electrical trouble shooting

tech tip

by Pete Ruff

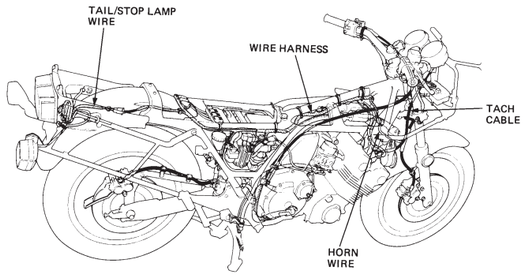
I have two separate but linked electrical problems to relate to you and some ideas on how to prevent them and correct them if they occur.

The first instance happened in 1996 while on my first Drunks and Bums tour to Montana. After a long day of riding in rain and darkness, I arrived at Dave Gaines' house in Bigfork with what appeared to be a severe electrical problem. The stop light was out, and the turn indicators were not working – no big deal, you say. Try that in the dark in the rain! The next morning, I discovered the fuse for the stop light, turn signals and horn was blown. Thanks to a little pocket size multi-meter that Herb Marcus carries and the electrical wiring diagram from Dave Gaines' Service Manual, we diagnosed the problem. The wire for the stop light in the main wiring harness was shorted to ground – zero ohms. A temporary fix was made by running a wire parallel to the main harness from the front where the right handle switch plugs into the harness, to the back of the bike, where the tail light sub-harness plugs in to the main harness. This jumper wire was spliced in with solder and the splices insulated with electrical tape. After the fuse was replaced, everything worked properly except the rear brake switch was no longer in the circuit, and didn't light the stop light - but I could live with that. I had made an effective on-the-road-fix.

Over the next several days we speculated about how a seemingly good wire harness could suddenly develop a dead short in the middle. Metal fatigue, old age, and bad karma all received some attention, but no good answer occurred to anybody.

After three years of riding the bike with this "temporary" fix, and not really knowing why the failure occurred, I decided to replace the main harness, effect a permanent fix, and remove all doubt. While it is basically a plug-in component, replacing the main harness is not a trivial task. The tank and seat must be removed, and every component that plugs into the harness must be unplugged – sometimes difficult because of space limitations, tight connectors, and the little release that must be pushed in before pulling the connector plugs apart.

I started at the back, the easy part. First the rear sub-harness, the spark unit plugs, rear stop switch, and turn signal flasher came off. Then came the row of connector plugs on the right side of the air box. Just forward of this area, the harness passed over the airbox as it heads for the central backbone tube. Here I noticed something strange. I couldn't pull the harness forward over the airbox – it was held fast. Two small bolts pass down through the frame and secure the airbox firmly in place.
I loosened these two bolts, and the harness pulled through easily. I examined the harness in this area, and discovered the bolt on the right side had not only pinched the harness, but had worn through the outer wrapping and through the insulation of one wire – you guessed it, the stop light lead. That's where the wiring diagram and color coding of the wires is important – you can easily identify individual circuits! Aahaaaa, I said to myself. There is no mystery here. There is no unknown gremlin lurking in the harness. This is a simple failure caused by improper assembly – but more about that later.



The fix was simple. I tested the formerly shorted wire and, of course, now it was not shorted to ground. I unwrapped about six inches of the black tape Honda wraps their harnesses with, and carefully wrapped the stop light wire with electrical tape. I carefully examined all the other wires in the area. I found a couple that had been deformed by being squeezed, but no more broken insulation or conductors. I wrapped this entire area with electrical tape to match the original Honda tape. Next I removed the jumper I had installed three years earlier, this time using heat shrink tubing on the solder joints at each end where I patched the original wire back into the circuit. I carefully wrapped the harness with electrical tape at each end where I took the jumper out so that it would also match the original Honda wrap. Every thing went back together, and everything worked! I now have a brand new spare 1981 CBX main harness that I may never need - but when I bought it, it was the only one in the country, so it's worth keeping "just in case".

Back to the "why". Just prior to my fateful first trip to Montana, I had installed a "Sport Kit" on my '81 CBX. I had tilted the motor to install the new throttle cables. Surely during that process, I had loosened the airbox retaining bolts – I don't remember specifically doing so. Just as surely, when I had tightened the bolts, I had inadvertently managed to get the wiring harness moved over enough to pinch it with the bolt. Fifteen hundred miles of riding had apparently caused the bolt to wear through the insulation and short the circuit. Moral: If you ever loosen the airbox, be sure the harness is clear before tightening the bolts. In a way, I was lucky. Had another wire been shorted, I might have burned up an expensive component like a voltage regulator.

Case two relates an entirely different electrical failure that occurs infrequently. I have noticed, on rare occasions, that when I would turn the ignition ON on my '81 CBX, there would be a slight delay of a second or two before the lights would come on. It happened so infrequently, and lasted for such a short time, that I hardly gave it a thought. I have a radar detector that comes on when the ignition is on, and emits a short "beep" when it comes on. In effect, with this detector, I can hear when the ignition comes on. One day, I was ready to go out for one a short winter day's ride, I turned the key on, and got nothing. Like a totally dead battery - nothing, no lights, no horn, no radar detector "beep". Nothing. It was as if the ignition switch was bad. But I don't think the problem is in the switch for two reasons.

