

# Controller Diagnostics

---



## CAUTION

**The controller cannot be repaired in the field. If a unit fails, do not disassemble it. Return it to the factory for replacement.**

### Status LED

The yellow Status LED on the controller, Figures 5 & 6, blinks in various patterns to indicate the controller status.

#### Normal Operation

The Status LED blinks on and off rapidly.

#### Keypad Not Connected

If the controller is powered without a keypad connected, the LED blinking pattern will be “off” for one second, followed by four quick “on” blinks.

#### Internal Errors

If the LED blinking pattern is “on” for a second, followed by one or more quick blinks “off,” the controller is experiencing internal errors. The specific error is indicated by the number of “off” blinks:

**One “Off” Blink**—Corrupt RAM

**Two “Off” Blinks**—Checksum error indicating EPROM corruption.

**Three “Off” Blinks**—System error.

**Four “Off” Blinks**—System error.

If any of the above four patterns occur, power cycle the control. If the pattern occurs again, remove the controller from service and return it to the factory.

**Five “Off” Blinks**—Internal error; possibly noise problems.

**Six “Off” Blinks**—Internal error; possibly noise problems.

If either of these two patterns occur, check for loose connections and fix any obvious noise problems. If the problem persists, remove the controller from service and return it to the factory.

# Keypad Diagnostics

## CAUTION

The keypad cannot be repaired in the field. If a unit fails, do not disassemble it. Return it to the factory for replacement.

### Keypad Fault LED

If the Fault LED on the keypad lights, turn the controller off and back on. If the keypad Fault LED does not go off, the keypad microprocessor has malfunctioned. Return the keypad to the factory.

### Keypad Diagnostics

The 6400 Keypad includes a series of diagnostics that show the status of various keypad functions. To start the diagnostics, turn the controller off, then restart the controller while pressing any key on the keypad.

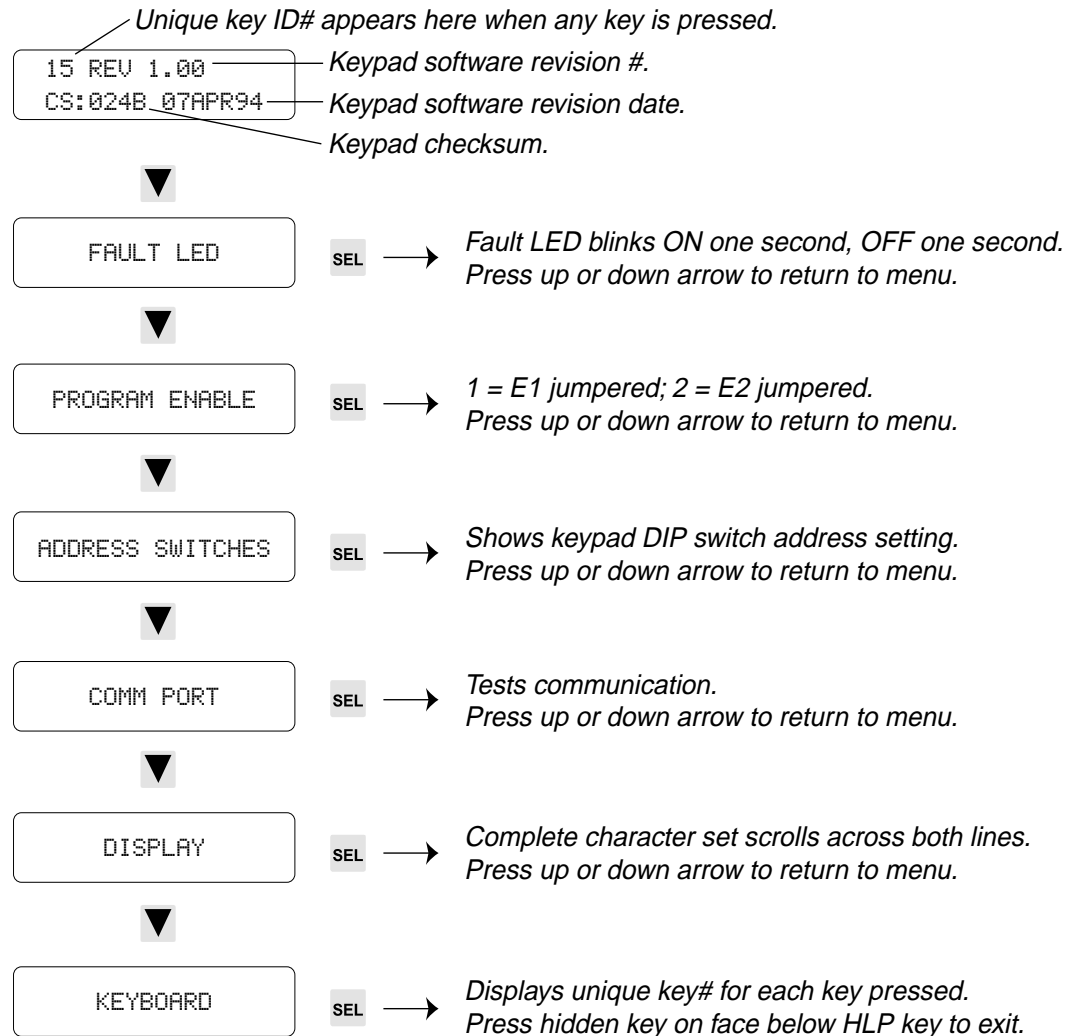
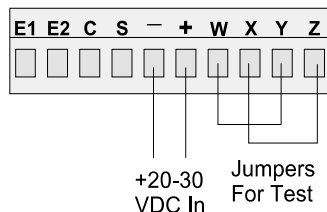


