

BankGuard PLUS™ ***Control***

Troubleshooting Instructions



S&C Electric Company
6601 North Ridge Blvd.
Chicago, Illinois 60626 USA

Instruction Sheets Include:

Product Description	1011-500 explains important product features.
Installation	1011-510 describes how to install and connect the BankGuard PLUS Control.
Setup	1011-530 describes how to use the Setup software to configure the BankGuard PLUS Control, check the present settings, and view real-time data.
Operations	1011-540 describes how to view historical data, how to generate reports, and how to update the Control software. This instruction sheet also explains how the BankGuard PLUS Control works during normal operation.
Troubleshooting	1011-550 describes how to diagnose and correct various BankGuard PLUS Control problems.

Latest Release of This Document

The latest release of this instruction sheet is available online at www.sandc.com.

Select: Support/ Product Support Documents. Documents are posted in PDF format.

Safety Information

 **WARNING** 

The equipment covered by this publication must be installed, operated, and maintained by qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead electric power distribution equipment along with the associated hazards. A qualified person is one who is trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from non-live parts of electrical equipment.
- The skills and techniques necessary to determine the proper approach distances corresponding to the voltages to which the qualified person will be exposed.
- The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment.

These instructions are intended only for such qualified persons. They are *not* intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

Read this Instruction Sheet

Thoroughly and carefully read this instruction sheet before programming, operating, or maintaining your S&C BankGuard PLUS Control. Familiarize yourself with “SAFETY INFORMATION” on pages 3 through 5.

Retain this Instruction Sheet

This instruction sheet is a permanent part of your BankGuard PLUS Control. Designate a location where you can easily retrieve and refer to this publication.

Warranty

The standard warranty contained in S&C’s standard conditions of sale, as set forth in Price Sheet 150, is applicable to the BankGuard PLUS Control.

Understanding Safety-Alert Messages

There are several types of safety-alert messages which may appear throughout this instruction sheet as well as on labels attached to the BankGuard PLUS Control. Familiarize yourself with these types of messages and the importance of the various signal words, as explained below.

DANGER

“DANGER” identifies the most serious and immediate hazards which *will likely* result in serious personal injury or death if instructions, including recommended precautions, are not followed.

WARNING

“WARNING” identifies hazards or unsafe practices which *can* result in serious personal injury or death if instructions, including recommended precautions, are not followed.

CAUTION

“CAUTION” identifies hazards or unsafe practices which can result in minor personal injury or product or property damage if instructions, including recommended precautions, are not followed.

⚠ NOTICE ⚠

“NOTICE” identifies important procedures or requirements that, if not followed, can result in product or property damage if instructions are not followed.

Following Safety Instructions

If you do not understand any portion of this instruction sheet and need assistance, contact your nearest S&C Sales Office or call S&C Headquarters at (773) 338-1000, Monday through Friday between 8:30 AM and 5:00 PM Central Standard Time. (In Canada, call S&C Electric Canada Ltd. at (416) 249-9171.)

⚠ NOTICE ⚠

Thoroughly and carefully read this instruction sheet before programming and operating your S&C BankGuard PLUS Control.

Replacement Instructions and Labels

If you need additional copies of this instruction sheet, contact your nearest S&C Sales Office, S&C Headquarters, or S&C Electric Canada Ltd.

It is important that any missing, damaged, or faded labels on the equipment be replaced immediately. Replacement labels are available by contacting your nearest S&C Sales Office, S&C Headquarters, or S&C Electric Canada Ltd.

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Introduction

This instruction sheet describes how to troubleshoot problems that can occur during setup and operation of the BankGuard PLUS Automatic Control Device, including:

- The tools normally used for troubleshooting (page 7)
- Power problems (page 8)
- LCD and LED problems (page 8)
- IntelliLINK software error messages (page 9)
- Incorrect real-time data (page 11)
- Communications and switching problems (page 11)
- Using the faceplate buttons and LCD to diagnose problems (page 12)
- Using the *Operation* and *Product Information* screens to diagnose problems (page 13)

Applicable Software

This instruction sheet was prepared for use with software **UPPD105S** or later releases.

You can find the release date on the Setup disk label. For questions regarding the applicability of information in this instruction sheet to future software releases, please contact S&C.

 **WARNING** 

These instructions do NOT replace the need for utility operation standards. Any conflict between the information in this document and utility practices should be reviewed by appropriate utility personnel and a decision made as to the correct procedures to follow.

