

# Installation, Field Programming, and Operation

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**Note:** Micro-AT control instruction sheets are posted as PDF files at [sandc.com/en/support/product-literature/](http://sandc.com/en/support/product-literature/). Matlink™ software (all revisions) and the Human Machine Interface (HMI) software application installer (for Wi-Fi adapter users) are available for download at [sandc.com/en/support/sc-customer-portal/](http://sandc.com/en/support/sc-customer-portal/). If assistance is needed, contact [customerportal@sandc.com](mailto:customerportal@sandc.com), or call (888) 762-1100.



## Introduction

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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 your Micro-AT Source Transfer Control. Familiarize yourself with the Safety Information and Safety Precautions on pages 3 through 4. The latest version of this publication is available online in PDF format at [sandc.com/en/support/product-literature/](http://sandc.com/en/support/product-literature/).

### Retain this Instruction Sheet

This instruction sheet is a permanent part of your Micro-AT Source-Transfer Control. Designate a location where you 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 Micro-AT Source-Transfer Control are listed in the ratings table in Specification Bulletin 515-31.

### 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 and tags attached to your Micro-AT Source-Transfer Control. Familiarize yourself with these types of messages and the importance of these various signal words:

<b>⚠ DANGER</b>
“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.
<b>⚠ WARNING</b>
“WARNING” identifies hazards or unsafe practices that can result in serious personal injury or death if instructions, including recommended precautions, are not followed.
<b>⚠ CAUTION</b>
“CAUTION” identifies hazards or unsafe practices that can result in minor personal injury if instructions, including recommended precautions, are not followed.
<b>NOTICE</b>
“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](http://sandc.com), or call the S&C Global Support and Monitoring Center at 1-888-762-1100.

<b>NOTICE</b>	
Read this instruction sheet thoroughly and carefully before installing your Micro-AT Source-Transfer Control.	

**Replacement Instructions and Labels**

If additional copies of this instruction sheet are needed, 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.

### **⚠ DANGER**



**The Micro-AT Source-Transfer Control operates equipment at high voltage. 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 a Micro-AT Source-Transfer Control 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.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing, in accordance with safe operating procedures and rules.
4. **SAFETY LABELS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels.
5. **OPERATING MECHANISM AND BASE.** Do not remove or disassemble operating mechanisms or remove access panels on the Micro-AT Source-Transfer Control unless directed by S&C Electric Company.
6. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded. Voltage levels can be as high as the peak line-to-ground voltage last applied to the unit. Units that have been energized or installed near energized lines should be considered live until tested and grounded.
7. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.

## General

The following instructions are for installation, field programming, and operation of the Micro-AT Source-Transfer Control In Weatherproof Enclosure. See Figure 1. This control is designed for use in conjunction with pole-mounted or steel-structure-mounted S&C Alduti-Rupter® Switches that are power-operated by S&C Switch Operators—Type AS-1A (for rotating operating mechanisms) or Type AS-10 (for reciprocating operating mechanisms) equipped for this application. This arrangement provides automatic source transfer for grounded primary-selective overhead distribution systems rated 7.2 kV through 46 kV.

If already familiar with the Micro-AT control, you may wish to skip these instructions and just check the quick-reference instructions for changing field-adjustable menu items contained in Instruction Sheet 515-530.

For instructions on the use of the optional test panel feature for the Micro-AT control (catalog number suffix “-Y5”), refer to S&C Instruction Sheet 515-505. For instructions on the use of the optional communications card feature (catalog number suffix “-Y8”), refer to Instruction Sheet 515-506. For instructions on the use of the Wi-Fi adapter for applicable Micro-AT controls (kit number TA-3401), refer to Instruction Sheet 515-535.

For installation and operation instructions for the Alduti-Rupter Switches and switch operators, refer to the specific S&C instruction sheets furnished with those devices.



Figure 1. A Micro-AT Source-Transfer Control In a weatherproof enclosure.

The Micro-AT Source-Transfer Control in a weatherproof enclosure includes the following standard features, illustrated in Figure 2 on page 7:

- A MANUAL/AUTOMATIC operation selector switch
- A two-line × 24-character backlit liquid-crystal display
- An automatic-transfer READY indicating lamp, SOURCE-VOLTAGE indicating lamps, and an overcurrent LOCKOUT indicating lamp with a reset key
- A keypad for entry of the control's operating characteristics and voltage-, current-, and time-related operating parameters
- Test keys for simulating overcurrent and loss of voltage on the sources
- Input isolation transformers and a signal-voltage input isolation assembly to isolate the source-transfer control from potential ground loops—as may occur because of differences in voltage between the grounding points of the voltage transformers and the control
- A control-voltage-seeking relay that transfers between the two sources, as required, to ensure adequate control voltage for the switch operators
- A terminal strip for external connections (All necessary internal connections are prewired.)
- Fuseholders for secondary fuses of user-furnished voltage transformers
- An unpainted 304L stainless steel NEMA 4X padlockable enclosure for steel structure mounting

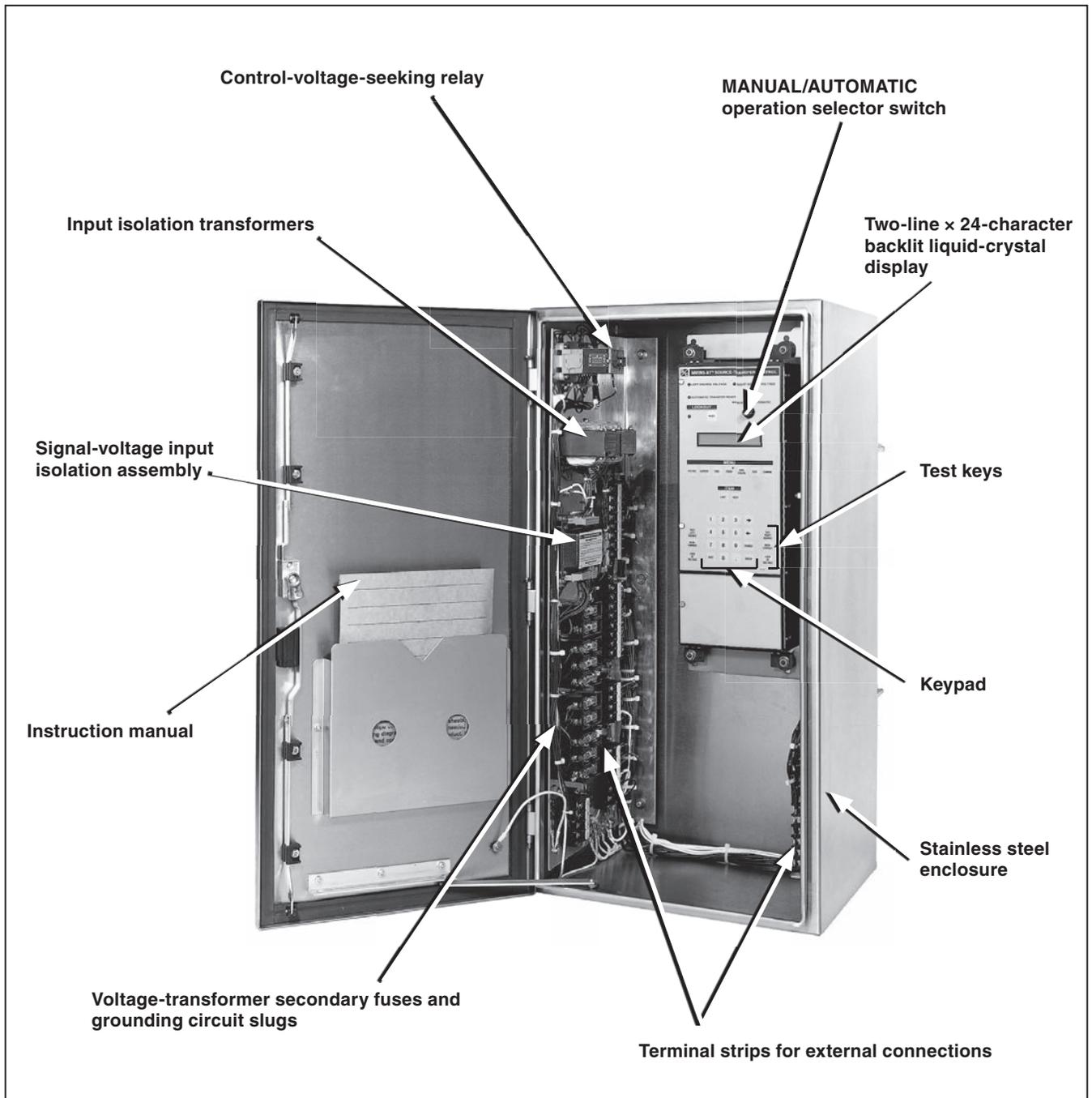


Figure 2. Close-up of the interior.

The Micro-AT Source-Transfer Control In Weatherproof Enclosure ensures a high degree of critical-load continuity for primary-selective overhead distribution systems by minimizing interruptions resulting from the loss of one source. Excluding the intentional time delay to coordinate with upstream protective devices and/or transition dwell time●, transfer is achieved in 1.5 seconds maximum (when Type AS-1A Switch Operators are used) or 2.4 seconds maximum (when Type AS-10 Switch Operators are used).

Under normal operating conditions, the preferred-source interrupter switch is closed and the alternate-source interrupter switch is open. See Figure 3.

The Micro-AT control monitors the condition of both power sources and initiates automatic loss-of-source transfer switching when preferred-source voltage has been lost (or reduced below a predetermined level) for a period of time sufficient to confirm that the loss is not transient. The preferred-source interrupter switch is automatically opened and the alternate-source interrupter switch is then automatically closed, restoring service to the load.

Following a loss of the preferred source that has resulted in a transfer away from the preferred-source and then to the alternate-source, the preferred-source interrupter switch is open and the alternate-source interrupter switch is closed. While in this condition, if the preferred source voltage meets the criteria for being considered normal but has not yet been normal for a sufficient period of time to satisfy the return-of-source time setting and the alternate-source is lost (or reduced below a predetermined level) for a period of time sufficient to confirm that the loss is not transient, the Micro-AT control will initiate a loss-of-source transfer. The alternate-source interrupter switch is automatically opened and the preferred-source interrupter switch is then automatically closed, restoring service to the load.

Both types of loss-of-source transfers in the common-bus primary selective system are always in “open transition.” The primary reason for the loss-of-source transfer always being in “open transition” is to best ensure that a fault on the distribution system is not fed by both sources simultaneously. In addition to the open transition loss-of-source transfer providing protection for closing both sources into a fault on the distribution system, the use of the transition dwell time can be made to further minimize the risk of creating a system fault condition by closing a source interrupter switch to connect a large motor load with the motor load out of synchronization during completion of a loss-of-source transfer.

● An adjustable time delay to allow motor residual voltage—the voltage appearing at the terminals of a connected motor when the source is interrupted—to drop sufficiently before service is restored.

