Connecting electric accessories to your bike
by Robert Lamishaw

There is no shortage of useful electronic and electric stuff to attach to our motors. Sat Nav systems, heated clothing, cell phones, powered this and that, are all great fun but do present some challenges. Arguably the four most critical are:

1. Making sure that we don't overload the often anemic electrical systems of our bikes;
2. Connecting all the wires in a manner that doesn't look like a rat's nest
3. Running out of room on the battery terminals for all the connectors
4. Ensuring that all connections are clean and tight to avoid intermittent electrical problems that can spoil the enjoyment of the toys and drive you nuts.

An elegant solution, to the latter three, is to use a fuse block and I recommend the FZ-1 by Fuzeblocks (at www.fuzeblocks.com and sold through Cyclenutz at www.cyclenutz.com). This clever little gizmo takes one connection to the battery, and then allows all the other electrical accessories (up to 6 separate circuits) to connect to it. There are several manufactures of similar devices but the one made by Fuzeblocks is unique and I believe ideally suited to a motorcyclists needs, but more on that in a moment. First let's take a look at the first issue, that of overloading the charging system.

Let's determine what the electrical load is and if your bike has the juice to do what you want.

Below are rough and ready estimates of our BMW's electrical output capacity and typical electrical demands of the bike and our accessories. It's a good idea to verify the bikes electrical capabilities by checking the owner's manual by looking in the technical specifications section or checking on-line.

A motorcycles electrical system consists of three major parts, the alternator, the regulator-rectifier and the battery. The alternator is responsible for producing the current to keep the battery charged and power all of the electrical loads. The regulator-rectifier converts the alternator output from un-useable AC power to useable 14.4 VDC. The battery is used to both start the bike and buffer the power from the alternator.

To calculate your bikes electrical capacity you need to know the "charging output" from the manufacturer's specification sheet (some examples of BMW charging outputs are listed in Table 1 below). Also keep in mind that these are typically peek outputs when the motor is revved to normal cruising RPM. At idle the alternator's output can be much less. This means in stop and go traffic with a high load for heated clothing, lights, etc. you will be drawing from your battery and that can result in a dead battery.

Table 1 – Peak Charging Output

- BMW R1150RT 700 watts
- BMW R1200RT 720 watts
- BMW K1300GT 945 watts
- BMW K1200LT 840 watts
- BMW F 650/800 GS twins 400 watts

Next calculate the common operating load (the total all of the electrical devices that are part of the bike and will be in operation during normal riding).

The FZ-1 is a great way to connect electric devices

Table 2 – Common Operating Loads

- High Beam 55 watts
- Low Beam 55 watts
- Number Plate 5 watts
- Brake/Tail 21 watts
- Instrument Panel 2 watts
- Computer 25 watts
- Fuel Pump 60 watts
- Cooling Fan 60 watts
- Electronic Ignition 50 watts

A typical operating load for a standard fuel injected motorbike is about 285-300 watts.

Subtracting the operating load from the charging output will give you the excess capacity of your charging system and tell you what electric accessories you can safely mount on the bike.

Next you need to figure out what accessories you plan to

use and if they'll ever all be used at the same time. The table below shows how much power some common electrical accessories draw. Only a few accessories draw high power (i.e. heated clothing, heated grips and auxiliary lighting). Small electronics like cell phones and radar detectors draw very little. You can usually run as many of the smaller items as you wish with little or no worry.

To find the total power required for all of the accessories you plan to use, add the power rating (watts) for each device. Most manufacturers will provide the electrical draw in watts or amps so check your owner's manuals or the company's web sites. If the manufacturer only provides the electric draw in amps a simple conversion formula exists to find the watts equivalent (watts=amps x voltage, all modern bikes use 12 volt systems).

Table 4 – Some Common Accessories

- Heated Garments 35 – 77 watts (per person)
- Heated grips 20 - 30 watts
- Aux lights 35 – 100 watts (each)
- Cell Phone 1 – 3 watts
- Radar Detector 1 – 3 watts
- GPS 2 – 6 watts
- Portable Music Player 1 – 3 watts

Sometimes your favorite bike does not have much excess capacity. For example, the F 650/800 GS only has a 400 watt alternator with about 100 watts of excess capacity. Powering several high demand accessories, (i.e. heated clothing, driving lights, etc.) could easily overload the capacity of the alternator and end up draining the battery. However, there are a few things that can be done to conserve a few precious watts:

