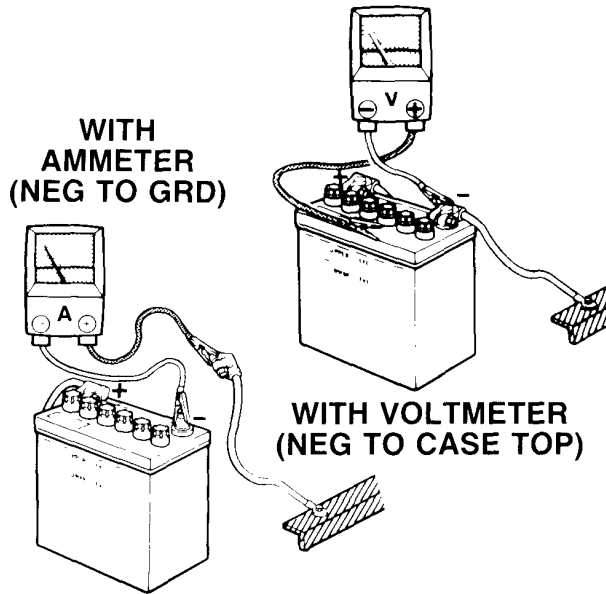


THE BATTERY

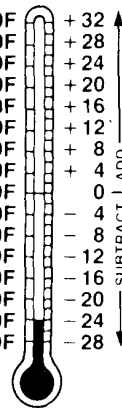
Start With A Review ... What you've learned in the classroom is just the start. Here's your chance to show what you know in the shop. To meet your learning objectives, there are four "jobs" to perform on **The Battery**. This page reviews some key concepts.

BATTERY DRAIN CHECK



HYDROMETER CHECK TEMP. CORRECTION

71C	160F	+ 32
65.5C	150F	+ 28
60C	140F	+ 24
54.5C	130F	+ 20
49C	120F	+ 16
43C	110F	+ 12
37.5C	100F	+ 8
32.5C	90F	+ 4
27C	80F	0
21C	70F	- 4
15.5C	60F	- 8
10C	50F	- 12
4.5C	40F	- 16
-1C	30F	- 20
-6.5C	20F	- 24
-12C	10F	- 28



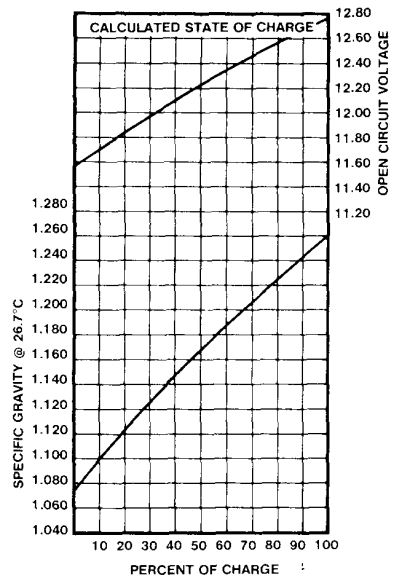
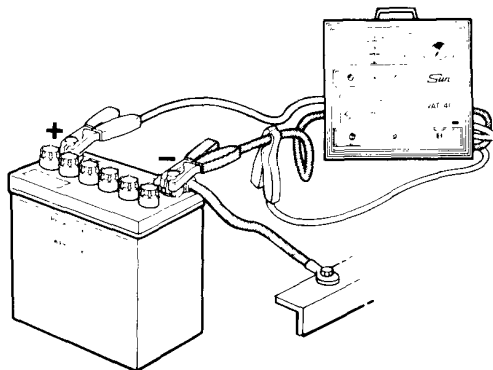
EXAMPLE
 HYDROMETER READING 1 250
 ELECTROLYTE TEMPERATURE 40F
 SUBTRACT SPECIFIC GRAVITY - 016
 CORRECTED SPECIFIC GRAVITY IS 1 234

EXAMPLE
 HYDROMETER READING 1 240
 ELECTROLYTE TEMPERATURE 100F
 ADD SPECIFIC GRAVITY + 008
 CORRECTED SPECIFIC GRAVITY IS 1 248

