CHAPTER FIVE

5 Troubleshooting

IN THIS CHAPTER

- LED Status
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Troubleshooting Guidelines

If your system is not functioning properly, first try these steps.

First Troubleshooting Steps:

- Is the left LED illuminated? If not, look for problems with AC power. Also see *System Problems* at the end of this chapter.
- Is the left LED illuminated RED? Try to enable drive by connecting pins 1 and 2 of the 50 pin DRIVE I/O connector. If you have a controller connected, this is usually done by sending a DRIVE1 to the controller.
- Cycle power to the drive. Cycling power clears most faults. Notice if the LED turns green, or if it goes directly from off to red.
- Check wiring and feedback connections

If these steps do not solve your problem, follow the general troubleshooting procedure outlined below:

General Troubleshooting Procedure

- Check the LEDs (see the chart below)
- Launch Motion Planner or Pocket Motion Planner
- Verify good RS-232/485 communications
- Save the configuration file
- Use software commands for problem identification:

TERRLG	reports the last 10 error conditions
TAS	reports on axis status
TASX	extended reports on axis status and conditions
TCS	reports codes for specific faults and warnings

- Look for non-Drive problems (problems with other parts of the system)

Detailed procedures for each of these topics are given in the rest of this chapter.

LEDs

The drive has two LEDs. The LED on the left can be red or green. The LED on the right can be yellow or green. LED illumination states, and the conditions they indicate, are tabulated below.

Left LED (Green/Red)	Right LED (Yellow/Green)	Indicated Condition:
off	Yellow	Initialization
Red (flashing)	off	Awaiting flash download
Red (flashing)	Yellow (flashing)	Programming flash memory
Red	Green	Keep Alive mode
Green	Green (flashing)	Incoming steps (variable rate)
Green	Yellow/Green (flashing)	Autorun mode
Red	off	Drive not enabled; or, Drive faulted
Green	off	Drive ready

Establish Communications and Verify Drive Configuration

If you cannot enable the drive, and examining LED conditions has not solved your problem, then establish communications with the drive and launch Motion Planner or Pocket Motion Planner. (See *Chapter 2 Installation* for detailed instructions on establishing communications. Information about installing and using these software programs can be found in the *Gemini Programmer's Reference*.)

If you are unable to establish communications, see *RS-232/485 Communication Problems* later in this chapter.

Save the Configuration File

Since further troubleshooting steps may change the drive configuration, you should upload the current drive configuration file and save it to your PC, in case you need it for future reference.

Reconfigure the Drive

To verify proper configuration, you may wish to reconfigure the drive. Pay particular attention to selecting proper configuration settings for the motor that you have installed, as motor configuration problems can cause a variety of errors. Download the new configuration to the drive; the changes will become effective after you RESET or cycle power. (A simplified configuration procedure was presented in *Chapter 2 Installation*. For full configuration information, see *Chapter 3 Configuration*.)

Software Commands for Troubleshooting

Four software commands are very useful for identifying problems. This section provides guidelines and tips for using these commands. For full command descriptions and tables of error codes, see the *Gemini Programmer's Reference*.

TERRLG – Transfer Error Log

The TERRLG command displays the last ten error conditions. It is updated every time an error occurs; you may want to make a note of the errors listed the first time you issue the command, as this original information will be written over as subsequent errors occur.

You can use the CERRLG command to clear the contents of the error log. This allows you to start the diagnostic process when the error log is in a known state.

TAS – Transfer Axis Status

The TAS command returns the status of all axes, in the form of a 32 bit response: 1 = Yes; Ø = No. (Use the TASXF command for a text-based status report). Note the positions of bits that are “1” rather than “0”—they indicate problem areas, some of which are:

Status Condition:	Solution:
Drive shut down	If this is the only bit that is set, it indicates that the drive is waiting to be enabled. To enable the drive, connect pins 1 and 2 of the DRIVE I/O connector—usually done by sending a DRIVE1 to the controller.
Drive faults occurred	To identify which faults occurred, check the TASX command. (See following section.)
Hardware limit hit	The default is for limits to be disabled. If these bits are set, install or check limit switches; or disable limits with the LHØ command.
Position error exceeded	During tuning, you may want to disable position error by setting SMPER to zero. To help protect the motor from damage, restore SMPER to an appropriate value when you complete tuning.

See the *Gemini Programmer's Reference* for the complete list of status conditions.

