

CHAPTER TWO

Installation

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 - Express Setup
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Checking Your Shipment

Inspect your shipment carefully. You should have received one or more of the following:

Gemini Drives

GT-U5
GT-U8
GT-L5
GT-L8

Ship Kit Items

The following ship with the drive:

Part	Part Number
Gemini GT Quick Reference Guide	88-017777-01
Gemini GT Hardware Installation Guide	88-017789-01
Gemini Programmer's Reference	88-017778-01
Gemini Motor Reference Manual	88-017790-01
Motion Planner CD-ROM	95-017633-01

Options and Accessories

You may have ordered one or more of the following options or accessories.

Part	Part Number
Drive Only (no accompanying manuals)	-NK
Cables: various cables, breakout modules, etc., are available. See <i>Appendix A Specifications</i> for cable and accessory information.	
Cable clamps, EMC filters, ferrites, etc., are available. See <i>Appendix C Regulatory Compliance</i> for part numbers and more information.	

Motors

You may have ordered a motor from one of the following families of Compumotor motors:

O Series R Series T Series E Series*

*E Series motors are similar to S and ZETA Series motors. If you use one of these motors, during configuration select the same size E Series motor from the configuration software's menu.

“Express Setup” Overview

This chapter gives instructions for performing an *express setup*. The purpose of the express setup is to verify that the drive, cables, and motor work properly as a system. It will also verify serial communications and controller connections.

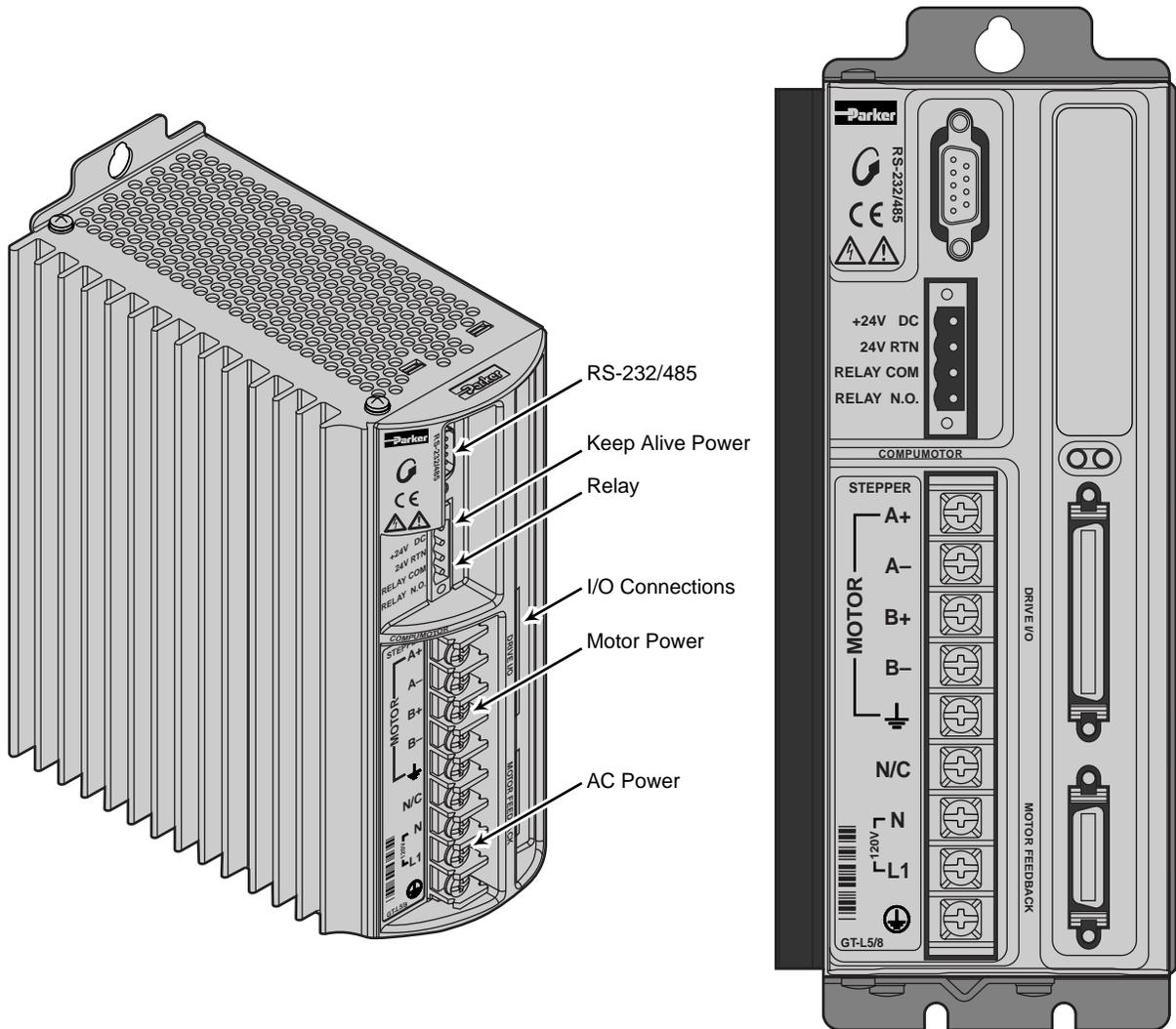
You will connect together only the components necessary to achieve basic motion—a drive, a motor (without a load connected), and a controller. You will use a computer to communicate with the drive, and with the controller.

