2003 Transportation Education Academy Activities

High School Activities: Land

Automobile Starting and Charging System Testing

LEARNING AREA: Read Listen & View
EDUCATIONAL LEVEL: High School
CONTENT STANDARDS: Technical Reading

STANDARD:

1. A student shall demonstrate the ability to read and apply technical information gathered from varied English documents or electronic media, listening and/or viewing.
2. For the selected applications in item A, a student shall:
    a. Identify and select relevant information for completing the application.
    b. Interpret specialized vocabulary.
    c. Interpret information found in charts, graphs, tables and other visual graphic representation of data.
    d. Apply step-by-step procedures.

WHAT THE STUDENTS WILL LEARN:

DESCRIPTION: Automobile Starting and Charging System Testing

Students will learn how to test an automobile starting and charging system

PRODUCTS/EVIDENCE OF LEARNING:

Each of the students will perform the following:

1. Locate the electrical diagrams for the starting and charging systems.
2. Check the condition of the battery cable connection
3. Check for a parasitic draw on the battery system.
4. Load test an automotive battery.
5. Draw the basic automotive charging system circuit.
6. Determine the condition of alternator drive belt.
7. Determine the voltage available at the alternator (field voltage).
8. Test the alternator voltage and amperage output at 2000 RPM.
9. Draw the basic automotive starting system circuit.
10. Determine the voltage available at the starter solenoid and starter motor.
11. Determine the voltage available at the “S” wire at the starter with the key in start position.
12. Determine the starter amperage draw and voltage after 15 seconds of cranking with fuel and/or ignition disabled.

OVERVIEW:

This activity is an introduction to automobiles course that would be geared to be a beginning to learn the basic automotive technician skills. Students should have knowledge of automotive shop safety and the use of automotive tools and equipment.

Specialized automotive tools like a voltage meter, battery load tester with amperage clamp, and service manuals will be needed, as well as vehicles with starting and charging problems.

Upon the completion of this activity, the student should understand what makes an automotive engine crank over.

1. Students will view VHS on starting and charging systems and operation of the VAT –40.
2. Each student will be given an oral exam on the operation of the starting and charging system of a vehicle.
3. Each student will identity and name the components of a battery, starter and alternator.
4. Each student will prepare a written presentation about an element of the starting or charging system, not to exceed ten minutes, which he or she will have to recite to the class.
5. Each student will create a flow chart for solving starting and charging system problems, which will be shared with other students.

Work Sheet

1. Where do you find electrical diagrams for starting and charging systems? Explain how and where you found the information.

2. Are the battery cables tight and clean?

3. What is the voltage drop between the cables and battery when the engine is cranking?

4. What is the parasitic draw on the system? Is it within the acceptable limits?

5. Is the battery fully charged?

6. Find the cold cranking rating for the battery and the vehicle requirements.

7. Load test the battery. Does the battery voltage fall below 9.6 volts after 15 seconds? Does the battery pass or fail?

8. Draw a charging system circuit included the battery, alternator and regulator.

9. Is the alternator drive belt tight? Describe the condition of the belt? Is it oily, cracked, worn, glazed, misrouted or incorrect for the vehicle?

10. What field voltage is available at the back of the alternator connection?

11. What are the factory specs (voltage and amperage) for the alternator you are testing? The average voltage is 13.5 volts to 14.2 volts. What are the readings you get from testing? What is the difference between your test results and your readings?

12. Draw the basic automotive starting system circuit, including the battery, starter motor, solenoid, and ignition switch.

13. What are the factory specs (voltage and amperage) for the starter you are testing?

14. What is the voltage available at the “S” wire at the starter with the key in start position?

15. What is the voltage available at the starter motor terminal? Does the starter motor have a good ground?

16. What is the starter amperage draw and voltage after 15 seconds of cranking with fuel and/or ignition disabled?

17. What is the difference between the test results and the specs? What other factors could cause your results besides the starter motor? What test results mean that starter is bad?

CHECKLIST:

Student	Teacher	
_____	_____	Complete all tasks on worksheet.
_____	_____	Complete oral exam on operation of the starting and charging system of vehicle.
_____	_____	Complete identity and naming of components of battery, starter motor, and alternator.
_____	_____	Complete written and oral presentation of starting and/or charging system.
_____	_____	Complete flow chart activities for starting and charging system.
_____	_____	Use appropriate and accurate technical vocabulary correctly.
_____	_____	Select and apply all necessary and accurate information from technical manuals and resources.

_____ _____ Access multiple sources to acquire information, as necessary.