Setup

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Qualified Persons

⚠ 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 nonlive 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

NOTICE

Read this instruction sheet thoroughly and carefully before installing or operating S&C 5800 Series Automatic Switch Controls. Familiarize yourself with the Safety Information page 3. The latest version of this publication is available online in PDF format at **sandc.com/en/support/product-literature/**.

Retain this Instruction Sheet

This instruction sheet is a permanent part of your 5800 Series Automatic Switch Control. Designate a location where you can easily retrieve and refer to this publication.

Proper Application

⚠ WARNING

The equipment in this publication must be selected for a specific application. The application must be within the ratings furnished for the selected equipment.

Special Warranty Provision

The standard warranty contained in S&C's standard conditions of sale, as set forth in Price Sheets 150 and 181, applies to the S&C 6800 Series Automatic Switch Control, except that the first paragraph of the said warranty is replaced by the following:

(1) General: The seller warrants to the immediate purchaser or end user for a period of 10 years from the date of shipment that the equipment delivered will be of the kind and quality specified in the contract description and will be free of defects of workmanship and material. Should any failure to conform to this warranty appear under proper and normal use within 10 years after the date of shipment, the seller agrees, upon prompt notification thereof and confirmation that the equipment has been stored, installed, operated, inspected, and maintained in accordance with the recommendations of the seller and standard industry practice, to correct the nonconformity either by repairing any damaged or defective parts of the equipment or (at the seller's option) by shipment of necessary replacement parts. The seller's warranty does not apply to any equipment that has been disassembled, repaired, or altered by anyone other than the seller. This limited warranty is granted only to the immediate purchaser or, if the equipment is purchased by a third party for installation in third-party equipment, the end user of the equipment. The seller's duty to perform under any warranty may be delayed, at the seller's sole option, until the seller has been paid in full for all goods purchased by the immediate purchaser. No such delay shall extend the warranty period.

Replacement parts provided by the seller or repairs performed by the seller under the warranty for the original equipment will be covered by the above special warranty provision for its duration. Replacement parts purchased separately will be covered by the above special warranty provision.

For equipment/services packages, the seller warrants for a period of one year after commissioning that the 6800 Series Automatic Switch Control will provide automatic fault-isolation and system reconfiguration per agreed-upon service levels. The remedy shall be additional system analysis and reconfiguration of the IntelliTeam Automatic Restoration System until the desired result is achieved.

Warranty of the S&C 6800 Series Automatic Switch Control is contingent upon the installation, configuration, and use of the control or software in accordance with S&C's applicable instruction sheets.

This warranty does not apply to major components not of S&C manufacture, such as batteries and communication devices. However, S&C will assign to the immediate purchaser or end user all manufacturer's warranties that apply to such major components.

Warranty of equipment/services packages is contingent upon receipt of adequate information on the user's distribution system, sufficiently detailed to prepare a technical analysis. The seller is not liable if an act of nature or parties beyond S&C's control negatively affect performance of equipment/services packages; for example, new construction that impedes radio communication, or changes to the distribution system that impact protection systems, available fault currents, or system-loading characteristics.

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels attached to the 5800 Series Automatic Switch Control. Familiarize yourself with these types of messages and the importance of these various signal words:

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

"CAUTION" identifies hazards or unsafe practices that *can* result in minor personal injury if instructions, including recommended precautions, are not followed.

NOTICE

"NOTICE" identifies important procedures or requirements that *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 S&C Authorized Distributor. Their telephone numbers are listed on S&C's website **sandc.com**, or call S&C Headquarters at (773) 338-1000; in Canada, call S&C Electric Canada Ltd. at (416) 249-9171.

NOTICE

Read this instruction sheet thoroughly and carefully before installing or operating your S&C 5800 Series Automatic Switch Control.

Replacement Instructions and Labels

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

Applicable Software

This instruction sheet was prepared for use with the IntelliTeam Automatic Restoration System and 5800 Series Control software Rev. 2.23. S&C Vista® Underground Distribution Switchgear requires 5800 Series Control software Rev. 2.21.

The software-revision number is on the *Troubleshooting>Control & Switch Information* screen. For questions regarding the applicability of information in this instruction sheet to future product releases, please contact S&C Electric Company.

⚠ 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.

S&C 5800 Series Controls are connected to switchgear operating at primary voltage levels. High voltage may be present in the wiring to the switch control or in the switch control itself during certain switchgear wiring or grounding system failures, or due to a problem with the switch control itself. For this reason, access to switch controls 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 switch control or any other part of the installation). These warning signs include smoke, fire, open fuses, crackling noises, loud buzzing, etc. If a malfunction is suspected, treat all components of the installation, including the switch control and associated mounting hardware, as if they were elevated to primary (high) voltage.

Whenever you manually reconfigure the circuit (for example, during repairs), follow your company's operating procedures to disable automatic operation of the switch control. This will prevent any unexpected operation.

Hardware and Software Requirements

This is an introduction to IntelliLink Setup Software and installing it on the computer.

The following hardware and support software are required for IntelliLink software:

- A portable computer—The computer must be transportable to the switch control installation site and must have:
  - Microsoft Windows® 7 or later operating system
  - A serial or USB port
  - Access to the S&C Automation Customer Support Portal, located at this link: **sandc.com/en/support/sc-customer-portal/**
- RS232 serial cable—The straight-through (not a null-modem) cable must have a DB9 connector for the port on the switch control faceplate and a connector for the computer serial port. The cable should be long enough to reach from the switch control at the site to the computer.
- IntelliLink software installer—S&C provides several software-controlled products. Make sure the correct software is installed for this switch control. The latest versions are posted at the S&C Automation Customer Support Portal.
- IntelliLink .CFG file (optional)—Use a .CFG file to quickly enter the same setup configuration into all team members. For more information, see the "Saving and Loading a Setup Configuration" section in Instruction Sheet 1042-540, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Operation*." Make sure the correct .CFG file is available on the computer.

Software Installation

Follow these steps to install IntelliLink software on the computer:

STEP 1. Download the latest IntelliLink software installer from the S&C Automation Customer Support Portal, and save it on the desktop.

STEP 2. On the Windows **Start** menu, click on the **Run as administrator** option. The Run dialog box opens.

STEP 3. The installer will run the software installation process.

STEP 4. When installation is complete, shut down the computer or go to the next section.

Starting IntelliLink Software

This section shows how to start the IntelliLink software to access setpoint configuration or data stored in the switch control. To edit a snapshot (virtual memory file) or simply view the software without data, see the "Using Snapshots" section in Instruction Sheet 1042-540, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Operation*."

IntelliLink software can be started from the Setup Manager software to easily move back and forth between IntelliLink software and RadioShop software. For more information, see the "Starting with Setup Manager Software" section on page 7.

NOTICE

When using a two-wire, ungrounded extension cord to power either the computer or the switch control while they are connected, damage to the serial port on the computer may occur. ALWAYS use a grounded, three-wire extension cord or battery power.

Follow these steps to start the IntelliLink software:

STEP 1. Connect the computer to the switch control.

Plug the communication cable into the serial port on the computer and into the LOCAL COMMUNICATION port on the switch control faceplate.

STEP 2. Open the Windows **Start** menu and select the Start>Programs>EnergyLine>IntelliLink program to start the software.

STEP 3. Wait while the IntelliLink software attempts to open communication with the switch control.

When the IntelliLink software establishes communication with the switch control, the *Operation* screen opens. See Figure 1. Control setpoints can be configured, live data can be viewed and saved, settings can be loaded into the control, and maintenance and troubleshooting procedures can be run.

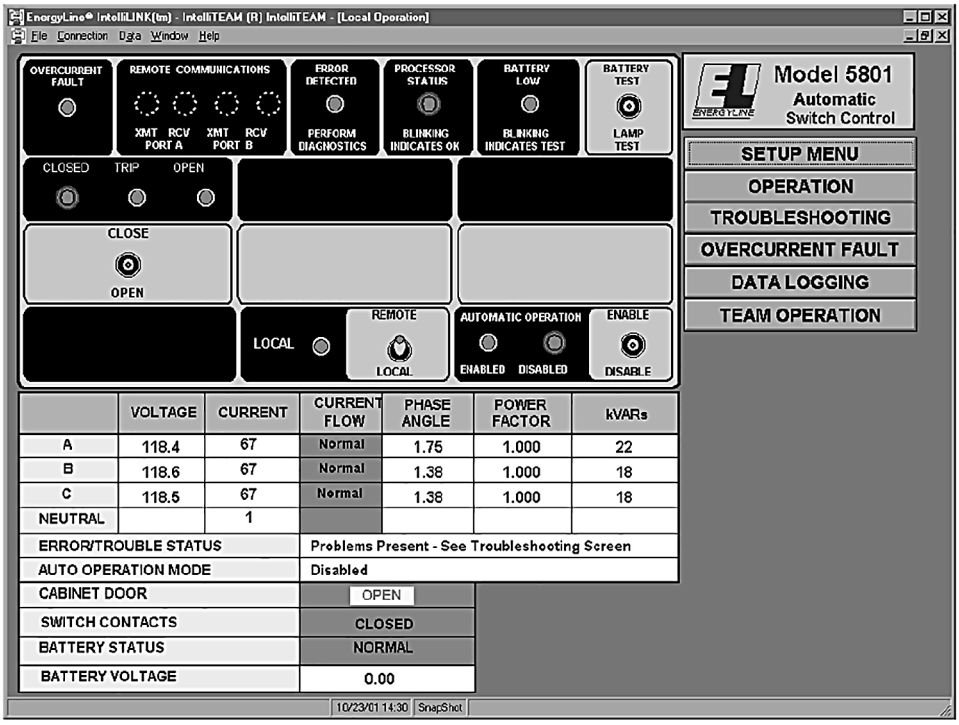


Figure 1. The *Operation* screen for a 5801 Switch Control.

Note: If the IntelliLink software does not establish communication with a functioning switch control, it displays the dialog box shown in Figure 2. When this dialog box appears or if the *Operation* screen opens but the software does not operate properly, see the "Software Troubleshooting and Error Messages" section in Instruction Sheet 1042-550, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Troubleshooting*."

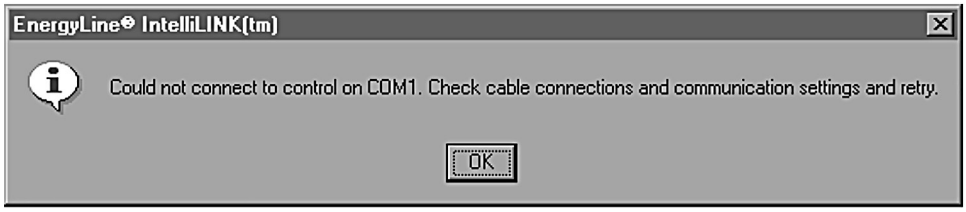


Figure 2. The dialog box displayed when IntelliLink software does not establish communication.

Starting with Setup Manager Software

Follow these steps to start IntelliLink software from inside the Setup Manager software:

STEP 1. Start the Setup Manager software.

Open the Windows **Start** menu. Then, click to open the Programs>EnergyLine> Setup Manager program.

STEP 2. In the *Setup Manager* screen, click on the **IntelliLink** tab.

STEP 3. Click on the **IntelliLink** button.

IntelliLink Software Screens

IntelliLink software includes a series of screens and dialog boxes that enable switch control configuration and have the capability to view and manage team activity.

Changing Data Values on the Screens

Follow these steps to add or change a value on a screen (for example, The *Setup>Miscellaneous* screen shown in Figure 5 on page 11):

STEP 1. Move the mouse cursor over the value to be changed. When the cursor changes to a double arrow, click the left mouse button to open a Change Value dialog box.

STEP 2. If the dialog box accepts typed input, use the keyboard to enter the new value. If the dialog box does not accept typed input, click on the Up or Down arrow to change the value, or click on the radio button for the correct value.

STEP 3. Click on the **OK** button to record the new value, or click on the **Cancel** button to exit the dialog box without changing the value.

STEP 4. Repeat this process for each value to be added or changed.

STEP 5. To view Help text for all fields on the screen, press the <F1> key.

Opening a New Screen

Click on the corresponding button in any IntelliLink screen to open a new screen. See Figure 3.

Note: The exact appearance and content of the IntelliLink screens depends on which version of software is installed. The menu tree on page 9 applies to all IntelliLink versions for 5800 Series Switch Controls with IntelliTeam software.

Figure 3. The screen selection buttons on every IntelliLink screen.

IntelliLink Software Menu Tree

Menu Tree for 5800 Series Controls with IntelliTeam Software

SETUP MENU screen

- *Setup>Miscellaneous* screen
- *Setup>Sensor* Configuration screen
- *Setup>Site-Related* screen [1 or 3 pages]
- *Setup>Fault Detection* screen
- *Setup>Automatic Operation* screen [3 pages]
- *Setup>Communications* screen [2 pages]
- *Setup>Team Configuration* screen [4 pages]

OPERATION MENU screen

- *Operation* screen [the program opens at this screen]
- *Team Operation* screen [2 pages]

TROUBLESHOOTING MENU screen

- *Troubleshooting>Event Status* screen [2 or 3 pages]
- *Troubleshooting>Chronological Log* screen [3 pages]
- *Troubleshooting>Control & Switch Information* screen
- *Troubleshooting>Switch Operations* screen
- *Troubleshooting>Battery System* screen
- *Troubleshooting>Communications* screen
- *Troubleshooting>Various Counters* screen [2 pages]

OVERCURRENT FAULT MENU screen

- *Overcurrent Fault>Fault Events* screen [4 pages]
- *Overcurrent Fault>Fault Magnitudes* screen [1 or 2 pages]
- *Overcurrent Fault>AC Power Outages* screen

DATA LOGGING MENU screen

- *Data Logging>Daily Highs and Lows for Today* screen
- *Data Logging>Daily Highs and Lows - Most Recent Week* screen [7 pages]

When configuring a switch control and team for normal operation, carry out the series of steps outlined in the Team Setup Procedure flowcharts in Instruction Sheet 1042-500, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Product Description*."

Note: Refer to these flowcharts as the automatic restoration system is being configured.

The values entered on each setup screen depend on the electrical distribution system and details specific to each individual switch.

Setup Parameters

Global and Non-global Parameters

When setting up the IntelliTeam Automatic Restoration System, both global and non-global parameter values will be specified.

Global parameters must have the same value for every member of a team. These include the selected sectionalizing features and the maximum-rated feeder capacity. In this instruction sheet, all global parameters are labeled [Global] where they are defined. Normally, global values are entered only at the last team member configured. Those values are then sent to the other team members when team configuration is initiated.

Non-global parameters may have, and sometimes must have, a different value for each member of the team. The parameters include the physical location of the team member and the peer-to-peer message-retry time. Non-global values are entered into each team member individually.

Using .CFG Files to Enter Values

After one member of a team is configured (or a snapshot is configured), the .CFG file can be used to copy those parameter values to other members of the team, or even to members of a different team. When using a .CFG file, only a few values have to be manually specified at each team member, such as the physical location and the communication RTU address. This is much faster than configuring every parameter for each team member separately. For more information, see the "Saving and Loading a Setup Configuration" section in Instruction Sheet 1042-540, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Operation*."

Establishing Communication with a Switch Control

Connect the portable computer to the switch control and start the IntelliLink software. See the "Starting IntelliLink Software" section on page 6 for the procedure.

When the *Operation* screen opens, go to the next section. If the correct screen does not appear or if the software does not operate properly, refer to Instruction Sheet 1042-550, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Troubleshooting*."