In the express setup, we will give procedures for the following steps:

1. Connecting the motor to the drive (without a load connected)
2. Connecting AC power to the drive
3. Establishing communications and configuring the drive for autorun
4. Connecting a controller, enabling the drive, and observing the motor turn

Information you may need for final installation will be presented in *Chapter 3 Configuration*, in *Chapter 4 Special Features*, in *Appendix A Specifications*, and in the separate *Gemini Motor Reference Manual*.

The next drawing shows locations and names of the Gemini components that you will encounter during the installation procedure.



Component Locations

Illustrations in this Installation Guide

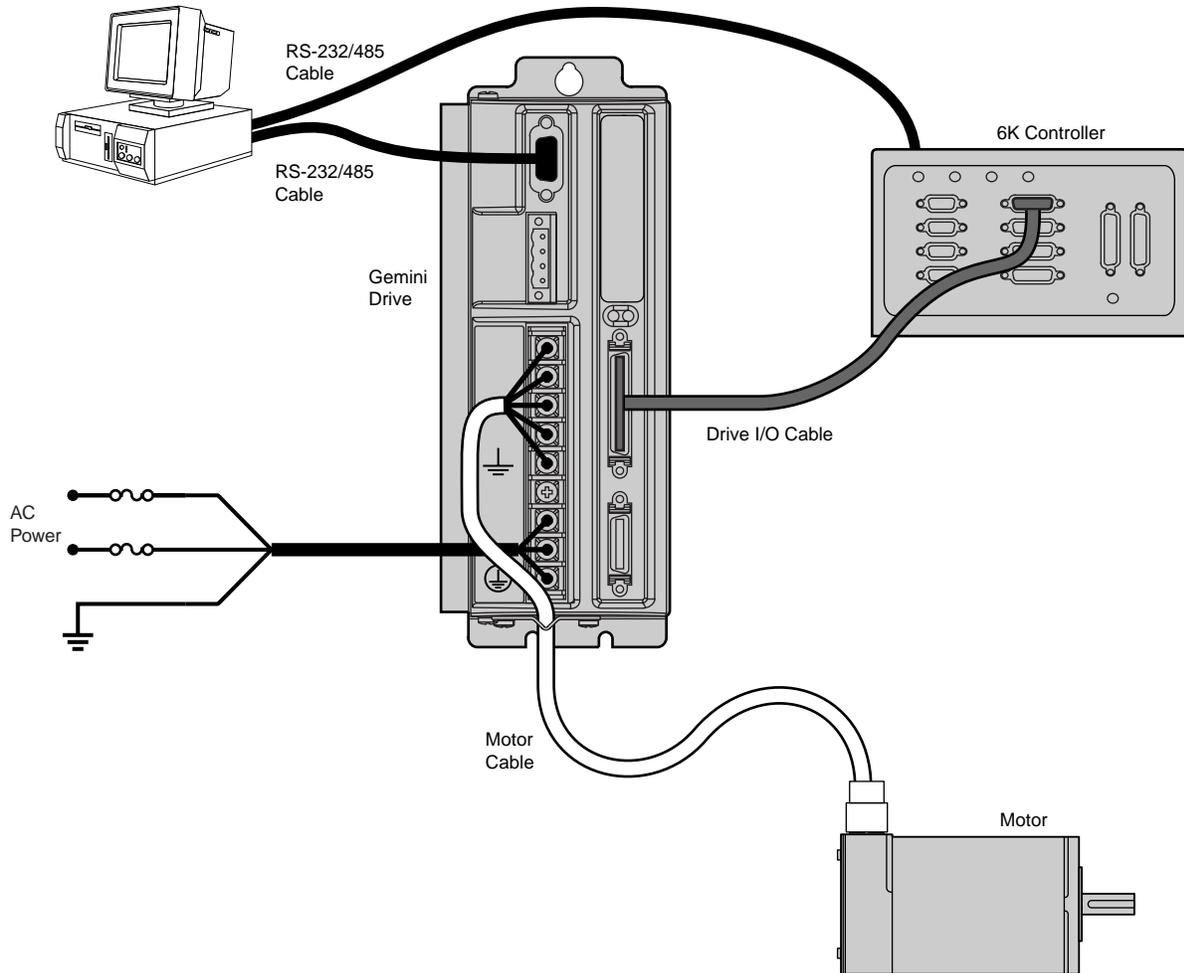
We will usually show the Gemini GT-L5 Drive in illustrations. Other Gemini drives have similar features. In cases where we need to illustrate *differences* between drives, we will show relevant drawings for each drive.

