



Owner Manual

Transfer Switch

RSS100 (Spec A)

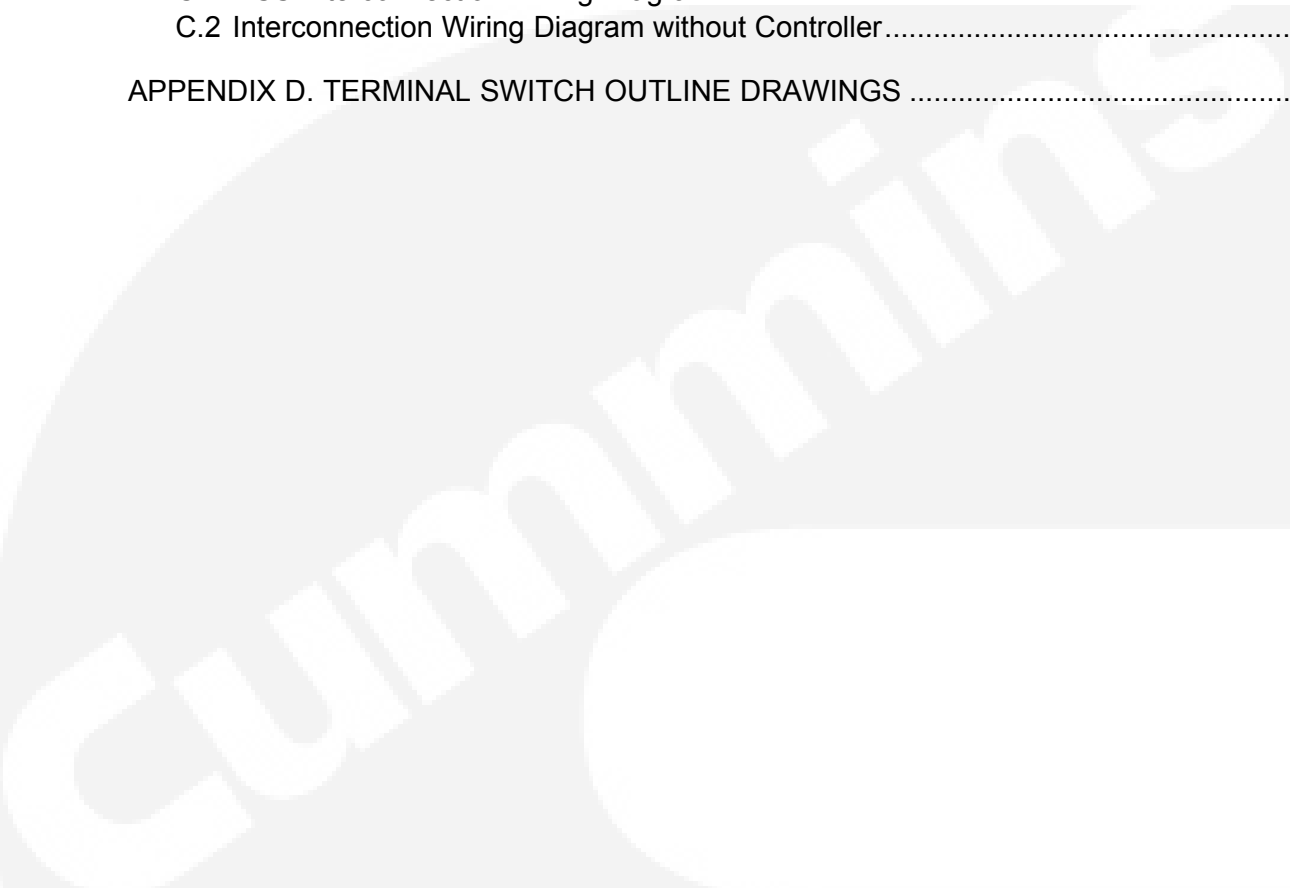
RSS200 (Spec A)

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1 Safety Precautions

This manual includes the following symbols to indicate potentially dangerous conditions. Read the manual carefully and know when these conditions exist. Then, take the necessary steps to protect personnel and the equipment.

DANGER

This symbol warns of immediate hazards that will result in severe personal injury or death.

WARNING

This symbol refers to a hazard or unsafe practice that can result in severe personal injury or death.

CAUTION

This symbol refers to a hazard or unsafe practice that can result in personal injury or product or property damage.

1.1 Electrical Shock and Arc Flash Can Cause Severe Personal Injury or Death

High voltage in transfer switch components presents serious shock hazards that can result in severe personal injury or death. Read and follow these suggestions:

- The Operator **must** always keep the transfer switch cabinet closed and locked.
- Make sure only authorized personnel have the cabinet keys.
- All service and adjustments to the transfer switch **must** be performed only by an electrician or authorized service representative.

NOTICE

Whenever closed transition is used, approval to parallel with the local electric utility must be obtained.

1.2 General Precautions

Refer to NFPA 70E Standard for Electrical Safety in the Workplace to be sure the proper personal protective equipment (PPE) is worn around this product.

Follow these guidelines while working on or around electrical equipment.

- Place rubber insulated mats on dry wood platforms over metal or concrete floors when working on any electrical equipment.
- Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling any electrical equipment.

- Remove all jewelry when working on electrical equipment.
- Wear safety glasses whenever servicing the transfer switch.
- Do not smoke near the batteries.
- Do not work on this equipment when mentally or physically fatigued, or after consuming alcohol or any drug that makes the operation of equipment unsafe.

⚠ WARNING

Incorrect service or replacement of parts can result in death, severe personal injury, and/or equipment damage. Service personnel must be qualified to perform electrical and/or mechanical service.

1.3 Utility-To-Generator Set Applications

If the cabinet must be opened for any reason:

1. Move the operation selector switch on the generator set to STOP.
2. Disconnect the battery charger.
3. Disconnect the starting batteries of the generator set or sets (remove the ground [-] lead first).
4. Remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

⚠ WARNING

AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. With the breaker in the OFF position, the line side lugs are still energized.

2 Introduction

This is an open transition transfer switch. With an open transition switch, there is never a time when both sources are supplying power to the load. This manual includes information on the following types of Residential Safety Switch (RSS) transfer switch installations.

- RSS with controller: the RSS transfer switch with an Automatic Transfer Switch (ATS) control includes an operator panel located behind the hinged panel in the upper left hand corner on the front of the enclosure. Access to the control can be obtained by removing the controller cover screw. The door panel must be removed to gain access to transfer switch components.
- RSS without controller, one circuit breaker: access to the circuit breaker can be obtained by removing the outer door panel. An internal panel must be removed to gain access to transfer switch components.

Refer to the wiring diagrams at the end of this manual for specific information about switch configuration.

Use normal and necessary safety precautions before starting any service procedure. Identify all hazards by referring to the Safety Precautions portion of this manual and by observing all warnings and cautions within the manual. Whenever you are troubleshooting, remember that the generator set, the transfer switch, and the utility power source are all interdependent.

2.1 About the Manual

This manual covers models produced under the Cummins® and Cummins Power Generation (CPG) brand names.

This manual provides information necessary for the operation, installation, and service, of the transfer switch(es) identified on the cover of this manual. This manual also includes parts information.

This manual provides information necessary for operation of an RSS transfer switch with a control.

The RSS transfer switch with a control includes an operator panel located behind the hinged panel in the upper left hand corner on the front of the enclosure, as shown in [Figure 1](#).

This manual contains service procedures for RSS transfer switches.

- Section 4 describes the basic operation of a transfer switch and provides information on model identification and how to obtain service.
- Section 7.3 provides information on how to troubleshoot transfer switches that include a controller, see [Figure 2](#).
- Section 7.4 provides information on how to troubleshoot transfer switches that include a circuit breaker but do not include a controller, see [Figure 3](#).
- Section 8 provides information on servicing the transfer switch.
- Appendix A includes parts information.
- Appendix C includes transfer switch wiring diagrams.

Refer to the schematic and wiring diagrams at the end of this manual for specific information about transfer switch configuration.

Use normal and necessary safety precautions before starting any installation or service procedure. Identify all hazards by referring to the Safety Precautions portion of this manual and by observing all warnings and cautions within the manual. Whenever you are installing or troubleshooting, remember that the generator set, the transfer switch, and the utility power source are all interdependent.