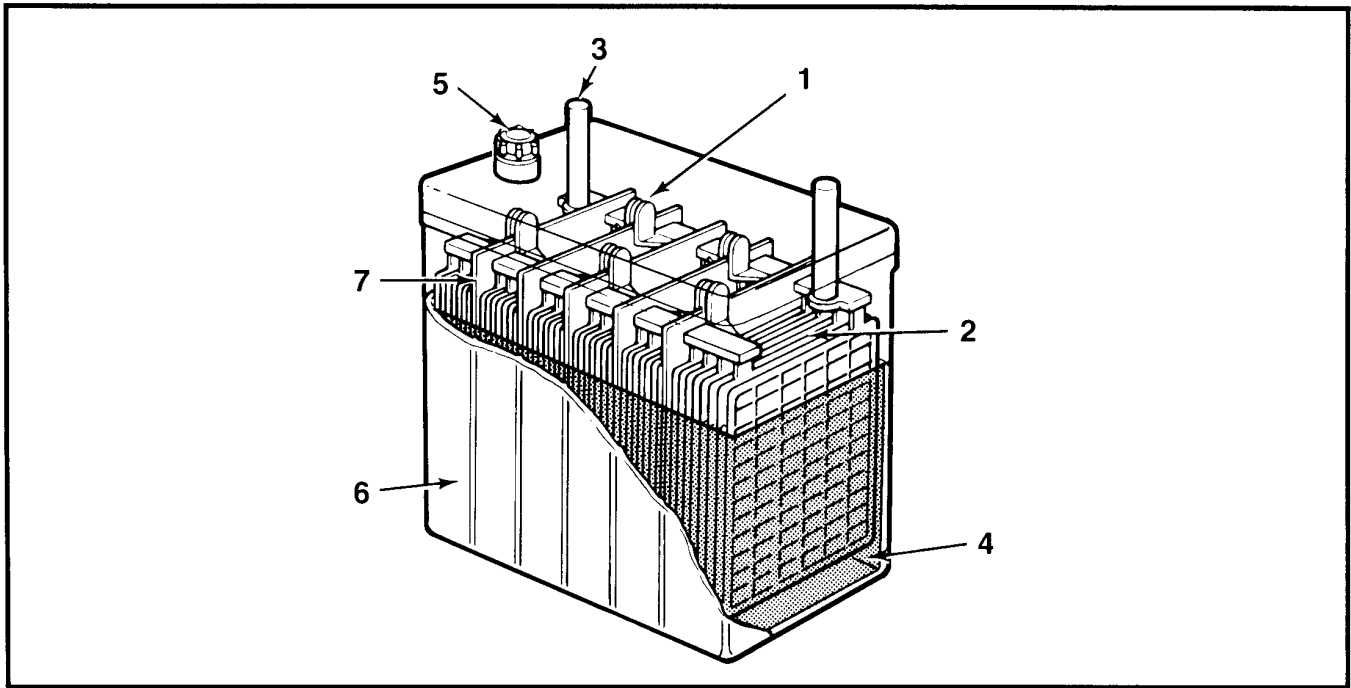
A FULLY CHARGED BATTERY HAS A SPECIFIC GRAVITY OF ABOUT 1 265

SPECIFIC GRAVITY AND PERCENT OF CHARGE

HEAVY LOAD TEST



Identify Terms Relating To Battery Operation And Construction



YOUR JOB (READ ALL INSTRUCTIONS BEFORE STARTING!)

1. Refer to page 97 in your workbook.
2. Identify the numbered battery parts by placing the correct number next to the part name below.

- | | |
|-----------------------|---------------------|
| _____ Case | _____ Terminal Post |
| _____ Plates | _____ Vent Cap |
| _____ Cell Divider | _____ Electrolyte |
| _____ Cell Connectors | |

3. Then, place the number of the correct part next to the phrase that describes it.

- | | |
|--|--|
| _____ Allows checking of electrolyte. | _____ The number and size determine current. |
| _____ Provides outlet for current. | _____ Connects plates of one cell to those of another. |
| _____ Separates battery cells. | _____ A mixture of sulfuric acid (H ₂ SO ₄) and water (H ₂ O). |
| _____ Holds all parts and electrolyte. | |

4. Complete this job within 5 minutes.

Stop here and have instructor signoff.

Job 1 complete: _____

Conduct A Visual Inspection Of A Battery

YOUR JOB (READ ALL INSTRUCTIONS BEFORE STARTING!)

TOOLS/EQUIPMENT

1. Refer to page 104 in your workbook.
2. Inspect the battery on the vehicle assigned.
 - Check each item listed.
 - Record your findings as indicated below.
3. Complete this job within 5 minutes.

1. Vehicle

TEST RESULTS

Check	Condition	Recommendation
1. Case	_____	_____
2. Terminals	_____	_____
3. Cables	_____	_____
4. Connectors	_____	_____
5. Hold-Down	_____	_____
6. Drive Belt	_____	_____
7. Electrolyte	_____	_____
8. Plates	_____	_____

QUESTIONS

Listed below are three situations in which a battery might explode. First, identify what may cause an explosion in each situation. Then, identify how to prevent an explosion; the precautions you would take in each situation.

Situation	Cause	Prevention or Precaution
1. During charging _____ (on vehicle, by alternator)	_____	_____
2. During charging _____ (off vehicle, by battery charger)	_____	_____
3. During jumping _____ (by another battery)	_____	_____

Stop here and have instructor signoff.

Job 2 complete: _____

A. Test The Specific Gravity Of Battery Electrolyte

CAUTION: Wear safety glasses while doing this job.

YOUR JOB (READ ALL INSTRUCTIONS BEFORE STARTING!)

