Product Description

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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.

Warranty

The warranty and/or obligations described in S&C's Price Sheet 150 "Standard Conditions of Sale-Immediate Purchasers in the United States" (or Price Sheet 153, Standard Conditions of Sale-Immediate Purchasers Outside the United States) plus any special warranty provisions, as set forth in the applicable product-line specification bulletin, are exclusive. The remedies provided in the former for breach of these warranties shall constitute the immediate purchaser's or end user's exclusive remedy and a fulfillment of the seller's entire liability. In no event shall the seller's liability to the immediate purchaser or end user exceed the price of the specific product that gives rise to the immediate purchaser's or end user's claim. All other warranties, whether express or implied or arising by operation of law, course of dealing, usage of trade or otherwise, are excluded. The only warranties are those stated in Price Sheet 150 (or Price Sheet 153), and THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY EXPRESS WARRANTY OR OTHER OBLIGATION PROVIDED IN PRICE SHEET 150 (OR PRICE SHEET 153) IS GRANTED ONLY TO THE IMMEDIATE PURCHASER AND END USER, AS DEFINED THEREIN. OTHER THAN AN END USER, NO REMOTE PURCHASER MAY RELY ON ANY AFFIRMATION OF FACT OR PROMISE THAT RELATES TO THE GOODS DESCRIBED HEREIN, ANY DESCRIPTION THAT RELATES TO THE GOODS, OR ANY REMEDIAL PROMISE INCLUDED IN PRICE SHEET 150 (or PRICE SHEET 153.)

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.

The IntelliTeam Automatic Restoration System is a peer-to-peer auto-reconfiguration system that works with up to seven switch controls and recloser controls (two to 14 line switches) on distribution systems up to 46 kV. Using special hardware and software features, the controls work together as a team to monitor the feeder for voltage loss and fault conditions. They then open and close switches to isolate faults and restore power quickly.

System Features

Distributed intelligence—The team does not require a SCADA master station for circuit reconfiguration, though the IntelliTeam system is compatible with SCADA systems using DNP. Pager monitoring and gateways to various SCADA protocols are also available for the IntelliTeam product line.

Automatic load transfer—Team members can transfer load from one source to another to provide power to as many customers as possible. The team members coordinate team operations to prevent overloading of a feeder during transfer operations.

Return to Normal—When this feature is enabled, the team members return the circuit to its normal configuration either automatically once a stable 3-phase voltage has been restored to the faulted line section or on command.

Team synchronization—Each team member shares its status information with other team members. Integrity checks ensure all team members are synchronized for team operations. This ensures proper reconfiguration of the circuit when trouble occurs.

Safety and reliability features—The IntelliTeam system is designed to avoid operational problems, such as cycling or opening a switch when the current is above the load break rating. Features that help to ensure team safety include:

- The ability to block any or all automatic operations remotely
- Event time-out periods
- Validation of status information among team members
- Blocking team operation when any team member is placed in automatic operation **Disable** mode
- Logic preventing extended parallel circuits

Local setup of global parameters—Using the IntelliTeam software and a portable computer, users can enter global setpoint values for the entire team from a single team member. However, the team cannot be programmed from only one control.

Critical team information available locally—The IntelliLink software can display critical data for all members of the team. The local LCD screen displays switch-position information for the other team members.

Stand-alone operation fallback—If team operation is not possible, team members operate as stand-alone sectionalizer controls.

Setup manager software—The setup manager software centralizes all the functions required to set up the team, including the use of RadioShop software to set up UtiliNet® WanGate Radios for team use.

Single Member Mode—A multi-switch team member with a normally open switch will fall back to the stand-alone source-transfer device functionality when team operation has been disabled for any reason. This offers a higher level of reliability for critical load at the feeder tie point.

The 5800 Series control package includes the following major components, as shown in Figure 1 and Figure 2 on page 6:

Switch Control Components

Switch control enclosure (if applicable)—The sturdy, corrosion-resistant aluminum enclosure provides weatherproof and tamper-resistant protection for the switch control components.

Switch interface connector—This provides a connection point at the bottom of the switch control enclosure for cables carrying sensor data and control/status signals, often referred to as the field interface connector (FIC).

