

Noise Effects on Signals

Electrical noise generated by AC power, electric motors, fluorescent lighting, relays, and many other sources can cause a plethora of problems in electrical systems. For the encoder in your system these problems can range from simple miscounting to a complete servo system lockup.

Electrical noise typically enters a system as one of two types – radiated and conducted. Radiated noise propagates through the air while conducted noise finds an electrical path onto the encoder cables from ground loops, power supplies or other equipment connected to the system.

Several methods can be used to reduce noise:

1. Always route power and signal lines separately.
2. Signal lines should be twisted and shielded, and placed at least 12 inches from other signal lines, and from power leads.
3. Signal wire continuity should be maintained from the encoder to the controller/counter (i.e. avoid junctions, splices).
4. Provide clean regulated power to encoder and associated equipment (+/- 2%).
5. Ensure equipment (motors, drives, shafts, etc.) is properly grounded.
6. Connect encoder cable shield to ground at controller/counter end, leaving the end near the encoder disconnected.
7. If possible, use differential line driver signal outputs with high quality twisted, shielded pair cable. The complimentary signals greatly reduce common mode noise levels, as well as signal distortion resulting from long cable lengths.

For additional details on differential outputs, please refer to the White Paper 2005 regarding Noise Suppression of Differential Signals.