Serious risk of personal injury or death may result from contact with electric distribution equipment when electrical isolation and grounding procedures are not followed. The equipment described in this document must be operated and maintained by qualified persons who are thoroughly trained and understand any hazards that may be involved. This document is written only for such qualified persons and is not a substitute for adequate training and experience in safety procedures for accessing high voltage equipment.

This control is connected to capacitors operating at primary voltage levels. High voltage may be present in the wiring to the control or the control itself during certain failures of the capacitor bank wiring or grounding system, or due to a failure of the capacitor bank itself. For this reason, access to the control should be treated with the same safety precautions that would be applied when accessing other high voltage lines and equipment. Follow all locally-approved safety procedures when working on or around this control.

Before attempting to access an existing switch installation, check carefully for visible or audible signs of electrical or physical malfunction (do this *before* touching or operating the control or any other part of the installation). These warning signs include such things as smoke, fire, open fuses, crackling noises, loud buzzing, etc. If a malfunction is suspected, treat all components of the installation, including the control and associated mounting hardware, as if they were elevated to primary (high) voltage.

Troubleshooting Overview

All the following tools and BankGuard PLUS features are used to diagnose and correct BankGuard PLUS problems.

LCD

The LCD on the BankGuard PLUS faceplate provides information about the present state of the control. (For an explanation of the faceplate and the LCD, see *The Control Device Hardware Components and Faceplate* in the *Operations* Instruction Sheet 1011-540.)

IntelliLINK Software

The IntelliLINK software *Operation* and *Product Information* screens display information about the BankGuard PLUS control device.

Electrical Interconnect Diagrams

The electrical interconnect diagrams in *Appendix B* show the BankGuard PLUS wiring layout.

Hardware Tools

To correct a problem, you may need one or more of the following tools:

- Multimeter
- 4" long, #2 Phillips screwdriver
- 4" long, 1/4"-blade screwdriver

<p>NOTE: If the suggested troubleshooting steps do not resolve the problem, call S&C Electric Company at (510) 864-6850.</p>

Power Problems

POWER SUPPLY ON/OFF button is not illuminated

Check for AC power to the control device. Following utility-approved work procedures and safety practices, verify that there is 120 VAC in the line which provides AC power to the control device.

LCD and LED Problems

LCD is blank

- A. **Check for AC/DC control power to the control device.** Following utility-approved work procedures and safety practices, verify that there is voltage of the correct magnitude on the line which provides power to the control device.
- B. **Replace the LCD.** There may be a problem with the PC board (including LCD) or the operating system; call S&C Electric Company.

LOCKOUT INDICATOR LED does not come ON during a lockout condition

- A. **Check the LCD.** If it is not operating normally, see *LCD is blank*.
- B. **Do a lamp test.** Scroll the LCD to display [**Lamp Test**]. If the LED does not turn ON but the other LEDs do, the LED is probably bad. If none of the LEDs turn ON, see *LCD is blank*.
- C. **Check the “Lockout Level” and “Lockout Time Delay” setpoints.** The control device may not be set to lock out the bank/reactor as expected. (See the *Setup* Instruction Sheet 1011-530 for details on setting these setpoints.)

ALARM INDICATOR LED does not come ON during an alarm condition

- A. **Check the LCD.** If it is not operating normally, see *LCD is blank*.
- B. **Do a lamp test.** Scroll the LCD to display [**Lamp Test**]. If the LED does not turn ON but the other LEDs do, the LED is probably bad. If none of the LEDs turn ON, see *LCD is blank*.
- C. **Check the “Alarm Level” and “Alarm Time Delay” setpoints.** The control device may not be set to indicate an alarm as expected. (See the *Setup* Instruction Sheet 1011-530 for details on setting these setpoints.)

LCD Displays “Setup Password = 0000” and does not enter the Setup Mode

The password feature has been enabled and a password is required before the Setup Mode is enabled. (See Setup Instruction Sheet 1011-530 for details.)

Software Troubleshooting and Error Messages

Each S&C control has a unique control software installed at the factory. This installation diskettes supplied with each control contain the IntelliLINK® program, which is used to setup and monitor S&C controls. The installation diskettes are used to install the IntelliLINK program on your PC computer along with files that are unique to the type of control they are supplied with (BankGuard PLUS™ Control Device, IntelliCAP® Capacitor Control, etc.). Therefore, the installation diskettes for each type of control that you use should be installed on your computer. When the proper installation diskettes have been installed, the IntelliLINK program will automatically determine and connect to the control type that you are accessing with your computer.

