

## *Troubleshooting*

### **Chapter Objectives**

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The information in this chapter will enable you to:

- Maintain the system to ensure smooth, efficient operation
- Isolate and resolve system problems

### **Drive Maintenance**

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Ensure that the drive's heatplate has proper thermal contact with the mounting surface. Enclosures must be connected to earth ground through a grounding electrode conductor to provide a low-impedance path for ground-fault or noise-induced currents (use a star washer with the lower mounting screw on the drive). All earth ground connections must be continuous and permanent. Periodically check the mounting screws to ensure they are tight.

### **Motor Maintenance**

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Inspect the motor regularly to ensure that no bolts or couplings have become loose during normal operation. This will prevent minor problems from developing into more serious problems.

Inspect the motor cable periodically for signs of wear. This inspection interval is duty-cycle, environment, and travel-length dependent. The cable should not have excessive tensile force applied to it and should not be bent beyond a one-inch radius of curvature during normal operation. Tighten all cable connectors.

### **Reducing Electrical Noise**

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For detailed information on reducing electrical noise in your system, refer to *Appendix B, EMC Installation Guide*.

## **Problem Isolation**

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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 accomplish this, you can effectively begin to resolve and eradicate 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.

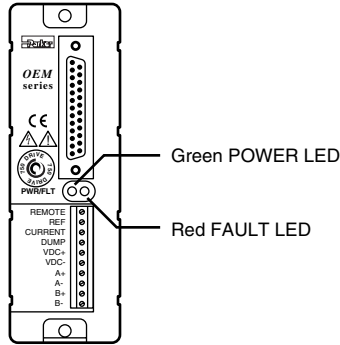
Determine if the problem is mechanical, electrical, or software-related. Can you repeat or re-create the problem? Random events may appear to be related, but they may not be contributing factors to your problem.

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, take the necessary steps to resolve it. Use the solutions in this chapter. If your system's problem persists, contact your local technical support resource.

## FRONT PANEL LEDs

The OEM750/OEM750X has two LEDs on its front panel.



### *LEDs*

The FAULT LED is red and illuminates when the amplifier is disabled. This LED is activated when any of the following conditions occur:

- Motor short circuit detected
- Drive overtemperature
- Internal fault detected

The POWER LED is green and illuminates when the internal power supply is operating and providing +5V.

## COMMON PROBLEMS AND SOLUTIONS

The following table will help you eradicate most of the problems you might have with the OEM750/OEM750X.

| <b>Symptoms</b>                              | <b>Probable Causes</b>                   | <b>Solutions</b>  |
|--|--|---|
| The drive loses pulses at high speed         | Indexer is overdriving step input        | Verify that the step input current is not greater than 15 mA  |
|  | Indexer is underdriving step input       | Verify that the step input current is greater than 6.25 mA  |
|  | Indexer is sending pulses too fast       | Verify that the indexer is not exceeding the 2 Mhz maximum pulse rate                                     |
|  | Motor is out of torque                   | Verify that the motor is sized correctly for your application   |
| The motor stalls at high speeds              | The velocity is too high                 | The drive can handle a maximum pulse rate of 2 Mhz or 50 rps, whichever comes first decrease the velocity |
|  | Motor current is not set correctly       | Check the current select resistor and verify that the current is set correctly                            |
|  | Loop gain is not set correctly           | Verify correct current loop gain setting for the motor inductance and supply voltage you are using        |
|  | Motor is undersized for application      | Verify that the motor is sized correctly for your application   |
| The motor stalls during acceleration         | Motor current is not set correctly       | Check the current select resistor and verify that the current is set correctly                            |
|  | The acceleration is set too high         | Decrease the acceleration   |
|  | There is insufficient rotor inertia      | Add inertia to the motor shaft  |
|  | Loop gain is not set correctly           | Verify correct current loop gain setting for the motor inductance and supply voltage you are using        |
|  | Motor is undersized for application      | Verify that the motor is sized correctly for your application   |
| The motor (unloaded) stalls at nominal speed | Loop gain is not set correctly           | Verify correct current loop gain setting for the motor inductance and supply voltage you are using        |
|  | There is insufficient rotor inertia      | Add inertia to the motor shaft  |
|  | Mid-frequency resonance                  | Verify anti-resonance is enabled  |
| Motor does not move commanded distance       | Motor resolution is set incorrectly      | Determine the resolution on your indexer and verify that the drive resolution setting is the same         |
| Motor will not change direction as commanded | The direction input is not being enabled | Verify that the direction input is being enabled (6.4 mA to 15 mA)  |

