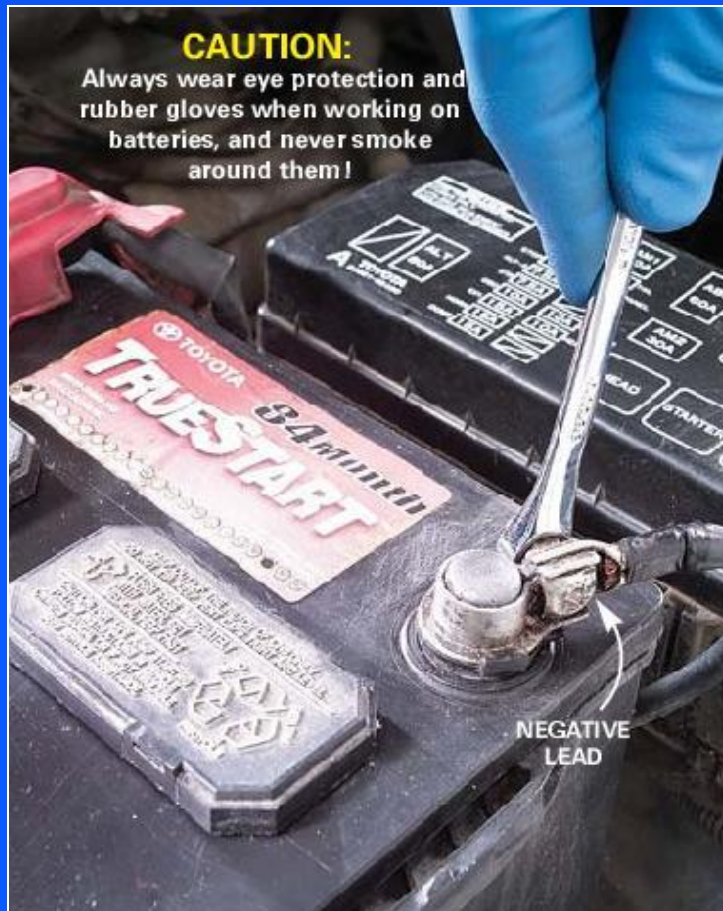






b) always reinstall **positive** first, then negative

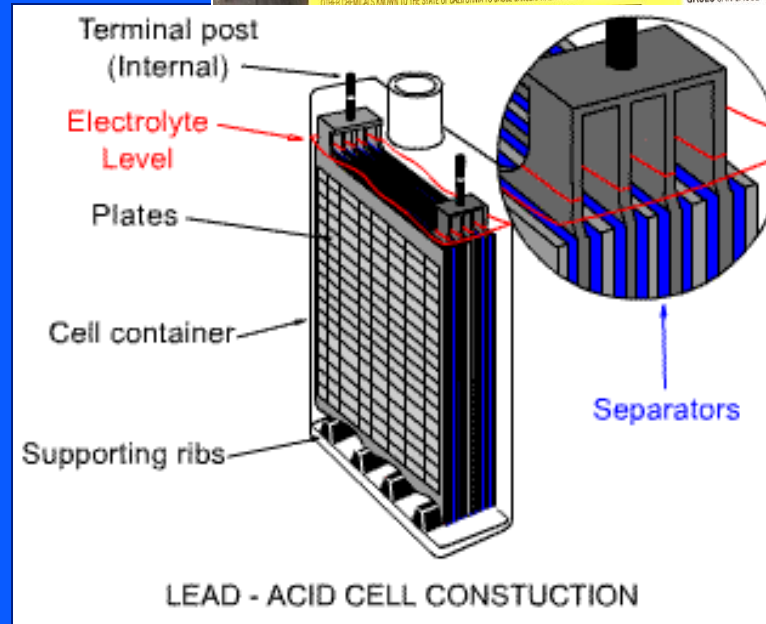
- remember: **NPPN**
- ensure the terminals cannot be moved by hand
- coat the terminals with spray paint or terminal protector to minimize corrosion



Step 2 in Battery Service...

