



*Presents*

## **Diagnosing Electrical Problems on Today's Motor Vehicles **PART 4****

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### ***Your Instructor For This Class***



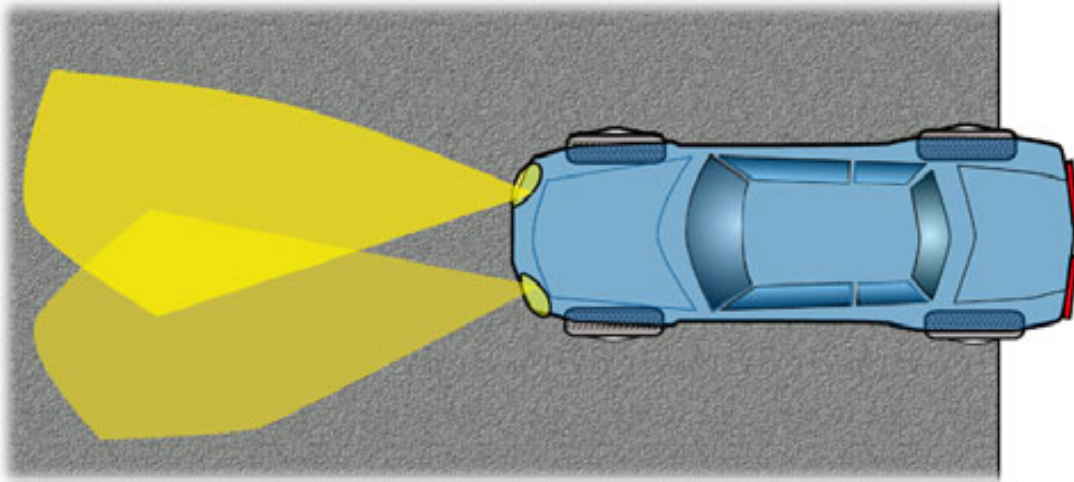
**"G" Jerry Truglia**

- National Trainer, ASE World Class, Master: Auto, Truck, School Bus, L1, L3, CNG and...
- **ATTP Master Instructor, New York State, CT and New Jersey**
- STS (Service Technician Society) 2003 President
- **TST (Technicians Service Training) Founder and President**
- Author / Co Author/ Technical adviser on 25 plus books including OBD II and Mode 6, and Understanding and Diagnosing Hybrid Vehicles
- **Published articles for multiple newsletters, and magazines**
- Picked as one of the Top Instructors in the country by EPA & SAE
- **Numerous Radio, TV, Internet, and SAE Video appearances**
- PTEN, MotorAge and TST Webcast Instructor
- **Motor Magazine Top 20 award winner**
- Provider of OBD II Training for 13 states, Ontario Canada and the US EPA
- **Guest speaker at SAE Congress, IM Solutions and Clean Air Conference**

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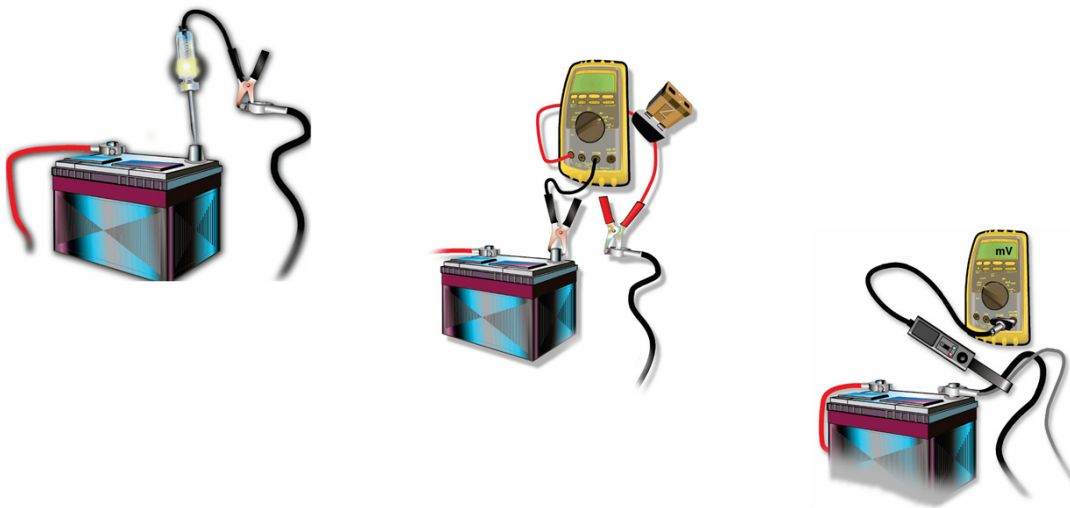
## Key Off Battery Drain