Specify the Non-global Values for This Switch Control

The non-global values can be, and sometimes must be, different for each member of the team. Follow these steps to configure the non-global values:

STEP 1. Start the IntelliLink software. For details, see the "Starting IntelliLink Software" section on page 6.

STEP 2. At any IntelliLink software screen, click on the **Setup Menu** button to display the *Setup Menu* screen. See Figure 4 on page 11.

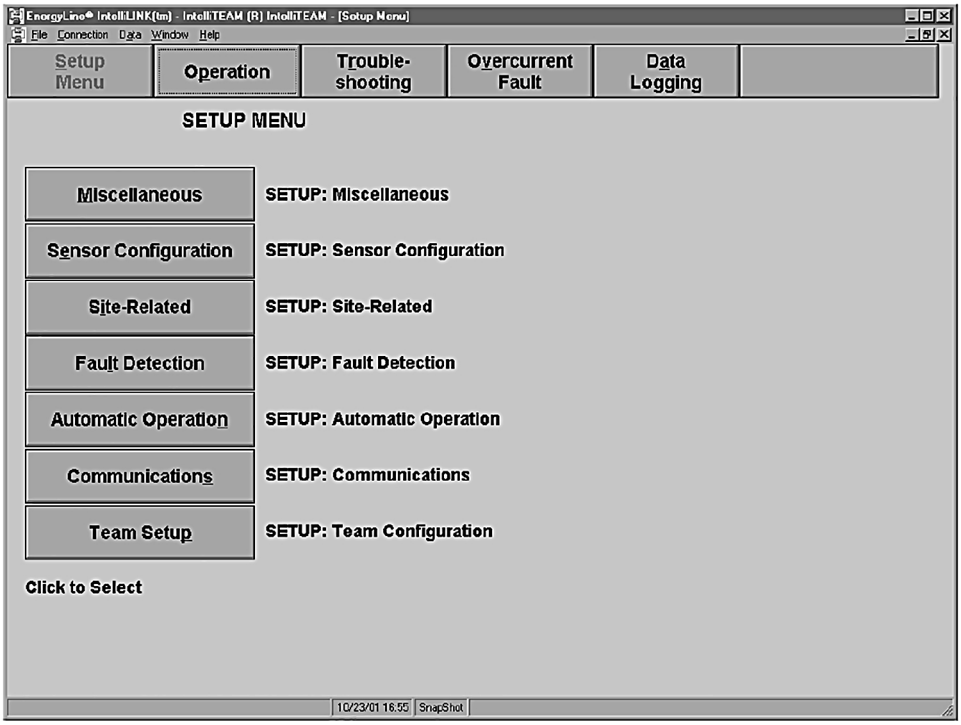


Figure 4. The *Setup Menu* screen.

STEP 3. At the *Setup Menu* screen, click on the **Miscellaneous** button to open the *Setup>Miscellaneous* screen. See Figure 5. Enter the correct values for this switch control.

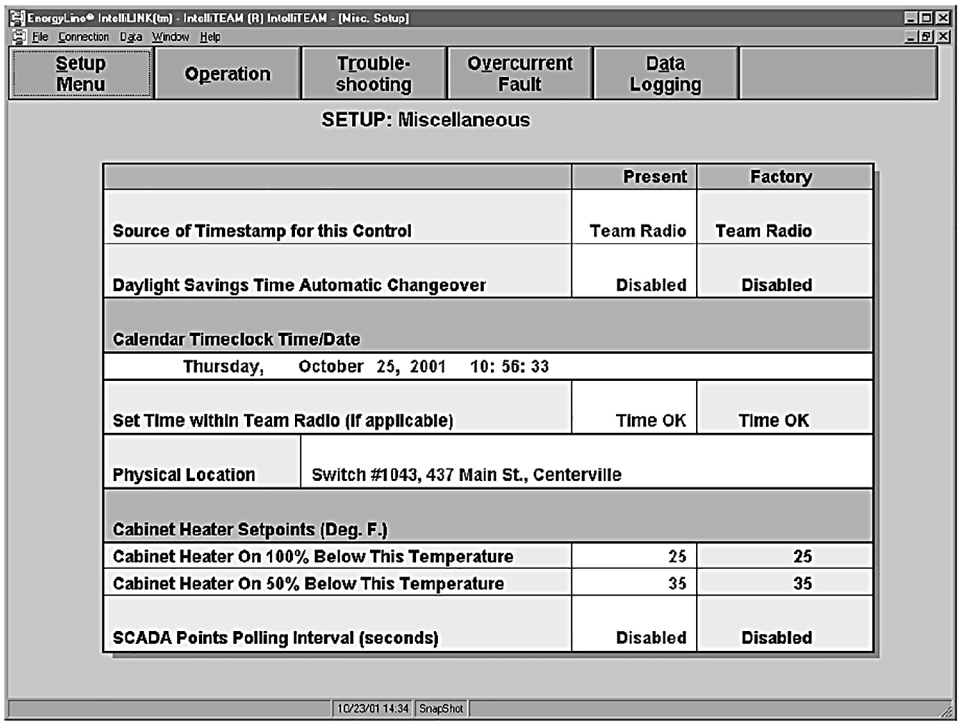


Figure 5. The *Setup>Miscellaneous* screen.

This screen includes the following fields:

Source of Timestamp for this Control

The time at every team member must be synchronized within one second. When a team member needs a new timestamp to stay in sync, it requests a timestamp from the assigned time source. This setpoint defines the time source to be used.

When the control has a team radio, the **Team Radio** mode is used.

When all team members are directly connected by fiber-optic transceivers instead of radios, one control is set as the timestamp source. The timestamp propagates along the single-line diagram.

For example: Device 1 is the timestamp source for a team of four directly connected controls. At Devices 1 and 2, Device 1 is set as the **Source of Timestamp for this Control** setpoint. At Device 3 the timestamp source is set to Device 2 and at Device 4 the timestamp source is set to Device 3.

When the team uses both radio and direct communication, the source for directly connected controls is the shortest route to a control with a radio.

For example: In a seven-member team, Devices 1 and 6 have radios; the others are directly connected. Devices 2 and 3 use the same setpoint values as in the previous example. However, Device 4 uses Device 5 as its timestamp source because Device 5 is next to a control with a radio.

Daylight Savings Time Automatic Changeover

Leave this set to **Disabled** mode because the timestamp is taken from the communications network. When set to **Enabled** mode, the control automatically adjusts its clock for the start and end of daylight savings time.

When this control is part of an isolated team, enable this setpoint in one of the team members. If the isolated team uses UtiliNet radios, the enabled control will cause the time to change in the radio network when the automatic daylight savings adjustment occurs. The team will be out of the **Ready** state until the new timestamp is distributed throughout the team and automatic team operation will not occur during this period. When the team does not use UtiliNet radios, enable this setpoint in the team member defined as the time source.

Calendar Timeclock Time/Date

The time and date are factory set to Pacific Standard Time (GMT-8:00). Reset this value when the control is installed in a different time zone.

When the **Daylight Savings Time Automatic Changeover** setpoint is enabled, the time/date statement includes the present daylight savings time status, for example: "Thursday, May 30, 2002 3:25:08 Daylight Savings." The control uses this information for data logging and event recording.

When the time and date are reset, wait at least six minutes. Then, check that the calendar and clock are correct. When the date change causes a transition into or out of daylight savings time, the one-hour automatic adjustment made by the control may to be corrected.

Set Time within Team Radio (if applicable)

When this setpoint is in the **Enabled** mode, the switch control sends a timestamp to the radio. The radio accepts the new timestamp and distributes it throughout the team during the radio network maintenance interval (usually 30 minutes).

To set the time in the radio, change this setpoint to **Set Time** mode immediately after setting the time in the switch control.

Note: The team will be out of the **Ready** state until the new timestamp is distributed throughout the team. No automatic team operation may occur during this period.

Physical Location

Enter the company's standard location identification information. For example, "Switch # 429, 73 Main St., Centerville." This information identifies the switch to the SCADA master station operator and appears on all reports generated from the switch control.

Cabinet Heater On 100% Below This Temperature

When an enclosure heater is present and the control is powered by an external ac source, the heater stays on continuously while the interior temperature is below this value. Leave this setpoint at the factory-default value.

The enclosure temperature is checked every 10 minutes. The temperature at the thermistor on the power supply/control I/O module is typically 10-15° F (5.6-8.3° C) above ambient air temperature.

Cabinet Heater On 50% Below This Temperature

When an enclosure heater is present and the control is powered by an external ac source, the heater stays on 50% of the time whenever the interior temperature is below this value but above the **Cabinet Heater on 100% Below This Temperature** setpoint. Leave this setpoint at the factory-default value.

SCADA Points Polling Interval

When so configured, the switch control can poll other team members to update its internal SCADA database continuously. This setpoint defines the polling interval. The switch control schedules a normal SCADA point scan to each of the other team members once per interval.

When setting the polling interval, account for the communication traffic generated. In general, do not set this interval to less than 10 seconds times the number of switch controls being polled.

When this control is not a gateway, this setpoint is normally set to the **Disabled** state. When polling is enabled, it should only be enabled for one switch control per team.≠

STEP 4. At the *Setup Menu* screen, click on the **Sensor Configuration** button to display the *Setup>Sensor Configuration* screen. See Figure 6. Enter the correct values for this switch control.

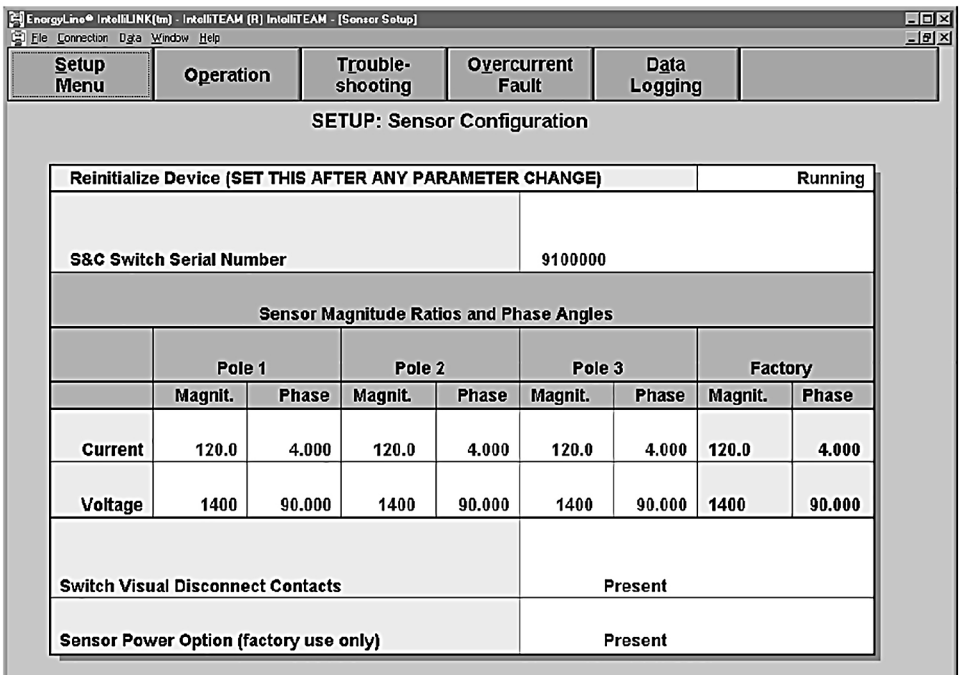


Figure 6. The *Setup>Sensor Configuration* screen for a 5801 control.

The screen shown in Figure 6 allows entry of calibration data (correction factors) for S&C Scada-Mate® Switching Systems, PME or PMH switchgear, or Vista Underground Distribution Switchgear sensors. The switch control uses these correction factors to produce voltage and current accuracy within specification for the S&C sensors.

This screen includes the following fields:

Reinitialize Device (Set this after any parameter change.)
Select this field and reinitialize the switch control after all required information on this screen has been entered.

S&C Switch Serial Number (Scada-Mate® Switching System)
Padmount Serial Number (PME and PMH switchgear)
Vista Gear Serial Number (Vista Underground Distribution Switchgear)
Copy this from the switch information. (This is the serial number of the line switch, not the switch control.)

The serial number may be useful to resolve a sensor conditioning/calibration problem.

Padmount Configuration (PME and PMH switchgear)
This is the type of pad-mounted switch installed at this location. The software is compatible with several pad-mounted cabinet configurations. When this setpoint is configured, the screen shows the appropriate setup parameters for this switchgear.

Note: After configuration, wait briefly for the software to update the screen with the appropriate setpoints before making configuration changes.

Current (Magnitude/Phase) & Voltage (Magnitude/Phase) on Pole 1, 2, and 3
Each S&C sensor is tested for accuracy. Sensor correction factors are provided in information shipped with the switch. The correction factor is also stamped on each sensor.

The factors must be entered to obtain accurate voltage and current measurement values. Each field shows the default value, so fewer keystrokes are needed to enter the correct value. The control ignores the values for all poles not specified in the **Voltage Sensors Present** setpoint on the *Setup>Site-Related* screen.

After entering the correction factors, put the information in the pocket inside the enclosure door or low-voltage cabinet door for future reference.

Switch Visual Disconnect Contacts (Scada-Mate Switching System)
When the Scada-Mate switch has visual disconnect contacts, set this setpoint to **Present** mode. When the visual disconnect contacts are open, the ERROR DETECTED LED on the faceplate is lit and the *Troubleshooting>Event Status* screen indicates a **Not Ready** condition. The condition is cleared when the visual disconnect is manually closed.

Sensor Power Option (Scada-Mate Switching System)
This indicates whether the switch control has the sensor power option installed. The setpoint is configured at the factory and should not be changed.

Low-Pressure Indication Option (Vista Underground Distribution Switchgear)
When the Vista switchgear has low-pressure indication, set this value to **Present** mode. When the switchgear indicates low pressure, the ERROR DETECTED LED on the faceplate is lit and the *Troubleshooting>Event Status* screen indicates a **Not Ready** condition.

Fault Interrupter Option (Vista Underground Distribution Switchgear)
When Vista switchgear includes fault-interrupting options, set this value to **Present** mode. When the fault interrupter trips open, the OVERCURRENT FAULT LED begins to flash, the LCD screen displays a message, and the switch control makes an entry in the Overcurrent Fault: Fault Events log. The condition is cleared when the fault interrupter is closed.

Note: Reinitialize the switch control after information is entered on this screen.

STEP 5. At the *Setup Menu* screen, click on the **Site-Related** button to display the *Setup>Site- Related* screen. See Figure 7 on page 15. Enter the correct values for this switch control.