2. Check the electrolyte level in each cell

- some vent caps are not removable – ask Roger if you are unsure!
- the electrolyte should cover the plates
- add water if needed, but **do not overfill!**

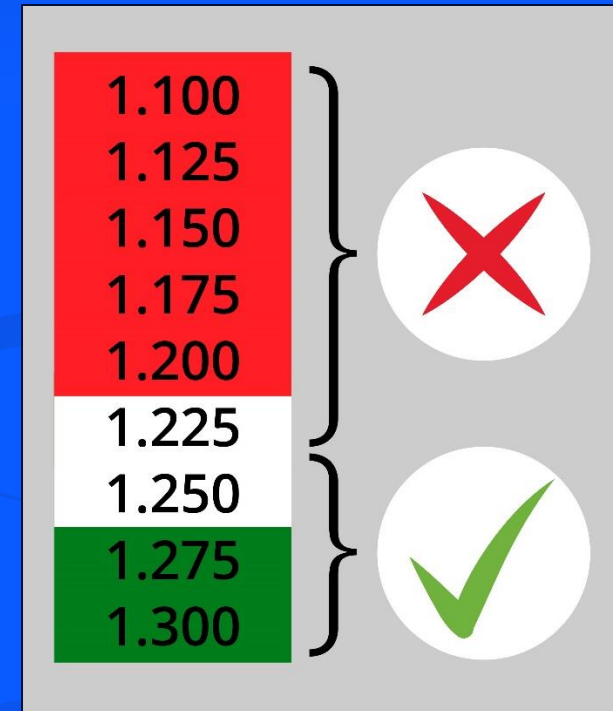


Fill cells slowly - normally, very little water is required!



Testing Electrolyte - specific gravity test

- use a battery hydrometer
- consistency between cells is important
- >30 points difference between cells = battery needs replacement
- if all 6 cells are low, but even, the battery can be recharged



Testing Electrolyte - specific gravity test using disc-type hydrometer



Battery Security

- makes sure the battery is properly secured
- replace hardware if needed



Battery Charging

1. Service the battery.
2. Connect the battery charger cables.
(red to positive, black to negative)
3. Set the charge rate to LOW.
4. Set the timer to 60 minutes.
5. Plug the charger in.



Monitor battery temperature by placing your hand on the case – if it gets hot, turn off the charger – the battery may be defective!

Unhooking the Battery Charger

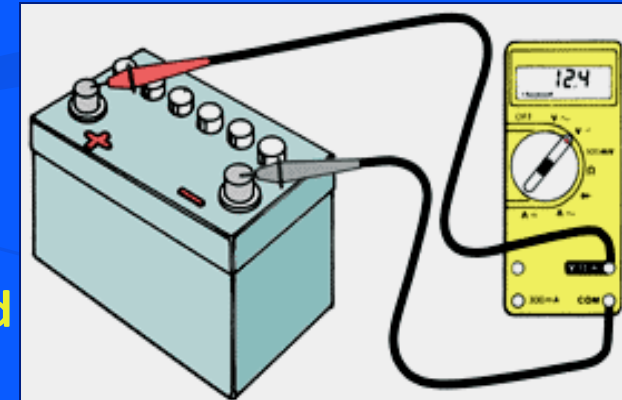
1. Unplug the charger!!!
2. Disconnect the cables.
3. Check the battery's voltage.

(should be 12 volts)



Battery Testing

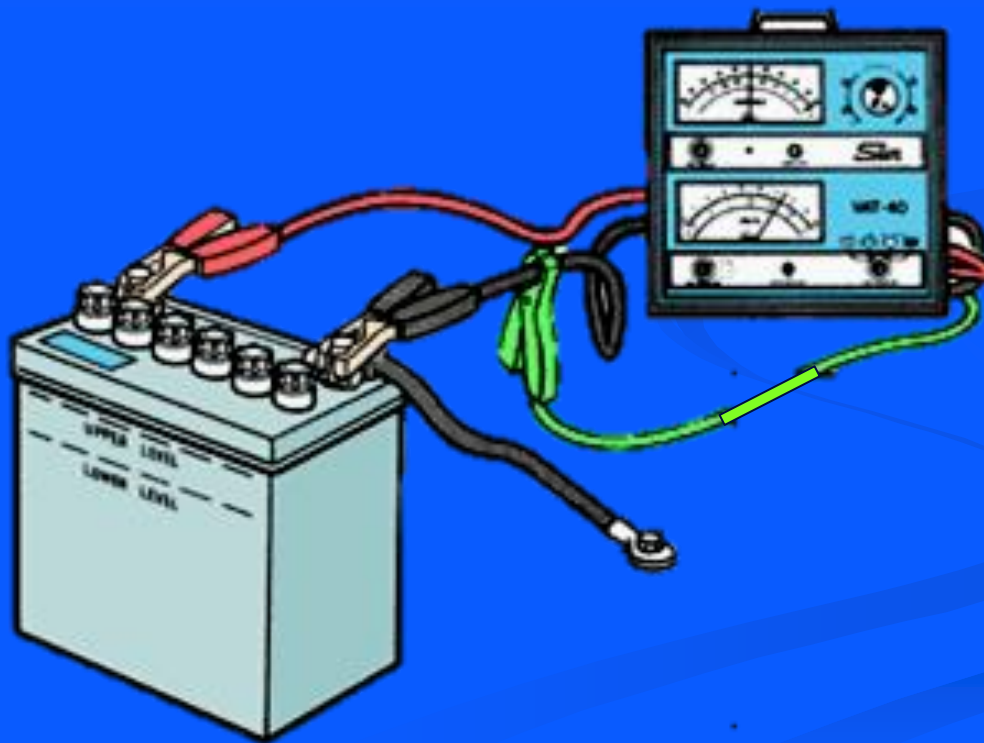
- To test a battery you will use the VAT-40 to perform a load test
- load test tells us if the battery can deliver the power needed to start the engine
- before you perform a load test...
 - service the battery
 - ensure the battery is fully charged (12.4v to 12.6v)
 - to do this, connect a voltmeter {+ to +, - to -}
 - if the voltage is <12 volts, it will have to be charged



