

## Chapter 6. Hardware Reference

### Chapter Objectives

The information in this chapter will enable you to:

- Use this chapter as a quick reference tool for most system specifications
- Use this chapter as a quick reference tool for most switch settings
- Use this chapter as a quick reference tool for proper I/O connections

### Factory Default Settings

<b>RS-232C Communications</b>	<ul style="list-style-type: none"> <li>• Baud Rates: 9,600 (default setting), 4,800, 2,400, 1,200, 600, 300</li> <li>• Data Bits: 8</li> <li>• Parity: None</li> <li>• Stop Bits: 1</li> <li>• Echo: Off (Full Duplex)</li> </ul>
<b>JSI Device Address</b>	<p>The default address setting for the JSI controller is <b>01</b>. Refer to Chapter 2, Getting Started for information on displaying and displaying the address setting with the push buttons.</p>
<b>Hardware Interfaces</b>	<p>Output command: <math>\pm 10V</math> analog voltage source</p> <p>Feedback Device Number: 1, Incremental encoder interface enabled; Incremental encoder base resolution = 4000 steps/revolution</p> <p>Absolute encoder interface is enabled</p> <p>Front-panel push buttons are enabled</p> <p>Analog input interface is disabled</p> <p>RS-232C is enabled</p> <p>Inputs active low, and configured as triggers, with dedicated home, clockwise, and counter-clockwise limits.</p> <p>Outputs active low, configured as programmable outputs.</p>
<b>Limits</b>	<p>Hardware limits enabled</p> <p>Software limits disabled</p>
<b>Tuning Parameters</b>	<p>Proportional gain = 10% of 500</p> <p>Integral gain = 0% of 1,000</p> <p>Derivative gain = 0% of 100</p>
<b>Motion Parameters</b>	<p>Maximum following error = 4000 steps</p> <p>Motion resolution = 4000 steps/revolution</p>

### Environmental Specifications

Parker Compumotor recommends that you operate and store your JSI servo controller under the following conditions.

- Operating Temperature: 32° to 104°F (0° to 40°C)
- Storage Temperature: -22° to 185°F (-30° to 85°C)
- Humidity: 0 to 95% non-condensing

**I/O Specifications & Descriptions**

**Connectors**

This section refers to the Inputs and outputs that are on the JSI controller's front panel. Refer to Figure 6-1 for the location of the inputs and outputs described in this section.