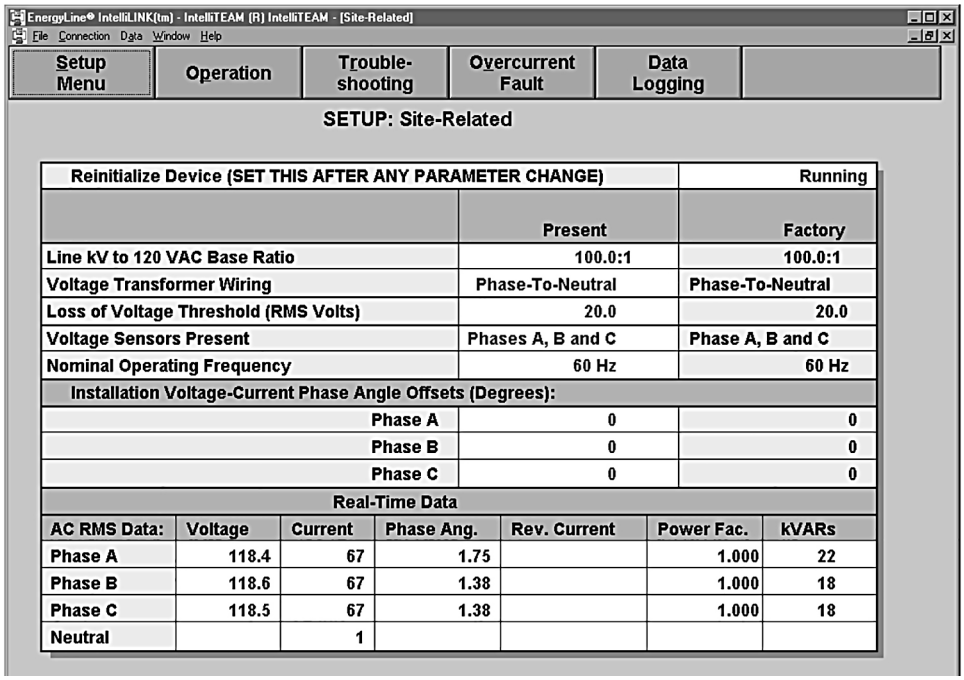


Figure 7. The *Setup>Site-Related* screen for a 5801 control.

The upper screen section allows configuration of all installation-dependent parameters associated with ac waveform analysis. The lower section displays real-time data produced by the ac waveform analysis.

Note: For S&C 5802/5803 switch controls, the phase-angle offset setpoints are on Page 2 of the *Setup>Site-Related* screen, and the real-time information is on Page 3. To view Pages 2 and 3, click on the **PgDn** button.

The switch control supports reporting voltage as either phase to phase (delta) or phase to neutral (wye), based on the connection for the single-phase transformers, and always displays voltage on a nominal 120-Vac or 240-Vac base. This is useful for comparing the measured voltages against those seen by customer load.

For Delta Voltage Reporting

The control sensor conditioning module measures primary phase-to-phase voltage. The control scales this voltage using the specified **Line kV to 120 VAC Base Ratio** setpoint to yield a nominal 120-Vac value.

Note: For delta voltage reporting, be sure the delta jumper is installed on the sensor conditioning module. Also, be sure to specify the value as **Phase-To-Phase** mode for the **Voltage Transformer Wiring** setpoint.

For Wye Voltage Reporting

For wye voltage reporting, the control sensor conditioning module measures primary phase-to-neutral voltage, and the control scales the voltage to yield a nominal 120-Vac value.

Note: For wye voltage reporting, be sure the wye jumper is installed on the sensor conditioning module. Also, be sure to specify the value as **Phase-To-Neutral** mode for the **Voltage Transformer Wiring** setpoint.

For more information about how the switch control processes sensor data, see Instruction Sheet 1042-540, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Operation*."

The *Setup>Site-Related* screen includes the following fields:

Reinitialize Device (Set this after any parameter change.)

The switch control looks at setup information only on startup. For new information to take effect, the switch control must be given a **Reinitialize Device** command.

Line-kV-to-120-Vac-Base Ratio

This is the voltage step-down ratio of customer load transformers on the feeder. The switch control records, displays, and manipulates voltages normalized on a 120- or 240-Vac base. This parameter provides the conversion ratio to the 120- or 240-Vac base.

Be sure to enter the ratio for transformers wired the same way (phase to phase or phase to neutral) as the value entered for the **Voltage Transformer Wiring** setpoint. See the following examples.

Example 1: For a four-wire, wye, multi-grounded, 24.9-kV (phase-to-phase) primary distribution system with phase-to-neutral connected customer transformers rated 14,400/120 volts, enter a ratio of 120:1. Then, specify **Phase-To-Neutral** mode for the **Voltage Transformer Wiring** setpoint.

Example 2: For a three-wire, wye, 12-kV (phase-to-phase) primary distribution system with phase-to-phase connected customer transformers rated 12,000/120 volts, enter a ratio of 100:1. Then, specify **Phase-To-Phase** mode for the **Voltage Transformer Wiring** setpoint.

Voltage Transformer Wiring

This configures the control for customer voltage reporting. The control also uses this information to calculate kvar values.

For delta voltage reporting, specify **Phase-To-Phase** mode for this setpoint.

For wye voltage reporting, specify **Phase-To-Neutral** mode for this setpoint.

Loss of Voltage Threshold (RMS Volts)

When the voltage level drops below this value (on a 120-volt base), the switch control assumes power is no longer being supplied to the monitored phase. For customer single-phase transformers connected phase to neutral, leave this at the factory default value of 20.0.

For customer single-phase transformers connected phase to phase, the loss of one phase results in sensor readings with magnitudes slightly more than ½ of normal phase-to-phase voltage. To detect phase loss with the loss of one phase, set the **Loss of Voltage Threshold** setpoint or the **Phase Loss Protection Voltage Loss Threshold** setpoint on the *Setup> Automatic Operation* screen to a slightly higher value than the expected voltage level. A threshold of approximately 75% of the normal phase voltage is recommended.

Loss of voltage is detected by the switch control true RMS transducer circuits, and voltage-loss detection qualification time can approach 600 ms. When the first voltage loss will be less than 600 ms, configure the **First-Reclose Qualification Time** setting on the *Setup>Automatic Operation* screen. When loss of voltage is detected, the **Voltage Loss** status indication will be active, and the **Phase Loss of Voltage** status indication will be active for any phase below this threshold. See Figure 8.

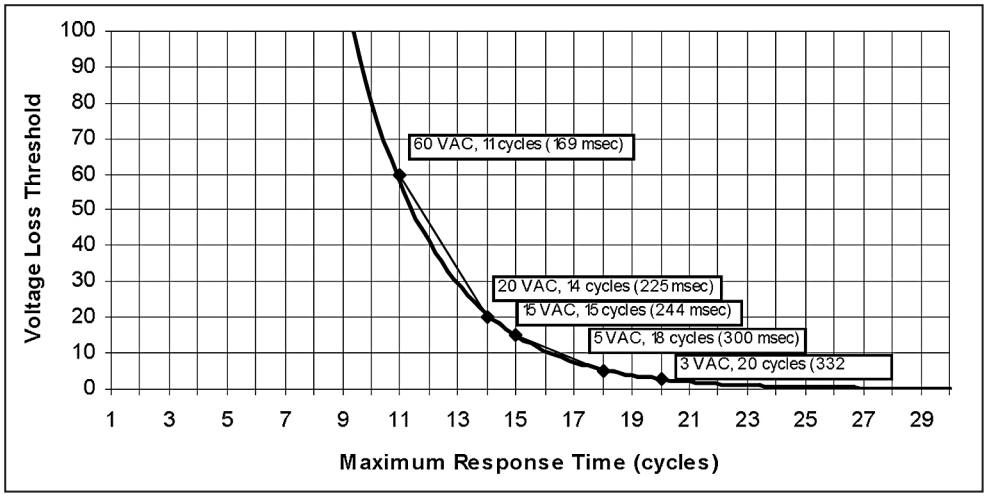


Figure 8. Voltage-Loss Threshold and Maximum Response Time.

NOTICE

Times in the Figure 8 chart on page 16 do not include the output relay or switch operation times. For proper coordination with a fast-reclosing source-side protective device, make sure the reclosing interval time for the device is long enough for the switch control to detect the outage and for the sectionalizing switch to open fully.

Note: Backfeed from customer loads also affects the speed of voltage-loss detection. Enter a threshold value high enough to detect the loss of voltage before service is resumed (typically no less than 0.6 seconds for a fast-reclose cycle) and low enough to ensure loss of voltage is not falsely detected because of system overload or persistent backfeed.

Voltage Sensors Present

This is the number (and location) of sensors on the line switch. Select the value for sensors installed by the switch manufacturer. If a PT is used, choose the phase where it is installed.

For PME/PMH pad-mounted switches, the software automatically chooses the correct value based on the mode configured for the **Pad-mounted Configuration** setpoint on the *Setup>Sensor Configuration* screen.

Installation Voltage-Current Phase-Angle Offsets (degrees)

The setpoints (one for each voltage-current phase) allow entry of installation-dependent phase-angle corrections. These corrections are used to determine the normal and reverse directions of current flow. The control also uses these corrections and the sensor-conditioning corrections (on the *Setup>Sensor Configuration* screen) to calculate power factor and kvars.

The sensors should face the substation end of the feeder when the team is in its normal configuration.

Note: The team members closest to the substations must have their sensors facing the substation.

When entering the phase-angle offset (correction) values, keep in mind that:

- Phase-angle detection and display require a minimum current of 0.75% of full scale (6 A at 800 A full scale). Current magnitudes continue to be detected and displayed below this level.
- To see the effect of any changed offset values on real-time data, the switch control must be reinitialized.

Switches with 3 or 6 Voltage Sensors and Phase-To-Neutral Connected Customer Transformers

Set the three phase-angle offsets to 0 degrees. If the **Rev. Current** fields for all three phases display a “Reverse” message when the offsets are set to 0 and current is flowing through the switch, power is being fed from the opposite direction. To remove the “Reverse” messages, set the three phase-angle offsets to 180 degrees.

The correct setting should result in reasonable real-time corrected phase angles (in the **Phase Ang.** fields) and no “Reverse” messages (in the **Rev. Current** fields).

Switches with 3 or 6 Voltage Sensors and Phase-To-Phase Connected Customer Transformers

Set all three phase-angle offsets to either 30 or 330 degrees. If neither of these setting combinations removes all the “Reverse” messages in the **Rev. Current** fields, the power flow direction is reversed. In this case, set all three phase-angle offsets to either 210 or 150 degrees.

One of these settings should eliminate all “Reverse” messages in the **Rev. Current** field and result in reasonable real-time corrected phase angles in the **Phase Ang.** fields and power factors in the **Power Fac.** fields.

Real-Time Data

The switch control displays real-time data values for Phases A, B, C, and Neutral. It creates these values from raw sensor data and the information entered on the setup screens.

Use the real-time data to immediately check the effect of any change made to the site-related setpoints.

For the S&C 5802/5803 controls, as the real-time data are reviewed, keep in mind that:

- To ensure the data on the screen are associated with the correct switch, make sure the connectors from the low-voltage cabinet to the switch control are attached properly (Compartment 1 to Switch 1, Compartment 2 to Switch 2).
- The switch control can only measure phase angles, kvars, and faults on two circuits (switches).
- The third set of RMS current sensors is optional. When using the third set of current sensors, only a single set of voltage sensors can be used.
- When using a single set of voltage sensors, the Switch 2 voltage displays N/A. However, because voltage is measured on the bus, the Switch 1 voltage applies to both switches.

Voltage

This is the present value of the distribution-line voltage, transformed to a nominal 120-Vac base and scaled according to the correction factors entered on the *Setup>Sensor Configuration* screen. The switch control uses this as the input-sensed value when it calculates the primary voltage.

Current

This is the current measured by the current sensor and scaled according to the correction factors entered on the *Setup>Sensor Configuration* screen.

Phase Ang.

This is the corrected phase angle, which is the offset of the current waveform referenced to the voltage after all setup correction factors have been applied. When the switch control is properly configured, these corrected phase angles will all be 0 ± 89.9 degrees.

Lagging phase angles are represented as values between 0 and 90 degrees. Leading phase angles are represented as values between 0 and -90 degrees.

Rev. Current

When the switch control is properly configured and power is flowing through the circuit in the normal direction, these three fields are all blank. If unusual circuit switching conditions cause the current-flow direction to reverse, the entry in all three fields changes to “Reverse.”

Power Fac.

This is the power factor calculated as the cosine of the value in the **Phase Ang.** field. Leading power factors are represented by negative numbers.

kvars

The switch control uses the line-to-neutral voltage, the current, and the sine of the phase angle to calculate the **kvar** (kilovolts-amperes, reactive) value.

Note: When all information on this screen has been entered, reinitialize the switch control.

Fault Detection

STEP 6. At the *Setup Menu* screen, click on the **Fault Detection** button to display the *Setup>Fault Detection* screen. See Figure 9.

Enter the correct values for this switch control.

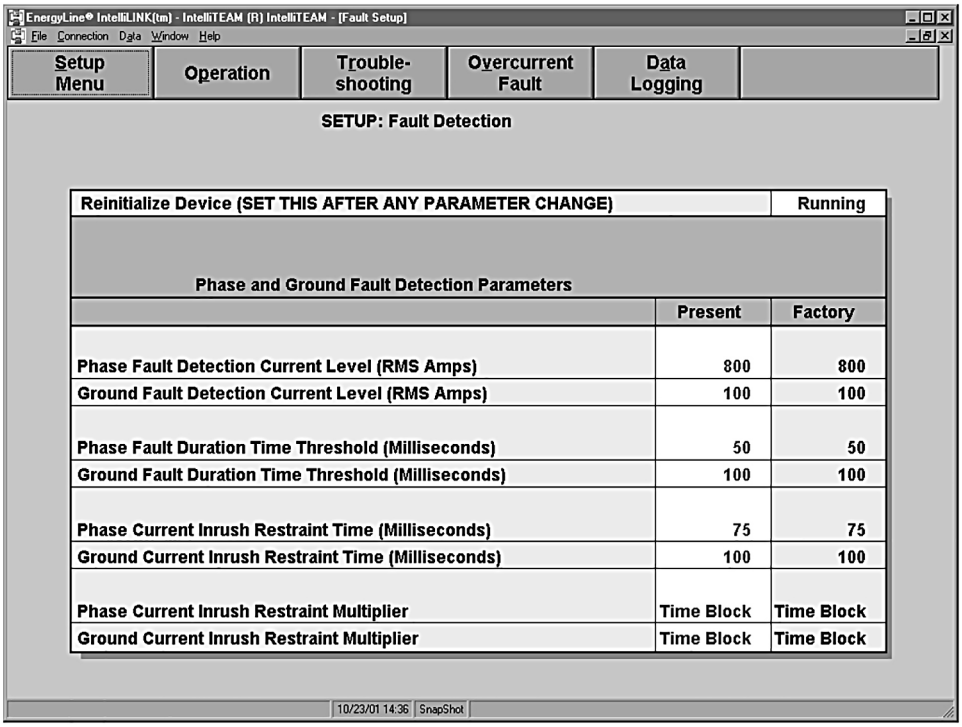


Figure 9. The *Setup>Fault Detection* screen.

This screen configures setpoint values the control uses to detect phase and ground faults.

About Fault Detection

If power has been continuously present and the switch control senses that current (on any phase) is greater than the **Phase Fault Detection Current Level** setpoint, the control starts the **Phase Fault Duration Time Threshold** timer.

If current drops below the **Phase Fault Detection Current Level** setpoint before this timer expires, the control ignores the overcurrent condition. If the phase overcurrent is still continuously present when the timer expires, the control registers an **Overcurrent Fault** condition and takes appropriate action.

For **Ground Overcurrent** conditions, the control follows the procedure described above, but it uses the **Ground Fault Detection Current Level** setpoint and the **Ground Fault Duration Time Threshold** setpoint values.

Note: Following a voltage outage, if the switch is closed and voltage rises above the **Loss of Voltage** threshold setpoint on any phase or current is detected on any phase, the control starts the **Phase Current Inrush Restraint** timer and the **Ground Current Inrush Restraint** timer. The behavior of the switch control during the inrush restraint period depends on the values configured for the **Phase Current Inrush Restraint Multiplier** setpoint and the **Ground Current Inrush Restraint Multiplier** setpoint.

For more information about configuring values on this screen, see Instruction Sheet 1042-572, "S&C 5800 Series Switch Controls: *Setting the Phase and Ground Overcurrent Levels*."