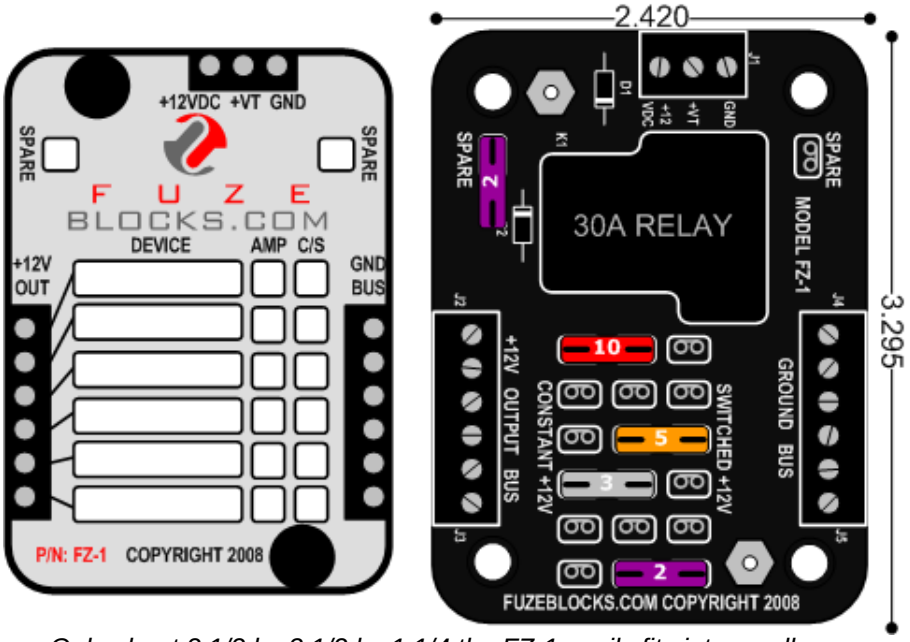
1. Replace standard lights with low power LED lighting (where possible).
2. HID headlights typically use much less power then stock headlights and put out a better quality of light.
3. Add a circuit that automatically turns the low beam off when the high beam is activated.
4. A dirty fuel filter can cause the fuel pump to use 120 watts, 60 more than normal. A dirty fuel filter is a common cause for a voltage regulator to fail on a fuel-injected bike.
5. Be very careful about auxiliary driving lights as these can be very high power users.
6. Limit use of heated garments, gloves, pants, etc. as they all draw huge amounts of power.

According to Widder Canada Inc. "Today's motorcycles of 500cc or larger can usually handle three (heated) garments together without overtaxing the charging system. Three garments would be equivalent to turning on a 100 watt headlight. Most larger bikes would have no problem riding two-up with both rider and passenger each wearing the full set. Another aspect to consider is that the items will not necessarily be on all the time, or if the thermostat is adjusted to less than full capacity, there will be less draw."

The Gerbing's web site states: "…the electrical output of the typical motorcycle continued to increase as motorcycle engineers attempted to satisfy the growing demand for electrical accessories. The result is that all but the smallest bikes can now provide the power needed to generate the needed heat."

Another technique to make sure you're not overloading you system is to use a voltmeter. With the bike in stock condition rev the engine to about 2,000 RPM and check the voltage across the battery terminals. It should read 13-14 Volts. After you connect all the accessories try it again and if the voltage across the battery is below the original reading then your bike isn't outputting enough power for all your toys. While this technique is pretty fool proof it does require connecting everything so use the mathematical method first and then double check with a voltmeter when everything is connected. This way you can be sure you are not overloading the bikes electrical system.

Once you have determined that your bike can handle the load the next step is to decide what circuits (devices) you want on constant or switched power. Constant power means that the device has a direct electrical connection to the battery and has to be turned on and off manually. This



Only about 2 1/2 by 3 1/2 by 1 1/4 the FZ-1 easily fits into small spaces and provides a protected and solid connection for all your electric devices.

is fine if you remember to do it. Just remember that even a forgotten MP3 player can drain the battery if left on for several days while the bike sits in the garage. High draw items, like electric clothing, can drain a battery in minutes even as you sit on the bike with the jacket plugged in and the motor off.