TOOLS/EQUIPMENT

1. Test the specific gravity of the electrolyte in each cell of the assigned battery.
 - Follow the Performance Procedures.
 - Record your findings as indicated.
2. Refer to pages 106 and 107 in your workbook.
3. Complete this job within 10 minutes.

1. Hydrometer
2. Battery
3. Safety Glasses

TEST RESULTS

Cell	Specific Gravity	Temperature	Adjusted S.G.	% Charge
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____
6.	_____	_____	_____	_____

- RECOMMENDATIONS:**
- _____ Battery good, ready for use.
 - _____ Battery OK, but needs a charge.
 - _____ Battery bad, should be replaced.
 - _____ Battery questionable, further testing required.
- Explain: _____

(Go on to the next page)

B. Check A Battery For Open-Circuit Voltage And Current Drain

CAUTION: Wear safety glasses while doing this job.

YOUR JOB (READ ALL INSTRUCTIONS BEFORE STARTING!)

1. Perform open-circuit voltage and current drain tests on the battery assigned.
 - Follow the Performance Procedures.
 - Record your findings as indicated below.
2. Refer to page 105 in your workbook.
3. Complete this job within 15 minutes.

TOOLS/EQUIPMENT

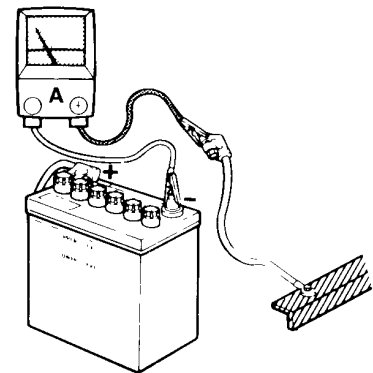
1. Voltmeter
2. Ammeter
3. 12 Volt Test Light
4. Battery Terminal Tools
5. Vehicle
6. Safety Glasses

TEST RESULTS

- **Open-Circuit Voltage Test:** Voltmeter reading _____ volts
- Refer to page 107 of the Student Workbook. What is the state-of-charge of this battery? _____ %

BATTERY DRAIN TEST (Parasitic Load)

1. Disconnect battery ground (–) cable from battery post.
2. Select proper ammeter scale and “zero” meter.
3. Connect ammeter between battery post and ground cable.
[Red (+) to ground cable and Black (–) to battery post.]
4. Record ammeter reading.
5. Reconnect ground cable to battery.



Battery Drain Test: Ammeter reading _____ amps

RECOMMENDATIONS: _____ No drain, everything is OK.
 _____ Slight drain, but normal.
 _____ Excessive drain, further testing required.
 Explain: _____

Stop here and have instructor signoff.

Job 3 complete: _____

Perform A Battery Heavy Load Test

CAUTION: Wear safety glasses while doing this job.

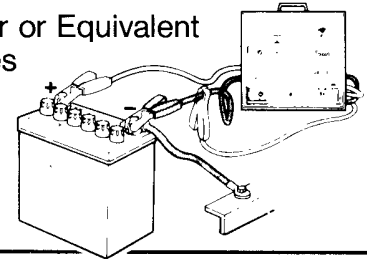
YOUR JOB (READ ALL INSTRUCTIONS BEFORE STARTING!)

1. Load test the battery assigned.
 - Follow the Performance Procedures.
 - Record your findings as indicated below.
2. Refer to page 108 in your workbook.
3. Complete this job within 15 minutes.

TOOLS/EQUIPMENT

1. Battery
2. VAT-40 Tester or Equivalent
3. Safety Glasses

HEAVY LOAD TEST



PERFORMANCE PROCEDURES

1. Check electrolyte specific gravity.
CAUTION: Do not proceed with load test unless specific gravity is above 1.190 and spread between the highest and lowest cell is within 50 points.
2. Determine the test load of the battery **required** for the vehicle being tested.
Battery Rating:
 _____ Amp-Hours or _____ Cold Cranking Amps
Test Load: _____ amps
Test Time: _____ seconds
3. Prepare VAT-40 tester according to manufacturer's instructions.
4. Connect VAT-40 to battery terminals. [Red to (+) and Black to (-).]
5. Connect amps pickup clamp **around** either (+) or (-) tester cable.
6. Set the Test Selector Switch to #1 STARTING.
7. Load the battery by turning the Load Increase control until the ammeter reads **3 times the amp-hour (AH) rating or one-half the cold-cranking ampere (CCA) rating.**
8. Maintain the load for **no more than 15 seconds** and note the voltmeter reading.
9. Immediately turn the Load Increase control OFF.

TEST RESULTS

Voltage under load: _____ volts

RECOMMENDATIONS: _____ Battery passed test.
 _____ Battery passed test, further testing required.
 _____ Battery failed test, further testing required.
 Explain: _____

Stop here and have instructor signoff.
Job 4 complete: _____