Operation

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Qualified Persons

⚠ WARNING

Only qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead and underground electric distribution equipment, along with all associated hazards, may install, operate, and maintain the equipment covered by this publication. A qualified person is someone 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 special precautionary techniques, personal protective equipment, insulated 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

Thoroughly and carefully read this instruction sheet and all materials included in the product's instruction handbook before installing or operating the IntelliNode Interface Module. Become familiar with the Safety Information and Safety Precautions on pages 4 and 5. 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 the IntelliNode Interface Module. Designate a location where users can easily retrieve and refer to this publication.

Proper Application

⚠ WARNING

The equipment in this publication is only intended for a specific application. The application must be within the ratings furnished for the equipment. Ratings for the IntelliNode Interface Module are listed in the ratings table in Specification Bulletin 1043-31.

Special Warranty Provisions

The standard warranty contained in the seller's standard conditions of sale, as set forth in Price Sheets 150 and 181, applies to IntelliNode Interface Modules, except that the first and second paragraphs of said warranty are 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, and maintained in accordance with 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.

The seller further warrants to the immediate purchaser or end user that for a period of two years from the date of shipment the software will perform substantially in accordance with the then-current release of specifications if properly used in accordance with the procedures described in seller's instructions. The seller's liability regarding any of the software is expressly limited to exercising its reasonable efforts in supplying or replacing any media found to be physically defective or in correcting defects in the software during the warranty period. The seller does not warrant the use of the software will be uninterrupted or error-free.

For equipment/services packages, the seller warrants, for a period of one year after commissioning, that the IntelliNode Interface Modules will provide automatic fault isolation and system reconfiguration per agreed upon service levels. The remedy shall be additional system analysis and reconfiguration of IntelliTeam SG system until the desired result is achieved.

Warranty Qualifications

The standard warranty contained in the seller's standard conditions of sale, as set forth in Price Sheets 150 and 181, 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, communication devices, and remote terminal units. However, S&C will assign to the immediate purchaser or end user all manufacturers' 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 impact performance of equipment/services packages; for example, new construction which 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 IntelliNode Interface Module. Become familiar with these types of messages and the importance of these various signal words:

⚠ DANGER

"DANGER" identifies the most serious and immediate hazards that will 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 any portion of this instruction sheet is not understood and assistance is required, contact the nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C's website **sandc.com**, or call the S&C Global Support and Monitoring Center at 1-888-762-1100.

NOTICE

Read this instruction sheet thoroughly and carefully before installing or operating the IntelliNode Interface Module.

Replacement Instructions and Labels

If additional copies of this instruction sheet are required, contact the 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 the nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

⚠ DANGER

The IntelliNode Interface Module line voltage input range is 93 to 276 Vac. Failure to observe the precautions below will result in serious personal injury or death.

Some of these precautions may differ from your company's operating procedures and rules. Where a discrepancy exists, follow your company's operating procedures and rules.

1. **Qualified Persons.** Access to the IntelliNode Interface Module must be restricted only to qualified persons. See the "Qualified Persons" section on page 2.
2. **Safety Procedures.** Always follow safe operating procedures and rules. Always maintain proper clearance from energized components.
3. **Personal Protective Equipment.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, arc-flash clothing, and fall protection, in accordance with safe operating procedures and rules.
4. **Safety Labels and Tags.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels and tags. Remove tags ONLY if instructed to do so.
5. **Maintaining Proper Clearance.** Always maintain proper clearance from energized components.

Applicable Software

These instructions were prepared for use with IntelliNode software installer versions ITNInstaller-7.6.x and later. References in this manual to the IntelliTeam SG Automatic Restoration System apply to IntelliTeam SG software revision 7.6.x, as indicated in Instruction Sheet 1044-570, "S&C IntelliTeam® Designer: *User's Guide*."

The revision number can be found on the *Setup>General>Revisions* screen. For questions regarding the applicability of information in this chapter to previous software releases or future versions later than 7.6.x, contact S&C Electric Company.

⚠ WARNING

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.

⚠ 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.

The S&C IntelliNode Interface Module is connected to switchgear operating at primary voltage levels. High voltage may be present in the wiring to the switch control or the switch control itself during certain failures of the switchgear wiring or grounding system, or because of a failure of the switch itself. For this reason, access to the switch control should be treated with the same safety precautions that would be applied when accessing other high-voltage lines and equipment. Follow all locally approved safety procedures when working on or around this switch 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 such things as smoke, fire, open fuses, crackling noises, loud buzzing, etc. If a malfunction is suspected, treat all components of the installation, including the switch control and associated mounting hardware, as though they were elevated to primary (high) voltage.

Whenever manually reconfiguring the circuit (for example, during repairs), follow your company's operating procedures to disable automatic operation of the IntelliTeam SG Automatic Restoration System. This prevents any unexpected operation of a team member.