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## Checking Parasitic Draw



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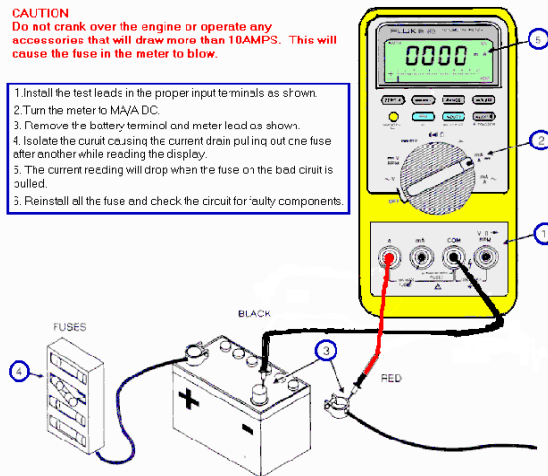
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## Checking Parasitic Draw

**WARNING**  
Do not perform this test on a lead-battery that has recently been recharged.

**CAUTION**  
Do not crank over the engine or operate any accessories that will draw more than 10AMPS. This will cause the fuse in the meter to blow.

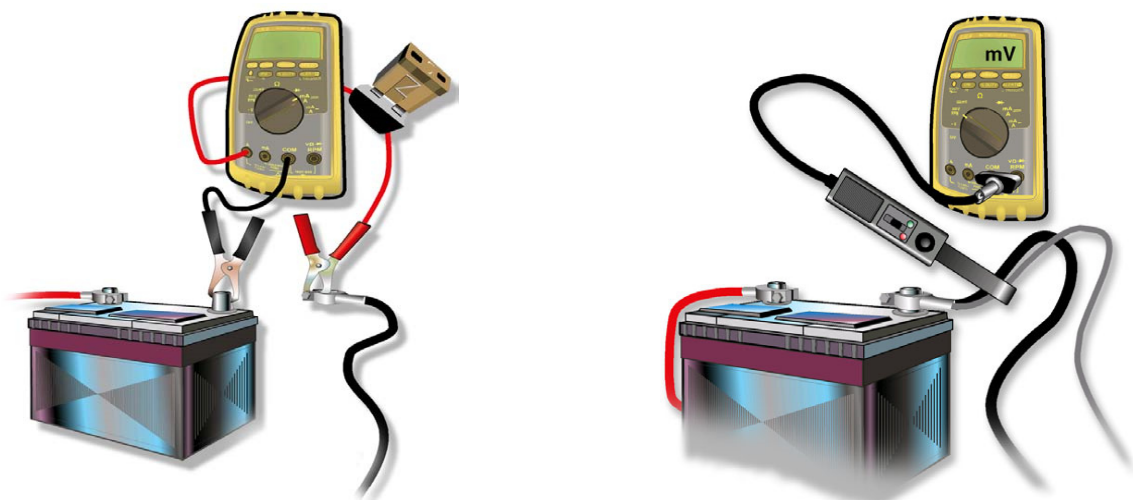
1. Install the test leads in the proper input terminals as shown.
2. Turn the meter to MA/DC.
3. Remove the battery terminal and meter lead as shown.
4. Isolate the circuit causing the current drain pulling out one fuse after another while reading the display.
5. The current reading will drop when the fuse on the bad circuit is pulled.
6. Reinstall all the fuse and check the circuit for faulty components.



