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All pages in this booklet should be double sided
LAB SHEET # B-1  On-Car Testing  NAME__________________________ 

CAUTION: WEAR SAFETY GLASSES

BATTERY TESTING - PRACTICAL
1. Test batteries on a variety of vehicles.
2. Make all tests necessary to determine the battery charge, capacity, condition, and identify any defects.
3. Record your results below, your findings must support your conclusions of battery condition and charge.
4. Follow the testing procedures outlined in the battery handout or textbook.

BATTERY #1    CAR #_____
1. Visual Inspection - Battery Case, Hold Down, Cables, and Connections? ____________________
2. Cell Readings: 1 ______ 2 _______ 3 _______ 4 _______ 5 _______ 6 _______
3. Electrolyte Level and Condition: ___________    Is there Excessive Cell Variation: _________
4. Open Circuit Voltage: ___________    State of Charge: 0%    25%    50%    75%    100%
5. Parasitic Drain:    Specification: _______________    Actual Reading: _______________
   
   NOTE: Clean Both Battery Terminals, Cable Clamps, and reinstall at this time.
6. Heavy Load Test:    Amp Load: ___________    Voltage: ___________    Time: ___________ 
8. Optional - Test battery with MIDTRONICS Capacitance Tester. Are results the same: ______ 

BATTERY #2    CAR #_____
1. Visual Inspection - Battery Case, Hold Down, Cables, and Connections? _________________
2. Cell Readings: 1 _______ 2 _______ 3 _______ 4 _______ 5 _______ 6 _______
3. Electrolyte Level and Condition: ___________    Is there Excessive Cell Variation: ________
4. Open Circuit Voltage: ___________    State of Charge: 0%    25%    50%    75%    100%
5. Parasitic Drain:    Specification: _______________    Actual Reading: _______________
   
   NOTE: Clean Both Battery Terminals, Cable Clamps, and reinstall at this time.
6. Heavy Load Test:    Amp Load: ___________    Voltage: ___________    Time: ___________ 
8. Optional - Test battery with MIDTRONICS Capacitance Tester. Are results the same: ______ 

LAB SHEET CONTINUED ON OTHER SIDE
BATTERY #3  CAR #____
1. Visual Inspection - Battery Case, Hold Down, Cables, and Connections? ________________
2. Cell Readings: 1 _______ 2 _______ 3 _______ 4 _______ 5 _______ 6 _______
3. Electrolyte Level and Condition: __________  Is there Excessive Cell Variation: __________
4. Open Circuit Voltage: ___________  State of Charge: 0%  25%  50%  75%  100%
5. Parasitic Drain:  Specification: ________________  Actual Reading: ________________

NOTE: Clean Both Battery Terminals, Cable Clamps, and reinstall at this time.

6. Heavy Load Test:  Amp Load: ___________  Voltage: ___________  Time: ___________
7. Battery Condition:  GOOD / BAD  Why?____________________________________________
8. Optional - Test battery with MIDTRONICS Capacitance Tester. Are results the same: ______

BATTERY #4  CAR #____
1. Visual Inspection - Battery Case, Hold Down, Cables, and Connections? ________________
2. Cell Readings: 1 _______ 2 _______ 3 _______ 4 _______ 5 _______ 6 _______
3. Electrolyte Level and Condition: __________  Is there Excessive Cell Variation: __________
4. Open Circuit Voltage: ___________  State of Charge: 0%  25%  50%  75%  100%
5. Parasitic Drain:  Specification: ________________  Actual Reading: ________________

NOTE: Clean Both Battery Terminals, Cable Clamps, and reinstall at this time.

6. Heavy Load Test:  Amp Load: ___________  Voltage: ___________  Time: ___________
7. Battery Condition:  GOOD / BAD  Why?____________________________________________
8. Optional - Test battery with MIDTRONICS Capacitance Tester. Are results the same: ______
STARTER CURRENT DRAW TEST
1. Insure battery is serviceable (At least 50% charged)
2. Connect the Volt-Amp tester (VAT-40) as instructed or outlined in your textbook.
3. Switch the Volt-Amp switch to Starting Test Position.
4. “Zero” the ammeter and connect amps pickup clamp around the ground cable.
5. Disable the ignition system or use a remote starter switch.
6. Crank the Engine (Do not crank engine for more than 15 seconds).
8. Observe the voltage and amperage. Record the results below and compare to specifications.
9. Perform voltage drop tests using a digital voltmeter or the external leads of the Volt-Amp tester.
10. Record the results below and compare to specifications.