System Overview

In this express setup procedure, we will give instructions for a Compumotor system—Gemini drive with Compumotor motor, Compumotor cables, and Compumotor 6K controller.

If you use non-Compumotor equipment, try to follow along and perform the steps in the *Express Setup* procedure; consult *Appendix A Specifications* for additional information you may need.

The next drawing shows the components of a Compumotor system.



Compumotor System

If you use a Compumotor controller other than the 6K, see *Appendix A Specifications* for wiring instructions.

Step 1 – Connecting the Motor

The Gemini drive is compatible with 4, 6, or 8 lead step motors designed for use with a bipolar drive.

Connecting the Motor

Make sure power is off before you connect the motor.

1. Wire your motor in series or parallel.

For wiring diagrams, color codes, dimensions and speed/torque curves for Compumotor motors, consult the separate *Gemini Motor Reference Manual*.

If you use a non-Compumotor motor, see *Appendix B Using Non-Compumotor Motors* for instructions on preparing your motor for connection to the Gemini drive.

2. Prepare four motor phase wires to connect to the Gemini drive, and identify them as A+, A-, B+, and B-.
3. Remove the clear plastic cover from the drive terminals. Connect the motor cable's earth wire to the drive terminal with the \perp symbol. This connects the motor's protective conductor terminal to the drive's safety earth.
4. Connect your motor cable's phase wires (A+, A-, B+, B-) to the drive's A+, A-, B+, B- terminals, respectively, as shown in the drawing below.