Mounting channel (Model 5801) or flanges (Model 5802/5803)—Special mounting holes and slots make it easy to hang and align the switch control. The channel on the Model 5801 is compact enough to allow a line worker to grasp the pole (instead of the enclosure) when climbing past the enclosure.

Faceplate LCD screen—This permits local, easy viewing of setpoint values and historical data without the need of a portable computer. A label supplied with each switch control shows easy information navigation.

Faceplate LEDs and switches—Clearly labeled LEDs provide information about the present state of the switch control. Switches permit local, manual control of operation. On the Model 5802/5803 control, each line switch can be individually operated.

Local communication access port—This allows users to connect their computer to the switch control faceplate and use the IntelliLink software to view data, change setpoints, download logged data, and update the control software.

Faceplate retainer (Model 5801)—This holds the faceplate open while working inside the control enclosure.

Door pocket (Model 5801)—The pocket provides a convenient place to store data sheets, instruction booklets, and other installation information.

Door retainer (Model 5801)—This holds the enclosure door open while using the faceplate.

Switch control electronic modules—The modules are modularized for easy troubleshooting and replacement.

Universal communication mounting plate—This provides a solid mount for SCADA and team communication equipment (radio, modem, etc.).

Communication equipment—The IntelliTeam system uses the DNP protocol and a radio, modem, or other device for peer-to-peer communication and for two-way communication between the switch control and a SCADA master station. Gateways for other protocols are also available.

Grounded ac outlet (Model 5801)—This provides an easily accessed power source for the portable computer. This feature requires ac control power.

