Operation of Test Panel

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Qualified Persons

⚠ WARNING

Only qualified persons who are knowledgeable in the installation, operation, and maintenance of 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 a Micro-AT Source-Transfer Control. Familiarize yourself with the Safety Information and Safety Precautions on pages 3 and 4.

Retain this Instruction Sheet

This instruction sheet is a permanent part of the 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 must be selected for a specific application. The application must be within the ratings furnished for the equipment.

Warranty

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

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to the Micro-AT® Source-Transfer Control. Familiarize yourself with these types of messages and the importance of these various signal words:

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

Following Safety Instructions

If you do not understand any portion of this instruction sheet and need assistance, contact your nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C's website **sandc.com**, or call the S&C Global Support and Monitoring Center at 1-888-762-1100.

NOTICE

Read this instruction sheet thoroughly and carefully before installing a 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.
7. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.

This publication provides instructions for use of the optional test panel feature for the Micro-AT Source-Transfer Control (catalog number suffix "-Y5"). See Figure 1. 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. If such a source is not available, limited testing may be performed using an external, adjustable single-phase source.

An S&C Test Accessory (catalog number TA-2669 in all applications) is required if the source-transfer control is to be tested with the switchgear de-energized, to provide control power for the switch operators. Refer to the nearest S&C Sales Office for availability of this device.

In instances where pad-mounted gear is to be tested using an external, adjustable three-phase source, an S&C Three-Phase Voltage Limiter, catalog number TA-1741, must be furnished. Again, refer to the nearest S&C Sales Office for availability of this device.

Refer to S&C Instruction Sheet 515-500 or 515-600 for instructions on field programming and operation of the Micro-AT Source-Transfer Control. Refer to S&C Instruction Sheet 515-510 for instructions on operation of the S&C Test Accessory.

Figure 1. The Micro-AT Source-Transfer Control test panel.

The instructions that follow apply to S&C Metal-Enclosed Switchgear and assume it has been installed in accordance with the applicable drawings, instruction sheets, and wiring diagrams, and is in all respects ready for operation. The metal-enclosed switchgear need not be energized and carrying current. But if the source-transfer control is to be tested with the switchgear de-energized, an S&C Test Accessory must be furnished to provide control power for the switch operators. In addition, if three-phase voltage sensing is provided by three S&C Indoor Voltage Sensors (Voltage-sensing arrangement catalog number suffix "-V3"), a separate 120-volt, 60-Hz source must be provided for the switch operators and Micro-AT Source-Transfer Control.

If any measurement made during the course of this procedure does not conform with the value specified, consult the nearest S&C Sales Office.

Make sure the doors of the entrance bays are fully closed to prevent the interlocks from jamming.

NOTICE

Do not apply test voltage directly to the secondary circuits of the voltage-sensing devices or the current sensors (if furnished).

Complete these steps to short-circuit and isolate the secondaries of the voltage sensors, if furnished, and isolates the voltage transformers.

STEP 1. Place the manual/automatic operation selector switch in **Manual** mode.

STEP 2. Because **Loss-of-Source** and **Return-of-Source** level detector settings are dependent upon the positions of the source interrupter switches, it will be necessary to change switch positions during loss-of-source testing. Thus, decouple each switch operator from its interrupter switch—unless temporary service interruptions are permissible.

STEP 3. Remove the input plug from the input receptacle and immediately transfer it to the shorting receptacle.

NOTICE

Failure to immediately place the input plug on the shorting receptacle may result in damage to the voltage sensors and voltage limiters that will render the automatic-transfer scheme inoperative.

If the Micro-AT control is to be tested with the switchgear de-energized: Plug the S&C Test Accessory into the input receptacle. Make up the connections to the test accessory, as shown in S&C Instruction Sheet 515-510.

STEP 4. Loosen the screw that retains the hinged lower panel of the source-transfer control and open the panel. See Figure 1 on page 5.

STEP 5. Place the external/normal selector switches on the test panel for the left source and the right source in **External** mode. See Figure 2 on page 7.

Loss of Source Testing

Follow these steps for Loss-of Source testing:

STEP 6. ***For metal-enclosed switchgear furnished with three-phase voltage sensing:*** If a 0 to 140-volt, 60-Hz three-phase signal voltage source with variable phase shift is available, make up the three-phase source test-circuit connections, as shown in Figure 2 on page 7.

If a 0 to 140-volt, 60-Hz three-phase signal voltage source with variable phase shift is not available: Make up the single-phase source test-circuit connections, as shown in Figure 3 on page 9. This test circuit cannot be used to test operation of the unbalance detection feature in response to a phase-angle unbalance.

Proceed to Step 8.

STEP 7. ***For metal-enclosed switchgear furnished with single-phase voltage sensing:*** Make up the single-phase source test-circuit connections to Phase 2 and neutral on the left source-transfer input connector and to Phase 2 on the right source-transfer input connector as shown in Figure 3 on page 9.

STEP 8. If, through independent measurement, the output voltage of a voltage transformer on Phase 2 of the system is known, energize the signal-voltage source and adjust the signal voltage on all three phases to that known voltage. Otherwise, energize the signal-voltage source and adjust the signal voltage on all three phases to 120 Vac.

For metal-enclosed switchgear furnished with single-phase voltage sensing, proceed to Step 11.

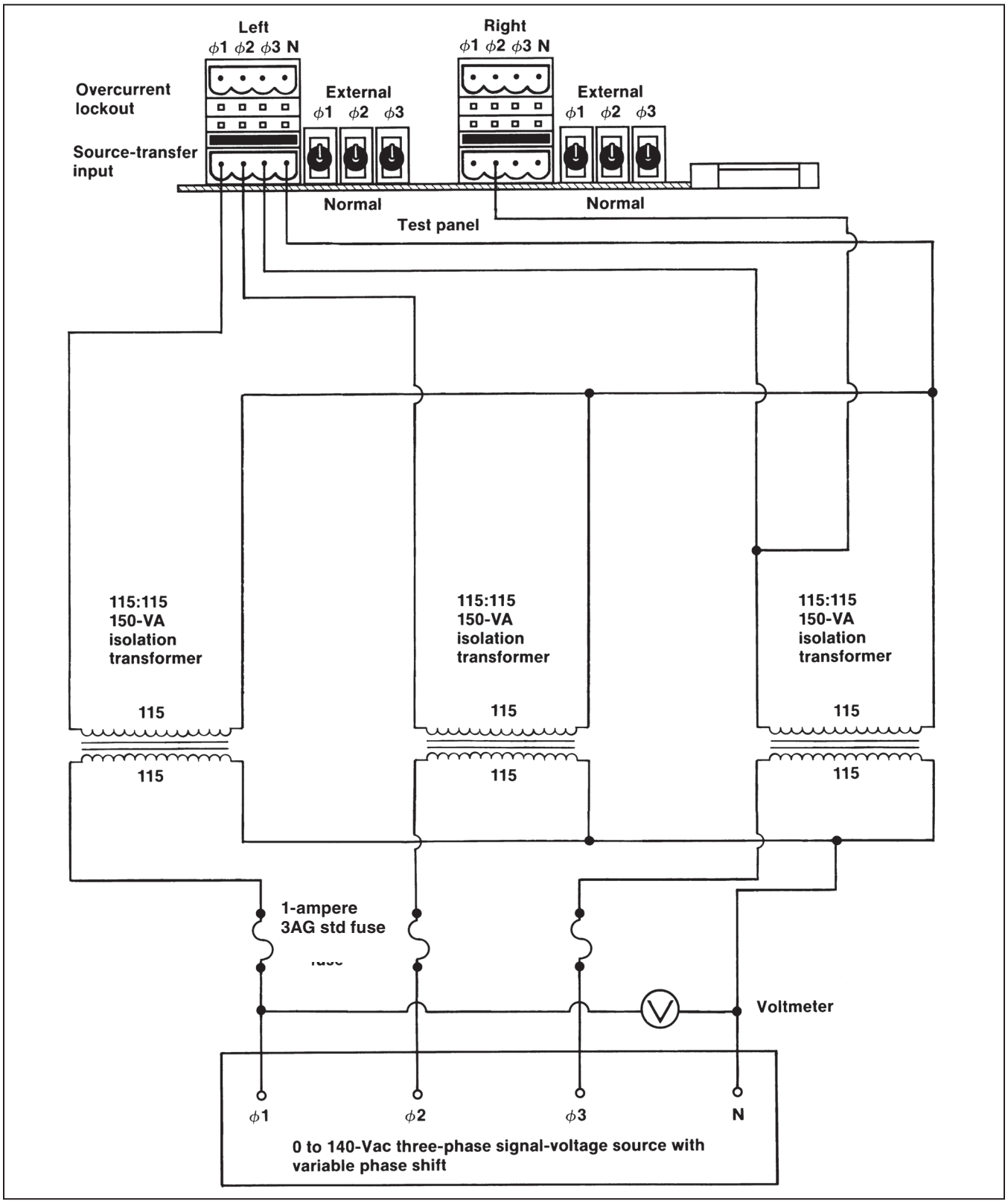

Figure 2. A three-phase source test-circuit connection diagram for metal-enclosed switchgear applications.

STEP 9. Turn off the **Unbalance Detect** mode.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Unbalance Detect" is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <◄—> or <—►> key to change the response to "Off." Then, press the <Enter> key.

STEP 10. Normalize the left source.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Normalize Left" is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <Enter> key again to normalize.

STEP 11. If, through independent measurement, the output voltage of a voltage transformer on Phase 2 of the system is known, set the left-source base voltage to that known value. Otherwise, set the left-source base voltage to 120 Vac.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or <Last> item key) repeatedly until "Set Base Left" is displayed; the value shown is the present Phase 2 base voltage. Base voltage may be field-adjusted over the range of 105 to 130 Volts. If a change to the base voltage is desired, proceed to Step 11(c). Otherwise, proceed to Step 12.

(c) Press the <Change> key.

(d) Press each digit of the access-code number, and then press the <Enter> key.

(e) Press the number keys corresponding to the desired value. Then, press the <Enter> key.

STEP 12. Press the **Open** pushbutton on the left-source switch operator.

STEP 13. Decrease the Phase 1● signal voltage until the left-source voltage indicating lamp extinguishes.

STEP 14. Slowly increase the Phase 1● signal voltage until the left-source indicating lamp is lit. Read the left-source Phase 1● voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Phase 1●" is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify the value shown is equal to the **Return of Source** setting. Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Return of Source" is displayed.

STEP 15. Press the **Close** pushbutton on the left-source switch operator.

STEP 16. Slowly decrease the Phase 1● signal voltage until the left-source voltage indicating lamp extinguishes. Read the left-source Phase 1● voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Phase 1"● is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify that the value shown is equal to the loss of source setting. Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Return of Source" is displayed.

STEP 17. For metal-enclosed switchgear furnished with three-phase voltage sensing:

If the three-phase source test circuit shown in Figure 2 on page 7 is used: Repeat Steps 12 through 16 for Phase 2 and then for Phase 3.

