Modern Automotive Technology
Chapter 30
Battery Service & Testing
Learning Objectives

- Visually inspect a battery for obvious problems.
- Perform common battery tests.
- Clean a battery case and terminals.
- Charge a battery.
- Jump start a car using a second battery.
- Replace a defective battery.
- Describe safety practices to follow when testing and servicing batteries.
Chapter 30

1. An Inductive Type load tester uses a clip-on ammeter lead to sense field around outside of cables.

2. To Jump Start a vehicle with a dead battery, connect a charged battery to the discharged battery.
Inductive Type Load Tester

Load tester

For loading battery by drawing current

Amps pickup

Black to negative

Red to positive

Inductive Type Pick-Up

Battery
Jumper Cable Connection

Run the engine in the vehicle with the live battery while cranking the other one

1. Pos. Cable Dead Battery; 2. Pos. Cable Helper Car;
3. A Battery Drain Test checks for abnormal current draw (parasitic loads) with the ignition key off.

4. A Battery Voltage Test is done with a voltmeter to determine the general state of charge and battery condition.
Battery Drain Test

Typically maximum 10 milliamps (mA)
Battery Voltage Test

This battery is about 75% charged
5. A **Hydrometer** measures the specific gravity of a liquid.

6. **Battery Terminal Test** quickly checks for poor electrical connections between the battery cables and terminals.
Hydrometer Check

Squeeze and release bulb

Thermometer

Read specific gravity by sighting number at electrolyte level

Electrolyte is sulfuric acid. Do Not Drip on clothes, skin or a vehicles finish. Flush with cool water if any splashes in your eyes!
# Battery Voltage Versus Specific Gravity

<table>
<thead>
<tr>
<th>Load on battery (Amps)</th>
<th>Specific Gravity (Percent charge)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.265 (100%)</td>
</tr>
<tr>
<td>0</td>
<td>12.7</td>
</tr>
<tr>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>15</td>
<td>12.3</td>
</tr>
<tr>
<td>25</td>
<td>12.1</td>
</tr>
</tbody>
</table>

This is the range in which most vehicle batteries normally operate in customer service.

At 1.180 and below, starting will be unreliable and function of other circuits may be erratic.
7. A Dead Battery usually causes an engine not to crank and start.

8. A Battery Charger forces current back into a battery.
Battery Cleaning
Wash with baking soda and water, and do not let debris enter filler openings.
Removing Battery Cables

Different methods of removal

- Bolted post-type cable end
- Spring-type post cable end
- Side terminal cable end

Tighten
Loosen
Cleaning Battery Posts and Cable Ends

- Rotate female end of brush on post
- Use male end of brush on cable end
Fast Charger

- Forces high current flow into battery
- Allows engine start from a low battery in a few minutes
Chapter 30

9. A Battery Load Test tests the battery under full current load.

10. A Battery Leakage Test determines whether current is discharging across the top of the battery case.
Load Tester

The most accurate method of determining battery condition
Load Tester Connection

Large cables load the battery by drawing current through the tester.
Battery Leakage Test

Any voltage indicates battery leakage

1.05 volts

Dirty battery top

Touch red voltmeter lead on case top

Connection to battery ground terminal
Battery Carriers

If you drop a battery, acid could splash out, causing eye or skin injury.
Battery Installation

Do not overtighten cable terminals
Battery Problems

- Deteriorated cables
- Dirty top
- Low electrolyte
- Damaged case
- Loose hold-down
Battery Problems
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