“Incompatible Ident”

The IntelliLINK software uses a different screenset (WMN file) for each type of control and normally selects the screenset for you. This message appears when you have a screenset selected (displayed) and try to connect to a snapshot (VM file) that requires a different screenset.

Use the correct screenset. To close the open screenset, choose File > Close Screenset. Then choose File > Open Snapshot. In the Open Controller Data File dialog box, select the snapshot you want to view, then click OK to open both the snapshot and the correct screenset.

“IntelliLINK setup incorrect or incomplete”

Reinstall the IntelliLINK software on your computer. There may be a problem with one of the files. (See *To Install the IntelliLINK Software* in the *Setup* Instruction Sheet 1011-530 for details.)

“Opening port COM1....Trying 9600 BAUD....Connection Failed”

These messages appear in the Connect dialog box when the IntelliLINK software in your computer cannot establish communication with the software in the control device.

- A. **Check that the control device has power.** If the LCD is blank, the control device has no power and cannot communicate with your portable computer. See *LCD is blank* on page -8.
- B. **Check the cable connections between your computer and the control device.** Check that you plugged your serial cable into the **LOCAL** port on the faceplate. Check that you plugged the cable into the correct port on your computer (usually COM1 on portable computers).
- C. **Try another communications port.** The COM1 port on the computer may be broken or assigned to a different device. Connect the cable to another comm port on your computer. In the Connect dialog box, click the Change Setup button. From the pull-down list, select the name of the port where you connected the cable. Click Connect.
- D. **Use a different serial cable.** The serial cable between your computer and the control device may have a broken wire or pin. The cable may be wired for use with a different kind of computer, or it may be a null-modem cable.
- E. **Check the serial port on your computer.** If you used a 2-wire, ungrounded extension cord to power your computer or the control device during lab testing, you may have damaged the serial port on your computer. Test the serial port by trying to communicate with a modem or other serial device.

“Program in the control: XXXX... not configured for this program”

Reinstall the IntelliLINK software on your computer. Make sure that you are installing the software for this type of control device. (See *To Install the IntelliLINK Software* in the *Setup* Instruction Sheet 1011-530 for details.)

“Software in control incompatible with open screenset... cannot be established”

The IntelliLINK software uses a different screenset (WMN file) for each type of control and normally selects the screenset for you. This message appears when you have a screenset selected (displayed) and try to connect to a control device that requires a different screenset.

Use the correct screenset. To close the open screenset, click on File > Close Screenset. Then click on File > Open Screenset and choose the correct screenset for your control device. Once the screenset opens (the *Operation* screen is visible), click on Connection > Connect to Device.

“Software in control is XXXX... not properly configured for this product”

Reinstall the IntelliLINK software on your computer. There may be a problem with one of the files. (See *To Install the IntelliLINK Software* in the *Setup* Instruction Sheet 1011-530 for details.)

Incorrect Real-Time Data

Line-to-ground voltage is zero on the Operation screen

- A. **Check the applicable potential devices.** Check that the wiring is securely connected to the potential devices and to the control device. Check that the wiring is not damaged. (See the *Installation* Instruction Sheet 1011-510 for details.)
- B. **Check the power line.** Following utility-approved work procedures and safety practices, verify that voltage is present at the potential device and that the potential device is installed properly.

Miscellaneous Problems

SCADA commands are ignored by the control device

- A. **Check for control device power.** See *LCD is blank* on page -8.
- B. **Check the RTU address.** On Page 1 of the IntelliLINK software *Communications Setup* screen, check which communications RTU address is used by this control device. Make sure the SCADA master station is sending commands for this control device to the correct address.
- C. **Check the baud rate.** On Page 2 of the *Communications Setup* screen, make sure the baud rate is correct for your communications equipment. For modems, the baud rate should match the baud rate used by the SCADA master station.
- D. **Check your communications hardware.** See the appropriate *Communications Supplement* for details.

Control device does not switch properly

Check the “Lockout Level” and “Alarm Level.” See the *Setup* Instruction Sheet 1011-530 for details on setting these values.

Using the LCD and Faceplate Buttons to Diagnose Problems

You can display and compare setpoints and real-time data using the faceplate LCD and buttons. Pressing the faceplate **ESC** button returns the LCD to the **[N-G Voltage]**. (For more details, see the *Setup* Instruction Sheet 1011-530.)

