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CHARGING SYSTEM - INTRODUCTION

The charging system of virtually any vehicle consists of the power generation source, a storage device for electricity and some sort of controller to maintain system voltage within preset limits. The purpose of this short article is to outline in simple terms the function of the system and to identify its parts. The article is not intended to be in depth on and has been written without proof but with the hope that it will be useful to someone.

In order to provide power for functions such as the ignition system (spark to ignite the air-fuel mixture), an electric starting motor (often referred to as a “starter”), lights, and other accessories the typical motorcycle system consists of a battery which is used to provide power when the engine is not running, to supplement power when the charging system is not providing sufficient output such as at idle, and often to act as a buffer to help keep system voltage more uniform.

*Note the KLR uses a separate system to generate power for the ignition system.

In the charging system, the battery simply acts like a tank or reservoir to store electricity until needed. Like a tank it has a limited capacity and will run “dry” if more comes out than goes in for a long enough interval of time. A bigger capacity battery will hold more power, take longer to drain at the same load, take more space and be heavier. A larger battery will also take longer to charge on the same charging system.

Remember we are talking at basic, basic level.

As time and energy allow I will try to deal with each of the components in greater detail.

The battery of course will eventually empty (go dead) if there is not

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some means of refilling the electricity that is used and that is the function of the power generation part of the system. In most modern applications the power generator is referred to as an “alternator”. Alternator because, unlike systems of the 1960’s and before, the alternator generates alternating current (AC like house power) which is changed (rectified) to direct current (DC like from flash light batteries). More on DC and AC current later.

The alternator is usually mounted internally to the engine on motorcycles and externally (belt driven) on automobiles. That whine which usually gradually diminishes when you start the cage in the morning is the sound of the alternator working hard to recharge the battery, replacing the power removed in starting the engine.

The other members of the charging system “team” are the rectifier and the regulator. In simple terms the rectifier uses diodes (electrical one-way valves) to change alternating current (back and forth) electricity to direct (one way) electricity. More on these later.

Automotive rectifiers are inside the alternator however small charging systems such as those on most motorcycles have the rectifier mounted somewhere where a reasonable amount of airflow can provide cooling for the rectifier. Rectifiers such as the KLR’s are 3 or 4 inches square by about 1 inch thick and typically have fins to help dissipate heat.

The final component of the charging system is the regulator that is really a misnomer because it doesn’t really regulate at all. What it does is to limit the maximum voltage that the charging system produces. Under typical circumstances it operates to prevent the charging system from pushing the system too voltage too high and frying things. Most motorcycle voltage regulators are mounted together with the rectifier.

Those of us who grew up with 1960’s motorcycles will remember characteristics of very simple charging systems. Many of these early bikes had not regulator and simply matched the alternator’s capacity to the load. This meant that the lights and any other loads were sufficient to prevent the alternator from pushing the system voltage too high. If the headlight bulb burned out the voltage would start to climb and burn out the tail light.

Many of the old British bikes were even more interesting. The twins would take brake light power from the ignition power for one cylinder, which meant that the engine would miss when the brake was applied. Typical British logic justified this by saying that you weren’t meant to accelerate with the brake on anyway.