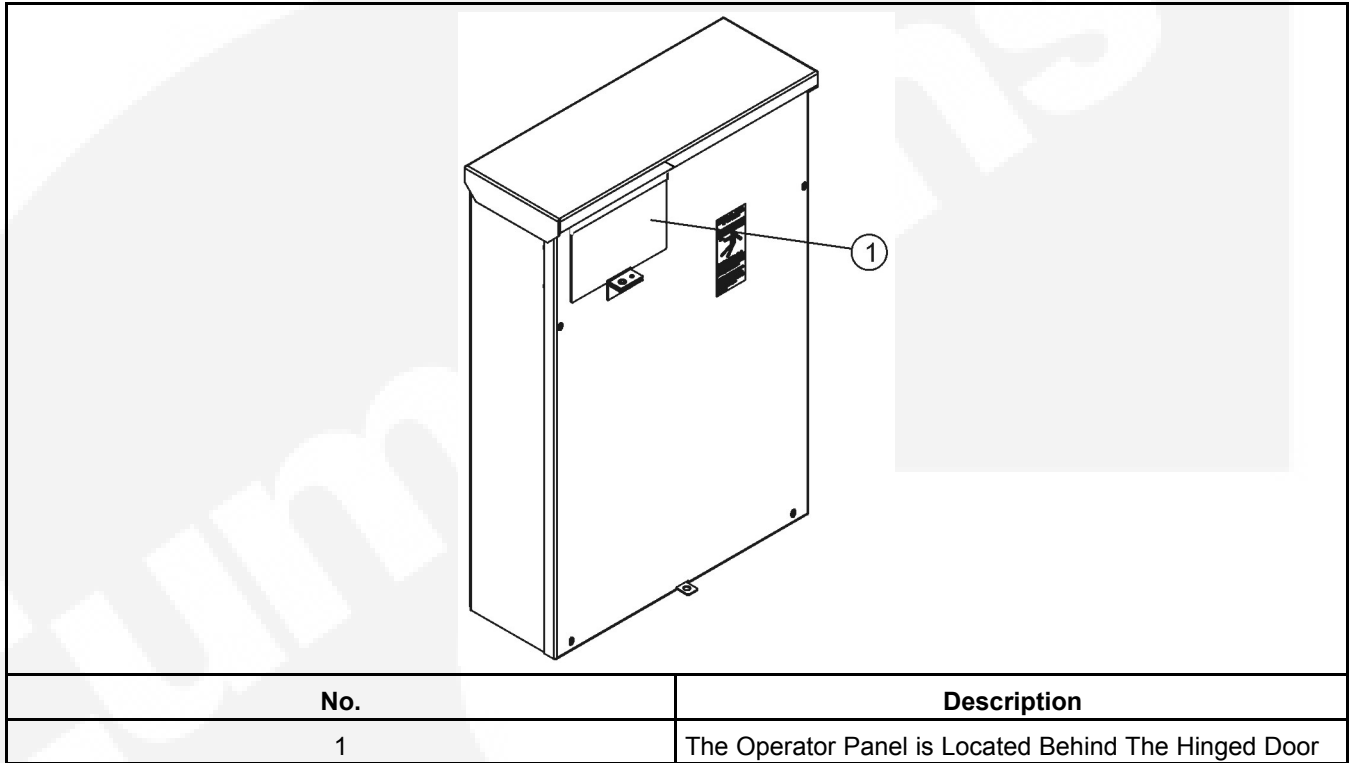


FIGURE 1. RSS TRANSFER SWITCH

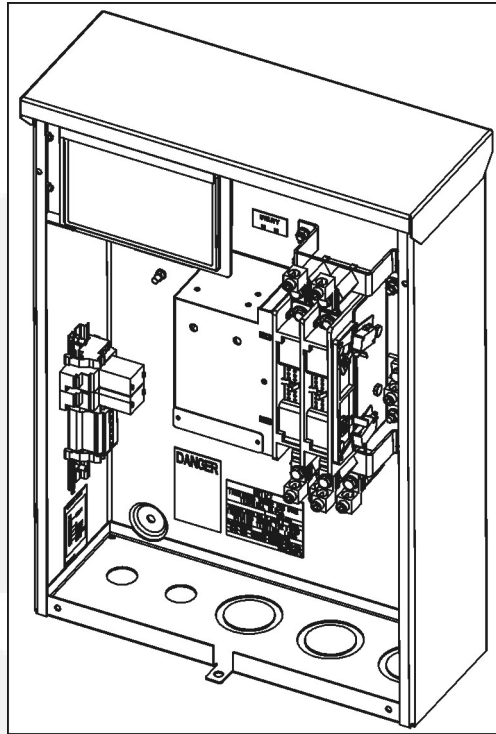


FIGURE 2. RSS TRANSFER SWITCH WITH CONTROLLER (DOOR PANEL REMOVED)

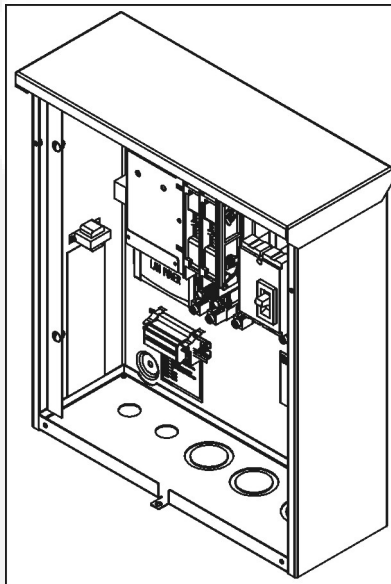


FIGURE 3. RSS TRANSFER SWITCH WITHOUT CONTROLLER, ONE BREAKER WITH DOOR PANELS REMOVED

2.2 Transfer Switch Application

Transfer switches are an essential part of a building's standby or emergency power system. The utility line (normal power), is backed up by a generator set (emergency power). The transfer switch automatically switches the electrical load from one source to the other.

The load is connected to the common of the transfer switch, see [Figure 4](#). Under normal conditions, the load is supplied with power from the utility (as illustrated). If utility power is interrupted, the load is transferred to the generator set (genset). When utility power returns, the load is re-transferred to the utility. The transfer and retransfer of the load are the two most basic functions of a transfer switch.

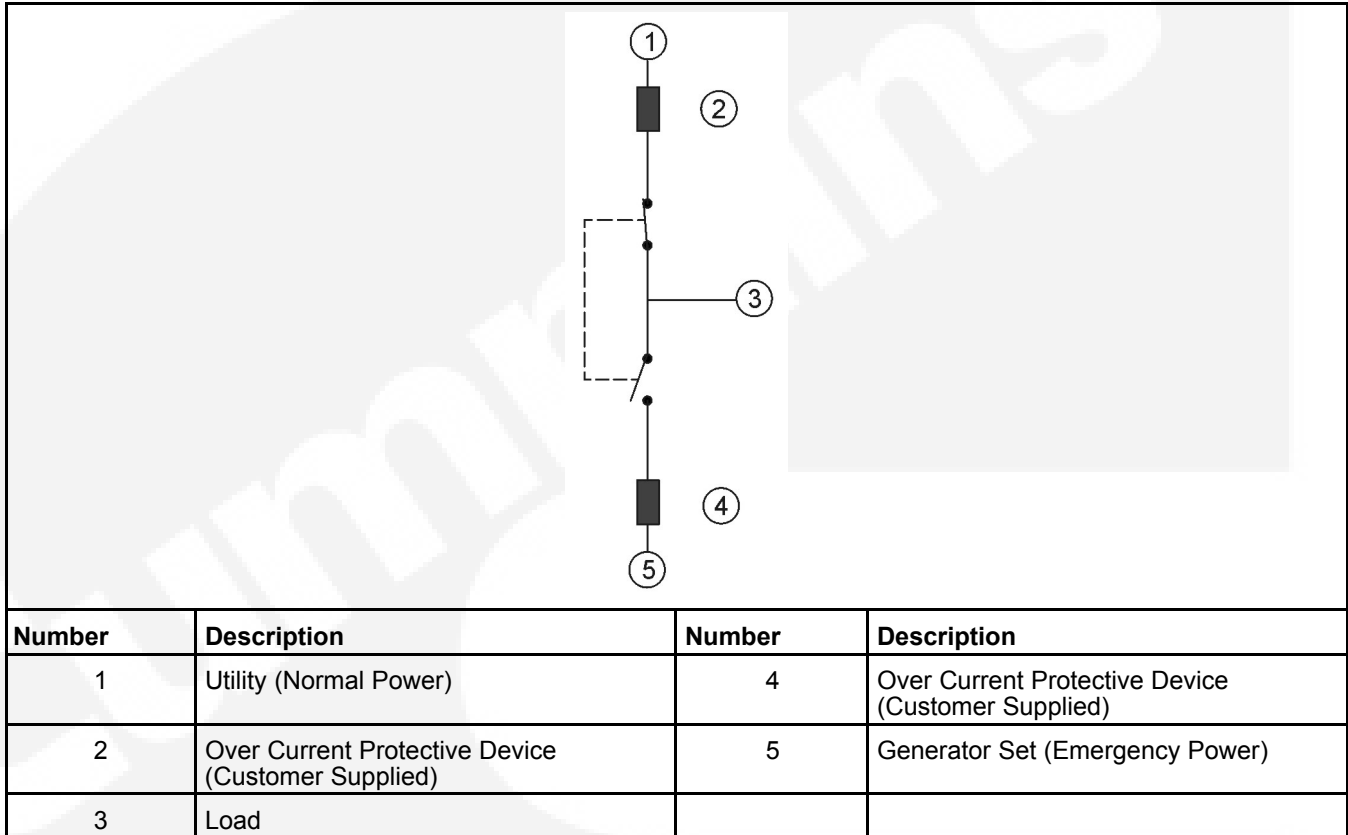


FIGURE 4. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

2.3 Transfer Switch Function

Transfer switches are an essential part of a standby power system. The utility (normal power source) is backed up by a generator (emergency power source). Should the utility fail, the transfer switch automatically switches the electrical load from the utility to the generator. When utility power returns, the transfer switch automatically switches the electrical load back to the utility.

Automatic transfer switches, capable of automatic operation without operator intervention, perform the basic function of transferring the load to the available power source. A controller monitors each source for allowable voltage and frequency range.

Automatic transfer switches, capable of automatic operation without operator intervention, are designed for utility-to-generator applications. In utility-to-generator applications, a transfer switch performs the following functions:

1. Senses the interruption of utility power.
2. Sends a start signal to the generator.

3. Senses generator power is available.
4. Transfers the load to the generator.
5. Senses the return of utility power.
6. Retransfers the load to the utility.
7. Sends a stop signal to the generator.

NOTICE

Models with integral control.

2.4 Model Identification

Identify your model by referring to the Model and Specification number as shown on the nameplate. The nameplate also includes electrical characteristics.

2.4.1 Transfer Switches with a Controller

The nameplate for transfer switches with a controller is located inside the cabinet, on the upper right side, see [Figure 5](#) for the RSS100 transfer switch and [Figure 6](#) for the RSS200 transfer switch.

