

CHAPTER FOUR

# 4 Special Features

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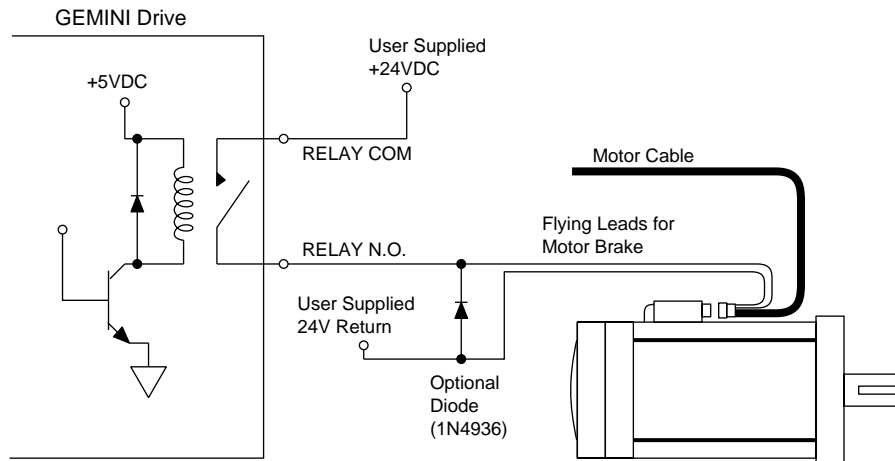
## IN THIS CHAPTER

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- Relay Connections
  - +24VDC Keep Alive Power Connections
  - Multiple Drive Installations
  - RS-232/485 Communications
  - Updating the Drive's Operating System
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## Relay Connections (optional)

To use the drive's internal relay, connect your external circuit to the RELAY COM and RELAY N.O. terminals. The next drawing shows a typical application—connecting a motor brake to the relay terminals.



*Relay Connections*

The relay is normally open. When the drive is enabled, it holds the relay closed. If the drive faults or is disabled, the relay will open.

### Relay Operation:

**Drive Condition:**

Enabled  
 Faulted  
 No AC power\*, or not enabled

**Relay State:**

Closed  
 Open  
 Open

\* +24VDC power does not affect the relay. With +24VDC applied, the relay will be open if AC power is *not* applied.

### Relay Specifications:

**Relay Type:**

Dry contact mechanical relay  
 Normally open

**Relay Rating:**

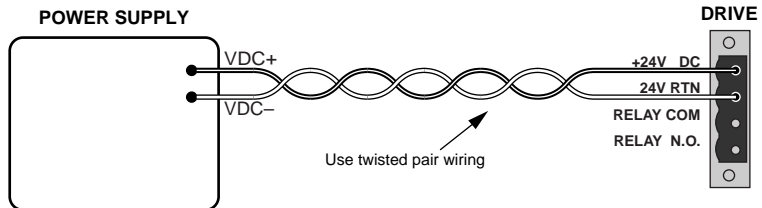
5 amps at 24VDC or 120VAC

See the OUTFNC and OUTLVL commands in the *Gemini Programmer's Reference* for more information on configuring the relay.

## +24VDC “Keep Alive” Power Connections (optional)

The following drawing shows how to connect an external +24VDC power source to the drive. Use the removable terminal connector that is supplied with the drive.

With +24VDC applied, the drive's internal control board will remain powered when the primary AC power source is disconnected, and will maintain several important functions, including communication diagnostics, position feedback, and other logic functions.



*+24VDC Power Input*

**+24VDC Specifications:**

Input voltage range:	19.2 – 28.8 VDC
Input current:	500 mA (maximum)
Functions powered under +24VDC:	position information (encoder or motor position counters in drive) communications diagnostics motor feedback
Software status bit (see TASX command):	indicates “keep alive” is active

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**CAUTION**

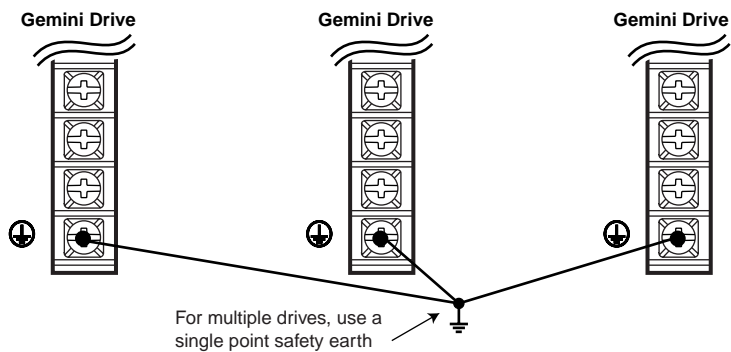
Do not exceed 28.8VDC input voltage

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## Multiple Drive Installations

### Safety Earth Connections

For multiple drive installations, we recommend a single point or “star” safety earth configuration, as shown below.