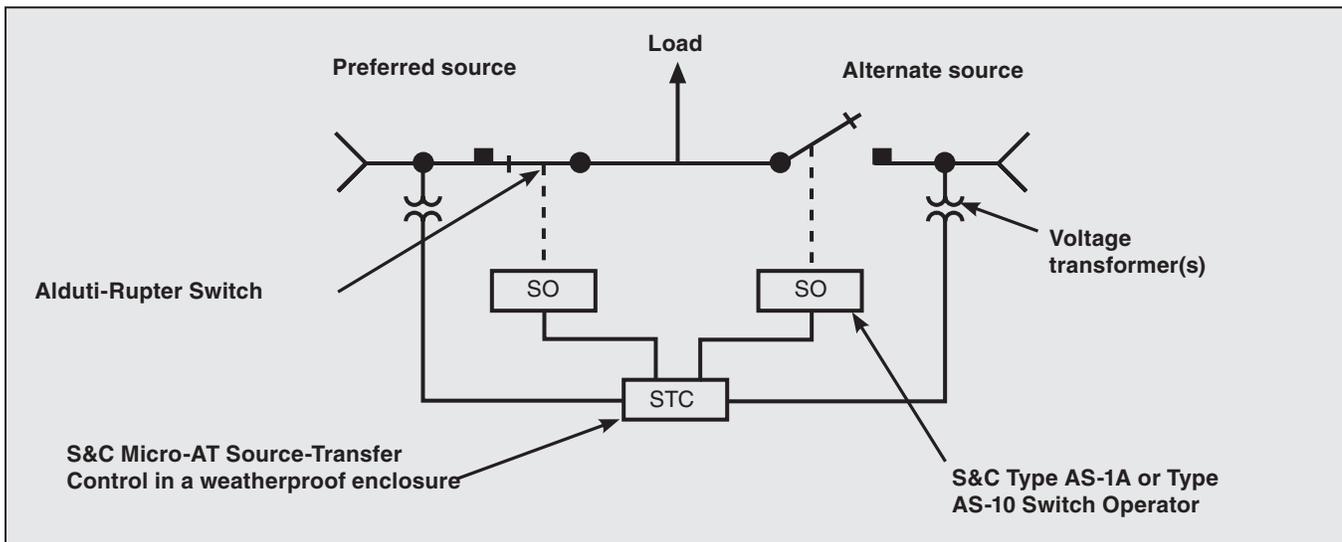


Figure 3. System diagram, normal configuration.

Depending on the control settings, return to the normal circuit configuration—preferred-source interrupter switch closed, alternate-source switch open—may be performed automatically on restoration of normal voltage to the preferred source after a delay sufficient to establish that the return is not temporary (**Automatic Return** mode or **Window Return** mode) or manually at a convenient time (**Hold Return** mode).

In the **Automatic Return** mode, such return-of-source transfer may be accomplished with an open transition or a closed transition. With an open transition, retransfer—used when the power sources are not to be paralleled—the alternate-source interrupter switch opens before the preferred-source interrupter switch closes . . . with a momentary interruption of service to the load. With a closed transition, retransfer—selected when it is permissible to parallel the sources so that there will be no interruption of service to the load—the alternate-source interrupter switch will open after the preferred-source interrupter switch closes.

The **Window Return** mode is functionally identical to the **Automatic Return** mode, except that return-of-source transfer is permitted to occur only if the time of day is within a user-specified time “window,” typically at a time when the implications are least severe for critical loads.

In **Hold Return** mode, if the preferred source voltage meets the criteria for being considered normal and if the alternate-source is lost (or reduced below a predetermined level) for a period of time sufficient to confirm that the loss is not transient, an automatic open transition loss-of-source transfer will take place so that the load is served from the preferred-source following the loss-of-source transfer.

## Voltage Sensing

The voltage-sensing input circuitry of the Micro-AT Source-Transfer Control In Weatherproof Enclosure accommodates either of the following single-phase or three-phase voltage-sensing schemes, using user-furnished voltage transformers having 240/120-Volt, 60-Hertz secondaries:

- For single-phase sensing, one line-to-ground or line-to-line connected voltage transformer per source
- For three-phase sensing, three line-to-ground connected voltage transformers per source or—on delta-connected systems only—two line-to-line connected voltage transformers per source

In instances where three-phase source voltage sensing is used, an output-voltage magnitude unbalance and/or phase-angle unbalance will likely exist between the voltage transformers on each source. The Micro-AT control must be normalized to compensate for such differences on the left source and the right source, respectively. A source can be normalized only if each phase has measurable voltage and its sequence of rotation is the same as on the other source.

The base voltages on phase 2 of the left and right sources can also be calibrated to known values.

## Unbalance Detection

An **Unbalance Detection** feature may be field-programmed in the Micro-AT control in instances where three-phase voltage sensing is provided by three line-to-ground connected voltage transformers per source. This feature protects the loads from any source-side open-phase condition at the same system voltage level as the S&C Alduti-Rupter Switches—whether caused by utility-line burndown, broken conductors, single-phase switching, equipment malfunctions, or single-phasing resulting from blown source-side fuses. The unbalance detection feature continuously develops and monitors the negative-sequence and zero-sequence voltages to detect any unbalance present as the result of an open-phase condition●.

If the voltage unbalance exceeds a preset reference level for a period of time sufficient to confirm that the loss is not transient, the Micro-AT control will initiate an automatic loss-of-source transfer to the other source. By monitoring negative-sequence and zero-sequence voltages, the unbalance detection feature detects virtually all source-side open-phase conditions, even those where backfeed defeats simple voltage-magnitude sensing schemes.

● The **Unbalance Detection** feature should not be programmed in applications using three-phase voltage sensing provided by two line-to-line connected voltage transformers per source.

## Overview

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### Overcurrent Lockout

An **Overcurrent Lockout** feature may be optionally furnished in the Micro-AT Source-Transfer Control In Weatherproof Enclosure. This feature prevents an automatic-transfer operation that would close a source interrupter switch into a fault, thereby avoiding further utility-system disturbance. The **Overcurrent Lockout** feature requires three user-furnished Fisher Pierce Series 1301 Powerflex® Line Post Current Sensors for each source.

An overcurrent in excess of a preset level will set up the lockout feature. If the overcurrent is due to a fault cleared by a source-side protective device, the prolonged loss of voltage will cause the associated source interrupter switch to open. At the same time, a lockout mode will be set up in the source-transfer control so the other source interrupter switch will not automatically close into the fault. (If the overcurrent is due to a fault cleared by a load-side protective device, however, there will be no prolonged loss of voltage, so the source-transfer control will not initiate any switching operations.)

To prevent nuisance lockouts resulting from reclosing operations by source-side circuit breakers, the **Overcurrent Lockout** feature includes a magnetizing-inrush current restraint scheme. Upon loss of source voltage or, if the **Unbalance Detection** feature is programmed, upon voltage unbalance exceeding a preset reference level for 5 cycles, the magnetic inrush current restraint scheme is initiated for a period of 2 minutes. During the period of magnetic inrush current restraint scheme activation 1 second is added to the overcurrent pickup delay setting duration, adjustable from 3 to 100 milliseconds. Unless an overcurrent condition exists that is greater than the 1 second plus overcurrent pickup delay duration, the magnetic inrush current restraint scheme remains in effect for 2 minutes immediately subsequent to the initial loss of voltage. The magnetic inrush current restraint scheme prevents pickup of the **Overcurrent Lockout** feature due to transformer magnetizing-inrush current that can be experienced during upstream recloser activity.

The lockout mode may be externally reset; a terminal block is included in the weatherproof enclosure for attachment of user-furnished control wiring providing the appropriate reset signal.

### Remote Indication

A **Remote Indication** feature may also be optionally furnished in the Micro-AT Source-Transfer Control In Weatherproof Enclosure. This feature permits remote monitoring of presence or absence of source voltages, manual or automatic operating mode, status of the READY indicator, EVENT indicator, and (if furnished) overcurrent lockout. A terminal block is included in the weatherproof enclosure for attachment of user-furnished control wiring to remote indicators.

### Test Panel

A **Test Panel** feature may also be optionally furnished. This feature permits the use of an external, adjustable three-phase source to verify, through independent measurement, the response of the control to **Loss-of-Source**, **Phase Unbalance**, and **Overcurrent Lockout** conditions.

### Supervisory Control

A **Supervisory Control** feature may be optionally furnished as well. This feature permits switch operation and Micro-AT operating mode control from a remote location. A terminal block is included in the weatherproof enclosure for attachment of user-furnished control wiring providing the appropriate supervisory control signals.

### Communications Card

A **Communications Card** feature may be optionally furnished as well. This feature is used in conjunction with a user-furnished personal computer● for local uploading of the Micro-AT control's "events," operating characteristics and operating parameters, digital input and output states, and messages explaining why the automatic-transfer READY indicating lamp isn't lighted. This feature also allows local downloading of the user's standard operating parameters to the Micro-AT control.

A Micro-AT control communication cable is necessary for connecting the communications card to the personal computer. Refer to the "Accessories" table in Specification Bulletin 515-31.

### Wi-Fi Adapter Kit

For Micro-AT control users with Windows 10, 64-bit operating system platforms, a Wi-Fi adapter kit (catalog number TA-3401) in tandem with the HMI application software can be used to locally connect to the Micro-AT control.

To obtain the HMI software application, go to [sandc.com/en/support/sc-customer-portal/](http://sandc.com/en/support/sc-customer-portal/) and download the Micro-AT control HMI application software installer.

● Requires a Windows® 95, 98, 2000, NT, XP, or Windows 7 32-bit operating system. A Windows 7 64-Bit Operating System must be run in **XP** mode (only available for Professional and Ultimate Operating Systems).

**Normal Condition**

With adequate voltage available from both utility sources, the preferred-source interrupter switch should be closed and the alternate-source interrupter switch should be open with its associated circuit available as a standby. The manual/automatic operation selector switch should be set to **Automatic** mode and—if the **Supervisory Control** option is enabled—the supervisory manual/automatic dry contact is closed and the left source voltage, right source voltage, and automatic-transfer READY indicating lamps should be lit. See the “Conditions required to light automatic-transfer READY indicating lamp” section on page 32.

**Transfer on Loss-of-Source Voltage**

At installations using single-phase source voltage sensing, the Micro-AT control continuously monitors the signal-input voltage level on phase 2 of each of the two sources and compares these inputs to the predetermined reference level to determine the status of each source. The control will initiate a loss-of-source transfer when each of the following conditions exist:

- The signal-input voltage from phase 2 of the source serving the load is reduced below the predetermined loss-of-source voltage setting●, for a period of time considered sufficient to confirm the condition is not transient—the predetermined loss-of-source time setting■
- The signal-input voltage from phase 2 of the standby source exceeds the predetermined return-of-source voltage setting▲
- The **Overcurrent Lockout** feature, if programmed, is not “set up” to prevent an automatic transfer operation that would close a source interrupter switch into a fault (See the “Overcurrent Lockout Condition” section on page 12.)

At installations using three-phase source voltage sensing, the Micro-AT control continuously monitors the signal-input voltage level on each phase of the two sources and compares these inputs to the predetermined reference level to determine the status of each source. The control will initiate a loss-of-source transfer when each of the following conditions exist:

- The signal-input voltage from one or more phases of the source serving the load is reduced below the predetermined loss-of-source voltage setting● for a period of time considered sufficient to confirm the condition is not transient—the predetermined loss-of-source time setting■
- The signal-input voltages from all three phases of the standby source exceed the predetermined return-of-source voltage setting▲
- The **Overcurrent Lockout** feature, if programmed, is not “set up” to prevent an automatic transfer operation that would close a source interrupter switch into a fault (See the “Overcurrent Lockout Condition” section on page 12.)

In addition, at installations using three-phase source voltage sensing, if the **Unbalance Detection** feature is programmed, the control will initiate a transfer as a result of an open-phase condition when the system unbalance exceeds the predetermined unbalance-detection voltage. See the “Transfer on Unbalance Condition” section on page 12.

If a loss-of-source transfer occurs, the automatic-transfer READY indicating lamp will extinguish—indicating the normal condition no longer exists.

**Transfer on Return-of-Source Voltage**

Upon return of preferred-source voltage for a period of time sufficient to establish that the return is not temporary—the predetermined return-of-source time setting◆, automatic return-of-source transfer to the normal condition will occur if the control has been programmed for **Automatic Return** mode. The return-of-source transfer will either be a “closed transition” or an “open transition,” depending on the control settings.

With a “closed transition” return, the preferred-source interrupter switch will close before the alternate-source interrupter switch is opened, so that there is no interruption of service to the load. With an “open transition” return, which prevents an automatic operation that would parallel the power sources, the alternate-source interrupter switch will open prior to closing of the preferred-source interrupter switch.