| Symptoms  | Probable Causes  | Solutions   |
|---|--|---|
| Indexer moves motor in wrong direction  | There is a direction conflict within the indexer   | Change direction within your indexer or by swapping motor leads A+ and A- at the drive connector  |
| When a move is commanded, no motion occurs  | A limit may be enabled and active  | Check hard limit or disable limits with the LD3 command   |
|   | You may be in Absolute mode and are already at the position you are commanding the motor to move to        | Try another distance and issue Go (G) command   |
| The unit may appear to not be responding to commands                                  | If you defined a sequence and never issued XT, the OEM750/OEM750X still thinks you are defining a sequence | Issue an XT command at the end of the sequence to end sequence definition   |
|   | OEM750X may be off-line (F command)  | Issue an E command to bring the unit on-line  |
| Power LED is not on (illuminated)   | The drive is not receiving adequate DC voltage   | Verify the VDC+ and VDC- connection<br><br>Verify your power supply is producing adequate power<br><br>Verify that there is DC voltage at the drive and at the VDC+ and VDC- connection |
|   | Drive screw terminals are loose  | Tighten screws – do not tin wires   |
| Power LED is flashing   | DC Line voltage is too low I/O incorrectly connected   | Check DC line voltage (24 VDC minimum)  |
|   | Internal damage to the drive   | Remove 25-Pin D connector to isolate the problem<br><br>Return drive to Compumotor for servicing  |
| There is little or no holding torque; the power LED is on; the motor fault LED is off | The incorrect current select resistor is being used  | Verify the current selector resistor with the correct table – measure the resistor with an ohmmeter   |
|   | The current select resistor is not installed or loose  | Check for current select resistor, tighten screws, check wiring   |
|   | Current range switches not set correctly   | Verify setting. See manual.   |
|   | Remote input activated   | Remove 25-pin D connector to isolate the problem  |
|   | Auto standby function enabled  | Check switches SW3-1, SW3-2   |

| Symptoms                                  | Probable Causes   | Solutions   |
|---|---|---|
| The motor fault LED is on                 | The drive has detected a short circuit in the motor wiring  | Check for miswiring— carefully check the motor wires for loose strands shorting the windings                                  |
|   | The drive is overheating                                    | Verify that the drives heatsink does not exceed 55°C  |
|   | The drive may have internal damage                          | Return the drive to Compumotor for servicing  |
| The motor moves erratically at low speeds | Motor current is set incorrectly                            | Check the current select resistor and verify that the current is set correctly  |
|   | Indexer pulses are being sent to the drive erratically      | Verify, with an oscilloscope, that the indexer pulses are being sent at a constant rate and are not being frequency modulated |
|   | Motor resolution is set for 200 or 400 steps per revolution | Full and half step modes will cause the motor to run roughly at low speeds  |
|   | Loop gain is not set correctly                              | Verify correct current loop gain setting for the motor inductance and supply voltage you are using                            |
|   | 1 motor phase is open                                       | Check wiring. Measure motor winding resistance at the drive <b>(remove power)</b>   |

## Testing the Motor

If the motor fails to move, you should test the motor with an ohmmeter to examine the resistance between the motor connections. If the motor is not malfunctioning, the source of the problem is probably within the drive. If you operate a faulty drive with a reliable motor, you may damage the motor. If you find that the drive is not faulty, remove power, and remove the motor from the drive. Use the following steps to test the motor.

1. Remove power from the system. Detach the motor from the drive.
2. With the motor detached from the system, use an ohmmeter to check the resistance across Phase A. It should be approximately 2 ohms.
3. Use the ohmmeter to check the resistance across Phase B. It should be approximately 2 ohms, also (*the resistance across Phase A and Phase B should be nearly identical*).
4. Use the ohmmeter to check the resistance between Phase A and Phase B. **It should be infinite.**
5. Use the ohmmeter to check the resistance between Phase A and Earth (the motor case shaft). **It should be infinite.**

6. Use the ohmmeter to check the resistance between Phase B and Earth (the motor case shaft). **It should be infinite.**
7. Turn the shaft manually. There should not be any torque.

