CHARGING SYSTEM TROUBLESHOOTING

CHARGING SYSTEM REVIEW

Charging System Overview

The previous chapter called “Charging Systems” should have already been read by the student before starting this chapter on troubleshooting the charging system. The previous chapter on charging systems gives the student a detailed understanding of how charging systems work.

The motorcycle charging system consists of the alternator, voltage rectifier/regulator, and battery. The alternator produces alternating current, and this is where the term “alternator” originated.

The main function of the alternator is to charge the battery. Alternators are constructed as one piece or as three pieces. Three-piece alternators are made up of a separate stator, rotor and regulator/rectifier.

One piece alternators can generate more power and are more dependable than three piece alternators. However, they are very large in size and are primarily used on only a few of the very largest touring bikes.

Because of limited space around the motorcycle engine, the only practical option for nearly all motorcycles is the three-piece alternator. The stator and rotor fit compactly around the engine crankshaft, and the rectifier is housed in the regulator which is typically bolted to the front of the bike where it can be air cooled.

The current generating capacity of alternators is rated in volts and amps. For example, the regulated voltage output, (charging output), of a GSXR-1000 alternator is 14.0 to 15.5 DC volts (DCV) at 5,000 rpm. This is direct current after the current has been rectified from AC current to DC current. This is also current that has been regulated by the regulator to put out no more than 15.5 DC volts.

Some service manual specifications refer to the un-rectified AC voltage output. For example, the Harley evolution engine alternator puts out 16.0 to 20.0 **AC volts** (ACV) per 1,000 rpm of the engine. In some

respects this is a better measure of the current producing power of the alternator, because alternator current from any alternator must be reduced to roughly 14.0 to 15.5 DC volts anyway, so as to not overcharge the battery.

In everyday descriptions of alternator output, alternators are typically described by amperage output. For example, a typical three-piece alternator for the Harley evolution engine will put out 32 amps (not volts) of electrical current. A more powerful aftermarket three-phase alternator for the same engine may be rated at 40 amps. It will generate 25 amps at idle rpm, and 40 amps continually with the engine running at over 2,800 rpm.

Late model Harley touring bikes with fuel injection feature 45 amp charging systems. The electrical demands of fuel injection require more amperage.

If the charging system develops a problem and begins to produce less current than it should, the battery will make up the difference required by the electrical system components, until the battery goes dead. In such case, a dead battery may not mean the battery is bad. It may be the result of a faulty charging system that is not keeping the battery charged.

Alternators are considered AC charging systems even though the rectifier will change the AC current to DC current for use in the motorcycle electrical system. A motorcycle requires DC current, not the AC current produced by the alternator. Alternators produce AC current and are sometimes referred to as “AC generators”, although this term is not always used.

In contrast to the 1999 Harley, a 2007 Suzuki GSXR 1000 charging system is powered by a three-phase AC generator. It produces a regulated voltage (charging output) of 14.0 to 15.5 volts at 5,000 rpm. It still uses a stator to generate current. **The stator is also called a generator coil or generator stator.** This charging system also utilizes a rectifier and regulator. **Note again that AC alternators are also called AC generators.**

The three types of alternators are the permanent magnet alternator, the electromagnet alternator and the flywheel magneto alternator.