The IntelliTeam SG Automatic Restoration System can be disabled by selecting the **Prohibit Restoration** state for any member of a team being disabled.

IntelliNode Faceplate

This section describes various IntelliNode module displays and controls. The "Operational Overview" section on page 12 explains how these components work with the external device to monitor the distribution feeder and manage switch operation.

IntelliNode module controls are shown in Figures 1 and 2.

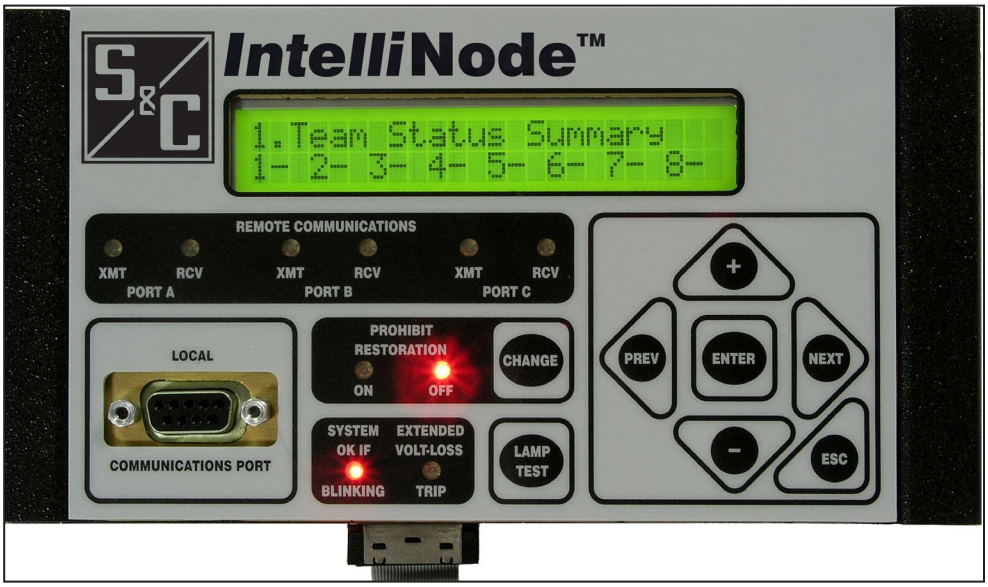

Figure 1. The panel-mounted IntelliNode module faceplate.

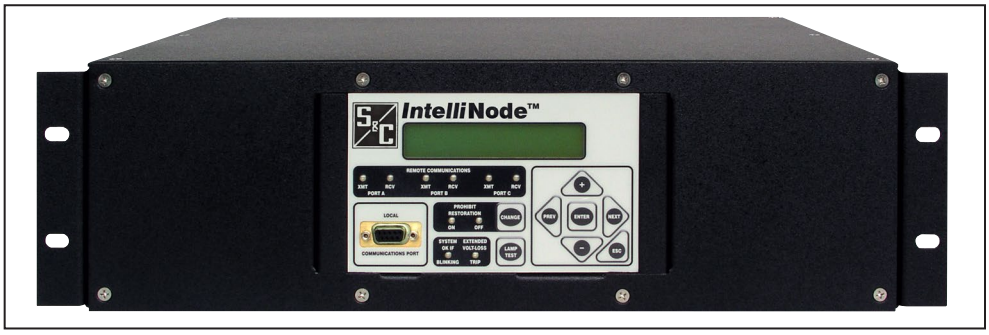

Figure 2. The rack-mounted IntelliNode module faceplate.

Local Communication Access Port—This port connect the computer to the IntelliNode module and uses IntelliLink software to view data, change setpoints, download logged data, and update IntelliNode module software.

Power Input Terminals—The panel-mounted IntelliNode module requires 12 Vdc. The rack-mounted IntelliNode module can be ordered for a specific power requirement of 12 Vdc, 24 Vdc, 48 Vdc, 125 Vdc, 120 Vac, or 240 Vac.

IED Communication Port—This port connects to the external device and communicates using DNP 3.0 protocol. The IntelliNode module is configurable to use the DNP points mapped in the host device to satisfy the data requirements of the IntelliTeam SG system.

Two Radio Communication Ports—These ports are used for connection to an S&C SpeedNet® Radio, a fiber-optic transceiver, or other SCADA radio. The DNP points list is configurable.

Faceplate LEDs

The faceplate includes these LEDs:

Prohibit Restoration

These LEDs indicate when the **Prohibit Restoration** mode is in the **Enabled** state.

Extended Volt-Loss Trip

This LED is on when a trip occurs because of the IntelliNode module's extended voltage-loss logic.

System OK If Blinking

This LED blinks once per second when the IntelliNode module software is running normally.