For more information about the fault-detection system, see Instruction Sheet 1042-540, "S&C 5800 Series Automatic Switch Controls with IntelliTeam® Automatic Restoration System: *Operation*."

This screen includes the following fields:

Reinitialize Device (Set this after any parameter change.)

The control looks at setup information only at startup. The switch control must be reinitialized to have new information take effect immediately.

Phase Fault Detection Current Level (RMS amps)

This is the RMS current level required (on any phase) to indicate the presence of a possible **Phase Overcurrent** (fault) condition.

Ground Fault Detection Current Level (RMS amps)

This is the RMS level of neutral or ground current required to indicate the presence of a possible **Ground Overcurrent** (fault) condition.

1. Set the **Ground Fault Detection Current Level** setpoint to the minimum ground-trip current of the protective device in use (recloser, breaker, etc.).
2. Find the time-current curve for the chosen **Ground Fault Detection Current Level** setpoint in Figure 10 on page 21.
3. Compare the time-current curves shown in Figure 10 on page 21 to the time-current curve for the protective device. The curve for the protective device should include the mechanical operating time. The switch control response time should be less than 75% of the protective device response time.
4. If necessary, reduce the **Ground Fault Detection Current Level** setpoint until the switch control response time is short enough.

Example: When the **Ground Fault Detection Current Level** setpoint is 150 amps, a 500-amp ground current must be present for approximately 42 milliseconds before the switch control registers a fault. See Figure 10 on page 21.

For more information about setting this value, see Instruction Sheet 1042-572, "S&C 5800 Series Switch Controls: *Setting the Phase and Ground Overcurrent Levels*."

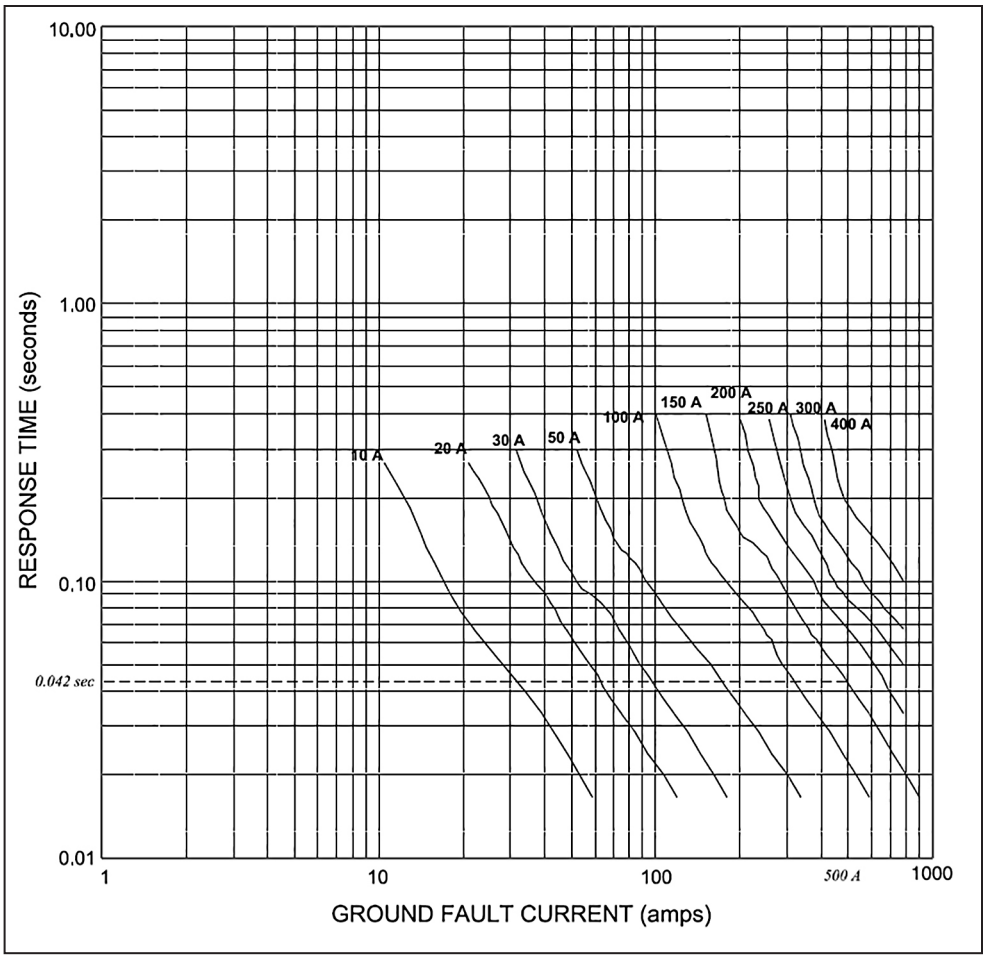


Figure 10. The Time-Current Characteristic curve for ground fault detection.

Phase Fault Duration Time Threshold (milliseconds)

This is the amount of time (in milliseconds) a detected phase-overcurrent condition must be continuously present before the control will register a **Phase Overcurrent Fault** condition.

The resolution of this value is 6.25 milliseconds, or approximately 1/3 cycle.

Ground Fault Duration Time Threshold (milliseconds)

This is the amount of time (in milliseconds) a detected ground-overcurrent condition must be continuously present before the control will register a **Ground Overcurrent Fault** condition.

The resolution of this value is 50 milliseconds (3 cycles). Set the value to the fastest reaction time of the protective device, rounded down to the nearest multiple of 50 milliseconds. Values of 0 or 50 milliseconds for this setpoint will yield the same effective time threshold of 50 milliseconds.

Note: The control will detect brief, high-current faults with a duration shorter than the **Ground Fault Duration Time Threshold** setpoint. For more information about ground-fault detection, see Instruction Sheet 1042-540, "S&C 5800 Series Automatic Switch Controls with IntelliTeam® Automatic Restoration System: *Operation*."

Phase Current Inrush Restraint Time (milliseconds)

Following a voltage outage, this is the amount of time (in milliseconds) that must elapse after restoration of voltage before the control will respond normally to a phase-overcurrent fault condition. During this time period, the response of the switch control is determined by the **Phase Current Inrush-Restraint Multiplier** setpoint.

This specialized response (immediately after restoration of voltage) prevents the switch control from falsely indicating phase faults due to inrush or load-pickup conditions.

Ground Current Inrush Restraint Time (milliseconds)

Following a voltage outage, this is the amount of time (in milliseconds) that must elapse after restoration of voltage before the control will respond normally to a ground-overcurrent fault condition. During this time period, the response of the switch control is determined by the **Ground Current Inrush-Restraint Multiplier** setpoint.

This specialized response (immediately after restoration of voltage) prevents the switch control from falsely indicating ground faults due to inrush or load-pickup conditions.

Phase Current Inrush-Restraint Multiplier

The switch control uses this setting to determine how to respond to phase-overcurrent conditions that occur during the specified **Phase Current Inrush Restraint Time** timer.

When the **Phase Current Inrush-Restraint Multiplier** setpoint is set to **Time Block** mode, the control ignores all phase-overcurrent conditions during the **Phase Current Inrush-Restraint Time** timer.

When the **Phase Current Inrush-Restraint Multiplier** is set to 2x, 4x, 8x, or 16x, the control responds to fault conditions that exceed the **Phase Fault Detection Current Level** setpoint by the specified multiplier value. When the **Phase Current Inrush Restraint Time** timer expires, the control responds to all faults that exceed the **Phase Fault-Detection Current Level** setpoint.

Example: The **Phase Fault Detection Current Level** setpoint is 500 and the **Phase Current Inrush-Restraint Multiplier** setpoint is 8x. During the **Phase Current Inrush-Restraint Time** period the control ignores all phase-fault conditions of less than 4000 RMS amperes. When the **Phase Current Inrush-Restraint Time** period expires, the switch control responds to all faults of at least 500 amperes.

Ground Current Inrush-Restraint Multiplier

The switch control uses this setting to determine how to respond to ground-overcurrent conditions that occur during the specified **Ground Current Inrush Restraint Time** setpoint. See the “Phase Current Inrush-Restraint Multiplier” section above for details.

Note: If any values on this screen have been changed, reinitialize the switch control.

Communication Setup

STEP 7. At the *Setup Menu* screen, click on the **Communications** button to display Page 1 of the *Setup>Communications* screen. See Figure 11.

Enter the correct values for this switch control.

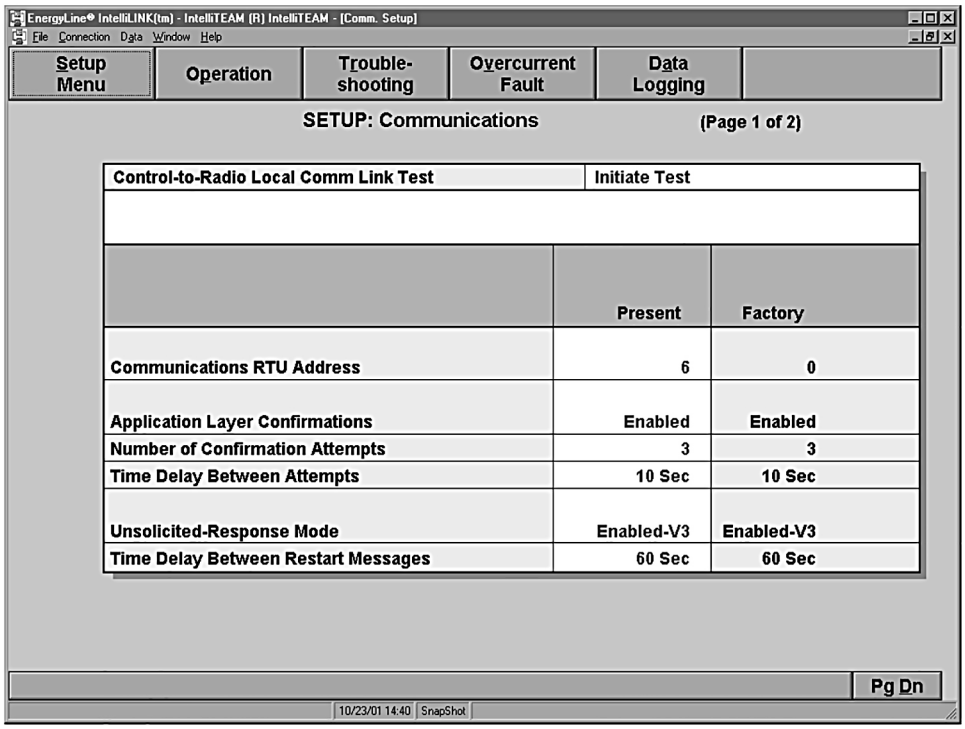


Figure 11. Page 1 of the *Setup>Communications* screen.

This screen configures setpoint values related to IntelliTeam and SCADA communications. This screen includes the following fields:

Control-to-Radio Local Comm Link Test

When this field is set to **Initiate Test** mode, the switch control checks the communications link to the radio (if applicable). For more information, see the "Test Control-to-Radio Communications" section on page 44.

Communications RTU Address

Enter the network address for this control installation. This must be the same as the DNP/RTU Address configured on the *Setup>Team Configuration* screen for this team member. When the team uses UtiliNet radios, this is the same as the **RTU Address** setpoint on the *Select Team* screen of the Setup Manager software. Be sure to enter an address even if this switch control will not be accessed via SCADA.

⚠ WARNING

When an already-configured switch control is moved to a new location, be sure to enter the new address into the switch control. If the old address is left in the switch control, it may respond to instructions meant for a different switch location.

Application Layer Confirmations

When this setpoint is enabled, the switch control requests a confirmation from the SCADA master station (if applicable) every time a response message is delivered. If the switch control does not receive a confirmation within a specified time period (the **Time Delay Between Attempts** timer), it retransmits the response with a request for another confirmation.

Note: Enabling this feature may add significant communication traffic to the team and may affect the reconfiguration speed.

Number of Confirmation Attempts

This is the number of times the switch control asks for a confirmation when the **Application Layer Confirmations** setpoint is enabled. This number includes the initial response transmission.

Time Delay Between Attempts

If the switch control did not receive a confirmation within this time period, it retransmits the response with a request for another confirmation unless the **Number of Confirmation Attempts** setpoint value has been reached.

Unsolicited-Response Mode

When this setpoint is enabled, the switch control sends a message to the SCADA master station every time a status point changes. For details, see the applicable DNP Points List and Implementation document. When this feature is enabled, the RTU address (and the UtiliNet WAN address if applicable) must be entered for the **Master** setpoint on the *Setup>Team Configuration* screen.

Enabled-V3 mode conforms to the latest DNP Level-2 requirements. For example, at power-up, null unsolicited responses are sent until the master station confirms them. The data-filled responses are sent only when the master station issues an **EnaUns** command (application function code 14x). In **Enabled-V2** mode, the switch control only sends null unsolicited responses at power-up for the number of times specified by the **Number of Confirmation Attempts** setpoint. It then starts sending data-filled unsolicited messages as needed, regardless of whether the master station is ready to receive them (that is, it does not need to receive an **EnaUns** command).

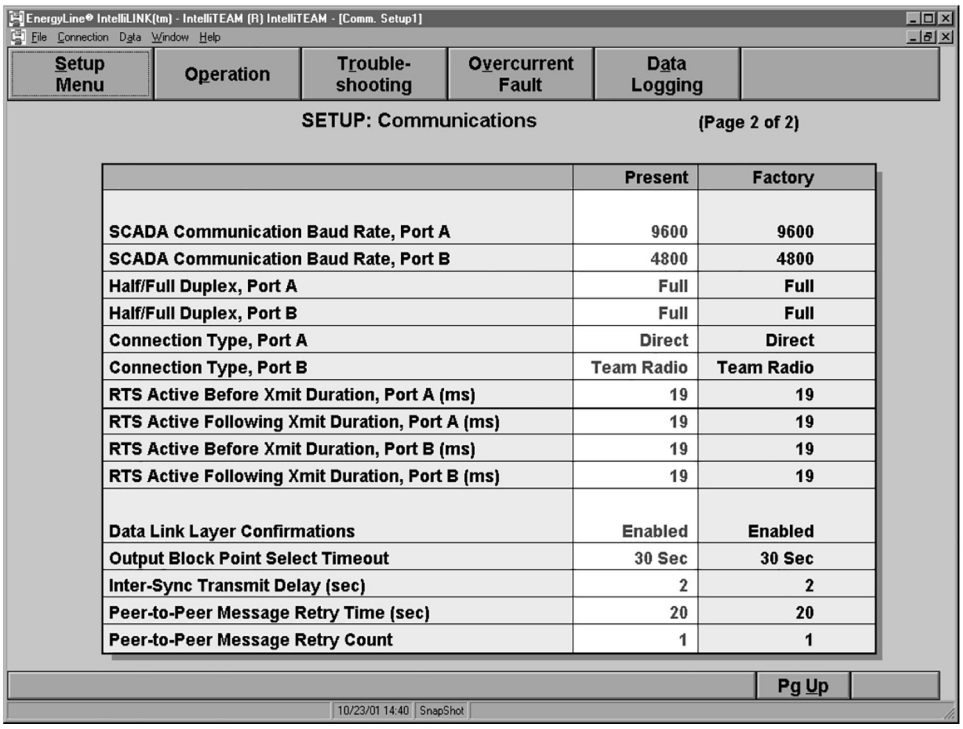
Note: Enabling this feature may add significant communication traffic to the communication network.

Unsolicited-Retry Time Interval

If the switch control did not receive a confirmation following an unsolicited response within this time period and the **Application Layer Confirmations** setpoint is enabled, the control retransmits the response with a request for another confirmation unless the **Number of Confirmation Attempts** setpoint value has been reached.

