TECHNICAL ARTICLE

CABLE PREPARATION

HOW TO PROPERLY PREPARE YOUR CABLES FOR TERMINATION

With cables getting smaller and insulation getting thinner, wire stripping has become more critical than ever. To ensure complete and accurate transfer of both analog and digital information signals, proper cable termination practices are vital. Correctly prepared cables not only improve the integrity of the signal but also decrease the amount of time required to complete termination. Shortcuts can lead to wire failure (no pun intended).
There are enough challenges making connections, so why cause an issue because the assembly to the connection is poorly made?

STRIPPING PROBLEMS

Damage during the wire stripping process typically occurs in one of two ways – by accidentally removing a strand or by nicking the conductor.

A wire-stripper may actually remove a strand or two along with insulation, leaving a shortage of conductors at the termination. When this happens, all remaining strands have to carry the current. This creates a bottleneck, overburdening the unimpaired conductors and making them prone to failure with possibly intermittent strands - all of which can produce extra heat, circuit noise, and/or changes in resistance.

Another common issue while stripping the insulation away is nicking the conductor and it's surprisingly easy to do. If a blade comes in contact with the conductor, even a small nick can lead to complete fracture. With vibration or even a small amount of stress, a "mere" nick can develop into a crack which may break and fail, sometimes long after the connection has been made. While stranded wires will bottleneck, a solid conductor may open completely!
There is no way to "fix" a nicked or broken conductor. The best practice is to cut it off and start fresh. With insulation materials generally being a great deal softer than copper, sometimes you can't tell by feel until you have already "touched bottom". So how can you assure you stay clear of the conductor while stripping the wire? By using the proper tools and a light touch. When you do, be sure to use tools which will sever only the insulation, staying clear of the conductor below. There is no such thing as a "mere" nick.

STRIPPING TOOLS

Here's a review of some of the tools found in common use:

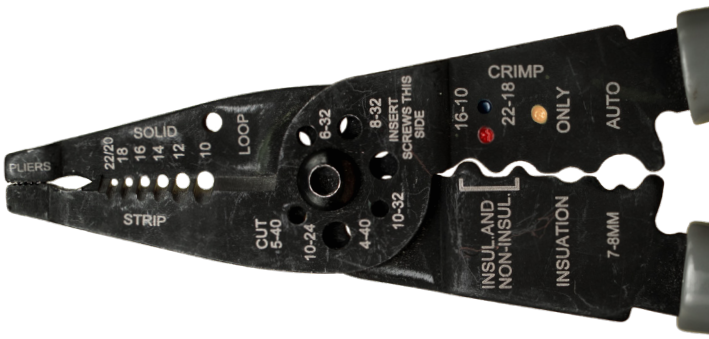
1. Thermal strippers are the kindest to the wire and will soften most insulation materials. These are available in hand operated or bench types.

2. Motorized hand and bench strippers have a spinning collet, which receives the wire. Adjustable blades can be set to a uniform insulation depth and will slice and then remove the "slug" of insulation without damage to the conductor. Some of these are very precision tools.

3. Pliers like mechanical strippers, with one or a range of slots for different AWG diameters, are inexpensive, handy, and perform well - provided the correct slot is chosen, the wire is well centered in the slot, and the cycle is smoothly performed. Counterbored die-type blades help greatly in centering the wire.

4. Inexpensive stripping pliers may also have one or more sharpened notches, often V-shaped (a poorer choice), requiring considerable care and some means of limiting their closure. Experience is vital and your experience may have already have steered you away from this tool.

5. Diagonal cutters are always handy but almost always a poor choice, relying on just the opposing edges (usually dull and better at holding than cutting insulation) and considerable skill. Diagonals grab and stretch the insulation to the breaking point in order to remove it - kind of an "all thumbs" approach. This process also leaves the length of the strip rather unpredictable due to the stretching. This tool is truly designed for simply cutting wire, but even so, it is inferior to cable cutters which scissor-cut a nice squared-off end instead of mashing the wire.



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6. Razor blades. Nice cut, but control can be a issue. With skill and care, a razor blade can prepare the insulation for removal with diagonal cutters, or even by hand. A razor blade is best used to "circumcise" or score the insulation part-way to define its breaking point. This can result in a rather precision length of strip and, in fact, may be necessary in the absence of more sophisticated tooling. It's not uncommon to use a razor blade to help in the stripping of coaxial cables.

7. Pocket knives are fine for whittling.

So, given a variety of tools, we recommend not leaving this delicate task to the inexperienced.

Additional, as with any "tools of the trade," quality is never a poor investment and maintenance is a necessity. A dull anything is actually a comment on the technician's concern for quality performance.

LEAVE NOTHING TO CHANCE

Professionalism and aircraft system reliability demand meticulous attention to detail. Choosing and using the best available tool for the job, double-checking everything, and performing careful inspection before completing the termination will help assure the quality of installation.

Moral of the story? When wire stripping, use the right tools and a light touch. That's precisely how we do it at PIC ... every day.