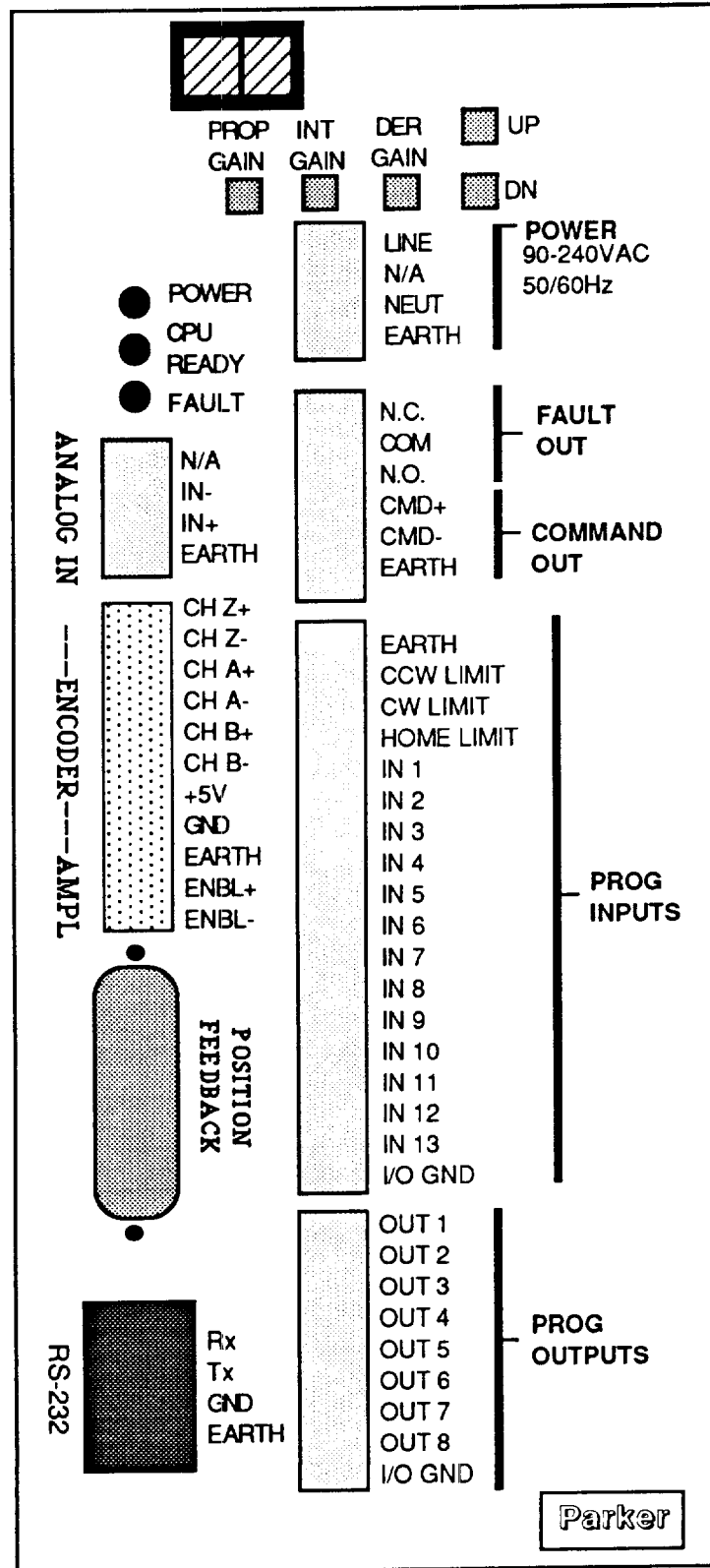


Figure 6-1. JSI Front-Panel Diagram

**POWER**

You can apply from 90 - 240VAC or 127 - 340VDC to this input. Figures 6-2 and 6-3 represent proper wiring for AC and DC power sources respectively.