Remote Communication RCV/XMT Indicator

These LEDs blink when the switch control sends or receives signals through remote communication equipment installed in the control enclosure. There are separate indicators for Port A and Port B. The RCV indicator blinks when the switch control detects an incoming character. The XMT indicator blinks when the switch control sends one or more characters. Comm Ports A, B, and C are indicated.

Activity will be seen on these LEDs only if remote communications equipment is installed, properly connected, and receiving power. The XMT LED blinks any time a transmission is attempted, regardless of whether the communications equipment is properly installed.

Faceplate Switches

The faceplate includes the following switches:

Prohibit Restoration

Press the CHANGE button to enable or disable the **Prohibit Restoration** mode.

Note: When selecting the **Prohibit Restoration** mode, the IntelliTeam SG system operation in all teams tied to this control is disabled.

Lamp Test switch

Press this switch to illuminate all LEDs and test that they operate.

LCD Display Navigation switches

Use this switch group to scroll each LCD screen into view and enter commands from the faceplate. The **ESC** button returns the LCD screen to the main screen, which displays team status information.

Faceplate LCD

The faceplate LCD screen quickly accesses key information while the user is at the site. The LCD screen shows five categories of information. See Table 1 on page 9. The top line of the display always begins with the category number.

- **Team Status Info—**This display includes the team ID and the **Ready/Fault/Alarm** status for each team where this control is a member. "R" indicates the team is in the **Ready** mode to take action (even if a transfer event has already taken place) and that there are no errors, faults, or team communication problems present. "F" indicates this team is isolating a faulted line segment. "A" indicates an **Alarm** state is active. An active switch error and the **Prohibit Restoration** status are also indicated. Real-Time Load and Capacity are displayed for each team. Team-status information is also reported on the *IntelliTeam SG>Team Summary* screen.)
- **Changeable Parameters**
- **External Device Information**
- **Communications Information**
- **Miscellaneous Information—**The software version, firmware identification, and physical location of the control are indicated. These values are also reported on the *Setup>General* screen.

Table 1. IntelliNode LCD Data

Category	Field	Description
1. Teams	1. Team Status Summary (indicated for each team by team number)	R = **Ready** status A = **Alarm** status F = **Faulted** status – = **Team not configured** status
	1. Team Sw. Errors:	When PRESENT, press the ENTER button to clear the error indication
	1. Team Prohibit Restore	ON or OFF, use the CHANGE Prohibit Restoration button, on the faceplate, to change the status
	1. Team 1 <Name>	Load and Capacity (Amps x 1.0) (Note: The team <Name> is entered on the *IntelliTeam SG>Team X* screen.)
	1. Team 2 <Name>	
	1. Team 3 <Name>	
	1. Team 4 <Name>	
	1. Team 5 <Name>	
	1. Team 6 <Name>	
	1. Team 7 <Name>	
	1. Team 8 <Name>	
2. Changeable Parameters	2. Compact Flash	ON or OFF, press the ENTER button to change the state (Turn off before removing the CF card.)
	2. Volt Loss Sectionalize	ON or OFF, press the ENTER button to change the state
3. External Device	3. Switch Status	CLOSED, OPEN, BAD, or ERROR
	3. Supervisory Mode	LOCAL, REMOTE, or N/A
	3. Trouble Status	NORMAL, PRESENT, or N/A
	3. Fault Status	NORMAL or DETECT
	3. Voltage Status	NORMAL or ACTIVE
	3. Freq. Trip Status	NORMAL, ACTIVE, or N/A
	3. Active Profile	NORMAL, ALTERNATE, or N/A
	3. Hot Line Tag	NORMAL, ACTIVE, or N/A
	3. Ground Trip	UNBLOCKED, BLOCKED, or N/A
	3. Reclosing	UNBLOCKED, BLOCKED, or N/A

Table 1. IntelliNode LCD Data—Continued

Category	Field	Description
4. Communications	4. Local Address	DNP/RTU network address
	4. Master Address	Master Station RTU address
	4. Master Port	DNP frames destined for the Master Station are sent to this port: A, B, C, D, or N/A. (D is the port on the faceplate)
	4. Master IP Address	IP address used to route DNP frames to Master Station over a UDP connection
	4. Maint. Master	Secondary master address that will not receive unsolicited messages
	4. Unsolicited:ENABLED or DISABLED	From *Setup>Communications>DNP* screen
	4. Port A \Baud + Protocol: DNP or ICP	From *Setup>Communications>Serial Ports* screen
	4. Port B \Baud + Protocol: DNP or ICP	From *Setup>Communications>Serial Ports* screen
	4. Port C \Baud + Protocol: DNP or ICP	From *Setup>Communications>Serial Ports* screen
	4. Port D \Baud + Protocol: DNP or ICP	From *Setup>Communications>Serial Ports* screen
	4. Native IP: XXX.XXX.XXX.XXX	
	4. Add-on IP: XXX.XXX.XXX.XXX	
5. Miscellaneous	5. Ver: XXX.XXX.XXX.XXX Product: XXXXXXXX	Software version number; software product identification
	5. Location Info 1: XXXXXXXXXXXXXXX	48-letter physical location of control entered on *Setup>General>Site Related* screen
	5. Location Info 2: XXXXXXXXXXXXXXX	Continuation of screen above
	5. App. Code Info: XXXX.XXXX.XXXX.XXXX	Used by S&C to track exact identity and ensure application integrity
	5. EOS Info: XXX.XXX.XXX.XXX	Operating system version installed in the control

