



CHAPTER FIVE

Troubleshooting

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Troubleshooting Guidelines

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

First Troubleshooting Steps:

- Are the LEDs illuminated? If not, look for problems with AC and/or +24VDC 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, and issuing a DRIVE1 command.
- Cycle power to the drive. Cycling power clears most faults.
- 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
- Verify good RS-232/485 communications
- 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: |
|-------------------------|-----------------------------|---|
| Red | Green | +24VDC only |
| Red | Yellow | AC only |
| Green | Green (flashing) | Motion in progress |
| Green | Yellow/Green (flashing) | Autorun mode |
| Red | Off | Drive not enabled; or, Drive faulted |
| Off | Yellow | Initializing |
| 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. (See *Chapter 2 Installation* for detailed instructions on establishing communications. Information about installing and Motion Planner can be found in the *Gemini GV6K/GT6K Command Reference*.)

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

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 issue a RESET, DRESET 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 GV6K/GT6K Command Reference*.

TERRLG – Transfer Error Log

The TERRLG command displays the last ten error conditions. It is updated every time an error occurs, if you have chosen that error to be included in the error log (see the ERRORL command). 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; 0 = No). 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, and issue a DRIVE1 command. |
| 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 LH0 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 GV6K/GT6K Command 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; 0 = No). 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. |
| 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 ² t fault | Current model indicates bridge is hot |
| 12 | Overvoltage (bus voltage) | Reduce deceleration (or install GPDM for regeneration on GV6K-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 | GT6K, GV6K-L3n, GV6K-H20n and GV6K-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 user fault input was active. |
| 24 | Keep Alive active | Not a fault; indicates +24VDC power at input. |
| 25 | Power dissipation fault | Indicates excessive regeneration (GV6K-L3n, GV6K-H20n/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 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 GV6K-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 GV6K/GT6K Command 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 GV6K/GT6K Command 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 Ports

Install and launch Motion Planner. See *Chapter 2 Installation* for information about using this software tool.

RS-232 communications require that you use a null modem cable. See *Chapter 2 Installation* for connection instructions. Pinout diagrams for the Gem6K's RS-232/485 and RS-232 connectors are in *Chapter 4 Special Features*.

Testing the COM Ports with Motion Planner

1. Install and launch Motion Planner.
2. When the product selection dialog appears, select a Gem6K drive and select the PC COM port to which the Gem6K 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.

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

Testing the Cable

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

“Loop Back” Test

1. Connect one end of your RS-232 cable to your PC. 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 Motion Planner and click the “Terminal” tab on the bottom of the screen to enter terminal mode.
4. Type several characters on the keyboard. These characters should appear on the terminal screen as you type them.

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. 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 and RS-485 Multi-Drop Problems

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

System Problems

If your Gem6K 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 Gem6K drive generates its own internal control signal, and commands the motor to turn clockwise at 1 revolution per second.

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 load from the motor.
2. Perform these procedures from *Chapter 2 Installation*:
 - Connect the Motor (power and feedback)
 - Connect AC and +24VDC 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 and +24VDC power.
5. In Terminal Emulator mode, issue the following commands:
DRIVE1 (enables the drive)
DMODE13 (changes mode to autorun)
6. 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 and DC Power

Verify that your AC power mains and +24VDC supply deliver adequate power to the respective drive power inputs.

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.