- Factory-set at 85.0 Volts.
- Factory-set at 2.00 seconds.
- ▲ Factory-set at 105 Volts.
- ◆ Factory-set at 3.00 minutes.

If the control has been programmed for “window return,” automatic return-of-source transfer to the normal condition will be performed in the same manner as for an “automatic return.” But return-of-source transfer is permitted to occur only if the time of day is within the specified time “window.” The beginning of this window is the predetermined **Window Begin** setting;● the window length is adjustable from 1 minute to 3 hours.

If the control has been programmed for “hold return,” transfer to the normal condition must be accomplished manually—unless alternate-source voltage becomes inadequate and preferred-source voltage is adequate. In this case of loss of alternate-source voltage, an automatic “open transition” loss-of-source transfer will take place.

When the return-of-source transfer occurs, the automatic-transfer READY indicating lamp will again light, indicating that the normal condition has been restored.

### Transfer on Unbalance Condition

At installations using three-phase source voltage sensing, the control may be programmed to detect phase unbalance conditions on the source. This feature protects the loads from any source-side open-phase condition at the same system voltage level as the Alduti-Rupter Switches—whether caused by utility-line burn-down, broken conductors, single-phase switching, equipment malfunctions, or single-phasing resulting from blown source-side fuses.■

When this feature has been programmed, the control will initiate an automatic source transfer when each of the following conditions exist:

- The signal-input phase-voltage unbalance of the source serving the load exceeds the predetermined unbalance-detect voltage,▲ for a period of time considered sufficient to confirm the condition is not transient—the predetermined **Loss-Of-Source Time** setting◆
- The signal-input phase-voltage unbalance of the standby source is less than the predetermined unbalance-detection voltage▲
- The **Overcurrent Lockout** feature, if programmed, is not “set up” to prevent an **Automatic Transfer** operation that would close a source interrupter switch into a fault. See the “Overcurrent Lockout Condition” section below

Upon return of the preferred-source phase voltages to their normal, balanced state, return to that source can be accomplished as described in the “Transfer on Return of Source Voltage” section on page 11.

### Overcurrent Lockout Condition

At installations where three user-furnished Fisher Pierce Series 1301 Powerflex Line Post Current Sensors have been provided on each source, the control may be programmed to include an **Overcurrent Lockout** feature. This feature prevents an automatic-transfer operation that would close a source interrupter switch into a fault, thereby avoiding further utility-system disturbances.

An overcurrent in excess of the predetermined **Lockout Level** setting▼ detected as the imbalance in the three-phase current—the summation of the currents sensed by the individual phase current sensors of the source serving the load—will “set up” the **Lockout** feature. The LOCKOUT lamp will light.

● Factory-set at 01:00 (24-hour format).

■ The **Unbalance Detection** feature should not be programmed in applications using three-phase voltage sensing provided by two line-to-line connected voltage transformers per source.

▲ Factory-set at 18 Volts.

◆ Factory-set at 2.00 seconds.

▼ Factory-set at 1200 amperes. S&C recommends customers use the factory-default setting or adjust this value to 70% of the available neutral fault current, whichever is lower. In some applications, the lockout level setting is determined by the setting of user-furnished external relaying. An adjustable overcurrent-lockout pickup time delay is provided to prevent nuisance lockouts due to motor load backfeed into upstream faults. Factory-set at 50 milliseconds. Adjustment range is 3 to 100 milliseconds.

If the overcurrent is due to a fault that is cleared by a source-side protective device, the prolonged loss of source voltage will cause the associated source interrupter switch to open, and the **Overcurrent Lockout** feature will prevent the other source interrupter switch from closing into the fault.

After the fault has been located and repaired, the manual/automatic operation selector switch must be set in **Manual** mode and the RESET key pressed to cancel the lockout condition, which will extinguish the LOCKOUT lamp.

Service to the load can then be restored by pressing the CLOSE pushbutton on the preferred-source interrupter switch operator. If, however, voltage is not available on the preferred source, service to the load can be restored by pressing the CLOSE pushbutton on the alternate-source interrupter switch operator. After the source interrupter switch has closed, the manual/automatic operation selector switch should be placed in the **Automatic** setting. If the normal condition has been restored, the automatic-transfer READY indicating lamp will light.

If the overcurrent is due to a fault that is cleared by a load-side protective device, no switching will occur because loss-of-source voltage is not of sufficient duration to initiate opening of the source interrupter switch serving the load. In this case, although the fault current initially “sets up” the **Lockout** feature (and the LOCKOUT lamp lights), the subsequent return of normal source voltage will actuate the lockout-reset time delay●. After this predetermined time delay, the **Lockout** feature will automatically reset and the control will return to its normal state and the LOCKOUT lamp will extinguish.

- Factory-set at 20.0 seconds.

Complete the following steps to install the Alduti-Rupter Switches, switch operators, and Micro-AT Source Transfer Control:

**STEP 1.** Install the S&C Alduti-Rupter Switches and Type AS-1A or Type AS-10 Switch Operators in accordance with the S&C instruction sheets and erection drawings furnished with those devices. Also install the voltage transformers and, if the **Overcurrent Lockout** feature has been specified, the current sensors in accordance with the instructions provided by the suppliers of those devices.

**STEP 2.** *If the source-transfer control enclosure is to be pole-mounted by means of the optional pole-mounting bracket (catalog number suffix “-PI”), perform the following:*

- (a) Drill two  $\frac{1}{4}$ -inch (17-mm) diameter holes  $9\frac{3}{8}$  inches (238 mm) apart in the center of the utility pole at the desired height for mounting the enclosure.
- (b) Insert two  $\frac{5}{8}$ -inch diameter through-bolts (not furnished) in the holes just drilled. Secure these bolts loosely with the necessary washers and nuts in such a manner the heads of the bolts project sufficiently (approximately 3 inches (76 mm) from the face of the pole) to engage the pole mounting bracket.
- (c) Attach two eyebolts (not furnished) to the holes provided at the top of the enclosure mounting frame. See Figure 4 on page 15. Securely tighten the eyebolts. Attach two suitable lifting slings to the eyebolts and slowly raise the slings so they become taut. Carefully raise the enclosure to its mounting level and guide it so the through-bolts projecting from the utility pole slip into the two keyholes in the pole mounting bracket. Lower the enclosure slightly so it bears on the through-bolts. Fully tighten the through-bolts, making sure the washer for each bolt is between the bolt head and the pole mounting bracket. Proceed to Step 3.

*If the source-transfer control enclosure is to be steel-structure-mounted:* Attach two eyebolts (not furnished) to the holes provided at the top of the enclosure mounting frame. See Figure 4 on page 15. Securely tighten the eyebolts. Attach two suitable lifting slings to the eyebolts and slowly raise the slings so they become taut. Carefully raise the enclosure to its mounting level and securely bolt it in place.

**STEP 3.** Ground the enclosure by solidly connecting one number 6 AWG wire (or wires of equivalent cross-sectional area) to the ground lug on the back of the enclosure. See Figure 4 on page 15.

### NOTICE

Failure to use proper-size ground wire may result in damage to the source-transfer control.

- STEP 4.** Remove the voltage-transformer secondary fuses and grounding circuit slugs from the source-transfer control enclosure. See Figure 2 on page 7 for location of these components.
- STEP 5.** Prepare a weather-tight entrance in the bottom of the enclosure in accordance with user's practice. Install conduit and interconnection wiring between the source-transfer control, the switch operators, the voltage transformers, and the current sensors (as appropriate) in accordance with the system wiring diagram and the interconnection wiring diagram furnished with the source-transfer control. Then, replace the fuses and slugs removed in Step 4.
- STEP 6.** *If three-phase voltage sensing is provided by two line-to-line connected voltage transformers per source:* It will be necessary to reposition the input plug on the voltage-input isolation assembly. Remove the input plug from Receptacle N and insert it in Receptacle V. See Figure 5.

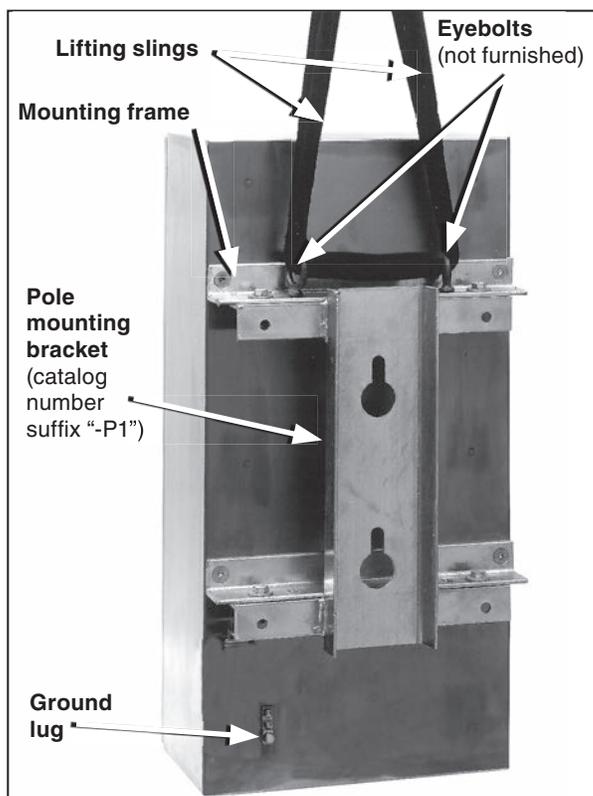


Figure 4. Hoisting the enclosure into position.

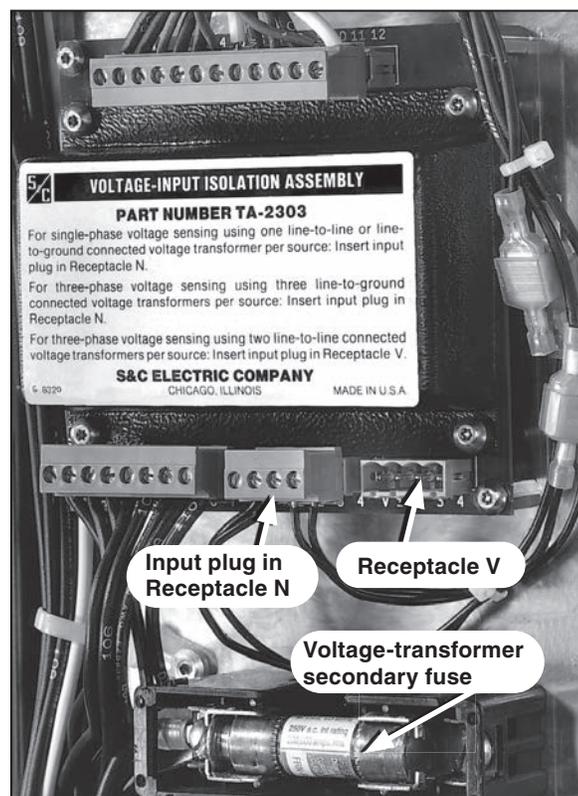


Figure 5. Removing voltage-transformer secondary fuses and grounding circuit slugs and repositioning the input plug on the voltage-input isolation assembly.

The Micro-AT Source-Transfer Control uses an advanced electronic microprocessor to perform control operations, as directed by settings programmed into the device at the factory and in the field. Such settings—consisting of the control’s operating characteristics and voltage-, current-, and time-related operating parameters—are entered into the control by means of a keypad on the front panel. See Figure 6 on page 17.

To simplify entry of this information and to permit its quick review on the liquid-crystal display, the operating characteristics have been grouped together as a series of “items” in the **Configure** menu. Similarly, the voltage-, current-, and time-related operating parameters have been grouped together as a series of items in the **Voltage**, **Current**, and **Time** menus, respectively. A particular item can be accessed for display by first pressing the appropriate menu key and then scrolling through the items, using the NEXT or LAST item key. To prevent unauthorized changes to the operating characteristics and operating parameters, each item is protected by an access code; the correct access code must be entered before the item can be altered.

