Question: Why is my connection to the ECU dropping when I am running the engine or when I rev up the engine?

Answer: This is caused by data loss communicating with your ECU. The most common cause for this data loss is a poorly shielded USB to Serial Cable. Also on more rare occasions there are problems with real serial cables such as pinch or break in the line.

Question: Why will a poor USB to Serial Cable cause this?

Answer: Real Serial Ports on Laptops have all but gone, there are few laptops left that have a true DB9 serial port. However for many devices this is still the most commonly used means of transport. After market ECU's are in this group and RS232 Serial communication is still the dominate way of connecting to your ECU. So how? There are several devices to fill this gap, but by far the most common is a USB to serial cable, this can fill the need and no one will miss the old Real DB9 on their laptop.

However if connecting to a running vehicle for data logging and live tuning, it is critical to understand a few things before selecting your USB to serial adapter.

A car is full of EM noise! EM noise is the Electro-Magnetic noise created by current flowing in electrical devices. the higher the current, the more EM noise. Think about your typical car electrical system; low voltage with high current to make up for it. You have injectors turning on and off, alternators running and coils firing, ohh the coils... There are terribly high levels of EM noise generated by an automobile. USB was not designed to be used in the automotive

environment.

Why is USB so much more susceptible to EM Noise than standard RS232 serial? It all comes down to 1's and 0's when transporting data, in either USB or traditional RS232, 1's and 0's are represented by voltage differences. However, look the substantial difference in the signal voltage:

USB Specification States - The receiver defines a differential ‘1’ as D+ 200mV greater than D- and a differential ‘0’ as D+ 200mV less than D-.

Standard RS232 Specification: The RS-232 standard defines the voltage levels that correspond to logical one and logical zero levels for the data transmission and the control signal lines. Valid signals are plus or minus **3 to 15 volts**

That is 200 mV difference in USB, compared to 3-15V using "Real Serial"! How does that relate to the EM noise in a car, well just think how much less EM noise it takes to cause a 200mV difference for corruption or a disruption to your data over USB compared to the good old serial where it takes a 3-15V difference! The RS-232 standard was originally conceived in a different era, to transport data via modems over primitive voice lines. So it needed a high signal to noise ratio for assured delivery. That era may be gone, but this still serves car enthusiast well in our high EM noise machines.

Question: But How do I connect to my car then?

Answer: While USB does present potential problems, it is commonly used to connect to cars without problems and is usually the most practical solution. You just need to follow some simple guidelines when purchasing a USB to serial cable and you will save your self a great deal of trouble and time...

What to look for in a USB cable:

- You should have either an adapter with no USB cable, or well shielded cable
- If it does have a cable, the cable is best to be no more than 1m (3ft).
- An FTDI Chipset is recommended. Prolifics chips are also very common, but many of their windows drivers have a nasty bug that can cause a BSOD.
- **Important!** I VERY Highly discourage use of USB adapters built into the MegaSquirt they cause connectivity issues and dropouts (other than those designed in like on the MS3). They should not be offered by any reseller and WILL cause you problems.

Generally you will need more than a 3ft cable, but for that you should use a traditional DB9 cable. These are typically 6ft long, when combined with a 3ft USB cable, you have 9ft of cable. If that isn't enough, you may want to consider using a Bluetooth to RS-232 adapter.

For USB to serial cables that meet these requirements or a Bluetooth solution, check out what we offer in:

Cables and Bluetooth

References:
USB In a nut Shell
RS-232