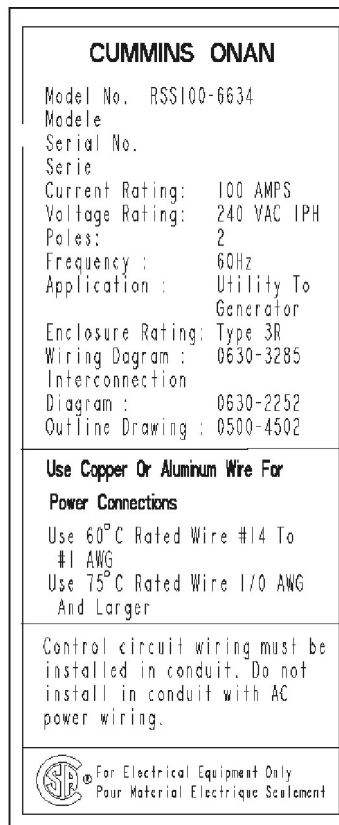


FIGURE 5. RSS100 WITH CONTROL DISPLAY NAMEPLATE BREAKER

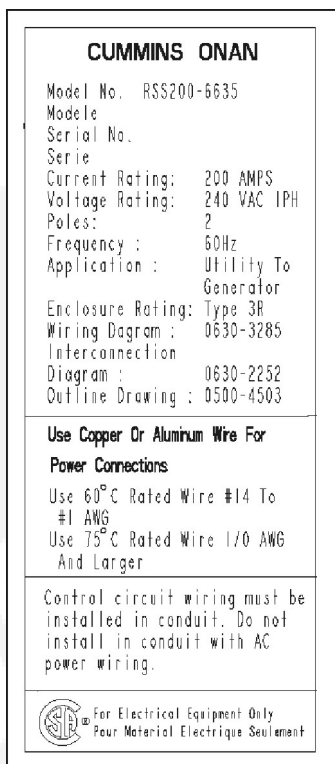


FIGURE 6. RSS200 WITH CONTROL DISPLAY NAMEPLATE BREAKER

2.4.2 Transfer Switches without a Controller

The nameplate for transfer switches without a controller, one circuit breaker, is located inside the cabinet, on the lower left side, see for the RSS100 transfer switch and for the RSS200 transfer switch.

CUMMINS ONAN
Model No. RSS100-6634
Model
Serial No.
Series
Current Rating: 100Amps
Voltage Rating: 240 VAC 1PH
Poles: 2
Frequency: 60Hz
Application: Utility To Generator
Enclosure Rating: Type 3R
Wiring Diagram: 0630-3395
Interconnection Diagram: 0630-3518
Outline Drawing:
Suitable for use as service equipment.
Use Copper Or Aluminum Wire For Power Connections
Use 60°C Rated Wire #14 To #1 AWG
Use 75°C Rated Wire 1/0 AWG And Larger
Control circuit wiring must be installed in conduit. Do not install in conduit with AC power wiring.
Suitable only for use with Cummins generator models GSAA, GSBA and GSBB.
This transfer switch is rated for use on a circuit capable of delivering not more than 10,000 rms symmetrical amperes, 240 volts maximum.
Continuous load current not to exceed 80 percent of switch rating.

FIGURE 7. RSS100 WITHOUT CONTROL DISPLAY NAMEPLATE, TWO CIRCUIT BREAKERS

<p>CUMMINS ONAN Model No. RSS200-6635 Model Serial No. Serie Current Rating: 200 Amps Voltage Rating: 240 VAC 1PH Poles: 2 Frequency : 60Hz Application : Utility To Generator Enclosure Rating: Type 3R Wiring Diagram : 0630-3365 Interconnection Diagram : 0630-3518 Outline Drawing: 0500-4824</p>
<p>Suitable for use as service equipment - UTILITY source only. An additional disconnect must be readily available for the alternate source, unless the alternate source is an accessible generator and can be readily shut down.</p>
<p>Use Copper Or Aluminum Wire For Power Connections Use 60°C Rated Wire #14 To #1 AWG Use 75°C Rated Wire 1/0 AWG And Larger</p>
<p>Control circuit wiring must be installed in conduit. Do not install in conduit with AC power wiring.</p>
<p>Suitable only for use with Cummins generator models GSAA, GSBA and GSDB.</p>
<p>This transfer switch is rated for use on a circuit capable of delivering not more than 10,000 rms symmetrical amperes, 240 volts maximum.</p>
<p>Continuous load current not to exceed 80 percent of switch rating.</p>

FIGURE 8. RSS200 WITHOUT CONTROL DISPLAY NAMEPLATE, ONE CIRCUIT BREAKER

2.5 Manufacturing Facilities

NORTH AMERICA	EMEA, CIS	ASIA PACIFIC
Cummins Power Generation Limited 1400 73rd Ave. NE Minneapolis, MN 55432 USA	Cummins Power Generation Limited Columbus Avenue Manston Park Manston, Ramsgate Kent CT12 5BF United Kingdom	Cummins Power Generation Limited 10 Toh Guan Road #07-01 TT International TradePark Singapore 608838
Phone +1 763 574 5000 Toll Free +1 800 888 6626 Fax +1 763 574 5298	Phone +44 1843 255000 Fax +44 1843 255902	Phone +65 6417 2388 Fax +65 6417 2399
BRAZIL	CHINA	INDIA
Rua Jati, 310, Cumbica Guarulhos, SP 07180-900 Brazil	Cummins Power Generation 2 Rongchang East Street, Beijing Economic – Technological Development Area Beijing 100176, P.R.China	Cummins India Ltd, Power Generation Business Unit, Plot No B-2, SEZ Industrial Area, Village-Nandal & Surwadi, Taluka- Phaltan Dist- Satara, Maharashtra 415523 India

Phone +55 11 2186 4195 Fax +55 11 2186 4729	Phone +86 10 5902 3000 Fax +86 10 5902 3199	Phone +91 021 66305514
LATIN AMERICA	MEXICO	
3350 Southwest 148th Ave. Suite 205 Miramar, FL 33027 USA	Eje 122 No. 200 Zona Industrial San Luis Potosi, S.L.P. 78395 Mexico	
Phone +1 954 431 551 Fax +1 954 433 5797	Phone +52 444 870 6700 Fax +52 444 824 0082	

2.5.1 How to Obtain Service

When a product requires servicing, contact your nearest Cummins Power Generation distributor. To locate your local Cummins Power Generation distributor, refer to www.cumminspower.com and select Distributor Locator. When contacting your distributor, always supply the complete model, specification, and serial number as shown on the nameplate.

To contact your local Cummins Power Generation (CPG) distributor in the United States or Canada, call 1-800-888-6626 (this automated service utilizes touch-tone phones only). By selecting Option 1 (press 1), you will be automatically connected to the distributor nearest you.

If you are unable to contact a distributor using the automated service, consult the Yellow Pages. Typically, our distributors are listed under:

- Generators-Electric,
- Engines-Gasoline or Engines-Diesel, or
- Recreational Vehicles-Equipment,
- Parts and Service.

If it is necessary to contact a distributor regarding the transfer switch, always give the complete Model and Serial number. This information is necessary to properly identify your unit among the many types manufactured.

- For models with a controller, a model and serial number label, see [Figure 9](#) is located on the back of the controller cover. To view the label, remove the screw securing the controller cover and open the cover, see [Figure 10](#).
- For models without a controller, a model and serial number label is located on the inner panel. To view the label, remove the outer panel, see [Figure 11](#).

