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BATTERIES AND STUFF 2 - WHAT IS 12 VOLTS?

The voltage of your bike battery likely isn't something you need to lie awake worrying about but as they say, "A little knowledge is a dangerous thing." Ah, maybe that's not the best cliche? (VBG)

So what is the practical difference between a 12 volt battery and a 6 volt battery? If they are of the same physical size then they likely contain about the same amount of electrolyte and have the same surface area of plate material so we can expect that each will store the same amount of electrical energy.

So let's look at "What if":

What if I put a 12 volt battery into my bike in place of the 6 volt battery it is supposed to have? OK what will happen is that the 12 volts of electrical pressure will be twice as much electrical pressure as the circuits were designed to operate under. Very basic electrical theory will indicate that twice as much pressure will cause twice as much electricity (electrons, amperes, amps.) to flow. This will be bad news because the circuits/components which do the job of producing heat will now produce twice as much heat as was intended. Components such as light bulbs will be very bright for maybe a second or so and then will burn out. Relays, ignition oils and the like, may last for some time but will also fail due to too much heat being produced. Electronic components such as transistors, integrated circuits and the like will fail, maybe instantly, maybe faster.

This brings us to a very important bit of electrical and electronics theory. It is important to recognize that all electrical and electronic components, wires and so on, are composed of smoke. That's right, they are made of smoke. The main difference between electrical components like headlight bulbs, starter motors, handle bar heaters and electronic

components such as transistors and ignition modules is that electrical components tend to contain a lot of smoke while electronic components contain very little smoke.

Here is where the theory becomes practical: If you let too much smoke out of a component, it will stop working. Electrical components like starter motors contain a lot of smoke so you can let a lot out before they quit working but ignition modules contain only tiny amounts of smoke so almost any smoke lost will see them fail.

I challenge anyone to show how this theory does not apply in the real world.

Wires contain a lot of smoke, the bigger the wire, the more smoke.

Much of what we do in service or repair is to replace something which has had too much smoke let out or to ensure that we install something so that no smoke will be lost.

Now, back to putting the 12 volt battery into my 6 volt bike….What will not happen is that the battery will be charged. Why? It takes more than 12 volts to completely charge a 12 volt battery. Remember in the last article? Each cell of a lead acid battery has a bit more than 2.1 volts so a fully charged 12 volt battery is actually a 12.8 volt battery and we will measure up to 13.2 or 13.4 volts across a 12 volt battery which has just been taken off the charger or just been in the bike. Typical 12 volt charging systems will apply 14.2 to 14.8 volts across the battery which ensures a full charge and a quick recharge. The numbers for a 6-volt system will be about ½ of those for a 12 volt. The 12 volt battery would function somewhat if it were dead when put into the 6 volt bike and the bike's charging system allowed to charge it but the result would be a weak six volt battery which would soon fail due to sulphation (more on these terms later). In short we wouldn't do this.

Have you noticed that your cage's and bike's lights become brighter when the engine is running? Why? When the engine is off, the charging system is not in operation so the most voltage available to power the lights is 12.8 volts and this will fall as the battery provides power. When the engine is started, the charging system operates and the system voltage rises. In some applications the charging system can operate at full output when at idle speed but most require that the engine be at a higher speed. Watch your tach as you gradually speed up the engine to see at what speed your charging system is reaching high output. You cannot expect a low battery to recharge much below this engine speed as a rule of thumb. As I said earlier, more voltage (pressure) means more electricity flowing so more work is done. There is a limit to the

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benefit of higher voltage since we don't want to fry things so this is where the voltage regulator acts to limit maximum voltage.

Back to the batteries… So what happens if I put a 6 volt battery into my 12 volt bike? Also a bad idea! Think of too little pressure causing too little flow so too little work being done. The lights will be very dim, the starter will not turn the engine fast enough for it to start (likely) and regardless, the ignition system will not produce a strong enough spark to fire the fuel (if the ignition is common to the battery system) so no go. In a later article we can explore some additional problems which will result from low battery capacity. If we succeed in starting the engine such as by bump starting a KLR, the charging system will begin to operate and one result will be over charging of the battery which will boil dry and be ruined.