

Getting Started

The information in this chapter will enable you to:

- Verify that each component of your system has been delivered safely
- Properly configure and *check out* the system

What You Should Have

Inspect your Z Drive shipment upon receipt for obvious damage to its shipping container. Report any damage to the shipping company immediately. Parker Compumotor cannot be held responsible for damage incurred in shipment. Z Series systems include the items listed in the upper table. Z Drive-only orders include the items listed in the bottom Table.

Part/Quantity	Available Types
Z Drive	Z600 (120VAC or 240VAC) or Z900 (240VAC)
Motor	Z605, Z606, Z610, Z620, Z630, Z635, Z640, Z805, Z806, Z810, Z820, Z830, Z840, Z910, Z920, Z930, or Z940
Motor Cable	25 ft., 50 ft., or 100 ft.
Resolver Cable	25 ft., 50 ft., or 100 ft.
Z Drive User Guide	88-010759-01 F

Ship Kit (Z System)

Part/Quantity	Available Types
Z Drive (1)	Z600 (120VAC or 240VAC) or Z900 (240VAC)
Z Drive User Guide	88-010759-01 F

Ship Kit (Z Drive Only)

Drive/Motor Configuration

Compumotor configures Z Drive's according to the motor that you order. *If you purchased the Z Drive to run 600 Series motors (Z605, Z606, Z610, Z620, Z630, Z635, and Z640), it will not run 800 Series (Z805, Z806, Z810, Z820, Z830, and Z840) or Z900 series motors (Z910, Z920, Z930, and Z940). All Z Series drives **must** be run with the same Z Series motors.* You can determine which motor you have by checking the model numbers on the drive and motor labels.

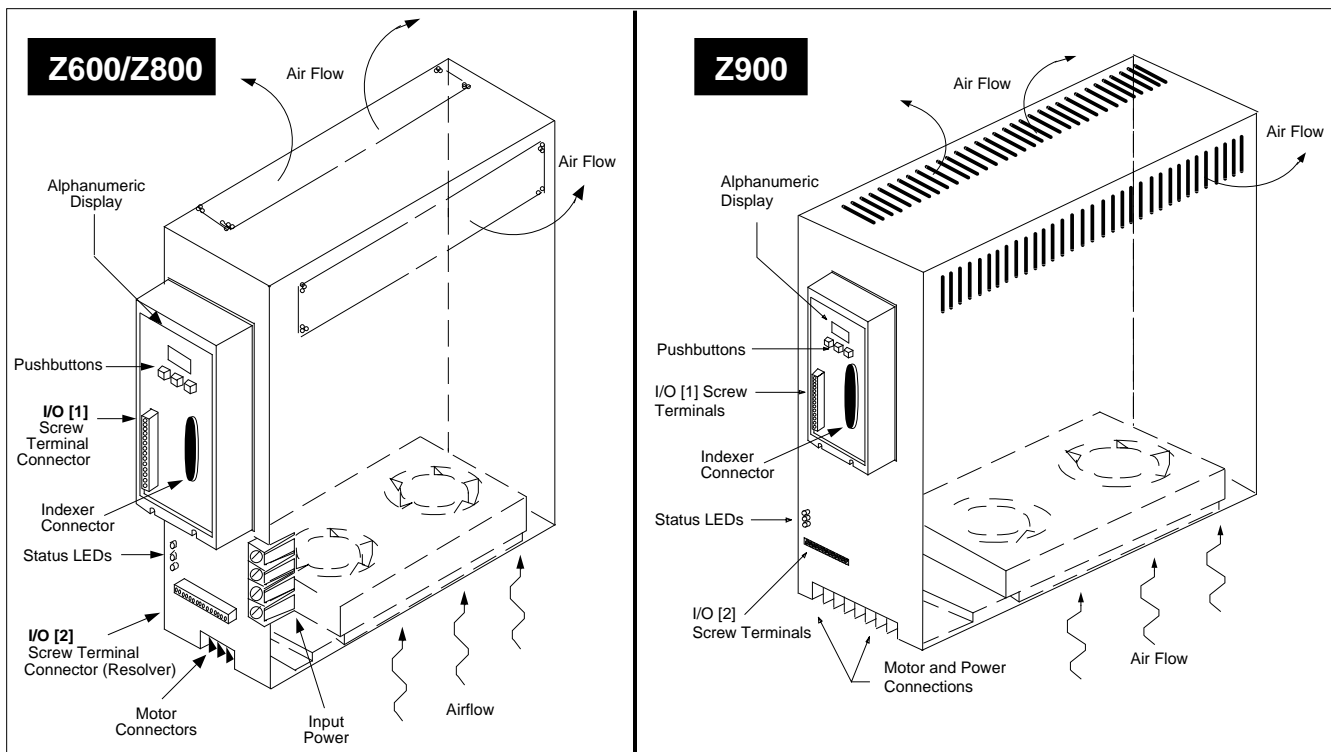
The Z600 and Z800 are available in a **120VAC version** and a **240VAC version**. The Z900 Drive is available in a **240VAC version** only. Be sure you have the drive version you ordered before you connect power to the drive. The model numbers on the drive and motor labels identify the 3-phase input power level (120V or 240V). **The model numbers must match.**