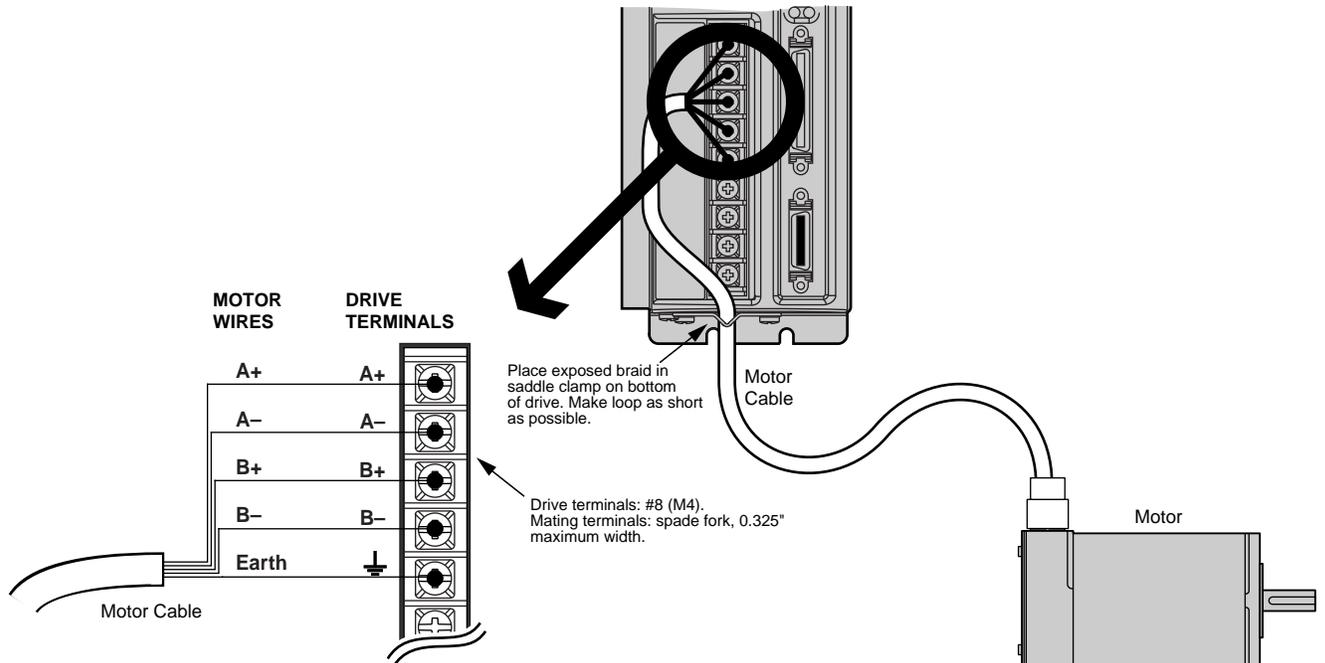
WARNING



The drive's barrier strip terminals are at hazardous voltages when power is applied to the drive, and up to 30 seconds after power is removed. Reinstall the clear plastic terminal cover after you make connections.

5. Secure the motor cable to the drive by placing the exposed cable shield in the saddle clamp on the bottom of the drive. Make the loop of cable between the saddle clamp and the drive terminals as short as possible.
6. Clamp the motor securely in place during this *Express Setup* procedure, if your motor is not permanently mounted.

The next drawing illustrates these connections.



Motor Wiring – Typical

Step 2 – Connecting AC Power

GT-L5 and GT-L8 can be operated only at 120VAC.

GT-U5 and GT-U8 can be operated at 120VAC or single phase 240VAC.

Acceptable ranges of AC input voltage are listed below:

Drive	AC Input Range
GT-L5	95VAC – 132VAC
GT-L8	95VAC – 132VAC
GT-U5	95VAC – 132VAC and 190VAC – 264VAC
GT-U8	95VAC – 132VAC and 190VAC – 264VAC



CAUTION



You must connect V DBL to L2/N on GT-U5 and GT-U8 to enable the voltage doubler for 120VAC operation.



WARNING



You must connect the drive's protective conductor terminal, marked with the \perp symbol, to a reliable system safety earth. Make the connection directly, by means of a low impedance path less than or equal to 0.1 ohm (no fuses, etc.). Under normal operation, no current should flow through the safety earth connection.



WARNING



The drive's barrier strip terminals are at hazardous voltages when power is applied to the drive, and up to 30 seconds after power is removed. Reinstall the clear plastic terminal cover after you make connections.

Fuse Information

Gemini drives have no internal fuses. For safety, you must provide a fuse in each of the AC input lines. Recommended fuse types and sizes are:

GT-L5/GT-L8 (120VAC)	GT-U5/GT-U8 (120VAC)	GT-U5/GT-U8 (240VAC)
125VAC Time Delay	125VAC Time Delay	125VAC Time Delay
10 amp	10 amp	10 amp
Type RK5 or better	Type RK5 or better	Type RK5 or better

The next table lists part numbers for suitable fuses, from several manufacturers:

Amps:	Bussman:	Gould:	Littelfuse:	Grainger:
10	FRNR10	TR10R	FLNR10	1A693

GT-L5 and GT-L8 AC Power Connections

Connections are illustrated in the next drawing, on the left.



