

I started making my own extensions a number of years ago. It began as an effort on my part to be neater in my installations, but with the cost of good pre-made extensions topping \$10, there is also a cost savings associated with doing the work yourself. Parts run less than \$5. Whatever your motivation might be, here are the things I have learned by trial and error along the way that might help you out if you are going to make the leap.

Tools are first. You will only need two ... a crimper and very small flat head screwdriver to help push the pins inside the connectors. Don't skimp on the crimper. A good tool is adjustable so that when it is fully compressed, it doesn't put so much force on the pin that it causes distortion. A crimper like the one pictured here is about \$40 and is available from a number of sources ... mine came from Hansen Hobbies.



As with the crimper, you do not want to skimp on parts. There are a variety of grades of connectors. The metal on good connectors will appear to be heavier and more substantial than cheaper connectors. Gold plating will also be complete ... no areas of silver will peek through. Another item to look for is the length of the outside sheath on the female connectors ... cheap parts will have a shorter sheath than a good quality commercial extension.

Searching for supplier of good connectors is a lot like looking for the holy grail. I tried many without success until I stumbled upon Peak Electronics. They sell the Custom Electronics brand of connectors. The Peak folks are easy to deal with and may offer discounts if you order in bulk, rather than buying the small packages. The last connector order I placed ran just over \$3.50 for a set of male/female pieces for a single extension. I did buy a quantity of 150 pairs to get the better price, however. While this seems like a lot, a typical plane will have 12-15 extensions on average, and connectors seem to disappear in a hurry if you are a prolific builder. Another thought is to pool needs for several friends and simply divide a large order.

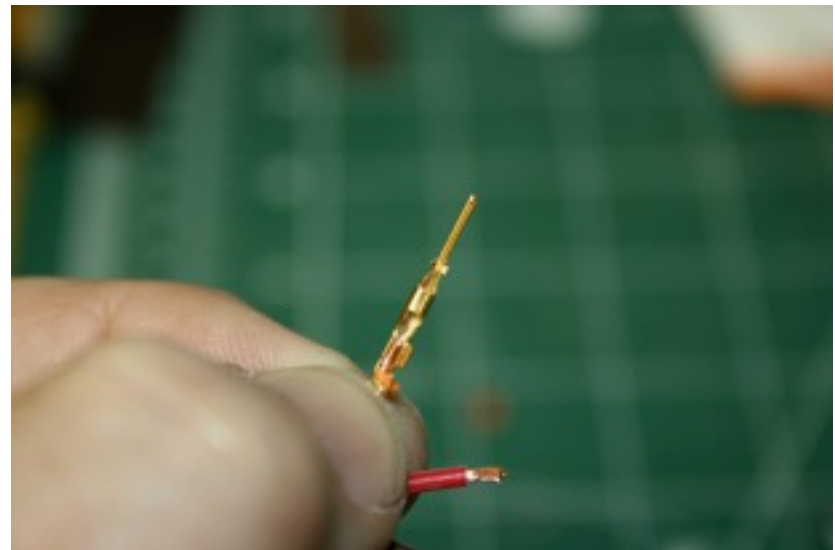
Wire is available in 100 foot bulk lots from various sources at .40 to .50 cents a foot. My supplier for heavy duty 22 gauge JR style wire has been Maxx Products for a number of years, though their price is toward the high end of the range. I recently made a switch from standard flat servo wire to twisted wire for better noise attenuation. This wire is also available from Peak in bulk lots, and the price is about 20% less than what I was previously paying. I just have to get used to the way it looks.

Construction of the extensions is fairly easy once you get the hang of it. It takes me about 5 minutes to produce a complete extension. I start by running a razor knife lightly across the wire about 1/8" from the end. Flip the wire over and score the other side. Don't cut too deeply, as you don't want to cut into the wire itself.



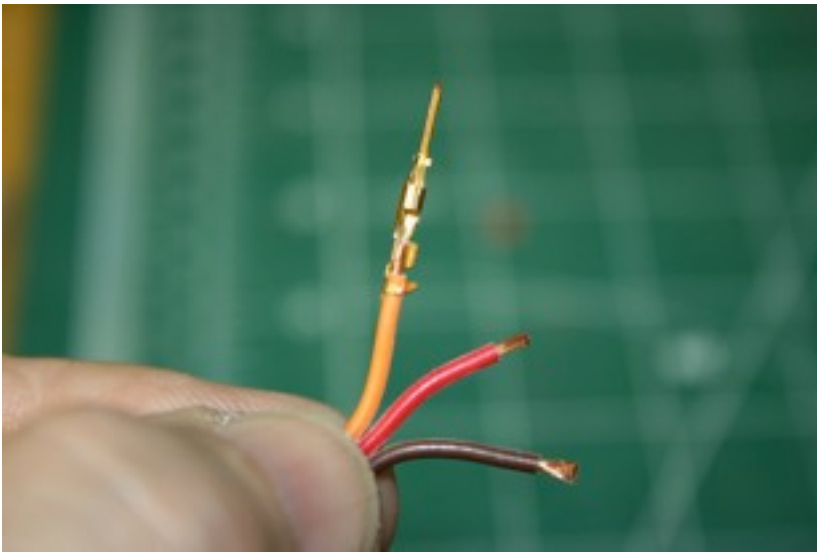
Using your thumbnail, peel away the insulation from the end of the wire. Using the knife, carefully separate the three wires for about .5". You should now have three wires with an identical length of bare wire exposed.