● For metal-enclosed switchgear furnished with single-phase source-voltage sensing, references to "Phase 1" in Steps 13, 14, and 16 should be "Phase 2."

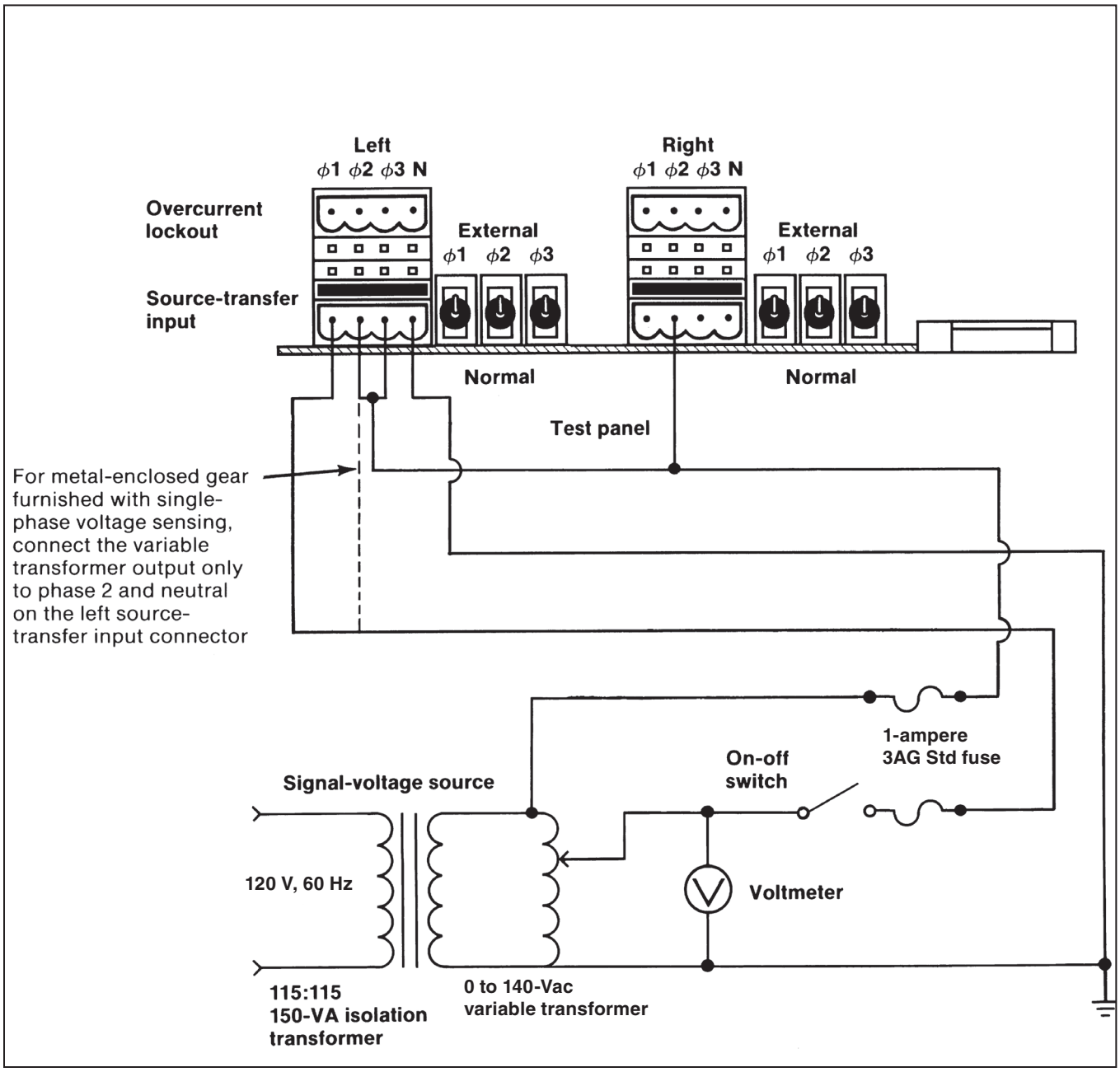

Figure 3. A single-phase source test-circuit connection diagram for metal-enclosed switchgear applications.

If the single-phase source test circuit shown in Figure 3 on page 9 is used: Repeat Steps 12 through 16 for Phase 2 and then for Phase 3. When inputting signal voltage to Phase 2, de-energize the signal-voltage source and jumper Phases 1 and 3 of the left source-transfer input connector (instead of Phases 2 and 3 as shown in Figure 3 on page 9). Then, energize the signal-voltage source. When inputting signal voltage to Phase 3, de-energize the signal-voltage source and jumper Phases 1 and 2 of the left source-transfer input connector. Then, energize the signal-voltage source.

For metal-enclosed switchgear furnished with single-phase voltage sensing,proceed to Step 24.

Unbalance-Detection Testing

The following testing steps can be performed only if the three-phase source test circuit shown in Figure 2 on page 7 is used. If a single-phase source test circuit is used, proceed to Step 24.

STEP 18. Adjust the three-phase voltage source for a nominal 120-degree phase angle between each phase.

STEP 19. Turn on the **Unbalance Detect** mode:

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Unbalance Detect" is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <◄—> or <—►> key to change the response to "Off." Then, press the <Enter> key.

STEP 20. With the left-source switch operator in the **Closed** position, slowly decrease the Phase 1 signal voltage until the left-source voltage indicating lamp extinguishes. Read the left-source unbalance voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Unbalance" is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify the value shown is equal to the unbalance detect setting. Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Unbalance Detect" is displayed.

STEP 21. Slowly change the phase angle of Phase 1 in the ***positive*** direction until the left-source voltage indicating lamp extinguishes. Read the phase angle on the signal-voltage source. The value shown should be approximately +8.6 degrees if a 120-volt base is used and the unbalance detect factory-setting of 18 volts is used. (If a different base voltage and/or unbalance detect setting is used, the phase angle value should be approximately equal to sin-1 [unbalance detect setting/base voltage].) Return the phase angle of Phase 1 to its nominal 120-degree setting.

STEP 22. Slowly change the phase angle of Phase 1 in the ***negative*** direction until the left-source voltage indicating lamp extinguishes. Read the phase angle on the signal-voltage source. The value shown should be approximately –8.6 degrees if a 120-volt base is used and the unbalance detect factory-setting of 18 volts is used. (If a different base voltage and/or unbalance detect setting is used, the phase angle value shown should be approximately equal to –sin-1 [unbalance detect setting/base voltage].) Return the phase angle of Phase 1 to its nominal 120-degree setting.

STEP 23. Repeat Steps 20 through 22 for Phase 2 and then for Phase 3.

STEP 24. De-energize the signal-voltage source. Reverse the test circuit connections to the left and right source-transfer input connectors and repeat Steps 8 through 17 for the right source.

STEP 25. ***If a single-phase source test circuit is used, proceed to Step 26.***

Repeat Steps 18 through 23 for the right source.

Overcurrent-Lockout Testing

The following testing can be performed only if the **Lockout** option has been selected and current sensors have been installed on the sources.

STEP 26. Verify the **Lockout** option has been selected.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Lockout Option" is displayed.

(c) If the response is "Out," proceed to Step 33. If the response is "In," proceed to Step 27.

STEP 27. Make up the test circuit connections to Phase 1 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector as shown in Figure 4 on page 11.

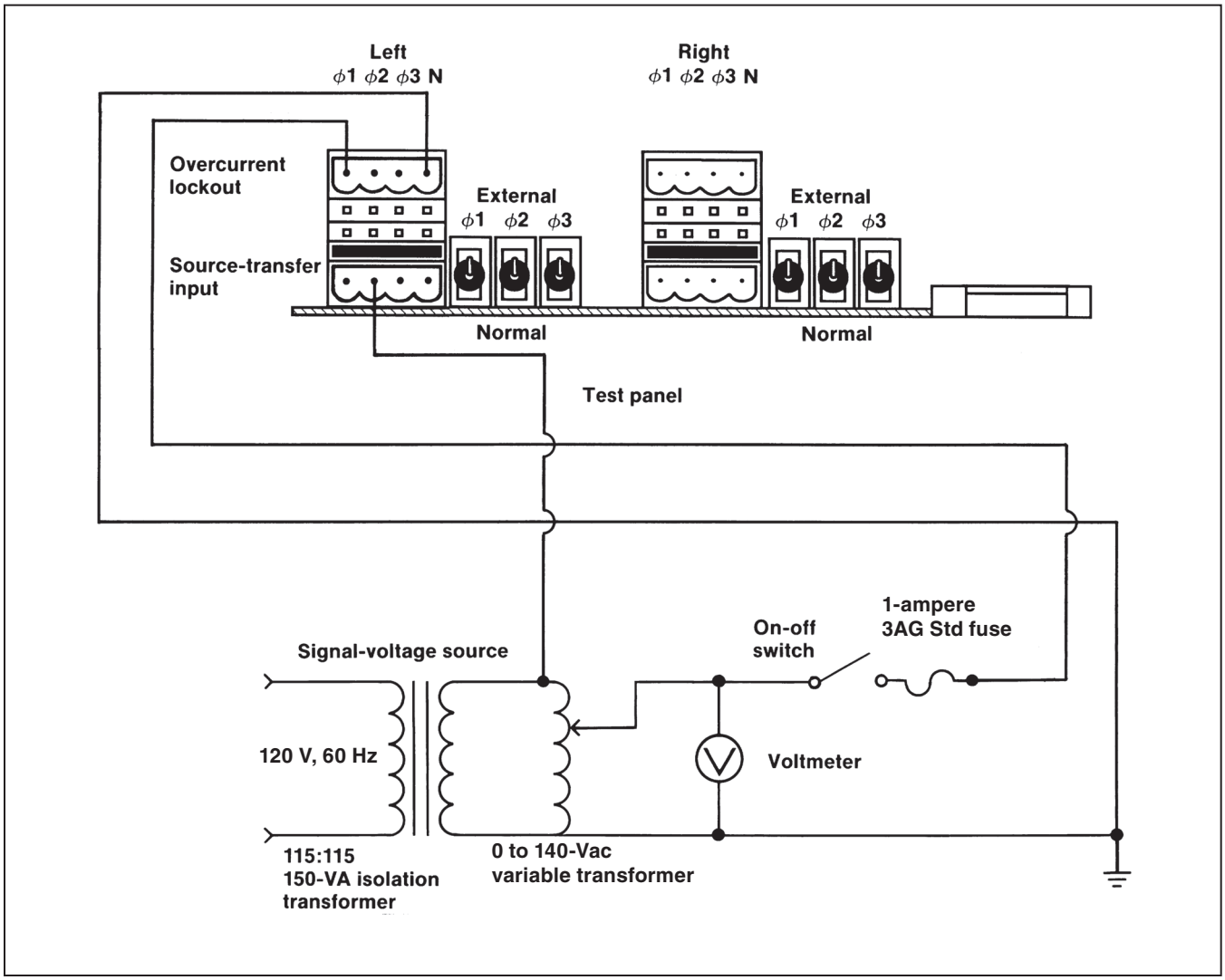

Figure 4. An overcurrent-lockout test-circuit connection diagram for metal-enclosed switchgear applications.