UNBALANCE COMPENSATION button

Pressing the **UNBALANCE COMENSATION** button displays the following (in order):

- A newly calculated unbalance compensation magnitude value
- The unbalance compensation magnitude presently in use

◆ **IMPORTANT:** *If the control device is in setup mode*, pressing the **UNBALANCE COMENSATION** button recalculates the unbalance compensation. If you then press it a second time, the control device accepts and starts using the recalculated unbalance compensation value. To return to the **[N-G Voltage]** display *without* accepting the value, press **ESC**.

LOCKOUT LEVEL button

Pressing the **LOCKOUT LEVEL** button displays the following (in order):

- “Lockout Level” setpoint
- “Lockout Time Delay” setpoint
- Comparison between the “Lockout Level” setpoint and the “N-G/Unbalance Voltage” value
- Comparison between the “Gross Overvoltage Level” setpoint and the “N-G/Unbalance Voltage” value

ALARM LEVEL button

Pressing the **ALARM LEVEL** button displays the following (in order):

- “Alarm Level” setpoint
- “Alarm Time Delay” setpoint
- Comparison between the “Alarm Level” setpoint and the “N-G/Unbalance Voltage” value
- Comparison between the “Gross Overvoltage Level” setpoint and the “N-G/Unbalance Voltage” value

ENTER button

Pressing the **ENTER** button while the control device is in display mode tests the faceplate LEDs (all LEDs turn ON for 2 seconds).

Using IntelliLINK Software to Locate Problems

The IntelliLINK software *Operation* and *Product Information* screens can help you check the status of the control device and locate the causes for several types of problems.

View the Operations Information

The IntelliLINK software *Operation* screen (Figure 1) displays the present status of the control device setpoint values and line-to-ground voltages.

To display the Operation screen:

Connect your computer to the control device, then double-click the IntelliLINK icon to start the IntelliLINK software (for more details, see *To Start the IntelliLINK Software* in the *Setup* Instruction Sheet 1011-530).

If the IntelliLINK software is already started, click the Operation button from any screen.

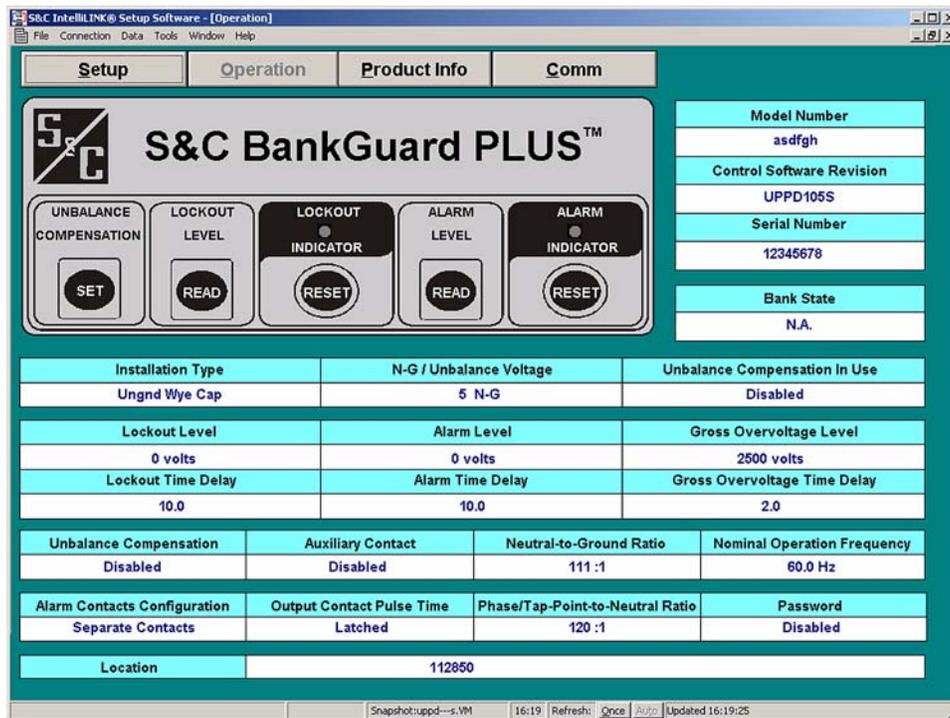


Figure 1
 Operation Screen

This screen includes the following fields:

Lockout Indicator LED and button

If this “LED” is ON, the control device has locked out the bank/reactor (based on the “Lockout Level” and “Lockout Time Delay” setpoints). To clear the LED and the lockout, click the LOCKOUT INDICATOR RESET button. Click OK.

