

THE BATTERY

HOW BATTERIES WORK.....5

The Functions of Batteries
Battery Plates and Terminals
Theories of Electrical Current Flow
How Electrons Flow
A Path For Electrons – The Electrical Circuit

CHEMICAL REACTIONS WHEN DISCHARGING.....12

Overview of Discharging
Battery Terms
The Oxidation Electrochemical Reaction
The Reduction Electrochemical Reaction
Electron Travel Through The Circuit
Electrical Potential

BATTERY RECHARGING.....19

Sulfation and Battery Recharging
Battery Chargers
Initial Charging
Battery Recovery From Severe Sulfation

TYPES OF BATTERIES.....26

Lead Acid Batteries
Maintenance Free Batteries

BATTERY RATINGS.....28

BATTERY TESTING.....29

Unloaded Testing – Measuring Specific Gravity of Electrolyte

Unloaded Testing – Measuring Open Circuit Voltage

Load Testing – Measuring Resistance In The Plates

IMPORTANT BATTERY FACTS.....35

TEST QUESTIONS AND ANSWERS.....36

HOW BATTERIES WORK

The Functions of Batteries

The main function of the battery is to store electrical energy in the form of chemical energy, for the purpose of starting the engine. Put simply, the basic job of the battery is starting the engine.

The battery converts chemical energy into electricity by way of chemical reactions. These chemical reactions produce the electrical energy needed to energize the starter motor, the ignition system, the fuel circuit if a fuel injection system is used, and the lighting circuits that include headlights, tail lights and turn signals.

Batteries do not store electricity. Batteries store chemical energy in the sulfuric acid of the electrolyte solution. Electrolyte solution consists primarily of highly concentrated sulfuric acid. This stored chemical energy will then be converted into electrical energy – electricity.

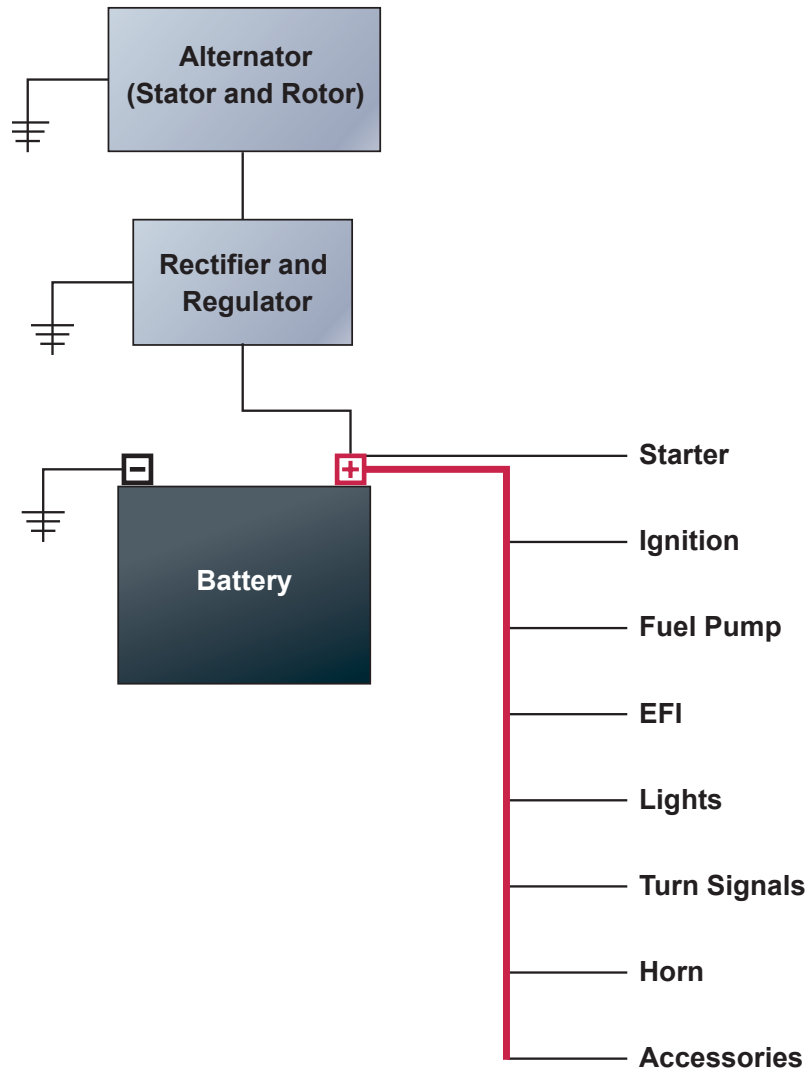
The second major function of the battery is to supplement the power generated by the alternator when the electrical system loads are greater than the power the alternator can deliver.

Technically the charging system alone could supply the electrical energy required by the motorcycle and no battery would be needed. However, at low engine rpm, the charging system may not put out enough energy to keep the lights burning brightly, the ignition system firing, and also supply auxiliary current for extra running lights, heated handlebar grips and a heated vest. The solution is to have the battery produce the current needed to make up the electrical deficit during low rpm operation.

Batteries also supply current to power parasitic loads when the engine is not running. Some electronic devices such as clocks and electronic control units need tiny amounts of power at all times in order to function properly. For example, a power outage in a house usually results in an electronic

alarm clock needing to be reset because it loses track of time when the parasitic power supply was broken.

Basic Electrical System



In the basic electrical system, the alternator produces the current to recharge the battery. The rectifier changes the AC alternator current to DC current, and the regulator reduces the voltage output to about 14 to 15.5 DC volts.

The starter is connected directly to the positive battery terminal. All other electrical components also receive current sourced from the positive battery terminal. Current travels from positive to negative in motorcycle and automotive electrical systems.

The third major function of the battery is to stabilize the voltage flow in the electrical system. A temporary spike in voltage is called a transient or a surge. A transient high voltage surge can overwhelm and break sensitive electronic parts such as an electronic ignition module or the electronic control module. The battery absorbs the voltage spike and smoothes out the flow of voltage while continuing to supply the normal voltage requirements in the electrical system. Think of the battery as a type of surge protector.

Disconnecting the wire from the alternator to the regulator while an engine is running, or, disconnecting one of the battery cables while the engine is running can cause a destructive voltage surge. This surge of voltage can damage sensitive electronic components which are not able to absorb high voltages without damage.