Using the VAT-40

1. Connect the cables as follows...

- 2 large load leads red to positive, black to negative
- set the volt selector to INT 18V
- green inductive pick-up around one of the load leads



VAT-40 Step #2

2. Determine the CCA of the battery

- look for a sticker on the battery that indicates the CCA or...
- refer to the Costco Battery catalog in the shop or in D2L

CHEVROLET

Make, Model & Year	Engine Liter & Options	Footnote/ Note	BCI Group Size	OEM Cold Cranking Amps (CCA)	Kirkland Signature Fitment Code	Optima Red Top Fitment Code	Optima Yellow Top Fitment Code
Marque, Modele et Annee	Moteur, Litre et Options	Footnote/ Note	Groupe De Tailles	Ampères de Démarrage à Froid Équipement d'Origine	Kirkland Signature Code de cor- respondance	Optima Red Top Code de cor- respondance	Optima Yellow Top Code de cor- respondance
CHEVROLET (Cont.)							
Caprice (Cont.)							
1987	V8 5.7L		75	525	3	17	—
1987	V8 5.7L SEO		78	730	5, 1	23●	18●
1987	V8 5.7L Optional		75	630	3	17	—
1986	V8 5.0L (305)		70	525	3	17	—
1986	V8 5.0L (305); Optional		75	570	3	17	—
1986	V8 5.0L (307)		75	430	3	17	—
1986	V8 5.0L (307); Optional		75	500	3	17	—
1986	V8 5.7L		78	730	5, 1	23●	18●
1985-84	V8 5.0L		75	500	3	17	—
1985-84	V8 5.0L Optional		75	630	3	17	—
1985-84	V8 5.7L Diesel		70(2)	405	3	17	—
1985-84	V8 5.7L Gas		75	500	3	17	—
1985-83	V8 5.7L Diesel; Optional		78(2)	550	5, 3, 1	23●, 17	18●
1985	V6 3.8L		71	390	3	17	—
1985	V6 3.8L Optional		78	550	5, 3, 1	23●, 17	18●

VAT-40 Step #3

3. Draw out ½ the CCA out of the battery for 10 seconds

- alternately, you can draw 3 times the amp/hour rating if CCA spec isn't listed

(e.g. on a 650 CCA battery, pull 325 amps out during the load test)

- the voltage should stay above 9.6 volts
- if the voltage drops below 9.6 volts, the battery will have to be replaced



Alternator Testing

3. Hook up the VAT-40 (or use a DMM instead)

❖ DMMs are in the blue tool chest

Do not turn the load control knob!

4. Start the engine.

❖ alternator should produce between 13.5 & 14.5 volts



Jump Starting a Battery

Connect the jumper cables in this order...

1. connect positive to positive
2. connect negative to ground
 - ✓ Ground is any solid, unpainted metal part such as the frame or a bracket that is bolted to the engine
3. start the engine
4. use a battery charger to recharge the dead battery
 - Do not allow the clamps to touch each other
 - Do not jump the battery if you suspect there is a fuel leak