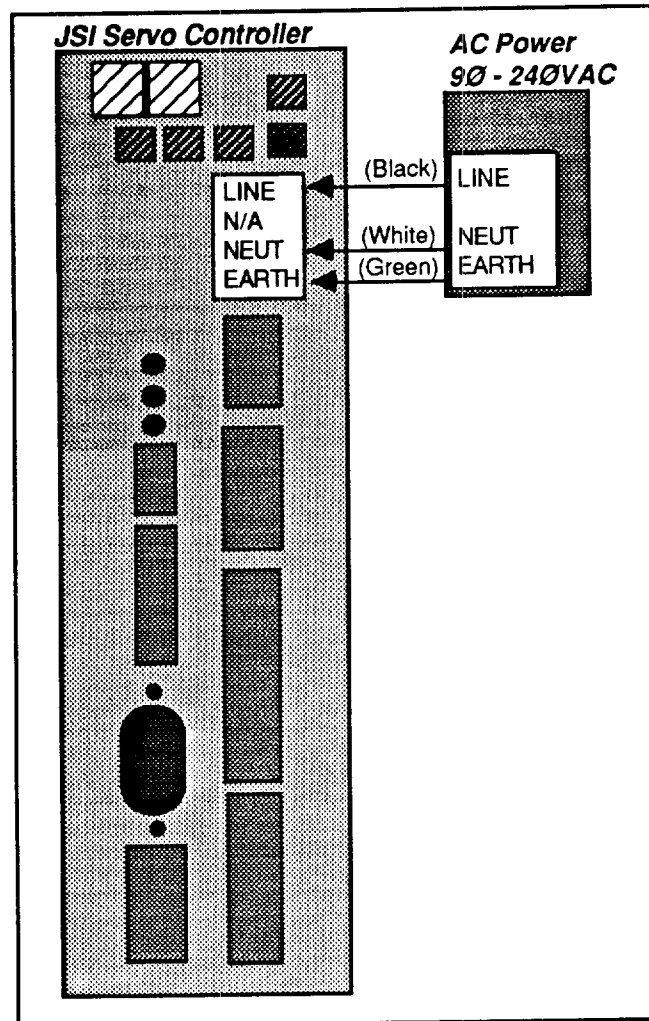


Figure 6-2. JSI Controller AC Power Wiring Diagram

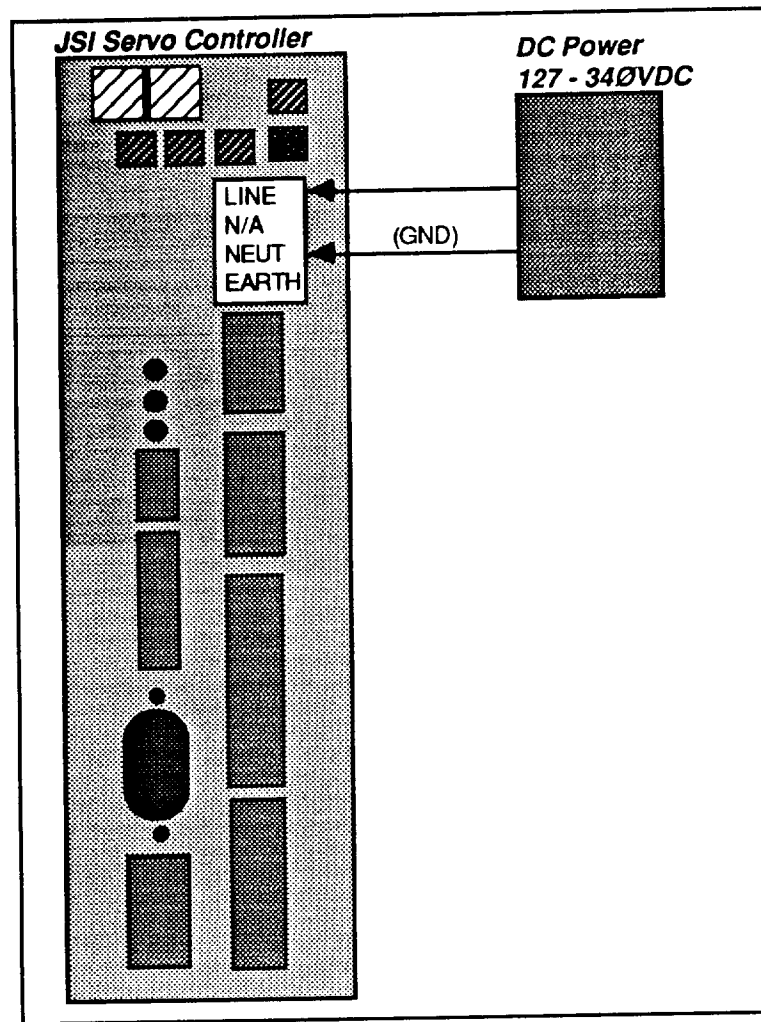


Figure 6-3. JSI Controller DC Power Wiring Diagram

**FAULT OUT** Normally-closed and normally-open fault outputs are relay outputs that have a contact rating of 2A at 120VAC.

- NC = Normally-closed relay output
- NO = Normally-open relay output.

**COMMAND OUT** This output is an analog current or voltage signal from the 12-bit DAC (digital-to-Analog converter). You can configure the output (**CMD+** and **CMD-**) as either a current output source or a voltage output source depending on your application's needs. The JSI is factory set as voltage output source controller. With the Configure Current Source—Low (**COCL**) or Configure Current Source—High (**COCH**) commands, you can convert the JSI into a current source controller.

- Configure Voltage Source (**COV**):  $\pm 10V$  Output
- Configure Current Source—Low (**COCL**):  $\pm 60$  mA output
- Configure Current Source—High (**COCH**):  $\pm 200$  mA output

This output drives either an analog servo drive or a hydraulic servo valve. Figure 6-4 provides an example of proper wiring for this output.

**ANALOG IN**

The JSI controller can receive analog voltage information from external devices through analog inputs (**IN+** and **IN-**). The analog input goes through a 10-bit analog-to-digital converter. You can use this analog input in two ways. You can use it either as a velocity input for a Velocity Following mode or as an error input for scaling the command velocity. Figure 6-4 provides an example of proper wiring for this input.