Product Labels

Check-Out Procedure

This section provides a basic **bench test** of the Z Drive. **You must complete the steps in this chapter before you permanently install the drive and connect the motor to its intended load.** The figures below illustrate the location of all the Z Series' connections.



Z600/Z800 and Z900 Drives

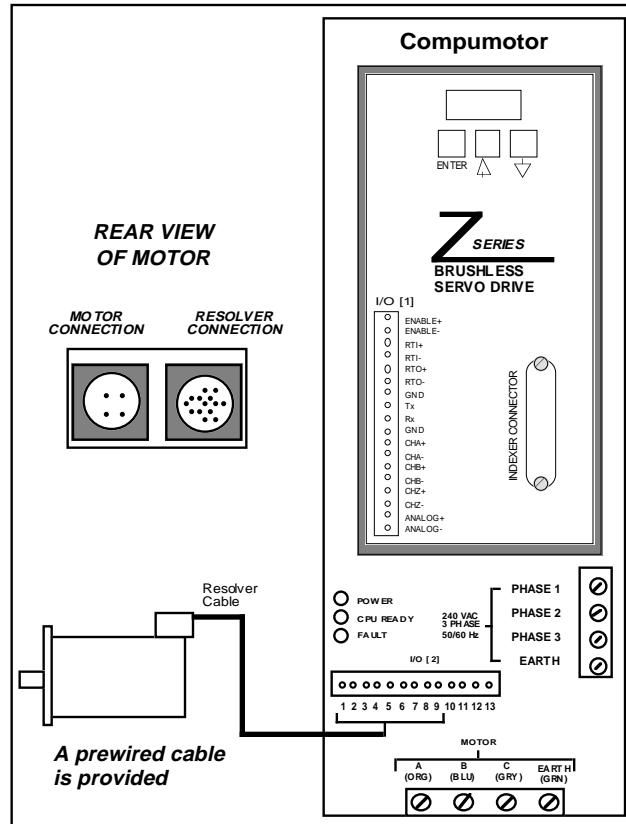
Tools

To complete the *Check-Out Procedure*, you must have the following tools:

- Phillips-head screwdriver
- Large flat blade screwdriver
- Small flat blade screwdriver
- Power cable