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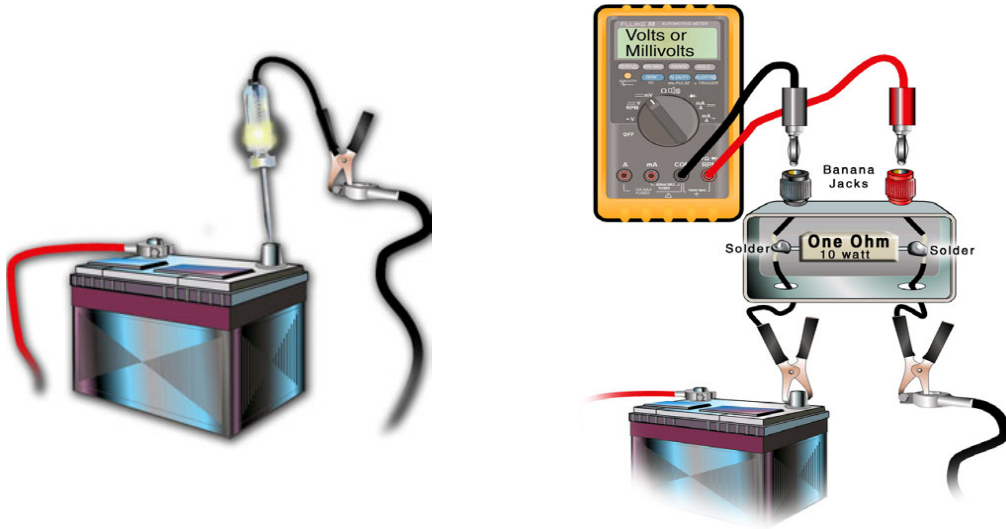
## Checking Parasitic Draw



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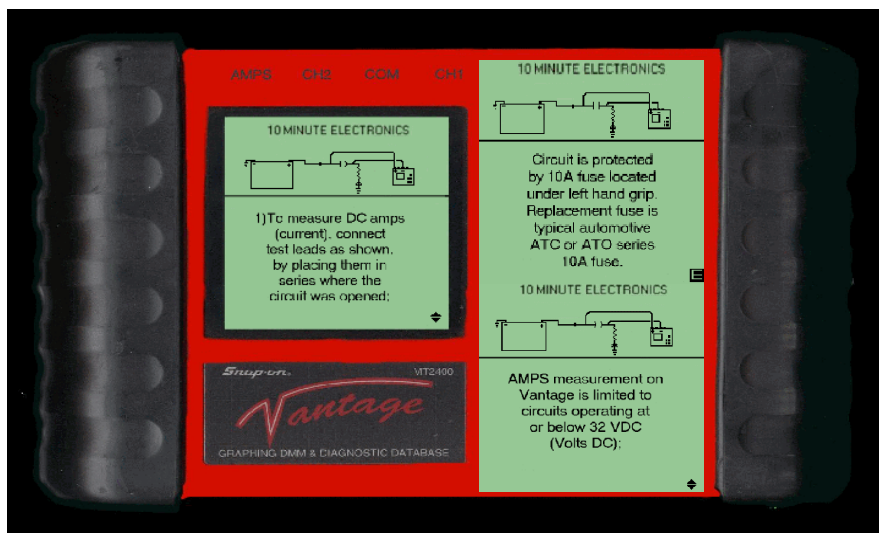
## Testing Battery Draw



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## Checking Parasitic Draw



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## Parasitic Draw

Courtesy of General Motors Corp.