The **Test** menu provides the means for checking the functioning of the source-transfer control and is also used to enable the test keys for simulating overcurrent and/or loss of voltage on the sources.

The Micro-AT control features powerful built-in diagnostic tools. The control automatically records system status and the status of the device’s controller circuits every time a control operation occurs. Each such operation, referred to as an “event,” is indicated by the illumination of a lamp on the **Event** menu key and is available for display under this menu. Further, the control has available for display, as items under the **Examine** menu, the present source voltage and current inputs, and the present status of discrete inputs to and outputs from the control.

### The Display

The liquid-crystal display provides the means for viewing the operating characteristics and operating parameters which have been programmed into the control as items in the **Configure**, **Voltage**, **Current**, and **Time** menus, entries in the **Event** menu, and present system and control states in the **Examine** menu.

The display normally appears like this:

DATE	TIME
PRESS ANY MENU KEY	

If a menu key is pressed—for example, the VOLTAGE menu key—the display changes to:

VOLTAGE:
PRESS LAST/NEXT ITEM

If the NEXT item key is then pressed, the first item in the menu—in this case, loss-of-source voltage— appears.

VOLTS: LOSS OF SOURCE	
85.0 VOLTS	CHANGE

In this example, the display is indicating that the present value of loss-of-source voltage programmed into the control is 85.0 volts. The **Change** message in the lower right-hand corner of the display indicates that the value of loss-of-source voltage can be changed.

If a change to the present value of loss-of-source voltage is desired, the manual/automatic operation selector switch must first be placed in **Manual** mode. Then, if the CHANGE key is pressed, the following display appears:

VOLTS: LOSS OF SOURCE
ENTER ACCESS CODE

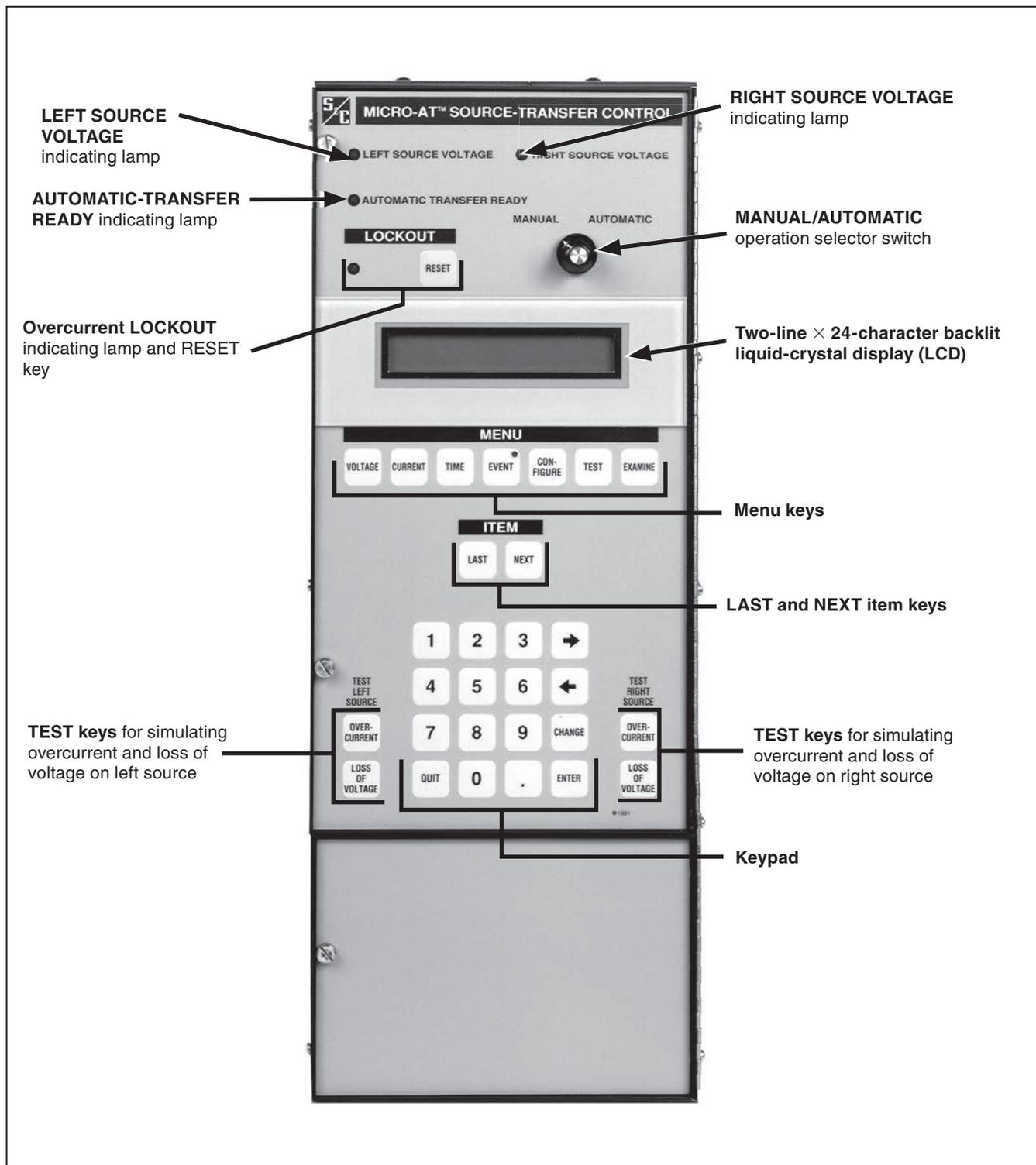


Figure 6. A Close-up of the front panel features.

The display is indicating the access code must be entered before the value of loss-of-source voltage can be changed. As each digit of the access-code number is pressed, the display indicates that digit. When all the digits have been pressed—followed by the ENTER key—the display changes to:

```
VOLTS: LOSS OF SOURCE  
85.0 VOLTS
```

The desired value of loss-of-source voltage can be entered at this time. If a value of 102 Volts were desired, the “1,” “0,” and “2” keys would be pressed—followed by the ENTER key. The display changes to:

```
VOLTS: LOSS OF SOURCE  
102 VOLTS CHANGE
```

Other items in the **Voltage** menu are accessed by use of the NEXT item key (or LAST item key) and changed, if necessary, in the same manner. The access code need not be reentered. When no further items are to be accessed in the **Voltage** menu, the NEXT key should be pressed and then the QUIT key should be pressed.

Items in other menus are similarly accessed by pressing the appropriate menu key, followed by the NEXT item key (or LAST item key) and exited gracefully by pressing the QUIT key. Following completion of the changes to the various settings, the manual/automatic operation selector switch placed in **Automatic** mode.

```
DATE TIME  
PRESS ANY MENU KEY
```

Incidentally, the display will also revert to its normal appearance if no keystrokes of the keypad have been detected for 5 minutes. Should this occur, the access code will need to be reentered before the value of an item can be changed.

## Error Messages

If an invalid access code is entered in the course of changing the value of an item, an **Error** message will be displayed for 5 seconds. For the example given above, this display would appear as follows:

```
VOLTS: LOSS OF SOURCE  
INVALID ACCESS CODE
```

If an unacceptable value (one not within the specified range) is entered in the course of changing the value of an item, another **Error** message will be displayed for 5 seconds. For the example given above, this display would appear as follows:

```
ENTRY MUST BE BETWEEN  
80.0 AND 105 VOLTS
```

## Non-Numeric Items

A few field changeable items in the **Configure** menu require a non-numeric response. In such instances, the display will be similar to this:

```
CONFIG: SELECT TRANSITION
OPEN                               CHANGE
```

Here the display is indicating the **Open** option has been selected as the type of transition by which an automatic return-of-source transfer will be effected. The **Change** message in the lower right-hand corner of the display indicates this selection can be changed.

If a change is desired, the access code will need to be entered in the same manner described above.

After the access code has been entered, pressing the “←” or “→” key will display the other possible selection(s): in this case, “CLOSED.” The ENTER key must be pressed to accept the selection of “CLOSED” transition.

The display will now look like this:

```
CONFIG: SELECT TRANSITION
CLOSED                               CHANGE
```

## Read-Only Items

Some items are available only for display of information. One such item, in the **Voltage** menu, is left-source phase 2 voltage. The display will be similar to this:

```
VOLTS: LEFT PHASE 2
118 VOLTS           MENU/ITEM
```

Here the display is indicating that the actual voltage on left-source phase 2 is 118 Volts. The **Menu/Item** message in the lower right-hand corner of the display indicates that a menu key, the NEXT item key, or LAST item key can be pressed to exit this particular menu item.

To operate properly, the Micro-AT Source-Transfer Control must be correctly programmed. Some menu items have been factory-set and *cannot* be field-adjusted●. Some menu items have factory-settings but *can* be field-adjusted. Still other menu items *must* be field-adjusted.

**Notes:** Be sure to check each field-adjustable item in the **Configure**, **Voltage**, **Current**, and **Time** menus in the manner described below. The factory settings for these items may not all be appropriate for a particular installation.

To perform the field-adjustment and programming procedures outlined in this document, enter the correct access-code number when directed.

The access-code number is **6601**.

**Notes:**

- To ensure any changes to the factory settings in all menus are stored in memory, press the NEXT item key before the QUIT key.
- Always normalize the left and right sources and set the base voltages on Phase 2 of the left and right sources after executing **CONFIG: RESTORE VALUES**.
- When changing **Select Bus Type** setting or the **Select Preferred** setting in the **Configure** menu, the Micro-AT control will power down and reboot. A “System Startup” will be recorded in the event log.

- Non-field-adjustable items in the **Configure** and **Voltage** menus are listed in the “Appendix” on page 38.

## Configure Menu

Follow these steps to set the following menus for field adjustment and programming.

**STEP 1.** Place the manual/automatic operation selector switch in **Manual** mode to prevent automatic operation during adjustment and programming.

**STEP 2.** Set the operating characteristics of the Micro-AT control using the following procedure:

(a) Press the CONFIGURE menu key. The following display will appear:

CONFIG:  
PRESS LAST/NEXT ITEM

(b) Press the NEXT item key. The first item of the **Configure** menu will appear on the first line of the display.

CONFIG: SELECT BUS TYPE

(c) Press the NEXT item key repeatedly to scroll to each field adjustable item of the **Configure** menu, as listed in the Table 1.

**Table 1. Field-Adjustable Items in the Configure Menu**

Field-Adjustable Item CONFIG:	Description	Displayed If	Operating State or Range <sup>①</sup>
<b>SELECT PREFERRED</b>	Assignment of "LEFT" or "RIGHT" as preferred source	CONFIG: SELECT BUS TYPE has been factory-set for "COMMON," "PAD MNT," or "SPLTCOM" bus type <sup>②</sup>	<b>LEFT, RIGHT</b>
<b>UNBALANCE DETECT</b>	Selection of <b>Unbalance Detection</b> feature "ON" or "OFF"	CONFIG: UNBALANCE INSTALL has been factory-set for "ON"	<b>ON, OFF</b>
<b>SELECT RETURN</b>	Selection of <b>Hold, Auto, or Window</b> option as means by which return-of-source transfer will be effected	Displayed at all installations	<b>HOLD, AUTO, WINDOW</b>
<b>SELECT TRANSITION</b>	Selection of <b>Open or Closed</b> setting as type of transition by which automatic return-of-source transfer will be effected	CONFIG: SELECT RETURN has been set for "AUTO" or "WINDOW" return	<b>OPEN, CLOSED</b>
<b>RESTORE VALUES</b>	Sets all field-adjustable items back to the factory settings	Displayed at all installations	PRESS ENTER
<b>DWELL TIMER</b>	Selection of transition-dwell time delay "IN" or "OUT"	Displayed at all installations	<b>IN, OUT</b>
<b>NORMALIZE LEFT</b>	Means of compensating for any output-voltage magnitude unbalance and/or phase-angle unbalance between voltage transformers on the left source	CONFIG: VOLTAGE SENSING has been factory-set for "4 WIRE" voltage sensing	PRESS ENTER
<b>NORMALIZE RIGHT</b>	Means of compensating for any output-voltage magnitude unbalance and/or phase-angle unbalance between voltage transformers on the right source	CONFIG: VOLTAGE SENSING has been factory-set for "4 WIRE" voltage sensing	PRESS ENTER
<b>SET BASE LEFT</b>	Means of calibrating control to a known voltage on phase 2 of the left source	Displayed at all installations	105-130 VOLTS <b>(120 VOLTS)</b>
<b>SET BASE RIGHT</b>	Means of calibrating control to a known voltage on phase 2 of the right source	Displayed at all installations	105-130 VOLTS <b>(120 VOLTS)</b>
<b>ACCESS CODES</b>	Selection of alternative access code	Displayed at all installations	4 DIGITS MIN., 7 DIGITS MAX.
<b>COM Ø BIT RATE</b>	Selection of communication port data transfer bit rate	Optional communications card has been installed	2400, 4800, 9600, 19200, or 38400 BPS <b>(19200 BPS)</b>

① Factory settings are shown in boldface type.