*Multiple Drives: Single Point Safety Earth*

Under normal operation, no current should flow through the safety earth connection.

# RS-232/485 Communications

The Gemini drive has a single serial port marked, “RS-232/485,” on the front of the unit. In the following this port will be referred to as the COM port. The Gemini drive uses a binary language for communication; it does not use ASCII. To enable 6000 ASCII level communication in a terminal mode, the Gemini uses a translator utility in Pocket Motion Planner and in the CommServer (for use with Motion Planner). In all other ways, the serial communication functions in the Gemini behave like other Compumotor products. Gemini drives can be connected together in RS-232 Daisy Chains and RS-485 Multi-Drop configurations.

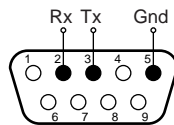
In this section:

- Establishing Communications
- Configuring the serial port
- RS-232 Communications
- RS-232 Daisy Chaining
- RS-485 Communications
- RS-485 Multi-Drop

## Establishing Communications

The drive’s configuration port is a 9 pin D-connector. You can use it for either RS-232 or four wire RS-485 communications, as shown in the next drawing.

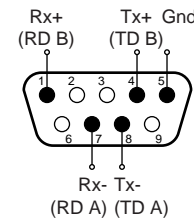
Gemini Drive  
RS-232 Connections



Gemini Drive  
Pin Assignments

1. RS-485 Rx+ (RD B)
2. RS-232 Receive
3. RS-232 Transmit
4. RS-485 Tx+ (TD B)
5. Ground
6. No connection
7. RS-485 Rx- (RD A)
8. RS-485 Tx- (TD A)
9. No connection

Gemini Drive  
RS-485 Connections



### RS-232/485 Connections

To communicate with the drive, connect the drive’s RS-232/485 connector to a PC running Motion Planner, or to a palm PC running Pocket Motion Planner with Windows CE. Verify your computer’s connector pinout; you may need to use a “null modem” cable to connect your computer’s transmit terminal to the Gemini’s receive terminal, and your computer’s receive terminal to the Gemini’s transmit terminal.

## Configuring the Serial Port

The following commands can be used to configure the Gemini serial port and the terminals used by Motion Planner and Pocket Motion Planner. Complete descriptions of these commands can be found in the *Gemini Programmer's Reference*.

E	Enable Serial Communication
ECHO	Enable Communication Echo
BOT	Beginning of Transmission Characters
EOT	End of Transmission Characters
EOL	End of Line Terminating Characters
ERRBAD	Error Prompt
ERRLVL	Error Detection Level
ERROK	Good Prompt

- The baud rate for the Gemini is set at 9600. Future releases of Gemini firmware will offer additional baud rate choices. Check the Compumotor web site ([www.compumotor.com](http://www.compumotor.com)) for information on new software releases.
- The Gemini serial port contains connections for both RS-232 and RS-485 communication. The Gemini drive will automatically switch between RS-232 and RS-485 mode depending on which connections in the port's 9 pin D-connector are active. See wiring diagrams.
- Some RS-232 cables use hardware handshake signals that are used by the RS-485 pins. The RS-485 interface will automatically disable itself if this is detected. If this occurs, you must reset the drive to re-enable the RS-485 interface.

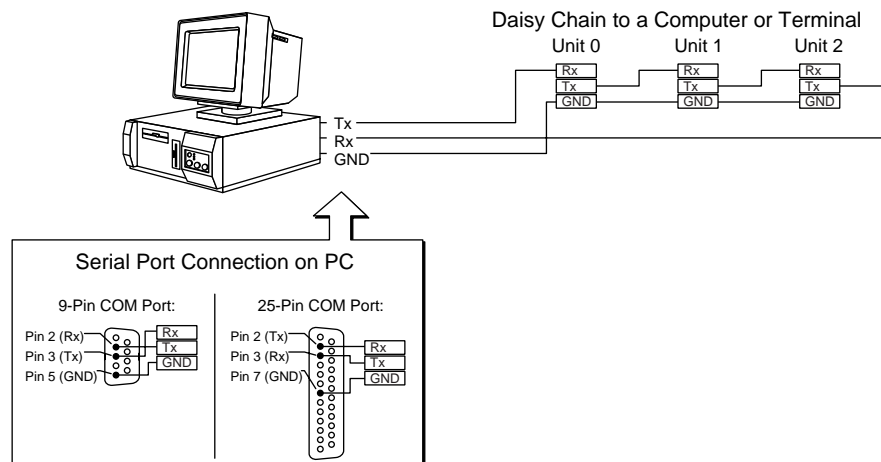
## RS-232 Communications

### Pin Out for RS-232 Communication:

#### Pin Description

- 2 Rx (receive). Connect to Tx on your computer.
- 3 Tx (transmit). Connect to Rx on your computer.
- 5 GND (logic ground). Connect to GND on your computer