IntelliNode Software

The control firmware is factory installed and manages control operation. It continually monitors:

- SCADA commands
- Faceplate switch commands
- Internal clock and calendar
- Software setpoint values
- Other setpoints and data values as needed

Based on this information, the control software decides how to respond to a command from the faceplate or SCADA master station, and other conditions.

The control software, setpoint values, and historical data are stored in non-volatile flash memory that can survive power interruptions, including complete failure of the switch control battery system.

IntelliLink Software

The IntelliLink Setup Software is downloaded from the S&C Automation Customer Support Portal and runs on PC computers. This software allows users to communicate with the control while at the switch-control site or remotely over a communication network that supports DNP communication. IntelliLink software can:

- Configure installation-dependent operating parameters (setpoints), such as the network address, automatic-operation features, etc.
- Monitor real-time data, such as the present line voltage and current
- Examine the performance and operating history of an installed switch control
- Transfer all configuration, operating, and historical data from the switch control to a report file on a computer
- Download new control software into the switch control
- Troubleshoot switch control installation problems

NOTICE

With software later than version 7.3.100, the default passwords for all user accounts, including the Admin account, must be changed before the IntelliLink software can connect to and configure a control. See Instruction Sheet 1043-531, "IntelliNode™ Interface Module: *Setup,*" for more information.

SCADA Communications Equipment

The S&C IntelliTeam SG system uses the DNP 3.0 protocol for team communication. When the SCADA system uses DNP users can remotely monitor, control, and change setpoints for all IntelliTeam SG switch controls. The DNP points are configurable to match the existing SCADA configuration.

The communication hardware (radio, modem, etc.) is mounted inside the switch control enclosure on the universal communication mounting plate on the back of the faceplate. This provides better reliability for the entire installation.

See Instruction Sheet 1043-561, "IntelliNode Interface Module: *DNP Points List and Implementation*," and the communication equipment documentation for more information. If you have any questions, contact S&C Electric Company.

Operational Overview

The IntelliNode module and host control device work together to detect and respond to overcurrent fault events and voltage outages.

When a circuit event occurs, the response taken by automated equipment in the IntelliTeam SG system proceeds in two steps:

- Isolation of the normal source from the faulted circuit section is the first step.
- Restoration of unfaulted circuit sections is the second step.

The IntelliTeam SG Automatic Restoration System provides the restoration function after the successful isolation of the normal source by the IntelliRupter fault interrupter, breaker, recloser, or sectionalizing switch.

The IntelliNode module does not interfere with the normal fault-isolation functionality of its host breaker/recloser device. The IntelliNode module only monitors the host device for changes in status so it can begin to take action should the host device indicate it has interrupted a fault and locked out. Monitoring is performed over a DNP communications link at a preconfigured polling interval, normally one second. The data received from the host device includes switch status, lockout status, overcurrent status, voltage status, error status, and other information so the IntelliTeam SG system has adequate information to perform its restoration function.

The IntelliNode module takes control of the host device when the host device trips open and is in the **Lockout** state or a source-side device has tripped open and locked out. When the host device is not open (because of a source side fault) but the IntelliTeam system determines that the source device for this team is open and locked out, the IntelliNode module will command the host device to open, and the reconfiguration process can continue. This is the only situation where the IntelliNode module will open the host device for the purpose of isolation.

By acting as a typical team member, the IntelliNode module may close the host breaker/recloser device at the appropriate time during the IntelliTeam system reconfiguration process. The IntelliNode module and the IntelliTeam system may use some features of the host breaker/recloser device if allowed to by the configuration.

For example, when closing the host breaker/recloser into a dead section of the circuit, the IntelliNode module may disable the reclosing feature of the breaker/recloser. When the breaker/recloser remains in the closed position for the configured time period, indicating the reenergized circuit section is unfaulted, the IntelliNode module will then re-enable the reclosing feature.

Automatic Load Transfer

The IntelliTeam SG system defines a team as two or more switch controls that protect a given line segment by transferring load to an alternate source. The switch control may be a member of one or more teams.

