

## CHAPTER TWO

# Troubleshooting

### **IN THIS CHAPTER**

- Troubleshooting basics:
  - Reducing electrical noise
  - Diagnostic LEDs
  - Test options
  - Technical support
- Solutions to common problems
- Resolving serial communication problems
- Product return procedure

# Troubleshooting Basics

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When your system does not function properly (or as you expect it to operate), **the first thing that you must do is identify and isolate the problem.** When you have accomplished this, you can effectively begin to resolve the problem.

The first step is to isolate each system component and ensure that each component functions properly when it is run independently. You may have to dismantle your system and put it back together piece by piece to detect the problem. If you have additional units available, you may want to exchange them with existing components in your system to help identify the source of the problem.

Determine if the problem is mechanical, electrical, or software-related. Can you repeat or recreate the problem? Random events may appear to be related, but they are not necessarily contributing factors to your problem. You may be experiencing more than one problem. You must isolate and solve one problem at a time.

Log (document) all testing and problem isolation procedures. You may need to review and consult these notes later. This will also prevent you from duplicating your testing efforts.

Once you isolate the problem, refer to the problem solutions contained in this chapter. If the problem persists, contact your local technical support resource (see *Technical Support* below).

## Reducing Electrical Noise

Refer to the guidelines on page 26. General information on reducing electrical noise can be found in the Engineering Reference section of the Parker Compumotor/Digiplan catalog. Appendix D (page 63) provides guidelines on how to install the ZETA6xxx in a manner most likely to minimize the ZETA6xxx's emissions and to maximize the ZETA6xxx's immunity to externally generated electromagnetic interference.

## Diagnostic LEDs

**POWER**..... On (green) if 120VAC (or 240 VAC for 240V versions) connected. Off if no power.

**STEP** ..... Flashes on (green) with each pulse sent to the motor. Off if no pulses.

**OVER TEMP** ..... On (red) if internal sensor reaches 122°F (50°C). Off = O.K.

**MOTOR FAULT**..... On (red) if there is a short in the motor windings, if the motor cable is disconnected or shorted, or if the INTERLOCK jumper on the MOTOR connector is removed or extended. Off = O.K.

## Test Options

- **Test Panel.** Motion Architect's Panel Module allows you to set up displays for testing system I/O and operating parameters. Refer to the *Motion Architect User Guide* for details.
- **Hardware Test Procedure** (see pages 27-29).
- **Motion Test.** A test program is available to verify that the ZETA6xxx is sending pulses to the motor and that the motor is functioning properly. The test program can be initiated by issuing the TEST command over the serial interface, or by accessing the RP240 TEST menu (see *6000 Series Programmer's Guide* for RP240 menu structure).

### WARNING

The TEST program causes the end-of-travel limits to be ignored. If necessary, disconnect the load to ensure the test moves do not damage your equipment or injure personnel.

## Technical Support

If you cannot solve your system problems using this documentation, contact your local Automation Technology Center (ATC) or distributor for assistance. If you need to talk to our in-house application engineers, please contact us at the numbers listed on the inside cover of this manual. (These numbers are also provided when you issue the HELP command.)

**NOTE:** Compumotor maintains a BBS that contains the latest software upgrades and late-breaking product documentation, a FaxBack system, and a tech support email address.

# Common Problems & Solutions

**NOTE:** Some software-related causes are provided because it is sometimes difficult to identify a problem as either hardware or software related.