Note: Voltage Drop test on positive side is from the battery B+ post to “C” terminal on the solenoid. Battery Post to “B” terminal + “B” terminal to “C” terminal = Total Positive Voltage Drop.

CAR #1
1. Explain how to disable the ignition system on this car. ________________________________

2. Explain how to install a remote starter switch. ________________________________


4. Starter Draw Specifications: Amperes _____A Voltage _____V

5. Starter Draw Test: Amperes _____A Voltage _____V

6. Voltage Drop Specs: Positive Side (B+) _____V Ground Side (-) _____V

7. Voltage Drop Tests: Positive Side Total (B+) _____V Ground Side (-) _____V

   Positive Side Total = Solenoid Switch (B to C) _____V Battery Cable _____V

Note: Positive Side Total Voltage Drop = Solenoid Switch (B to C) + Battery Cable (Batt to B)

Starting System: GOOD / BAD Why? ________________________________

Recommendations: ________________________________

Electrical - Revised 8 / 00
CAR #2

1. Visual inspect Starting System?

2. Starter Draw Specifications: Amperes _____ A Voltage _____ V

3. Starter Draw Test: Amperes _____ A Voltage _____ V

4. Voltage Drop Specs: Positive Side (B+) _____ V Ground Side (-) _____ V

5. Voltage Drop Tests: Positive Side Total (B+) _____ V Ground Side (-) _____ V

Positive V.D. Total = Solenoid Switch (B to C) _____ V Battery Cable _____ V

Note: Positive Side Total Voltage Drop = Solenoid Switch (B to C) + Battery Cable (Batt to B)

Starting System: GOOD / BAD Why?

Recommendations:

CAR #3

1. Visual inspect Starting System?

2. Starter Draw Specifications: Amperes _____ A Voltage _____ V

3. Starter Draw Test: Amperes _____ A Voltage _____ V

4. Voltage Drop Specs: Positive Side (B+) _____ V Ground Side (-) _____ V

5. Voltage Drop Tests: Positive Side Total (B+) _____ V Ground Side (-) _____ V

Positive V.D. Total = Solenoid Switch (B to C) _____ V Battery Cable _____ V

Note: Positive Side Total Volage Drop = Solenoid Switch (B to C) + Battery Cable (Batt to B)

Starting System: GOOD / BAD Why?

Recommendations:

CAR #4

1. Remove and replace starter - Locate and read instructions prior to removing starter. Check with instructor prior to and after removal of the starter.
LAB SHEET # B-3

NAME________________________________________#_____

CHARGING SYSTEM OUTPUT
1. Insure battery is serviceable (At least 50% charged)
2. Connect the Volt-Amp tester (VAT-40) as instructed or outlined in your textbook.
3. Switch the Volt-Amp switch to Charging Test Position.
4. “Zero” the ammeter and connect amps pickup clamp around the ground cable.
5. Connect the Volt-Amp tester to the battery. RED to positive and Black to negative.
6. Raise engine speed to 2000 RPMS.
7. Adjust the Load Control Knob to obtain the highest ammeter reading possible while not letting voltage drop below 12 volts. (No less than 12V for no more than 10 seconds).
8. Charging system should produce alternator output current within 10% of the manufacturers rated output.
   NOTE: DO NOT EXCEED 16.5 VOLTS DURING ANY TEST

CAR#1
1. What is the reason for the “arrow” on the inductive amp probe?____________________________
2. What would the affect be if the “arrow” is ?____________________________________________
3. How is RPM going to be measured?______________________________________________________
4. Is the regulator internal or external?_____________________________________________________
5. Visual Inspection: Belts, Wires, Mounting:_______________________________________________
6. Belt Tension:                     Specs _______ mA   Actual Reading: _______ mA
7. Parasitic Drain:              Specs _______ mA   Actual Reading: _______ mA
8. Alternator Output Specs:          Amps _______ Voltage _______ RPM _______
9. Alternator Output Reading:       Amps _______ Voltage _______ at IDLE
                                      Amps _______ Voltage _______ at 2000 RPM
10. Voltage Drop Specifications:  Positive (B+) _______ V       Ground (-) _______ V
11. Voltage Drop Readings:         Positive (B+) _______ V       Ground (-) _______ V
12. Charging System Condition: GOOD / BAD    Why?__________________________________________
13. Recommendations:_____________________________________________________________________

LAB SHEET CONTINUED ON OTHER SIDE
CAR#2
2. Belt Tension: Specms ______ mA  Actual Reading: ______ mA
3. Parasitic Drain: Specms ______ mA  Actual Reading: ______ mA
4. Alternator Output Specs: Amps ______ Voltage ______ RPM ______
5. Alternator Output Reading: Amps ______ Voltage ______ at IDLE
   Amps ______ Voltage ______ at 2000 RPM
6. Voltage Drop Specifications: Positive (B+) ______ V  Ground (-) ______ V
7. Voltage Drop Readings: Positive (B+) ______ V  Ground (-) ______ V
8. Charging System Condition: GOOD / BAD  Why?____________________________