GENERAL MOTORS PARASITIC LOAD TABLE (MILLIAMPS)

Component	Normal Draw	Maximum Draw	Time-Out (Minutes)
Anti-Theft System	0.4	1.0	...
Auto Door Lock	1.0	1.0	...
Body Control Module	3.6	12.4	20
Central Processing System	1.6	2.7	20
Electronic Control Module	5.6	10.0	...
Electronic Level Control	2.0	3.3	20
Heated Windshield Module	0.3	0.4	...
HVAC Power Module	1.0	1.0	...
Illuminated Entry	1.0	1.0	1
Light Control Module	0.5	1.0	...
Oil Level Module	0.1	0.1	...
Multi-Function Chime	1.0	1.0	...
Pass Key Decoder Module	0.75	1.0	...
Power Control Module	5.0	7.0	...
Retained Accessory Power	3.8	3.8	...
Radio	7.0	8.0	15
Twilight Sentinel Module	1.0	1.0	...
Voltage Regulator	1.4	2.0	...

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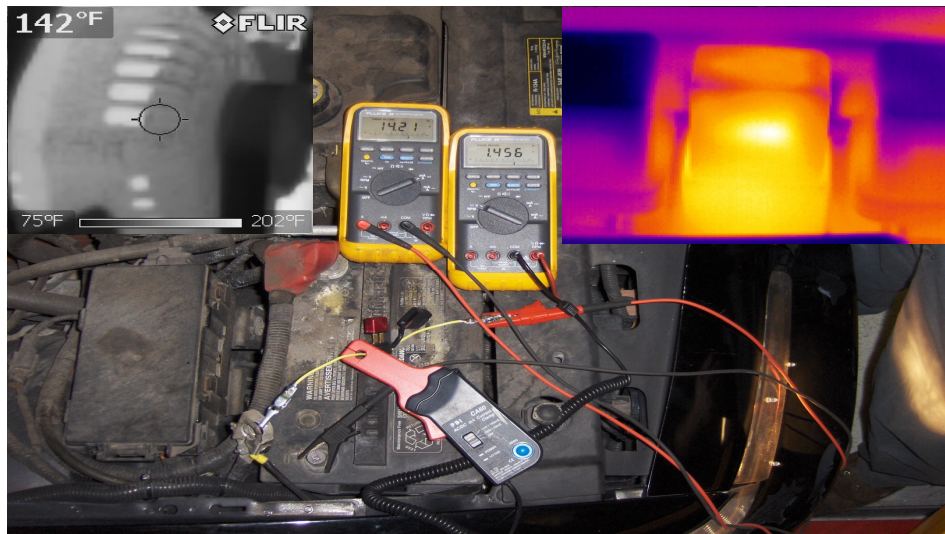
## Checking Parasitic Draw With Voltage Drop



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## Checking Parasitic Draw With Current

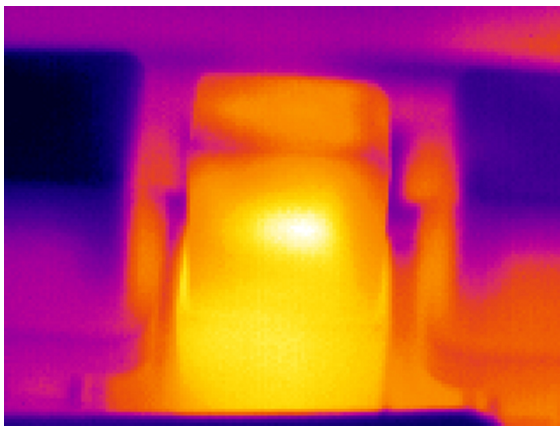


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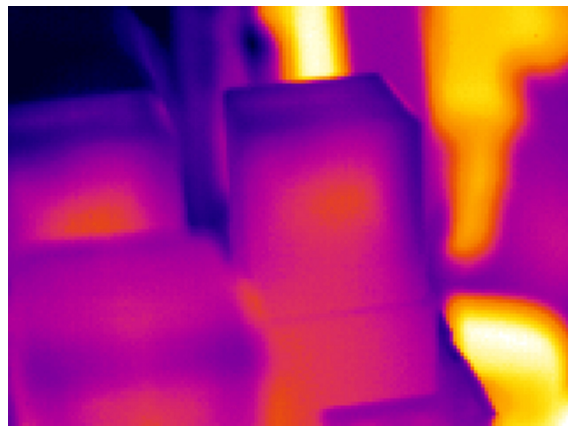
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## Parasitic Draw