1.) It is a fairly new switch – I fiddled with the key; on, off, rattle it around, nothing made a difference.
2.) I took the switch apart, and could find nothing wrong with it. So for now, keeping in mind the Honda adage that the only true test of a suspected bad component is to replace it with a known good part, i.e., a part you know works on another motorcycle, I am going to consider the ignition switch good

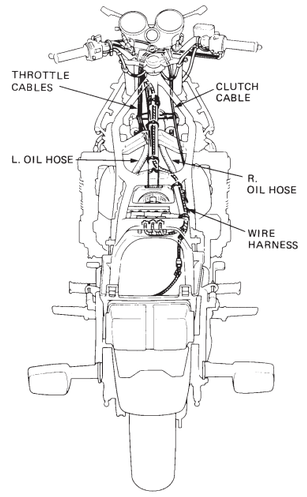
Back to the failure. Thinking I better get the wiring diagram and some test equipment, I headed into the house. As the garage door was swinging closed, I heard a "beep". I thought to myself, "That sounds like the detector", I went back to the garage. There sat the CBX, headlight and marker lights aglow!

I have a self-healing failure that disappears before any meaningful tests can be conducted. The worst kind of problem to trouble shoot. Now before you think this won't happen to you, it can. It has happened to others, so you could be next - I hope not, but be forewarned.

I devised a trouble shooting strategy and what I believe is a fix. The Pro-Link model has a newer style starter relay than the early model and what follows applies specifically to the Pro-Link. The starter relay is connected to the bike with two heavy cables, one from the battery and the other to the starter motor. There is also a four conductor male plug that connects the rest of the bike's circuitry to the battery. The connectors in this plug are, I believe, the problem area - corrosion, or other "grunge" can cause an open circuit. It is difficult to test this because access to the main fuse is behind a cover that can't be opened without removing the plug connector. That means it's hard to test for 12 volts to the ignition switch. Removing and replacing the plug connector "fixes" the problem. The act of removing the plug "wipes" the surfaces of the blades and the internal parts in the plug so when you reinstall the plug, the trouble is gone – temporarily.

Here is the strategy: If you look at the wiring diagram in the Pro-Link service manual, you will see that the 1 amp accessory fuse in the right fairing pocket is always hot. That is your test point. If you have a good battery in the bike, and no electrical problems, you will always have 12 volts at that fuse, because the hot side of the fuse is connected directly to the hot side of the ignition switch, and then directly to the connector plug on the starter relay. If you turn the ignition on, and don't get any lights, the next step is to check for 12 volts at the 1 amp fuse. If you have 12 volts at the fuse, the ignition switch is bad. If you don't have 12 volts at the fuse, the connector on the starter relay is not making a good connection (of course you could have a bad wiring harness, but at this point we will assume the harness is good.)

The fix: All the connectors, mini plugs, or gang plugs have removable terminals. The trick is to remove them from the plastic shell without destroying anything. Sometimes a jeweler's screwdriver will work, but the best bet is a special tool. I bought a Molex tool, # 11-03-003 for a couple of bucks. The connectors have a barb that keeps them in place. From the side away from the wire, insert the tool and depress the barb. It helps if you push the wire in toward the shell to release any pressure on the barb. With the barb depressed, pull the wire. The connector should slip easily out of the plug shell. The one we are primarily interested in here is the one with the solid red wire – that's the hot lead that supplies power to all the loads on the motorcycle. You want to be sure the connector on the red/white wire is good too, because that goes to the regulator/rectifier and ultimately keeps the battery charged. The other two wires merely energize the starter relay coil when you push the starter button.



Note area where wire harness crosses airbox

With a pair of needle nose pliers, carefully squeeze the sides of the connector to assure that it will make good contact on the spade of the starter relay. Be careful and don't squeeze too tight and deform the connector. While you're there, inspect the crimp, and the condition of the wire in the crimp. If any corrosion is present, you should probably get a new connector, and install it on the wire end after you remove the old connector. Corrosion is bad - it causes an increase in resistance at the crimp. Resistance causes heat, so if you see corrosion, carefully inspect the plastic plug, or gang plug, for signs of melting plastic. The usual place for overheated connectors is the one going to the alternator, or the regulator/rectifier. I have an old used 81 wiring harness that I used for this picture. The plastic plug that attaches to the starter relay is a little melted, so it would seem overheating can occur here too.

Connector removed from shell or gangplug. Carefully squeeze the rounded sides so they make better contact with the spade - not shown.

The last step to take when putting everything back together is to coat the gangplug with dielectric grease. Honda sells dielectric grease in small tubes for just this purpose. It helps to keep moisture out, thus preventing corrosion. My dictionary defines a dielectric as "a nonconductor of electricity, especially a substance with electrical conductivity less than a millionth (10-6) of a siemens." It would be a good idea to check the alternator and regulator/rectifier plugs for corrosion too. I have seen the first stages of corrosion in these areas too. An ounce of prevention – but you know that one!

I want to close by saying I hope to meet a lot more of you at the various rides this year. I have found that attending club events and meeting all the great CBXers really enhances the CBX experience. Try it! Attend an event this year. You'll be glad you did.