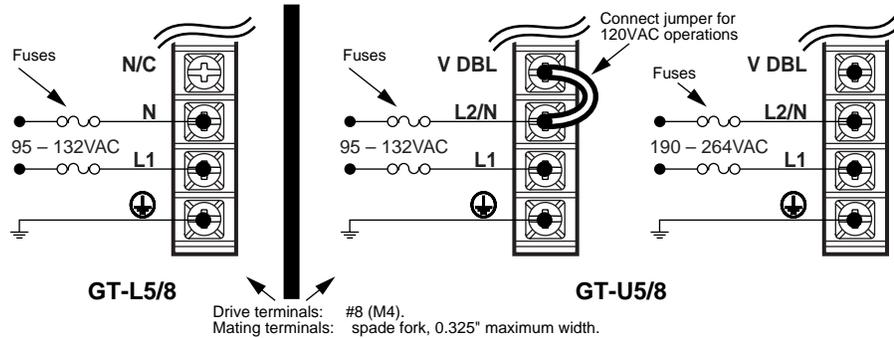
CAUTION



Do not operate GT-L5/8 above 132VAC, or the drive will be permanently damaged.

120VAC Operations:

1. Connect power system's safety earth to drive's protective conductor terminal, marked with the \oplus symbol. Do not fuse the protective conductor terminal.
2. Connect 120VAC, 50/60 Hz, single phase power line to drive's L1 and N terminals.
3. **Reinstall the clear plastic terminal cover after you make connections.**



Power Connections

GT-U5 and GT-U8 AC Power Connections

Connections are illustrated in the drawing above, on the right.



CAUTION



Do not operate GT-U5/8 in the 132VAC – 190VAC range, or the drive will be permanently damaged.

120VAC Operations:

1. Connect power system's safety earth to drive's protective conductor terminal, marked with the \oplus symbol. Do not fuse the protective conductor terminal.
2. Connect a short jumper between V DBL and L2/N. Use insulated wire for the jumper, 18 AWG (0.75 mm²) or thicker diameter; keep the wire as short as possible.
3. Connect 120VAC, 50/60 Hz, single phase power to drive's L1 and L2/N terminals
4. **Reinstall the clear plastic terminal cover after you make connections.**

240VAC Operations:

1. Connect power system's safety earth to drive's protective conductor terminal, marked with the \oplus symbol. Do not fuse the protective conductor terminal.
2. **Verify there is no jumper between V DBL and L2/N.**
3. Connect 240VAC, 50/60 Hz, single phase power to drive's L1 and L2/N terminals.
4. **Reinstall the clear plastic terminal cover after you make connections.**

Applying Power

1. Verify that the load is not connected to the motor, and that the motor is clamped securely in place.
2. Verify that a cable is not attached to the DRIVE I/O connector.
3. Apply power to the drive. The LEDs should display the following states:

Left LED	Right LED	Indicated State
red	off	initial power applied
off	yellow	drive initializing
red	off	drive ready, not enabled

Proceed to *Configuring the Drive*.

Step 3 – Configuring the Drive

Gemini drives have no DIP switches or potentiometers for configuration. You will use software tools to communicate with the drive and configure drive settings.

Configuration Software

Two software programs are located on the Motion Planner CD-ROM. *Motion Planner* runs on a personal computer (PC). *Pocket Motion Planner* runs on a palm PC or Handheld Personal Computer (HPC) that uses Windows CE 2.0 or higher, or on a PC. These programs are also available on the Compumotor web site at <http://www.compumotor.com>.

Information about installing and using each of these software tools can be found in the *Gemini Programmer's Reference*.

Establishing Communications

We assume you are using a Gemini drive and a 6K controller, and that you have only one serial port on your PC. The following procedures give instructions for moving the cable back and forth between the Gemini and 6K.



WARNING



This procedure causes the motor shaft to move. Do not connect a load to the shaft.

1. Verify that a load is not connected to the motor, and that the motor is clamped securely in place.
2. Verify that a cable is not attached to the DRIVE I/O connector.
3. Using a null modem cable, connect the drive's RS-232/485 connector to the serial port on your PC, palm PC, or HPC. (A null modem cable is available from Compumotor. See *Appendix A Specifications* for more information.) It is not necessary to turn off AC power before you plug in an RS-232 cable; however, connect RS-485 cables *before* applying AC power.
4. Install and launch Motion Planner or Pocket Motion Planner.