After completing the sectionalizing and/or phase-loss logic, the switch control can reclose the switch to transfer load to an adjacent distribution circuit or to restore service to load on the source side of the fault. The switch control uses information it receives from other team members to do this.

Team members use an independent software agent—the coach—to distribute data and coordinate operation. The coach visits each team member within a prescribed time period, carrying with it an ID number and incrementing visit counter. When the coach arrives at a team member that has already seen that ID and visit counter, the coach assumes it is a duplicate and dies.

The team member generates a new coach when the coach has not visited that team member within a prescribed time period. The new coach will have an ID one number higher than the last visiting coach and a visit counter reset to zero. The new coach determines the state of the team line segment and takes any necessary action. When an arriving coach finds that a new coach with a higher ID has visited, the arriving coach with the lower ID dies.

Any team member that witnesses an event tells all other team members and the coach about the event. The transmission includes a sequence number, the nature of the event, and which team member made the report. All members continually monitor for this report.

When the report requires local team restoration, the coach visits the other normally closed team members to verify they are now open and then follows the alternate source sequence list, visiting team members that could become an alternate source.

When the report requires service restoration for an adjacent team, the coach immediately moves to the team member that is also a member of the team with the outage.

Load averaging stops when an event begins so the load value before the event will be used for reconfiguration negotiations.

Loading Restrictions

As the default, a team decides whether to restore a line segment based only on the available capacity of the feeder. It is updated as the reconfiguration progresses and with any restrictions placed on the line segment caused by wire size, switch capacity, or other limiting factor.

This method does not prevent circuit overloading when non-continuous line segments (a bifurcated circuit) assume that loading information is correct and both close simultaneously to restore independent loads.

When a line segment cannot handle any overloading, set the **Contract Required** mode (on the *Setup>Restoration>IntelliTeam SG> Team X* screen) to “Yes” for all teams. When team members encounter a line segment in a restoration path that requires a contract, they communicate with all subsequent line segments in the direction of the alternate source to ensure the alternate source will not be overloaded. This slows the reconfiguration process.

The number of line segments a team can pick up is restricted by using the **Line Segment Limit** setpoint on the *Setup>Restoration>IntelliTeam SG>Team X* screen. For example, the **Add 1** value inhibits any other line segments from being restored through a member after it restores its first line segment. When set to the **N/A** value, the team can pick up as many line segments as capacity will allow.

The line segment limit may be configured in any or all teams, but it is a global value for all members in that team. The limit is continuously propagated outward from the source segment as the coach travels from team member to team member. As the limit propagates outward, limits with a lower configured count take precedence and are then propagated further.

When the coach arrives at the team member for the switch it would like to close, it looks for the coach from the adjacent team. If it's not already there, the first coach calls, and the second coach will move to the shared team member. Both coaches decide whether to close the switch based on available capacity, contracts for resources, and other restrictions.

As switches close, the IntelliTeam SG system updates available capacity on the feeders used to restore service. When a transfer with a known load value occurs, it resets the loading data to reflect the new value. This updates information more quickly than the **Two-Minute Load Averaging** feature.

As load is restored, some team members may want to begin the **Return to Normal** process for their team(s). But the **Return to Normal** process is blocked by the Two-Coach Rule. When a coach knows its team is not being fed from its normal source, it will not allow an adjacent team coach to start the **Return to Normal** process.

When a team is in the reconfigured state and the alternate source experiences a new event, the team can look for a new alternate source, if available, to supply its line segment.

A normally open switch in a source/substation location must have the voltage sensors on the substation side. Otherwise, transfer operations will not work correctly. If this is an existing installation with voltage sensors on the wrong side and they cannot be moved, contact S&C Electric Company for more information.

To enable automatic load transfer:

- Set the **Team Logic** setpoint on the *Setup>Restoration>IntelliTeam SG> Team X* screen to **Enabled** mode for each team if applicable.
- Use either the faceplate AUTOMATIC OPERATION ENABLED/DISABLED switch or a SCADA command to enable the **Automatic Operation** mode for the switch control.

Contracts

A large IntelliTeam SG system may have reconfigurations occurring simultaneously at more than one location. To prevent circuit overloading, the system uses contracts to ensure that it will not pick up more line segments than the circuit can supply. Contracts travel across teams to safely secure resources needed to energize the line segment.

As the IntelliTeam SG system transfers load to an alternate source, a contract is required if the **Line Segment Limit** setpoint has been set or if a **Line Segment Limit** value has been propagated from the source. A contract is generally not required unless the line segment being energized will be directly or indirectly fed from an alternate source. For example, a source/substation switch never requires a contract to close, but a tie switch will always require a contract to close.

Every team member has a contract agent. Unlike the coach, contract agents are static, and only the contract is communicated. The contract agent obtains contracts and maintains outstanding contracts.