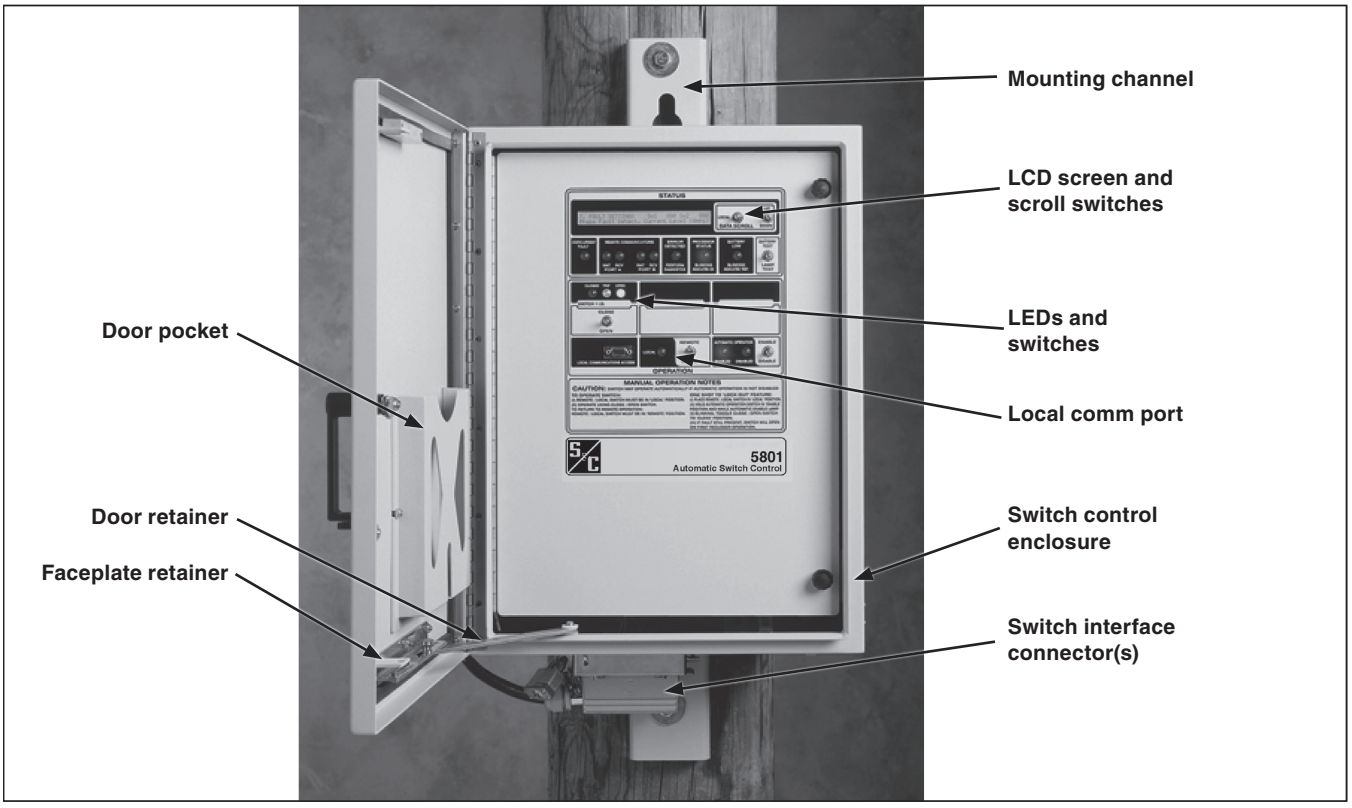

Figure 1. Model 5801 Switch Control with enclosure door open.

Control software—The application resides in the switch control and manages the moment-by-moment functioning of the installation. Users can easily update the software with the IntelliLink software update utility. Version upgrades are installed with software uploads, and computer chips never need to be replaced.

IntelliLink software—This software is used to verify and change all setup and configuration parameters, monitor real-time operating data, perform troubleshooting, create reports, and export data for use in spreadsheets. It is installed on a Microsoft® Windows® portable computer.

Switch Control Features

Dependable quality—Electronics are manufactured in an ISO 9002-certified plant.

Toughness and reliability—The control is designed to withstand the difficult environmental and electrical conditions found in electric distribution applications.

Rugged, well-proven core electronics design—Microprocessor, memory, and all related components are based on technology developed for the full range of S&C control products, with units in the field since 1985.

Data-logging capability—This is useful for both stand-alone and communication-oriented applications.

Flexible communication capability—The control has a local communication port (for a portable computer) and two SCADA ports (for remote communication).

Setpoint control of most operating parameters—Automatic operation options, address information, and other operating parameters can be viewed and changed as needed.

Non-volatile memory—Programming, setpoints, and data are stored in permanent, nonvolatile memory for maximum field functionality and reliability.

Real-time clock—The crystal-controlled clock provides accurate timestamping of realtime data.

Electrical isolation designed for the application—All power supplied to external devices, switch motors, wetting voltage for external digital inputs, and external sensor conditioning circuitry is isolated by opto-couplers and can withstand a surge of 2500 volts RMS for one minute.

Highly efficient, computer-controlled power supply and battery charger system—The system provides 12 Vdc, battery charging (24 or 36 Vdc, depending on the switch in use), and other voltages from a single source (24 or 36 Vdc) for the switch control, switch, and communication equipment. Fully temperature-compensated charging, accurate measurement of battery voltage, and response predictions (for heavy loads) yield maximum battery life and minimal required maintenance.

Battery supply for the control—The control provides power for critical components even during complete ac power loss.

Automatic line sectionalizing—When combined with a source-side reclosing device, the control can assist in the speedy isolation of faults. This minimizes service loss for the maximum number of customers.

Phase-Loss Protection—This minimizes single-phase damage to customer equipment when voltage is lost on only one or two phases.