STEP 28. Set the variable transformer for zero volts. Energize the isolation transformer and slowly increase the signal voltage until the LOCKOUT lamp is lit. Read the signal voltage on the voltmeter.

If S&C Closed-Gap Current Sensors are used: The value shown should be approximately 21.1 volts if the lockout level factory-setting of 1200 amperes is used. (If a different lockout level setting is used, the value shown should be approximately equal to [lockout level/57 amperes per volt].) The presence of load current can significantly affect this measurement.

If superseded-design open-gap S&C Current Sensors are used (as would be the case if the Micro-AT Source-Transfer Control replaces an obsolete S&C Type AT-2 or Type AT-3 Source-Transfer Control): The value shown should be approximately 4.6 volts if the lockout level factory-setting of 1200 amperes is used. (If a different lockout level setting is used, the value shown should be approximately equal to [lockout level/263.2 amperes per volt].)

Note: The presence of load current can significantly affect this measurement.

STEP 29. Press the <Reset> key. The LOCKOUT lamp will extinguish.

Decrease the signal voltage by 10%.

STEP 30. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 2 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector. Then, repeat Steps 28 and 29. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 3 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector. Then, repeat Steps 28 and 29.

STEP 31. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 1 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 28 and 29.

STEP 32. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 2 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 28 and 29. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 3 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 28 and 29.

When Testing Is Completed

STEP 33. De-energize the signal-voltage source and remove the test-circuit connections.

STEP 34. Place the EXTERNAL/NORMAL selector switches for the left source and for the right source in **Normal** mode.

STEP 35. De-energize the connections to the test accessory, if applicable. Then, unplug the test accessory from the input receptacle of the source-transfer control. Remove the input plug from the shorting receptacle and immediately transfer it to the input receptacle. Recouple each switch operator to its interrupter switch.

NOTICE

Failure to immediately place the input plug on the input receptacle may result in damage to the voltage sensors and voltage limiters that will render the automatic-transfer scheme inoperative.

STEP 36. If the switchgear is energized, repeat Steps 10 and 11 for the known normal system state. Repeat Steps 10 and 11 for the right source.

Please see the "Before Walking Away" section on page 31.

The instructions that follow apply to S&C Source-Transfer Pad-Mounted Gear and assume it has been installed in accordance with the applicable drawings, instruction sheets, and wiring diagrams, and is in all respects ready for operation. The pad-mounted gear need not be energized and carrying current. But if voltage sensing is provided by three 14.4-kV S&C Indoor Voltage Sensors applied at 4.16 kV (Voltage-Sensing Arrangement Catalog Number Suffix "-V2"), a separate 120-volt, 60-Hz source must be provided for the switch operators and Micro-AT Source-Transfer Control.

If any measurement made during the course of this procedure does not conform with the value specified, consult the nearest S&C Sales Office.

If the pad-mounted gear is equipped with optional mechanical cable interlocks (catalog number suffix "-C6" or "-C16"), make certain that the switch-compartment doors are fully closed to prevent the interlocks from jamming.

NOTICE

Do not apply test voltage directly to the secondary circuits of the voltage sensors or the current sensors (if furnished).

Complete these steps to short-circuit and isolate the secondaries of the voltage sensors and isolate the current sensor used with the optional overcurrent-lockout feature, if furnished:

STEP 1. Place the manual/automatic operation selector switch in **Manual** mode.

STEP 2. Because the **Loss-of-Source** and **Return-of-Source** level detector settings are dependent upon the positions of the source interrupter switches, it will be necessary to change switch positions during loss-of-source testing. Thus, decouple each switch operator from its interrupter switch—unless temporary service interruptions are permissible.

STEP 3. Remove the bolted cover that provides access to the input plug and shorting receptacle for the Micro-AT control. Remove the input plug from the input receptacle and immediately transfer it to the shorting receptacle.

NOTICE

Failure to immediately place the input plug on the shorting receptacle may result in damage to the voltage sensors and voltage limiters that will render the automatic-transfer scheme inoperative.

STEP 4. Loosen the screw that retains the hinged lower panel of the source-transfer control and open the panel. See Figure 1 on page 5.

STEP 5. Place the EXTERNAL/NORMAL selector switches on the test panel for the left source and the right source in **External** mode. See Figure 5 on page 14.

Loss-of-Source Testing

Follow these steps for Loss-of Source testing:

STEP 6. ***If a 0 to 140-volt, 60-Hz three-phase signal-voltage source with variable phase shift is available***: Make up the three-phase source test-circuit connections as shown in Figure 5 on page 14.

If a 0 to 140-volt, 60-Hz three-phase signal-voltage source with variable phase shift is not available: Make up the single-phase source test-circuit connections as shown in Figure 6 on page 16. This test circuit cannot be used to verify signal-voltage calibration on Phase 2, nor can it be used to test operation of the unbalance detection feature in response to a phase-angle unbalance.

STEP 7. ***If, through independent measurement, the output voltage of a voltage transformer on Phase 2 of the system is known***: Energize the signal-voltage source and adjust the signal voltage on all three phases to that known voltage. Otherwise, energize the signal-voltage source and adjust the signal voltage on all three phases to 120 Vac.

STEP 8. Turn off **Unbalance Detect** mode.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Unbalance Detect" is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <◄—> or <—►> key to change the response to "Off." Then, press the <Enter> key.

STEP 9. Normalize the left source.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Normalize Left" is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <Enter> key again to normalize.

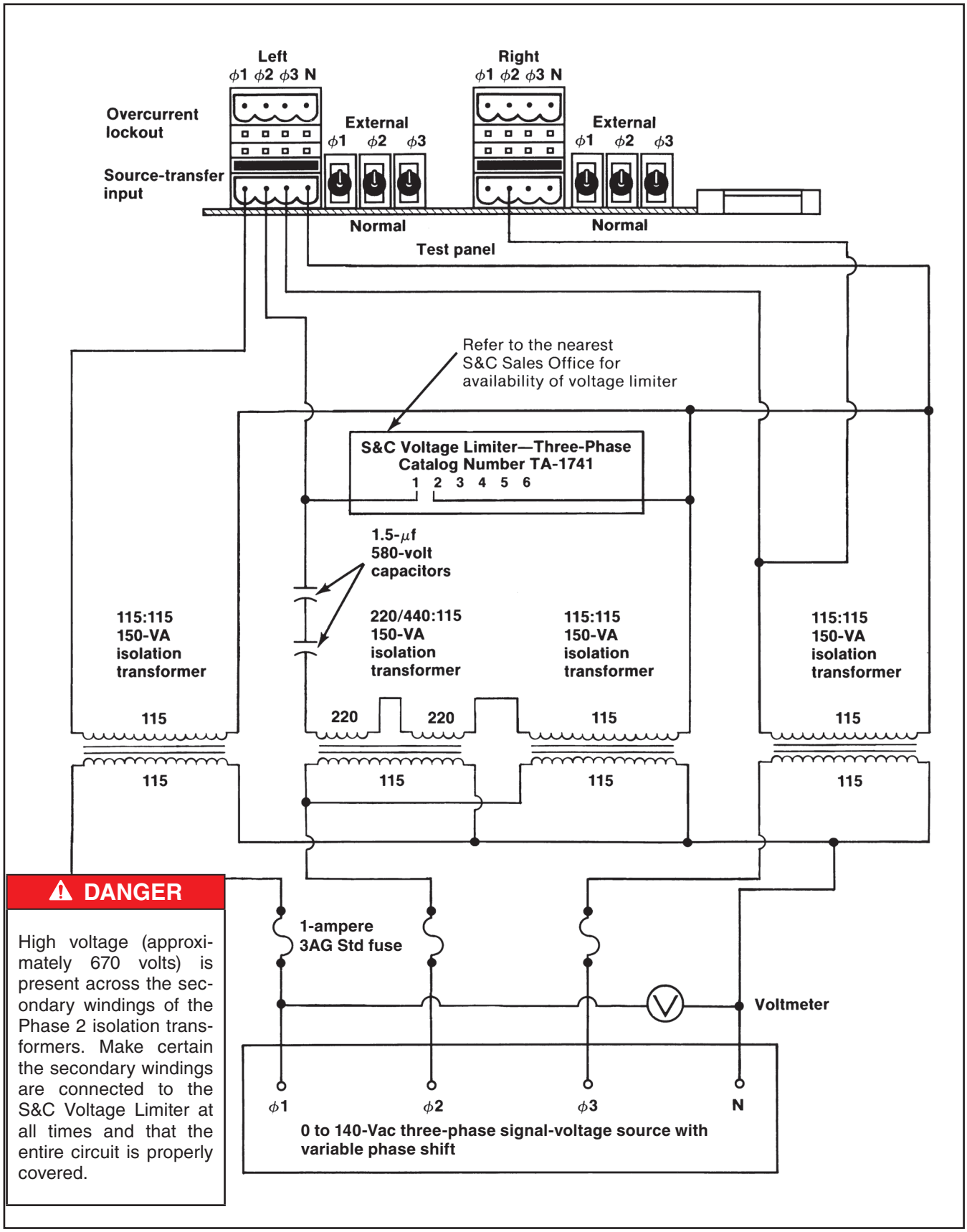

Figure 5. A three-phase source test-circuit connection diagram for source-transfer pad-mounted gear applications.

STEP 10. ***If, through independent measurement, the output voltage of a voltage transformer on Phase 2 of the system is known***: Set the left-source base voltage to that known voltage. Otherwise, set the left-source base voltage to 120 volts ac.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Set Base Left" is displayed; the value shown is the present Phase 2 base voltage. Base voltage may be field adjusted over the range of 105 to 130 volts. If a change to the base voltage is desired, proceed to (c). Otherwise, proceed to Step 11.

(c) Press the <Change> key.

(d) Press each digit of the access-code number, and then press the <Enter> key.

(e) Press the number keys corresponding to the desired value. Then, press the <Enter> key.

STEP 11. Press the **Open** pushbutton on the left-source switch operator.

STEP 12. Decrease the Phase 1 signal voltage until the left-source voltage indicating lamp extinguishes.

STEP 13. Slowly increase the Phase 1 signal voltage until the left-source voltage indicating lamp is lit. Read the left-source Phase 1 voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Phase 1" is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify the value shown is equal to the return of source setting. Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Return of Source" is displayed.

STEP 14. Press the **Close** pushbutton on the left-source switch operator.

STEP 15. Slowly decrease the Phase 1 signal voltage until the left-source voltage indicating lamp extinguishes. Read the left-source Phase 1 voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Phase 1" is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify the value shown is equal to the loss of source setting. Press the <Next> item key (or <Last> item key) repeatedly to scroll through the items in this menu until "Return of Source" is displayed.

STEP 16. ***If the three-phase source test circuit shown in Figure 5 on page 14 is used, repeat Steps 11 through 15 for Phase 2 and then for Phase 3.***

If the single-phase source test circuit shown in Figure 6 on page 16 is used: Repeat Steps 11 through 15 for Phase 3 only because the single-phase source test circuit cannot verify signal-voltage calibration of the voltage sensor on Phase 2. When inputting signal voltage to Phase 3, de-energize the signal-voltage source and jumper Phases 1 and 2 of the left source-transfer input connector (instead of Phases 2 and 3 as shown in Figure 6 on page 16). Then, energize the signal-voltage source.