- Maximum RS-232 cable length is 50 feet (15.25 meters)
- To establish unique addresses for daisy-chained units, use the ADDR command.



RS-232 Daisy Chain Connections

## RS-232 Daisy-Chaining

Up to ninety-nine stand-alone Gemini drive products may be daisy-chained. Refer to the wiring diagrams for daisy-chain connections.

Follow these steps to implement daisy-chaining:

### Step 1

To enable and disable communications on a particular drive unit in the chain, you must use the Daisy-Chain Address (ADDR) command to establish a unique device address for each unit. The ADDR command automatically configures unit addresses for daisy chaining. This command allows up to 99 units on a daisy chain to be uniquely addressed.

Sending ADDR $i$  to the first unit in the daisy chain sets its address to be ( $i$ ). The first unit in turn transmits ADDR( $i + 1$ ) to the next unit to set its address to ( $i + 1$ ). This continues down the daisy chain until the last unit of ( $n$ ) daisy-chained units has its address set to ( $i + n - 1$ ).

Note that a drive with the default device address of zero (0) will send an initial power-up start message similar to the following:

```
*TREV-GT6-U8_D1.0_F1.0
```

### Step 2

Connect the daisy-chain with a terminal as the master.

To allow daisy chaining you must turn on echo mode for each drive on the chain (ECHO1). The ADDR command automatically leaves each device in echo mode after the device address is set when in RS-232 mode.

In the Gemini, daisy chaining can work in all error levels except error level 0 (see ERRLVL command). To set the drive error levels to your preferred state you can address each drive individually or send a global command. Note the address syntax used to send data to particular units:

#### Commands:

```
1_ERRLVL4      ; Set error level to 4 for unit #1  
2_ERRLVL4      ; Set error level to 4 for unit #2  
ERRLVL4        ; Set error level to 4 for all units on the chain
```

Unlike ASCII-based products, the binary prompts associated with the different error levels can pass through the daisy chain to the terminal controller without interfering with the other drives. At that point they are translated into the text strings defined by the ERROK and ERBAD commands. Consequently, error levels using prompts can be used in Gemini daisy chains.

To receive data from a particular drive on the chain, you must prefix the command with the appropriate unit's device address and an underline:

#### Commands:

```
1_DRES        ; Request drive resolution from unit #1  
*DRES25000     ; Response from unit #1
```

Use the E command to enable/disable RS-232 communications for an individual unit. If all drive units on the daisy chain are enabled, commands without a device address identifier will be executed by all units. Because of the daisy-chain's serial nature, the commands will be executed approximately 1 ms per character later on each successive unit in the chain (assuming 9600 baud).

Units with RS-232 disabled (EØ) will not respond to any commands, except E1; however, characters are still echoed to the next device in the daisy chain.

**Commands:**

- 3\_E0 ; Disable RS-232 on unit #3
- DRES25000 ; Set resolution to 25000 on all other units
- 3\_E1 ; Enable RS-232 on unit #3
- 3\_DRES4000 ; Set resolution to 4000 on unit #3

Verify communication to all units by using the techniques described above.