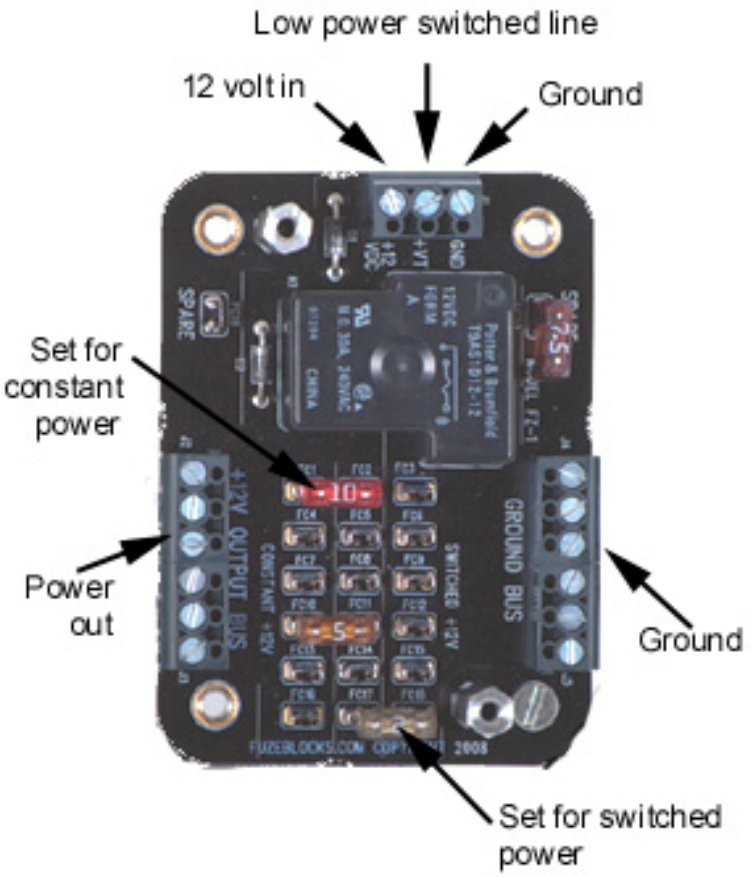
Switched power only comes on when the ignition is turned on, although the motor does not need to be running in many cases. Your parking lights are an example of switched power. In order to use a switched power setup you need to have a relay.

A relay is nothing more than an electrically controlled switch that allows you to use a very low power source, like your parking lights, to automatically close a high capacity circuit that connects to your battery. By placing a relay between your battery and the electric device you can be sure that only when the key is on will power be drained from the charging system. If you don't use a fuse block then you'll have to have a separate relay for each device you want to have on switched power, a complex and messy system. You can use a relay with any fuse block, however, most require that either all the circuits be switched or none are.

This is where a product like the Fuzeblock FZ-1 really stands out. The FZ-1 has a built in relay so once you connect the battery wire to the input on the FZ-1 and find a wire that supplies +12V when the bike is turned on, the FZ-1 allows you to select switch or constant power for each individual circuit. The ability of the FZ-1 to mix and match constant power and switched power in the same device saves having to have two fuse blocks or decide that all your electric accessories will be one way or the other. Connect the left and center post constant power, connect the center and right post switched power, it's that easy. What's more since the FZ-1 has the relay built in, so there are no additional electrical devices to buy or connect and no worries that the relay is of the right type and capacity. Having the relay built in also means that there are several fewer crimp or other type connectors to break, short or otherwise be a point of failure or intermittent electrical problems, potentially a very big deal in the harsh environment of a motorbike.

Some of the features of the FZ-1 are:

- A weather Resistant flame retardant (UL 94-5VA) ABS Cover
- 2 - Onboard diodes to prevent transient voltages (Good news for our Canbus bikes)
- Each circuit can handle up to 10A
- The total amperage used via the relay (switched power) is 30A
- The total amperage on the constant side is 30A
- Note: The total amperage for the entire FZ-1 should not exceed 30A
- Crimpless heavy duty screw terminals
- Takes wire gauges up to 12AWG
- Mini fuses that can be found at most auto parts stores



- Spare Fuse holders
- Compact Design: L 3.25" x W 2.5" x H 1.25"

As with any of these devices it is recommended that you install an "in line" 25-30 amp fuse between the battery and fuse block, typically not supplied, but readily available at any good auto parts store and while in the store you may want to buy some extra mini-fuses of different amps.

At $79.95 the Fuzeblock isn't cheap, but considering it has the relay built in and allows both switch and constant power circuits in the same box, it is very competitive.

For much more information on this product and lots of good hints for wiring up your accessories check out Fuzeblocks very complete web site at www.fuzeblocks.com. The product is available from Cyclenutz who have a lot of very cool gear and several other similar products you can check out. Their web site is at www.cyclenutz.com.