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## EMI Noise Checklist

*The following is a checklist users can use as a reference to help avoid problems due to electromagnetic interference (EMI) in their motion control application:*

### Use Anaheim Automation Cables

Anaheim Automation engineers have designed shielded cables for use in motion systems. Typically, machine builders who use product-specific power and feedback cables have far fewer problems than those that make their own cables. Matched cable and product sets will not only help to eliminate EMI, they also provide for quick and easy hook-ups.

### Use common-mode chokes on motor leads

Cables exceeding 75 feet in length may require motor common-mode chokes. Check with an Anaheim Automation Applications Engineer for more details.

### Separate motor drive/controller power and signal cables

Always bundle and route signal cables separately from power/motor cables. Factory-made cables are recommended for use in our motor and driver systems. These cables are purchased separately, and are designed to minimize EMI. These cables are recommended over customer-built cables to optimize system performance and to provide additional safety for both the system and the user.

Always be sure to strictly comply with the following rules:

- Follow the wiring diagram for each motor
- Route high-voltage power cables separately from low-voltage power cables
- Segregate input power wiring and stepper motor power cables from control wiring and motor feedback cables as they leave the stepper motor driver. Maintain this separation throughout the wire run
- Use shielded cable for power wiring and provide a grounded 360 degree clamp termination to the enclosure wall. Allow room on the sub-panel for wire bends
- Make all cable routes short as possible

To avoid the possibility of electrical shock, perform all mounting and wiring of a motor and driver system prior to applying power. Once power is applied, connection terminals may have voltage present.

### Splice Cables Properly



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Connectors with metal backshells should be used whenever cables must to be divided. Both shells need to connect along the full 360 degrees of the shields. **NOTE:** No portion of the cabling should be unshielded. By no means should cable be divided across a terminal strip.

#### **Ensure good shield connections**

For cables entering a cabinet, never connect a simple “pigtail.” Connect shields on all 360 degrees of the cable.

\*It is typically considered best practice to keep cable lengths as short as possible; under 25 feet is admissible.

#### **Use differential inputs for analog signals**

Using differential outputs can greatly reduce noise susceptibility in analog signals. Connect the output signal to the positive differential input and the ground of the device generating the output to the negative differential input. Use twisted-pair shielded cable lines, connecting shields on both ends.

#### **Ensure good connections between the cabinet components**

Use multiple conductive braids to connect the cabinet body to both the back panel and cabinet door. **CAUTION:** Never rely on mounting bolts or hinges for ground connections. Set up an electrical connection across the back surface of the drive panel. It is preferred that the user do this with electrically-conductive panels; this includes galvanized steel or aluminum.

#### **Ensure good ground connection**

Connect cabinet to the appropriate earth ground. The ground leads should be the same gauge or a gauge smaller than the leads to the main power source.