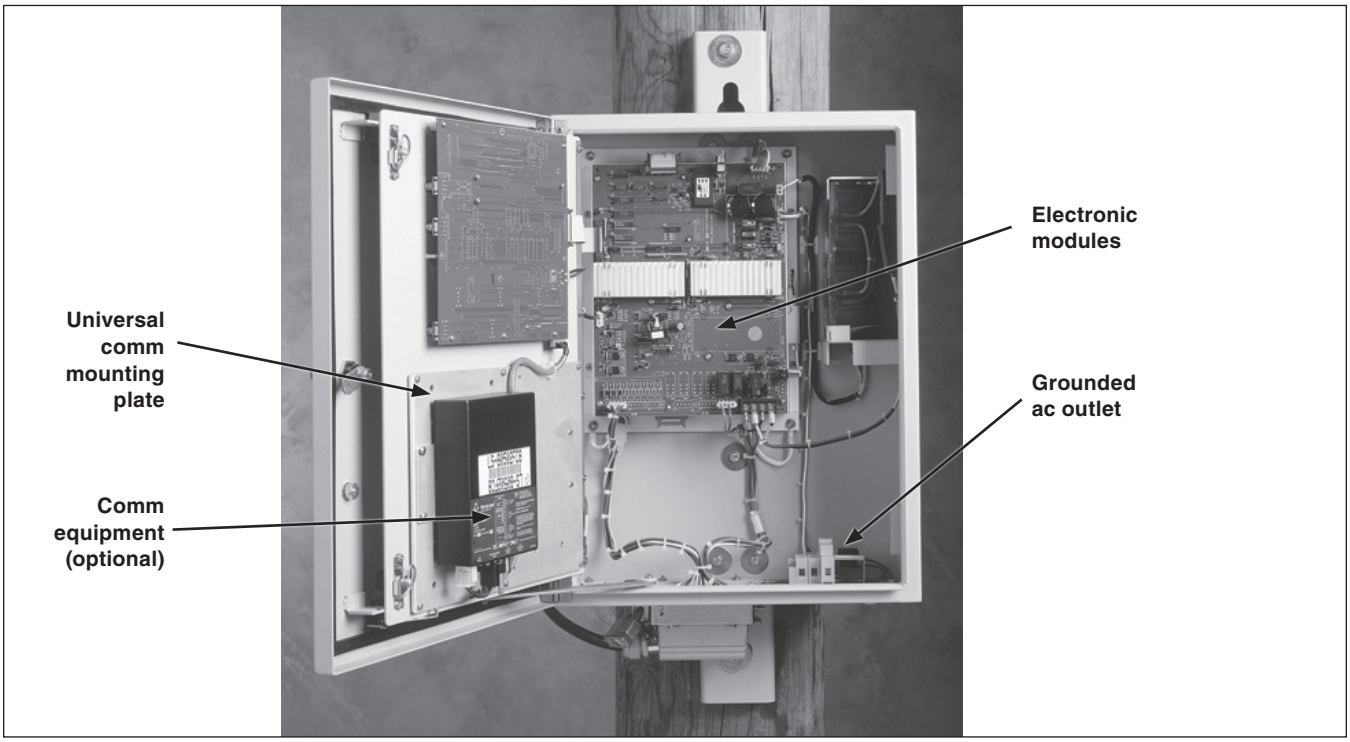

Figure 2. Model 5801 Switch Control with faceplate open.

Automatic Reclose—This function closes the switch after resumption of steady three-phase voltage following a phase loss.

Shots-to-lockout feature—When closing into a fault, this limits the number of reclose operations performed by the source-side protective device (recloser, breaker, etc.).

Reliable overcurrent fault detection—Detection includes a redundant electronic path for phase-fault current, scaled specifically for fault detection. The ground-fault current is measured with high accuracy as the analog vector sum of the three individually sensed phase currents.

Ac control power from S&C sensors—Most switch controls connected to S&C switches can receive power directly from S&C sensors (for circuits with voltages near the nominal rating of the sensors). This is especially useful where ac control power is unavailable. When both ac control power and sensor power are available, the switch control uses ac control power. If the ac control power fails, the control automatically switches to sensor power. 5800 Series controls without the sensor power option are powered from an external 120- or 240-Vac line.)

Additional Model 5801 Features

The Model 5801 switch control also includes special features that customize it for use with overhead switches. These features include:

Custom ac voltage and current-signal conditioning—This is specifically designed and tested for use with the type of sensors in use.

Specialized enclosure wiring—The switch interface connector and internal enclosure wiring are matched to the control cable.

Switch control shipped ready to install—The switch control is modular and requires no discrete field wiring other than 120 Vac control power.

Visual disconnect—The S&C D2 visual disconnect option (disconnect closed and latched indication) is supported both in the IntelliLink software and in the SCADA status points. When the visual disconnect is open, the switch cannot operate.

Additional Model 5802/5803 Features

The Model 5802/5803 switch control also includes special features That customize it for use with multi-switch installations. These features include:

Custom ac voltage and current-signal conditioning—This is specifically designed and tested for use with up to six current and six voltage sensors, or nine current and three voltage sensors.

Specialized enclosure wiring—Internal wiring is matched to the pad-mounted switch operator and sensor cables.

