The Technical Side Cables - The Weak Link

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In this article we will be addressing cables, cable problems and the proper care of cables. All cables will fail eventually and the following are a few tips to insure that they will last as long as possible. Cables are sometimes the weakest link in the overall surveying or GPS system. As we look at the whole system we mustn't forget that an abused or mistreated cable can mean the difference between working and not working. For this reason it is always good to have spare cables on hand when doing any mission critical work. Unfortunately many times the spare cable is put into use and the broken one does not get repaired or replaced in a timely manner.

To help cables survive, a good strain assembly is crucial.

There are many different cable applications: data collection cables for surveying and GPS systems; power cables for lasers and instruments; and battery and antenna cables for GPS systems. Many of these applications use different types of connectors and cable materials.

In several surveying systems there is a common type of instrument connection. Many Nikon, Pentax, Sokkia and Topcon systems use the Hirose brand connector. Although these instruments use this same connector, only Sokkia and Topcon use the same wiring configuration. The Nikon and Pentax wiring configurations differ from the Sokkia and Topcon as well as from each other. This particular type of connector uses a keyed snap-in type of securing assembly and the cable and connector body should never be twisted. Even though the cable is generally secured to the connector body for strain relief purposes, twisting or pulling directly on the cable can result in premature cable failure.

Another widely used connector type is the Lemo connector. Lemo connectors generally use a compression collet and boot type of strain relief. This type of strain relief works well if the connector barrel is secured to the back-nut with some type of light adhesive. If the barrel is not secured in this way it may unscrew and release the collet resulting in connector disintegration. Some data collector manufacturers have begun using the small (0B) right-angle Lemo connectors. These smaller connectors can break with even a slight amount of cable tension. If this does happen to a (0B) Lemo right-angle connector it can usually be replaced with a straight connector for increased durability. The larger (1B) Lemo connectors are often subjected to intense bending directly at the strain relief causing conductor breakage and failure. These (1B) connectors can be fitted with a right-angle block assembly to immobilize and protect the cable from breakage.

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To help cables survive, a good strain relief assembly is crucial. A good strain relief will distribute the flex and strain over an acceptable portion of the cable. A rigid strain relief is generally not a good strain relief. When a rigid strain relief is used, the cable can be bent or kinked at the end of the strain relief material resulting in broken conductors. After extended use and abuse, multi-stranded conductors can begin to break resulting in higher resistance. In power cables this can cause voltage drop which can look like a bad or weak battery.

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GPS and radio antenna cables are typically not manufactured to endure the abuse that they receive. These cables are generally a coax type cable, which have crimp type connectors. The strain relief on a crimp connector is only the crimping of the shield of the coax cable to the connector. Additional strain relief may be provided by using shrink tubing, usually containing a hard adhesive. This method creates a rigid strain relief, which as we have discussed causes the cable to be bent or kinked sometimes stressing the shield and center conductor of the cable. In mobile situations, antenna cables with excess hanging cable materials are vulnerable to snagging. Coiled coax cables are available for some applications. Also, it is never a good idea for any cables to be repaired by splicing the conductors and/or shield. This not only makes your cable weak where it has been spliced, but can allow significantly more interference.

It is a good idea to clean connector contacts occasionally with a non-flammable, non-conductive cleaner to insure all contacts are free of corrosion and debris.

It is important to frequently examine cable material for nicks and cuts and the connectors for looseness or damage. If there is damage to the connectors or cable material the cable should be taken to a qualified service technician for testing and/or necessary repairs or replacement.

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