STEP 8. At Page 1 of the *Setup>Communications* screen, click on the **PgDn** button to display Page 2. See Figure 12.

Enter the correct values for this switch control.



	Present	Factory
SCADA Communication Baud Rate, Port A	9600	9600
SCADA Communication Baud Rate, Port B	4800	4800
Half/Full Duplex, Port A	Full	Full
Half/Full Duplex, Port B	Full	Full
Connection Type, Port A	Direct	Direct
Connection Type, Port B	Team Radio	Team Radio
RTS Active Before Xmit Duration, Port A (ms)	19	19
RTS Active Following Xmit Duration, Port A (ms)	19	19
RTS Active Before Xmit Duration, Port B (ms)	19	19
RTS Active Following Xmit Duration, Port B (ms)	19	19
Data Link Layer Confirmations	Enabled	Enabled
Output Block Point Select Timeout	30 Sec	30 Sec
Inter-Sync Transmit Delay (sec)	2	2
Peer-to-Peer Message Retry Time (sec)	20	20
Peer-to-Peer Message Retry Count	1	1

Figure 12. Page 2 of the *Setup>Communications* screen.

This screen includes the following fields:

SCADA Communication Baud Rate, Port A
SCADA Communication Baud Rate, Port B

This is the baud rate between the switch control and the directly connected communications device (radio, modem, etc.). This baud rate must be identical to the baud rate for the device. If the device is a UtiliNet radio, set the baud rate to 4800.

Half/Full Duplex, Port A
Half/Full Duplex, Port B

Set this value to match the value selected for the device (modem, radio, master station, another team member, etc.) directly connected to this port. For example:

- Select the **Full Duplex** mode when this port is connected to another member in the team, a UtiliNet radio without an intermediate communications buffer board, or other full-duplex device.
- Select the **Half Duplex** mode when this port is connected to a device using an intermediate comm buffer board or other half-duplex communications device.

Connection Type, Port A
Connection Type, Port B

This configures the type of connection for this port that defines how the control handles communications. The setting modes are:

None	There is no connection to this port.
Non-Relay	Messages received on this port are not intended for the entire team. This setting also prevents the switch control from recording errors if this port receives a message not addressed to the local control.
SCADA	This port is connected to a SCADA master station.
Direct	This port is connected directly to another team member.
Team Radio	This port is connected to a radio used for communication within the team.

RTS Active Before Xmit Duration, Port A
RTS Active Before Xmit Duration, Port B

This is the amount of time (in milliseconds) that RTS (request to send) is active for this port before a transmission takes place. If a team radio is connected to this port, the delay also provides some spacing for packets on the local Control-to-Radio LAN. This setpoint is usually configured at the factory-default value.

RTS Active Following Xmit Duration, Port A
RTS Active Following Xmit Duration, Port B

This is the amount of time (in milliseconds) that RTS (request to send) is active after a transmission has taken place. If a team radio is connected to this port, the delay also provides some spacing for packets on the local Control-to-Radio LAN. This setpoint is usually configured at the factory default value.

Data Link Layer Confirmations

When this setpoint is enabled, a data link layer function of DNP suppresses losses and duplicate messages to another team member receiving requests. This function only affects messages that originated from a team member, not responses. This setpoint is usually enabled.

Output Block Point Select Timeout

This is the timeout duration of the **Select** function on control points. (For details about using analog outputs, see the applicable DNP Points List and Implementation documentation.) If the timeout duration is too short between the **Select** and the **Operate** functions during a Select-Before-Operate sequence, the switch control disables the point and reports a failure to the master station (if applicable).

Inter-Sync Transmit Delay (sec)

This delay provides some spacing (in seconds) between successive transmissions from a single team member. This setpoint is usually configured at the factory default value.

Peer-to-Peer Message Retry Time (sec)

The switch control waits this amount of time (in seconds) to receive a response from another team member. If it does not receive the response within this time period, it resends the message to that team member. It continues sending the message until it receives a response or reaches the **Peer-to-Peer Message Retry Count** setpoint.

Peer-to-Peer Message Retry Count

This is the number of times the switch control retries sending a message to a team member that does not respond within the **Peer-to-Peer Message Retry Time** setpoint.

Note: Decreasing the **Peer-to-Peer Message Retry Time** setpoint or increasing the **Peer-to-Peer Message Retry Count** setpoint may have a negative effect on some communications systems due to increased traffic. Be sure to take this into account when changing these setpoints. These setpoints are usually set at the factory default values if the team members are communicating through a UtiliNet communications network.

Automatic Operation

STEP 9. At the *Setup Menu* screen, click on the **Automatic Operation** button to display Page 1 of the *Setup>Automatic Operation* screen. See Figure 13.

Enter the correct values for this switch control.

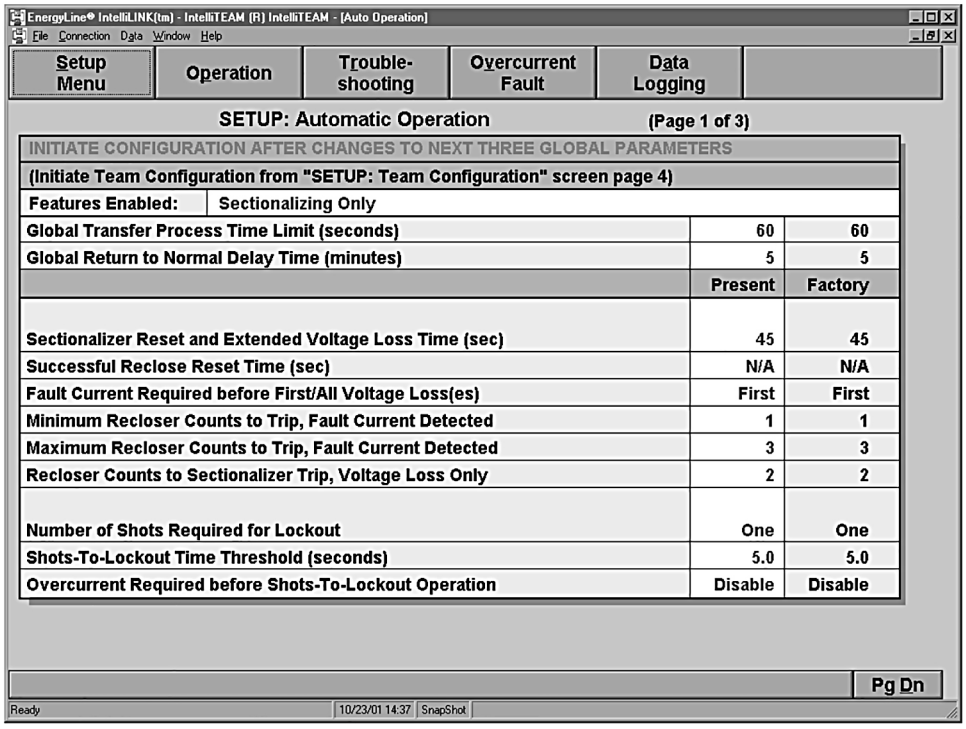


Figure 13. Page 1 of the *Setup>Automatic Operation* screen for a 5801 control.

The *Setup>Automatic Operation* screens allows enabling and disabling various automatic switch control operations and entry of the setpoints for these operations. Pages 1 and 3 of the screen contain both global and non-global setup parameters. The non-global parameters are explained below; the global parameters are explained in the following section, "Global Team Values," on page 32. For the S&C 5802/5803 controls, select separate values for Switch 1 and Switch 2 for most of the setpoints on these screens.

The 5800 Series switch control opens the line switch for the following four conditions:

- Fault current counts—The control has seen fault current and observed the source-side protective device tripping and reclosing. When the control has counted the right number of counts (defined as three-phase voltage, then fault current followed by three-phase voltage loss), it opens the switch.
- Voltage loss counts—The control has observed the source-side protective device tripping and reclosing. When the control has counted the right number of counts (defined as three-phase voltage followed by three-phase voltage loss), it opens the switch.
- Extended loss of voltage—The control observes the three-phase voltage going below a pre-programmed value near zero and staying there for an extended period of time.
- Single-phasing minimization—The control observes the voltage on one or two phases staying below a pre-programmed value for an extended period of time.

About Sectionalizing

When sectionalizing is enabled and the team members recognize a three-phase voltage outage, they start the **Sectionalizer Reset and Extended Voltage Loss Time** timer and begin to count **Trip** operations. If the reclose count reaches the appropriate **Recloser Counts to Trip** setpoint before the timer expires, the control trips open the switch. If the timer expires before the **Recloser Counts to Trip** setpoint is reached, the switch control resets the timer and counter to zero.

When three-phase voltage remains off for the duration of the **Sectionalizer Reset and Extended Voltage Loss Time** setpoint value, an **Extended Voltage Loss** condition exists and the switch control opens the switch. If the switch control knows a source-side switch is open, it continues the reconfiguration process without waiting for the **Sectionalizer Reset and Extended Voltage Loss Time** setpoint value to elapse.

The screen shown in Figure 13 on page 27 includes the following fields:

Sectionalizer Reset and Extended Voltage Loss Time

This is the time during which the switch control counts normal source-side **Trip** operations and monitors the three-phase voltage for an **Extended Voltage Loss** condition.

Set this value to a time 5 seconds longer than the maximum lockout time for the normal source-side recloser device. This ensures the loss of voltage is not a temporary condition.

Successful Reclose Reset Time (sec)

When three-phase voltage is continuously present without faults for this amount of time (in seconds), the switch control considers the source-side recloser device to have had a successful reclose. When this timer expires, the control resets the sectionalizing timers and counters to zero.

Use this setpoint when the source-side recloser device resets its counts following a trip and reclose that does not result in another trip. If the source-side device does not use this reset scheme, set the value to **N/A**; the switch control will use the **Sectionalizer Reset and Extended Voltage Loss Time** setpoint to reset the count.

Fault Current Required before First/All Voltage Loss(es)

For the switch control to trip open the switch due to a fault, it must detect and count fault-current and voltage-loss events. When this setpoint is set to **All**, the switch control only increments the counts if it detected a fault current before every voltage loss. Any voltage loss without an associated fault current disarms the sectionalizer. If the setpoint is set to **First**, the control must detect fault current only before the first voltage loss. After that, the recloser operation count increments with each voltage loss. If the count is reset, the next voltage loss must be preceded by fault current for the switch control to start counting again.

First is the default value because the current transformers are load-metering CTs, not fault-current CTs. After the first fault, they may not correctly register subsequent faults.

Minimum Recloser Counts to Sectionalizer Trip, Fault Current Detected
Maximum Recloser Counts to Sectionalizer Trip, Fault Current Detected
(S&C 5801 control only)

S&C 5801 switch controls with IntelliTeam functionality automatically coordinate the recloser counts to trip along a circuit. Each switch control determines how many switches it is away from the presently open switch. If the number is between the **Minimum Recloser Counts to Sectionalizer Trip** setpoint and the **Maximum Recloser Counts to Sectionalizer Trip** setpoint, the switch control uses that value. If the number is below the **Minimum Recloser Counts to Sectionalizer Trip** setpoint or above the **Maximum Recloser Counts to Sectionalizer Trip** setpoint, the switch control uses the closer setpoint value. To disable automatic coordination, enter the same value for both setpoints.

Note: If the switch control cannot tell how many switches it is away from the presently open switch due to an invalid team address table (for example, before the team is configured), it uses the **Maximum Reclose Counts to Sectionalizer Trip** setpoint.

The switch control trips open the switch when all of the following are true:

- The switch control detects the applicable number of three-phase voltage outages within the **Sectionalizer Reset and Extended Voltage Loss Time** setpoint.
- Sectionalizing is enabled.
- An overcurrent fault preceded the number of outages set by the **Fault Current Required before First/All Voltage Loss(es)** setpoint.

For example, if the applicable value is 3, the switch control trips open the switch on the third qualifying voltage outage.

Recloser Counts to Trip, Fault Current Detected (S&C 5802/5803 controls only)

This is the number of three-phase voltage outages detected within the **Sectionalizer Reset and Extended Voltage Loss Time** setpoint before sectionalizing occurs.

The switch control trips open the switch when all of the following are true:

- The switch control detects the applicable number of three-phase voltage outages within the **Sectionalizer Reset and Extended Voltage Loss Time** setpoint.
- Sectionalizing is enabled.
- An overcurrent fault preceded the number of outages set by the **Fault Current Required before First/All Voltage Loss(es)** setpoint.

For example, if the applicable value is 3, the switch control trips open the switch on the third qualifying voltage outage.

Recloser Counts to Sectionalizer Trip, Voltage Loss Only

When sectionalizing is enabled and the switch control detects this number of three-phase voltage outages with no fault current within the **Sectionalizer Reset and Extended Voltage Loss Time** setpoint value, the control trips open the switch.

For example, if the applicable value is 3, the switch control trips open the switch on the third qualifying voltage outage.

Number of Shots Required for Lockout

This is the number of three-phase voltage losses the switch control must detect during the **Shots-To-Lockout Time Threshold** setpoint before it trips open the switch. The switch control can lockout after either one voltage loss or two voltage losses. This value is normally set to one, unless the coordinating breaker uses an instantaneous reclose feature.

Shots-To-Lockout Time Threshold (seconds)

This is the number of seconds the **Shots-to-Lockout** timer runs. The switch control trips open the switch if the applicable number of three-phase voltage losses occurs during this time period. See the "Switch Control Automatic Operations" section in Instruction Sheet 1042-540, "S&C 5800 Series Automatic Switch Controls with IntelliTeam® Automatic Restoration System: *Operation*," for more information.

To enable the **Shots-to-Lockout** feature, set this time to a value greater than zero.

Note: During circuit reconfiguration, the **Shots-to-Lockout** timer is always enabled. When a switch closes, it does not broadcast a successful close until the timer elapses, and the next switch does not operate until it receives the broadcast. When the **Global Transfer Process Time Limit** setpoint is configured, be sure to take the **Shots-To-Lockout Time Threshold** setpoint into account.

Overcurrent Required before Shots-To-Lockout Operation

Enable this setpoint when the **Shots-to-Lockout** feature should reopen the switch only if the three-phase voltage loss was preceded by an overcurrent event. The **Shots-to-Lockout** feature was designed only to look at voltage loss to detect a breaker trip. This prevents mis-operation because of an incorrect fault detection or inrush restraint setting. If the system circuit breakers trip on inrush current, enabling this setpoint is recommended.

Note: If the **Number of Shots Required for Lockout** setpoint is set to 2, the relationship between the detection of overcurrent and voltage losses follows the **Fault Current Required before First/All Voltage Loss(es)** setpoint.

STEP 10. At Page 1 of the *Setup>Automatic Operation* screen, click on the **PgDn** button to display Page 2 of the *Setup>Automatic Operation* screen. See Figure 14.

Enter the correct values for this switch control.

