

# TECH TIPS – DISCRETE WIRE: Simplifying Internal Wiring Designs

## Application Challenge

Many of the connections in my equipment design use discrete wires. Managing the bundles of different wires, routing and connecting them can become complex during assembly, but particularly so during field maintenance or repair. How can I reduce the complexity of discrete wire?

## Have You Thought of This?

Consider replacing the runs of discrete wire with parallel lay flat cable (also known as 'ribbon cable'). In ribbon cable, the conductors are laid side by side in their respective insulations along the entire length of cable. The controlled physical dimensions result in good transmission lines. It has good cross talk reduction when driven in either balanced or unbalanced configurations. Parallel lay cable replace twisted pair when driven unbalanced – except in applications where magnetic immunity is important – and can do so at significant cost savings. The ability to decrease cross talk, or minimize grounds to increase signal density, makes parallel lay a very versatile cable. Parallel lay cables come in single colors – typically grey – or with the individual conductors picked out in rainbow colors to aid identification during termination. Jacketed, Halogen-free and high flex, as well as twisted pair versions, are also available.

If you *can't* change the cable and connectors, consider tie-wraps to bundle wires together, or attach color-coded labels/markers to identify which wires perform what functions.

If you *can't* change the cable but *can* change the connectors, consider using modular versions. For example,

- 3M™ Mini-Clamp II Connector makes terminating discrete wire as easy as squeezing a pair of pliers. The 2mm socket and plug connectors uses the proven IDC contact for reliable terminations in 3 and 4 positions. On the boardmount side, choose from 1, 2 or 4 socket modules to manage cables. The connector can handle up to 5 Amps
- 3M Power Clamp Connector accommodates wire diameters from 1.6 to 3.0 mm and conductor sizes 18 - 20 AWG, and is able to handle up to 10 Amps (1 pin) or 7 Amps (multi-pin). Use a pair of pliers to terminate wires. Connectors include a cover to inspect termination and are offered in 5 positions
- 3M CHG Connectors Series enables you to terminate discrete wires up to 64 conductors in a convenient module and to plug them into standard boxed or latch/eject headers. The connector is available in single and dual row versions in a choice of plating options and uses the proven IDC contact for reliable terminations

## 3M Tech Tips

- Use tie wraps to bundle discrete wires into manageable cable assemblies.
- Mark cables or wires using 3M™ Cable Markers. Color-code the mating connectors to ensure the user knows where to attach them.
- To shield discrete wires, use a braided shield like the High Flex Life Braided Shield, DS/FS Series from 3M. It slides over the wire bundle and can be grounded at the connectors.
- To attach the drain wire to the shield of a round cable, use a drain wire spring clip, like the Connector Assembly 3535 Series from 3M. The drain wire can then be routed to a metal cabinet or through the connector body to the inside of the cabinet.
- Ribbon cable can be zipped to separate conductors to give you precisely the right number for your application.

## Additional Resources

*Products*

[3M™ Discrete Wire Products](#)