Proceed to *Configuring the Drive*.

Configuring the Drive

Choose one of the columns below, based upon which software program you are using—Motion Planner, or Pocket Motion Planner—and follow the procedure to configure your drive.

NOTE: If this is not the first time the drive has been configured, issue an RFS command (Return to Factory Settings) from the terminal emulator, before performing the following procedures.

Using Motion Planner to Configure the Gemini Drive

1. Install and launch Motion Planner
2. When the product selection dialog appears, select GT drive and select the COM port to which the Gemini is connected.
3. In the Editor window, click on the Gemini button at the top of the window to launch the setup wizard.
4. Select “Express Setup”, and select “Initialize wizard with factory defaults”. (If you wish to keep the existing drive configuration, you should upload it, save it, and then initialize from the editor.)
5. Click the “Next” button to proceed with the wizard. Fill in the wizard dialogs as prompted, including choosing a motor series, frame size, and part number. At the end of the wizard, click the “finish” button; this creates the setup code and places it in the Editor window.
6. Select File/Save to save the setup code to a file (*.prg) on your hard drive.
7. Select Communications/Download to download the setup code (contents of the Editor window) to the Gemini drive. When the download is complete, choose to “Reset” the drive.
Drive setup is complete. All of the setup parameters (command values) are stored in the Gemini drive’s EEPROM and are automatically recalled when you cycle power or reset the drive.
8. Click the “Terminal” tab on the bottom of the screen to enter terminal mode.
9. Issue a DMODE13 command. This configures the drive for autorun mode, in which the motor runs in the clockwise direction at 1 rps. (The motor will not begin turning, though, because you have not yet enabled the drive.)

Proceed to *Step 4 – Connecting the 6K Controller* on the next page.*

Using Pocket Motion Planner to Configure the Gemini Drive

1. Install and launch Pocket Motion Planner.
2. Select “Tools/Config Tool”.
3. Select “Edit Current Configuration” for factory defaults. (If you wish to keep the existing drive configuration, you should upload it, save it, and then select “Edit Current Configuration”.)
4. Select drive type by choosing “Auto Detect”. The software will identify the drive type, and automatically use settings for your specific drive type. If the message “Auto Detect Failed” appears, see *RS-232 Communication Problems* in *Chapter 5 Troubleshooting*.
5. Select “Express Configuration”
6. Choose a motor series, frame size, and part number
7. Save your configuration file
8. Download the configuration file to the Gemini drive; choose to “Reset” the drive.
Drive setup is complete. All of the setup parameters (command values) are stored in the Gemini drive’s EEPROM and are automatically recalled when you cycle power or reset the drive.
9. Enter terminal mode.
10. Issue a DMODE13 command. This configures the drive for autorun mode, in which the motor runs in the clockwise direction at 1 rps. (The motor will not begin turning, though, because you have not yet enabled the drive.)

Proceed to *Step 4 – Connecting the 6K Controller* on the next page.*

* If you are not using a 6K controller, proceed to *Verifying Correct System Operations without a 6K Controller*, in *Step 4* on the following pages.

Step 4 – Connecting the 6K Controller

Connecting the 6K Controller and Enabling the Drive

In this section of *Express Setup*, you will use the 6K to enable the Gemini drive. When you issue the DRIVE1 command in *Step 7*, the 6K will connect the Gemini's enable input to ground, thus enabling the drive.

NOTE: If you are *not* using a 6K controller, proceed to *Verifying Correct System Operations Without a 6K Controller*, on the next page.

We assume below that you will connect the Gemini drive to Axis 1 on the 6K. If you use a different axis, modify the following commands accordingly.

NOTE: Pocket Motion Planner can *not* be used to communicate with the 6K. Only use Motion Planner to communicate with the 6K.