Unbalance-Detection Testing

The testing steps in this section can be performed only if the three-phase source test circuit shown in Figure 5 on page 14 is used. If a single-phase source test circuit is used, proceed to Step 22.

STEP 17. Adjust the three-phase voltage source for a nominal 120-degree phase angle between each phase.

STEP 18. Turn on unbalance detect.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Unbalance Detect" is displayed. Then press the <Change> key.

(c) Press each digit of the access code number, then press the <Enter> key.

(d) Press the <◄—> or <—►> key to change the response to "Off." Then, press the <Enter> key.

STEP 19. With the left-source switch operator in the **Closed** position, slowly change the phase angle of Phase 1 in the positive direction until the left-source voltage indicating lamp extinguishes. Read the phase angle on the signal-voltage source. The value shown should be approximately +14.3 degrees if a 120-volt base is used and the unbalance detect factory-setting of 30 volts is used. (If a different base voltage and/or unbalance detect setting is used, the phase angle value shown should be approximately equal to sin-1 [unbalance detect setting/base voltage].) Return the phase angle of Phase 1 to its nominal 120-degree setting.

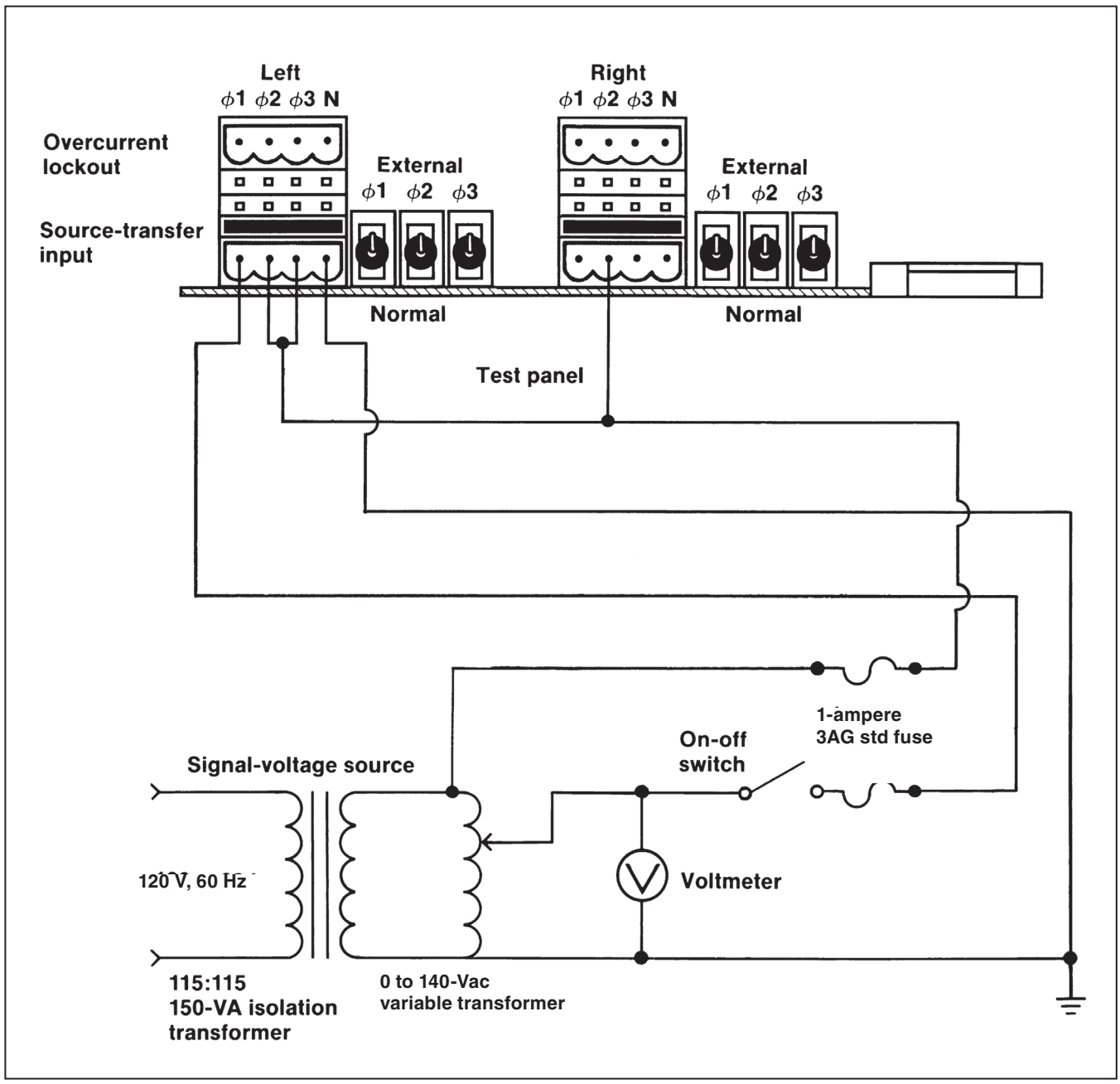

Figure 6. A single-phase source test-circuit connection diagram for source-transfer pad-mounted gear applications.

STEP 20. Slowly change the phase angle of Phase 1 in the negative direction until the left-source voltage indicating lamp extinguishes. Read the phase angle on the signal-voltage source. The value shown should be approximately –14.3 degrees if a 120-volt base is used and the **Unbalance Detect** factory setting of 30 volts is used. (If a different base voltage and/or **Unbalance Detect** setting is used, the phase angle value shown should be approximately equal to –sin-1 [**Unbalance Detect** setting/base voltage].) Return the phase angle of Phase 1 to its nominal 120-degree setting.

STEP 21. Repeat Steps 19 and 20 for Phase 2 and then for Phase 3.

STEP 22. De-energize the signal-voltage source. Reverse the test circuit connections to the left and right source-transfer input connectors and repeat Steps 7 through 16 for the right source.

STEP 23. ***If a single-phase source test circuit is used, proceed to Step 24.***

Repeat Steps 17 through 21 for the right source.

Overcurrent-Lockout Testing

The testing steps in this section can be performed only if the **Lockout** option has been selected and current sensors have been installed on the sources.

STEP 24. Verify the **Lockout** option has been installed.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Lockout Option" is displayed.

(c) If the response is "Out," proceed to Step 31. If the response is "In," proceed to Step 25.

STEP 25. Make up the test circuit connections to Phase 1 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector as shown in Figure 7 on page 18.

STEP 26. Set the variable transformer for zero volts. Energize the isolation transformer and slowly increase the signal voltage until the LOCKOUT lamp is lit. Read the signal voltage on the voltmeter.

If S&C Closed-Gap Current Sensors are used: The value shown should be approximately 18.8 volts if the lockout level factory-setting of 1200 amperes is used. (If a different lockout level setting is used, the value shown should be approximately equal to [lockout level/64 amperes per volt].)

If superseded-design open-gap S&C Current Sensors are used (as would be the case if the Micro-AT Source-Transfer Control replaces an obsolete S&C Type AT-12 Source-Transfer Control): The value shown should be approximately 2.4 volts if the lockout level factory-setting of 1200 amperes is used. (If a different lockout level setting is used, the value shown should be approximately equal to [lockout level/510.2 amperes per volt].)

Decrease the signal voltage by 10%.

STEP 27. Press the <Reset> key. The LOCKOUT lamp will extinguish.

STEP 28. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 2 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector. Then, repeat Steps 26 and 27. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 3 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector. Then, repeat Steps 26 and 27.

STEP 29. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 1 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 26 and 27.

STEP 30. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 2 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 26 and 27. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 3 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 26 and 27.

When Testing Is Completed

Follow these steps once the testing has been completed:

STEP 31. De-energize the signal-voltage source and remove the test-circuit connections.

STEP 32. Place the EXTERNAL/NORMAL selector switches for the left source and for the right source in **Normal** mode.

STEP 33. Remove the input plug from the shorting receptacle and immediately transfer it to the input receptacle. Recouple each switch operator to its interrupter switch.

NOTICE

Failure to immediately place the input plug on the input receptacle may result in damage to the voltage sensors and voltage limiters that will render the automatic-transfer scheme inoperative.

STEP 34. ***If the pad-mounted gear is energized***: Repeat Steps 9 and 10 for the known normal system state. Repeat Steps 9 and 10 for the right source.

See the "Before Walking Away" section on page 31.

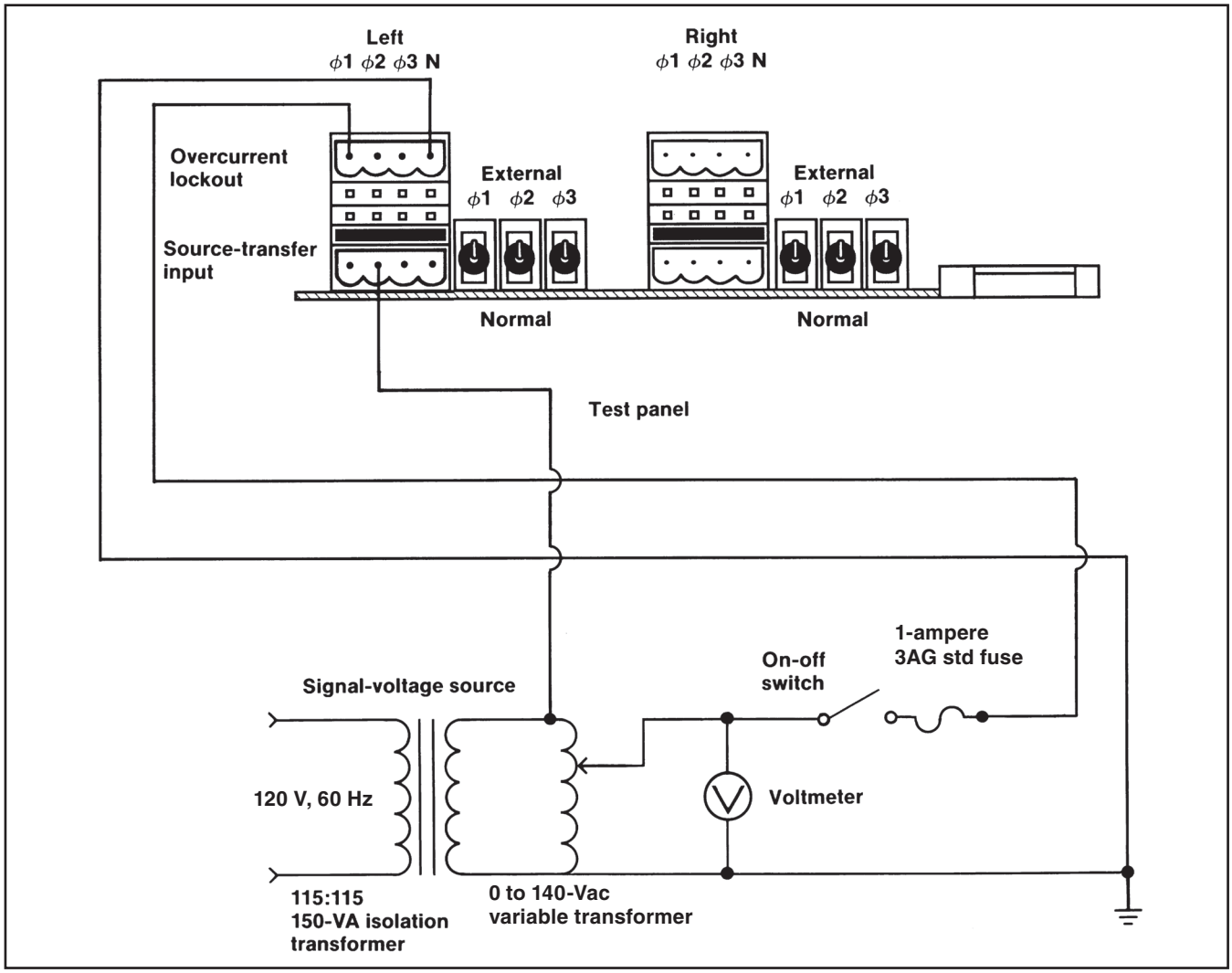

Figure 7. An overcurrent-lockout test-circuit connection diagram for source-transfer pad-mounted gear applications.