Problem	Cause	Solution												
Communication (serial) not operative, or receive garbled characters.	<ol style="list-style-type: none"> <li>Improper interface connections or communication protocol.</li> <li>COM port disabled.</li> <li>In daisy chain or multi-drop, the unit may not be set to proper address.</li> </ol>	<ol style="list-style-type: none"> <li>See <i>Troubleshooting Serial Communication</i> section below.</li> <li>a. Enable serial communication with the E1 command.</li> <li>b. If using RS-485, make sure the internal jumpers are set accordingly (see page 8). Make sure COM 2 port is enabled for sending 6000 language commands (execute the PORT2 and DRPCHKØ commands).</li> <li>Verify DIP switch settings (see page 7), or proper use of ADDR command.</li> </ol>												
Direction is reversed.	<ol style="list-style-type: none"> <li>Phase of step motor reversed (motor does not move in the commanded direction).</li> <li>Phase of encoder reversed (reported TPE direction is reversed).</li> </ol>	<ol style="list-style-type: none"> <li>Swap the A+ and A- connection at the MOTOR connector.</li> <li>Swap the A+ and A- connection at the ENCODER connector.</li> </ol> <p>SOFTWARE ALTERNATIVE: If the motor (and the encoder if one is used) is reversed, you can use the CMDDIR1 command to reverse the polarity of both the commanded direction and the polarity of the encoder feedback counts.</p>												
Distance, velocity, and accel are incorrect as programmed.	<ol style="list-style-type: none"> <li>Incorrect resolution setting.</li> </ol>	<ol style="list-style-type: none"> <li>a. Set the drive resolution to 25,000 steps/rev (DRES25000 command).</li> <li>b. Set the ERES command setting (default setting is 4,000 counts/rev) to match the post-quadrature resolution of the encoder. <u>Compumotor encoders:</u> <table style="margin-left: 20px; border: none;"> <tr> <td>E Series Encoders .....</td> <td>ERES4000</td> </tr> <tr> <td>OS motor with -HJ encoder (OSxxx-xxx-HJ) .....</td> <td>ERES2048</td> </tr> <tr> <td>OS motor with -RE encoder (OSxxx-xxx-RE) .....</td> <td>ERES4000</td> </tr> <tr> <td>OS motor with -RC encoder (OSxxx-xxx-RC) ....</td> <td>ERES4000</td> </tr> <tr> <td>RS motor with -EC encoder (RSxxx-xxx-EC) .....</td> <td>ERES4000</td> </tr> <tr> <td>TS motor with -EC encoder (TSxxx-xxx-EC)*</td> <td></td> </tr> </table> </li> </ol>	E Series Encoders .....	ERES4000	OS motor with -HJ encoder (OSxxx-xxx-HJ) .....	ERES2048	OS motor with -RE encoder (OSxxx-xxx-RE) .....	ERES4000	OS motor with -RC encoder (OSxxx-xxx-RC) ....	ERES4000	RS motor with -EC encoder (RSxxx-xxx-EC) .....	ERES4000	TS motor with -EC encoder (TSxxx-xxx-EC)*	
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Encoder counts missing.	<ol style="list-style-type: none"> <li>Improper wiring.</li> <li>Encoder slipping.</li> <li>Encoder too hot.</li> <li>Electrical noise.</li> <li>Encoder frequency too high.</li> </ol>	<ol style="list-style-type: none"> <li>Check wiring.</li> <li>Check and tighten encoder coupling.</li> <li>Reduce encoder temperature with heatsink, thermal insulator, etc.</li> <li>a. Shield wiring.</li> <li>b. Use encoder with differential outputs.</li> <li>Peak encoder frequency must be below 1.6MHz post-quadrature. Peak frequency must account for velocity ripple.</li> </ol>												
Erratic operation.	<ol style="list-style-type: none"> <li>Electrical noise and/or improper shielding.</li> <li>Improper wiring.</li> </ol>	<ol style="list-style-type: none"> <li>a. Reduce electrical noise or move ZETA6xxx away from noise source.</li> <li>b. Refer to <i>Reducing Electrical Noise</i> on page 46.</li> <li>Check wiring for opens, shorts, &amp; mis-wired connections.</li> </ol>												
LEDs	See <i>Diagnostic LEDs</i> above (page 46)													
Motion does not occur.	<ol style="list-style-type: none"> <li>Check LEDs.</li> <li>End-of-travel limits are active.</li> <li>P-CUT (Pulse cut-off) not grounded.</li> <li>Drive fault detected.</li> <li>Undervoltage (AC supply &lt; 95 VAC).</li> <li>Improper wiring.</li> <li>Load is jammed.</li> <li>No torque from motor.</li> </ol>	<ol style="list-style-type: none"> <li>See <i>Diagnostic LEDs</i> above.</li> <li>a. Move load off of limits or disable limits with the LHØ command.</li> <li>b. Set LSPOS to a value greater than LSNEG.</li> <li>Ground the P-CUT connection.</li> <li>Check status with TASXF command (see bit #4).</li> <li>Check status with TASXF command (see bit #2). Check AC supply.</li> <li>Check motor and end-of-travel limit connections.</li> <li>Remove power and clear jam.</li> <li>See problem: <i>Torque, loss of.</i></li> </ol>												
Motor creeps at slow velocity in encoder mode (ENC1).	<ol style="list-style-type: none"> <li>Encoder direction opposite of motor direction.</li> <li>Encoder connected to wrong axis.</li> </ol>	<ol style="list-style-type: none"> <li>Switch encoder connections A+ &amp; A- with B+ &amp; B-.</li> <li>Check encoder wiring.</li> </ol>												
Programmable inputs not working.	<ol style="list-style-type: none"> <li>IN-P (input pull-up) not connected to a power supply.</li> <li>If external power supply is used, the grounds must be connected together.</li> <li>Improper wiring.</li> </ol>	<ol style="list-style-type: none"> <li>a. When inputs will be pulled down to 0V by an external device, connect IN-P to +5V supplied <u>or</u> to an external 5-24V positive supply (<u>but not to both</u>).</li> <li>b. When inputs are pulled to 5-24V by an external device, connect IN-P to 0V.</li> <li>Connect external power supply's ground to ZETA6xxx's ground (GND).</li> <li>Check wiring for opens, shorts, and mis-wired connections.</li> </ol>												