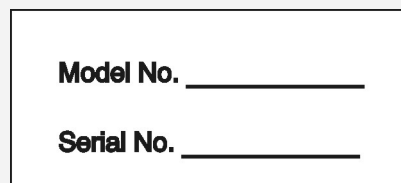


FIGURE 9. MODEL AND SERIAL NUMBER LABEL

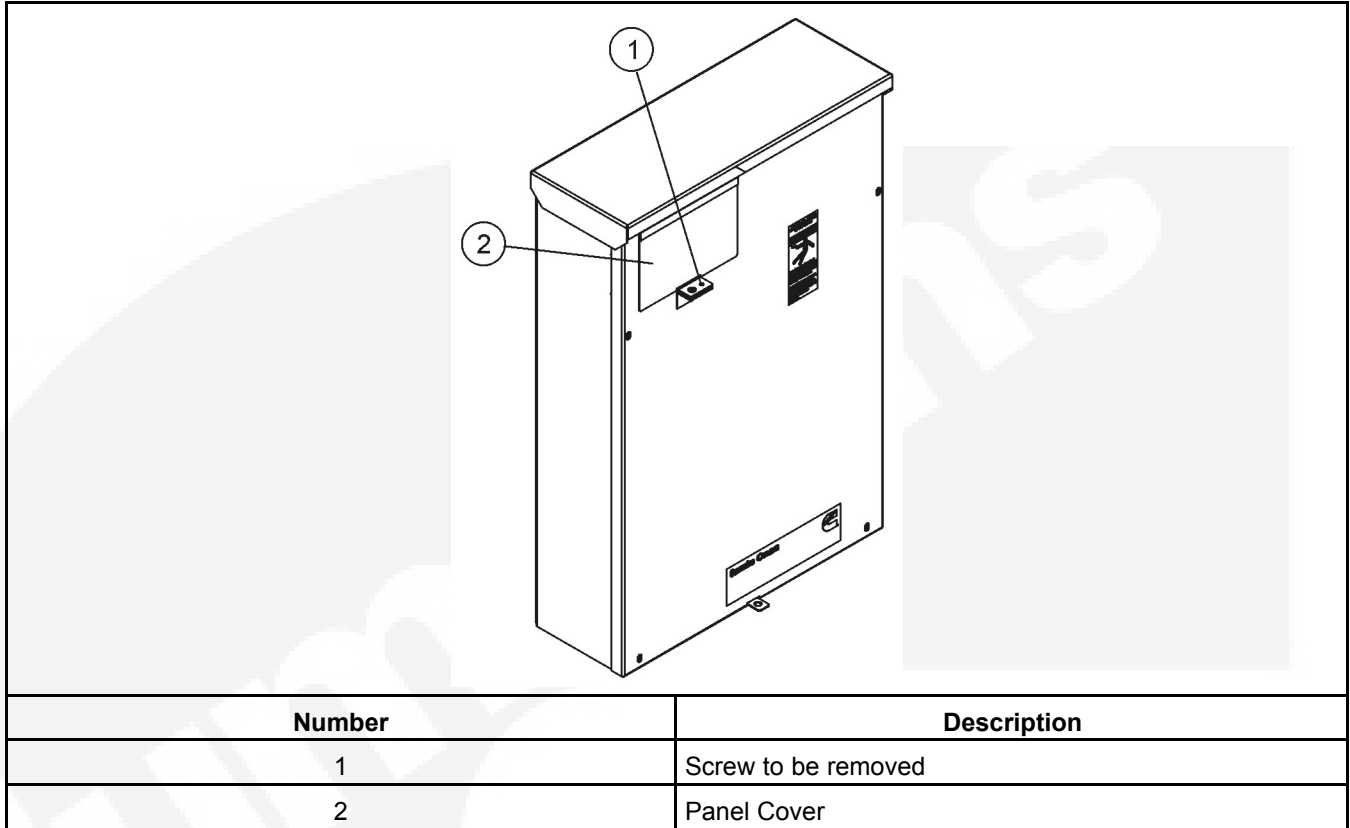


FIGURE 10. OPERATOR PANEL COVER

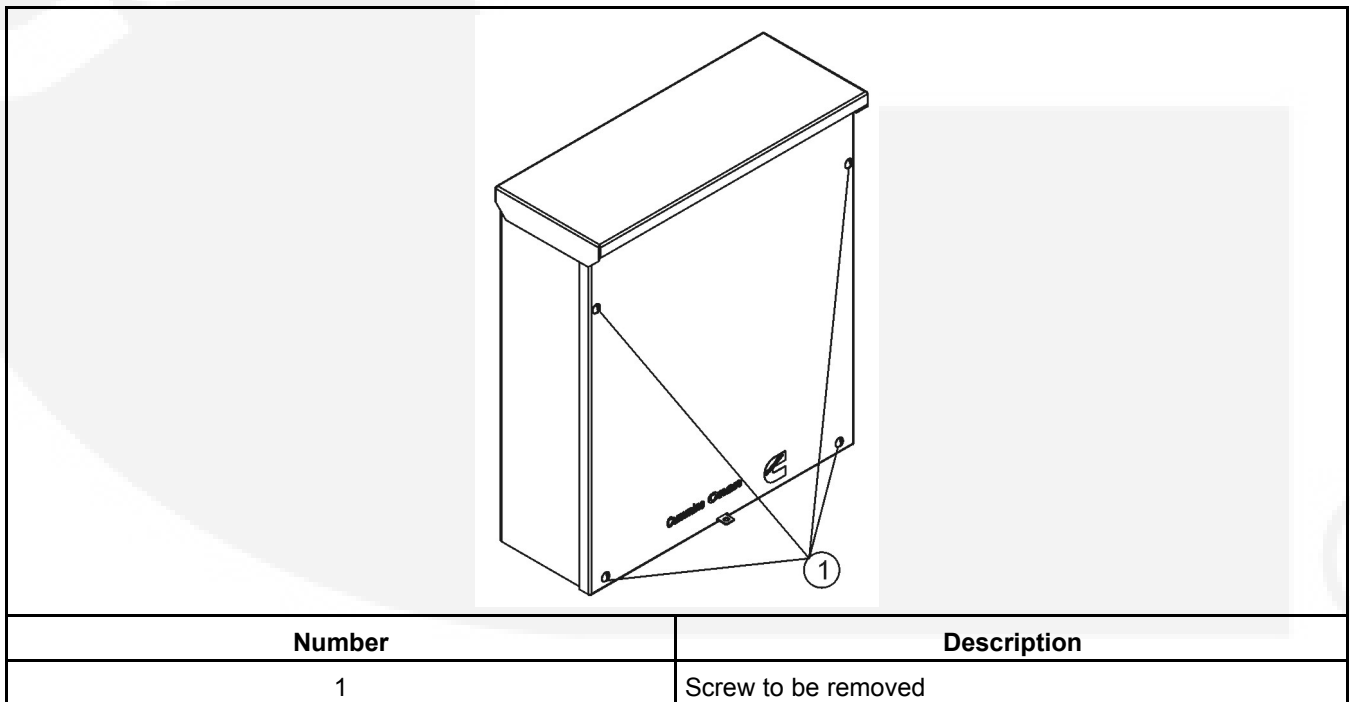


FIGURE 11. TRANSFER SWITCH WITHOUT CONTROLLER

2.5.1.1 Locating a Distributor

In North America

Telephone +1 800 888 6626 (this is an automated service for touch-tone phones only) to contact the nearest Cummins Power Generation distributor in the United States or Canada. Select Option 1 (press 1), to automatically connect to the nearest distributor.

If unable to contact a distributor using the automated service, consult the Yellow Pages. Typically, distributors are listed under:

GENERATORS – ELECTRIC or

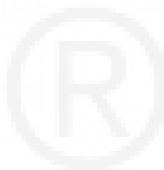
ENGINES – GASOLINE OR DIESEL

If unable to arrange a service or resolve an issue, contact the Service Manager at the nearest Cummins Power Generation distributor for assistance.

When contacting the distributor, always supply the complete Model, Specification, and Serial Number as shown on the product nameplate.

Outside North America

Refer to power.cummins.com and select Distributor Locator, or send an email to ask.powergen@cummins.com.





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3 Description

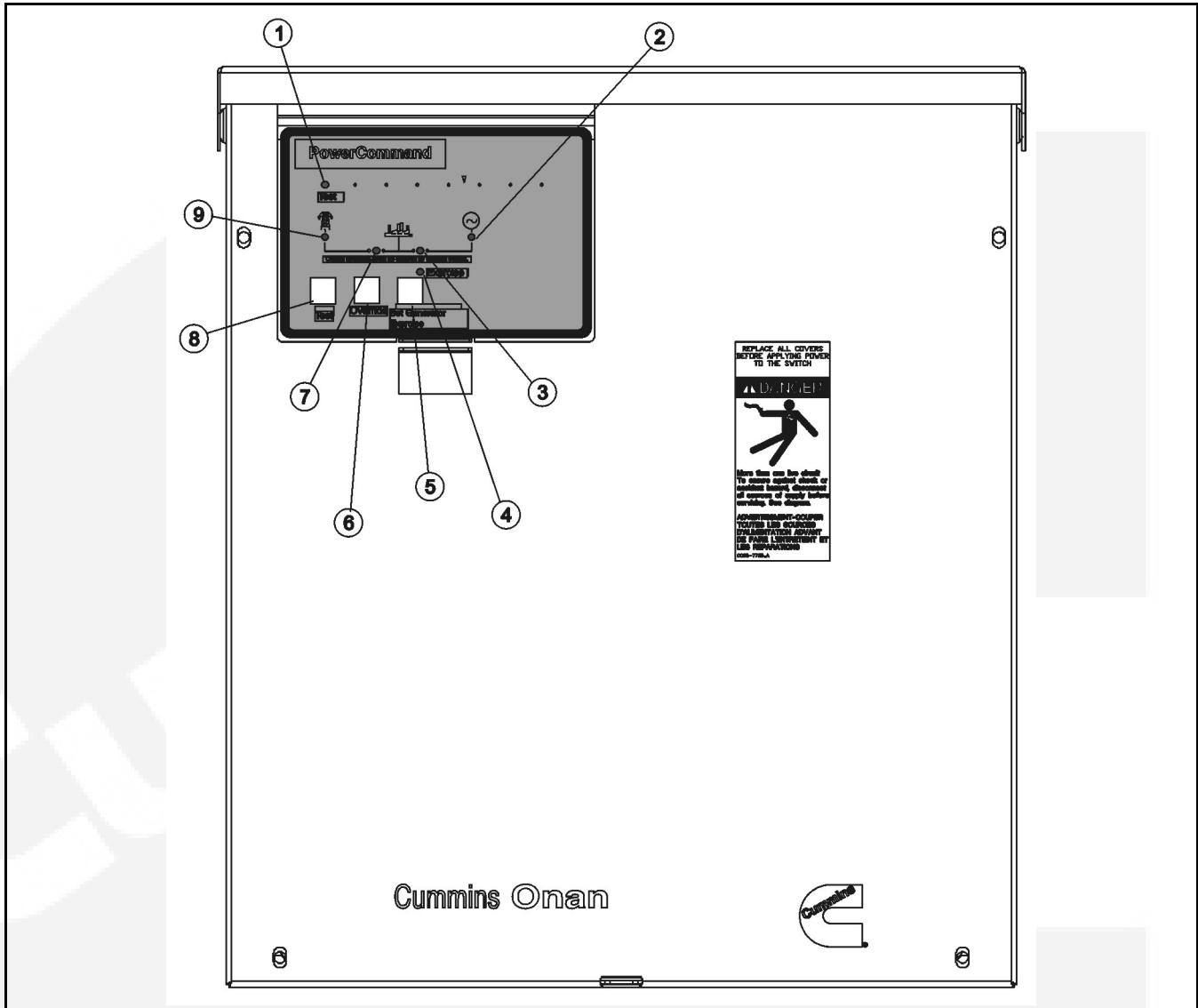
This section describes how the basic components of a transfer switch function.

3.1 Transfer Switch with Control

[Figure 12](#) shows the operator panel used with transfer switches with a control. The panel's features are divided into two groups:

- ATS Status LEDs
- Membrane Pushbuttons





No.	Description	No.	Description
1	Test Activity LED	6	Override Pushbutton
2	Generator Power Available LED	7	Utility Power Connected LED
3	Generator Power Connected LED	8	Test Pushbutton
4	Active Set or Programmed Exercise LED	9	Utility Power Available LED
5	Set Exercise Pushbutton		

FIGURE 12. CABINET DOOR (SHOWN WITHOUT HINGED COVER)

3.1.1 ATS Status LEDs

The operator panel includes six LEDs that provide Automatic Transfer Switch (ATS) status information.

- **Utility Power Available:** this green LED is lit when the utility power source has acceptable output voltage.
- **Generator Power Available:** this amber LED is lit when the Generator power source has acceptable output voltage and frequency.