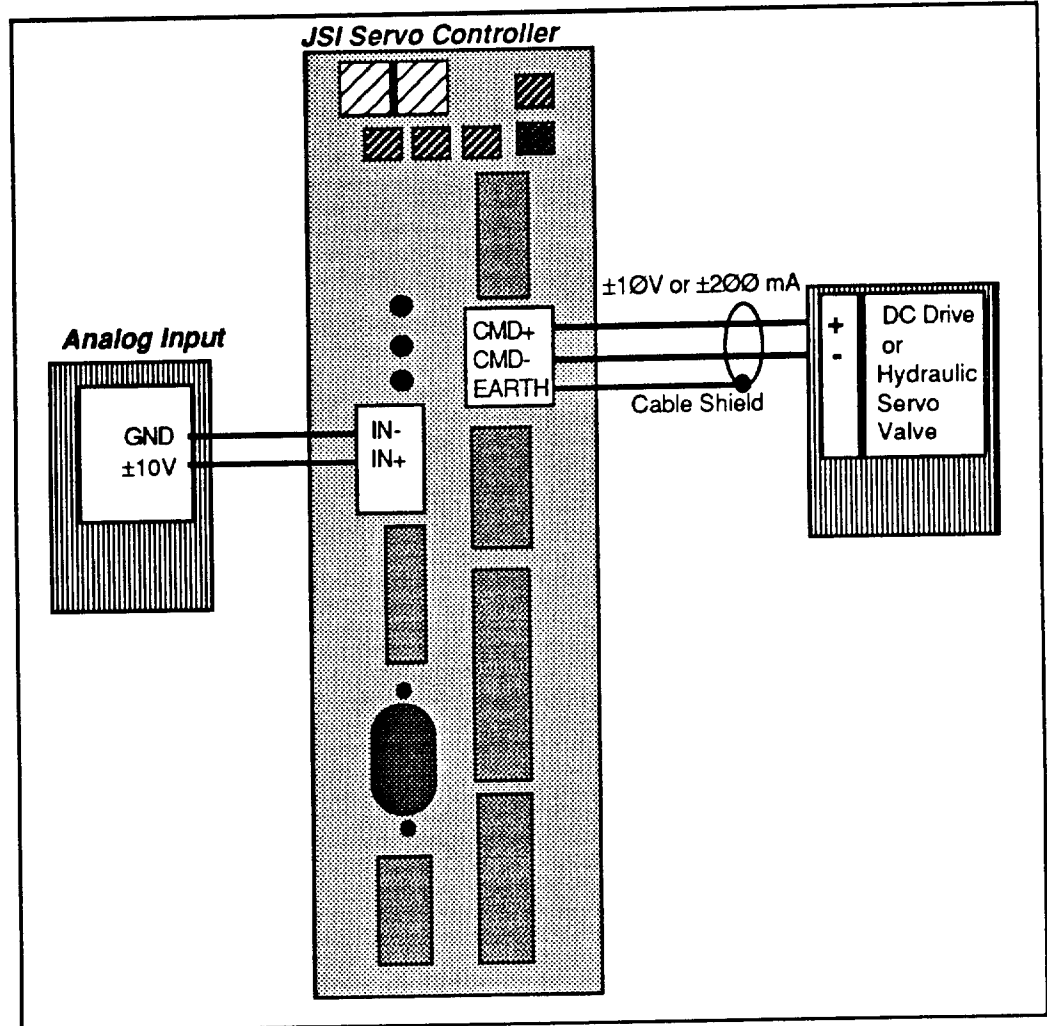


Figure 6-4. Analog Input and Command Output Connections

**PROG INPUTS**

There are 16 inputs, 1 I/O ground and one earth ground pin associated with **PROG INPUTS**. The first three inputs are the **CCW**, **CW** and **HOME LIMITs**. These inputs are electrically identical to inputs **IN1** through **IN13**. The primary difference between these inputs is that the **CCW**, **CW** and **HOME LIMIT** inputs are dedicated inputs, while **IN 1** through **IN 13** have programmable input functions. The inputs have an internal isolated 5V supply. Figure 6-5 represents a typical input circuit.

Input Voltage: 5 - 30 VDC. Current Limiting Resistor not needed

**PROG  
OUTPUTS**

There are eight programmable outputs available on JSI controller. These outputs are open collector outputs and you must supply between 5 to 30VDC and a pull up resistor with a minimum resistance of 100 ohms. Refer to Figure 6-5.

Output: 5 - 30V and can sink up to 300 mA.