Switch control shipped ready for integration—It only requires mounting in the low-voltage compartment and connection of control/status, sensor, ac power, and communication wiring.

Separate automatic control setpoints for switches 1 and 2—Independent setpoint values and automatic features can be enabled for each switch.

Figure 3, Figure 4 on page 9, and Figure 5 on page 10 show the normal order for setting up an IntelliTeam system and this switch control.

NOTICE

These flowcharts assume the team consists entirely of 5800 Series Switch Controls. If the team includes other control types, some steps may be slightly different.

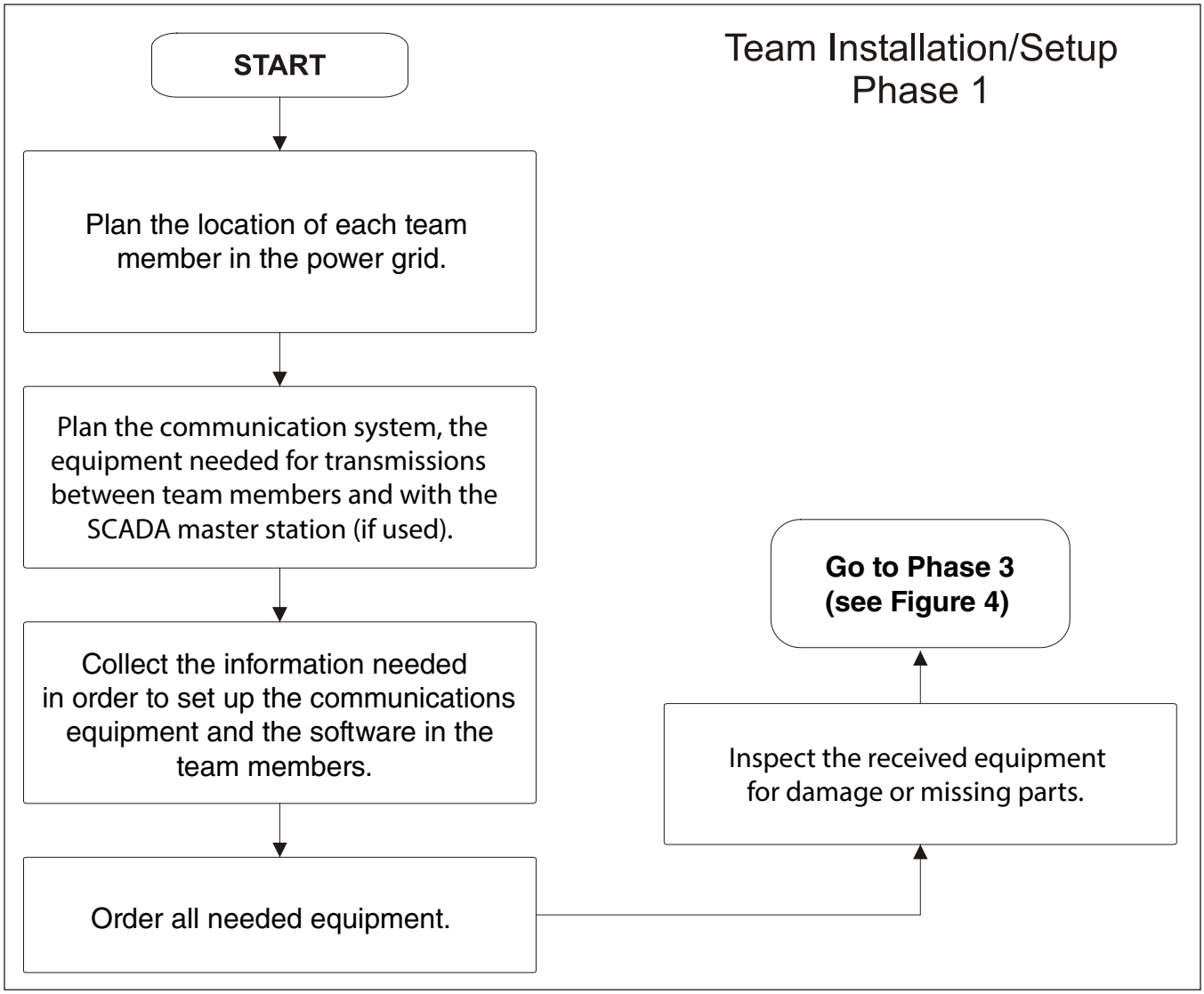

Figure 3. Suggested team installation and setup procedure - Phase1.