Both power source LEDs can be lit simultaneously.

- **Utility Power Connected:** this green LED is lit when the transfer switch is connected to utility power which is supplying power to the load.

If this LED is flashing, it means that the transfer switch has failed to connect to or disconnect from utility power, when commanded by the control.

- **Generator Power Connected:** this amber LED is lit when the transfer switch is connected to the generator set which is supplying power to the load.

If this LED is flashing it means the transfer switch has failed to connect to or disconnect from the generator set, when commanded by the control.

- **Test:** this amber LED is lit when there is an active test period. It flashes twice per second when the Test pushbutton is pressed to set or cancel a test period.
- **Exercise:** this amber LED is lit when repeat exercise periods are set. It flashes twice per second when the Set Exercise pushbutton is pressed to set or cancel an exercise. It flashes once per second during an active exercise period.

3.1.2 Membrane Pushbutton

The operator panel includes three membrane pushbuttons.

- **Test:** the Test pushbutton is used to start or cancel a test period.
- **Override:** the Override pushbutton is used to terminate or bypass some time delays, to stop the Power Connected LEDs from flashing as a result of a failure to connect to or disconnect from a power source, and to cancel an active exercise period.
- **Set Exercise:** the Set Exercise pushbutton is used to enable or disable repeatable exercise periods using the exerciser. The exerciser is built into the controller. The exercise period runs for 20 minutes and it repeats every 28 days when an exercise is enabled.

3.2 Control Time Delays

For transfer switches with an operator panel, the transfer switch control uses various time delays to break from one power source and connect to the other source.

In the following descriptions of time delays, it is important to remember that:

- When the transfer switch is connected to the Normal side, it is connected to the Utility power source.
- When the transfer switch is connected to the Emergency side, it is connected to the Generator power source.

3.2.1 Time Delay Engine Start (TDES)

This time delay prevents the generator set from starting during brief utility power interruptions. This timer starts the instant the utility fails, as detected by the Undervoltage Sensor.

When the control senses a utility failure, the control starts the Time Delay Engine Start (TDES) timer. This time delay is set to 3 seconds.

If utility power returns while the TDES timer is active, the timer is reset. When the timer expires, the control signals the generator set to start. The timer is not reset until utility power returns. If the Override pushbutton is pressed while the TDES timer is active, the TDES timer is immediately terminated and the control signals the generator set to start.

3.2.2 Time Delay Engine Cooldown (TDEC)

This time delay allows the generator set to cool down (under no load conditions) after the switch returns to utility power.

The Time Delay Engine Cooldown (TDEC) starts timing when the load is retransferred to utility power. This time delay is set to 10 minutes.

When the TDES expires, the stop signal is sent to the generator's control to shut down the generator and the timer is reset. Pressing the Override pushbutton has no effect on this time delay.

3.2.3 Time Delay Normal-to-Emergency (TDNE) (Transfer)

This time delay allows the generator set to stabilize before the load is applied.

While connected to the utility, this time delay starts after utility power fails and the generator set becomes available (the amber Generator Power Available LED is lit). This time delay also starts after the generator set becomes available when a with load Test or Exercise period is activated.

The time delay is set to 5 seconds. If the generator set fails any time during a TDNE, the control resets the timer and restarts it once the generator set is again available.

If the Override pushbutton is pressed while the TDNE timer is active, the TDNE is terminated immediately and the control transfers the load to the generator set.

3.2.4 Time Delay Emergency to Normal (TDEN) (Retransfer)

While connected to Generator power, this time delay allows utility power to stabilize before the load is transferred back (retransferred) to the utility. This delay also allows the generator set to operate under load for a minimum amount of time before transferring the load back to utility power.

This time delay starts with the transfer switch connected to the generator set and after the utility becomes available following an outage (the green Utility Power Available LED is lit). This time delay also starts when an active Test or Exercise period is ended. After the delay, the transfer switch can retransfer the load to the utility power source.

The time delay is set to 10 minutes. If the utility fails any time during this time delay, the control resets the timer and restarts it once utility power becomes available. If the generator set fails at any time during this time delay while power is available, the timer expires and the normal retransfer sequence takes place.

If the Override pushbutton is pressed while the TDEN timer is active, the TDEN timer is terminated immediately and the transfer switch retransfers the load back to the utility.

3.3 Transfer Switch without Control

For transfer switches without an operator panel, the service entrance transfer switch is operated by the controller on the generator. [Figure 13](#) shows the RSS transfer switch without a controller.

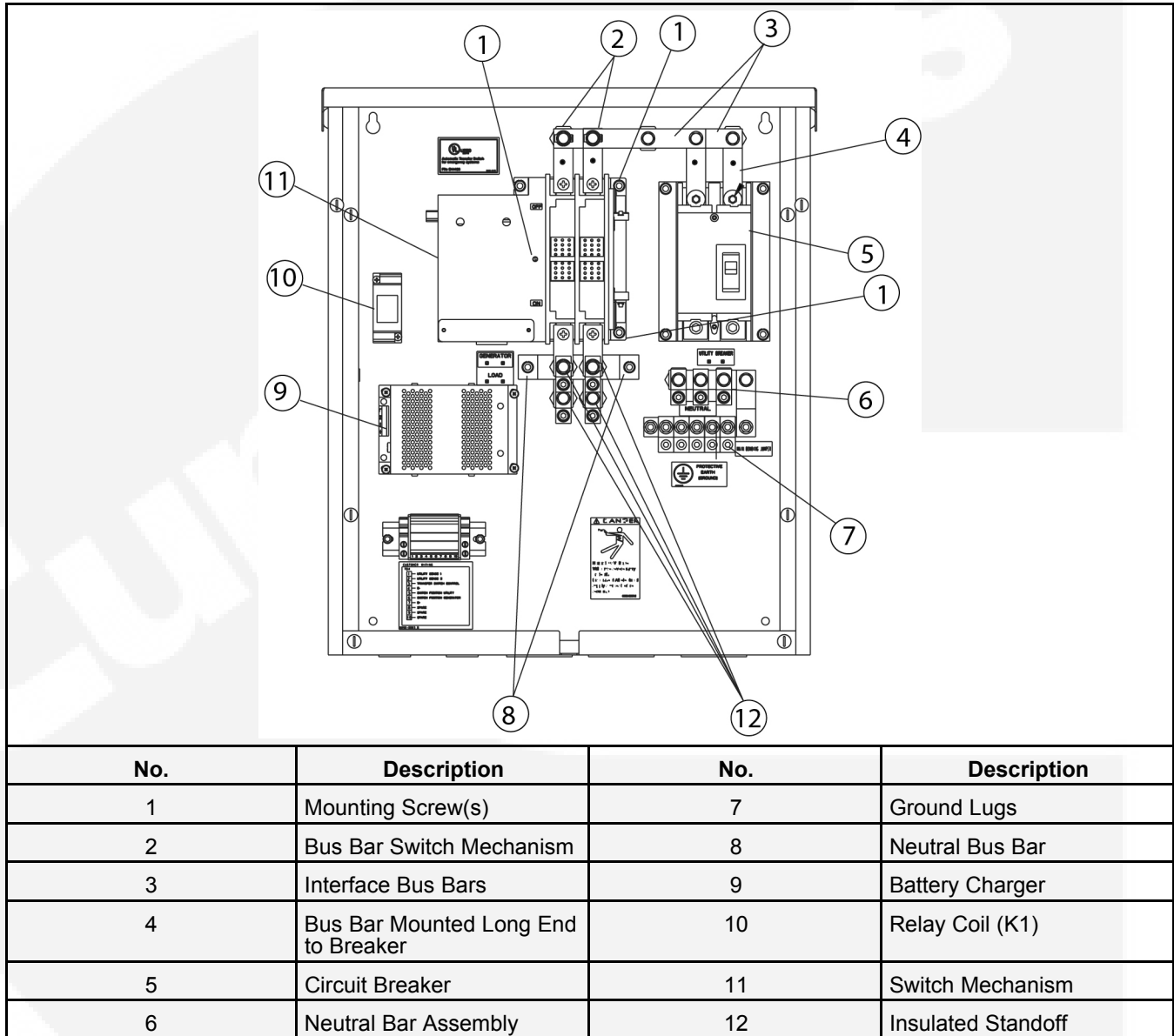


FIGURE 13. SERVICE ENTRANCE RSS TRANSFER SWITCH WITHOUT CONTROLLER

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4 Operation

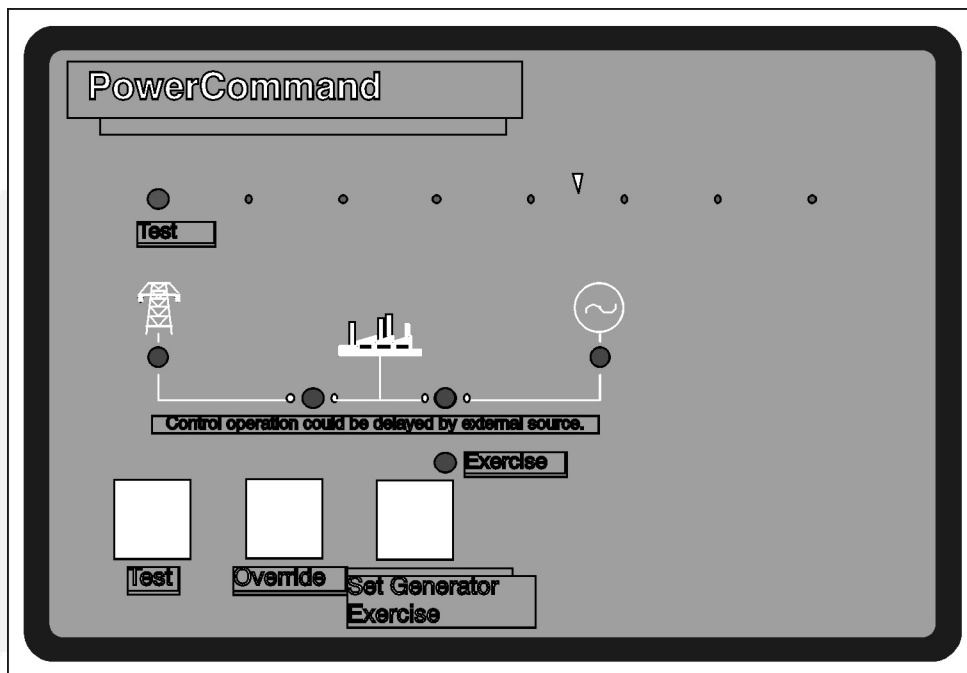


FIGURE 14. CONTROL PANEL

4.1 Transfer Switches with an Operator Panel

The transfer switch provides three operator pushbuttons and six LEDs that indicate operation status.