Some pilots will next insert the connector into the crimper, and then insert the wire into the connector. I prefer not to do this, as I find it difficult to get the connectors identically positioned on each of the three wires. Instead, I position the connector on the wire and just barely crimp one of the

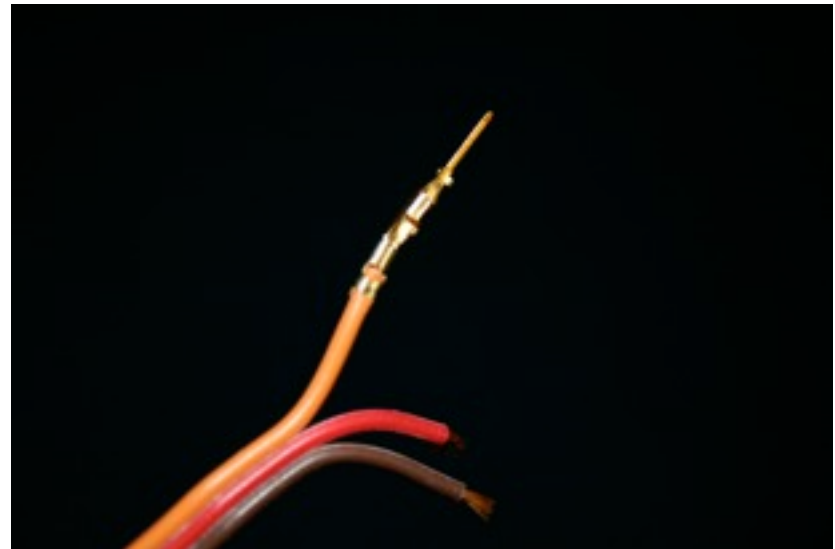


insulation tabs at the very bottom of the connector with my thumbnail as shown. This will hold the connector on the wire as you insert it into the crimper, and allow you to precisely position each of the three connectors in identical spots ... important if you don't want a bulge in the wiring as you insert the connectors into their plastic ends. See photo.

Always start with the signal wire, and the open tabs in the connector that will be crimped over should be facing you. This procedure is the same for both male and female connectors.



Crimp each connector as you go. Make sure the connectors are straight ... if not, gently remove any bends. This is important for proper fit in the plastic ends. When working with 22 gauge wire, you may also find a



small bulge of insulation between the insulation tabs and the wire tabs. Simply slice this bulge away with a sharp razor knife and you will find the connectors slide more easily into the plastic end. The connector is inserted with the wire tabs level with the top of the crimper as shown below.

Once all three wires are crimped, insert them into the plastic ends. Keep the signal wire on the left, the positive red wire in the middle and the ground wire on the right. The hold down tabs in the plastic end should be facing you as shown. The picture shows the connectors partially inserted.



Flip the plastic end over, and using your small screwdriver, push each of the connectors into place until the hold down tab clicks. Don't squeeze these tabs too hard or you will break them off. For some reason, this is

easier to do with the female ends, so be extra careful with these. It takes a little practice, but this part becomes easier with each extension.

If you are making a female end, the last step is to put the sheath in place. If you look inside the sheath, you should see a small tab, and this hooks over the hold down tab side of the plastic end. Another trick is that it should be positioned with the rounded off corners on the inside of the sheath at the top with the signal wire on the left. If there is doubt, look at one of your commercial extensions for orientation until you become more proficient. Insert the two ends into each other when complete to make sure the pins are straight and everything works properly.

One other tip ... when laying out extensions for a new aircraft, I use waxed string tied together with wire ties to lay out all the lengths, and then use this as a template for making the extensions.

I sometimes will run the extensions through plastic sheathing. It keeps the servo wires together and offers rigidity, protects the wires from chafing at bulkheads, and also provides some degree of additional heat protection. The sheath is like the old chinese finger handcuffs ... when you push on it, it expands to handle bundles of various sizes. Use a lighter to cauterize the ends of the sheathing where you cut it to keep it from unravelling. You can use electrical tape or heat shrink to neaten up the ends where the wire emerges.

That's how I do it ... I would welcome any tips on other suppliers or techniques and I will share them in future updates. This article is now a part of the JPO Knowledge Bank on our web site, so you can access it at any time.