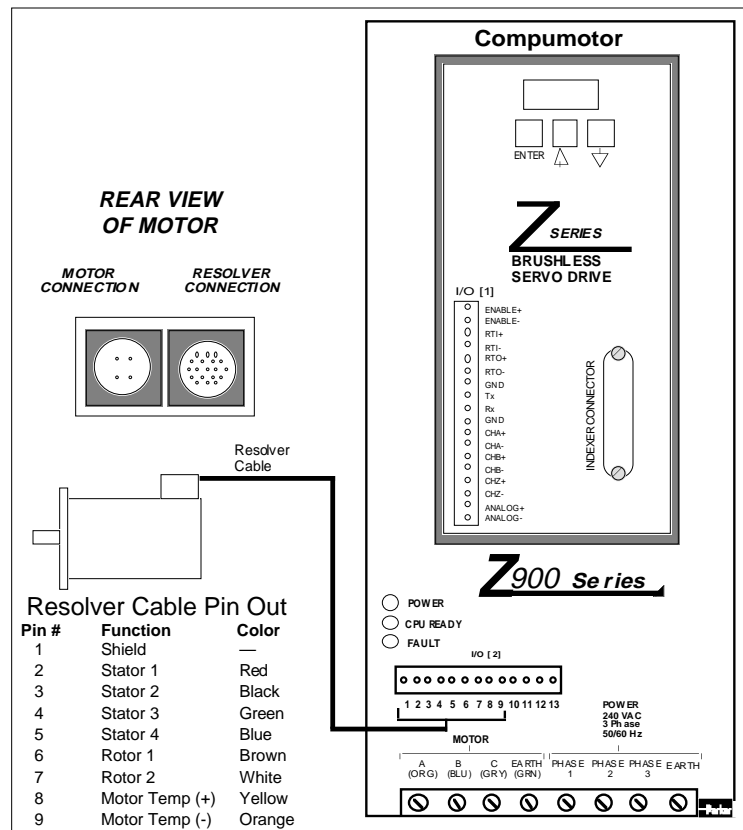
Step ①

Connect the resolver cable between the Z Drive I/O[2] connector and the servo motor as shown in the figures below (for Z600/Z800 and Z900).



Z600/800 Resolver Cable Connection

Helpful Hint:
The table in the figure is a summary of the resolver cable pin out. All Z Drives (Z600, Z800, and Z900) have the same resolver connections.



Z900 Resolver Cable Connection

Resolver Cable Pin Out

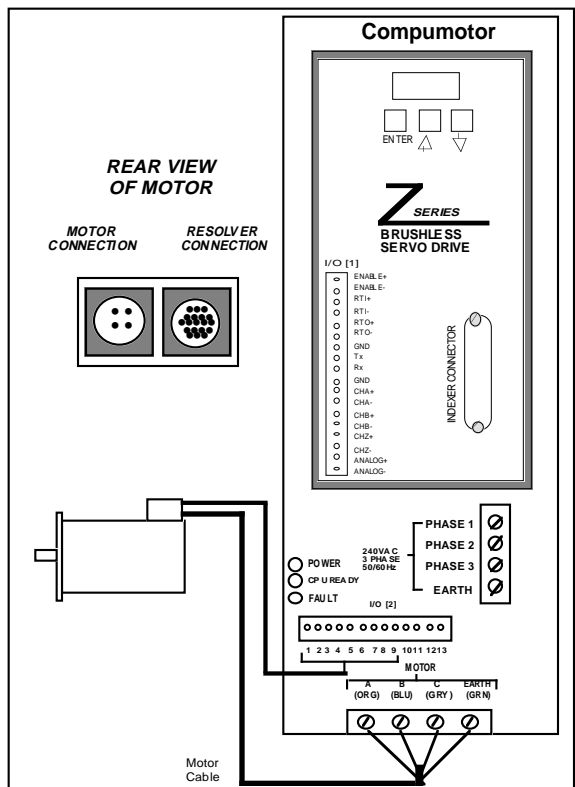
Pin #	Function	Color
1	Shield	—
2	Stator 1	Red
3	Stator 2	Black
4	Stator 3	Green
5	Stator 4	Blue
6	Rotor 1	Brown
7	Rotor 2	White
8	Motor Temp (+)	Yellow
9	Motor Temp (-)	Orange

Step ②

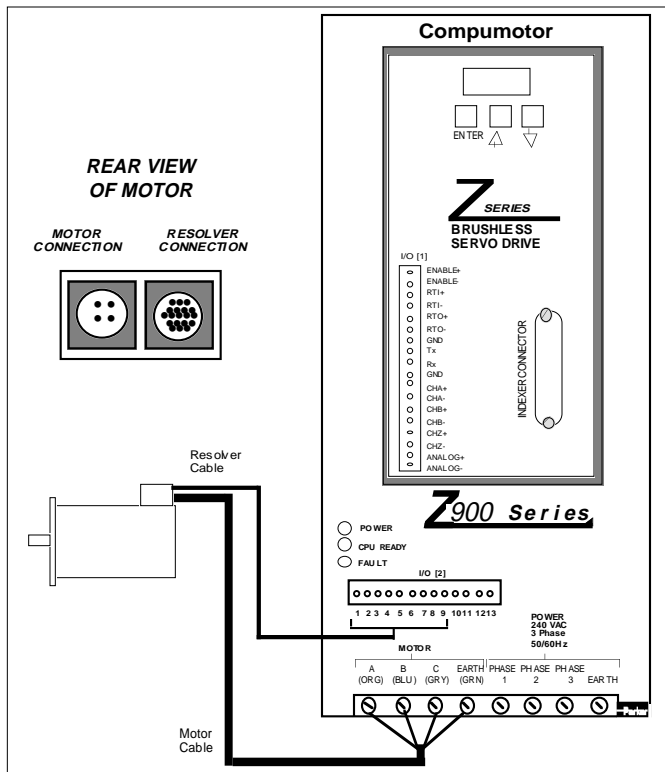
Connect the cable between the Z motor connector and the servo motor. **Match the color of the wire with the proper terminal.**