To access the operator panel, remove the screw securing the panel cover and open the cover (see [Figure 15](#)).

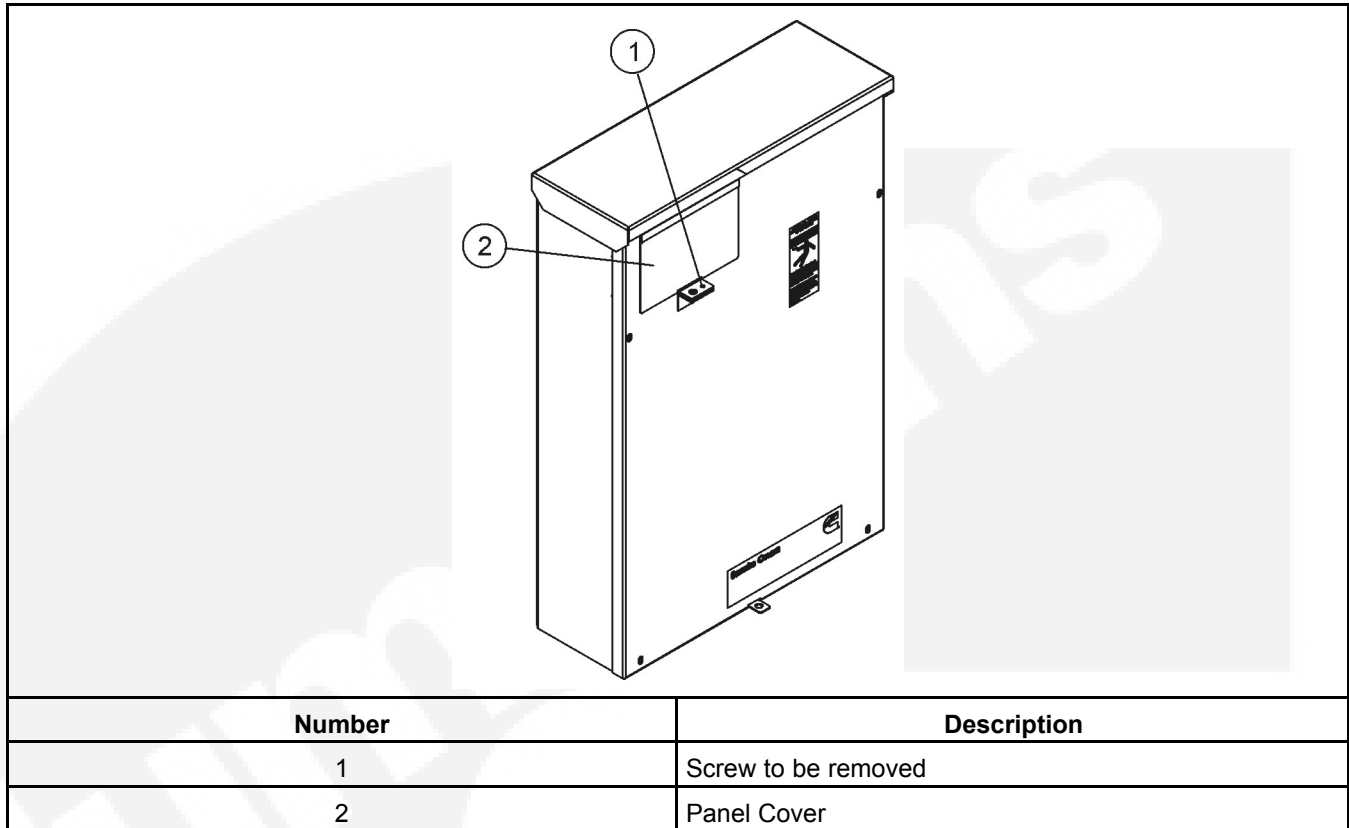


FIGURE 15. OPERATOR PANEL COVER

4.2 Override

The Override pushbutton is used to;

- Terminate the following system time delays:
 - Time Delay Engine Start (TDES)
 - Time Delay Normal-to-Emergency (TDNE)
 - Time Delay Emergency-to-Normal (TDEN)
- Stop the Utility Power Connected LED from flashing as a result of a failure to connect to or disconnect from the utility when commanded.
- Stop the Generator Power Connected LED from flashing as a result of a failure to connect to or disconnect from the generator set when commanded.
- Cancel an active exercise period.

The engine cool down, TDEC, time delay is not affected by pressing this pushbutton.

4.3 Complete System Test

A complete system test is recommended to verify that the electrical system is working properly. Testing the system once every three months is required to make sure the transfer switch will transfer the load to the generator set, should there be a utility power failure.

To complete a system and periodic test,

1. Switch the main circuit breaker from the "ON" to the "OFF" position.
2. Make sure the following occur:
 - a. The generator set control receives a signal to start the generator set.
 - b. After the generator set starts and the TDNE expires, the load is transferred from the utility to the generator set.
3. Switch the main circuit breaker from the "OFF" to the "ON" position.
4. Make sure the following occur:
 - a. After a 10-minute TDEN time delay, the load is transferred back to the utility.
 - b. Once the transfer switch is connected to utility power, the generator set receives a signal to cool down the generator set.
 - c. After a 10-minutes TDEC time delay, the generator set stops.

NOTICE

When ending a test, you can bypass the re-transfer time delay, TDEN, and cause the immediate load retransfer by pressing the Override pushbutton. The generator set stops after the engine cooldown time delay, TDEC.

4.4 Generator Set Exerciser

The generator set should be run at least once every 28 days to make sure it operates properly. The exerciser will automatically start the generator set and let it run for 20 minutes once every 28 days. The automatic exercise is set by pressing the Set Exercise pushbutton.

4.4.1 Setting an Exercise Period

The operator has to be present at the transfer switch to set the start time of the exercise. There are two ways to start an exercise period. It can be set to start immediately and repeat at this time every 28 days or it can be set to start 12 hours from now and repeat at that time every 28 days.

There is a 12-hour offset feature so that the operator does not have to be present at an inconvenient time. For example, you can set the exercise at 3:00 PM so that it will start at 3:00 AM.

Step 2 below shows how to set the 12-hour offset and step 3 below shows how to set an immediate exercise period.

1. Verify that the Exercise LED is off.
2. To set and **exercise period that will start 12 hours from now** and repeat every 28 days from that time, press and hold the Set Exercise pushbutton for 5 seconds.

The Exercise LED flashes at a rate of twice per second for 5 seconds and then stays on when the exercise period is set.

A delayed 20 minute exercise period will start in 12 hours.

The Exercise LED flashes at a rate of once per second during the exercise period.

When the exercise period is over, the Exercise LED quits flashing and remains on to signify that repeat exercise periods are enabled.

3. To start an **immediate exercise period** and have it repeat, press and hold the Set Exercise pushbutton for 5 seconds.

The Exercise LED flashes at a rate of twice per second for 5 seconds and then stays on.

Momentarily press the Set Exercise pushbutton a second time within ten seconds and an exercise period will start immediately.

Momentarily pressing and releasing the Set Exercise pushbutton a second time starts an immediate 20 minute exercise period instead of waiting for 12 hours.

The Exercise LED flashes at a rate of once per second during the exercise period.

When the exercise period is over, the Exercise LED stops flashing and remains on to signify that repeat exercise periods are enabled.

4. Record the exercise start time for future reference.

4.4.2 Cancelling Repeat Exercise Periods

With the control panel Exercise LED on steady, press and hold the Set Exercise pushbutton for 5 seconds. The Exercise LED flashes at a rate of twice per second for 5 seconds and then goes out to signify that repeat exercise periods are cancelled.

4.4.3 Canceling an Active Exercise Period

Active exercise periods can be canceled by pressing the Override pushbutton on the control panel.

4.4.4 Power Source Failure during an Active Exercise Period

If either power source fails during an active exercise period, the control immediately terminates the exercise and proceeds with the automatic mode of operation.

4.5 Sequence of Events

The control executes a prescribed sequence of events for all transfer switch operations.

4.5.1 Utility-to-Generator Set Sequence of Events for Transfer Switches with a Controller

The following describes the sequence of events for an RSS transfer switch during a utility power failure. In this example, TDNE is set higher than zero, TDPT and TDEL are set to zero, and phase check is not enabled.

The following steps describe what normally happens when the transfer switch is connected to the Utility, utility power fails, and the switch transfers to the Generator (see [Figure 43](#)).

1. While the transfer switch is connected to the utility, utility power fails. The Utility Connected LED remains lit but the Utility Power Available LED goes out.
2. The time delay engine start (TDES) begins.
3. When the TDES expires, the internal start contact closes P5-6 and P5-7, sending a start signal to the generator set.