◆NOTE: If the conditions that led to the lockout are still present, the control device will lock out the bank/reactor again after the “Lockout Time Delay” has elapsed.

Alarm Indicator LED and button

If this “LED” is ON, the control device has set a voltage alarm the bank/reactor (based on the “Alarm Level” and “Alarm Time Delay” setpoints). To clear the LED and the alarm, click the ALARM INDICATOR RESET button. Click OK.

◆NOTE: If the conditions that led to the alarm are still present, the control device will set the alarm again after the “Alarm Time Delay” has elapsed.

Model Number

This field shows the model number for this control device.

Control Software Revision

This field shows the S&C name for the Control Device software version present in this control device.

Serial Number

This field shows the serial number of this control device.

Installation Type

This is the type of installation with which this control device is used: ungrounded wye-connected shunt capacitor bank (“Ungnd Wye Cap Bank”), grounded wye-connected shunt capacitor bank (“Gnd Wye Cap Bank”), or ungrounded wye-connected shunt reactor (“Ungnd Wye Reactor”). This value is set on the *Setup* screen.

N-G/Unbalance Voltage

For ungrounded, wye-connected capacitor banks / reactors these fields display the capacitor bank neutral-to-ground voltage. The maximum voltage displayed is 65,536 Volts divided by the voltage sensor ratio. This field will display that maximum value even when voltage is above that limit. When the Installation Type is **Gnd Wye Cap** (Grounded Wye Capacitor Bank) this field displays the sum of the three intermediate-tap-point voltages (percent of unbalance) in percent.

Unbalance Compensation in Use

This field shows the present magnitude of the correction value that the control device is using to compensate for neutral-to-ground error voltages. These voltages may be

caused by system voltage imbalances and/or inherent capacitor unit variations. If the Unbalance Compensation feature is disabled, this field displays “Disabled”.

Lockout Level

This is the voltage level or tap-point voltage percent imbalance at which the control device isolates and locks out the bank or reactor after capacitor unit or reactor turn failures.

Lockout Time Delay

This is the amount of time (in seconds) that the neutral-to-ground voltage must exceed the “Lockout Level” setpoint before the control device isolates and locks out the bank or reactor.

Alarm Level

This is the voltage level or tap-point voltage percent imbalance at which the control device issues an optional alarm.

Alarm Time Delay

This is the amount of time (in seconds) that the neutral-to-ground voltage must exceed the “Alarm Level” before the control device issues an alarm.

Gross Overvoltage Level

This is the voltage level or tap-point voltage percent imbalance considered a gross overvoltage.

Gross Overvoltage Time Delay

This is the amount of time (in seconds) that the neutral-to-ground voltage must exceed the “Gross Overvoltage Level” before the control device locks out the capacitor bank or reactor.

Unbalance Compensation

This field shows whether unbalance compensation is enabled or disabled. When enabled, the options are “Cap/Line” (the control device compensates for the system voltage imbalance plus the inherent capacitor bank imbalances), or “Cap Only” (the control device compensates for inherent capacitor bank imbalances only).

Auxiliary Contact

This field displays whether the device is configured to accept an “a” or “b” contact from the capacitor bank or reactor switching device, or is disabled.

Neutral-to-Ground Ratio

This field shows the voltage ratio setting for the neutral-to-ground potential device.

Nominal Operating Frequency

This is the nominal operating frequency (in Hz) for your distribution system.

Alarm State at Power Up

When this field displays “Alarmed,” the control device issues an alarm and turns ON the **ALARM INDICATOR** LED when power returns after an outage.

The control device optionally provides one or two sets of alarm relays; each set includes one normally open relay and one normally closed relay. All alarm relays operate simultaneously.

While the control device is unpowered, the normally closed contacts are closed. When the “Alarm State at Power Up” setpoint is set to “Unalarmed” and the control device powers up, the normally closed relay contacts open. When the “Alarm State at Power Up” setpoint is set to “Alarmed” and the control device powers up, the normally closed relay contacts remain closed.

Output Contact Pulse Time

This is the amount of time (in seconds) that the control device energizes the capacitor bank/reactor switching device’s open or close circuitry (as appropriate).

