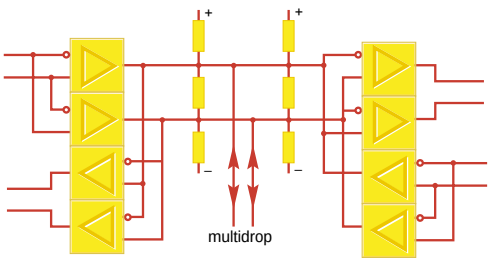
Interference suppression



Fast balanced communication

In any system, electronic signals are always prone to interference. Analogue signals tend to be more prone due to the fact that all points on the signal carry information- i.e. amplitude and frequency. Small disturbance to the signal will cause the receiving system to interpret the signal differently to that of the original transmitted signal and give an incorrect output.

Digital signals are less prone to interference as there are only two basic states; high or low. However due to the interaction of the capacitance, resistance and inductance of the cables used to carry the digital signals and the effects of external noise, the information contained in the signals can be distorted until the signal is unrecognisable.

Industrial signals

Many techniques have been developed to overcome the problems associated with transmitting data over long distance. For example RS-422 and RS-485 are designed to operate up to 1 200 m.

Even with busses specially designed to be used in long distance data communications applications, electronic interference will always be a problem and in extreme cases the expected transmission distance will not be achieved.

There are many practical steps that can be taken to improve the susceptibility of the signals to interference.

Isolation

In all data communications it is essential to galvanically isolate equipment and networks from each other to prevent the propagation of transients and other forms of interference that can cause transmission errors or damage equipment.

There are several methods ensuring isolation for example relays, transformers, isolation amplifiers and optocouplers. Incoming transients can also be removed using protective components such as varistors, capacitors, RC filters and zener diodes.

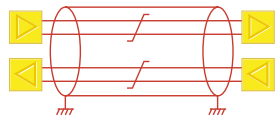
Westermo use optocouplers for isolation in their receivers. Optocouplers provide better performance than for example differential amplifiers. Transformers provide isolation on the power source and varistors and zener diodes are used to suppress transients.

Shielding

Shielded or double shielded cables can be used to increase the resistance to external interference. Under normal circumstances the cable shield should only be connected to ground at one end.

In some extreme circumstance where high frequency noise is a problem, the cable can be connected to ground at both ends. However this method introduces a potentially larger problem if there is a potential difference between the points. If this is the case current will start to flow through the shield of the cable and carry with it any noise on the ground plain.

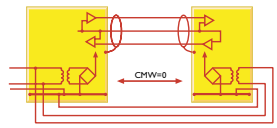
As an alternative it is sometimes possible to connect one end of the shield to ground and the other to ground via a small value, high voltage capacitor



Data communications to RS-422 for 10 Mbit.

Telephone modems and interference

For very long distance data communication PTT modems are used. These devices rely on analogue signals to carry the digital information over the PTT network . As stated earlier the analogue signals are prone to the effects of noise. To counter these effects error checking algorithms and filtering are used.



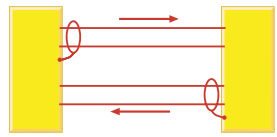
Data communications to RS-232/V.24

Optical fibre cables

An increasingly common means of reducing the effects of noise in an industrial environment is to use fibre optic cables.

Data transmission via fibre-optic cable tends to be insensitive to electrical interference and provide total isolation between systems, so making it an excellent media for industrial data communications.

There are limitations as to the maximum distance that can be achieved. This is due to the amount of available power at the transmitter, the loses within the cable, the type of fibre and the sensitivity of the receiver.



Improved transmission with a modem and twin-screened cable, with each screen grounded at one end.