A contract is required when:

- During a transfer event the coach of the requesting line segment asks a team member to close an alternate source switch to energize the segment
- A team member contacts the coach of the alternate-source line segment to verify circuit resources
- A team member finds the line-segment limit has not yet been exceeded and it issues a request to the local contract agent (While the contract agent works to obtain a contract, both the requesting coach and the alternate-source coach must remain at this team member (except to satisfy the **Visit** timer). The team member also waits while the contract is being obtained.)
- The contract agent prepares and sends the contract to the agent of the team member presently the source for the alternate-source line segment (The requesting agent waits for the contract to be returned.)
- The receiving contract agent checks the requested resource availability (When there is not enough excess capacity, the agent updates the contract to decline the request and returns the contract to its sender. When sufficient excess capacity is available at this team member, the contract agent adds its ID to the routing list and forwards the contract to the next team member in the direction of the absolute source.)
- The contract reaches the source/substation switch agent and the agent checks for available excess capacity (When the contract request exceeds excess capacity, the agent declines the contract and returns the contract directly to the originating contract agent.)
- Circuit resources are sufficient and the contract agent accepts the contract, lists its ID as the granting contract agent, increments its local count of line segments that have been transferred, and keeps a copy
- Following the contract routing table, the accepted contract returns, through each previous contract agent, back to the originating agent (When the contract is declined it goes directly to the originating contract agent.)
- The contract is declined and the requesting agent reports to its team member that the transfer is not allowed and dissolves the contract (When the contract is accepted, the agent reports that the transfer may continue and the agent saves the contract.)

An accepted contract must be maintained and carry an associated maintenance timer. The requesting contract agent or an intermediate agent can initiate contract maintenance. When the timer expires, the agent sends a maintenance message along the contract route to verify the existence of the contract and reset the maintenance timer.

The requesting contract agent may also dissolve the contract when a manual switching operation energizes the line segment from another source, a local **Return-to-Normal** operation occurs, or a second event occurs that causes additional circuit reconfiguration. To dissolve the contract, the requesting agent sends a message down the contract route. Each contract agent then dissolves the contract and decrements the local line-segment count.

Return to Normal

Following the reconfiguration event and subsequent repair and restoration of the faulted line section, team members can return to their normal state. When the **Return-to-Normal** timers expire, the coaches begin the process of returning each team to its normal configuration. The **Return-to-Normal** process begins at the team closest to the normal source and works outward. The closed transition **Return-to-Normal** mode must notify the normal tie switch before it continues.

Each team member may be configured for an open or closed transition. Teams with no tie switches allow their members to follow the needs of the adjacent teams.

A load switch between teams where an open transition is required will remain closed. It relays the **Return-to-Normal** request, becomes de-energized, and returns a go-ahead message before finally being reenergized from the normal source.

The team member at a tie switch will automatically open the switch after a prescribed timeout. This ensures a circuit parallel condition will not be left in place indefinitely.

To enable Return to Normal:

- Set the **Rtn to Norm Mode** setpoints on the *Setup>Restoration>IntelliTeam SG> Team X* screen to the **Open** or **Closed** state for each team member in each team, if applicable.
- Use either the faceplate AUTOMATIC OPERATION ENABLED/DISABLED switch or a SCADA command to enable the **Automatic Operation** mode.

Prohibit Restoration

This feature disables the team **Automatic Restoration** feature (automatic closing of switches) in case of emergency or for circuit anomalies where restoration would be undesirable. The feature is enabled and disabled by SCADA (with DNP Control Point Code #21) and also with the IntelliLink Enable/Prohibit Restoration selection on the *Setup>Restoration>IntelliTeam SG>Team Summary* screen. See Figure 3 on "Figure 3. The IntelliTeam SG>Team Summary screen." on page 17. The **Prohibit Restoration** command affects all teams associated with the switch control receiving the command.

The **Prohibit Restoration** command will not prevent the auto-sectionalizing logic from acting on fault conditions to open the switch. When a team is not ready to transfer (such as the **Prohibit Restoration** state), the auto-sectionalizing logic reverts to standard sectionalizing logic. Standard sectionalizing logic does not include sectionalizing on three-phase voltage loss or on an extended three-phase voltage loss. If all automatic operation must be stopped, the user must send the **DNP Disable Automatic** command (with DNP Control Point Codes 13 or 14) to each switch individually.

Indications that a team is in the **Prohibit Restoration** state are:

- The *Setup>Restoration>IntelliTeam SG>Team Summary* screen will indicate ***Alarm*** in the **Ready Status** field.
- The LCD display will indicate ***Alarm*** instead of the **Ready** state for that team.
- The DNP Status Point Code #47 will be set.

Prohibit Restoration

The **IntelliTeam SG Restoration** feature can be enabled or disabled on the *IntelliTeam SG>Team Summary* screen. See Figure 3.