Relay Stuck On



Relay Off

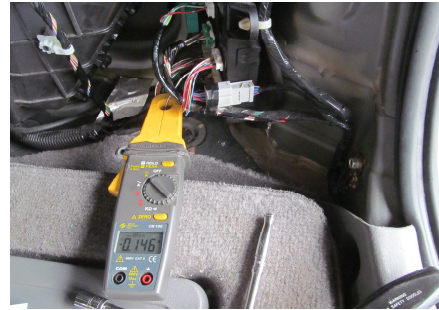
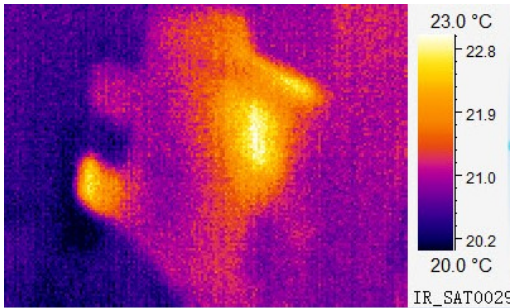


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## Parasitic Draw

2010 Honda Odyssey 3.5L, V6 came in with a complaint of a dead battery. Using a thermal imager led us to the right rear side sliding door motor assembly and the right rear body module that were draining the battery. Using a thermal imager can save time and make you money. Always make sure that the vehicle is cold for best results.



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## Safety First



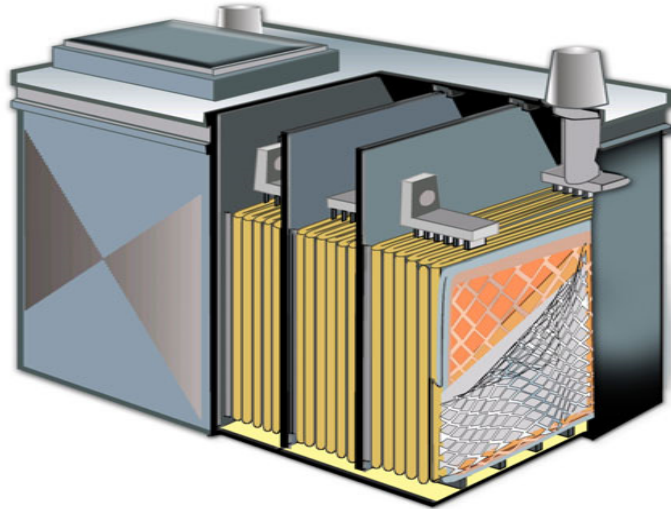
Before you grab your meter!

- Eye Protection!
- **Eye Protection!**
- Eye Protection!
- Gloves
- Long Sleeves
- Have first aid handy
- No smoking!

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## Battery Construction

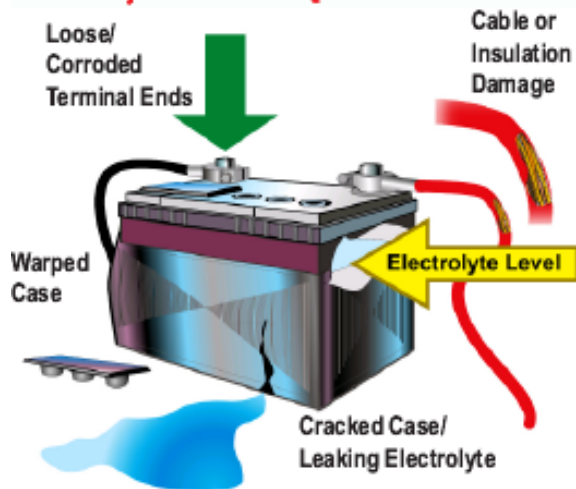


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## Battery Inspection

### Battery Visual Inspection



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**Start every battery inspection with a thorough visual inspection.**

