Section 1

Essential Electrical Concepts

Introduction

Modern vehicles incorporate many electrical and electronic components and systems:

- Audio
- Lights
- Navigation
- Engine control
- Transmission control
- Braking and traction control

You need to know essential electrical concepts to effectively troubleshoot these and other electrical circuits.

Electrical and electronic system troubleshooting can be straightforward if …

- You know what to look for.
- You know how to select and use the appropriate tools and test equipment.

With the knowledge and techniques you will learn in this course, you will be able to …

- Diagnose and repair electrical and electronic problems correctly on the first attempt.
- Reduce diagnostic and repair time.
- Increase customer satisfaction.

Meters

Different meters are used to measure voltage, current, and resistance:

- Voltmeter - to measure voltage
- Ammeter - to measure current
- Ohmmeter - to measure resistance

These three metering functions are combined into a single tester called a “multimeter.” Nearly all automotive technicians use multimeters.

A multimeter is often called a “volt-ohmmeter,” even though most multimeters also measure amperes (current).

A multimeter can be one of two types:

1. Analog - display uses a needle to point to a measured value on a scale.
2. Digital - display shows measured value in actual numbers (digits).

Metering Functions

Three metering functions are combined in a typical digital multimeter.

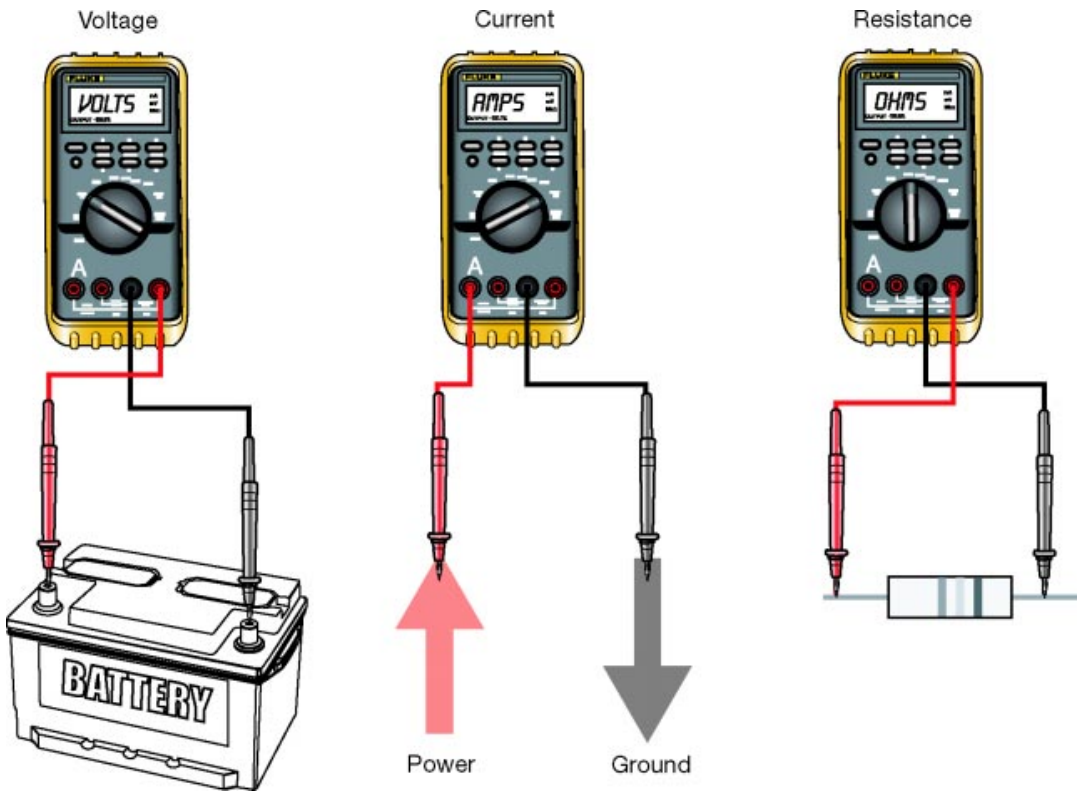

Fig. 1-01
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Analog Multimeters

Analog multimeters …

- Use a mechanical movement to drive a pointer.
- Display a measured value where the pointer intersects a calibrated scale.
- Are not suitable for measurements in circuits with sensitive electronic components (such as ECUs).
- Are more susceptible to damage from mechanical shock than are digital multimeters.

Typical Analog Multimeter

Analog meters use a mechanical movement and are not suitable for measurements in circuits with sensitive electronic components.

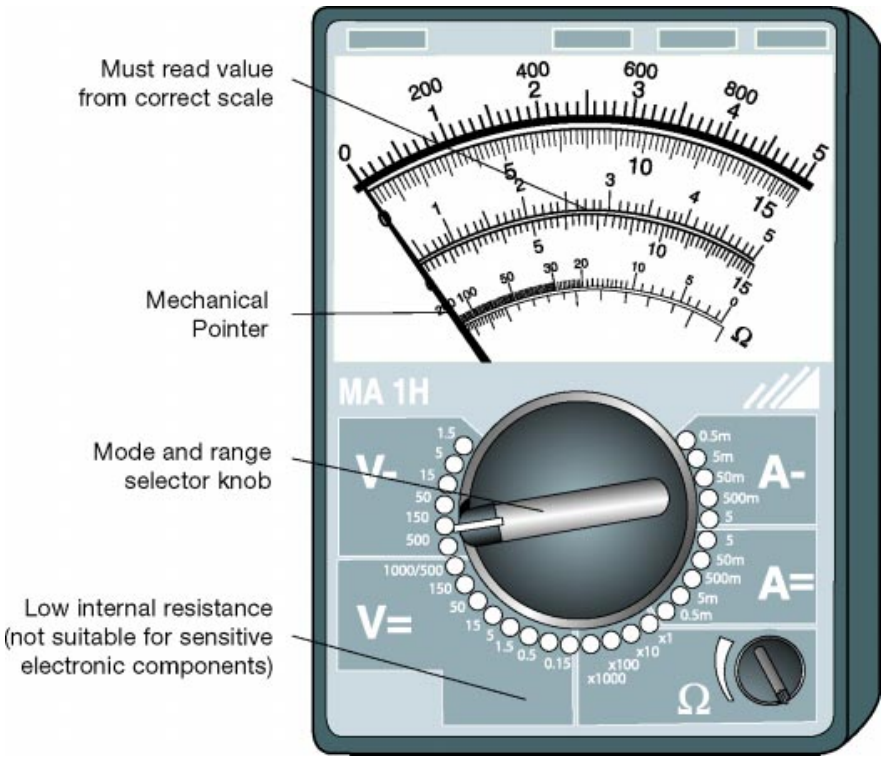

Fig. 1-02
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