Figure 40—Keypad Communications Port Test Setup

### Keypad Terminal Block



When the COMM PORT diagnostic is run with keypad terminals W, X, Y, and Z jumpered as shown, a string of “plus” signs will scroll across the display. When either jumper is removed, the scrolling will stop.

# Keypad Error Messages

---

The following PL-1746 error messages will assist in troubleshooting:

<b>Error Message:</b>	<b>Description:</b>
Comm Failure Host to Keyboard	Occurs when there is a communication time out between keypad/display and controller card. <b>Solution:</b> <i>Press the ESC key to clear the error. If error re-occurs, check connections between keypad and controller.</i>
Resolver not connected	Bad or no connection to resolver detected. <b>Solution:</b> <i>Press the ESC key to clear the error. Check connections between the resolver and controller.</i>
Flash Checksum Error	The system firmware has become corrupted and the system has shut down. <b>Solution:</b> <i>Press the ESC key to clear the error. If error re-occurs, consult factory.</i>
Configuration Checksum Error	The configuration information is corrupted and default values have been loaded. <b>Solution:</b> <i>Press the ESC key to clear the error. If error re-occurs, consult factory.</i>
Pulse Checksum Error	The pulse information is corrupted and all setpoint information has been removed. <b>Solution:</b> <i>Press the ESC key to clear the error. If error re-occurs, consult factory.</i>
Rack Link Failure	Either the communication interface between the controller and the rack has been broken or the rack has failed. <b>Solution:</b> <i>Press the ESC key to clear the error. If error re-occurs, consult factory.</i>
Watchdog Timer Time-out	The system watchdog timer has timed out and reset the system. <b>Solution:</b> <i>Press the ESC key to clear the error. If error re-occurs, consult factory.</i>
SLC-500 Bus time-out	The SLC-500 backplane bus access timer has timed out. <b>Solution:</b> <i>Press the ESC key to clear the error. If error re-occurs, consult factory.</i>
Operator Enable Minimum	There was an attempt to adjust a setting without at least the operator enable hardware, or password. <b>Solution:</b> <i>Press the ESC key to clear the error. Enter the operator enable code, or add the hardware.</i>
Function not enabled for Operator Use	There was an attempt to adjust a function to which the operator has not been given access. <b>Solution:</b> <i>Press the ESC key to clear the error. Use a higher level of programming enable (setup, master) to access the function. Or have a master set the enable options feature to give the operator access to the function.</i>
Channel not enabled for Operator Use	There was an attempt to adjust a channel, at operator level, to which the operator has not been given access. <b>Solution:</b> <i>Press the ESC key to clear the error. Use a higher level of programming enable (setup, master) to access the function. Or have a master set the enable options feature to give the operator access to the function.</i>
Not allowed while running	There was an attempt to change a programmed item that can only be changed while the transducer is stationary. <b>Solution:</b> <i>Press the ESC key to clear the error. Stop motion of the transducer and change the programmed item.</i>