When the **Prohibit Restoration** mode is active, view the *Logs>Status Point Log* screen to determine whether this was the result of a SCADA command or a **Prohibit Restoration Timer** operation.

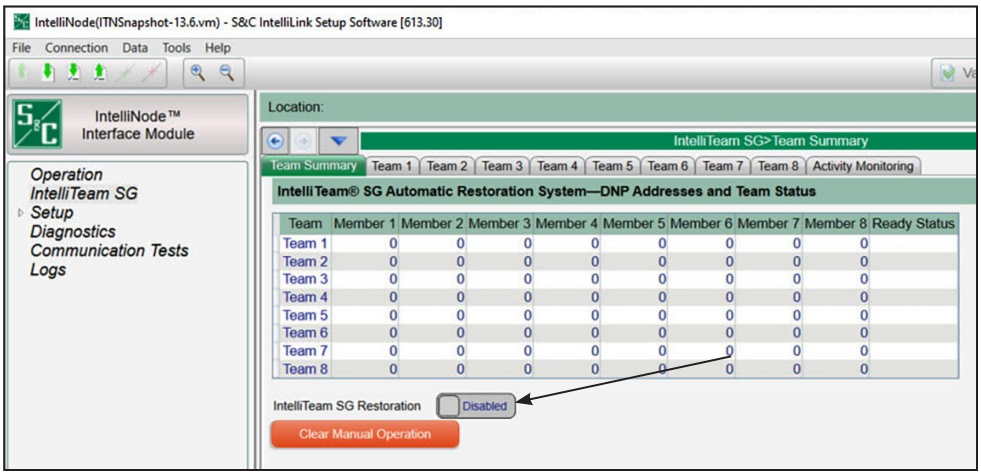

Figure 3. The *IntelliTeam SG>Team Summary* screen.

The **Prohibit Restoration** mode also may be enabled automatically through use of the **Prohibit Restoration** timer configured on the *Setup>Restoration>IntelliTeam SG>Team X* screen. Enabling this feature automatically with the timer is useful when needing a predetermined time limit for the team to perform restoration. If restoration does not occur within this time limit, all restoration activity will be stopped and the team will remain in an alarm state until the **Prohibit Restoration** feature is disabled.

The **Report** feature will save the control software settings and stored data to the computer in a CSV (comma-separated value) file. A report can be saved as a permanent record, and report data can be used in spreadsheets or other programs.

Follow these steps to generate reports:

STEP 1. Connect the computer to the switch control and start the IntelliLink software.

STEP 2. From the **Data** menu, choose the **Reports** option.

STEP 3. Select the report and click on the **OK** button.

STEP 4. In the **Save Report** dialog box, specify a name and location for the report and click on the **Save** button.

When a location is not specified, the file is saved to the same directory as the program files for this team member (the default location is C:\Program Files\S&C Electric\). The extension ".CSV" is added automatically. When the report is complete, the message ***Task completed*** appears on the status line of the Writing Report dialog box.

STEP 5. Click on the **OK** button. The software closes the dialog box.

Saving a Setup Configuration

When two or more team members use a similar setup configuration and the same software version, users can save the configuration from one team member and load it into the other(s). Only the setpoints unique for each individual team member must be manually adjusted.

This process also can be used to save the setpoint values on the *Setup>Restoration>IntelliTeam SG>TeamX* screen and then load these setpoints into each team member. This ensures the *Setup>Restoration>IntelliTeam SG>TeamX* screen is identical for all members of the same team. Follow these steps to save the setpoint values:

STEP 1. Select the team member that contains the configuration being saved.

STEP 2. Connect the computer to the selected team member and start the IntelliLink software.

For information about starting the IntelliLink software, see the Start IntelliLink Software section in S&C Instruction Sheet 1043-531, "IntelliNode™ Interface Module: *Setup*." If the computer is already connected to the team member, skip this step.

STEP 3. In the screen menu select the **File** step-down menu and click on **Save Setpoints** entry.

STEP 4. In the Select Setpoint Profile dialog box, choose the setpoint values to save.

(a) To save the stand-alone setpoint values, click on the **PROFILE: Non-Team Setpoints** option, and click on the **OK** button.

(b) To save the team setpoint values, click on the **PROFILE: Team X Setpoints** option for the desired team, and click on the **OK** button.

(c) To save all setpoint values, including values for teams that may not have been configured, click on the **Save Configuration Data** option, and click on the **OK** button.

STEP 5. In the Save Setpoints dialog box, specify a name and location for this configuration (CFG) file, then click on the **Save** button and click on the **OK** button.

Be sure to name team setpoint profiles logically. For example, use the Team 2 name for the Team 2 setpoints. When loading the setpoint profile into another team member, the IntelliLink software will automatically place the profile into the *Setup>Restoration>IntelliTeam SG>TeamX* screen with the matching team number.