② Weatherproof enclosure applications use "COMMON" bus.

## Field Adjustment and Programming

---

Is the factory setting for each item (shown in the last column of the table, in boldface type) appropriate for this installation? If not, change it.

For example, here is the display for **CONFIG: SELECT PREFERRED** with its factory setting, **LEFT**:

```
CONFIG: SELECT PREFERRED
LEFT                CHANGE
```

If the right source is the preferred source at this installation, press the CHANGE key. The following display will appear:

```
CONFIG: SELECT PREFERRED
ENTER ACCESS CODE
```

Press each digit of the access-code number, then press the ENTER key.

**Note:** You will not be required to reenter the access code number until one of the following occurs:

- The QUIT key is pressed.
- The MANUAL/AUTOMATIC operation selector switch is placed in **Automatic** mode
- No keystrokes of the keypad have been detected for 5 minutes.

Press the “→” key to select the other possible operating state for **CONFIG: SELECT PREFERRED**, the **RIGHT** source. Then, press the ENTER key. The display will now look like this:

```
CONFIG: SELECT PREFERRED
RIGHT                CHANGE
```

The other field-adjustable items of the **Configure** menu can be changed in the same manner. Procedures for normalizing the left and right sources, setting the base voltages on the left and right sources, selecting a custom access code, and selecting the communications card bit rate are discussed below.

- (d) Normalize the left and right sources (unless **CONFIG: VOLTAGE SENSING** has been factory-set for 2 WIRE voltage sensing). Each source must be normalized to compensate for any output-voltage magnitude unbalance and/or phase-angle unbalance between the voltage-sensing devices on that source. Each source should be in its known normal state, so unusual system conditions aren't calibrated out. Here, for example, is the display for **CONFIG: NORMALIZE LEFT**:

```
CONFIG: NORMALIZE LEFT
NORMALIZE            CHANGE
```

Press the CHANGE key. If the display prompts you to reenter the access-code number, do so. The following display will appear:

```
CONFIG: NORMALIZE LEFT
ENTER TO:      NORMALIZE
```

Press the ENTER key. The display will now look like this:

```
CONFIG: NORMALIZE LEFT
NORMALIZE      CHANGE
```

Normalize the right source the same way.

**Note:** A source can be normalized only if each phase has measurable voltage and its sequence of rotation is the same as on the other source. If normalizing can't be performed, one of the following messages will be displayed:

**CANNOT NORMALIZE**  
**PHASE VOLT(S) TOO LOW**      OR      **CANNOT NORMALIZE**  
**OPPOSITE PHASE ROTATION**

If either of these messages is displayed, contact your nearest S&C Sales Office.

- (e) Set the base voltages on phase 2 of the left and right sources. Each source should be in its known normal state so unusual system conditions aren't calibrated out.

Here, for example, is the display for **CONFIG: SET BASE LEFT** with its factory setting, 120 Volts:

```
CONFIG: SET BASE LEFT
120 VOLTS      CHANGE
```

If the left-source base voltage is to be set to some other value, press the CHANGE key. If the display prompts you to reenter the access-code number, do so. The display will now look like this:

```
CONFIG: SET BASE LEFT
120 VOLTS
-----
```

Enter the desired left-source base voltage. If, for example, 117 volts is the desired value, the "1," "1," and "7" keys would be pressed—followed by the ENTER key. The display will change to:

```
CONFIG: SET BASE LEFT
1 1 7 VOLTS    CHANGE
```

Set the right-source base voltage the same way.

## Field Adjustment and Programming

---

- (f) The Micro-AT control can be programmed to accept a custom access-code number of your choosing, using the following procedure. If you don't wish to enter a custom access-code number, proceed to Step 2(g). Here's the display for **CONFIG: ACCESS CODES**:

```
CONFIG: ACCESS CODES
                CHANGE
```

Press the CHANGE key. The following display will appear:

```
CONFIG: ACCESS CODES
ENTER ACCESS CODE
```

Press each digit of the "standard" access-code number, then press the ENTER key. The display will change to:

```
CONFIG: ACCESS CODES
USER ENTER NEW CODE
```

Enter your desired "custom" access-code number (4 digits minimum, 7 digits maximum). The display will change to:

```
CONFIG: ACCESS CODES
USER REENTER NEW CODE
```

To make sure the number entered is really the custom access-code number desired, reenter the same number.

### NOTICE

If accidentally entering a different custom access-code number the second time, the following message will appear: **REENTRY FAILED**.

If attempting to enter a custom access-code number already in use, the following message will appear: **CODE IN EFFECT**.

In either case, repeat the procedure described above.

The Micro-AT control will now accept either the custom access-code number just entered or the standard access-code number.

- (g) If the Micro-AT control has been furnished with the optional communications card feature (catalog number suffix "Y8"), the communication port data transfer bit rate may need to be changed using the following procedure. Refer to Instruction Sheet 515-506. If the Micro-AT control has not been furnished with the communications card, proceed to Step 3.

Here's the display for **CONFIG: COM 0 BIT RATE** with its factory setting, **19200 BITS PER SECOND**:

```
CONFIG: COM 0 BIT RATE
19200                CHANGE
```

If a different data-transfer bit rate is needed to establish communications between the Micro-AT control and the personal computer, press the CHANGE key. The following display will appear:

```
CONFIG: COM 0 BIT RATE
ENTER ACCESS CODE
```

Press each digit of the access-code number, and then press the ENTER key. The display will change to:

```
CONFIG: COM 0 BIT RATE
19200 ← OR → 38400
```

Press the “→” key to select the other possible selections: 2400, 4800, 9600, or 38400 bits per second. Then, press the ENTER key.

### Voltage Menu

**STEP 3.** Set the voltage-related operating parameters of the Micro-AT control using the following procedure:

(a) Press the VOLTAGE menu key. The following display will appear:

```
VOLTAGE:
PRESS LAST/NEXT ITEM
```

(b) Press the NEXT item key. The first item of the **Voltage** menu will appear on the first line of the display:

```
VOLTS: LOSS OF SOURCE
```

(c) Press the NEXT item key repeatedly to scroll to each field-adjustable item of the **Voltage** menu, as listed in Table 2 on page 26.

Is the factory setting for each item (shown in the last column of Table 2, in boldface type) appropriate for this installation? If not, change it.

For example, here is the display for **VOLTS: LOSS OF SOURCE** with its factory setting, 85.0 Volts:

```
VOLTS: LOSS OF SOURCE
85.0 VOLTS CHANGE
```

If the loss-of-source voltage is to be set to some other value, press the CHANGE key. If the display prompts to reenter the access-code number, do so. The display will now look like this:

```
VOLTS: LOSS OF SOURCE
85.0 VOLTS
```

Enter the desired loss-of-source voltage. If, for example, 102 Volts is the desired value, the “1,” “0,” and “2” keys would be pressed—followed by the ENTER key. The display will change to:

```
VOLTS: LOSS OF SOURCE
102 VOLTS CHANGE
```

The other field-adjustable items of the **Voltage** menu can be changed in the same manner.

## Field Adjustment and Programming

### Current Menu

**STEP 4.** If **CONFIG: LOCKOUT OPTION** setting has been factory-set for Internal mode, set the lockout level of the Micro-AT control using the following procedure:

- (a) Press the CURRENT menu key. The following display will appear:

**Table 2. Field-Adjustable Items in the Voltage Menu**

Field Adjustable Item VOLTS:	Description	Displayed If	Operating Range <sup>①</sup>
<b>LOSS OF SOURCE</b>	Voltage level on source serving the load which, if reduced below, will result in control initiating automatic loss-of-source transfer. Also, if the <b>Hold</b> return option has been selected, the voltage level on an alternate source which, if reduced below, will result in control initiating automatic return-of-source transfer	Displayed at all installations	10-105 Volts <b>(85 Volts)</b>
<b>RETURN OF SOURCE</b>	Voltage level on source formerly serving the load which, if equaled or exceeded, will result in control initiating automatic return-of-source transfer. (Applicable only if the <b>Auto</b> or <b>Window</b> return option has been selected)	Displayed at all installations	100-120 Volts <b>(105 Volts)</b>
<b>OVERVOLT DETECT</b>	Voltage level on a source which, if equaled or exceeded, will result in the control posting an entry in the event log	Displayed at all installations	120-140 Volts <b>(135 Volts)</b>
<b>UNBALANCE DETECT</b>	Unbalance level on source serving the load which, if equaled or exceeded, will result in control initiating automatic transfer. Also, if the <b>Hold</b> return option has been selected, unbalance level on alternate source which, if equaled or exceeded, will result in control initiating automatic return transfer	CONFIG: UNBALANCE INSTALL has been factory-set for "IN"	12-60 Volts <b>(18 Volts)</b>

<sup>①</sup> Factory settings are shown in boldface type.

CURRENT:  
PRESS LAST/NEXT ITEM

- (b) Press the NEXT item key. The following display will appear for CURRENT: LOCKOUT LEVEL:

CURRENT: LOCKOUT LEVEL  
1200 AMPS CHANGE

The lockout level has been factory set for 1200 amperes but may be field-adjusted to any value between 200 and 1500 amperes.

- (c) Is the factory setting appropriate for this installation? If not, change it.

**Note:** The **Lockout Level** setting should take into account the emergency peak-load current of the system to preclude nuisance lockouts.

If the lockout level is to be set to some other value, press the CHANGE key. If the display prompts to reenter the access-code number, do so. The display will now look like this:

CURRENT: LOCKOUT LEVEL  
1200 AMPS ----

Enter the desired lockout level. If, for example, 600 amperes is the desired value, the "6," "0," and "0" keys would be pressed, followed by the ENTER key. The display will change to:

CURRENT: LOCKOUT LEVEL  
600 AMPS CHANGE

## Time Menu

**STEP 5.** Set the time-related operating parameters of the Micro-AT control using the following procedure.

- (a) Press the TIME menu key. The following display will appear:

VOLTAGE:  
PRESS LAST/NEXT ITEM

- (b) Press the NEXT item key. The first item of the **Time** menu will appear on the first line of the display:

TIME: LOSS OF LEFT SOURCE

- (c) Press the NEXT item key repeatedly to scroll to each item of the **Time** menu, as listed in Table 3. Each item in the **Time** menu is field-adjustable.

Is the factory setting for each item (shown in the last column of Table 3, in boldface type) appropriate for this installation? If not, change it.

