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MASON-GREY

FIELD FAILURES
OF THE MICROLOGIX 1500
(SOURCE: www.ab.com)

Occasionally, the MicroLogix has spontaneously reset itself and cleared its memory in the field. Below are recommendations for preventing this from happening. The problem is ALWAYS related to noise or voltage spikes in the system. Below is a list of the faults that occur after such an event, and guidelines to use to prevent this from occurring.

FAULT CODES

Code (Hex)	Description / Recommended Action(s)
0001	The default program was loaded. This non-user error occurs at power up. Re-download or transfer the program. Verify battery is connected.
0002	Unexpected reset occurred. This non-user error occurs at power up. Check grounding and surge suppression. Verify battery is connected.
0003	EEPROM memory is corrupt. This non-user error occurs at power up. Reprogram the memory module. If the error persists replace the memory module.
0004	A run time memory integrity error occurred. This is a non-user error. Cycle power and then re-download. Check grounding and surge suppression.
0005	Retentive data is lost. This recoverable error occurs when going to run.
0006	Memory Module hardware fault or memory module incompatible with OS. Non-user error. Upgrade the OS to be compatible with memory module. Obtain a new memory module.
0007	Failure during memory module transfer. Non-user error. Re-attempt the transfer. If the error persists replace the memory module.
0008	A fatal internal software error occurred. This non-user error occurs at power up. Cycle power, re-download and reinitialize any necessary data. Check grounding and surge suppression.
0009	A fatal internal hardware error occurred. This non-user error occurs at power up. Cycle power, re-download and reinitialize any necessary data. Check grounding and surge suppression.

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GUIDELINES

Follow the guidelines in this document to resolve noise conditions and single digit CPU fault codes such as 0001H, 0002H, 0008H, 0009H.

The recommendations made in the MicroLogix User Manuals, and The Industrial Automation Wiring and Grounding Guidelines for Noise Immunity Document, Publication 1770-4.1- February 1998 are the actual conditions under which the NEMA and CE certification tests are performed by Allen-Bradley.

If these recommendations are ignored, unknown problems, including unexpected faults, could occur. The areas of concern if MicroLogix faults occur are:

- Grounding
- I/O
- Power
- Communications

Grounding
This is generally the most critical aspect of product installation with respect to noise immunity. A poorly grounded system allows transient energy into the controller instead of diverting it away from internal components. Chapter 2 of the above referenced MicroLogix User Manual discusses MicroLogix grounding guidelines in detail. The following is a checklist that covers the most important aspects of grounding a MicroLogix controller.

Ensure that there is a 6 inch or less length of 14 gauge wire used from the ground screw of the controller to the ground bus. Or, if this is not possible, connect the ground screw of the controller to the mounting plate or panel, making sure that this panel is securely grounded with a 14 gauge or heavier wire to the ground bus.

When AC power is supplied to the controller as a separately derived system through an isolation/step-down transformer, you can connect it as a grounded AC system. For a grounded AC system, connect one side of the transformer secondary (L2) to the ground bus. We strongly recommend using grounded systems.

Follow local codes in determining whether to use a grounded system.

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Inputs / Outputs
The suppression of conducted and radiated noise attributable to the arcing of inductive loads has been the single most effective solution to improving MicroLogix noise immunity.

In addition, inductive load devices such as motor starters and solenoids require the use of some type of surge suppression to protect the controller output contacts. By adding a suppression device directly across the coil of an inductive device, you will significantly prolong the life of the switch contacts.

Refer to pages 1-8 through 1-10 of the above referenced MicroLogix User Manual and pages 15-18 of the Industrial Automation Wiring and Grounding Guidelines for a complete description of I/O suppression devices for A-B inductive loads connected to MicroLogix outputs. It takes energy from some source to create electrical noise conditions. The most common sources of such energy are from turning inductive loads on/off.

Are inductive devices connected to MicroLogix outputs properly suppressed? If not, suppression devices must be added as near to the load as possible.

For non-Allen Bradley loads, check the vendor's literature for the load being used for the correct suppression devices. For A-B loads, refer to the following table for the correct suppression device:

Recommended Surge Suppressers for switching 24VDC inductive loads is a 1N4004 Diode that is reverse wired across the load.

If a suppression device cannot be found, use the following: For 120VAC loads, Harris P/N V175LA10A. For 240VAC loads, Harris P/N V320LA20A.

For detailed information on Allen-Bradley Surge Suppression devices please refer to the Allen-Bradley Industrial Controls Catalog at **http://www.ab.com/catalogs/**.

Be aware that an MOV should be used for the suppression of inductive devices connected to AC (triac) outputs. RC network suppressers can damage triacs.

Power
The power supplied to the MicroLogix power supply and I/O is also a critical aspect concerning noise immunity. Power considerations for MicroLogix controllers are discussed on pages 1-12 and 1-13 in the above referenced MicroLogix User Manual. To increase power supply immunity to conducted noise, perform the following:

Connect MOVs across the following AC input terminals on the controller: L1 and L2, L1 and GND, and L2 and GND.

For 120VAC input, use Harris P/N V175LA10A. For 240VAC input, use Harris P/N V320LA20A.

The installation of a low cost power line filter can yield more than a 300% improvement in processor immunity to high frequency noise. The "VB" series of CORCOM filters are recommended. The following are examples of the 10 ampere versions available:

1. CORCOM 10VB1 (faston connections)
2. CORCOM 10VB6 (screw terminals)

These filters may be obtained from NEWARK. They are used in series between the AC power source and the Micrologix 1000 Controller.

Communication Cable Routing
Keep the communication cable at least 1.52m(5ft) from any electric motors, transformers, rectifiers, generators, arc welders, induction furnaces, or sources of microwave radiation. If you must run the cable across power feed lines, run the cable at right angles to these lines If you do not run the cable through a contiguous metallic wireway or conduit, keep the communication cable at least 0.15m(6in) from AC power lines of less then 20A, 0.30m(1ft) from lines greater then 20A, but only up to 100KVA, and 0.60m(2Ft) from lines of 100KVA or more.

If you run the cable through a contiguous metallic wireway or conduit, keep the communication cable at least 0.08m (3in) from AC power lines of less than 20A, 0.15m (6 in) from lines greater then 20A, but only up to 100KVA, and 0.30m (1ft) from lines 100KVA or more.

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NOTE: Running the communication cable through conduit provides extra protection from physical damage and electrical interference. If you route the cable through conduit, follow these additional recommendations.

Use ferromagnetic conduit near critical sources of electrical interference. You can use aluminium conduit in non-critical areas.

Use plastic connectors to couple between aluminium and ferromagnetic conduit. Make an electrical connection around the plastic connector (Use pipe clamps and the heavy gauge wire or wire braid to hold both sections at the same potential.

Ground the entire length of conduit by attaching it to the building earth ground.

Do not let the conduit touch the plug on the cable

Arrange the cables loosely within the conduit. The conduit should contain only serial communications cables.

Install the conduit so that it meets all applicable codes and environmental specifications.

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