



Eliminating Induced Noise

Keypads Turning On By Themselves:

A dealer gets a call from the home owner saying that the keypad in a certain room will turn itself on in the middle of the night. Usually the only way to turn it off is to turn off the main power switch on the controller. There is nothing in our current line of controllers that has the capability to turn itself on, so how does this happen?

Usually, it turns out to be induced voltage from other wiring in the house that has been run too close to the CAT-5 going out to the keypads. When voltage flows through a wire, there is a magnetic field around the wire called Electro Magnetic Interference or **EMI**.

When this EMI bleeds into the CAT-5 it travels back into the controller and can cause unpredictable and inconsistent problems. The keypad or controller sees EMI noise, but doesn't know what to do with it. It can then over load the microprocessors and cause them to lock up. Cycling power on the controller might let the system run normally, until it locks up again. If you have an existing install with keypads turning themselves on, you can use a "toner" or inductive tester to "listen" for noise on the CAT-5 coming into the controller.

Common sources of EMI are 120/220 VAC, security equipment (usually dialers) and low voltage lighting. With AC wiring, the higher the amp draw on any wiring near the CAT-5, the higher the chances are that you'll encounter this. Many times these situations involve a keypad in the kitchen, where there are lots of appliances pulling lots of amps, or because keypads are installed in the same box as a light switch or dimmer switch in the bathroom.

Low voltage lighting such as dimmer switches can also generate huge amounts of EMI and RF noise. Sometimes the noise can come from outside the house from radio and cell towers. EMI can also cause problems with IR repeating systems, ABUS® systems, intercoms, phone systems, or any other sensitive electronic devices.

Avoiding these issues is something that needs to be done before the sheetrock goes up. Start by using a quality CAT-5e. Shielded CAT-5e and Cat-6, although a bit tougher to pull, is ideal. Make sure your CAT-5 runs are "clean" – i.e. keep low voltage wiring at least 2 ft. away from high voltage or noise-prone wiring. Avoid parallel runs, but if needed always cross run at right angles with a couple of inches in between.

Ferrite beads can be placed around the CAT-5 before it goes into the controller and the keypads to absorb enough of the noise to resolve the issue. They can be purchased in bulk online for little money. Search the internet for "**Ferrite Beads**" or "**Ferrite Chokes**."

System Lockups and Reboots:

Sometimes a system may encounter random lockups or reboots not caused by EMI on low voltage wiring. In these cases, the system may be experiencing voltage spikes or surges on the power cords. It's recommended to run systems on high quality **power conditioners** which level out voltage and prevent voltage spikes, drops, or noisy voltage. Simple surge protectors may help protect equipment from major hits, but they can't protect the system from erratic behavior caused by poor grounding.

Now that you have some information regarding induced noise, you can take some steps and practice good wiring techniques to prevent these types of issues in the future. If you come across an existing install with some of these issues, using these good practices can help the system run cleaner, faster, and the client will be much happier.