The instructions that follow apply to S&C Source-Transfer Vista Underground Distribution Switchgear and assume it has been installed in accordance with the applicable drawings, instruction sheets, and wiring diagrams, and is in all respects ready for operation. If the source-transfer control is to be tested with the switchgear de-energized, an S&C Test Accessory must be furnished to provide control power for the motor operators, switch controls, and Micro-AT Source-Transfer Control.

If any measurement made during the course of this procedure does not conform with the value specified, consult the nearest S&C Sales Office.

NOTICE

Do not apply test voltage directly to the secondary circuits of the voltage sensing devices or the current sensors (if furnished).

Complete these steps to isolate the voltage sensors and voltage transformers:

STEP 1. Place the MANUAL/AUTOMATIC operation selector switch in **Manual** mode.

STEP 2. Because the **Loss-of-Source and Return-of-Source** detector settings are dependent upon the positions of the load-interrupter switches, it will be necessary to change switch positions during loss-of-source testing. Thus, remove each motor operator from its interrupter switch—unless temporary service interruptions are permissible.

STEP 3. Remove the input plug from the input receptacle.

If the source-transfer control is to be tested with the switchgear de-energized: Plug the S&C Test Accessory into the input receptacle. Make up the connections to the test accessory as shown in S&C Instruction Sheet 515-510.

STEP 4. Loosen the screw that retains the hinged lower panel of the source-transfer control and open the panel. See Figure 1 on page 4.

STEP 5. Place the EXTERNAL/NORMAL selector switches on the test panel for the left source and the right source in **External** mode See Figure 8 on page 20.

Loss-of-Source Testing

STEP 6. ***If a 0 to 140-volt, 60-Hz three-phase signal-voltage source with variable phase shift is available:*** Make up the three-phase source test-circuit connections as shown in Figure 8 on page 20.

If a 0 to 140-volt, 60-Hz three-phase signal-voltage source with variable phase shift is unavailable: Make up the single-phase source test-circuit connections as shown in Figure 9 on page 22. This test circuit cannot be used to test operation of the **Unbalance Detection** feature in response to a phase-angle unbalance.

STEP 7. ***If, through independent measurement, the output voltage of a voltage transformer on Phase 2 of the system is known***: Energize the signal-voltage source and adjust the signal voltage on all three phases to that known voltage. Otherwise, energize the signal-voltage source and adjust the signal voltage on all three phases to 120 Vac.

STEP 8. Turn off unbalance detect.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until “Unbalance Detect” is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <◄—> or <—►> key to change the response to “Off.” Then, press the <Enter> key.

STEP 9. Normalize the left source.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until “Normalize Left” is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <Enter> key again to normalize.

STEP 10. ***If, through independent measurement, the output voltage of a voltage transformer on Phase 2 of the system is known***: Set the left-source base voltage to that known value. Otherwise, set the left-source base voltage to 120 volts ac.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until “Set Base Left” is displayed; the value shown is the present Phase 2 base voltage. Base voltage may be field adjusted over the range of 105 to 130 volts. If a change to the base voltage is desired, proceed to (c). Otherwise, proceed to Step 11.

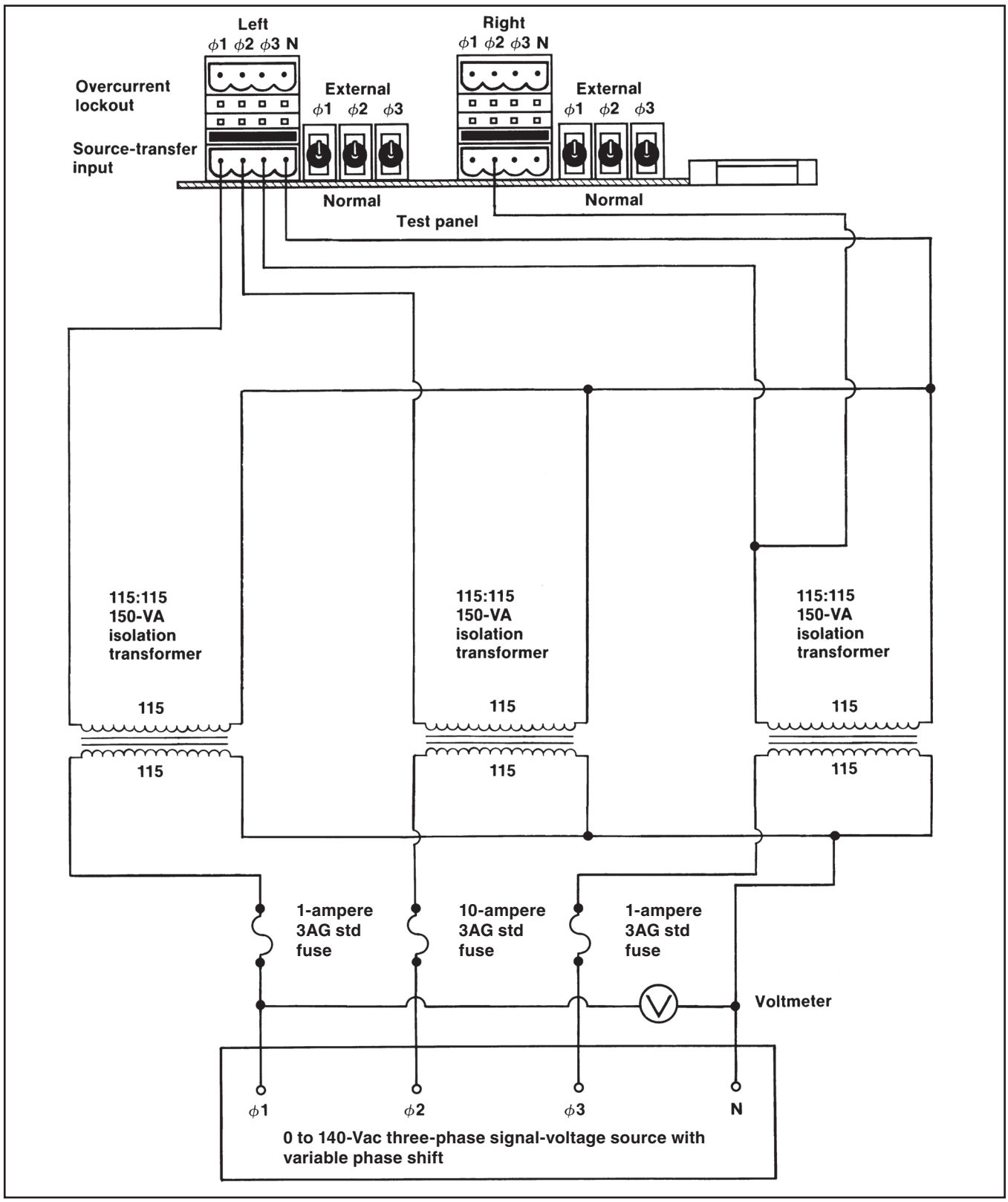

Figure 8. A three-phase source test-circuit connection diagram for Vista switchgear applications.

(c) Press the <Change> key.

(d) Press each digit of the access-code number, and then press the <Enter> key.

(e) Press the number keys corresponding to the desired value. Then, press the <Enter> key.

STEP 11. Press the **Open** pushbutton on the left-source switch operator.

STEP 12. Decrease the Phase 1 signal voltage until the left-source voltage indicating lamp extinguishes.

STEP 13. Slowly increase the Phase 1 signal voltage until the left-source indicating lamp is lit. Read the left-source Phase 1 voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Phase 1" is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify the value shown is equal to the return of source setting. Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Return of Source" is displayed.

STEP 14. Press the **Close** pushbutton on the left-source switch operator.

STEP 15. Slowly decrease the Phase 1 signal voltage until the left-source voltage indicating lamp extinguishes. Read the left-source Phase 1 voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Phase 1" is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify the value shown is equal to the loss of source setting. Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Return of Source" is displayed.

STEP 16. ***If the three-phase source test circuit shown in Figure 8 on page 20 is used, repeat Steps 11 through 15 for Phase 2 and then for Phase 3.***

If the single-phase source test circuit shown in Figure 9 on page 22 is used: Repeat Steps 11 through 15 for Phase 2 and then for Phase 3. When inputting signal voltage to Phase 2, de-energize the signal-voltage source and jumper Phases 1 and 3 of the left source-transfer input connector (instead of Phases 2 and 3 as shown in Figure 3 on page 9). Then, energize the signal-voltage source. When inputting signal voltage to Phase 3, de-energize the signal-voltage source and jumper Phases 1 and 2 of the left source-transfer input connector. Then, energize the signal-voltage source.

Unbalance-Detection Testing

The steps in this testing section can be performed only if the three-phase source test circuit shown in Figure 8 on page 20 is used. ***If a single-phase source test circuit is used, proceed to Step 23.***

STEP 17. Adjust the three-phase voltage source for a nominal 120-degree phase angle between each phase.

STEP 18. Turn on **Unbalance Detect** mode.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Unbalance Detect" is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <◄—> or <—►> key to change the response to "Off." Then, press the <Enter> key.