WARNING

Never disconnect the motor cable with the power on. The motor produces lethal voltages. Be sure the motor is properly grounded to reduce the chance of electrical shock.



Z600/800 Motor Cable Connection



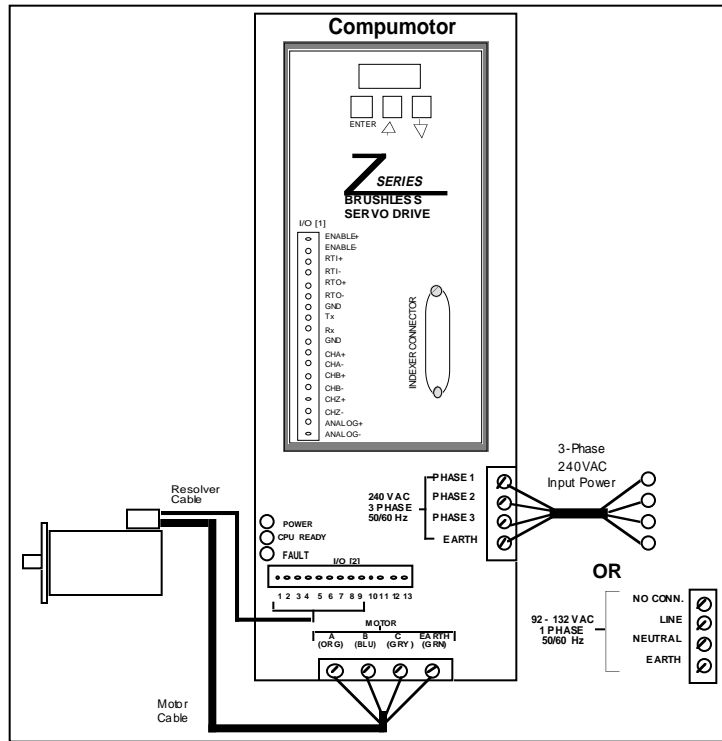
Z900 Motor Cable Connection

Step ③

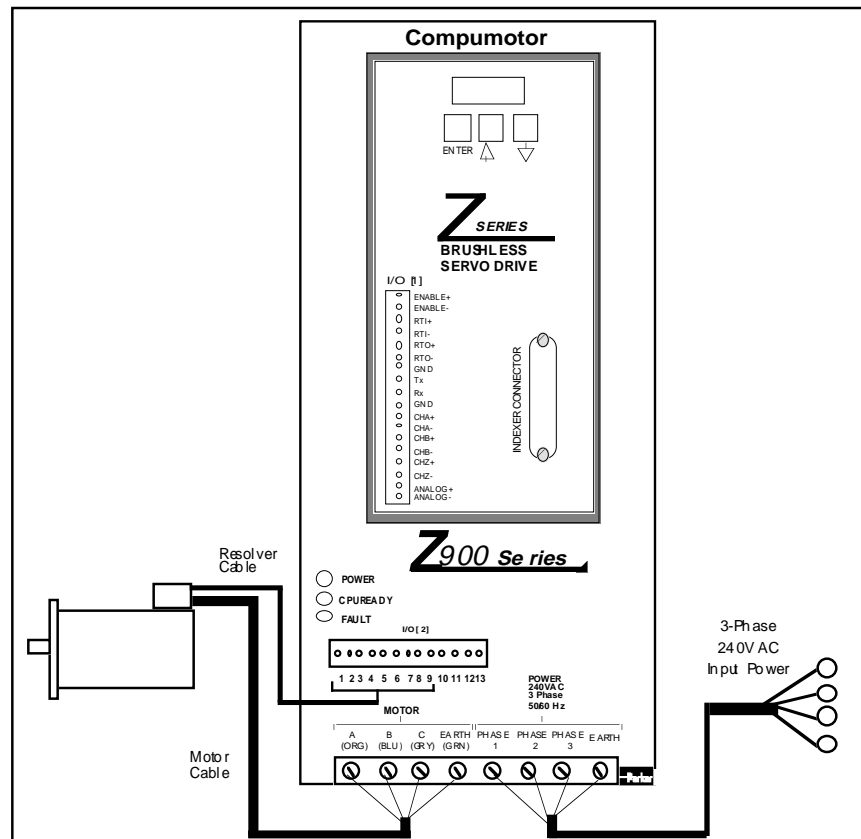
Measure and verify your incoming 3-phase 240VAC (or 120VAC) line with a voltmeter. Connect, **but do not energize**, the 3-phase power as shown in the figure below. The Z Drive is designed to operate best on a balanced 3-phase input. Additional wiring options for this connection are provided in *Chapter ③ Installation*.