**Step 3**

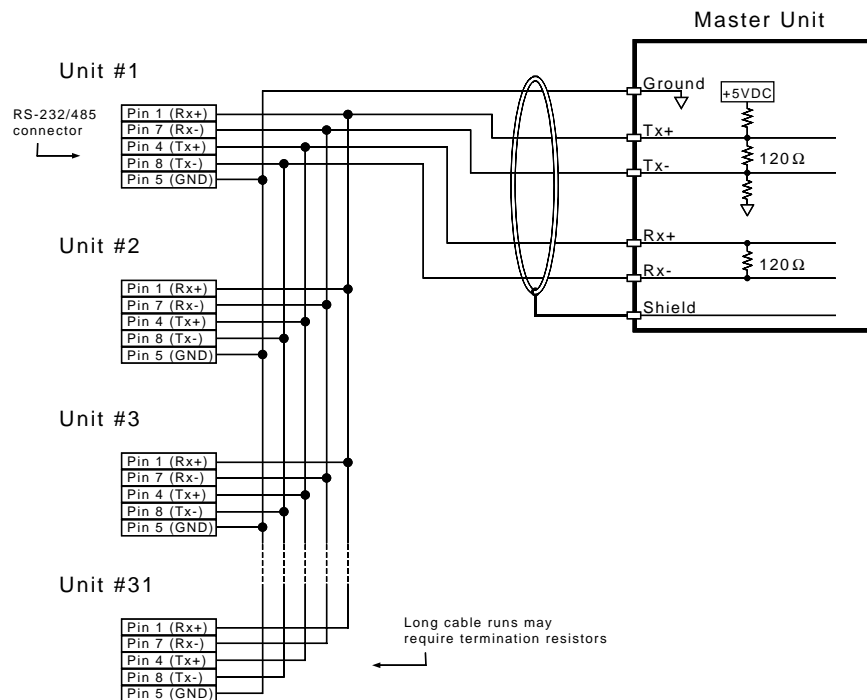
Now that you have verified that the daisy chain is set up properly, you can use the various Pocket Motion Planner and Motion Planner tools to configure and monitor all units on the daisy chain.

**RS-485 Communications**

**Pin Out for 4-Wire RS-485 Communications:**

Pin	Description
1	Rx+ (also called RD B)
4	Tx+ (also called TD B)
5	GND (logic ground)
7	Rx- (also called RD A)
8	Tx- (also called TD A)

- Maximum RS-485 cable length is 4000 feet (1220 meters)
- To establish unique addresses for multi-drop units, use the ADDR command.
- Keep wires as short as possible. Termination resistors may be required on long cable runs.
- Connect RS-485 cables before applying power to the drive.
- Recommended cable: Belden 9842
- Refer to the diagram below for connection information.



RS-485 Multi-drop Connections

## RS-485 Multi-Drop

Up to 99 Gemini drives may be multi-dropped. Refer to the diagrams in this section for daisy-chain connections.

The ADDR command allows you to establish up to 99 unique addresses. To use the ADDR command, you must address each unit individually before it is connected on the multi drop. For example, given that each product is shipped configured with address zero, you could set up a 4-unit multi-drop with the commands below, and then connect them in a multi drop:

1. Connect the unit that is to be unit #1 and transmit the  $\emptyset\_ADDR1$  command to it.
2. Connect the unit that is to be unit #2 and transmit the  $\emptyset\_ADDR2$  command to it.
3. Connect the unit that is to be unit #3 and transmit the  $\emptyset\_ADDR3$  command to it.
4. Connect the unit that is to be unit #4 and transmit the  $\emptyset\_ADDR4$  command to it.

If you need to replace a unit in the multi drop, send the  $\emptyset\_ADDRi$  command to it, where “i” is the address you wish the new unit to have. For RS-485 multi-drop to work properly, each drive must have echo mode turned off (ECHO $\emptyset$ ). The ADDR command will automatically do this when the drive is in RS-485 mode.

In order to prevent the collision of prompts being transmitted simultaneously from several drives in response to a global command, you must configure the drives for either error level 2 or error level 0 in multi-drop mode. This can be done as follows:

**Commands:**

- |           |                                    |
|-----------|------------------------------------|
| 1_ERRLVL2 | ; Set error level to 2 for unit #1 |
| 2_ERRLVL2 | ; Set error level to 2 for unit #2 |
| 3_ERRLVL2 | ; Set error level to 2 for unit #3 |

In general, to send a Gemini command from the master unit to a specific unit in the multi-drop, prefix the command with the unit address and an underscore (e.g., 3\_DRES25000 sets the drive resolution to 25000 steps on unit #3). The master unit may receive data from a multi-drop unit. You should now verify that you can access each unit on the multi-drop.

Now that you have verified that the multi-drop is set up properly, you can use the various Pocket Motion Planner and Motion Planner tools to configure and monitor all units on the multi-drop.

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## Updating the Drive's Operating System

The Gemini drive runs under an internal software operating system (firmware). The operating system was loaded into your drive during the manufacturing process, and under ordinary circumstances you will not need to update your drive's operating system. However, because Compumotor continues to add enhancements, you may want to upgrade the operating system. You may obtain a new operating system file from the Compumotor web site, or from Technical Support (see phone numbers on the inside cover of this manual).

For more information about web site downloads and update procedures, see the *Gemini Programmer's Reference*.