CAR#3
2. Belt Tension: Specms ______ mA  Actual Reading: ______ mA
3. Parasitic Drain: Specms ______ mA  Actual Reading: ______ mA
4. Alternator Output Specs: Amps ______ Voltage ______ RPM ______
5. Alternator Output Reading: Amps ______ Voltage ______ at IDLE
   Amps ______ Voltage ______ at 2000 RPM
6. Voltage Drop Specifications: Positive (B+) ______ V  Ground (-) ______ V
7. Voltage Drop Readings: Positive (B+) ______ V  Ground (-) ______ V
8. Charging System Condition: GOOD / BAD  Why?____________________________

CAR#4
2. Belt Tension: Specms ______ mA  Actual Reading: ______ mA
3. Parasitic Drain: Specms ______ mA  Actual Reading: ______ mA
4. Alternator Output Specs: Amps ______ Voltage ______ RPM ______
5. Alternator Output Reading: Amps ______ Voltage ______ at IDLE
   Amps ______ Voltage ______ at 2000 RPM
6. Voltage Drop Specifications: Positive (B+) ______ V  Ground (-) ______ V
7. Voltage Drop Readings: Positive (B+) ______ V  Ground (-) ______ V
8. Charging System Condition: GOOD / BAD  Why?____________________________

CAR#5  (Check with instructor prior to starting this section)
1. Remove and replace alternator - Locate and read instructions prior to removing alternator.

Electrical  Revised 8/00
DIAGNOSIS & REPAIR OF BATTERIES, STARTING, & CHARGING SYSTEMS

Make of Vehicle_________________________ Model_________________________ Year______

THE BATTERY:

Visual Inspection - Battery Case, Hold Down, Cables, and Connections? _________________

Cell Readings: 1 _______ 2 _______ 3 _______ 4 _______ 5 _______ 6 _______

Electrolyte Level and Condition: ___________  Is there Excessive Cell Variation: ___________

Open Circuit Voltage: _________________  State of Charge: 0%  25%  50%  75%  100%

Parasitic Drain:  Specification: _________________  Actual Reading: _________________

NOTE: Clean Both Battery Terminals, Cable Clamps, and at this time.

Heavy Load Test:  Amp Load: _________________  Voltage: _________________  Time: _________________

Battery Condition:  GOOD / BAD  Why?_____________________________________________

Optional - Test battery with MIDTRONICS Capacitance Tester. Are results the same: _______

Recommendations: _______________________________________________________________

THE STARTING SYSTEM:


2. Starter Draw Specifications:  Amperes _______A  Voltage _______V

3. Starter Draw Test:  Amperes _______A  Voltage _______V

4. Voltage Drop Specs: Positive Side (B+) _______V  Ground Side (-) _______V

5. Voltage Drop Tests: Positive Side Total (B+) _______V  Ground Side (-) _______V

   Positive V.D. Total = Solenoid Switch (B to C) _______V  Battery Cable _______V

Note: Positive Side Total Voltage Drop = Solenoid Switch (B to C) + Battery Cable (Batt to B)

Starting System:  GOOD / BAD  Why?_________________________________________________

Recommendations: _______________________________________________________________
THE CHARGING SYSTEM:


2. Belt Tension: 
   Spec: ______ mA  
   Actual: ______ mA

3. Parasitic Drain: 
   Spec: ______ mA  
   Actual: ______ mA

4. Alternator Output Specs: 
   Amps ______  Voltage ______ RPM ______

5. Alternator Output Reading: 
   Amps ______  Voltage ______ at IDLE
   Amps ______  Voltage ______ at 2000 RPM

6. Voltage Drop Specifications: 
   Positive (B+) ______ V  
   Ground (-) ______ V

7. Voltage Drop Readings: 
   Positive (B+) ______ V  
   Ground (-) ______ V

8. Charging System Condition: GOOD / BAD  Why? ____________________________

Recommendations: __________________________________________________________
# LAB SHEET # B-5

**NAME_________________________#_________**

## SELF ASSESSMENT AND TARGET TRAINING WORKSHEET

### BATTERIES

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<td>State of Charge (Open Circuit Voltage)</td>
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### STARTING SYSTEM

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### CHARGING SYSTEM

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<td>Charging Circuit Resistance Test</td>
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