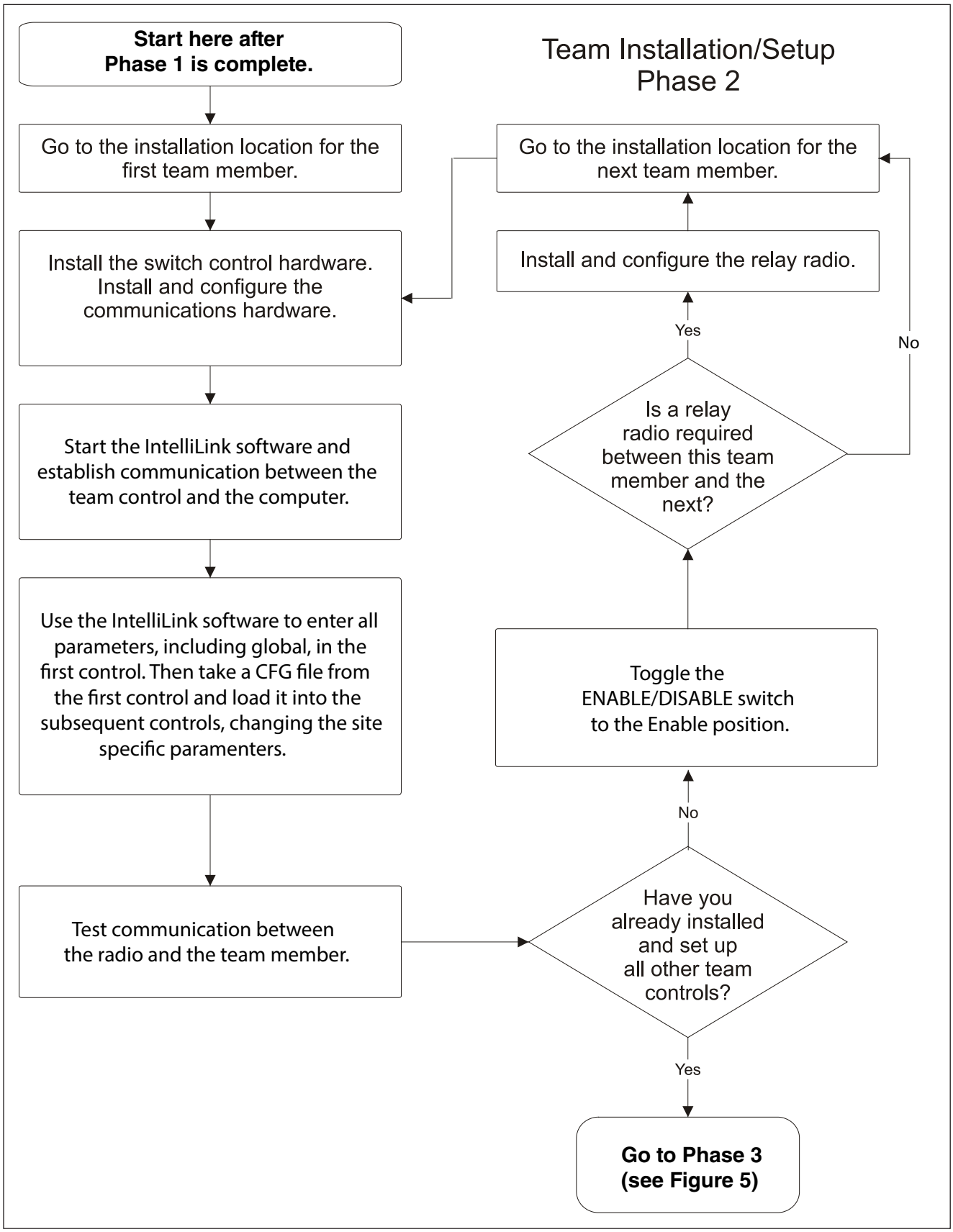

Figure 4. Suggested team installation and setup procedure - Phase 2.

