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WIRE GUIDE FOR TIMING SYSTEMS

Wire and cable are a major part of any successful timing system. Requirements vary and because some installations require large quantities that cost a considerable amount just to ship, we recommend that customers choose a local supplier for their wiring needs. The timing and communications systems we sell will work with just about any good quality twisted-pair wire that has a total impedance (resistance) of less than 2000 Ohms over the length of the race course. This is a very important specification, and 2000 Ohms translates to a very high tolerance for bad wire condition or long length.

As an example, a 5-mile (8km) length of typical 22-gauge wire will check in at +/- 800 Ohms or lower (a smaller Ohm reading is better), so this is a specification that is generally easily met. Wire impedance (and cost) is a function of total length, conductor thickness (gauge: the smaller the number the greater the thickness) and condition of the wire and any connections you make. Also consider weight when making your decision. There is less impedance in a thicker 20-gauge wire than in a 22-gauge wire, but it comes at a penalty of weight. If you intend to move the wire around on a spool, a single upgrade in gauge thickness will make a big difference in weight. As a rule of thumb, avoid wire gauge of more than 26 – it is too thin and difficult to work with. Likewise, 18-guage should be a minimum number, since anything thicker gets unpleasantly heavy to work with or install, particularly when it's –20 outside and you didn't have breakfast!

Calculate the number of pairs you need and then consider adding one or two more so that you have spares if a conductor or a pair goes bad. As with airplanes and their engines, the more the better! There is also the aspect of wire type, solid or stranded. Solid conductors are less expensive but in thinner gauges are more prone to breakage. Stranded wire is more supple to work with and at less risk of breakage because of the multiple strands that make up each wire. Again the tradeoff is price. Stranded wire is substantially more expensive. Shielded cable is an option (at additional cost) that may be needed in the case of long cable runs or in situations where there is a great deal of electrical interference such as close proximity of your cable run to adjacent power cables or radio interference. An overall foil shield to the cable is a physical "electronic noise barrier" that shields the cable from outside interference. Any long wire has the same characteristics as an antenna, and shielding best controls the negative effects of this phenomenon.

Pay attention to color codes and wire pair assignments, and try to adhere to telephone or electrical industry norms. Multiple twisted pair cables have color codes that designate the wire pairs that are twisted together. This has the effect of balancing each designated pair and helps negate the effects of unwanted induced signals that are always present in long cables. Find out what the wire pairs are and what the color codes for your particular cable represent, and respect them. Most ski areas almost always have a “phone guy” on staff who will know the correct color assignments.

As a general guideline for timing installations we recommend 22 or 24-gauge, solid or stranded, shielded or unshielded PVC cable in multiple twisted pairs. As an optimal general choice we would suggest 22-gauge, 6-pair, stranded, foil-shielded PVC cable for runs of up to 5km in length. The goal would be to always try to keep the total impedance to no more than 500 Ohms.

Try to avoid making too many splices in your wire, since each splice adds significant resistance to the line. If you must make splices, use proper outdoor-grade electrical connectors – NEVER use just electrical tape!!! Remember the electronic axiom: 90% of system failures are the result of bad cables, splices, or connectors.

If necessary take these notes to your local wire supplier and find out what your pricing and cable-storage options are. Cable-storage refers to how the cable is distributed -- in boxes, on spools, and in what lengths. In determining your purchase you will need to consider several factors: how much these reels or boxes weigh, how many you’ll need, whether you need to spool it back in after the race, etc. There have been situations where a customer has ordered 5km of 16-gauge 50-pair cable only to have a 1,000 lb. wooden reel delivered to his house…!

Finally, PLEASE CONSIDER YOUR SAFETY FIRST. Working with wire can be dangerous. Wire often carries residual electrical current, and it is easy to be confused when there are many cables running in the same area. In certain conditions the need often arises to “fly” cable in the air across areas where burying it isn’t practical, and this can be both difficult and dangerous. Get a “pro” to handle these situations if you are not prepared to do it properly. Taking the time to install your wire properly and patiently will pay huge long-term dividends.