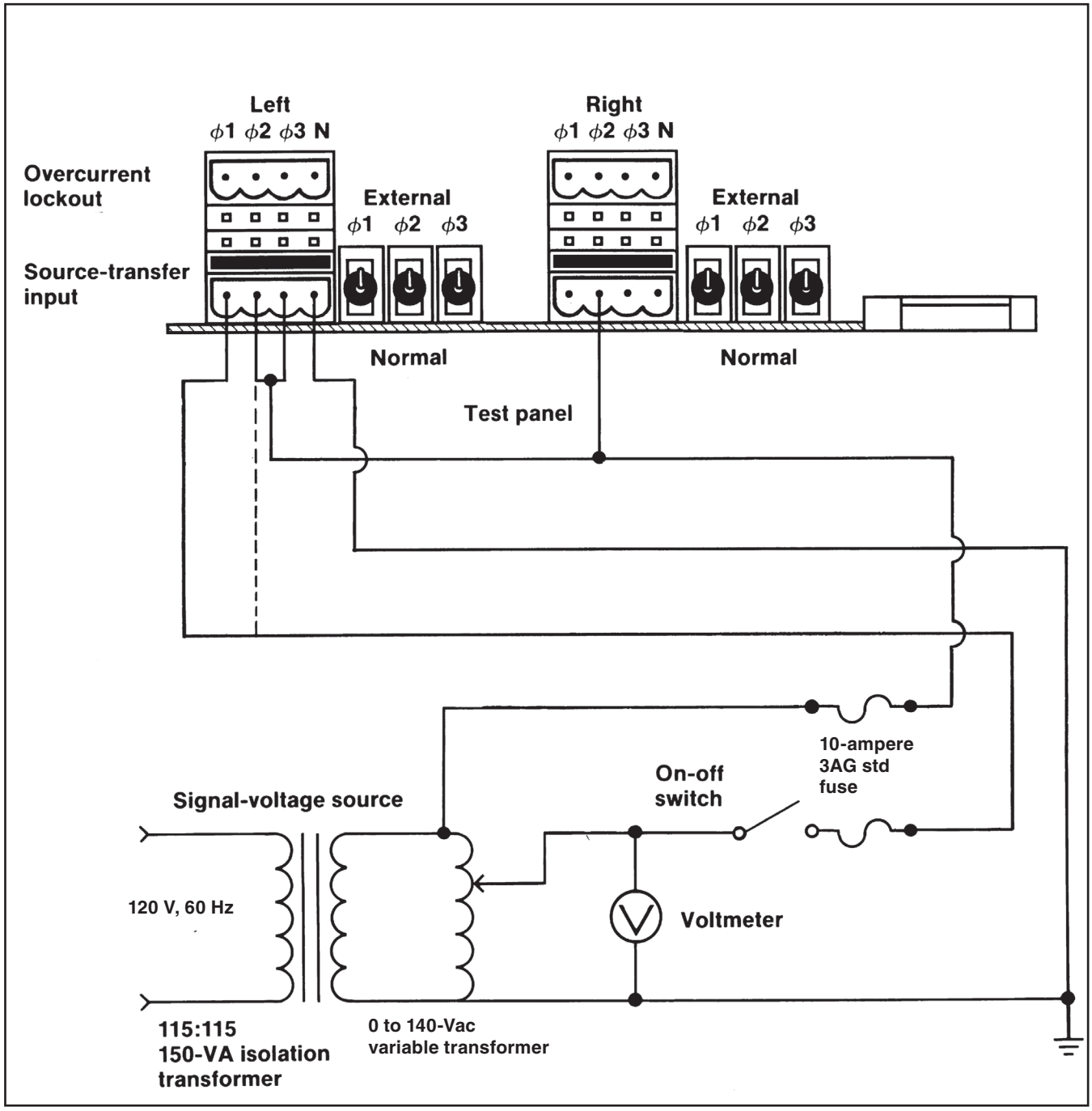

Figure 9. A single-phase source test-circuit connection diagram for Vista switchgear applications.

STEP 19. With the left-source motor operator in the **Closed** position, slowly decrease the Phase 1 signal voltage until the left-source voltage indicating lamp extinguishes. Read the left-source unbalance voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Unbalance" is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify the value shown is equal to the unbalance detect setting. Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Unbalance Detect" is displayed.

STEP 20. Slowly change the phase angle of Phase 1 in the positive direction until the left-source voltage indicating lamp extinguishes. Read the Phase angle on the signal-voltage source. The value shown should be approximately +8.6 degrees if a 120-volt base is used and the **Unbalance Detect** factory-setting of 18 volts is used. (If a different base voltage and/or **Unbalance Detect** setting is used, the phase angle value should be approximately equal to sin-1 [**Unbalance Detect** setting/base voltage].) Return the phase angle of Phase 1 to its nominal 120-degree setting.

STEP 21. Slowly change the phase angle of Phase 1 in the negative direction until the left-source voltage indicating lamp extinguishes. Read the phase angle on the signal-voltage source. The value shown should be approximately –8.6 degrees if a 120-volt base is used and the **Unbalance Detect** factory-setting of 18 volts is used. (If a different base voltage and/or **Unbalance Detect** setting is used, the phase angle value shown should be approximately equal to –sin-1 [**Unbalance Detect** setting/base voltage].) Return the phase angle of Phase 1 to its nominal 120-degree setting.

STEP 22. Repeat Steps 19 through 21 for Phase 2 and then for Phase 3.

STEP 23. De-energize the signal-voltage source. Reverse the test circuit connections to the left and right source-transfer input connectors and repeat Steps 7 through 16 for the right source.

STEP 24. ***If a single-phase source test circuit is used,*** proceed to Step 25.

Repeat Steps 17 through 22 for the right source.

Overcurrent-Lockout Testing

The steps used in this testing section can be performed only if the **Lockout** option has been selected and current sensors have been installed on the sources.

STEP 25. Verify the **Lockout** option has been selected.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Lockout Option" is displayed.

(c) If the response is "Out," proceed to Step 32. If the response is "In," proceed to Step 26.

STEP 26. Make up the test circuit connections to Phase 1 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector as shown in Figure 10 on page 24.

STEP 27. Set the variable transformer for zero volts. Energize the isolation transformer and slowly increase the signal voltage until the LOCKOUT lamp is lit. Read the signal voltage on the voltmeter.

The value shown should be approximately 4.6 volts if the lockout level factory-setting of 1200 amperes is used. (If a different lockout level setting is used, the value shown should be approximately equal to [lockout level/263.2 amperes per volt].)

Note: The presence of load current can significantly affect this measurement.

Decrease the signal voltage by 10%.

STEP 28. Press the <Reset> key. The LOCKOUT lamp will extinguish.

STEP 29. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 2 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector. Then, repeat Steps 27 and 28. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 3 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector. Then, repeat Steps 27 and 28.

STEP 30. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 1 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 27 and 28.

STEP 31. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 2 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 27 and 28. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 3 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 27 and 28.

When Testing Is Completed

Follow these steps once the testing is complete:

STEP 32. De-energize the signal-voltage source and remove the test-circuit connections.

STEP 33. Place the EXTERNAL/NORMAL selector switches for the left source and for the right source in **Normal** mode.

STEP 34. De-energize the connections to the test accessory, if applicable. Then, unplug the test accessory from the input receptacle of the source-transfer control. Replace the input plug to the input receptacle. Return each motor operator to its load-interrupter switch.

STEP 35. ***If the switchgear is energized***: Repeat Steps 9 and 10 for the known normal system state. Repeat Steps 9 and 10 for the right source.

See the "Before Walking Away" section on page 31.

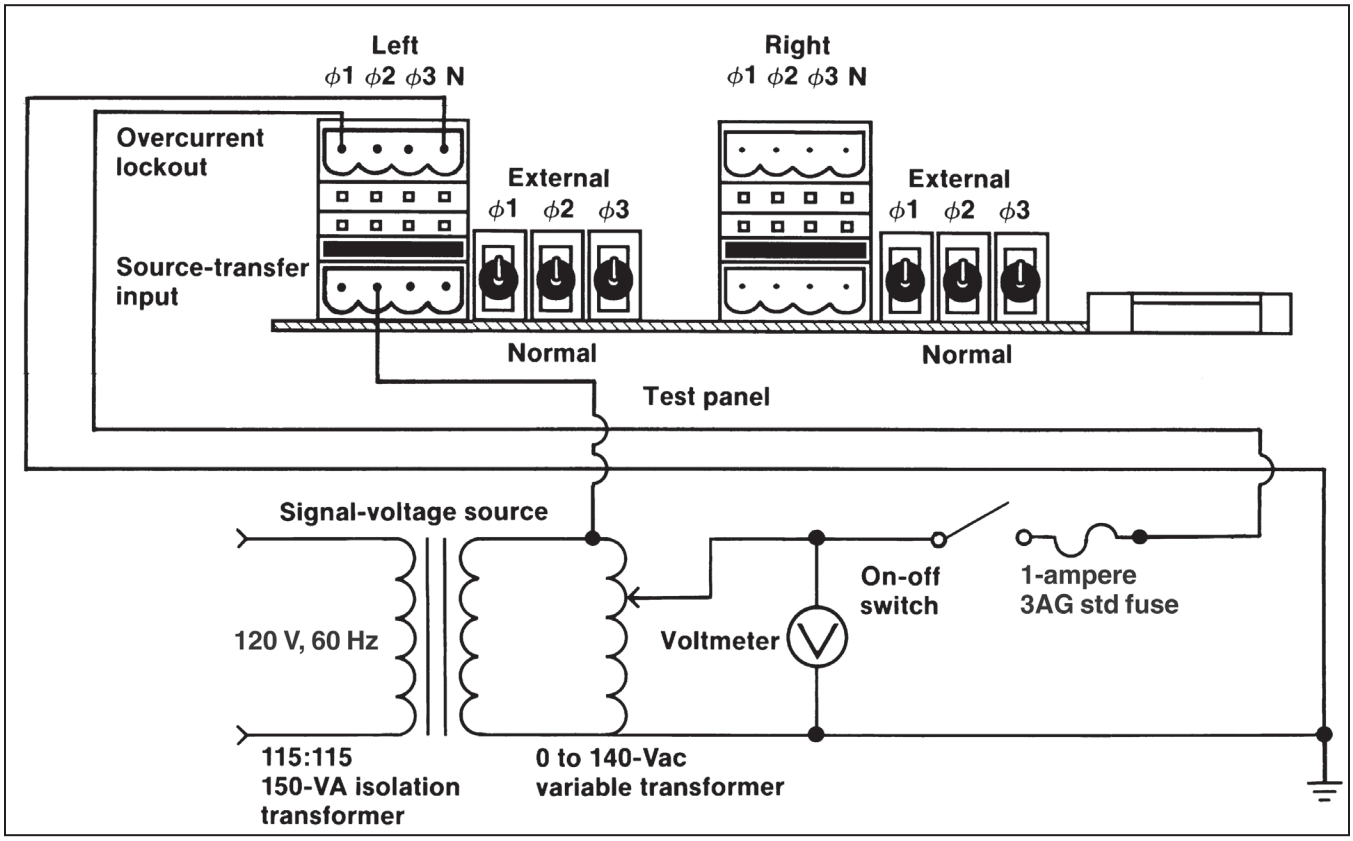

Figure 10. An overcurrent-lockout test-circuit connection diagram for Vista switchgear applications.

The instructions that follow assume the interrupter switches, switch operators, and source-transfer control have been installed in accordance with the applicable drawings, instruction sheets, and wiring diagrams, and that the equipment is in all respects ready for operation, with the high-voltage circuits energized.