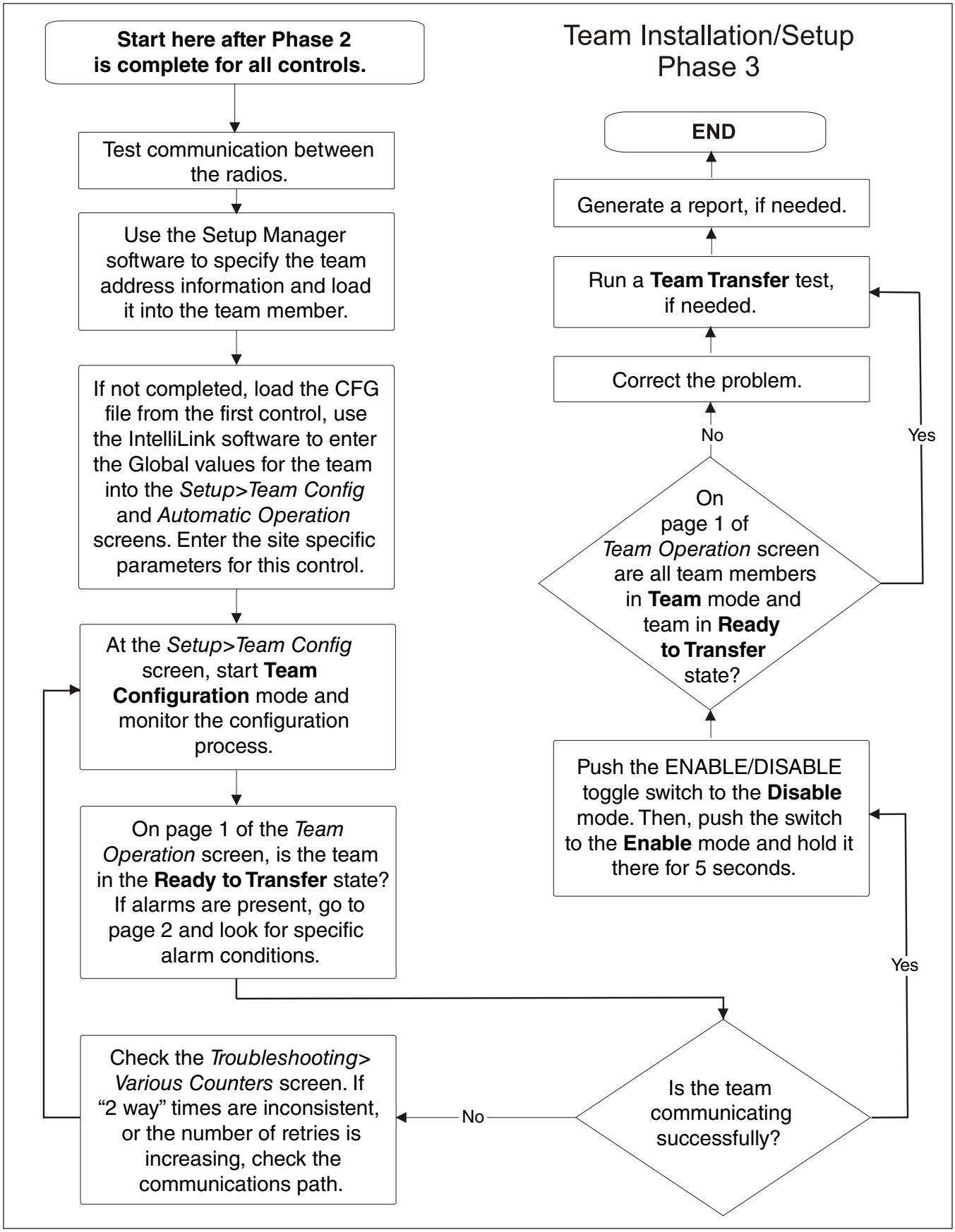

Figure 5. Suggested team installation and setup procedure - Phase 3.

ASP
Analog signal processing. The ASP module processes waveforms.

Connectivity (good or poor)
Connectivity is the ability of a radio to communicate with other radios. When communicating properly, connectivity is good; when communication is undependable or fails completely, connectivity is poor.