WARNING

Be sure the drive is properly grounded to reduce the chance of electrical shock.



Z600/800 Power Cable Connection



Z900 Power Cable Connection

Step ④
(Optional)

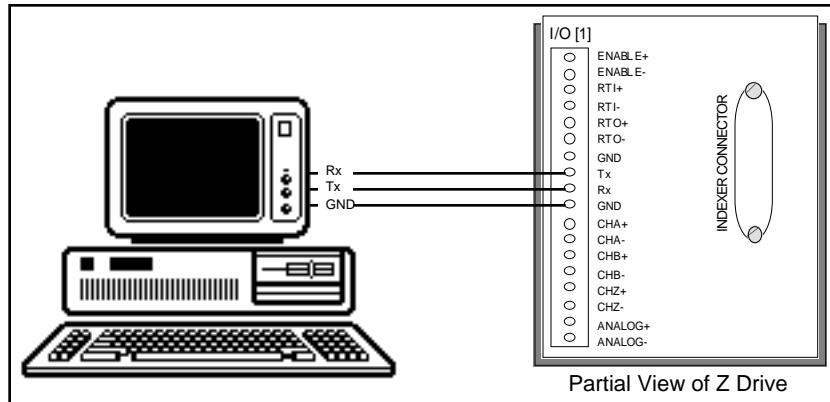
The Z Drive is functional without a terminal; however, a terminal simplifies the setup of system parameters. Some features are not available without a terminal (e.g., report back of servo parameters). Connect a terminal to the RS-232C connector (I/O [1]) using the Rx (receive), Tx (transmit) and GND (ground) connections. All Z Series drives have the same RS-232C connections.

Helpful Hint:
These are the basic communications parameters.

- Baud Rate: 9600
- Parity: None
- Data Bits: 8
- Full Duplex mode
- Stop Bits: 1

Refer to the operations manual that accompanied your terminal for instructions on setting the communication parameters listed above.

Chapter ③ Installation provides detailed RS-232C information for the Z Drive.



RS-232C Connection

Be sure that the Z Drive's **ENABLE** input (I/O [1]) is jumpered to ground. The Z Drive is shipped with the **ENABLE** input grounded.

If you use a host computer to send characters to the Z Drive via RS-232C at a high rate, you may need to insert time delays (**pacing characters**) to ensure that the drive has enough time to process each character. The ability to set a variable time delay is available in most terminal emulator packages.

Step ⑤

In this step, you will select the operating mode that you want to use. **You must select one mode and complete only the test procedures that are applicable to the selected mode.** All Z drives have three operating modes:

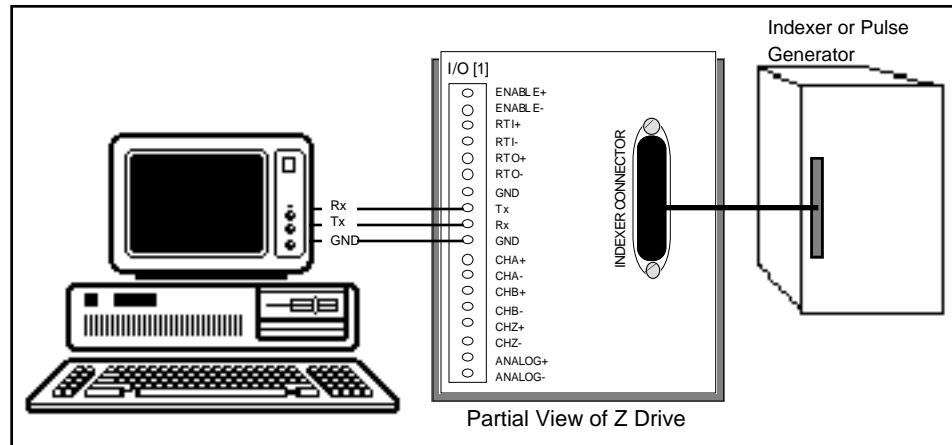
- Position mode
- Velocity mode
- Torque mode

Position mode is the default operating mode. Chapter ④ *Application Design* provides detailed information about these operating modes.

Position Mode

In this mode, the drive receives indexer pulses and a direction sign from any Compumotor indexer. The drive interprets these pulses as STEP pulses and moves accordingly. The default resolution is 5,000 steps per revolution. To test this mode, complete the following steps:

- ① Connect a Compumotor indexer or a pulse generator (TTL out) to the INDEXER CONNECTOR on the Z Drive.



Position Mode Bench Test

Helpful Hint:
This step is optional

- ② Make certain that the motor shaft is clear of all objects. The motor should be firmly supported to prevent it from shifting while the drive is operating.
- ③ Energize the 3-phase 240VAC (or 120VAC). The POWER LED and the CPU READY LED should both be on (green).
- ④ If you are using a terminal with the Z Drive, it should be connected to the Z Drive's Rx (receive), Tx (transmit), and GND (ground) connections on I/O[1]. You should also have set the RS-232C communication parameters. Be sure that you have completed this step properly before proceeding.
To ensure that your RS-232C communication link is working properly (**if you are using a terminal**), send the Display Drive Information (DDI) command.

Helpful Hint:
Type DDI and press ENTER (or the space bar) on your terminal. The Z Drive will send the following message.

```

          PP    PI    PD    VP    VI    VF    TG
*PERCENT  50    10    00    20    00    50    60
*MAXIMUM 10000  400  32000  5000  00  32000  32000

*TIME_CONSTANT=00005(*100_microSeconds)
*AVERAGE_CURRENT_LIMIT=020.00_AMPS
*PEAK_CURRENT_LIMIT=040.00_AMPS
*MOTOR_RESOLUTION=05000_STEPS
*RESOLVER_RESOLUTION=AUTO
*MOTOR_TYPE=Z640
*Z_MODE=1...[POSITION]

```

If you type one character, and **two** characters are shown on your screen, your terminal is set for **Half Duplex mode** rather than **Full Duplex mode** (i.e., you type *D* and *DD* appears on the screen). Reset the terminal for **Full Duplex mode** and try the test again.

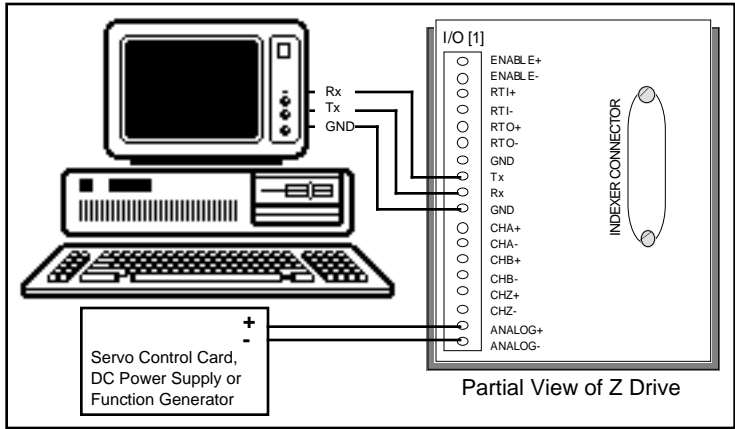
- ⑤ Send a one-revolution move command from your indexer to the Z Drive. **Most Compumotor Indexers have a default resolution value of 25,000 steps per rev.** The default one-revolution move for the Z drive would only be 5,000 steps. At this point, the motor should turn 5 revolutions.