If a location is not specified, the file is saved to the same directory as the program files for this team member. The default location is C:\Program Files\S&C Electric\. The extension ".CFG" is added automatically.

For the stand-alone setpoints, this process does not save the physical location, the **Local Device DNP Address** setting (on the *Setup>Communications>DNP* screen), or the sensor-configuration data (on the *Setup>General>Sensor Cfg* screen), if applicable.

Loading a Setup Configuration

When two or more team members use a similar setup configuration and the same software version, the configuration can be saved from one team member and loaded into the other(s). Only the setpoints unique for each individual team member must be manually adjusted.

Follow these steps to load a setup configuration:

STEP 1. Connect the computer to the team member whose configuration is being saved into and start the IntelliLink software.

For information about starting IntelliLink software, see the "Start IntelliLink Software" section in S&C Instruction Sheet 1043-531, "IntelliNode™ Interface Module: *Setup*." If the computer is already connected to the team member, skip this step.

STEP 2. In the screen menu select the **File** drop-down menu and click on the **Load Setpoints** option.

STEP 3. In the dialog box, select the CFG file for the configuration being loaded and click on the **Open** button.

STEP 4. Make any setpoint changes that are required for this team member. For more information see Instruction Sheet 1045-530, "S&C 6800 Series Automatic Switch Controls: *Setup*."

Note: If loading the stand-alone setpoints, be sure to enter the correct value for the **Physical Location** setting, the **Local Device DNP Address** setting (on the *Setup>Communications>DNP* screen), or the sensor configuration data (on the *Setup>General>Sensor Cfg* screen), if applicable.

Viewing IntelliLink Screens Without a Connection

To view the IntelliLink screens and Help file without connecting to a team member or a snapshot:

STEP 1. Start the IntelliLink software on the computer. During startup, click on the **Cancel** button to close the Connect dialog box.

When the IntelliLink software is already running, choose the **Disconnect from the Connection** option, then in the **File** pull-down menu choose the **Close Screenset** option to clear the present screenset from memory.

STEP 2. From the **File** pull-down menu, choose the **Open Screenset** option.

STEP 3. In the Open Screenset dialog box, find and select the .WMN file whose name matches the software version name for this switch control.

Saving Settings and Data to a Snapshot

Follow these steps to save operational and data-logging information in Snapshots (.VM, virtual memory files). Snapshots let users view data, generate a report, and save or change setpoint configurations even when not connected to a switch control. To access the stored information, connect to the snapshot instead of the physical control.

STEP 1. Connect the computer to the switch control from which information is to be saved, and start the IntelliLink software.

For information about starting IntelliLink software, see the "Start IntelliLink Software" section in S&C Instruction Sheet 1043-531, "IntelliNode™ Interface Module: *Setup*." If the computer is already connected to the team member, skip this step.

STEP 2. From the **File** pull-down menu, choose the **Save Snapshot** option.

STEP 3. In the dialog box, specify a file name and location for this snapshot. Then, click on the **Save** button.

If a location is not specified, the file is saved to the same directory as the program files for this team member (the default location is C:\Program Files\S&C Electric\). The extension ".VM" is added automatically.

Viewing a Snapshot

Follow these steps to open the snapshot with the IntelliLink Offline software:

STEP 1. Start the IntelliLink software on the computer. During startup, click on the **Cancel** button to close the Connect dialog box.

STEP 2. When the IntelliLink software is already running, choose the **Connection** option and click on the **Disconnect** option. If wanting to view a snapshot for a different type of control, select the **File** pull-down menu and click on the **Close Screenset** option to clear the present screenset from memory.

STEP 3. From the **File** pull-down menu, click on the **Open Snapshot** option. The Open Controller Data File dialog box opens. Select the snapshot to view. Then, click on the **Open** button.

STEP 4. To change the configuration settings in the snapshot in the Connect to File dialog box, click on the **Yes** button. To avoid accidentally changing a setting, click on the **No** button. The IntelliLink software opens and displays the contents of the selected snapshot.

Saving Changes Made to the Snapshot

All changes made to configuration settings in the snapshot are automatically saved to disk immediately. It is not necessary to save the changes in a separate operation.

Generating a Report from a Snapshot

Follow the same procedure as when connected to a switch control.

Creating a Configuration File from a Snapshot

This procedure allows users to prepare a setpoint configuration for a team member in the field and there is no access to a comparable device. Follow these steps:

STEP 1. Connect to the snapshot.

STEP 2. Change the configuration settings in the snapshot as needed.

STEP 3. To save a configuration, follow the same procedure as when connected to the control.

For stand-alone setpoint values, this process does not save the **Physical Location** or the **Local Device DNP Address** setting (on the *Setup>Communications>DNP* screen), if applicable.