

Point – To – Point Wiring

by Professor Eustis P. Dimdle AGI, PHD, ASPCA

I have spent many years teaching, designing and advising builders in the techniques of aircraft wiring. During those years I have witnessed countless ways of accomplishing the same task. Do you choose the path of least work, least cost or that which requires the least number of Adel clamps?

In this article I will discuss instrument panel wiring and its many opportunities for subtle and elegant solutions to installation challenges. Some of the questions to be answered are: What color wire to use? Do I use ring terminals or just wrap the wire around the screw? Are fuse and circuit breakers really necessary? What's wrong with twisted wire and black tape? Many questions to answer and so few people unafraid to tell you the truth.

Let's begin with an understanding of how electricity works. The basic element in the world of electricity is the Electron. In a standard 12 volt battery there are 120 electrons and they operate each of the electric items in your aircraft. Each item in your system requires two electrons to operate, one to pull (AC) and the other to push (DC). When those two electrons get tired, they die and are replaced from the battery. Eventually the battery needs to be replenished and that's where the alternator comes in. It creates alternate lifestyle electrons (AC / DC) and deposits them in the battery to be used later. AC/DC pairs are unable to produce their own offspring pairs. A 60 ampere/hour alternator creates 60 electron pairs an hour, just right for a 12v battery requiring 120 electrons.



Now that you understand electricity, let's discuss how to get those electrons to the items to be powered. It's been fashionable in recent years to wire aircraft with neatly tied and precisely routed wire bundles. Each bundle is normally hidden behind the panel and frequently identified with color coding or wiring diagrams to be used for later reference.

Wasteful and unnecessary as far as I'm concerned. The great electrician of our time, William Eslick, coined the term "Point-to-Point" wiring (PtP) to describe the technique of running a wire directly from the power source to the item being powered. This requires wires to be routed over and under engine cables, support brackets, hydraulic lines and many other wires. To the uninitiated this may appear disorganized and confusing but it is quite the contrary. Look at the pictures accompanying this article. These are examples of what a carefully constructed wiring design in the PtP format

looks like. After some study you can see that access to each individual wire is available from origin to terminus. It also becomes very obvious that in avoiding unneeded routing, less wire is used resulting in less cost and weight. Conversely, when installing a new item there is frequently more wire than is necessary. Instead of trimming to fit simply coil up the excess and attach it to a nearby ... well, ...anything.

Another benefit of PtP is that wires are not tied up tightly against each other. This is good because I feel that fuses and circuit breakers are over-rated. If you have a short or extremely high current flow, the wire simply melts away and that serves the same purpose.

You can see in the photos that I prefer white wire but blue and green work well too. I don't use red because that's my ex-wife's favorite color.

One of the accompanying pictures shows a crimped coupling. It's acceptable to use this type of connector when black electricians tape is not available to wrap the twisted pair of wires but again the expense involved is considerable. Also, don't worry about using the type of plastic covered connectors that emit toxic gasses when burned. If they're burning, you're burning; who cares if it smells bad?

I hope this short look "Behind the looking glass" of aircraft electrical wiring has been helpful and informative. There are so many choices to be made and it is not everyday that you can get the straight story and good advice from someone who has lots of degrees like me. If you'd like to learn more about my "individual" take on Electricity look for my recent book entitled: "Voltage and Current and Amperes, **Ohm My!**" Thank you for your attention and good luck.