## Keypad Error Messages (Cont'd)

---

Error Message:	Description:
Too many Speed Compensated chns.	The maximum number of speed compensated channels have already been programmed. <b>Solution:</b> <i>Press ESC key to clear the error.</i>
Too many Timed Outputs	The maximum number of timed outputs have been used. <b>Solution:</b> <i>Press ESC key to clear the error.</i>
A Group is in Mode 1 or Mode 2: Can't go to ONE:	There are groups that are in modes that affect the offset of the group. Cannot change Group Position Display to ONE offset for all groups. <b>Solution:</b> <i>Press ESC key to clear the error.</i>
Can't change # of Channels in Last Group.	There was an attempt to change the number of channels in the last group. The last group receives all remaining channels available in the controller. <b>Solution:</b> <i>Press ESC key to clear the error.</i>
Mode Cannot be 1 or 2 if Group Position Display in ONE	There was an attempt to set a group to mode 1 or 2 when the Group Position Display is set to ONE. <b>Solution:</b> <i>Press ESC key to clear the error. Change the Group Position Display to "EACH".</i>
Keypad RS-485 Link Was Broken.	Check for Loose Wires. One of the wire connections from the controller to keypad has experienced an intermittent connection or maintained an open connection. <b>Solution:</b> <i>Press ESC key to clear the error. Check to make sure cable connections are securely plugged in. Check wires going into connectors for broken wires or loose connections. Check for continuity between connectors while flexing the cable to check for intermittent connections.</i>
Too Many Setpoints	There was an attempt to program in another setpoint after the maximum number of setpoints were already in the controller. <b>Solution:</b> <i>Press ESC key to clear the error.</i>
Value out of limit	A number was entered that exceeds allowable limits for the item being programmed. Some examples are: A setpoint value that exceeds the scale factor, a channel number that exceeds the number of channels available, a program number higher than is allowed by the controller, etc. <b>Solution:</b> <i>Press ESC key to clear the error and re-enter a value that is within the limits of the parameter.</i>
Pulse will overlap another pulse in the same channel	There was an attempt to program a pulse that has either an ON or OFF point overlapping an existing pulse in the channel. <b>Solution:</b> <i>Press ESC key to clear the error. Review the existing setpoints to determine the cause of the overlap condition and re-enter values.</i>
I/O Power Fail	This indicates that the power supply for the isolated circuitry and rack has failed. <b>Solution:</b> <i>Press ESC key to clear the error. Check power source and connections to I/O rack power input.</i>

# Resolver Troubleshooting

## Mechanical Problems

If the resolver is generating erratic RPM or position readings, or the position appears to be shifting periodically with respect to the machine cycle, check the mechanical coupling between the resolver and the machine.

If the coupling is not slipping, loosen the coupling and rotate the resolver shaft in both directions with sudden, jerky motions. If the controller displays unusual position or RPM readings, the resolver may be need to be replaced.

### **IMPORTANT**

**Resolvers cannot be repaired in the field. If a unit fails, do not disassemble it. Return it to the factory for replacement.**

## Electrical Problems

Page 2-18 shows the wiring diagrams for Electro Cam Corp. resolvers and cables. If any wire in one of the three individually shielded pairs becomes disconnected, the following error message will appear on the keypad/display:

```
ERROR: RESOLVER  
NOT CONNECTED
```

The output channels will immediately be disabled until the resolver is re-connected. Press ESC to clear the error message.