Programmable outputs not working.	<ol style="list-style-type: none"> <li>1. Output connected such that it must source current (pull to positive voltage).</li> <li>2. OUT-P not connected to power source.</li> <li>3. If external power supply is used, the grounds must be connected together.</li> <li>4. Improper wiring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Outputs are open-collector and can only sink current -- change wiring.</li> <li>2. Connect OUT-P to the +5V terminal <u>or</u> to an external supply of up to 24V.</li> <li>3. Connect the external power supply's ground to the ZETA6xxx's ground (GND).</li> <li>4. Check wiring for opens, shorts, and mis-wired connections.</li> </ol>
Torque, loss of.	<ol style="list-style-type: none"> <li>1. Improper wiring.</li> <li>2. No power (POWER LED off).</li> <li>3. Overtemp, low voltage, or motor fault.</li> <li>4. Drive shutdown.</li> <li>5. Current standby mode enabled.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check wiring to the motor, as well as other system wiring.</li> <li>2. Check power connection (POWER LED should be on).</li> <li>3. Check LED status (see <i>Diagnostic LEDs</i> above).</li> <li>4. Enable drive with the <code>DRIVE1</code> command.</li> <li>5. If more torque is needed at rest, disable standby mode (<code>DAUTOSØ</code> command).</li> </ol>
Trigger, home, end-of-travel, or P-CUT inputs not working.	<ol style="list-style-type: none"> <li>1. If external power supply is used, the grounds must be connected together.</li> <li>2. Improper wiring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Connect external power supply's ground to ZETA6xxx's ground (GND).</li> <li>2.a. Check wiring for opens, shorts, and mis-wired connections.</li> <li>2.b. When inputs are pulled down to 0V by an external device, connect AUX-P to +5V supplied <u>or</u> to an external +5-24V supply (<u>but not to both</u>).</li> <li>2.c. When inputs are pulled to 5-24V by external device, connect AUX-P to 0V.</li> <li>2.d. Make sure a 5-24V power source is connected to the V_I/O terminal.</li> </ol>

\* Not released as of this printing.

# Troubleshooting Serial Communication Problems

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## General Notes

- Power up your computer or terminal *BEFORE* you power up the ZETA6xxx.
- Make sure the serial interface is connected as instructed on page 12. Shield the cable to earth ground at one end only. The maximum RS-232 cable length is 50 feet (15.25 meters).
- RS-232: Handshaking must be disabled. Most software packages allow you to do this. You can also disable handshaking by jumpering some terminals on the computer's/ terminal's serial port: connect RTS to CTS (usually pins 4 and 5) and connect DSR to DTR (usually pins 6 and 20).
- RS-485: Make sure the internal DIP switches and jumpers are configured as instructed on page 8.