**Make sure the battery hold down is in place and properly tightened.**

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## The Game Plan

Next try starting your diagnostic procedure by testing from the basics up, finding out what's right and what's wrong, just like the big box scope analyzers did for years gone past. **The good thing about the old big box analyzers was that they forced us to start at the battery, starter, alternator, engine mechanical condition, emission gas readings, ignition, fuel systems and scan data.**



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## The Game Plan

**The corrosion on this Toyota Rav 4 battery caused the fusible link and fuse box to be damaged.**



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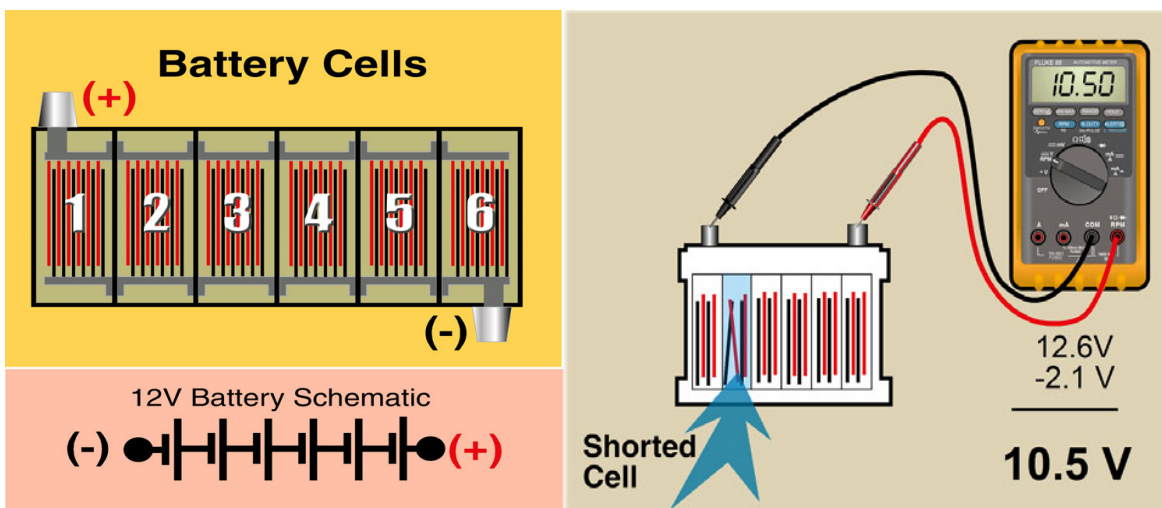
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## Battery Cells

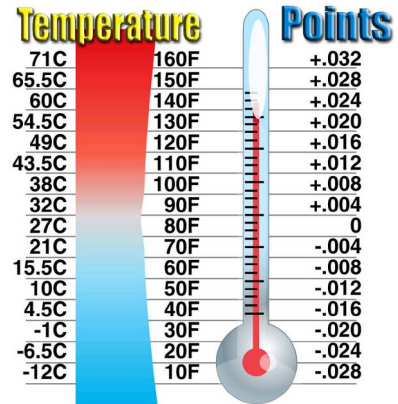
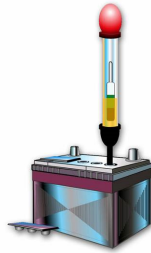


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## Battery Specific

Specific Gravity	State of Charge
1.270	100%
1.225	75%
1.190	50%
1.155	25%
1.120	0%