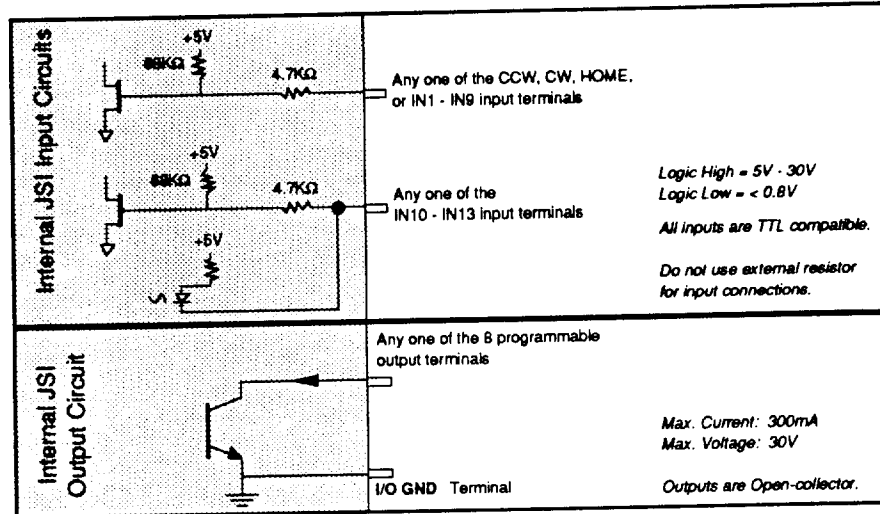


Figure 6-5. Typical JSI Output Circuit

**ENCODER  
(Incremental  
encoder)**

This input reads incoming pulses from an incremental encoder. The JSI can accept quadrature pulses in a differential or single-ended fashion. If you are using a single-ended encoder, do not connect the A-, B-, and Z- inputs. The JSI controller provides the 5VDC at 500 mA supply for the encoder.

Max Frequency Input: 60 kHz pre-quadrature.

**AMPL**

This input enables the JSI's command output (**CMD+** and **CMD-**). If you place a jumper (short) between **ENBL+** and **ENBL-** inputs, the JSI command output will be enabled. If you leave the **ENBL+** and **ENBL-** inputs open, the command output will be disabled. If you power the JSI without jumpering the enable input (**ENBL+** and **ENBL-**), the fault LED will illuminate and error code **23** will flash.

**POSITION  
FEEDBACK  
(absolute encoder)**

This input receives feedback from Compumotor's absolute encoders. The JSI supports the ABS8 (AR23 with -4 decoder), AR23 with -1 decoder, AL-C, AR-C, and Photo-Trak encoders. Refer to Chapter 3, *Installation*, for connection details.

**RS-232**

You can communicate with the JSI controller with your computer or terminal through RS-232C inputs. You must wire the **Tx** (Transmit), **Rx** (Receive), and **GND** (Logic Ground) inputs as shown on Figure 6-6. The controller accepts standard EIA RS-232C signals from +15 to -15VDC. You can change the baud rate, but the other parameters are fixed. You must configure your computer or terminal to the proper setting.