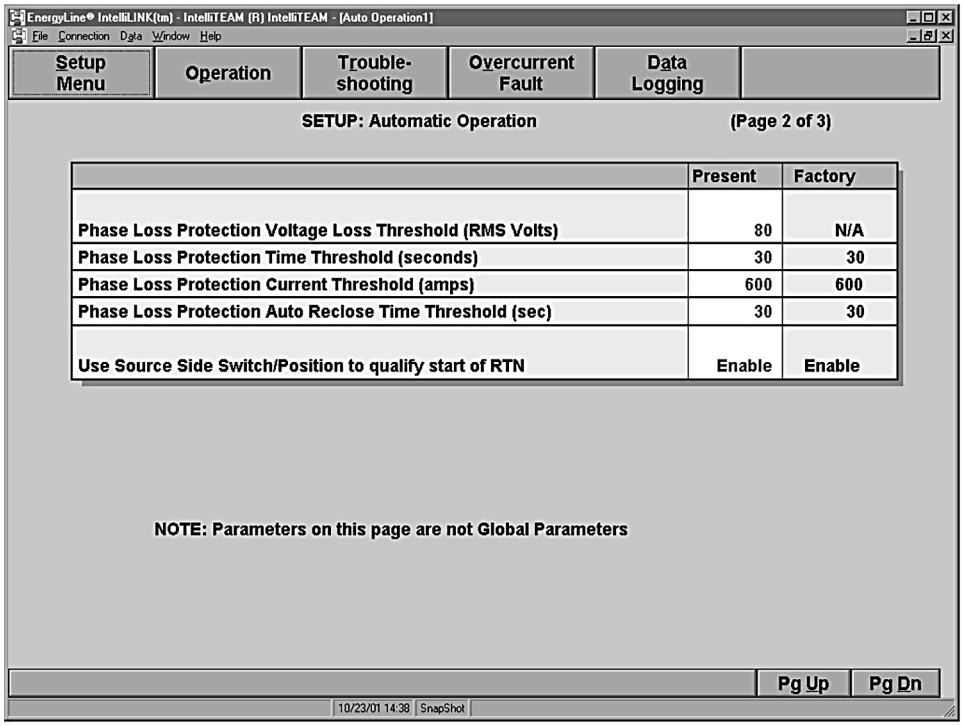


Figure 14. Page 2 of the *Setup>Automatic Operation* screen for a 5801 control.

About Phase Loss Protection

When **Phase Loss Protection** mode is enabled and the switch control detects a loss of voltage on one or two phases, it starts the **Phase Loss Protection Time Threshold** timer. If the voltage loss persists and true RMS current remains below the setpoint until the timer expires, the control trips open the line switch. When voltage returns on one phase but is then lost on another phase, the switch control restarts the timer.

In a wye system, if a phase loses voltage, the voltage reading is 0 for that phase. A phase imbalance is easily detected.

In a delta system, the loss of one phase results in sensor readings with magnitudes slightly more than ½ of normal phase-to-phase voltage. Simultaneous loss of two phases is not detectable as a phase imbalance condition.

The screen shown in Figure 14 includes the following fields:

Phase Loss Protection Voltage Loss Threshold (RMS Volts)

When voltage on one or two phases drops below this value, the switch control starts the **Phase Loss Protection Time Threshold** timer. If the voltage stays continuously below this voltage until the timer expires, the control opens the switch. When this setpoint is set to **N/A**, the switch control uses the **Loss of Voltage Threshold** value configured on the *Setup>Site-Related* screen for both a three-phase voltage loss and for phase-loss protection. A higher value for this setpoint lets the switch control detect phase-loss conditions where there are delta-connected transformers and still provide accurate sensing of true 3-phase outages. A threshold of approximately 75% of the normal phase voltage is recommended (90 volts on a 120-volt base).

This setpoint is also used with the **Return to Normal** feature. For a **Return to Normal** operation to begin, all phases must have voltages above the **Phase Loss Protection Voltage Loss Threshold** and the **Loss of Voltage Threshold** setpoints. If the voltage stays above these thresholds for the length of the **Global Return to Normal Delay Time** timer, the team returns the line switches to their normal configuration.

Phase Loss Protection Time Threshold (seconds)

This is the number of seconds the switch control waits after it detects a loss of phase voltage before it trips open the switch. When the timer expires, if the voltage on one or two phases has remained below the **Phase Loss Protection Voltage Loss Threshold** setpoint value and the current has remained continuously below the **Phase Loss Protection Current Threshold** setpoint value, the control trips open the line switch.

At a minimum, this time should exceed the reaction time of any single-phase source-side recloser.

Phase Loss Protection Current Threshold (amps)

When minimizing loss-of-phase conditions, the control must switch the remaining live phases. To make sure these live phases have current flows that are safe for the control to switch, configure this setpoint to the load-break rating of the line switch.

About Automatic Reclose (in Conjunction with Phase Loss Protection)

When the **Automatic Reclose** feature is enabled and the switch is tripped open because of a phase imbalance, the control recloses the switch when voltage is again present on all three phases.

Note: The **Automatic Reclose** feature is not available in conjunction with **Automatic Transfer** mode unless the team is on a closed-loop circuit.

Phase Loss Protection Auto Reclose Time Threshold (seconds)

When **Automatic Reclose** mode is enabled, this is the number of seconds the switch control waits (after three-phase voltage is sensed) before it recloses the switch.

If the voltage status fluctuates, the control delays the reclose operation until the three-phase voltage stabilizes for this length of time or until an operator manually closes the switch or disarms the pending **Automatic Close** operation.

Use Source Side Switch/Position to qualify start of RTN

When this setpoint is enabled, the switch control can use the state of an adjacent team member to decide whether to start the **Return-to-Normal** process. Before the switch control can begin the process, all of the following must be true:

- The adjacent team member is on the normal source side of this control.
- The switch at the adjacent team member is closed.
- The adjacent team member reports stable voltage for the entire **Global Return to Normal Delay Time** setpoint.

This feature is useful for a multiple-switch team member when the voltage sensors are on the bus and the control will not locally detect the return of voltage.

Setting this to the **Disable** state forces the team member to use only the local voltage-status information when determining whether to start the **Return-to-Normal** process.

STEP 11. If this team member uses a radio, test communication with the radio.

For details, see the "Test Control-to-Radio Communications" section on page 44.

STEP 12. If necessary, reinitialize the switch control.

To reinitialize the switch control, click on the **Sensor Configuration** button at the *Setup Menu* screen and click on the **Reinitialize Device** entry.

STEP 13. Do one of the following:

- If this switch control is not the last member of this team, go to Step 14 on page 32.

  Complete a few final steps so this team member will be in the **Ready** state after the **Initiate the Team Configuration** command is issued from the last team member.
- If this switch control is the last member of this team, go directly to the "Global Team Values" section on page 32.

STEP 14. Enter the global team configuration values. Then, send them to the entire team.

Note: If this device is not presently part of a team, treat it as the last member of a one-member team and go to the "Global Team Values" section.

STEP 15. Exit the IntelliLink software.

Select the menu **File>Exit** option. Then, click on the **OK** button to exit the IntelliLink software.

STEP 16. Shut down the computer. Then, disconnect it from the switch control.

STEP 17. On the switch control faceplate, set the Automatic Operation ENABLE/DISABLE switch to the preferred position.

It is safest to leave the faceplate switch set to the **Disable** state – to avoid unexpected operation while the rest of the team is configured. Team setup and testing cannot be completed until this switch is set to the **Enable** state.

Global Team Values

Global values must be the same for all members of a team. Normally, these are entered at the last team member and sent to the other team members.

STEP 1. If this team uses radios, use the Setup Manager software to load the team address information into this switch control.

All radio address information is entered manually on the *Setup>Team Operation* screen, but it is much faster to use the Setup Manager software.

STEP 2. On Page 1 of the *Setup>Automatic Operation* screen, enter the correct **Global** values for this team. Then, go to the next step.

The **Global** values on this screen include:

Features Enabled [Switches 1 and 2, if applicable] [Global]

The switch control can perform the following automatic operations:

Note: Some team members may have different capabilities. Be sure to select a feature combination that is supported in all members of this team.

- None (all automatic-operation features disabled)
- Sectionalizing Only
- Phase Loss Protection Only
- Sectionalizing + Phase Loss Protection
- Phase Loss Protection with Automatic Reclose
- Sectionalizing + Phase Loss Protection with Automatic Reclose
- Sectionalizing + Automatic Transfer
- Phase Loss Protection + Automatic Transfer
- Sectionalizing + Phase Loss Protection + Automatic Transfer
- Sectionalizing + Automatic Transfer + Return to Normal Open
- Phase Loss Protection + Auto Transfer + Return to Normal Open
- Sectionalizing + Phase Loss + Auto Transfer + Return Open
- Sectionalizing + Auto Transfer + Return to Normal Closed
- Phase Loss Protection + Auto Transfer + Return Closed
- Sectionalizing + Phase Loss + Auto Transfer + Return Closed

Sectionalizing—Team members monitor conditions associated with breaker and recloser operations and sectionalize the line based on a combination of overcurrent, loss of voltage, and other sensed parameters.

Phase Loss Protection—Team members open their switches based on loss of voltage on one or two individual phases.

Phase Loss Protection with Automatic Reclose—The switch control opens the switch based on loss of voltage on one or two individual phases. It then recloses the switch once three-phase voltage is sensed for a specified length of time. The software does not close the switch if it was opened for any reason other than **Phase Loss Protection** mode.

Note: The **Automatic Reclose** mode is not available in conjunction with the **Automatic Transfer** mode unless the team is on a closed-loop circuit.

Automatic Transfer—The team of switch controls follows the sequences for sectionalizing and/or phase-loss protection. Team members then communicate with each other to isolate the faulted line section and restore power to unaffected sections based on **Load Transfer** mode and team parameters.

Note: For the IntelliTeam system to operate, choose a **Features Enabled** option that includes the **Automatic Transfer** mode.

Return to Normal Open—If the team reconfigured the circuit and power is restored to the faulted line section, the tie switch opens. The team members then return the affected circuit to its normal configuration. The circuit does not return to the **Normal** state if the team did not originally reconfigure the circuit, if another fault occurs, or if any of the team members is placed in the **Automatic Operation Disabled** mode.

Return to Normal Closed—If the team reconfigured the circuit and power is restored to the faulted line section, the team members close all of the switches. The tie switch then opens, returning the affected circuit to its **Normal** state. The circuit does not return to the **Normal** state if the team did not originally reconfigure the circuit, if another fault occurs, or if any of the team members is placed in the **Automatic Operation Disabled** mode.

Note: If one of the **Automatic Operation** options is selected (on either switch, if applicable), the faceplate Automatic Operation ENABLE/ DISABLE switch or a SCADA command can be used to disable the **Automatic Operation** mode. When the **None** mode is selected (on both switches, if applicable), the control puts the team member in **Automatic Operation Disabled** mode and ignores all commands from the faceplate Automatic Operation ENABLE/DISABLE switch and automatic operation cannot be enabled from the SCADA master station.

This will disable team operation. However, a multiple-switch team member (for example, an S&C 5802/5803 control) enters **Single Member** mode (acts alone as a two-switch team) if all of the following are true:

- The switch control does not have **Team Operation** mode set to the **Disabled** state.
- Both line switches are active team members.
- One of the switch positions is the normally open switch.

Note: Total loss of power to the switch control, because of complete battery discharge and no ac control power, will cancel all automatic operations in progress.

Note: A multiple-switch team member is one that controls two line switches. The following special rules apply when the **Features Enabled** setpoint is configured for teams that include multiple-switch team members:

- If the team configuration is initiated from a single-switch team member (for example, an S&C 5801 control or an S&C IntelliNode™ Interface Module), all multiple-switch team members set the **Features Enabled** setpoint to the same value for both line switches.
- If the team configuration is initiated from a multiple-switch team member, single-switch team members use the **Features Enabled for Switch 1** state. Other multiple-switch team members use the two **Features Enabled** settings. If one switch position needs a different value (such as the **All Automation Operations Disabled** mode), set it individually following the team configuration.

Global Transfer Process Time Limit (seconds) [Global]

This is the amount of time (in seconds) during which a team can transfer load. It applies both to **Reconfiguration** and **Return-to-Normal** operations. The timer starts when sectionalizing takes place after a fault or when the **Return-to-Normal** process starts at one or more team members. When the timer ends, no further transfer activity is allowed, regardless of whether the team members completed the process.

Note: Set the **Global Transfer Process Time Limit** setpoint for correct IntelliTeam system operation; the minimum time is based on communication delays. Make sure the time limit is long enough to account for a shots-to-lockout delay every time an open switch closes (see the "Shots-To-Lockout Time Threshold (seconds)" section on page 29). It should also be longer than the **Sectionalizer Reset and Extended Voltage Loss Time** setpoint (see page 28).

The number of team switches determines the minimum value for this setpoint. The suggested minimum value is the number of team switches multiplied by 10 seconds, plus the shots-to-lockout delays and a 10-second margin. For each multiple-switch team member, also allow up to 3 seconds per line switch for operation time.

For example, for a team of four overhead switches where the **Shots-To-Lockout Time Threshold** setpoint is set to 5 seconds, the minimum time is (4x10) + (3x5) + 10 = 65 seconds.

NOTICE

The IntelliTeam system prevents extended parallel-circuit conditions during a **Return-to-Normal** (closed-transition) process. If the normally open switch does not receive a message to open within the time limit, it reopens independently if the current measured at that switch is below the **Phase Loss Protection Current Threshold** setpoint. When the normally open device is a recloser controlled by an IntelliNode Interface Module, the present line current does not matter.

Global Return to Normal Delay Time (minutes) [Global]

Power must be restored to the faulted line section for this amount of time (in minutes) before the **Return-to-Normal** process will start. In general, set this time to a value longer than the **Sync Interval** setpoint on the *Team Operation* screen. If this parameter is set to the **On Command Only** mode (its maximum value), the team will only start the **Return-to-Normal** process if it receives a **Return-to-Normal** command via SCADA or from an authorized device external to the team.

Note: When the team receives a command to begin the **Return-to-Normal** process, it will do so regardless of switch states or remaining fault conditions.

STEP 3. At Page 1 of the *Setup>Automatic Operation* screen, click on the **PgDn** button to display Page 3 of the *Setup>Automatic Operation* screen. See Figure 15.

Enter the correct values for this switch control.

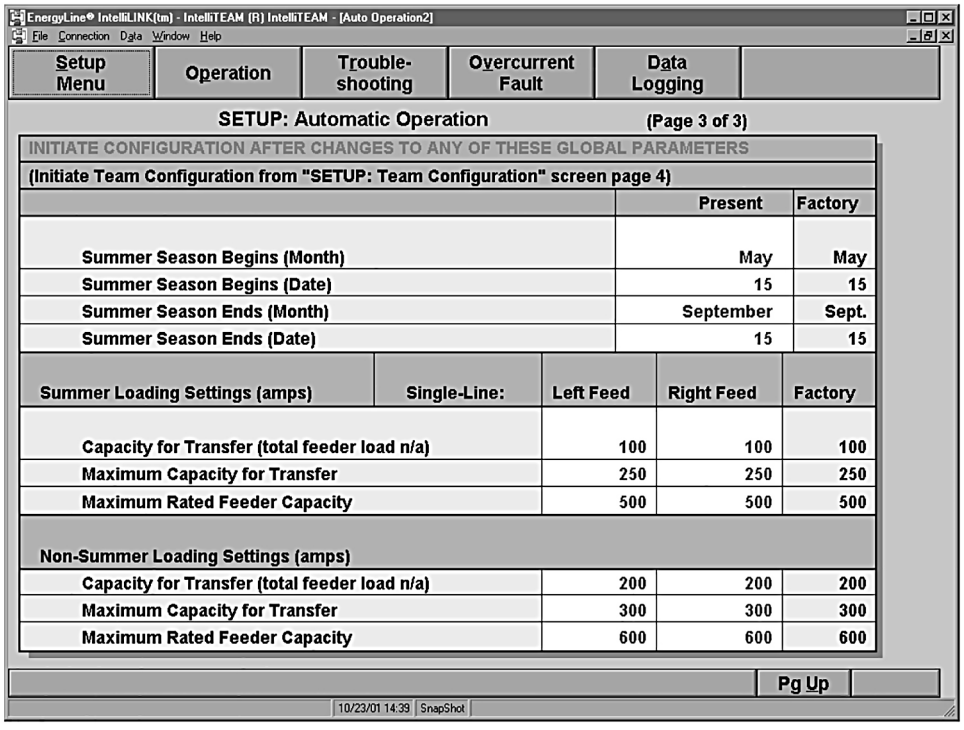


Figure 15. Page 3 of the *Setup>Automatic Operation* screen for a 5801 control.