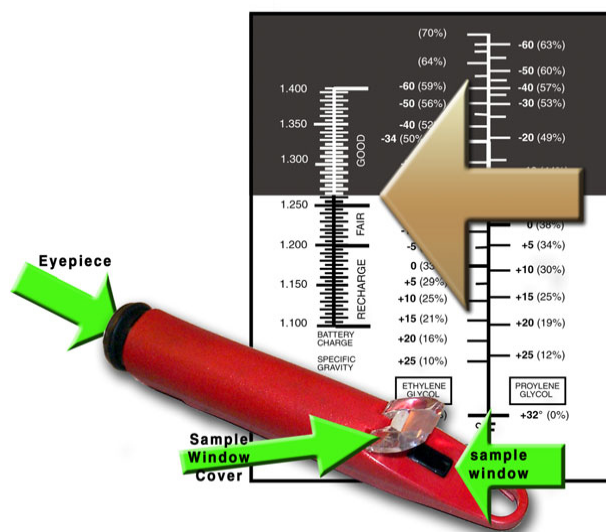


Celsius temperatures rounded to closest half degree

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## Battery Testing With A Refractometers

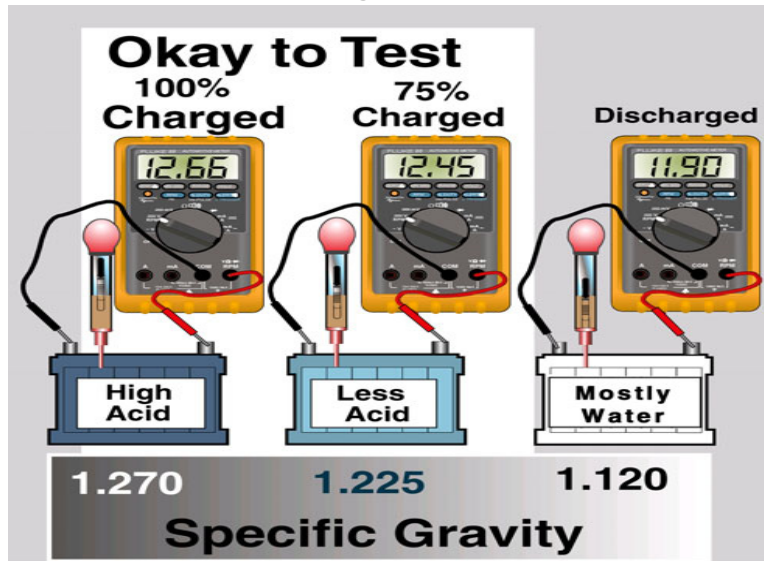


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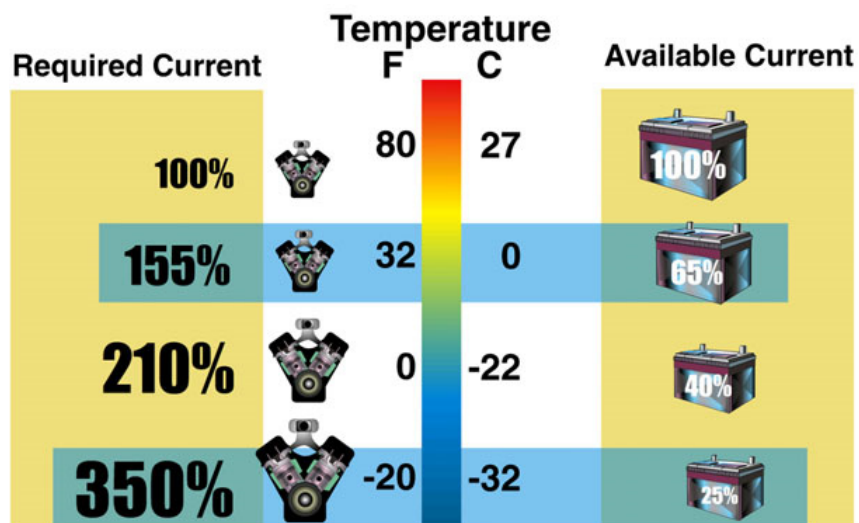
## Testing Batteries