1. In Motion Planner, end the session with the Gemini drive by exiting the program. Save changes. (Exiting the program stops *binary* communications with the drive.)
2. Move the null modem cable from the drive's RS-232/485 connector to the 6K's COM port.
3. Restart Motion Planner and establish communications with the 6K:
 - Select File/New/Terminal Emulator/OK.
 - Under Communications/Settings, select the 6K product and COM port you are using. (When you select a 6K product, Motion Planner begins *ASCII* communications with that 6K product.)
4. From Motion Planner, issue the following commands to the 6K:
 - DRIVE0 (ensures the drive is disabled)
 - CMDDIR0 (ensures clockwise is the positive direction)
5. Configure the 6K axis by sending the following command:
 - AXSDEF0 (configures axis 1 for step and direction)
6. Connect the 6K's Axis 1 to the Gemini's DRIVE I/O connector.
 - Use the Step & Direction Command Cable.

Tighten the jackscrews on the cable. It is not necessary to turn off AC power before you plug in the cable. (Because you issued a DRIVE0 command above, the drive should not enable when you connect the cable.)
7. From Motion Planner, issue the following command to the 6K:
 - DRIVE1 (enables the drive)

The motor should begin turning.

Proceed to *Verifying Correct System Operations*.

Verifying Correct System Operations

Choose one of the columns below, based upon which controller you are using—6K or non-6K—and follow the procedure to verify correct system operations.

Verifying Correct System Operations with a 6K Controller

1. Verify that the drive is enabled. (Left LED is illuminated green; right LED flashes yellow/green during autorun.)
2. Verify that the motor is rotating clockwise at approximately one revolution per second, as viewed from the shaft end of the motor. (The motor is turning because earlier you configured the drive for autorun.)
3. From Motion Planner, issue the following command:
 - DRIVE0 (disable the drive)
 - For the 6K to read and react to a GT fault, enter the command DRFEN1 for each axis.
4. End the Motion Planner session with the 6K by closing the terminal and the editor.

Proceed to *Reconfiguring the Drive*, below.

Verifying Correct System Operations without a 6K Controller

1. Enable the Gemini drive by connecting a jumper between pin 1 and pin 2 on the 50 pin DRIVE I/O connector. (For connector diagrams, see *Appendix A Specifications*.)
2. Verify that the drive is enabled. (Left LED is illuminated green; right LED flashes yellow/green during autorun.)
3. Verify that the motor is rotating clockwise at approximately one revolution per second, as viewed from the shaft end of the motor. (The motor is turning because earlier you configured the drive for autorun.)

Proceed to *Step 3 of Reconfiguring the Drive*, below.

Reconfiguring the Drive

1. Connect the null modem cable from the PC to the drive's RS-232/485 connector.
2. In Motion Planner, establish communications with the Gemini drive:
 - Select File/New/Terminal Emulator/OK.
 - Under Communications/Settings, select the GT.
3. Issue a DMODE6 command to configure the drive for step/direction mode.

This completes the *Express Setup* procedure.

What's Next?

This chapter has given you information and instructions for performing an *Express Setup*. The following list explains the steps you should take to complete your installation, and indicates where to find additional information for each of those steps.

1. **Mount the drive.** For information on drive dimensions, environmental specifications, airflow and cooling, etc., see *Appendix A Specifications*.
2. **Mount the motor.** For information on motor dimensions, motor cables, encoders, speed/torque curves, etc., see the separate *Gemini Motor Reference Manual*.
3. **Make System Connections.** Information about Compumotor cables is in *Appendix A Specifications*. For information on cabling practices to reduce electrical noise, see *Appendix C Regulatory Compliance: UL and CE*.

Connect any of the drive's optional inputs and outputs you may wish to use (see *Appendix A Specifications* for more information):

- Reset Input
- VINref – Voltage Input Reference
- Digital Inputs (and CNTRL-P)
- Digital Outputs
- Encoder Output
- Analog Monitor

Connect any of the drive's special features you may wish to use (see *Chapter 4 Special Features* for more information):

- Relay, and how to control a Motor Brake
- +24VDC "Keep Alive" Power
- Multiple Drive Installations
- RS-232 Daisy Chain
- RS-485 Multi-Drop

4. **Connect the Load.**
5. **Configure Your Drive.** After completing your hardware installation in Steps 1 – 4 above, proceed to *Chapter 3 Configuration* for information about additional drive configuration options, including:
 - **Advanced Features Configuration** – Configure settings for Active Damping, Electronic Viscosity, ABS Damping, and encoderless stall detect.
 - **Motor Matching** – Match your drive to your particular motor.