4. When the generator set starts and produces power, the Generator Power Available LED lights.
5. A Time Delay Normal-to-Emergency (TDNE) begins.
6. After the TDNE timer expires, the Open Normal (P5-1) and Close Emergency (P5-4) output is grounded, energizing the K2 relay coil which closes the contacts (K2-8/K2-12 and K2-5/K2-9) to move the transfer switch from utility to generator set. The S2 auxiliary switch within the switch mechanism breaks the signal to the ATS operator coil (C).
7. Limit switch ASW removes the ground signal from P4-7, signaling that the transfer switch has disconnected from utility; then the Utility Connected LED goes out and limit switch BSW provides a ground signal to P4-8, signaling that the transfer switch has connected to the generator set; then the Generator Connected LED lights, de-energizing the K2 relay by opening K2-8/K2-12 and K2-5/K2-9.
8. The load is transferred to the generator.

4.5.2 Generator Set-to-Utility Sequence of Events for Transfer Switches with a Controller

The following describes the sequence of events for an RSS transfer switch that occur after the load has been transferred to the generator set and then utility power is restored. In this example, the TDEN is set higher than zero, TDPT and TDEL are set to zero, and phase check is not enabled.

The following steps describe what normally happens when the transfer switch is connected to the generator, utility power returns, and the switch moves from the generator to the utility (see [Figure 44](#)).

1. The utility returns. The Utility Power Available LED lights.
2. A time delay emergency to normal (TDEN) begins.
3. After the TDEN timer expires, the Open Emergency (P5-3) and Close Normal (P5-2) output is grounded, energizing the K1 relay coil, closing the normally open K2 contacts (K1-8/K1-12 and K1-5/K1-9) to move the transfer switch to the utility. The S1 auxiliary switch within the switch mechanism breaks the signal to the ATS operator coil (C).
4. Limit switch BSW removes the ground signal from P4-8, signaling the ATS has disconnected from the generator set. The Generator Connected LED goes out and limit switch ASW provides a ground signal to P4-7, signaling that the transfer switch has transferred the load; then the Utility Connected LED lights, and the K1 relay coil is de-energized, opening K1-8/K1-12 and K1-5/K1-9.
5. The control starts the Time Delay Engine Cooldown (TDEC) timer.
6. When the TDEC timer expires, the P5-6 to P5-7 contact opens, the generator set stops running, and the Generator Power Available LED goes out.
7. The load is retransferred to the utility.

4.5.3 Utility-to-Generator Set Sequence of Events for Transfer Switches without a Controller

The following describes the sequence of events for an RSS transfer switch during a utility power failure.

The following steps describe what normally happens when the transfer switch is connected to the Utility, utility power fails, and the switch transfers to the generator set (see [Figure 45](#)).

1. While the transfer switch is connected to the utility, the utility power fails. After a three second delay (TDES), the generator set control starts the generator set.
2. After the generator warms up (five second TDNE), the generator control signals the relay coil (K1), energizing the relay coil which opens K1-1/K1-9 and K1-2/K1-10 and closes K1-7/K1-11 and K1-8/K1-12 to move the transfer switch from the Utility position to the Generator position. The S2 auxiliary switch within the transfer switch mechanism breaks the signal to the ATS operator coil (C).
3. The K1 relay de-energizes by opening K1-7/K1-11 and K1-8/K1-12 and closing K1-1/K1-9 and K1-2/K1-10.
4. Limit switch ASW removes the ground signal (TB4-5), signaling the transfer switch has disconnected from the Utility; then the BSW limit switch provides a ground signal to TB4-6, signaling that the transfer switch has connected to the generator set. The generator set receives a signal to indicate the switch position on the generator side.
5. The load is transferred to the generator set.

4.5.4 Generator Set-to-Utility Sequence of Events for Transfer Switches without a Controller

The following steps describe what normally happens when the transfer switch is connected to the generator, utility power returns, and the switch moves from the generator to the utility (see [Figure 46](#)).

1. The utility returns.
2. The generator set control receives a signal from TB4-1/TB4-2 of the step down transformer to indicate that utility power is available.
3. The generator set control signals the relay coil (K1), energizing the relay coil which opens K1-1/K1-9 and K1-2/K1-10 and closes K1-7/K1-11 and K1-8/K1-12 to move the transfer switch from the generator position to the utility position. The S1 auxiliary switch within the transfer switch mechanism breaks the signal to the ATS operator coil (C).
4. The K1 relay de-energizes, opening K1-7/ K1-11 and K1-8/K1-12 and closing K1-1/K1-9 and K1-2/K1-10 to move the transfer switch mechanism signal to the ATS operator coil (C).
5. Limit switch BSW removes the ground signal (TB4-6), signaling the transfer switch has disconnected from the generator set; then the ASW limit switch provides a ground signal to TB4-5, signaling that the transfer switch has connected to the utility. The generator set control receives a signal to indicate switch position on the utility side.
6. The load is transferred to the utility.
7. After a ten minute delay to let the engine cool down (TDEC), the generator stops.

4.6 Transfer Switch without an Operator Panel

For operation of a transfer switch without an operator panel, refer to the controller manual that came with your GSAA, GSBA, or GSBB generator.

5 Installation

5.1 Installation - Mounting

5.1.1 Introduction

Proper storage, installation, operation, and maintenance helps to increase the life of the transfer switch. **Installation is to be done only by licensed certified electricians.**

⚠ WARNING

AC power within the cabinet presents a shock hazard that can cause severe personal injury or death. Incorrect installation, service, or parts replacement can result in severe personal injury, death, and/or equipment damage. All corrective service procedures must be done only by technically trained and experienced personnel.

Each RSS transfer switch is factory wired and tested. Installation of the RSS transfer switch includes the following.

- Mounting a transfer switch cabinet
- Connection of all Utility, Generator, and Load cables (covered in [Chapter 3](#))
- Connection of low voltage signal circuits (covered in [Chapter 3](#))
 - For transfer switches with a controller, refer to [Figure 51](#) through [Figure 58](#).
 - For transfer switches without a controller, refer to [Figure 59](#). **RSS transfer switches without a controller are only designed to be installed with GSAA, GSBA, and GSBB generators. Installing this transfer switch with any other generator model will void the warranty.**

5.1.2 Installation Overview

These installation recommendations apply to typical installations. Whenever possible, these recommendations also cover factory designed options or modifications. However, because of the many variables in any installation, it is not possible to provide specific recommendations for every situation. If there are any questions not answered by this manual, contact your nearest Cummins distributor for assistance.

5.1.2.1 Safety Considerations

The transfer switch has been carefully designed to provide safe and efficient service when properly installed, maintained, and operated. However, the overall safety and reliability of the complete system depends on many factors outside the control of the manufacturer. To avoid possible safety hazards, make all mechanical and electrical connections to the transfer switch exactly as specified in this manual. All systems external to the transfer switch must comply with all applicable codes. Make certain all required inspections and tests have been completed and all code requirements have been satisfied before certifying the installation is complete and ready for service.

Verify that both power source voltages match the nameplate rating prior to installation.

5.1.3 Equipment Inspection and Storage

Once you have received the transfer switch, inspect it for any damage. Check for damage to the enclosure, the transfer switch, the control panel (if applicable), and the wiring harness.

Prior to installation, make sure the transfer switch is stored in a clean dry place, protected from dirt and water. Provide ample air circulation and heat, if necessary, to prevent condensation from gathering on the equipment. Be sure to adhere to the transfer switch storage and operating requirements listed below.

Transfer Switch	Storage Temperature	Operating Temperature (Ambient)	Humidity
RA 100A, RA 200A	-22 °F to +158 °F (-30 °C to +70 °C)	-4 to +140 °F (-20 to +60 °C)	Up to 90% @ 68 °F (20 °C)
RA 400A	-13 °F to +131 °F (-25 °C to +55 °C)	-4 to +131 °F (-20 to +55 °C)	

5.1.4 Location

The location of the transfer switch in the existing electrical circuit varies with the application and the type of entrance switch.

There must be a service disconnect (circuit breaker or fuses) in the power line ahead of the transfer switch, see [Table 1](#) through [Figure 20](#).

A typical installation of a transfer switch with a controller is shown in [Figure 19](#). It is a graphical representation of the diagram shown in [Figure 18](#).

A typical installation of a transfer without with a controller is shown in [Figure 21](#). It is a graphical representation of the diagram shown in [Figure 20](#).

Cabinet dimensions and weights are listed in [Table 1](#).

Choose a vibration-free mounting surface that supports the weight of the switch. Avoid locations that are near flammable liquids or gases, or are hot, moist, or dusty.

WARNING

An electrical arc occurs during transfer that can ignite flammable vapors or gases, resulting in severe personal injury or death. The switch must not be located near batteries, fuel tanks, solvents, or other sources of flammable liquids or gases, or in areas sharing ventilation with such sources.

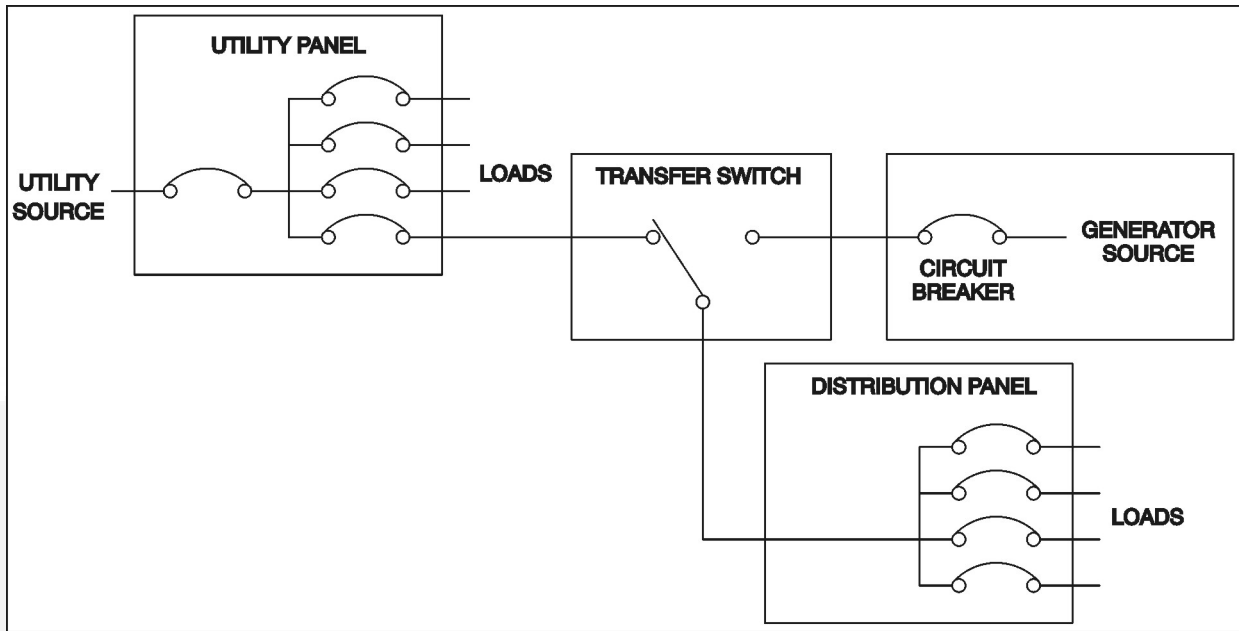


FIGURE 16. PARTIAL COVERAGE SYSTEM (TRANSFER SWITCH WITH CONTROLLER)