The successful completion of this test means that you wired the resolver, motor, terminal (optional), and power connections correctly. The components of your system are functioning properly. If the motor does not move as commanded, check your connections and try the test again. When you successfully complete this test, you may begin Chapter ③ Installation.

Torque Mode

In Torque mode, the drive receives a $\pm 10V$ signal that is proportional to commanded torque. Positive torque will accelerate the motor CW (as viewed from the front). The default torque-to-voltage relationship is 50% of the peak torque rating. You can modify the torque-to-voltage relationship with software commands (refer to the **ANV** command description in *Chapter 5 Software Reference*). **The Z Drive will shut down automatically if the unit operates at peak torque for more than 3.3 seconds.** To test this mode, complete the following steps:

- ① Connect a DC power supply or a function generator to the **ANALOG+** and **ANALOG-** connections on the Z Drive's **I/O[1]** connector.
If an analog ground point is available on your servo control card, function generator or DC power supply, connect it to either ground terminal on I/O[1].



Torque Mode Bench Test

Helpful Hint:
 This step is *optional*

- ② Make certain that the motor shaft is clear. The motor should be firmly supported to prevent it from shifting while the drive is operating.
- ③ Energize the 3-phase 240VAC (or 120VAC). The Power LED and the CPU READY LED should be on (green).
- ④ You can enter Torque mode via the Z Drive's front panel or via a software command (if you are using a terminal). You can follow either of the subsequent sets of instructions to enter Torque mode. *Once entered, Torque mode will be the default Power-Up mode (instead of Position mode) until you change modes again.*

Torque Mode Via Front Panel:

- A. Press the down arrow button under the display until **MODE** appears.
- B. Press the **ENTER** button once.
- C. Press the down arrow button until **TOR** appears in the display.
- D. Press the **ENTER** button again. An asterisk (*) should appear next to **TOR**.

Torque Mode Via Terminal (CZM2) Command:

- A. If you are using a terminal with the Z Drive, it should be connected to the Z Drive's **Rx** (receive), **Tx** (transmit), and **GND** (ground) connections on **I/O[1]**. You should also have set the RS-232C communication parameters. Be sure that you have completed this step properly before proceeding.
- B. Type **CZM2** (Configure Z Drive Mode 2) to set the drive to **Torque mode**. The following modes are available:
 - CZM1** = Position mode
 - CZM2** = Torque mode
 - CZM3** = Velocity mode

*If you type one character, and **two** characters are shown on your screen, your terminal is set for **Half Duplex mode** rather than **Full Duplex mode**. (i.e., you type **C** and **CC** appears on the screen). Reset the terminal for **Full Duplex mode** and try the test again.*

- C. To ensure that your RS-232C communication link is working properly (if you are using a terminal), send the Display Drive Information (**DDI**) command.

Helpful Hint:
Type DDI and press ENTER (or the space bar) on your terminal. The Z Drive will send the following message.

```

          PP   PI   PD   VP   VI   VF   TG
*PERCENT 00   00   00   00   00   00   00
*MAXIMUM 00000 00000 00000 00000 00000 00000 00000

*TIME_CONSTANT=00020(*100_microSeconds)
*AVE_CURRENT_LIMIT=020.00_AMPS
*PEAK_CURRENT_LIMIT=040.00_AMPS
*MOTOR_RESOLUTION=05000_STEPS
*RESOLVER_RESOLUTION=AUTO
*MOTOR_TYPE=Z640
*Z_MODE=2...[TORQUE]

```

- ⑤ Increase the voltage to command the motor to accelerate. If the motor appears to be creeping at **zero voltage** (0V), you may have a slight offset in the supply. The Analog Zero (ANZ) command can compensate for this offset.