**Note that ESC will clear the message and restore access to keypad programming even if the resolver has not been re-connected.**

Follow this procedure to troubleshoot electrical problems:

1. Verify that the electrical connections at each end of the resolver cable are secure.
2. Disconnect the cable at the controller. Measure the resistances between all wires on the terminal block. The paired wires should have the resistances shown in the table below, while the resistance between every other combination of wires should be infinite. If the resistances are correct, the controller may need to be replaced.
3. If the resistances in Step 2 are incorrect, the problem may be in the cable or in the resolver. Disconnect the cable at the resolver and measure the resistances at the resolver pins. If the resistances are correct, the cable is bad. If the resistances are wrong, the resolver should be replaced.

<u>Wire Pair</u>	<u>Resistance</u>	<b>OR</b>	<u>Resistance</u>
White/Black	15 to 25 Ohms		60 to 85 Ohms
Red/Black	20 to 40 Ohms		135 to 185 Ohms
Green/Black	20 to 40 Ohms		135 to 185 Ohms

**NOTE:** The resolver resistance will fall into one set of ranges or the other, depending on the date of manufacture.

## General Troubleshooting



### IMPORTANT

The controller and keypad cannot be repaired in the field. If a unit fails, do not disassemble it. Return it to the factory for replacement.

<b>Problem</b>	<b>Possible Solution</b>
Controller & keypad dead.	<ol style="list-style-type: none"><li>1. Check main fuse shown in Figs. 5 &amp; 6.</li><li>2. Check power supply to controller.</li></ol>
Keypad dead, but controller LED's are on.	<ol style="list-style-type: none"><li>1. Check wiring between keypad and controller, Figure 12.</li></ol>
Keypad Fault LED "On"	<ol style="list-style-type: none"><li>1. Keypad microprocessor has malfunctioned. Turn the controller off and back on. If the keypad Fault LED does not go off, return the keypad to the factory.</li></ol>
Menu operation Slow on keypad display	<ol style="list-style-type: none"><li>1. Check KEYBOARD QTY programming. If it is set for two keypads, but only one is connected, menu operation will be very slow.</li></ol>
Power up is Slow	<ol style="list-style-type: none"><li>1. When more than one keypad/display is attached to one controller, some power supplies will take longer to come up (i.e., Condor HB24-1.2-A+).</li></ol>
COMM FAILURE—HOST TO KEYBOARD message	<ol style="list-style-type: none"><li>1. This message may flash briefly on power-up under normal conditions.</li><li>2. If the message persists, check keypad wiring connections at keypad and controller, Figure 12.</li><li>3. Check DIP switch settings, Figures 13 &amp; 14.</li><li>4. While performing processor-intensive programming tasks such as recalculating many setpoints due to a change in SCALE FACTOR, or creating many setpoints through PULSE COPY, the controller may briefly lose contact with the keypad. Once the calculations are complete, contact will be re-established. Press ESC to clear any remnants of the error message.</li></ol>
Programming functions not accessible.	<ol style="list-style-type: none"><li>1. Programming not enabled. See Figure 12, and also ENABLE CODES for details.</li></ol>
ERROR: RESOLVER NOT CONNECTED message	<ol style="list-style-type: none"><li>1. Resolver or resolver cable may have failed. See Resolver Troubleshooting, pg. 7-3.</li></ol>
ERROR: WD RESET message	<ol style="list-style-type: none"><li>1. This indicates that the watchdog timer has timed out. To clear, turn power to keypad OFF and ON. If this doesn't help, keypad is probably defective.</li></ol>
POS (position) moves opposite to machine direction.	<ol style="list-style-type: none"><li>1. Check INCREASING DIR for the correct direction of rotation.</li><li>2. Check resolver wiring.</li></ol>
POS (position) does not match machine position.	<ol style="list-style-type: none"><li>1. Verify that OFFSET is correct. Once set, the offset value should not change. If it does, check the resolver coupling to be sure it is not loose. Also see "Resolver Troubleshooting," page 7-3.</li></ol>
Serial communications not working	<ol style="list-style-type: none"><li>1. Check COMMUNICATIONS programming to be sure type, baud rate, and address are correctly set.</li><li>2. Be sure the DIP switches for the PL<math>\mu</math>S-to-host communications are set correctly as shown in Figure 13.</li><li>3. Check communication cable wiring, Figure 15.</li></ol>
Outputs cycling regularly at incorrect machine positions	<ol style="list-style-type: none"><li>1. Check that the correct program number is active.</li><li>2. Check the setpoints of the output(s) in question. Also check SPEED COMP settings.</li><li>3. Verify that OFFSET is correct.</li></ol>