TASX – Transfer Extended Axis Status

The TASX command returns the axis status conditions. It reports more information than the TAS command, and is helpful for identifying which faults occurred. It returns a 32 bit response: 1 = Yes; Ø = No. (Use the TASXF command for a text-based status report). Note the positions of bits that are "1" rather than "0"—they indicate problem areas, some of which are:

Bit #:	Fault:	Solution:
1	Motor temperature fault	Thermal switch in motor is open; motor is hot
2	Low voltage fault	Check acceleration; AC power wiring and input level
3	Drive temperature fault	Check ventilation; ambient temperature
5	Resolver failed	Check resolver wiring.
7	Configuration error	Drive cannot operate as configured. See TCS command, below.
8	Incoming steps at startup	Stop indexer pulses.
9	Velocity error limit exceeded	Check mechanics for jam; check tuning. Raise limit.
10	Bridge fault	Check motor wiring for short circuit. (See note below.)
11	Bridge I^2t fault	Current model indicates bridge is hot.
12	Overvoltage (bus voltage)	Reduce deceleration (or install GPDM for regeneration on GV-U3n/U6n/U12n).
18	Override mode invoked	Velocity override (torque mode) or torque override (velocity mode) was invoked. Check mechanics. (Warning only: does not light LED or stop motion.)
19	Bridge foldback	Output current was reduced, to decrease dissipation. (Warning only: does not light LED or stop motion.)
20	Power Dissipation active	GV-L3n, GV-H20n, GV-H40n only. Internal regeneration circuit was active. Check deceleration. (Warning only: does not light LED or stop motion.)
21	Bad Hall state	Bad state (111 or 000) was detected. Check Hall wiring.
22	Unrecognized hardware	Consult factory
23	User fault	Indicates input #3 was active.
24	Keep Alive active	Not a fault; indicates +24VDC power at +24VDC input.
25	Power dissipation fault	Indicates excessive regeneration (GV-L3n, GV-H20n, GV-H40n only). Check deceleration, load inertia.
28	Configuration warning	Drive altered a user entered value. See TCS command. (Warning only: does not light LED or stop motion.)
29	Encoder output failure	ORES is set too high for maximum velocity commanded
30	Motor thermal model fault	Thermal model indicates motor is hot
31	Torque/force is at limit	Commanded torque/force has reached limit set by DMTLIM (TTRQ = DMTLIM). Not a fault condition.

(NOTE: Bridge fault can also indicate output bridge overheating (except in GV-L3n). To test, check drive heatsink temperature; allow drive to cool, then reset drive. If fault remains, it is due to a short circuit—check motor and motor wiring. If fault reoccurs after several minutes, it may be due to restricted airflow over the drive's heatsink.)

See the *Gemini Programmer's Reference* for the complete list of status conditions.

TCS – Transfer Configuration Status

If the TASX command indicates a configuration error or warning, use the TCS command to help ascertain the cause of the condition.

NOTE: TCS reports only one error code; errors will overwrite warnings. Therefore, if there is more than one error condition present:

1. Resolve the known error.
2. Cycle power to the drive, issue a RESET command, or activate the RESET input.
3. If another error condition presents itself (e.g., the drive will not enable), check for subsequent errors with the TCS command.

See the *Gemini Programmer's Reference* for the complete list of faults and warnings.

RS-232/485 Communication Problems

If you cannot establish RS-232 or RS-485 communications, the next sections give instructions for procedures to help isolate problems.

Testing the COM Port

Install and launch either Motion Planner or Pocket Motion Planner. See *Chapter 2 Installation* for information about using these software tools.

RS-232 communications require that you use a null modem cable. See *Chapter 2 Installation* for connection instructions. Pinout diagrams for the Gemini's RS-232/485 connector is in *Chapter 4 Special Features*.

Testing the COM Port with Motion Planner

If you use Motion Planner, follow these steps.

1. Install and launch Motion Planner.
2. When the product selection dialog appears, select a Gemini drive and select the COM port to which the Gemini is connected.
3. If you see the error message "unable to connect to com *n*", then the wrong PC COM port is selected, or the PC COM port is busy.
    - Check the PC COM port setting again. Your PC may have multiple COM ports. Try connecting to a different port.
    - Check to see if another application is busy using the COM port. Close all other applications.
    - Try connecting to a different port.
    - Check AC power to the drive. (The drive's left LED should be illuminated, either red or green.)

If these steps do not solve your problem, see *Testing the Cable*, below.

Testing the COM Port with Pocket Motion Planner

If you use Pocket Motion Planner, follow these steps.

1. Install and launch Pocket Motion Planner.
2. From the "Communications" menu, select "Com Port", and select an appropriate com port.
3. From the "Communications" menu, select "Test Com Port".
4. You will see one of the following responses:

    If the response is "Communications OK!", then:
    - communications are working properly.

    If the response is "Communications problem found", then:
    - Verify the drive is powered up
    - Verify the RS-232 cable is connected to the drive
    - Check your com port settings within Pocket Motion Planner
    - Make sure no other programs or hardware are trying to use this com port.

If these steps do not solve your problem, see *Testing the Cable*.

Testing the Cable

Use the following two procedures to test your null modem cable, and verify that it is working properly.