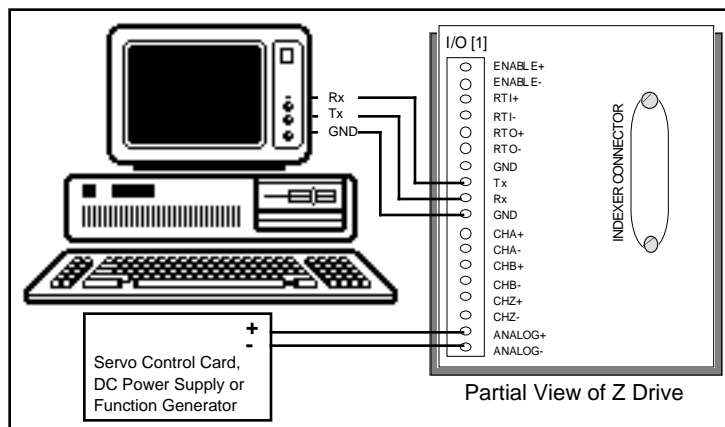
The successful completion of this test means that you wired the resolver, motor, terminal (optional), and power connections correctly. The components of your system are functioning properly. If the motor does not move as commanded, check your connections and try the test again. When you successfully complete this test, you may begin Chapter ③ Installation.

Velocity Mode

In Velocity mode, the drive receives a $\pm 10V$ signal that is proportional to commanded velocity. Positive voltage turns the motor CW as viewed from the front. A default speed-to-voltage relationship of 10V = maximum rated speed is stored in the drive. You can change this value (refer to the ANV command description in Chapter ⑤ Software Reference). To test this mode, complete the following steps:

- ① Connect a DC power supply or a function generator to the ANALOG+ and ANALOG- connections on the Z Drive's I/O[1] connector.

If an analog ground point is available on your servo control card, function generator, or DC power supply, connect it to either ground terminal on I/O[1].



Velocity Mode Bench Test

- ② Make certain that the motor shaft is clear of all objects. The motor should be firmly supported to prevent it from shifting while the drive is operating.
- ③ Energize the 3-phase 240VAC (or 120VAC). The Power LED and the CPU READY LED should be on (green).
- ④ You can enter Velocity mode via the Z Drive's front panel or via a software command (if you are using a terminal). You can follow either of the subsequent sets of instructions to enter Velocity mode. *Once entered, Velocity mode will be the default Power-Up mode (instead of Position mode) until you change modes again.*

Velocity Mode Via Front Panel:


- A. Press the down arrow button under the display until MODE appears.
- B. Press the ENTER button once.
- C. Press the down arrow button until VEL appears in the display.
- D. Press the ENTER button again. An asterisk (*) should appear next to VEL.

Velocity Mode Via Terminal (CZM3 Command):

- A. If you are using a terminal with the Z Drive, it should be connected to the Z Drive's **Rx** (receive), **Tx** (transmit), and **GND** (ground) connections on **I/O[1]**. You should also have set the RS-232C communication parameters. Be sure that you have completed this step properly before proceeding.
- B. Type **CZM3** (Configure **Z** Drive **M**ode 3) to set the drive to **Velocity mode**. The following modes are available:
 - CZM1** = Position mode
 - CZM2** = Torque mode
 - CZM3** = Velocity mode

*If you type one character, and **two** characters are shown on your screen, your terminal is set for **Half Duplex mode** rather than **Full Duplex mode**. (i.e., you type **C** and **CC** appears on the screen). Reset the terminal for **Full Duplex mode** and try the test again.*

- C. To ensure that your RS-232C communication link is working properly (if you are using a terminal), send the Display Drive Information (DDI) command.

 **Helpful Hint:**
Type DDI and press ENTER (or the space bar) on your terminal. The Z Drive will send the following message.

```
          PP   PI   PD   VP   VI   VF   TG
*PERCENT  00   00   00   50   20   00   00
*MAXIMUM 00000 00000 00000 15000 01000 00000 00000

*TIME_CONSTANT=00005(*100_microSeconds)
*AVE_CURRENT_LIMIT=020.00_AMPS
*PEAK_CURRENT_LIMIT=040.00_AMPS
*MOTOR_RESOLUTION=05000_STEPS
*RESOLVER_RESOLUTION=AUTO
*MOTOR_TYPE=Z640
*Z_MODE=3...[VELOCITY]
```

- ⑤ Increase the voltage to command the motor to turn. If the motor appears to be creeping at **zero voltage** (0V), you may have a slight offset in the supply. The Analog Zero (ANZ) command can compensate for this offset (refer to Chapter ⑥ Software Reference for a detailed description of the ANZ command).

The successful completion of this test means that you wired the resolver, motor, terminal (optional), and power connections correctly. The components of your system are functioning properly. If the motor does not move as commanded, check the connections and try the test again. When you successfully complete this test, you may begin to Chapter ③ Installation.