## Test the Interface

1. Power up the computer or terminal and launch the terminal emulator.
2. Power up the ZETA6xxx. A power-up message (similar to the following) should be displayed, followed by a prompt (>):

```
*PARKER COMPUMOTOR 6000 Series - SINGLE AXIS INDEXER/DRIVE
*RP240 CONNECTED
>
```

3. Type "TREV" and press the ENTER key. (The TREV command reports the software revision.) The screen should now look as follows (if not, see Problem/Remedy table below).

```
*PARKER COMPUMOTOR 6000 Series - SINGLE AXIS INDEXER/DRIVE
*RP240 CONNECTED
>TREV
*TREV92-014630-01-4.72
```

Problem	Remedy (based on the possible causes)
No Response	<ul style="list-style-type: none"> <li>• COM port not enabled for 6000 language communication. If RS-232 connected to COM 1: issue "PORT1" and "DRPCHKØ" commands. If RS-232 connected to COM 2: issue "PORT2" and "DRPCHKØ" commands. If RS-485 connected to COM 2: issue "PORT2" and "DRPCHKØ" commands.</li> <li>• RS-232: Echo may be disabled; enable with the ECHO1 command.</li> <li>• If you are using an RS-232 connection between the host computer and the master ZETA6xxx connected to multiple ZETA6xxxs in an RS-485 multi-drop, make sure the master ZETA6xxx has these settings executed in the order given (you should place these settings in your power-up STARTP program): <ul style="list-style-type: none"> <li>PORT1 (select RS-232 port, COM1, for configuration)</li> <li>ECHO3 (echo to both COM ports)</li> <li>PORT2 (select RS-485 port, COM2, for configuration)</li> <li>ECHO2 (echo to the other COM port, COM1)</li> </ul> </li> <li>• Faulty wiring. See instructions on page 12. RS-485: verify internal DIP switch and jumper settings on page 8. Also check for shorts or opens.</li> <li>• Is the cable or computer/terminal bad? Here's a test: <ol style="list-style-type: none"> <li>1. Disconnect the serial cable from the ZETA6xxx end only.</li> <li>2. Connect the cable's Rx and Tx lines together (this echoes the characters back to the host).</li> <li>3. Issue the TREV command. If nothing happens, the cable or computer/terminal may be faulty.</li> </ol> </li> <li>• The controller may be executing a program. Issue the !K command or the &lt;ctrl&gt;K command to kill the program.</li> </ul>
Garbled Characters	<ul style="list-style-type: none"> <li>• Verify setup: 9600 baud (range is 19200-1200—see <i>AutoBaud</i>, page 7), 8 data bits, 1 stop bit, no parity; RS-232: Full duplex; RS-485: Half duplex (change internal jumper JU6 to position 1).</li> <li>• RS-485: Transmission line not properly terminated. See page 8 for internal DIP switch and jumper settings. See page 12 for connections and calculating termination resistors (if not using the internal resistors via internal DIP switches).</li> <li>• Faulty wiring. See instructions on page 12. RS-485: verify internal DIP switch and jumper settings on page 8. Also check for shorts or opens.</li> </ul>
Double Characters	<ul style="list-style-type: none"> <li>• Your terminal emulator is set to half-duplex; set it to full-duplex.</li> </ul>

# Product Return Procedure

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- Step 1 Obtain the serial number and the model number of the defective unit, and secure a purchase order number to cover repair costs in the event the unit is determined by the manufacturers to be out of warranty.
- Step 2 Before you return the unit, have someone from your organization with a technical understanding of the ZETA6xxx system and its application include answers to the following questions:
- Which version of the ZETAxxx do you have?
  - What is the extent of the failure/reason for return?
  - How long did it operate?
  - Did any other items fail at the same time?
  - What was happening when the unit failed (e.g., installing the unit, cycling power, starting other equipment, etc.)?
  - How was the product configured (in detail)?
  - Which, if any, cables were modified and how?
  - With what equipment is the unit interfaced?
  - What was the application?
  - What was the system environment (temperature, enclosure, spacing, contaminants, etc.)?
  - What upgrades, if any, are required (hardware, software, user guide)?
- Step 3 Call for return authorization. Refer to the *Technical Assistance* phone numbers provided on the inside front cover of this document. The support personnel will also provide shipping guidelines.