If any measurement made during the course of this procedure does not conform with the value specified, consult the nearest S&C Sales Office.

NOTICE

Do not apply test voltage directly to the secondary circuits of the voltage transformers or the current sensors (if furnished).

Complete these steps to place the Micro-AT control test panel in **External** mode:

STEP 1. Place the MANUAL/AUTOMATIC operation selector switch in **Manual** mode.

STEP 2. Because the **Loss-of-Source** and **Return-of-Source level** detector settings are dependent upon the positions of the source interrupter switches, it will be necessary to change switch positions during loss-of-source testing. Thus, decouple each switch operator from its interrupter switch—unless temporary service interruptions are permissible.

STEP 3. Loosen the screw which retains the hinged lower panel of the source-transfer control and open the panel. See Figure 1 on page 5.

STEP 4. Place the external/normal selector switches on the test panel for the left source and the right source in **External** mode. See Figure 11 on page 26.

Loss-of-Source Testing

STEP 5. ***For applications using three-phase voltage sensing:*** If a 0 to 140-volt, 60-Hz three-phase signal-voltage source with variable phase shift is available, make up the three-phase source test-circuit connections as shown in Figure 11 on page 26.

If a 0 to 140-volt, 60-Hz three-phase signal-voltage source with variable phase shift is unavailable: Make up the single-phase source test-circuit connections as shown in Figure 12 on page 28.

Note: This test circuit cannot be used to test operation of the Unbalance Detection feature in response to a phase-angle unbalance.

Proceed to Step 7.

STEP 6. ***For applications using single-phase voltage sensing:*** Make up the single-phase source test-circuit connections to Phase 2 and neutral on the left source-transfer input connector and to Phase 2 on the right source-transfer input connector as shown in Figure 12 on page 28.

STEP 7. If, through independent measurement, the output voltage of a voltage transformer on Phase 2 of the system is known, energize the signal-voltage source and adjust the signal voltage on all three phases to that known voltage. Otherwise, energize the signal-voltage source and adjust the signal voltage on all three phases to 120 Vac.

For applications using single-phase voltage sensing, proceed to Step 10.

STEP 8. Turn off unbalance detect.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Unbalance Detect" is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <◄—> or <—►> key to change the response to "Off." Then, press the <Enter> key.

STEP 9. Normalize the left source.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Normalize" is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <Enter> key again to normalize.

STEP 10. **If, through independent measurement, the output voltage of a voltage transformer on Phase 2 of the system is known**: Set the left-source base voltage to that known value. Otherwise, set the left-source base voltage to 120 volts ac.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Set Base Left" is displayed; the value shown is the present Phase 2 base voltage. Base voltage may be field adjusted over the range of 105 to 130 volts. If a change to the base voltage is desired, proceed to (c). Otherwise, proceed to Step 11.

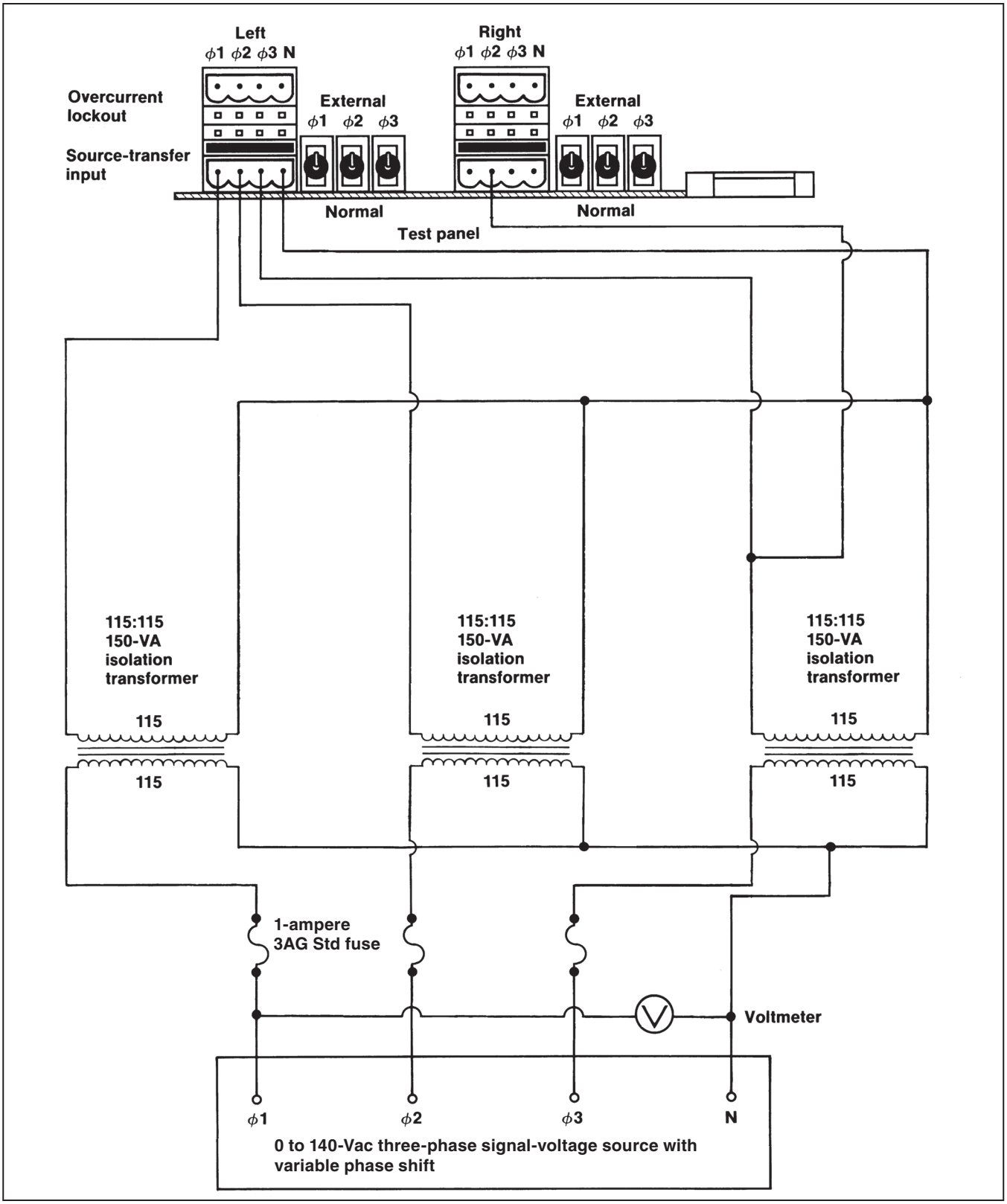

Figure 11. A three-phase source test-circuit connection diagram for weatherproof enclosure applications.

(c) Press the <Change> key.

(d) Press each digit of the access-code number, and then press the <Enter> key.

(e) Press the number keys corresponding to the desired value. Then, press the <Enter> key.

STEP 11. Press the **Open** pushbutton on the left-source switch operator.

STEP 12. Decrease the Phase 1● signal voltage until the left-source voltage indicating lamp extinguishes.

STEP 13. Slowly increase the Phase 1● signal voltage until the left-source indicating lamp is lit. Read the left-source Phase 1● voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Phase 1●" is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify the value shown is equal to the return of source setting. Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Return of Source" is displayed.

STEP 14. Press the **Close** pushbutton on the left-source switch operator.

STEP 15. Slowly decrease the Phase 1● signal voltage until the left-source voltage indicating lamp extinguishes. Read the left-source Phase 1● voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Phase 1"● is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify the value shown is equal to the loss of source setting. Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Return of Source" is displayed.

STEP 16. For applications using three-phase voltage sensing:

If the three-phase source test circuit shown in Figure 11 on page 26 is used: Repeat Steps 11 through 15 for Phase 2 and then for Phase 3.

If the single-phase source test circuit shown in Figure 12 on page 28 is used: Repeat Steps 11 through 15 for Phase 2 and then for Phase 3. When inputting signal voltage to Phase 2, de-energize the signal-voltage source and jumper Phases 1 and 3 of the left source-transfer input connector (instead of Phases 2 and 3 as shown in Figure 12 on page 28). Then, energize the signal-voltage source. When inputting signal voltage to Phase 3, de-energize the signal-voltage source and jumper Phases 1 and 2 of the left source-transfer input connector and then energize the signal-voltage source.

For applications using single-phase voltage sensing, proceed to Step 23.

Unbalance-Detection Testing

The steps in this testing section can be performed only if the three-phase source test circuit shown in Figure 11 on page 26 is used. ***If a single-phase source test circuit is used, proceed to Step 23.***

STEP 17. Adjust the three-phase voltage source for a nominal 120-degree phase angle between each phase.

STEP 18. Turn on unbalance detect.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Unbalance Detect" is displayed. Then, press the <Change> key.

(c) Press each digit of the access code number, and then press the <Enter> key.

(d) Press the <◄—> or <—►> key to change the response to ""Off." Then, press the <Enter> key.

STEP 19. With the left-source switch operator in the **Closed** position, slowly decrease the Phase 1 signal voltage until the left-source voltage indicating lamp extinguishes. Read the left-source unbalance voltage.

(a) Press the <Voltage> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Left Unbalance" is displayed. The value shown should be equal to the voltmeter reading, ±3%.

(c) Verify the value shown is equal to the unbalance detect setting. Press the <Next> item key (or the <Last> item key) repeatedly to scroll through the items in this menu until "Unbalance Detect" is displayed.

● For applications using single-phase source-voltage sensing, references to "Phase 1" in Steps 12, 13, and 15 should be "Phase 2."

