

Application Note: Recommended Grounding for use with the 1786 RPA/RPCD/RPFM/RPFS/RPFRL/RPFRXL modules.

There has been a documented case where the grounding in Drives applications has caused problems with the 1786 RPA/RPCD/RPFM/RPFS/RPFRL/RPFRXL modules. This is due to ground loops developed between the drive cabinets where ControlNet Coaxial modules are used for control. The loops are formed by (see Figure 2.) Internal to each ControlNet communications device, there is a Resistor and Capacitor. The parallel RC is connected from the ControlNet Coax Shield to the local cabinet ground. When there is large local currents into the local ground there is a voltage potential in the form of a transient that is developed across the PE ground conductor connecting the particular cabinet to the common star point in the system. The magnitude of the voltage transient is a function of the amount of current into the local (cabinet) ground and the impedance of the ground conductor. When there is a significant difference between two or more cabinets in the system where ControlNet is connected there will be current flowing through the ControlNet coax shield, through the PE ground conductor and back to the star ground point. This path will cause a voltage to be developed on the shield of the ControlNet Coax. This voltage has been found to cause problems for the Carrier Detect circuits in the 1786-RPA module.

To verify the presents of ground loops in a communications system, connect a scope to a free Tap, at the 1786-RPA cabinet. Connect a 1788-CNCHKR to a second free tap. Connect the channel 2 scope to the trigger out of the 1788-CNCHKR and set the tool for a valid node address. Set the channel 1 scope to 200mV/div and channel 2 for 2 volts / div. Trigger on channel 2. The data will be off the screen due to the vertical setting. Observe the baseline between the data transmissions on the coax. A baseline wander of greater than 100mV PK. should be avoided. Figure 1 is an example of a problematic system.

Figure 1 Baseline noise due to ground loops

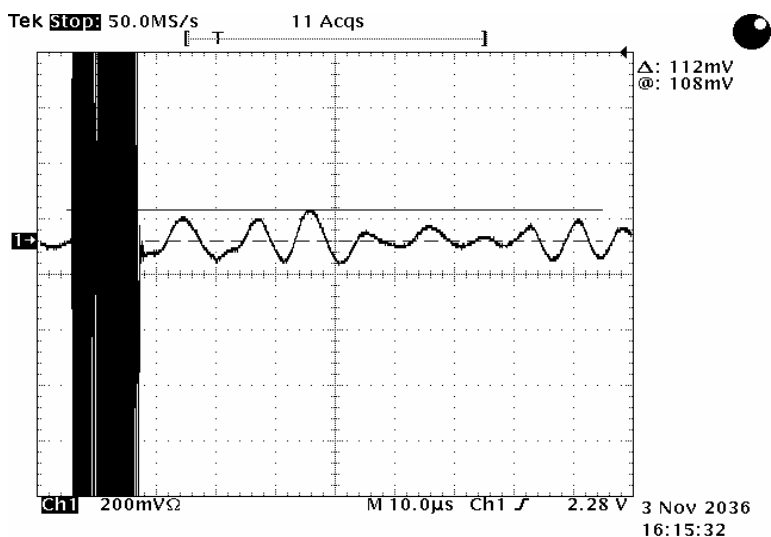
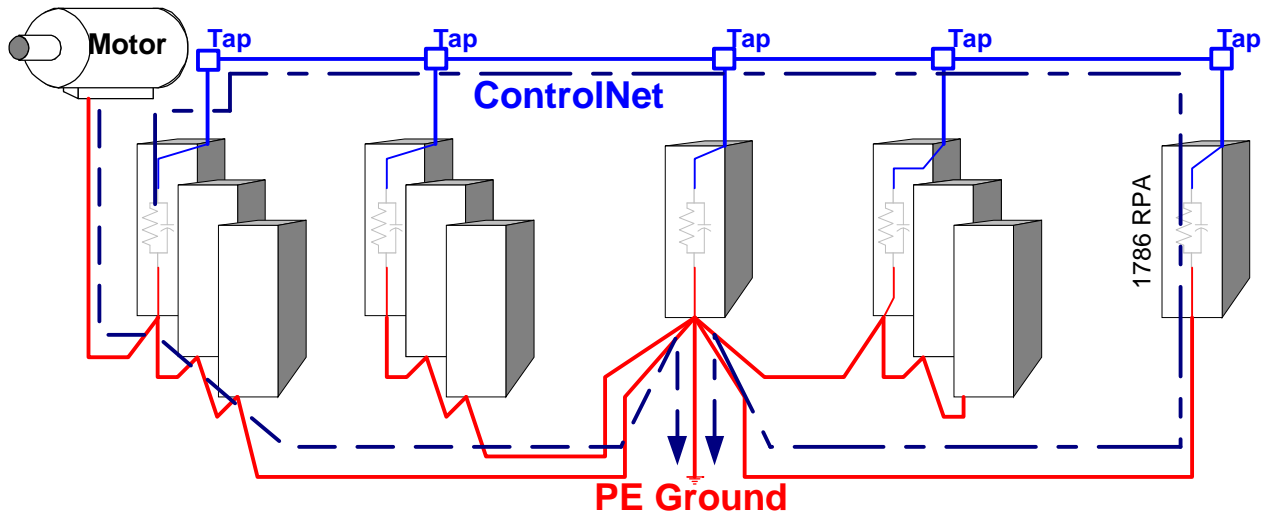


Figure 2 Example of Ground Loops



To avoid the ground loops caused by the high current and relatively high impedance of the ground conductors, the ControlNet nodes should be isolated from the local PE ground. This is accomplished by mounting the Communication module's DIN rails on non-conductive standoffs. Additionally running a separate ground wire from each DIN rail back to the star ground point see Figure 3. Isolating the Communications node grounds from the local PE ground will eliminate all ground currents in the coax shields and reduces overall noise in the system. The recommended grounding wire should be 12 gauge stranded THHN wire.

Figure 3 Isolated Ground System