Phase/Tap-Point-to-Neutral Ratio

This field shows the voltage ratio setting for the Phase line potential devices.

Password

When this field displays a 4-digit password, the control device requires a password to make changes from the faceplate.

Location

This is the location of the control device. This information (up to 100 characters) may help identify the control device to the SCADA master station operator and appears on all reports generated from the control device.

View the Product Information Screen

The *Product Information* screen (Figure 2) includes information about the hardware and software for your control.

To display the Product Information screen:

Click the Prod Info button from any IntelliLINK screen.

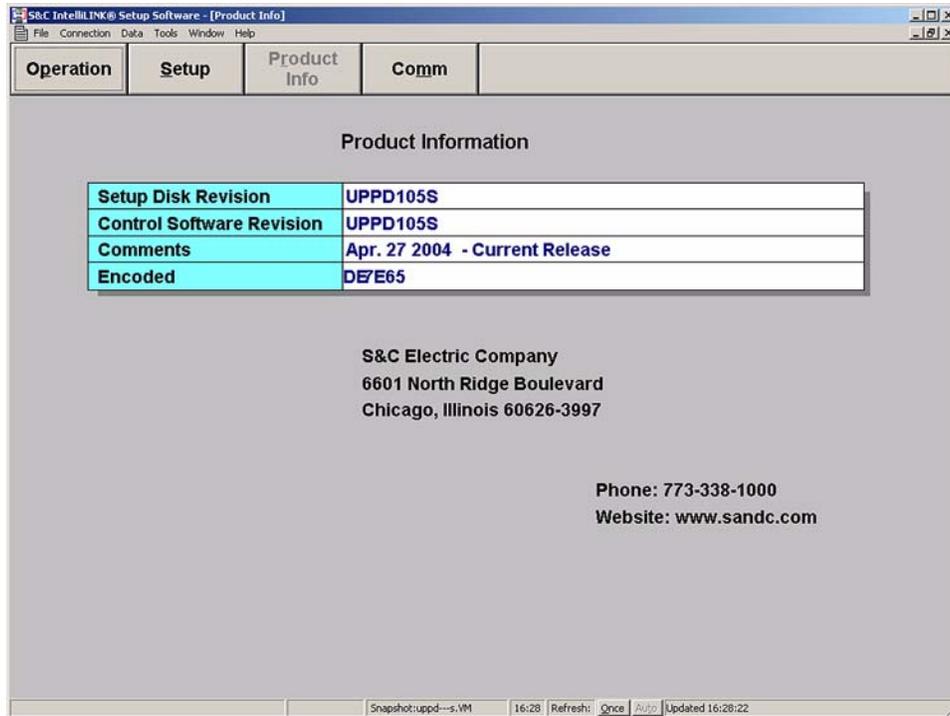


Figure 2
Product Information Screen

This screen includes the following fields:

Setup Disk Revision, Control Software Revision

Please have this information available when you call S&C Electric Company about a problem. These fields include:

- The S&C name and revision date for the IntelliLINK software version that is presently loaded into memory on your computer.
- The S&C name for the Control Device software version present in this control device.

Comments

This field includes miscellaneous information about your control and IntelliLINK software. For example, if the IntelliLINK software is older than the Control Device

software, this field includes the message “Setup Disk/Control Software Version Mismatch.” If the IntelliLINK software is newer than the Control Device software, this field includes the Control Device software’s date and the message “Obsolete Release.”

Encoded

This is a six-digit hexadecimal encoding of the name/version information for the software in the control. (This code is used by S&C staff during software troubleshooting.)

Model Number

This field shows the model number for this control device.

Serial Number

This field shows the serial number of this control device.

View the Chronological Log

The *Chronological Log* window shows a log of various troubleshooting-related events. This information may help you identify the cause of problems.

To display the Chronological Log window:

From the Data menu, choose **Event/Data Logs**, the **Select Log** dialog box will appear. Open **Data_Logs**. Select **Chronological Log**, and select **OK**. The IntelliLINK software automatically opens a browser window to display the data.

Events logged on the Chronological Log are:

- Alarm Active
- Alarm Cleared
- Bank Open
- Bank Closed
- Control Power Up
- Gross Lockout Active
- Lockout Active
- Lockout Cleared
- No Date
- Over-voltage Alarm Active
- Over-voltage Alarm Cleared
- Power Up Alarm Set