For example, here is the display for **TIME: LOSS OF LEFT SOURCE** with its factory setting, 2.00 SECONDS:

TIME: LOSS OF LEFT SOURCE  
2.00 SECONDS            CHANGE

**Table 3. Field-Adjustable Items in the Time Menu**

Field-Adjustable Item TIME:	Description	Displayed If	Operating Range <sup>①</sup>
<b>LOSS OF LEFT SOURCE</b>	Time delay between detection of loss of voltage on left source and initiation of automatic loss-of-source transfer	Displayed at all installations	0.25-240 SECONDS <b>(2.00 SECONDS)</b>
<b>LOSS OF RIGHT SOURCE</b>	Time delay between detection of loss of voltage on right source and initiation of automatic loss-of-source transfer	Displayed at all installations	0.25-240 SECONDS <b>(2.00 SECONDS)</b>
<b>RETURN OF SOURCE</b>	Time delay between return of preferred-source voltage and initiation of automatic return-of-source transfer	CONFIG: SELECT RETURN has been set for "AUTO" or "WINDOW" return	5 SECONDS TO 8 HOURS <b>(00:03:00)</b>
<b>LOCKOUT RESET</b>	Time delay that voltage must remain on load, following its resumption after a momentary overcurrent, before the <b>Overcurrent Lockout</b> feature is automatically reset	CONFIG: LOCKOUT OPTION has been factory-set for "INTERNAL" or "EXTERNAL"	0.25-240 SECONDS <b>(20.0 SECONDS)</b>
<b>OC LOCKOUT PICKUP</b>	Time delay between detection of overcurrent and initiation of overcurrent lockout	CONFIG: LOCKOUT OPTION has been factory-set for "INTERNAL"	3-100 MILLISECONDS <b>(50 MS)</b>
<b>TRANSITION DWELL</b>	Time delay, during automatic loss-of-source transfer, between opening of a source interrupter switch and closing of the other source interrupter switch. Also, time delay, during automatic return-of-source transfer, between opening of a source interrupter switch and closing of the other source interrupter switch	CONFIG: DWELL TIMER has been set for "IN"	0.25-10 SECONDS <b>(2.00 SECONDS)</b>
<b>WINDOW BEGIN</b>	The beginning of a time "window" in which an automatic return-of-source transfer can occur; the window is adjustable from 1 minute to 3 hours. (Transfer will take place after the return-of-source time delay has expired—provided that the time of day is within the window selected)	CONFIG: SELECT RETURN has been set for "WINDOW" return	hh:mm (hour: minute—24-hour format) <b>(01:00)</b>
<b>WINDOW LENGTH (24 HR)</b>	The time duration of the "window" in which an automatic return-of-source transfer can occur	CONFIG: SELECT RETURN has been set for "WINDOW" return	hh:mm (hour: minute—24-hour format) <b>(03:00)</b>
<b>TODAY'S DATE</b>	Month-day-year reference for event log	Displayed at all installations	mm/dd/yy (month/day/year)
<b>TIME OF DAY (24 HR)</b>	Hour-minute-second reference for event log	Displayed at all installations	hh:mm (hour: minute—24-hour format)

① Factory settings are shown in boldface type.

## Field Adjustment and Programming

---

If the loss-of-left source time is to be set to some other value, press the CHANGE key. If the display prompts you to reenter the access-code number, do so. The display will now look like this:

TIME: LOSS OF LEFT SOURCE 2.00 SECONDS      ----
---

Enter the desired loss-of-left source time. If, for example, 10.5 seconds is the desired value, the “1,” “0,” “.” and “5” keys would be pressed, followed by the ENTER key. The display will change to:

TIME: LOSS OF LEFT SOURCE 10.5 SECONDS      CHANGE
---

The other items of the **Time** menu can be changed in the same manner.

Considerations for time delays is as follows:

- The loss-of-left-source and loss-of-right-source time delays should be set for values sufficient to establish that the loss of source is not transient (thus preventing unnecessary transfers). Care should be exercised to ensure these settings coordinate properly with those of the upstream protection devices.
- The return-of-source time delay should be set for a value sufficient to establish that return of preferred-source is not temporary.
- The lockout-reset time delay should be set for a value greater than the longest clearing time of all feeder fuses.
- The transition dwell time delay should be set for a value greater than the longest time required for motor residual voltage (the voltage appearing at the terminals of a connected motor when the source is interrupted) to drop to 25% or less of rated voltage.

**STEP 6.** Perform the loss-of-source testing and overcurrent-lockout testing outlined in the “Operational Testing” section on page 30.

## Test Menu

The **Test** menu provides a means for checking the functioning of the source-transfer control. Items listed under this menu include the following:

- **Test lamps**
- **Test display**
- **Test keypad**
- **Enable test keys**—The means for enabling loss-of-source testing and overcurrent-lockout testing, as described under the “Operational Testing” section on pages 30 and 31

**STEP 7.** To check the functioning of the source-transfer control, perform the following:

- (a) Press the TEST menu key.
- (b) Press the NEXT item key (or LAST item key) repeatedly to scroll through the items, until the desired one is displayed.
- (c) When the “Test Lamps” item has been selected, press the ENTER key. The lamps on the control should flash a total of five times. Press the NEXT item key.
- (d) When the “Test Display” item has been selected, press the ENTER key. All dot segments comprising each character of the display should alternately appear black then disappear, a total of five times. Press the NEXT item key.
- (e) When the “Test Keypad” item has been selected, press the ENTER key. Now, pressing any key on the control should result in the value or name of that key being shown on the display, thus testing the switch contact of that key. Press the QUIT key.
- (f) When the “Enable Test Keys” item has been selected, perform the following:
  - (1) Place the manual/automatic operation selector switch in **Manual** mode. Then, press the CHANGE key.
  - (2) Press the “←” or “→” key to select “On.” Then, press the ENTER key. The test keys are now enabled for 15 minutes.

Loss-of-source testing and overcurrent-lockout testing can now be performed in the manner described under the “Operational Testing” section on pages 30 and 31.

- (g) When no additional items are to be tested, press the QUIT key. Then, place the manual/automatic operation selector switch in **Automatic** mode.

The testing procedures described in this document should be performed during initial startup and thereafter about once per year to verify the source-transfer control and its associated switch operators are fully functional.

Because Type AS-1A and Type AS-10 Switch Operators may be readily decoupled from their associated Alduti-Rupter Switches, checkout of functional performance (e.g., operating sequence and timing) of the source-transfer control—and the switch operators—may be accomplished at any convenient time, without requiring an interruption of service.

### Loss-of-Source Testing

**STEP 8.** To simulate a loss of source voltage, perform the following:

- (a) Decouple each switch operator from its interrupter switch—unless temporary service interruptions are permissible.
- (b) Enable the test keys in the manner described in Step 7 (a), (b), and (f) on page 29.
- (c) Place the MANUAL/AUTOMATIC operation selector switch in **Automatic** mode.

**Note:** The control *will not* function automatically if one switch operator is coupled and the other switch operator is decoupled. As a point of information, when operational testing is performed with the switch operators decoupled, the automatic-transfer READY indicating lamp *will not* light. (See the “**Conditions required to light automatic-transfer READY indicating lamp**” section on page 32.)

- (d) **If the source-transfer control has been programmed for automatic return or window return:**
  - (1) Simulate a prolonged loss of preferred-source voltage by pressing *and holding in* the LOSS OF VOLTAGE key for the left source or right source, as appropriate. The associated source voltage lamp will extinguish. The key must be held in long enough for the associated loss-of-source time delay to complete its preset cycle. A loss-of-source transfer will occur.
  - (2) Release the LOSS OF VOLTAGE key to simulate a return of the preferred-source voltage. The associated source voltage lamp will relight. The return of source transfer will occur automatically after the return-of-source time delay has completed its preset cycle●. Return will be “open transition” or “closed transition,” depending on the control settings.
- (e) **If the source-transfer control has been programmed for hold return:**
  - (1) Simulate a prolonged loss of preferred-source voltage by pressing and holding in the LOSS OF VOLTAGE key for the left source or right source, as appropriate. The associated source voltage lamp will extinguish. The key must be held in long enough for the associated loss-of-source time delay to complete its preset cycle. A loss of source transfer will occur.
  - (2) Release the LOSS OF VOLTAGE key to simulate a return of the preferred-source voltage. The associated source voltage lamp will relight. Wait a sufficient length of time to verify the return of source transfer does not occur automatically. Then, simulate a loss of alternate-source voltage by pressing and holding in the LOSS OF VOLTAGE key for the left source or right source, as appropriate. The associated source voltage lamp will extinguish. The key must be held in long enough for the associated loss-of-source time delay to complete its preset cycle. A loss of source transfer will occur.
- (f) If the **Lockout** option has been factory-selected, proceed to the “Overcurrent-Lockout Testing” setting on page 31. Otherwise, place the

● If the source-transfer control has been programmed for a window return, the return of source transfer is permitted to occur only if the time of day is within the user-specified time “window.”

**Overcurrent-Lockout Testing**

MANUAL/AUTOMATIC operation selector switch in **Manual** mode and recouple each switch operator to its interrupter switch. Then, place the MANUAL/AUTOMATIC operation selector switch in **Automatic** mode. To ensure the source-transfer control is ready for automatic operation, perform the final checks outlined under the “**Before Walking Away**” section on page 32.

**STEP 9.** To simulate an overcurrent condition on the sources, perform the following:

- (a) With the manual/automatic operation selector switch in **Automatic** mode, simulate a fault cleared by feeder fuses by momentarily pressing, and then releasing, the OVERCURRENT key for the preferred source. This action will “set up” the lockout feature, as indicated by illumination of the LOCKOUT lamp. Because the continuity of source voltage has not been affected, the lockout-reset time delay will start; after it completes its preset cycle, the lockout feature will automatically reset and the LOCKOUT lamp will extinguish.
- (b) To simulate lockout resulting from a fault cleared by a source-side protective device, momentarily press, then release the OVERCURRENT key for the preferred source—and, at the same time, press and hold in the associated LOSS OF VOLTAGE key. The associated source voltage lamp will extinguish. Further, this action will “set up” the lockout feature, as indicated by illumination of the LOCKOUT lamp.

With the switch operators in the normal configuration, if the LOSS OF VOLTAGE key is held in long enough for the loss-of-source time delay to complete its preset cycle, the preferred-source switch operator will move to its **Switch Open** position; the alternate-source switch operator will remain in the **Switch Open** position, locked out.

- (c) To cancel the lockout condition, perform the following:
  - (1) Place the manual/automatic operation selector switch in **Manual** mode.
  - (2) Press the “RESET” key. The LOCKOUT lamp will extinguish.
  - (3) Press the **Close** pushbutton on the preferred-source switch operator. The switch operator will move to its **Switch Closed** position.
- (d) Place the manual/automatic operation selector switch in **Manual** mode and recouple each switch operator to its interrupter switch. Then place the manual/automatic operation selector switch in **Automatic** mode. To be sure that the source-transfer control is ready for automatic operation, perform the final checks outlined under the “**Before Walking Away**” section on page 32.

### Before Walking Away

So the source-transfer control is ready for automatic operation, verify the following:

- The manual/automatic operation selector switch is in **Automatic** mode.
- If the **Supervisory Control** option is enabled, the Supervisory manual/automatic dry contact is closed.
- The left source voltage and right source voltage indicating lamps are illuminated, indicating the availability of voltage on the sources.
- The automatic-transfer READY indicating lamp is illuminated.

### Conditions required to light automatic-transfer READY indicating lamp:

1. Manual/automatic operation selector switch is in **Automatic** mode.
2. If the **Supervisory Control** option is enabled—the Supervisory manual/automatic dry contact is closed.
3. The LOCKOUT lamp is reset (if the **Lockout** option has been factory-selected).
4. **Unbalance Detection** feature is “On” (if the unbalance install has been factory-selected).
5. Switch operators are coupled to switches.
6. Preferred-source switch is closed and alternate-source switch is open.