## General Troubleshooting (cont'd)

Erratic Operation	<ol style="list-style-type: none"> <li>1. Run the Watchdog Timer test described under MEMORY TESTS in the programming section of this manual.</li> <li>2. See Resolver Troubleshooting page 7-5.</li> </ol>
Analog output not working.	<ol style="list-style-type: none"> <li>1. Check that ANALOG QTY and ANALOG OUTPUT are programmed correctly.</li> <li>2. Check that analog output module is located in the correct module position. See Figure 5 or 6.</li> <li>3. Check correct wiring of analog output.</li> <li>4. Verify that analog load device is within specifications for the analog module.</li> <li>5. Try a different analog output module.</li> </ol>
Some transistor outputs not working	<ol style="list-style-type: none"> <li>1. Check that the correct program number is active.</li> <li>2. Use OUTPUT STATUS to see if the controller is activating the output(s) at the correct position in the resolver revolution. If not, verify that the SETPOINTS are correctly programmed. Other programming that may prevent an output from energizing includes MOTION ANDING and OUTPUT ENABLE ANDING.</li> <li>3. If OUTPUT STATUS shows the output is on, use a meter to see if the output terminal is energized. If so, check the load device and its wiring. If not, go to Step 4.</li> <li>4. Check the transistor array chips, Figure 17.</li> </ol>
All transistor outputs not working	<ol style="list-style-type: none"> <li>1. Check that the correct program number is active.</li> <li>2. Use OUTPUT STATUS to see if the controller is activating the output(s) at the correct position in the resolver revolution. If not, verify that the SETPOINTS are correctly programmed. Other programming that may prevent an output from energizing includes MOTION ANDING and OUTPUT ENABLE ANDING.</li> <li>3. If OUTPUT STATUS shows the output is on, use a meter to see if the output terminal is energized. If so, check the load device and its wiring. If not, check the transistor output fuse, Figure 18. Use the fuse tester built into the controller, Figure 17.</li> <li>4. Check that 10-30 VDC power is connected to TB 11, Figure 10 &amp; 11.</li> </ol>
AC/DC module not working	<ol style="list-style-type: none"> <li>1. Check that correct program number is active.</li> <li>2. Use OUTPUT STATUS to see if the controller is activating the output(s) at the correct position in the resolver revolution. If not, verify that the SETPOINTS are correctly programmed. Remember that AC/DC output modules are controlled by Channels 17-25 (1-17 on M17). Other programming that may prevent an output from energizing includes MOTION ANDING and OUTPUT ENABLE ANDING and TIMED OUTPUTS.</li> <li>3. If OUTPUT STATUS shows the output is on, but the LED on top of the module does not light, try replacing the module.</li> <li>4. If the LED on the module lights but the output terminal does not energize, check the fuse built into the top of the module. Use the fuse tester built into the controller, Fig. 17.</li> <li>5. Check that load power is present in the circuit and correctly wired. Remember that modules do not supply power to loads; they simply switch the load circuit on and off.</li> </ol>

## Fuse Part Numbers

<u>Fuse</u>	<u>Description</u>	<u>Mfct. Part #</u>	<u>Electro Cam Part #</u>
<b>Main Fuse</b> (Figs. 5 & 6) .....	1-1/4 Amp Slo-Blo Glass ....	Bussman MDL-1-1/4 .....	PS-9000-4114
<b>Module Fuse</b> .....	4 Amp TR-5 .....	Wickmann 19370-062 .....	PS-9005-0004
<b>Input Fuse</b> (Fig. 17) .....	250 mA TR-5 .....	Wickmann 19372-035 .....	PS-9005-0250
<b>Output Transistor Fuse</b> (Fig. 17) .....	1 Amp TR-5 .....	Wickmann 19370-048 .....	PS-9005-0001