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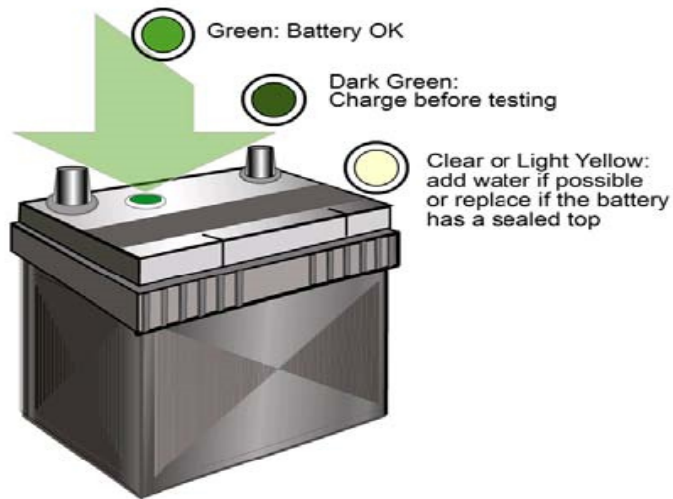
## Battery Testing



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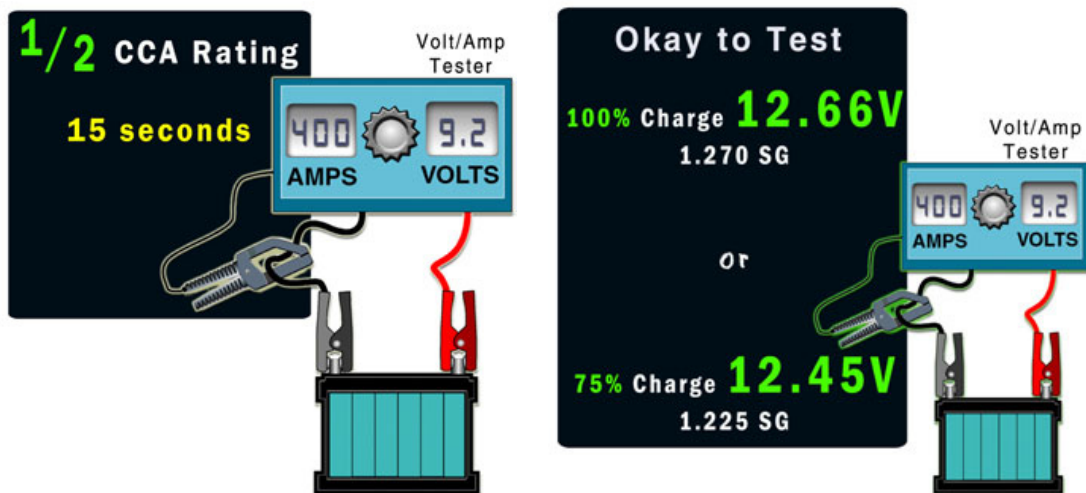
## Battery Testing



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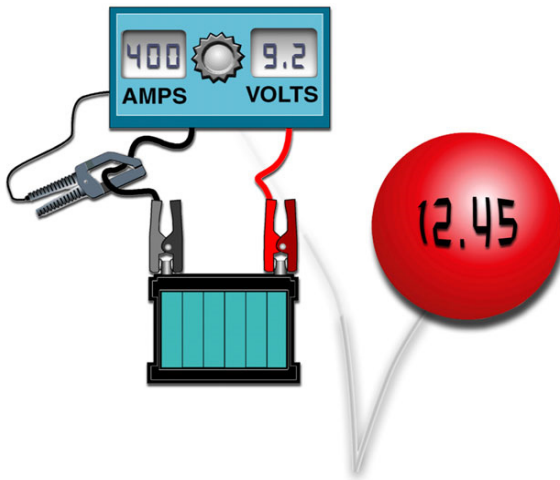
## Battery Testing



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## Battery Testing



### Bounce Back Voltage

If the battery bounces back **over 12.45 volts** after **FAILING** a LOAD TEST

**It's BAD.**

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## Battery Testers



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