**If the display is not being used to show menu information, it will show messages explaining why the automatic-transfer READY indicating lamp isn't lit.**

**Note:** If the automatic-transfer READY indicating lamp is not lit, it does not necessarily mean that the control is inoperative. For example, when a loss-of-source transfer occurs, the lamp extinguishes but the control is ready for any subsequent programmed automatic operation required by a change in source conditions. Likewise, if the switch operators are decoupled, the lamp is extinguished—and the switches will not operate—but the control is fully operative.

**Event Menu**

The Micro-AT control automatically records system status and the status of the device's controller circuits each time a control operation occurs. Each such operation, referred to as an "event," is indicated by the illumination of a lamp on the EVENT menu key and is available for display under this menu. The last 130 events are stored in memory at any given time.

Each event is time-marked to indicate its date and time of occurrence, and is identifiable by an "event ID" code number. There are a total of 85 such code numbers—each representing a specific action by the source-transfer control; these code numbers are listed and described in the "Appendix" on page 39.

Also recorded for each event are the operating conditions which existed at the time of the control operation. Included are the left-source and right-source phase and unbalance voltages and the status of the source-transfer left-source and right-source control states, overcurrent left-source and right-source control states, and switch operator control states.

The table below summarizes the items available for display under the **Event** menu for each of the last 130 events. (Items are listed in their order of appearance upon consecutively pressing the NEXT item key.)

**Table 4. Non-Field-Adjustable Items in the Event Menu**

Non-Field-Adjustable Item EVENT:	Operating Response		
<b>DATE TIME ID</b>	mm/dd/yy (month/day/year)	hh:mm:ss (hour:minute:second)	Event ID <sup>①</sup>
<b>LEFT VOLTAGES</b>	Phase 1	Phase 2	Phase 3
<b>LT UNBALANCE</b>	NEG SEQ		ZERO SEQ
<b>RIGHT VOLTAGES</b>	Phase 1	Phase 2	Phase 3
<b>RT UNBALANCE</b>	NEG SEQ		ZERO SEQ
<b>SOURCE STATES</b>	Left-source voltage state (good, bad, or overvoltage)		Right-source voltage state (good, bad, or overvoltage)
<b>OC STATES</b>	Left-source overcurrent state (normal, latch, or reset)		Right-source overcurrent state (normal, latch, or reset)
<b>OPER STATES</b>	Left-source operator state <sup>②</sup>		Right-source operator state <sup>②</sup>
<b>TRANSFER STATE</b>	Transfer controller state <sup>③</sup>		
<b>FLAGWORD</b>	16-bit flagword (for diagnostic use)		

① See the "Appendix" page 39.

② Possible responses include the following:

Text Displayed	Meaning
N/A	Not Applicable
Ready Close	Ready to Close Operator
Closing	Closing Operator (Trip Relay Activated)
Retry Close	Retrying Close Operation
Unknown	Unknown or Ambiguous Data Inputs
Oper Except	Operator Exception, Conflicting Data Inputs
Ready Open	Ready to Open Operator
Opening	Opening Operator (Trip Relay Activated)
Retry Open	Retrying Open Operation

③ Possible responses include the following:

On Preferred	Verify Alternate Loss
Timing Loss of Preferred	Time Return Preferred
Verify Preferred Loss	Opening Alternate
Opening Preferred	Closing Preferred
Delay Forward Transfer	Lockout
Closing Alternate	Manual
On Alternate	Exception
Time Loss Alternate	Delaying Return

To read an item listed under the **Event** menu, perform the following:

- (a) Press the EVENT menu key.
- (b) Press the NEXT item key (or LAST item key) repeatedly to scroll through the items associated with the latest event, until the desired one is displayed. (The number in the upper right-hand corner of the display indicates the event identification code number—from 0 to 523.)
- (c) If the same item associated with an earlier event is desired, use the “←” key, as necessary, to display that event. The “→” key may then be used to display the same item associated with later events—up to the latest event.
- (d) When no additional items are to be read, press the QUIT key. The EVENT lamp, if lit, will extinguish.

## Examine Menu

The present source voltage and current inputs, and the present status of discrete inputs to and outputs from the source-transfer control are available for display under the **Examine** menu.

The table below summarizes the items available for display under the **Examine** menu. (Items are listed in their order of appearance upon consecutively pressing the NEXT item key.)

To read an item listed under the **Examine** menu, perform the following:

- (a) Press the EXAMINE menu key.
- (b) Press the NEXT item key (or LAST item key) repeatedly to scroll through the items in this menu, until the desired one is displayed.
- (c) Use the “←” key or “→” key, as necessary, to display a particular discrete input or discrete output.
- (d) When no additional items are to be read, press the QUIT key.

**Table 5. Non-Field-Adjustable Items in the Examine Menu**

Non-Field-Adjustable Item EXAMINE:	Operating Response
SOFTWARE VERSION	Version ID String
SYSTEM FREQUENCY	Ac system frequency
LEFT NEUTRAL <sup>①</sup>	Left-source neutral current, amperes
RIGHT NEUTRAL <sup>①</sup>	Right-source neutral current, amperes
LEFT NEG SEQ	Left-source negative sequence voltage, volts
LEFT POS SEQ	Left-source positive sequence voltage, volts
LEFT ZER SEQ	Left-source zero sequence voltage, volts
RIGHT NEG SEQ	Right-source negative sequence voltage, volts
RIGHT POS SEQ	Right-source positive sequence voltage, volts
RIGHT ZER SEQ	Right-source zero sequence voltage, volts
LEFT MC1	Left-source Phase 1 real and imaginary correction factors
LEFT MC2	Left-source Phase 2 real and imaginary correction factors
LEFT MC3	Left-source Phase 3 real and imaginary correction factors
RIGHT MC1	Right-source Phase 1 real and imaginary correction factors
RIGHT MC2	Right-source Phase 2 real and imaginary correction factors
RIGHT MC3	Right-source Phase 3 real and imaginary correction factors
LEFT SETBASE	Left-source set base conversion factor
RIGHT SETBASE	Right-source set base conversion factor
ROTATION FLAG	Phase rotation, forward or reverse
DISCRETE INPUTS <sup>②</sup>	Input data line states, true or false
DISCRETE OUTPUTS <sup>②</sup>	Output data line states, true or false

<sup>①</sup> Displayed if CONFIG: LOCKOUT OPTION has been factory-set for **Internal** or **External** mode.

<sup>②</sup> See the “Appendix” page 39.

No routine maintenance is recommended for the S&C Micro-AT Source-Transfer Control other than an occasional operational test—in the manner described on pages 30 through 31—about once per year to verify that the control and its associated switch operators are operational.

Occasionally, check functioning of the lamps, display, and keypad in the manner described on page 28. Functioning of the lamps may also be checked at any time by pressing and holding for approximately 5 seconds the TEST menu key.

An odd-looking clock display is an indication that the clock battery requires replacement. Refer to the clock battery specifications on page 37.

**Note:** The Micro-AT CPU Card battery should be replaced every 10 years. Catalog number TA-2299 is available from S&C.

S&C Instruction Sheet 515-526 describes CPU card battery replacement.

Should an operating problem be experienced with the Micro-AT control, refer to the troubleshooting guide in Instruction Sheet 515-520. Instructions for replacing a circuit card or front panel assembly of a Micro-AT control are provided in Instruction Sheet 515-525. Spare circuit cards and front panel assemblies are listed in the “Appendix” on page 42.

**Table 6. Catalog Number of Micro-AT Source-Transfer Control—in Weatherproof Enclosure**

Primary-Selective System Application	Catalog Number <sup>①</sup>
Two-way source transfer using two Type AS-1A or Type AS-10 Switch Operators <sup>②</sup>	39060

<sup>①</sup> For steel structure mounting. For pole mounting, the optional pole mounting bracket should be specified. See Table 7.

<sup>②</sup> Switch operators must utilize 115-Volt 60-Hertz or 230-Volt 60-Hertz motor and control voltage and be furnished with optional source-transfer control compatibility, catalog number suffix “-U1.”

The basic catalog number may be suffixed to specify one or more optional features, in accordance with the following table:

**Table 7. Optional Features**

Item	Suffix Added to Source-Transfer Control Catalog Number
Overcurrent lockout—For Use with Fisher Pierce Series 1301 Powerflex Line Post Current Sensors. Prevents an automatic-transfer operation that would close a switch into a fault. Includes facilities for external reset <sup>①</sup>	-Y21
Remote indication. Includes provisions for remote monitoring of presence or absence of source voltages, <b>Manual</b> or <b>Automatic</b> operating mode, status of the READY indicator, EVENT indicator, and (if furnished) <b>Overcurrent Lockout</b> feature	-Y4
Test panel. Permits the use of an external, adjustable three-phase source to verify, through independent measurement, the response of the control to <b>Loss-of-Source</b> , <b>Phase Unbalance</b> , and <b>Overcurrent Lockout</b> conditions	-Y5
Supervisory control. Includes facilities for switch operation from a remote location	-Y6
Communications card. Permits local uploading of “events” and settings from the Micro-AT control to a user-furnished personal computer, as well as downloading of the user’s standard operating parameters <sup>②③</sup>	-Y8
Pole mounting bracket with Hardware	-P1

<sup>①</sup> Three user-furnished Fisher Pierce Series 1301 Powerflex Line Post Current Sensors are required for each source. The lockout level of the source-transfer control is factory-set at 1200 amperes, but may be field-adjusted to any value between 200 and 1500 amperes; the setting chosen should take into account the emergency peak-load current of the system, so as to preclude nuisance lockouts.

<sup>②</sup> Requires a Windows® 95, 98, 2000, NT, XP, or Windows 7 32-Bit operating system. A Windows 7 64-Bit Operating System must be run in **XP** mode (only available for Professional and Ultimate operating systems). A USB-to-serial adapter must be used if the computer does not have a serial port.

<sup>③</sup> Requires S&C Communication Cable catalog number TA-2320 or TA-2321. See Table 8 on page 37.

**Table 8. Accessories**

Item		Catalog Number
Communication cable. For connecting optional communications card to user-furnished personal computer. Includes Matlink™ communications software on 3.5-inch DOS-format diskette	For personal computers having 25-pin serial communication port	TA-2320
	For personal computers having 9-pin serial communication port	TA-2321
Wi-Fi adapter kit.	Used to locally connect to the Micro-AT control for users with Windows 7 or 10 64-bit operating system platforms.●	TA-3401

● Used in tandem with the HMI application software. To obtain the HMI software application, download the installer from the S&C customer portal as described on page 10. Contact S&C to determine whether

additional items are required to make the Micro-AT control components and firmware compatible with the Wi-Fi adapter kit.

**Ratings**

**Control Circuit**

Voltage, Nominal . . . . . 120 Vac  
 Voltage, Operating Range . . . . . 95 to 140 Vac

**Operating Temperature Range**

Ambient inside enclosure: . . . . . -40°F (-40°C) to +160° F (71°C)

**Signal-Input Circuits**

Voltage Input, Nominal . . . . . 120 Vac  
 Voltage-Level Detector Accuracy (over ambient temperature range) . . . . . ±3% of setting

**Current Input●**

Continuous, Nominal . . . . . 600 amperes RMS  
 Momentary Withstand, 10 cycles . . . . . 22,400 amperes

RMS asymmetrical

Current-Level Detector Accuracy . . . . . ±15% of setting■

Frequency Range . . . . . 60±0.3 hertz▲

**Timing**

Timer Accuracy . . . . . ±1%  
 Clock Accuracy . . . . . ±2 hours/year

**Output-Relay Contact Ratings**

Current Carrying Continuous . . . . . .5 amperes  
 Interrupting . . . . . .5 amperes, 120 Vac, 40% P.F.

**Indicating Lamps**

Hewlett-Packard Part Number . . . . . HLMP-1340

**Clock Battery**

S&C Part Number . . . . . TA-2299

- Sensed at the primary of Fisher Pierce Series 1301 Powerflex Line Post Current Sensors.
- Correction factor for Fisher Pierce Series 1301 Powerflex Line Post Current Sensors = 4.45 / (3.92 + D), where D equals the outside diameter of the conductor.
- ▲ For 50-Hertz applications, refer to nearest S&C Sales Office.