If the motor responds as described to each of these steps, it is functioning properly. The source of the problem is probably within the drive.

## RS-232C Problems

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Use the following procedure to troubleshoot communication problems that you may have with the OEM750X.

1. Be sure the host computer's transmit (Tx) wire is wired to the peripheral's receive (Rx) connection, and the host computer's receive (Rx) wire is wired to the peripheral's transmit (Tx) connection. Switch the receive and transmit wires on either the host or peripheral if the problem persists.

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### **CAUTION**

OEM750X Rx, Tx, and GND pins are not 2, 3, and 7 like most devices.

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2. Confirm that the host and peripheral are configured for the same baud rate, 8 data bits, 1 stop bit, and no parity.
3. Use DC common or signal ground (pin 7) as a reference, not earth ground.
4. Cable lengths should not exceed 50 feet (15 m) unless you are using some form of line driver, optical coupler, or shield. As with any control signal, be sure to shield the cable-to-earth ground at one end only.
5. To test the terminal or terminal emulation software and the RS-232C cable for proper three-wire communication, unhook the OEM750X and enter a character. You should not receive an echoed character. If you do, you are in half duplex mode. Connect the host's transmit and receive lines together and send another character. You should receive the echoed character. If not, consult the manufacturer of the host's serial interface for proper pin outs.
6. (Note: This only applies to firmware 92-016638-01). If the controller echoes back **&** for each byte sent to the controller, a data communication error has occurred. To re-establish communication, see the **%** command.
7. (Note: This only applies to firmware 92-016638-01). To extend cable length and/or improve noise immunity, RS-485 option is available as a custom product request. Contact the Custom Products department for details.
8. (Note: This only applies to firmware 92-016638-01). If commands are being lost intermittently while data streaming, reference the **XONOFF** command for using software flow control.

## Software Debugging Tools

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The OEM750/OEM750X has several tools that you can use to debug a problem in the system. The software tools are listed below:

|           |                            |
|-----------|----------------------------|
| <b>RA</b> | Limit Switch Status Report |
| <b>R</b>  | Report Status              |
| <b>IS</b> | Input Status Report        |
| <b>BS</b> | Buffer Status Report       |
| <b>B</b>  | Buffer Status Report       |

## Returning the System

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If your OEM750/OEM750X system is faulty, you must return the drive and motor for replacement or repair. A failed drive can damage motors. If you must return your OEM750/OEM750X to effect repairs or upgrades, use the following steps:

1. Get the serial number and the model number of the defective unit(s), and a purchase order number to cover repair costs in the event the unit is determined to be out of warranty.
2. Before you return the unit, have someone from your organization with a technical understanding of the OEM750/OEM750X and its application include answers to the following questions:
  - 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 (i.e., installing the unit, cycling power, starting other equipment, etc.)?
  - How was the unit configured (in detail)?
  - What, if any, cables were modified and how?
  - With what equipment is the unit interfaced?
  - What was the application?
  - What was the system sizing (speed, acceleration, duty cycle, inertia, torque, friction, etc.)?
  - What was the system environment (temperature, enclosure, spacing, unit orientation, contaminants, etc.)?
  - What upgrades, if any, are required (hardware, software, user guide)?
3. In the USA, call your Automation Technology Center (ATC) for a Return Material Authorization (RMA) number. Returned products cannot be accepted without an RMA number. If you cannot obtain an RMA number from your ATC, call Parker Compumotor's Customer Service Department at (800) 722-2282.

Ship the unit to: Parker Compumotor Corporation  
5500 Business Park Drive  
Rohnert Park, CA 94928  
Attn: RMA # xxxxxxx

4. In the UK, call Parker Digiplan for a GRA (Goods Returned Authorization) number. Returned products cannot be accepted without a GRA number. The phone number for Parker Digiplan Repair Department is 0202-690911. The phone number for Parker Digiplan Service/Applications Department is 0202-699000.

Ship the Unit to:                   Parker Digiplan Ltd.,  
  21, Balena Close,  
  Poole, Dorset,  
  England. BH17 7DX

5. Elsewhere: Contact the distributor who supplied the equipment.