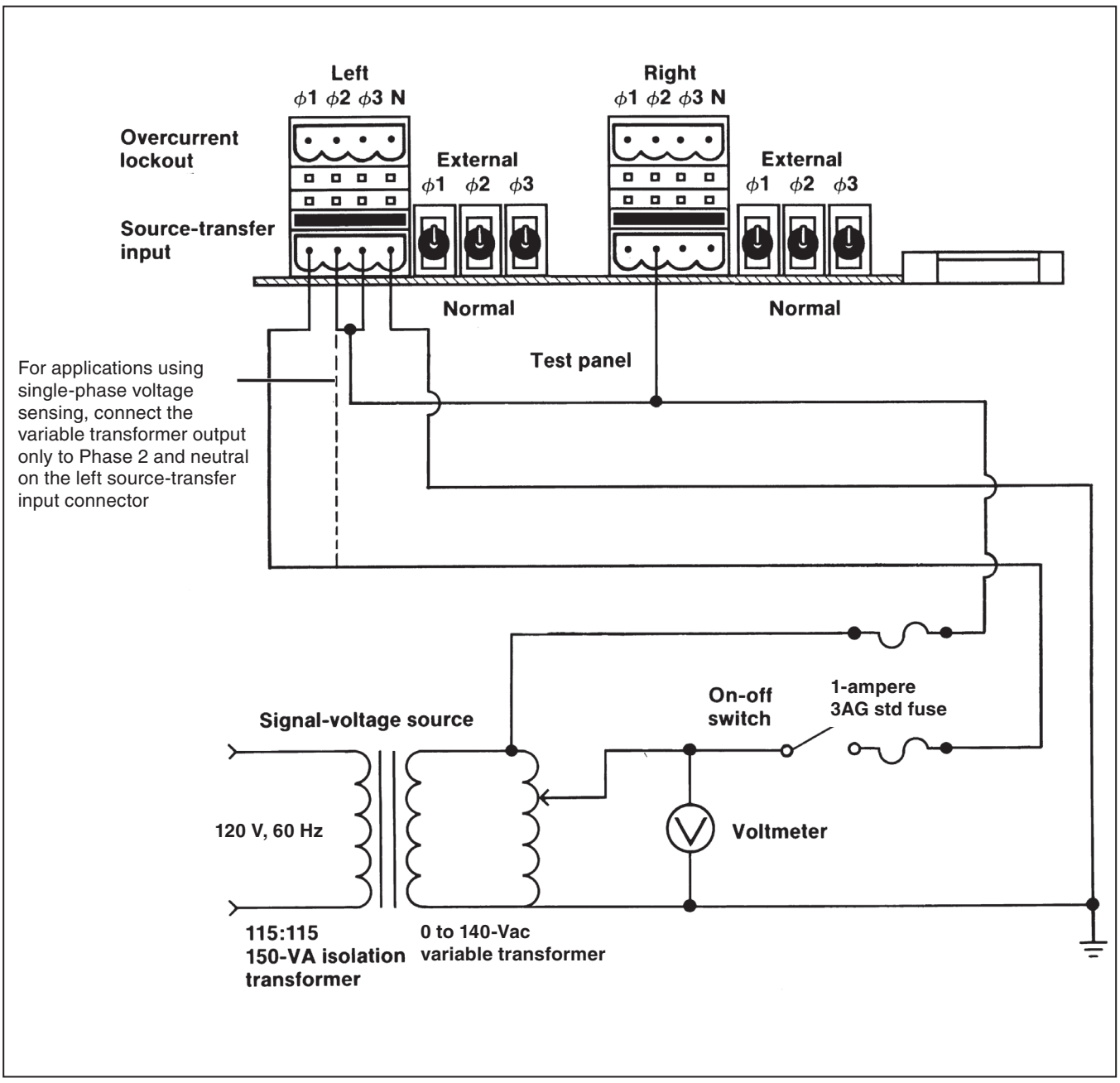

Figure 12. A single-phase source test-circuit connection diagram for weatherproof enclosure applications.

STEP 20. Slowly change the phase angle of Phase 1 in the positive direction until the left-source voltage indicating lamp extinguishes. Read the phase angle on the signal-voltage source. The value shown should be approximately +8.6 degrees if a 120-volt base is used and the **Unbalance Detect** factory-setting of 18 volts is used. (If a different base voltage and/or **Unbalance Detect** setting is used, the phase angle value shown should be approximately equal to –sin-1 [**Unbalance Detect** setting/base voltage].) Return the phase angle of Phase 1 to its nominal 120-degree setting.

STEP 21. Slowly change the phase angle of Phase 1 in the negative direction until the left-source voltage indicating lamp extinguishes. Read the phase angle on the signal-voltage source. The value shown should be approximately –8.6 degrees if a 120-volt base is used and the unbalance detect factory-setting of 18 volts is used. (If a different base voltage and/or **Unbalance Detect** setting is used, the phase angle value shown should be approximately equal to –sin-1 [**Unbalance Detect** setting/base voltage].) Return the phase angle of Phase 1 to its nominal 120-degree setting.

STEP 22. Repeat Steps 19 through 21 for Phase 2 and then for Phase 3.

STEP 23. De-energize the signal-voltage source. Reverse the test circuit connections to the left and right source-transfer input connectors and repeat Steps 7 through 16 for the right source.

STEP 24. ***If a single-phase source test circuit is used, proceed to Step 25.***

Repeat Steps 17 through 22 for the right source.

Overcurrent-Lockout Testing

The steps used in this testing section can be performed only if the overcurrent lockout feature has been specified and Fisher Pierce Series 1301 Powerflex® Line Post Current Sensors have been installed on the sources.

STEP 25. Verify the **Lockout** option has been selected.

(a) Press the <Configure> menu key.

(b) Press the <Next> item key (or the <Last> item key) repeatedly until "Lockout Option" is displayed.

(c) If the response is "Out," proceed to Step 32. If the response is "In," proceed to Step 26.

STEP 26. Make up the test-circuit connections to Phase 1 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector, as shown in Figure 13 on page 30.

STEP 27. Set the variable transformer for zero volts. Energize the isolation transformer and slowly increase the signal voltage until the LOCKOUT lamp is lit. Read the signal voltage on the voltmeter.

The value shown should be approximately 10.8 volts if the lockout level factory-setting of 1200 amperes is used. (If a different **Lockout Level** setting is used, the value shown should be approximately equal to [lockout level/111.6 amperes per volt].)

Note: The presence of load current can significantly affect this measurement.

Decrease the signal voltage by 10%.

STEP 28. Press the <Reset> key. The LOCKOUT lamp will extinguish.

STEP 29. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 2 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector. Then, repeat Steps 27 and 28. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 3 and neutral on the left overcurrent-lockout connector and to Phase 2 on the left source-transfer input connector. Then, repeat Steps 27 and 28.

STEP 30. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 1 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 27 and 28.

STEP 31. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 2 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 27 and 28. De-energize the signal-voltage source. Make up the test-circuit connections to Phase 3 and neutral on the right overcurrent-lockout connector and to Phase 2 on the right source-transfer input connector. Then, repeat Steps 27 and 28.

When Testing Is Completed

Follow these steps when testing is completed:

STEP 32. De-energize the signal-voltage source and remove the test-circuit connections.

STEP 33. Place the EXTERNAL/NORMAL the right source in **Normal** mode.

STEP 34. Recouple each switch operator to its interrupter switch.

STEP 35. Repeat Steps 9 and 10 for the known normal system state. Repeat Steps 9 and 10 for the right source. See the "Before Walking Away" section on page 31.

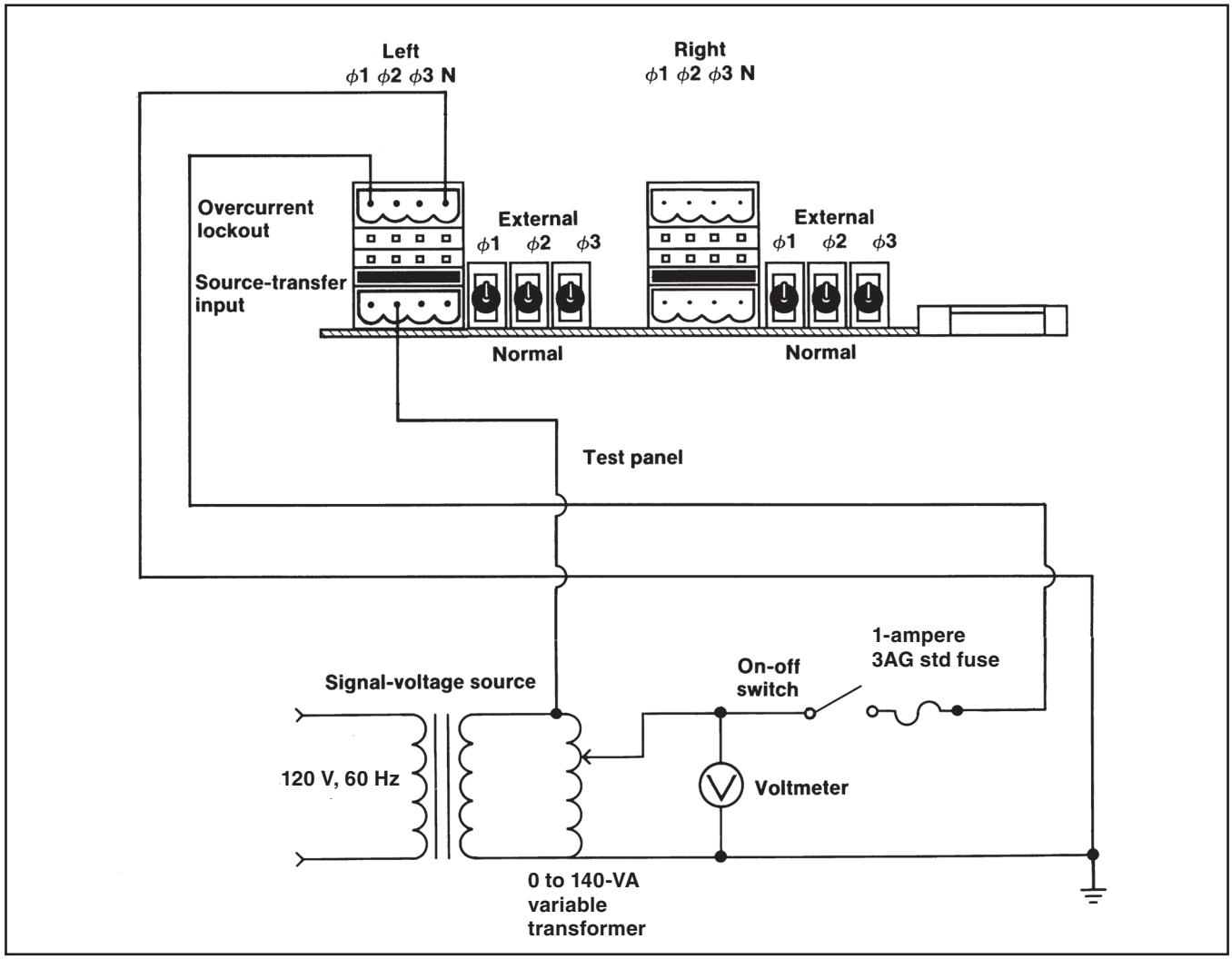

Figure 13. An overcurrent-lockout test-circuit connection diagram for weatherproof enclosure applications.

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

1. All test connections have been removed.
2. If the **Supervisory Control** option is enabled—the Supervisory manual/automatic dry contact is closed.
3. All EXTERNAL/NORMAL selector switches have been placed in **Normal** mode.
4. The hinged lower panel of the source-transfer control has been closed.
5. The input plug has been removed from the shorting receptacle and transferred to the input receptacle (in switchgear and pad-mounted gear applications).
6. The left and right sources have been normalized.
7. The left and right sources have been set to the appropriate base voltage.
8. The MANUAL/AUTOMATIC operation selector switch is in **Automatic** mode.
9. The left-source voltage and the right-source voltage indicating lamps are illuminated, indicating the availability of voltage on the sources.
10. The automatic-transfer READY indicating lamp is illuminated.

Now, replace and padlock the protective steel covers, if furnished, over the source-transfer control and the switch operators (in switchgear applications), close and padlock the access doors to the control compartment and high-voltage compartments (in pad-mounted gear applications), close and padlock the high-voltage enclosure covers and low-voltage enclosure door (in Vista Underground Distribution System applications), or close and padlock the enclosure door (in weatherproof enclosure applications).

NOTICE

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.**