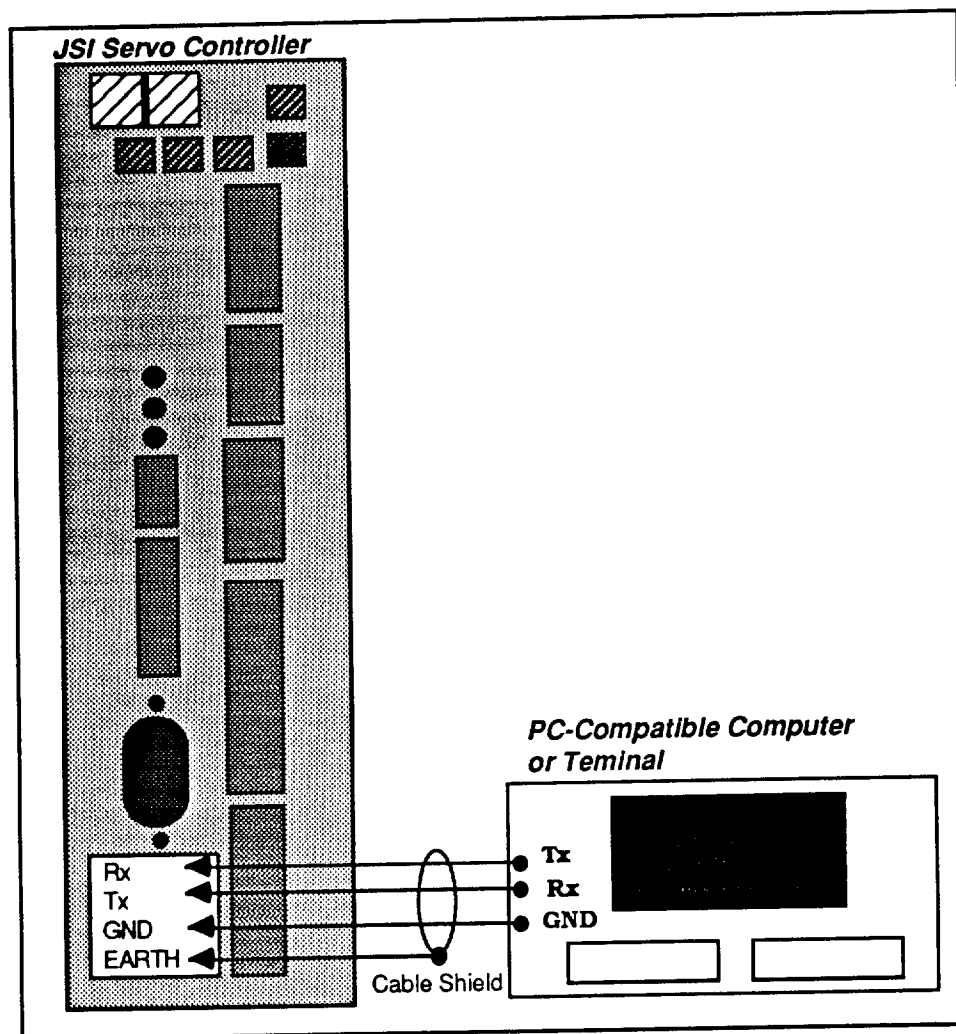


Figure 6-6. Wiring RS-232C Interface to a Computer or a Terminal.

## LEDS

The two-digit LED flashes an error code if any type of error occurs. You can also light the LEDs with the LED command.

The Power LED will be green if you power up the JSI microprocessor properly.

The On-line LED will be green if the microprocessor and its peripherals are functioning properly. If this LED is off, a problem exists within the processor.

The Fault LED will be off under normal operations. If a hardware or software error exists, this LED will turn red. Refer to the *Diagnostic Codes* section of Chapter 7, *Maintenance & Troubleshooting*, for a complete listing of these codes.

