# Testing Electrical Systems and Electrical Controls

**Activity 2-2**

**Format:** Small Group (3-5 students)

**Time Frame:**

* 1:30 (chassis voltage systems, parasitic loads, individual circuit loads)
* 3:00 (5-volt reference circuits)

**Description**

This activity provides students with an opportunity to use test, calibration, and diagnostic equipment; measure voltage, amperage, and resistance; operate and test systems, distinguish defects and deficiencies; perform electrical calculations; and recommend required repairs to resolve deficiencies on low-voltage electrical systems and electronic controls and instrumentation.

**Materials**

Activity sheet

Pen/pencil

Emergency response vehicle

DVOM

Ammeter

Fuse-resistance chart

**Instructions**

1. For each table below, complete the diagnostic measurements and the document whether you would repair or replace the component/system.
2. Share your findings with the class.

**Instructor Notes (Delete before printing student copies)**

1. Before distributing the Activity 3-1 to the students, complete column 3 (Acceptable Range) based on specifications for the vehicle used for the activity.
2. For each sensor, component, or system tested, describe any characteristics that would indicate failed or faulty parts or other operational deficiencies.

## Chassis Voltage Systems

Using a DVOM, complete and document diagnostic measurements on **chassis voltage systems**.

**Chassis Voltage Systems**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sensor, Component, or System to test** | **Acceptable Range** | **Actual Reading** | **Recommended Action** |
| Relay system |  |  |  |
| Solenoid system |  |  |  |
| Lighting system |  |  |  |
| Starting system |  |  |  |
| Charging system |  |  |  |
| DC motor system |  |  |  |
| Warning system |  |  |  |

## Parasitic Loads

Using a DVOM and ammeter, complete and document diagnostic measurements for **parasitic loads**:

* Agency-added: flashlights, radio chargers, computer chargers, EMS equipment, etc.
* Vehicle-based: onboard computers, lights, keep-alive memories, etc.

**Vehicle-based Parasitic Loads**

|  |  |  |  |
| --- | --- | --- | --- |
| **Time** | **Acceptable Range** | **Actual Reading** | **Recommended Action** |
| 5 minutes |  |  |  |
| 10 minutes |  |  |  |
| 15 minutes |  |  |  |

**Agency-added Parasitic Loads**

|  |  |  |  |
| --- | --- | --- | --- |
| **Time** | **Acceptable Range** | **Actual Reading** | **Recommended Action** |
| 5 minutes |  |  |  |
| 10 minutes |  |  |  |
| 15 minutes |  |  |  |

## Individual Circuit Loads

Use fuse voltage drop to determine individual circuit loads.

* Using a DVOM, measure voltage drop at the fuse for the circuit being tested
* Using a fuse-resistance chart, determine the resistance of the specific fuse
* Using Ohm’s law, calculate amperage per circuit

**Individual Circuit Loads**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Circuit/System** | **Acceptable Range** | **Actual Reading** | **Resistance** | **Amperage per Circuit** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## 5-volt Reference Circuits

Using a DVOM, complete and document diagnostic measurements on 5-volt reference circuits.

**5-volt Reference Circuit**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sensor, Component, or System to Test** | **Acceptable Range** | **Actual Reading** | **Recommended Action** |
| Throttle position sensor |  |  |  |
| Manifold absolute pressure sensor |  |  |  |
| Mass airflow sensor |  |  |  |
| Intake air temperature sensor |  |  |  |
| Coolant temperature sensor |  |  |  |
| Oxygen sensor |  |  |  |