About the Automatic Transfer Setpoints

When **Automatic Transfer** mode is enabled, the team members try to restore power to as many customers as possible by transferring load to an alternate source. During circuit reconfiguration, each team member can transfer load either to the left-side or to the right-side team member. The values entered on this screen correspond to the additional capacity available on the left feed and the right feed. Each feed has summer and non-summer load settings.

When real-time feeder loading data are not available to the team members, the **Capacity for Transfer** setpoint value limits how much load the member can transfer. When real-time feeder loading data are available, the **Maximum Capacity for Transfer** and **Maximum Rated Feeder Capacity** setpoints together determine the load the team members can transfer based on present conditions.

Page 3 of the *Setup>Automatic Operation* screen includes the following fields:

Summer Begins (Month) [Global]
Summer Begins (Date) [Global]

These setpoints select the date to begin the summer season.

Summer Ends (Month) [Global]
Summer Ends (Date) [Global]

These setpoints select the date to end the summer season. For example, set this date to "September 15." Then, the **Non-Summer Loading Settings** setpoint takes effect one minute after midnight on September 16.

Summer Loading Settings (amps)
Non-Summer Loading Settings (amps)

Capacity for Transfer (total feeder load n/a) [Global for each feeder]

Enter a conservative load value for transfer; a transfer of this amount could occur at any time and still be accommodated by the alternate feeder. Be sure to consider average loading, peak loading, and the emergency load capacity on the alternate feeder.

The alternate feeder will pick up a new section only if the last one-minute averaged load logged before the transfer event is less than this setpoint value.

Maximum Capacity for Transfer [Global for each feeder]
Maximum Rated Feeder Capacity [Global for each feeder]

Enter appropriate values for the system.

When real-time loading data are available, the control uses these two setpoints together to determine how much load can be transferred to the alternate circuit. First, the control subtracts the present load on the alternate feeder from the **Maximum Rated Feeder Capacity** setpoint. This is the **Available Rated Capacity** value. The switch control also checks the **Maximum Capacity for Transfer** setpoint. That is the maximum amount of load that may be transferred when the feeder is lightly loaded.

If the load to be transferred does not exceed either the **Available Rated Capacity** value or the **Maximum Capacity for Transfer** setpoint, the alternate feeder can pick up the line section.

A SCADA master station or other SCADA device can transmit the **Real-Time Feeder Loading** value to the switch control using analog output points 3 and 4. For information about analog output points, see the applicable DNP Points List and Implementation document.

Note: Each team member keeps the last reported **Real-Time Feeder Load** value for 20 minutes. If the value is not updated within that time, the team member assumes **Real-Time Feeder Load** data are not available and instead uses the **Capacity for Transfer** setpoint.

Example 1: The **Maximum Rated Feeder Capacity** setpoint is 500 amps. On this feeder, the last section is wired with a small-diameter conductor and can only handle 150 A; therefore, the **Maximum Capacity for Transfer** setpoint is 150 amps.

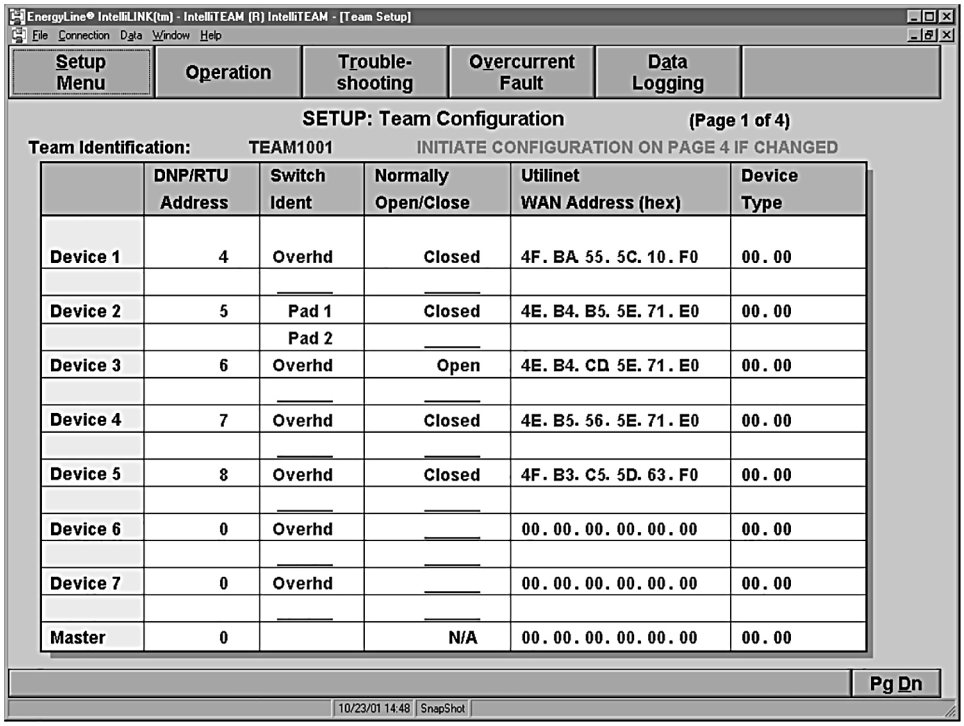
Before a transfer event, the **Real-Time Feeder Load** is reported as 200 A. This leaves 300 A of available rated capacity. However, because of the conductor limitations of the last section of the feeder, the team can only transfer 150 A of the available 300 A.

Example 2: In a team of seven switch controls, with Device 5 at the normally open position, voltage is lost at the source feeding Device 1. Devices 1 through 4 all open their switches after the **Sectionalizer Reset and Extended Voltage Loss Time** setpoint expires.

The **Maximum Capacity for Transfer** setpoint for the left feed is 120 A. Device 5 checks the real-time load on the segment between it and Device 4; the load is 40 A, so Device 5 closes its switch. Then, Device 4 checks the load between it and Device 3; that load is 50 A, so Device 4 closes its switch. When Device 3 checks, the load between it and Device 2 is 50 A as well. However, because only 30 A of capacity for transfer remains, the team cannot transfer any more load. Devices 1 through 3 remain open.

STEP 4. At the *Setup Menu* screen, click on the **Team Setup** button to display Page 1 of the *Setup>Team Configuration* screen. See Figure 16. Do one of the following:

- If the Setup Manager software entered the address information, confirm the values are correct, and then go to the next step.
- If the Setup Manager software was not used, enter the address information manually. Then, go to the next step.



	DNP/RTU Address	Switch Ident	Normally Open/Close	Utilinet WAN Address (hex)	Device Type
Device 1	4	Overhd	Closed	4F. BA. 55. 5C. 10. F0	00. 00
Device 2	5	Pad 1	Closed	4E. B4. B5. 5E. 71. E0	00. 00
		Pad 2			
Device 3	6	Overhd	Open	4E. B4. CD. 5E. 71. E0	00. 00
Device 4	7	Overhd	Closed	4E. B5. 56. 5E. 71. E0	00. 00
Device 5	8	Overhd	Closed	4F. B3. C5. 5D. 63. F0	00. 00
Device 6	0	Overhd		00. 00. 00. 00. 00. 00	00. 00
Device 7	0	Overhd		00. 00. 00. 00. 00. 00	00. 00
Master	0		N/A	00. 00. 00. 00. 00. 00	00. 00

Figure 16. Page 1 of the *Setup>Team Configuration* screen.

This page configures the WAN address and other information for each team member. The IntelliTeam system uses a single-line representation of the circuits. Device 1 is the team member furthest left on a single-line circuit. For a radial circuit, start the single-line representation with the team member closest to the substation. For the master device, enter information for the SCADA master station, if there is one for this team.

Team members do not have to be numbered consecutively. However, the numbers should increase when moving from left to right on the single-line representation. For example, if the team presently has 4 team members but another may soon be added in the middle of the circuit, one could enter the present team members as Device 1, Device 2, Device 4, and Device 5.

This page of the *Setup>Team Configuration* screen includes the following fields:

Team Identification [Global]

Enter the name assigned for this team. The name identifies the team to the SCADA master station operator and appears on all reports generated from the team members. During team configuration, the name is passed along with the other information. It also appears on the faceplate LCD screen.

DNP/RTU Address [Global]

This entry is the RTU address of each team member and must be the same as the Communications RTU Address on the *Setup>Communications* screen for that team member.

Switch Ident [Global]

This entry identifies the type of switch equipment operated by the control. For a single, pole-mounted, overhead switch or recloser, set this to **Overhd** mode. For two pad-mounted switches, set this to Pad 1 or Pad 2. Enter identifiers for the multiple-switch team members in the order in which the switches appear in the single-line diagram. For example, if the circuit loops from Device 3 to Device 4 by entering switch 2 and leaving through switch 1, Pad 2 should appear above Pad 1 on the entry screen. Also, make sure each switch is associated with its correct normally open or normally closed state.

Normally Open/Close [Global]

This entry is the state of the line switch when the circuit is configured normally. The team uses this information during transfer operations. Each team should have no more than one normally open switch. For a multiple-switch team member, indicate the correct normal state of each switch, even if one switch is not active within the team.

UtiliNet WAN Address [Global]

This entry is the encoded version of the latitude and longitude (WAN address) for the UtiliNet radio connected to each team member. Normally, use the Setup Manager software to create the encoded addresses from the raw latitude/ longitude numbers, and import them into this screen. When this team does not use UtiliNet radios, leave these entries set to all zeros.

Device Type [Global]

This entry is the device code for each member of the team. For example, the code for an IntelliTeam switch control connected to a Scada-Mate Switch is 00.00.01.01. The code cannot be changed for team members. For sideline devices, however, this value must be entered manually on Page 4 of this screen.

STEP 5. At Page 1 of the *Setup>Team Configuration* screen, click on the **PgDn** button to display Page 2. See Figure 17.

Enter these **Global** values.

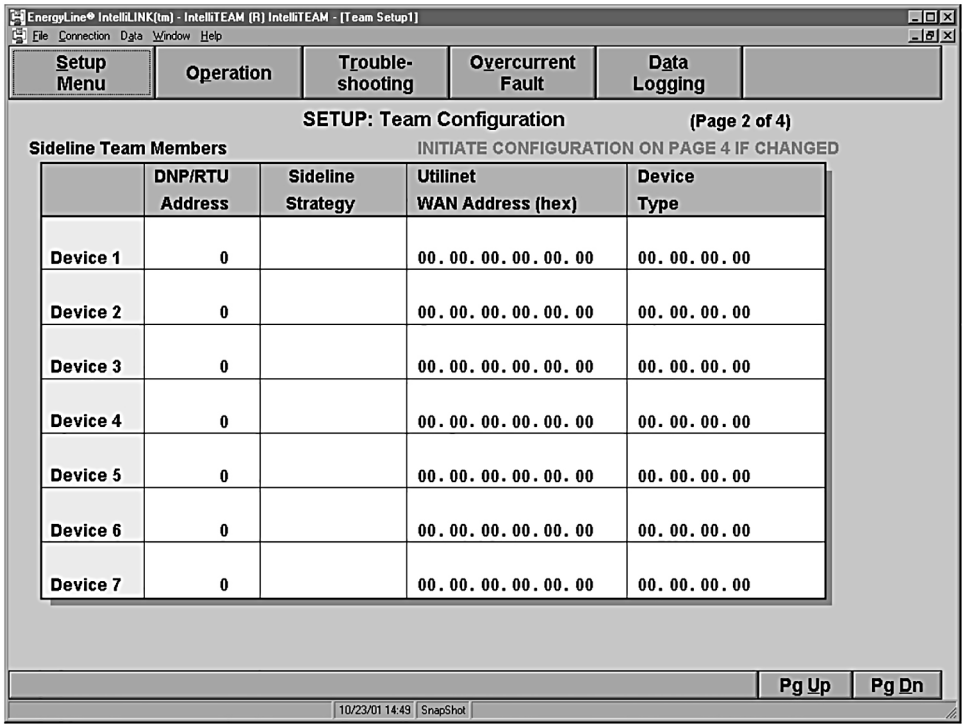


Figure 17. Page 2 of the *Setup>Team Configuration* screen.

This page lists assorted information for the sideline team members. Sideline team members are devices that provide operational data to active team members. This information is used by the IntelliTeam system reconfiguration process.

Page 2 of the *Setup>Team Configuration* screen contains the following fields:

Device [Global]

An active team member and its associated sideline team member must have the same device number. This applies only to team members connected to reclosers.

DNP/RTU Address [Global]

This column shows the DNP/RTU address for the sideline device connected to each team member. The address here must be the same as the address entered in the device. Leave this set at zero when there is no sideline device.

Sideline Strategy [Global]

This field is reserved for use with future IntelliTeam versions.

Utilinet WAN Address [Global]

This column shows the encoded latitude/longitude address (WAN address) for the UtiliNet radio used by each sideline device.

Normally, the Setup Manager software is used to create the encoded addresses from the raw latitude/longitude numbers in the nodes table. The addresses are then imported to this screen. For a sideline device that does not use a radio, leave this set to zero.

Device Type [Global]

This entry is the identification code for each sideline device. This information must be entered manually for each sideline device in this team. For team members, however, this information is entered automatically on Page 1 of this screen and cannot be changed. Table 1 lists all existing device types.

Note: In the **Device Type** field, each pair of digits is in a separate field. Click on the field for the first pair to highlight and change those numbers. Then, click on the field for the second pair to change those numbers, etc.

Table 1. Device Type Code for Sideline Devices

Device Type	Device Description
00.01.04.01	Cooper F5 Recloser, sideline team member
00.00.04.01	Recloser IntelliTeam Module, IntelliTeam
00.00.01.01	S&C Scada-Mate, IntelliTeam (2800 version)
00.00.01.11	S&C Scada-Mate, IntelliTeam (5800 version)
00.00.01.21	S&C Scada-Mate, IntelliTeam with Gateway
00.00.01.12	Universal switch, IntelliTeam (5800 version)
00.00.03.13	S&C Pad-mounted, IntelliTeam
00.00.03.23	S&C Pad-mounted, IntelliTeam with gateway
00.00.01.13	S&C Scada-Mate, standalone
00.00.03.33	S&C Pad-mounted, standalone
00.00.01.32	Universal switch, standalone
00.00.05.31	M Series Motor Operator, standalone

STEP 6. At Page 2 of the *Setup>Team Configuration* screen, click on the **PgDn** button to display Page 3. See Figure 18.

Enter these **Global** values.