### Dimensional Drawings

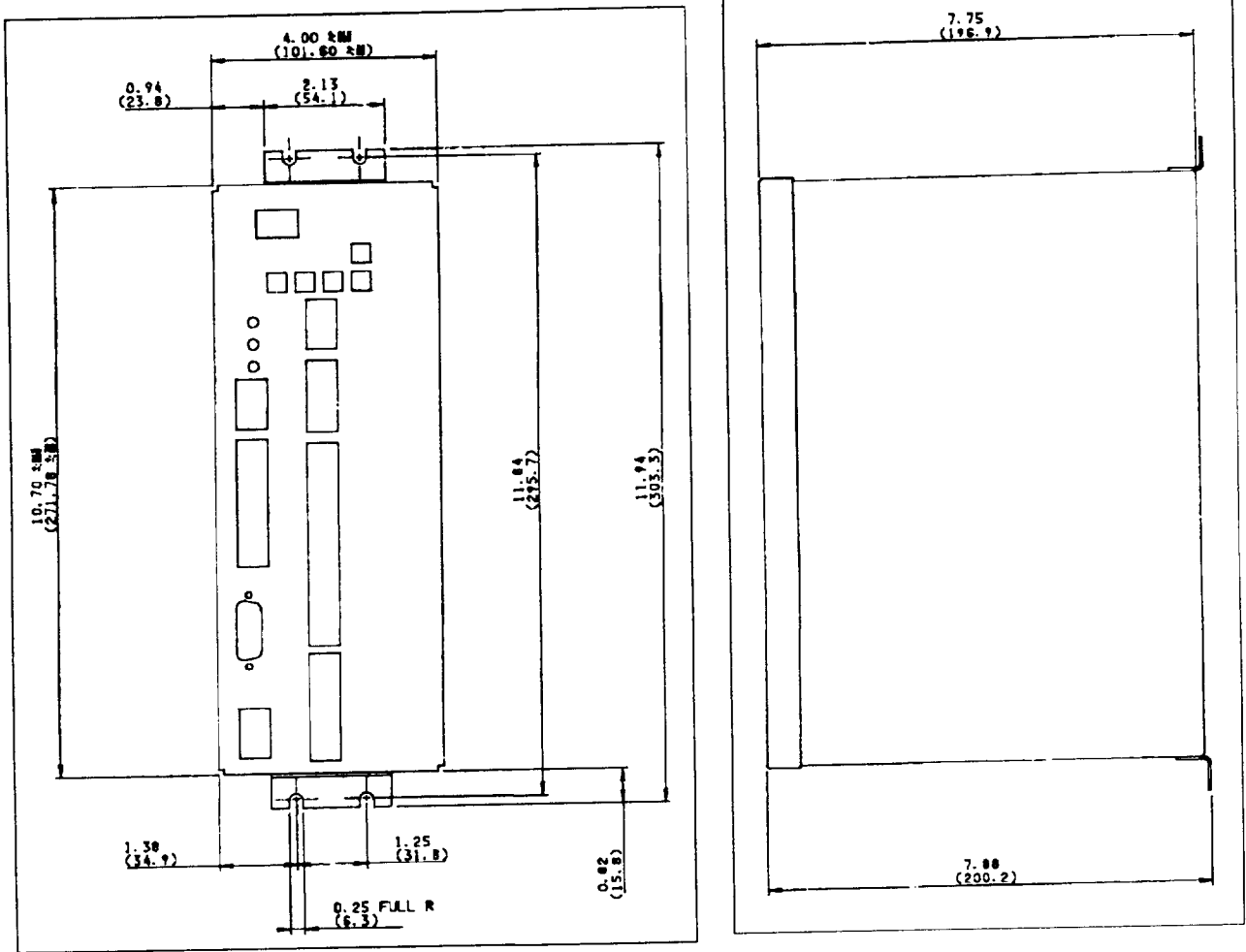


Figure 6-7. JSI Dimensional Diagrams

## Chapter 7. Maintenance & Troubleshooting

### Chapter Objectives

The information in this chapter will enable you to:

- Maintain the system's components to ensure smooth, efficient operation
- Isolate and resolve system hardware and software problems
- Use this chapter as a quick reference tool for a description of system error codes

### Maintenance

#### Spare Parts Table

Table 7-1 is a list of recommended spare parts for the JSI system.

Description	Function	Part Number
4-Pin Connector	Power Connection	43-005560-01
6-Pin Connector	Command Output & Fault Output	43-006006-01
9-Pin Connector	Programmable Output	43-008755-01
11-Pin Connector	Inc. Encoder & Enable Input	43-008885-01
Battery	Maintains RAM memory	47-007709-01

Table 7-1. Spare Parts Table

#### Battery

The nonvolatile memory of the JSI Controller is a Battery-Backed RAM (Random Access Memory). The battery is used to keep the RAM powered at all times. The life of this battery is approximately 10 years. When the battery runs low, the JSI will be unable to hold a program in nonvolatile memory. If the battery back up is not functioning properly, error **30** will be displayed when you cycle power. To verify that the battery is OK, type **SV** (Save) then cycle power to the JSI controller. If the battery is OK, the error 30 (Check Sum error) should be gone. If the message is still flashing after the Save (**SV**) and power cycle, you should replace the battery (Compumotor Part Number 47-007709-01). Call your local distributor to order the battery.

### Troubleshooting

This section provides methods to identify and resolve possible indexer-related hardware and software problems. You should also refer to the drive's user guide for troubleshooting procedures specific to the drive you are using.

#### Problem Isolation

When your system does not function properly (or as you expect it to operate), the first thing that you must do is identify and isolate the problem. When you accomplish this, you can effectively begin to eradicate and resolve the problem.

The first step is to isolate each system component and ensure that each component functions properly when it is run independently. You may have to dismantle your system and put it back together piece by piece to detect the problem. If you have additional units available, you may want to use them to replace existing components in your system to help identify the source of the problem.

Try to determine if the problem is mechanical, electrical, or software-related. *Can you repeat or recreate the problem?* Do not attempt to make quick rationalizations about problems. Random events may appear to be related, but they are not necessarily contributing factors to your problem. You must carefully investigate and decipher the events that occur before the subsequent system problem.

You may be experiencing more than one problem. You must solve one problem at a time. Log (document) all testing and problem isolation procedures. You may need to review and consult these notes later. This will also prevent you from duplicating your testing efforts.

Once you have isolated the problem, take the necessary steps to resolve it. Refer to the problem solutions contained in this chapter. If your system's problem persists, contact Parker Compumotor's Applications Department at (800) 358-9070.

**WARNING**

**Be sure to remove power before disconnecting JSI system components or changing wiring.**

**CW, CCW & Home Switches** If you are having problems using the Trigger (TR), Home (GH), CW, CCW and Sequence Select inputs, you must first check your wiring for proper installation. Use an Ohm meter for proper connection of the switches and inputs. If the hardware connection seems correct, you must use the Input Status (IS) command to report the hardware status of each input and see if the JSI recognizes the input change. You may do this by changing the input state manually and issue the IS command. If the status does not change, check the hardware settings.

**Remote Sequencing (BCD Inputs)** If you are trying to run sequences from BCD interfaces, the first thing you must verify is the hardware interface. Use the Ohm meter to verify proper wiring. Then use the IS command to read the status of the inputs. Change the input setting and check the Input Status (IS) again to make sure that the JSI recognized the change in the sequence select input. Make sure that your BCD input is calling the proper sequences. Check Chapter 4, *Application Design*, for the Sequence Select Table. If you have a problem running a sequence from the remote input, try running the sequence using the XR command before attempting to run it using BCD input.