Control software
Software installed in the switch control that manages the moment-by-moment functioning of the installation. This software can be easily updated with the IntelliLink software.

DCW
The DCW (device control word) is special-purpose application code loaded into each UtiliNet radio used by team members. This code is used for communication between the radios. Other names for this code include "the intercept driver" and the "communication code."

FIC
Field interface connector. The connection point for the cable from an S&C Scada-Mate® Switching System.

Global parameters
Parameters that must have the same value for every team member. These include all parameters on the *Setup>Team Configuration* screen and some of the parameters on the *Setup>Automatic Operation* screen. All global parameters are labeled "[Global]" where they are explained in Instruction Sheet 1042-530, "S&C 5800 Series Automatic Switch Control with IntelliTeam® Automatic Restoration System: *Setup*."

IntelliLink software
Software used to verify and change all switch control setup and configuration parameters, monitor real-time operating data, perform troubleshooting, create reports, and export data for use in spreadsheets. It is installed on your Windows® portable computer.

IntelliTeam Automatic Restoration System
This is the S&C feeder-reconfiguration and management system for automating distribution feeders.

IntelliNode™ Interface Module
This is the S&C module that allows a non-S&C device to participate in an IntelliTeam system.

initiate the team configuration
This is used to send the Global parameter values from one team member to all the other members of the team.

IWR
UtiliNet "Internal WANGate Radio," the radio normally used by an IntelliTeam system.

LED
Light-emitting diode used on the faceplate and circuit boards to indicate the present condition of the switch control.

Local communication port
The serial port on the faceplate for connecting a computer to the control. IntelliLink software is the application used to view data, change setpoints, download logged data, and update the control software.

Local team member
The team member at the site where the user is presently located.

Multiple-switch team member
A team member that can control two line switches. It is sometimes called a "multiple-position switch control" or is identified by the specific model name rather than by a generic term.

Non-global parameters
Parameters that may have, and sometimes must have, a different value for each member of the team. These include the parameters on the *Setup>Miscellaneous* screen.

PS/IO
This is the Power Supply/Control I/O module, and it is the source of all low-voltage power used by the switch control and any associated communication equipment. It also provides all the digital interface. The PS/IO module performs all data acquisition, control, and basic communication interface functions.

Radio configuration file
The file type loaded into a UtiliNet team radio. Depending on which version selected, this file enables the radio to act (a) only as a relay radio, (b) as a team-member radio that can also relay information to other team members, or (c) as a team-member radio that cannot relay information to other team members.

RadioShop software
Software installed on the portable computer that is used to set up and manage radios used by the IntelliTeam system.

Relay radio
A stand-alone radio that relays information between two or more team members. It is used when distance or an obstacle blocks direct team-member communication.

Remote team member
A team member at any location other than the location where the user is presently located.

RTN
Return to Normal; the process that returns the IntelliTeam system to its normal configuration.

Screenset
The screens and dialog boxes required for IntelliLink software to communicate with a specific version of control software.

Sideline device
A device that is not a team member but is polled by a team member. The collected information may be used by the team member for IntelliTeam operation. For example, the Cooper Form 5 Recloser Control is a sideline device, but the IntelliNode Interface Module is a team member.

Single-line diagram
The team diagram based on the device number of each team member. It emphasizes the present state of the line switches and the relationship between adjoining team members.

X - | | - | | - | | - - | | - ?

For example, the single-line diagram above shows a system in which:

- Device #1 is a closed switch
- The line switches at Devices 2, 3, 4, and 6 are open
- Device #5 is a two-switch control; Switch 1 is open and Switch 2 is closed
- The switch state of Device 7 is unknown

Single member mode
A multi-switch team member with a normally open switch will become a standalone source-transfer control when team operation has been disabled for any reason.

Single-switch team member
A team member that controls only one line switch.

Switch cable
The cable that brings input from the line switch(es) to the switch control.

Switch interface connector
The connector at the bottom of the enclosure for attaching the cable from the line switch.

Switch interface module
The board on the inside bottom of the Model 5802/5803 switch control enclosure where the voltage and current inputs are configured.

Team member
A control configured to be included in an IntelliTeam system.

Tie switch
The normally open line switch between two feeders in a two-feeder IntelliTeam transfer scheme.