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Troubleshooting

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Diagnosis

The ADAM-5000 system provides two kinds of diagnosis: hardware diagnosis and software diagnosis to help the user detect and identify various types of system and I/O module failures.

7.1 Hardware Diagnosis

When the ADAM-5000 is first powered on, the system does a self-diagnosis. The diagnosis information will be indicated on the LEDs of the system module in the following sequence:

1. The LEDs will come on according to the following sequence:
PWR -> RUN -> TX -> RX,
2. Then all LEDs will go off
3. If the system self test is OK, the LEDs will follow the sequence outlined in Steps 1 and 2. If the system has some problems, the LEDs indicate errors as shown in the following table.

LED Status	Error Type
PWR LED On	Checksum error
RUN LED On	EEPROM Read/Write error on CPU board
TX LED On	RS-232 malfunction
RX LED On	RS-485 malfunction

7.2 Software Diagnosis

The ADAM-5000 provides an ASCII command \$AAE (Refer to the command set in Chapter 6) to read the status of I/O modules through the RS-232 port for field diagnosis or RS-485 port for remote diagnosis. The response of such a command is !AAFFFFFFFF (FF represents the error message of a slot from 0 to 3). The error messages are detailed in the following table:

Error Code	Error Type
00h	OK
01h	AI module span calibration error
02h	AI module self-calibration error
04h	AI module zero calibration error
08h	AI module data reading error
10h	CJC reading error
20h	EEPROM read/write error of AI/AO modules

7.3 System Indicators

While the ADAM-5000 system is in operation the indicators on the front can help you diagnose problems with the system. The table below gives a quick reference of potential problems associated with each status indicator.

Indicator Status	Potential Problems
PWR (Off)	<ol style="list-style-type: none">1. System voltage incorrect2. Power supply is faulty3. Other components such as I/O modules have power supply shorts
RUN (Off)	CPU board is faulty
TX (Off)	Data not sent to adjacent node
RX (Off)	Data not received from adjacent node

PWR Indicator

In general there are 3 reasons for the system power status LED (PWR) to be OFF.

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1. External power to the system is incorrect or is not applied.
2. Power supply is faulty.
3. Other component(s) have the power supply shut down.

Incorrect External Power

If the voltage to the power supply is not correct, the system may not operate properly or may not operate at all. Use the following guidelines to correct the problem.

1. First, turn off the system power and check all incoming wiring for loose connections.
2. If the connections are acceptable, reconnect the system power and measure the voltage at the power terminal strip to insure it is within specification. If the voltage is not correct, shut down the system and correct the problem.
3. If all wiring is connected correctly and the incoming power is within the specifications required, the system module should be returned for repair.

Faulty Power Supply

Substitute a power supply known to be good to see if this corrects the problem. If you have experienced major power surges, it is possible that the system and power supply have been damaged. If you suspect this is the cause of the power supply damage, a line conditioner which removes damaging voltage spikes should be used in the future.

Device or Module causing Power Supply to Shutdown

It is possible a faulty module or external device using the system 5V can shut down the power supply. This 5V can be coming from the system module.

To test for a device causing this problem:

1. Turn off power to the system module
2. Disconnect all external devices (such as communication cables) from the system module.
3. Reapply power to the system.

If the power supply operates normally, you probably have either a shorted device or a shorted cable. If the power supply does not operate normally, then test for a module causing the problem by using the following procedure.

To isolate which module is causing the problem, disconnect the external power and remove one module at one time till the PWR LED operates normally. Follow the procedure below:

1. Turn off power to the base.
2. Remove a module from the base.
3. Reapply power to the base.

RUN Indicator

If the self test for the system has passed, the RUN LED is still on except no power.

7.4 Communication Problems

If you cannot establish communications with the system module, check these items:

- The cable is disconnected
- The cable has a broken wire or has been wired incorrectly
- The cable is improperly terminated or grounded
- The device connected is not operating at the correct baud rate
- The device connected to the port is sending data incorrectly
- A grounding difference exists between the two devices
- Electrical noise is causing intermittent errors
- The system module has a bad communication port and it should be replaced

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7.5 I/O Module Troubleshooting

There is a LED to indicate the connection between the base and an I/O module in any ADAM-5000 system. The LED is on when the connection is good. If you suspect an I/O error, there are several things that could be causing the problem.

- A loose terminal block
- The power supply has failed
- The module has failed

Some Quick Steps

When troubleshooting the ADAM-5000 series digital I/O modules, there are a few facts you should be aware of. These facts may assist you in quickly correcting an I/O problem.

- The digital output modules can not detect shorted or open output points. If you suspect one or more points on an output module to be faulty, you should measure the voltage drop from the common to the suspect point.
- Leakage current can be a problem when connecting field devices to I/O modules. False input signals can be generated when the leakage current of an output device is great enough to turn on the connected input device. To correct this, install a resistor in parallel with the input or output of the circuit. The value of this resistor will depend on the amount of leakage current and the voltage applied but usually a 10K to 20 KW resistor will work. Insure the wattage rating of the resistor is correct for your applications.
- The easiest method to determine if a module has failed is to replace it if you have a spare. However, if you suspect another device to have caused the failure in the replacement module as well. As a point of caution, you may want to check devices or power supplies connected to the failed module before replacing it with a spare module.