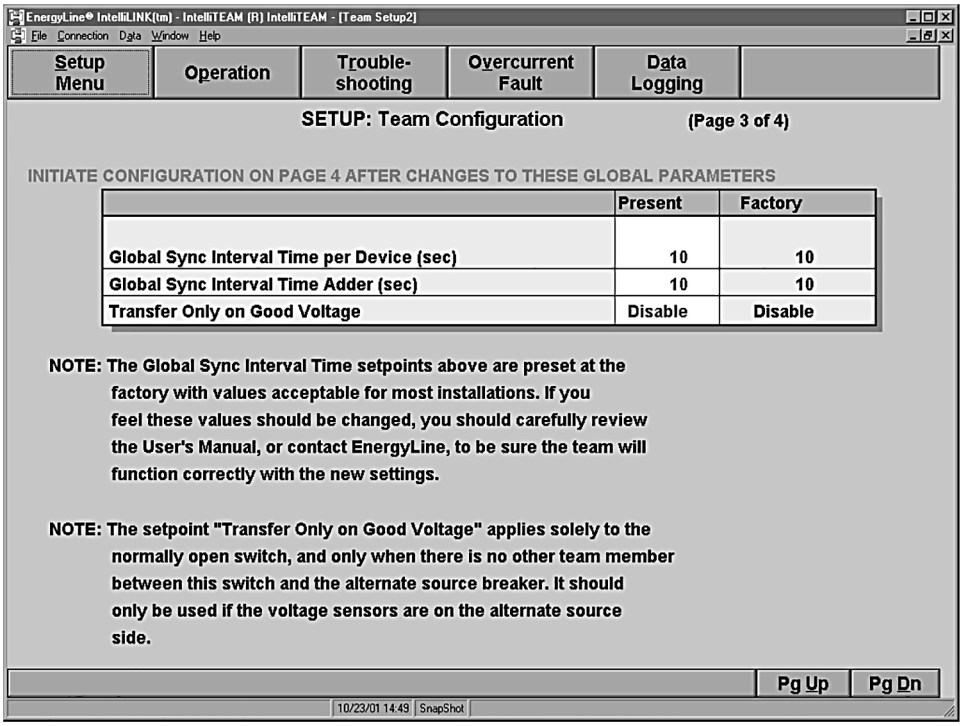


Figure 18. Page 3 of the *Setup>Team Configuration* screen.

This screen adjusts the team global sync interval. The **Global Sync Interval Time** setpoints are preset at the factory with values acceptable for most installations. If these values must be changed, carefully review the **Sync Interval** setpoint on Page 2 of the *Team Operation* screen and the values on Page 2 of the *Setup>Communications* screen, or contact S&C, to be sure the team will function correctly with the revised settings.

Global Sync Interval Time per Device (sec) [Global]
Global Sync Interval Time Adder (sec) [Global]

These setpoints are used together to calculate the synchronization interval for the team using database records (see Page 2 of the *Team Operation* screen). The sync interval calculation is:

[(device database records in use) x **Time per Device** setpoint] + **Time Adder** setpoint = the **Sync Interval** value

For example, for a four-member team and using the factory default values, the sync interval is [(4 x 10) + 10] = 50 seconds. This sync interval time affects the overall time it takes for the team to enter the **Ready to Transfer** state during startup following an event and after the correction of an error. The **Global Transfer Process Time Limit** and **Global Return to Normal Delay Time** setpoints are also affected by the sync interval time.

The quality and speed of communication are important factors to consider when changing the global sync interval setpoints. Slower communication times may require a slightly longer sync interval, while faster communication may allow slightly shorter sync intervals. Communication parameters on the *Setup>Communications* screens may also need adjustment in these cases as well.

For the team to operate properly and reliably, a good balance among the sync interval time, team performance, and communications performance must be selected.

Transfer Only on Good Voltage [Global]

When this setpoint is enabled, the normally open switch or recloser does not close if it detects a voltage loss on the alternate feeder.

Note: This setpoint applies solely to the normally open switch in the team, if one exists, and only when there is no other team member between this switch and the alternate source breaker. It should only be used when the voltage sensors are on the alternate source side. Enabling this setpoint when these conditions do not apply will result in improper operation of the team during transfer events.

STEP 7. If desired, review the information on the two pages of the *Setup>Automatic Operation* screen and the three pages of the *Setup>Team Configuration* screen to make sure everything is correct.

When this step is completed, team configuration can be initiated.

Team Configuration

Initiate a Team Configuration at the Last Team Member

After global parameters have been entered at the last team member, the next step is to initiate the team configuration. To do this, send the global information to the other team members. Then, confirm that all team members are communicating and synchronized:

STEP 1. At Page 3 of the *Setup>Team Configuration* screen, click on the **PgDn** button to display Page 4. See Figure 19.

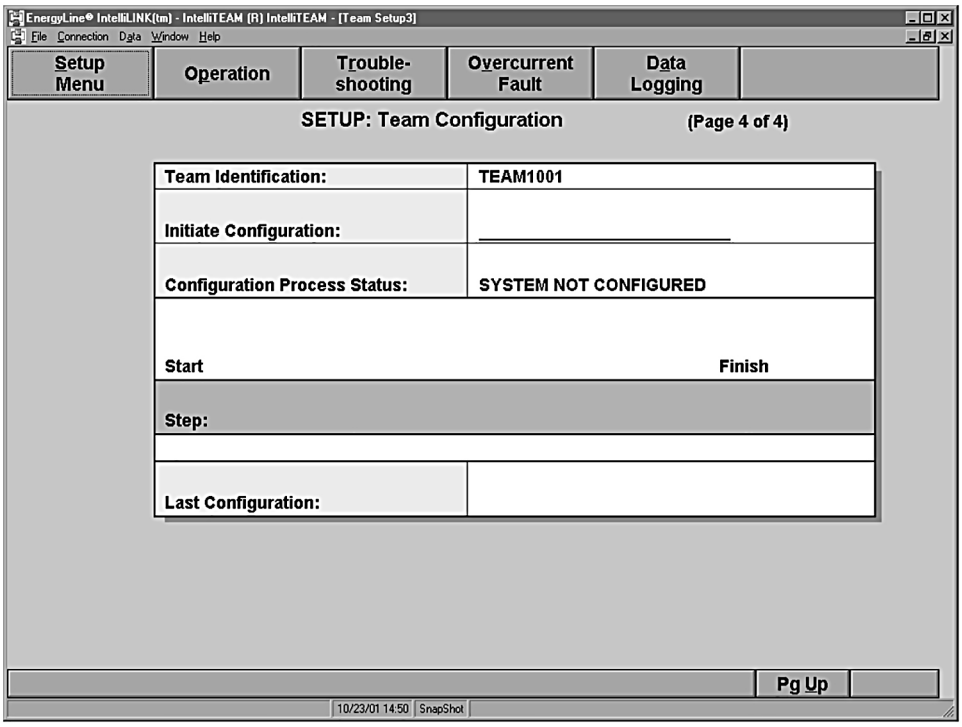


Figure 19. Page 4 of the *Setup>Team Configuration* screen.

This page of the screen includes the following fields:

Team Identification

This is the designation for this specific team. The name is set on Page 1 of the *Setup>Team Configuration* screen and it cannot be changed here.

Initiate Configuration

When setting this field to **Initiate** mode, all global team parameters presently set in this team member are transmitted to the other members of the team.

When this field is set to **Start Team Communications** mode and the **OK** button is clicked, the **Configuration Process Status** value changes to the **Configuring Team Devices** state. The **Step** field briefly displays "Configuring address table in local radio," then "Informing team devices the configuration process is starting." This message persists until the **Initiate Configuration** command is selected. While communication between team members is stopped, the **Team Status** field on Page 1 of the *Team Operation* screen displays the **Not Operational** state.

Configuration Process Status

This field displays the present status of the team-configuration process. Possible messages are:

- SYSTEM NOT CONFIGURED
- Configuring Team devices
- System Configured
- SYSTEM CONFIGURATION FAILED

Step

This field displays the steps performed during a configuration process:

- Configuring address table in the local radio
- Informing team devices the configuration process is starting
- Waiting for acknowledgment of configuration process starting
- Sending device address information to team members
- Waiting for acknowledgment of address information
- Sending sideline device information to team members
- Waiting for acknowledgment of sideline information
- Sending global parameters to team members
- Waiting for acknowledgment of global parameters
- Starting local device/radio configuration process
- Waiting for completion of local device/radio configuration

Last Configuration

This is the date and time of the last configuration process performed at this switch control. A configuration process initiated at another team member is not recorded here.

STEP 2. Start the configuration process.

Click on the **Initiate Configuration** field, and select the **Initiate** command. Then, click on the **OK** button.

STEP 3. Monitor the progress of the team configuration.

The messages in the **Configuration Process Status** and **Step** fields show the present state of the operation. The process is complete when the advancing status bar in the center of the screen reaches the right side.

STEP 4. When configuration is finished and the **Status** field shows the **System Configured** state, make any required local changes to the global values in this control.

Under very unusual circumstances, it may be necessary to manually enter a different global value at one or more team member. If so, do it now.

Note: Carry out this step only if instructed to do so by S&C Electric Company.

STEP 5. Go to Page 2 of the *Team Operation* screen.

(a) Click on the **Operation** button to open the *Operation Menu* screen.

(b) At the *Operation Menu* screen, click on the **Team Operation** button to view Page 1 of the *Team Operation* screen.

(c) Click on the **PgDn** button to view Page 2. See Figure 20 on page 43.

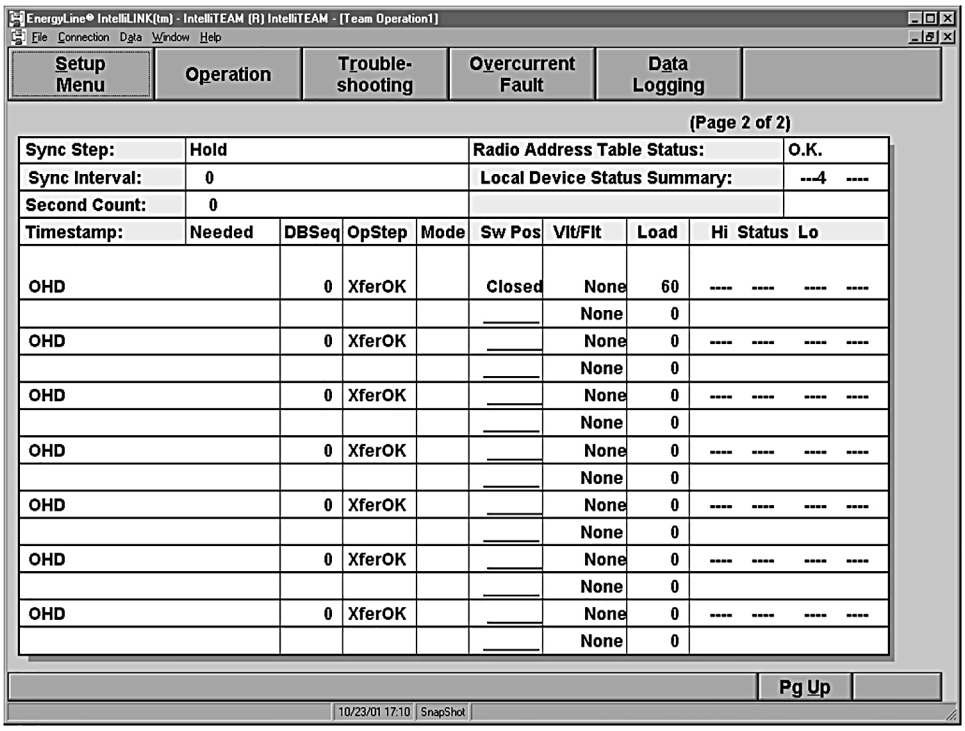


Figure 20. Page 2 of the *Team Operation* screen.

STEP 6. Check the sync activity.

(a) In the first column, confirm that the **Timestamp** value is within one second for all team members.

(b) Confirm that the **DBSeq** value is the same for all team members and that it changes.

Note: If the team is not in sync within 5 minutes after configuration is complete, check the *Troubleshooting>Various Counters* screen. If the **2way** time values are inconsistent or the **Number of Retries** value is increasing, use the RadioShop software to check the communication paths. For more information, review RadioShop documentation.

STEP 7. When all team members are in sync, follow the steps in the "Enable Normal Team Operation and Test the Team" section to complete the team setup and begin normal team operation.

Enable Normal Team Operation and Test the Team

After team configuration is initiated, a few final steps must be completed to enable normal team operation.

STEP 1. If necessary, reinitialize the switch control. Click on the **Sensor Configuration** button on the **Setup Menu** screen and reinitialize the switch control.

STEP 2. Make sure all team members enter the **Team** mode.

(a) Toggle the faceplate ENABLE/DISABLE switch to the **Disable** state and back to the **Enable** state. If the switch is already in the DISABLE position, toggle it to the **Enable** state.

(b) On Page 2 of the *Team Operation* screen, confirm that the value in the **Mode** column is **Team** for all team members.

STEP 3. If desired, review the present status of the switch control and the team.

(a) Click on the **Operation** button to display the *Operation Menu* screen.

(b) Do either of the following:

- For information about the local switch control, click on the **Local Operation** button.
- For information about the team, click on the **Team Operation** button.

For a detailed explanation of the *Local Operation* and *Team Operation* screens, see the "View the Local Operation Screen" and "View the Team Operation Screens" sections in Instruction Sheet 1042-550, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Troubleshooting*."

STEP 4. If desired, run a team transfer test.

An actual transfer event can be tested to help ensure the team is operating properly. For details, see the "Team Transfer Test" section at the explanation of the *Team Operation* screen in Instruction Sheet 1042-550, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Troubleshooting*."

⚠ WARNING

Exercise extreme caution when performing this test. Switches will open and close during the procedure; if they are not properly bypassed, load will be dropped. The tie switch will also close, paralleling the circuits.

Note: If any faceplate ENABLE/DISABLE switch is left set to the **Disable** state, the installer must return to that team member and manually change it to the **Enable** state before a team transfer test can be run.

STEP 5. If needed, generate a report.

Generate a report if a printed record of the team settings is needed or if a problem exists that requires help from S&C Electric Company. For more information, see the "Generating Reports" section in Instruction Sheet 1042- 540, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Operation*."

STEP 6. Exit IntelliLink software.

Click on the **File>Exit** menu entries. Then, click on the **OK** button in the dialog box to exit the IntelliLink software.

STEP 7. Shut down the computer and disconnect it from the switch control.

STEP 8. On the switch control faceplate, set the REMOTE/LOCAL and Automatic Operation ENABLE/DISABLE switches for the desired operation states.

For normal team operation, set the AUTOMATIC OPERATION switch to the **Enable** state.

Test Control-to-Radio Communications

When this switch control uses a radio, test communications between the control and its radio:

STEP 1. Go to Page 1 of the *Setup>Communications* screen.

For details, see Figure 11 on page 23.

STEP 2. Set the **Control-to-Radio Local Comm Link Test** field to the **Initiate Test** state.

The switch control checks the communication link to the radio. If the control cannot communicate with the radio or there is no radio, the message box displays "Failed, No Response." Otherwise, a message is temporarily displayed that states the test was successful.

If communication with the radio fails, see the suggestions in the "Team does not communicate" section in Instruction Sheet 1042-550, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Troubleshooting*."

Change an Existing Team Configuration

A new team configuration can be initiated any time the system is stable.

⚠ WARNING

Do not try to initiate a new team configuration while the team is performing an automatic operation or waiting for a timer to expire so it can complete an automatic operation.

STEP 1. At any suitable member of the team, toggle the faceplate ENABLE/DISABLE switch to the **Disable** state.

Under most conditions, a new configuration can be initiated from any member of the team. When the team contains a multiple-switch team member or a global value must be manually changed at one of the team members after the new configuration was initiated, make the change from that control.

STEP 2. Make all needed adjustments to the global values.

For details, see the "Global Team Values" section on page 32.

STEP 3. Follow the steps in the "Initiate a Team Configuration at the Last Team Member" section on page 41 and the "Enable Normal Team Operation and Test the Team" section on page 43 to initiate the new team configuration.

This completes the switch control setup procedure.