"Loop Back" Test

1. Connect one end of your RS-232 cable to your PC, palm PC, or HPC. Disconnect the other end of the cable from the drive.
2. Connect pin 2 to pin 3 on the drive end of the RS-232 cable.
3. Launch Pocket Motion Planner and select "Test Com Port" from the "Communications" menu.
4. If you receive a "Communications OK!" response, your cable is good.
5. Under "Tools", select "Terminal Emulator". Under "Options", select "Show Hex."
6. With pins 2 and 3 at the drive end of your null modem cable *open*, typing "DRES" in the terminal will produce the response "DRES 0A00".
7. With pins 2 and 3 at the drive end of your null modem cable shorted, typing "DRES" in the terminal will produce the response "DRES 0A00 0A00".

If you are continuing to have trouble with communications, proceed to *Verifying a Null Modem Cable*.

Verifying a Null Modem Cable

1. Connect one end of your RS-232 cable to your PC, palm PC, or HPC. Disconnect the other end of the cable from the drive.
2. With no data being transmitted, measure the voltage on the RS-232 cable's transmit pin (should be pin 2). The voltage on the transmit pin should be in the range -3VDC to -12VDC.
3. Measure the voltage on the RS-232 cable's receive pin (should be pin 3). The voltage on the receive pin should be zero volts.
4. Verify that the cable's transmit pin connects to Pin 2 on the Gemini's RS-232/485 connector.

This completes the test.

RS-232 Daisy Chain Guidelines

All drives in an RS-232 daisy chain must be configured as follows:

- Echo must be on (ECHO1)
- Error level must be set to a value greater than Ø. (See ERRLVL command).

For more information about RS-232 daisy chain problems, see *RS-232/485 Communications* in *Chapter 4 – Special Features*.

RS-485 Multi-Drop Guidelines

All drives in an RS-485 multi-drop must be configured as follows:

- Echo must be off (ECHOØ)
- Error level must be set to either 2 or Ø. (See ERRLVL command).
- Connect RS-485 cables before applying power to the drive.

For more information about RS-485 multi-drop problems, see *RS-232/485 Communications* in *Chapter 4 – Special Features*.

System Problems

If your Gemini drive is functioning properly, other parts of your system may be causing problems. It may be difficult to identify where the problem is coming from. To diagnose system problems, we recommend that you first have the drive perform its autorun function. Then check the other topics in this section.

Using Autorun Mode to Isolate Problems

In autorun mode, the motor runs open loop—the Gemini drive generates its own internal control signal, and commands the motor to turn clockwise at 1 rps.

NOTE: In autorun mode, the drive limits current to 90% of drive rating or continuous motor current rating, whichever is lower.

Follow these steps to put the drive in autorun mode, which will verify that the drive is functioning properly, and is not the source of the problem.

1. Disconnect the controller from the drive. Disconnect the load from the motor.
2. Perform these procedures from *Chapter 2 Installation*:
    - Connect the Motor (power and feedback)
    - Connect AC Power
    - Configure the Drive

    The final step in "Configure the Drive" is issuing a DMODE13 command, which configures the drive for autorun.
3. Enable the drive by connecting Pin 1 to Pin 2 on the drive's 50 pin DRIVE I/O connector. NOTE: connecting pin 1 to pin 2 may require that you use a breakout module, such as Compumotor's GEM-VM50.
4. Apply AC power.
5. The motor should begin turning clockwise at one revolution per second.

Successful completion of the autorun test indicates that AC power and motor cables are connected correctly, and that the drive is functioning properly. Check the topics below for other sources of problems.

AC Power

Verify that your AC power mains deliver adequate power to the drive's AC power input.

Motor Problems

Verify that the drive is configured properly for the motor you are using. The motor series, frame size, and part number information on a Compumotor motor's name plate should match the settings stored in the drive's memory.

Motor Brake

If you are using a motor with a brake, verify that the brake is connected properly, and that it is functioning as intended.

Motor Resolver

Resolvers on Compumotor motors are aligned at the factory. Ordinarily, no further alignment is necessary. However, if you suspect that the resolver has been altered and is out of alignment, you can follow the alignment procedure in *Aligning the Resolver*, located in *Chapter 4 Special Features*.

Mechanical System

Shaft Coupler

Verify that the shaft coupler is not slipping during acceleration or deceleration. We recommend bellows or disk style couplers for servo applications. Helical couplers are inadequate, and are *not* recommended.

Mechanical Transmission

Verify that your mechanical system functions properly, and is not jammed.

Motion Problems

If problems occur during motion, check these possible causes:

- Motor Sizing (ensure that the motor has enough torque to perform the move)
- Excessive Acceleration or Deceleration
- Excessive Velocity

Electrical Noise

Electrical noise on input or output lines can cause stop or kill inputs to activate unexpectedly. See *Appendix C: Regulatory Compliance* for installation guidelines on reducing electrical noise.

Software/Motion Program Problems

Check to see that your motion programs are functioning properly, and are not causing unexpected problems.