**Diagnostic Codes Table** The two-digit LED flashes an error code if any type of error occurs. You can also light the LEDs with the LED command.

The following table lists the error codes and the explanation of each error code. The symptoms and solutions table shows how you can try to correct these error conditions.

CONDITION	LED DISPLAY CODE
BLANK	NO ERRORS
16	AMPLIFIER OFF
20	EXCESSIVE POSITION ERROR
23	DRIVE ENABLE NOT ACTIVE
30	EEPROM CHECKSUM ERROR
41	CW LIMIT SWITCH ENGAGED
42	CCW LIMIT SWITCH ENGAGED
43	CW SOFTWARE LIMIT ENGAGED
44	CCW SOFTWARE LIMIT ENGAGED
60	COMMANDED SHUTDOWN

Table 7-2. Diagnostic Codes Table

**RS-232C  
Problems**

If you are having problems communicating with the JSI, try the following procedure to troubleshoot the communications interface.

1. Power-up your computer or terminal *and then* power-up the JSI.
2. The serial port of your computer/terminal may require handshaking. If so, you must disable handshaking with your terminal emulator software package. You can also disable handshaking by connecting the computer's/terminal's RTS to CTS (usually pins 4 and 5) and DSR to DTR (usually pins 6 to 20).
3. Verify that the computer/terminal and 500 are configured to the same baud rate, number of data bits, number of stop bits, and parity.
4. Check to make sure you are using DC common or signal ground as your reference, not earth ground.
5. Cable lengths should not exceed 50 ft. unless you are using some form of line driver, optical coupler, or shield. As with any control signal, be sure to shield the cable to earth ground at one end only.
6. Press the space bar several times. The cursor should move one space each time you press the space bar. If your terminal displays garbled characters, check the terminal's protocol set-up. The baud rate setting probably does not match the JSI's setting.
7. If the terminal does not display garbled characters, press the space bar several times. If the cursor does not move, disconnect the RS232 plug from the 500 and measure the cable's continuity. If you do not measure > -3V on Pin 1 (Rx) to Pin 3 (GND), your cable is wired incorrectly or your terminal is broken. If you measure > -3V on Pin 2 (Tx) to Pin 3 (GND), then switch the JSI's transmit (Tx) and receive (Rx) wires and try this test again.
8. Once you are able to make the cursor move, enter some characters. These characters should appear on the computer or terminal display. If each character appears twice, your host is set to half-duplex. It should be set to full-duplex.

**Reducing  
Electrical Noise**

Try to eliminate sources of possible noise interference. Potential noise sources include inductive devices such as solenoids, relays, motors, and motor starters operated by a hard contact.

For more information on identifying and suppressing electrical noise, refer to the Technical Data section of the *Compumotor Programmable Motion Control Catalog*.

**Returning the  
System**

If you must return your JSI system to affect repairs or upgrades, use the following steps:

1. Get the serial number and the model number of the defective unit, and a purchase order number to cover repair costs in the event the unit is determined by the manufacturers to be out of warranty.

- 2 Before you return the unit, have someone from your organization with a technical understanding of the JSI system and its application include answers to the following questions:
  - What is the extent of the failure/reason for return?
  - How long did it operate?
  - Did any other items fail at the same time?
  - What was happening when the unit failed (i.e., installing the unit, cycling power, starting other equipment, etc)?
  - How was the product configured (in detail)?
  - What, if any, cables were modified and how?
  - With what equipment is the unit interfaced?
  - What was the application?
  - What was the system environment (temperature, enclosure, spacing, unit orientation, contaminants, etc.)?
  - What upgrades, if any, are required (hardware, software, user guide)?
- 3 In the USA, call Parker Compumotor for a Return Material Authorization (RMA) number. Returned products cannot be accepted without an RMA number. The phone number for Parker Compumotor Applications Department is (800) 358-9070.

Ship the unit to:           Parker Hannifin Corporation  
                                  Compumotor Division  
                                  5500 Business Park Drive  
                                  Rohnert Park, CA 94928  
                                  Attn: RMA # xxxxxxxx
- 4 In the UK, call Parker Digiplan for a GRA (Goods Returned Authorization) number. Returned products cannot be accepted without a GRA number. The phone number for Parker Digiplan Repair Department is 0202-690911. The phone number for Parker Digiplan Service/Applications Department is 0202-699000.

Ship the unit to:           Parker Digiplan Ltd.,  
                                  21, Balena Close,  
                                  Poole,  
                                  Dorset,  
                                  England.  
                                  BH17 7DX
- 5 Elsewhere: Contact the distributor who supplied the equipment.