## Appendix

**Table 9. Non-Field Adjustable Items in the Configure Menu**

Non-Field-Adjustable Item CONFIG:	Description
<b>SELECT BUS TYPE</b>	Setting of the control to accommodate Common bus or Split bus (in switchgear applications), "PAD MNT" bus (in pad-mounted gear applications). A fourth setting, "SPLTCOM," applies to split-bus switchgear in which the bus-tie interrupter switch does not function automatically; the source interrupter switches function as in common-bus switchgear.● Weatherproof enclosure applications use Common bus
<b>VOLTAGE SENSING</b>	Setting of the control to accommodate "2 WIRE" voltage sensing provided by one line-to-ground or line-to-line connected voltage transformer per source. Or, setting of the control to accommodate "4 WIRE" voltage sensing provided by three line-to-ground connected voltage transformers or—on delta-connected systems only—two line-to-line connected voltage transformers per source
<b>VOLT SENSE CONFIG</b>	Setting of the control to accommodate between either monitoring sensors whose primary windings are connected line-to-line, or monitoring sensors whose primary windings are connected line-to-ground. In both cases the sensor secondaries must be referenced to local chassis ground
<b>SRCE BAD CRITERIA</b>	Setting of the control to accommodate a source considered BAD when a single phase drops below the loss-of-source threshold setting, or a source considered BAD when all three phases drop below the <b>Loss-of-Source Threshold</b> setting
<b>UNBALANCE INSTALL</b>	Setting of the unbalance detection feature "In" or "Out"■
<b>VOLT VALUE FORMAT</b>	Setting of the control to display voltage values in units of Volts or in percentage variance (%), the percentage values are relative to 120 V
<b>LOCKOUT OPTION</b>	Setting of the <b>Overcurrent Lockout</b> feature is <b>External</b> or <b>Internal</b> mode or "OUT" (depending on whether the optional <b>Overcurrent Lockout</b> feature—catalog number suffix "Y21"—has been specified)▲
<b>SUPERVISORY CONTROL</b>	Setting, "IN" or "OUT," of the capability of the control to accept an external signal to operate manually (depending on whether the optional supervisory control feature—catalog number suffix "-Y6"—has been specified)

● "SPLTCOM" switchgear has the capability for future conversion to split-bus switchgear (i.e., automatic functioning of the bus-tie interrupter switch as well as the source interrupter switches).

■ Displayed if CONFIG: VOLTAGE SENSING has been factory-set for "4 WIRE" voltage sensing.

▲ In **Internal** mode, the lockout level is field-adjustable at the source-transfer control. In **External** mode, the lockout level is determined by the setting of user-furnished external relaying.

**Table 10. Non-Field Adjustable Items In The Voltage Menu**

Non-Field-Adjustable Item VOLTS:	Description
<b>LEFT PHASE 1</b>	Actual left-source phase 1 voltage after normalizing●
<b>LEFT PHASE 2</b>	Actual left-source phase 2 voltage after normalizing
<b>LEFT PHASE 3</b>	Actual left-source phase 3 voltage after normalizing●
<b>LEFT UNBALANCE</b>	Actual left-source unbalance voltage after normalizing■
<b>RIGHT PHASE 1</b>	Actual right-source phase 1 voltage after normalizing●
<b>RIGHT PHASE 2</b>	Actual right-source phase 2 voltage after normalizing
<b>RIGHT PHASE 3</b>	Actual right-source phase 3 voltage after normalizing●
<b>RIGHT UNBALANCE</b>	Actual right-source unbalance voltage after normalizing■

● Displayed if CONFIG: VOLTAGE SENSING has been factory-set for "4 WIRE" voltage sensing.

■ Displayed if CONFIG: UNBALANCE INSTALL has been factory-set for **In** mode.

Table 11. Event Identification Code Numbers In The Event Menu

Code Number	Description	Code Number	Description
<b>General Events</b>		<b>Overcurrent Latch Events</b>	
0	System Startup	410	Latch OC Left
10	Local to Auto	411	Start LR Timer Left
11	Local to Manual	412	Cancel LR Timer Left
12	Remote to Auto	413	Reset OC Latch Left
13	Remote to Manual	414	Enter Normal Left
20	Test keys enabled	415	Enter Restraint Left
21	Test keys disabled	416	Enter Reset Restraint Left
88	Illegal Power Fail	417	Cancel Restraint Left
90	EEPROM Initialized	418	Cancel Confirm OC Left
99	Power Fail	419	Cancel Reset Restraint Left
		420	Latch OC Right
		421	Start LR Timer Right
		422	Cancel LR Timer Right
		423	Reset OC Latch Right
		424	Enter Normal Right
		425	Enter Restraint Right
		426	Enter Reset Restraint Right
		427	Cancel Restraint Right
		428	Cancel Confirm OC Right
		429	Cancel Reset Restraint Right
		430	Start Verify OC Timer Left
		431	Reset Verify OC Timer Left
		440	Start Verify OC Timer Right
		441	Reset Verify OC Timer Right
<b>Switch Operator Control Events</b>		<b>Source Condition Events</b>	
100	Closing Left		
102	Opening Left		
104	Operation Timeout Left		
105	Operation Limit Left		
111	Unexpected Opening Left		
112	Unexpected Closing Left		
113	Unknown Position Left		
115	Illegal Position Left		
120	Closing Right		
1222	Opening Right		
124	Operation Timeout Right		
125	Operation Limit Right		
131	Unexpected Opening Right		
132	Unexpected Closing Right		
133	Unknown Position Right		
135	Illegal Position Right		
<b>Source-Transfer Control Events</b>			
201	On Preferred	510	Loss of Left Due to Undervoltage
202	Timing Preferred Loss	511	Loss of Left Due to Open Phase
203	Opening Preferred	512	Return of Left
204	Closing Alternate	513	Overvoltage Left
205	On Alternate	520	Loss of Right Due to Undervoltage
206	Timing Alternate Loss	521	Loss of Right Due to Open Phase
207	Timing Preferred Return	522	Return of Right
208	Opening Alternate	523	Overvoltage Right
209	Closing Preferred		
210	Delaying Return		
211	Delaying Forward Transfer		
212	Verify Preferred Loss		
213	Verify Alternate Loss		
217	Enter Lockout		
218	Enter Manual		
219	Enter Exception		
220	Waiting for Window		

TABLE CONTINUED ►

**Table 11. Event Identification Code Numbers In The Event Menu—Continued**

Code Number	Description	Code Number	Description
<b>General Events</b>		<b>Overcurrent Latch Events</b>	
601	Bus Type changed to COMMON		
602	Bus Type changed to SPLIT		
603	Bus Type changed to SPLIT-COM		
604	Bus Type changed to PAD MNT		
605	Bus Type changed to VISTA COM	640	UPS Application set to UPS ON RIGHT
606	Bus Type changed to VISTA SPLT	641	Transition set to OPEN
		642	Transition set to CLOSED
		643	Lockout set to OUT
620	Preferred set to LEFT	644	Lockout set to IN
621	Preferred set to RIGHT	645	Lockout set to EXTERNAL
622	System Frequency set to 50 Hz	646	Restore Values Executed
623	System Frequency set to 60 Hz	647	Dwell Timer set to OUT
624	Voltage Sensing set to 2-WIRE	648	Dwell Timer set to IN
625	Voltage Sensing set to 4-WIRE	649	Supervisory Control set to OUT
626	Voltage Sensing Configuration set to LINE-TO-GND	650	Supervisory Control set to IN
627	Voltage Sensing Configuration set to LINE-TO-LINE	651	Normalize Left Executed
		652	Normalize Right Executed
628	Source Bad Criteria set to 1-PHASE	653	Set Base Left Executed
629	Source Bad Criteria set to ALL PHASES	654	Set Base Right Executed
630	Unbalance Detect set to OUT	655	COM0 Bit Rate set to 2400
631	Unbalance Detect set to IN and OFF	656	COM0 Bit Rate set to 4800
632	Unbalance Detect set to IN and ON	657	COM0 Bit Rate set to 9600
633	Voltage Value Format set to VOLTS	658	COM0 Bit Rate set to 19200
634	Voltage Value Format set to PERCENTAGE	659	COM0 Bit Rate set to 38400
635	Return set to HOLD		
636	Return set to AUTO	700	System date changed
637	Return set to WINDOW	701	System time changed
638	UPS Application set to NO UPS		
639	UPS Application set to UPS ON LEFT		

Table 12. Discrete Inputs In The Examine Menu

Non-Field-Adjustable Item EXAMINE:	Description
L SW OPEN L SW CLOSED L SW COUPLED L SW TR OPEN L SW TR CLOSED	Left Switch Open Left Switch Closed Left Switch Coupled Left Switch Trip to Open (Manual Open Push button) Left Switch Trip to Close (Manual Close Push button)
R SW OPEN R SW CLOSED R SW COUPLED R SW TR OPEN R SW TR CLOSED	Right Switch Open Right Switch Closed Right Switch Coupled Right Switch Trip to Open (Manual Open Push button) Right Switch Trip to Close (Manual Close Push button)
SUPER AUTO/MAN <sup>①</sup> L SUPV TR OPEN <sup>①</sup> L SUPV TR CLOSE <sup>①</sup> R SUPV TR OPEN <sup>①</sup> R SUPV TR CLOSE <sup>①</sup>	Supervisory Auto/Manual Left Supervisory Trip to Open (Supervisory Open) Left Supervisory Trip to Close (Supervisory Close) Right Supervisory Trip to Open (Supervisory Open) Right Supervisory Trip to Close (Supervisory Close)
L EXT OC SET <sup>②</sup> R EXT OC SET <sup>②</sup> L EXT OC RESET <sup>③</sup> R EXT OC RESET <sup>③</sup>	Left External Overcurrent Set Right External Overcurrent Set Left External Overcurrent Reset Right External Overcurrent Reset

① Displayed if CONFIG: SUPERVISORY CONTROL has been factory-set for **In** mode.

② Displayed if CONFIG: LOCKOUT OPTION has been factory-set for **External** mode.

③ Displayed if CONFIG: LOCKOUT OPTION has been factory-set for **External** or **Internal** mode.

Table 13. Discrete Outputs In The Examine Menu

Non-Field-Adjustable Item EXAMINE:	Description
R OPERATOR TRIP	Right operator trip
L OPERATOR TRIP	Left operator trip

**Table 14. Spare Circuit Cards**

Item	For Source-Transfer Control		Catalog Number
	Catalog Number	Suffix	
Power supply card	39060	All	TA-2257
CPU card	39060	All	TA-2283R1
Digital input card	39060	All	TA-2285
Analog input card	39060	All	TA-2284-3
Burden card	39060	All (except -Y5)	TA-2286-3
		-Y5	TA-2280-3
Relay output card	39060	All	TA-2288-2
Remote indication card	39060	-Y4	TA-2287
Communications card	39060	-Y8	TA-2311

**Table 15. Spare Front Panel Assembly**

Item	For Source-Transfer Control		Catalog Number
	Catalog Number	Suffix	
Front panel assembly	39060	All	TA-2294

When replacing a circuit card or front panel assembly, precautions should be taken to prevent static charges, which can damage not only the existing component but the replacement component as well. Although spare circuit cards and front panel assemblies are furnished in static-shielded bags, the use of a static-dissipative work surface, such as the 3M 8501 Portable Static-Dissipative Field Service Kit, is highly recommended. See Table 16.

**Table 16. Static-Dissipative Work Surface**

Item	Catalog Number
3M 8501 Portable Static-Dissipative Field Service Kit. Includes a static-dissipative work mat and a ground cord assembly with wrist strap, for connecting the mat—along with the person changing out the component—to the same ground point	9931-218