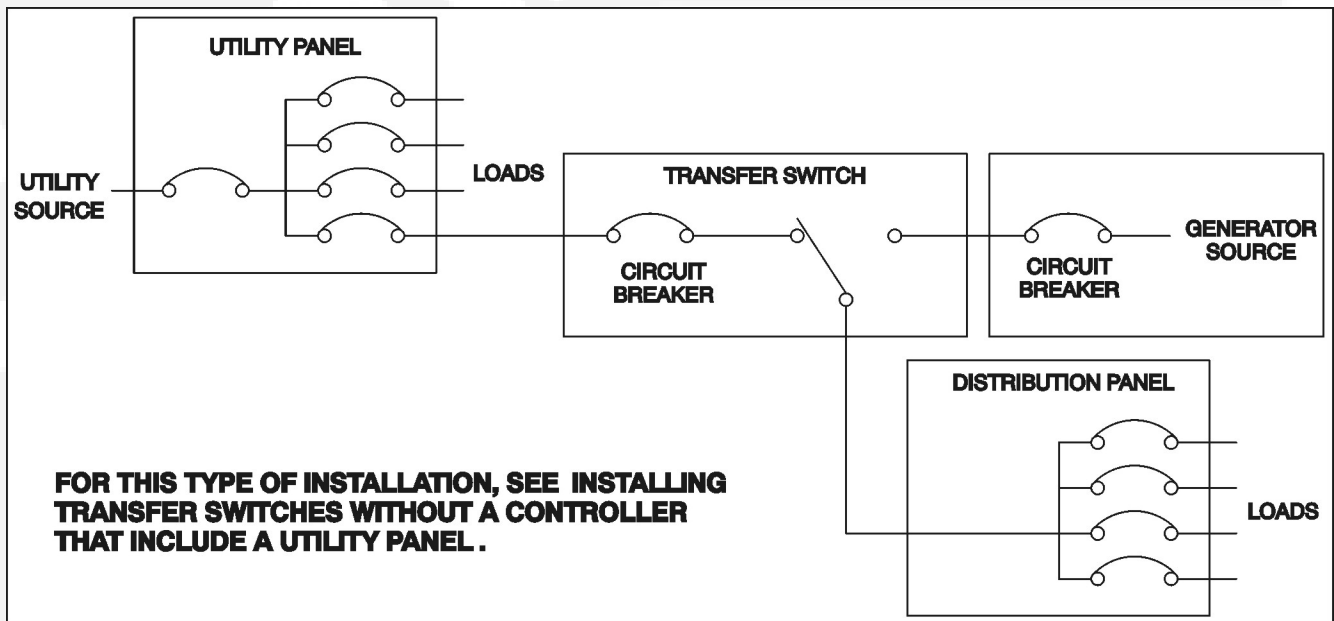


FIGURE 17. PARTIAL COVERAGE SYSTEM (TRANSFER SWITCH WITHOUT CONTROLLER)

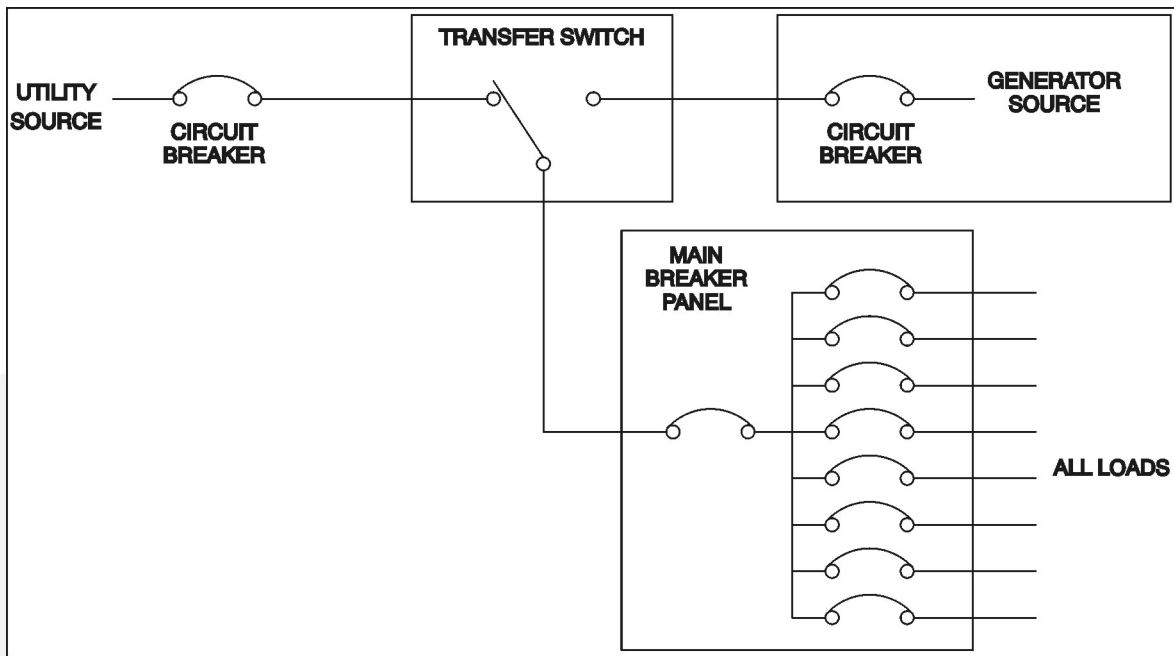


FIGURE 18. TOTAL COVERAGE SYSTEM (TRANSFER SWITCH WITH CONTROLLER)

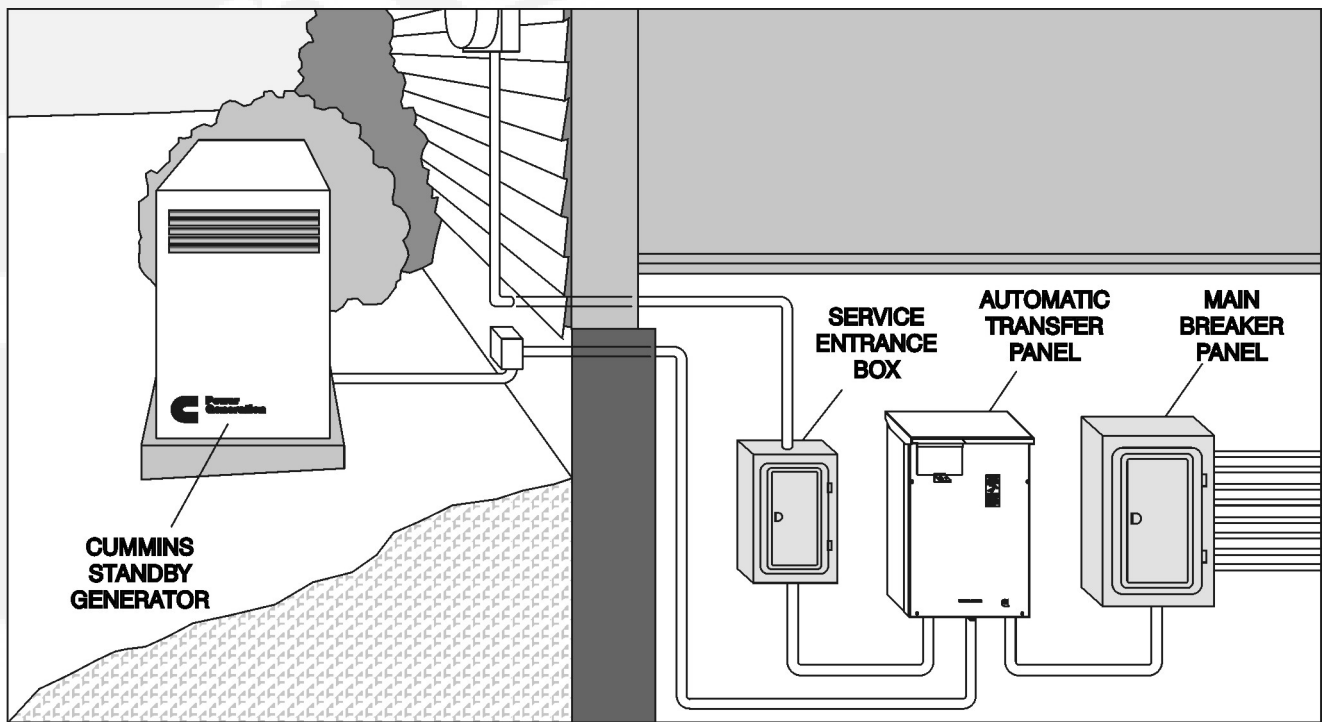


FIGURE 19. TYPICAL WALL-MOUNT INSTALLATION (SHOWN SCHEMATICALLY IN [FIGURE 18](#))

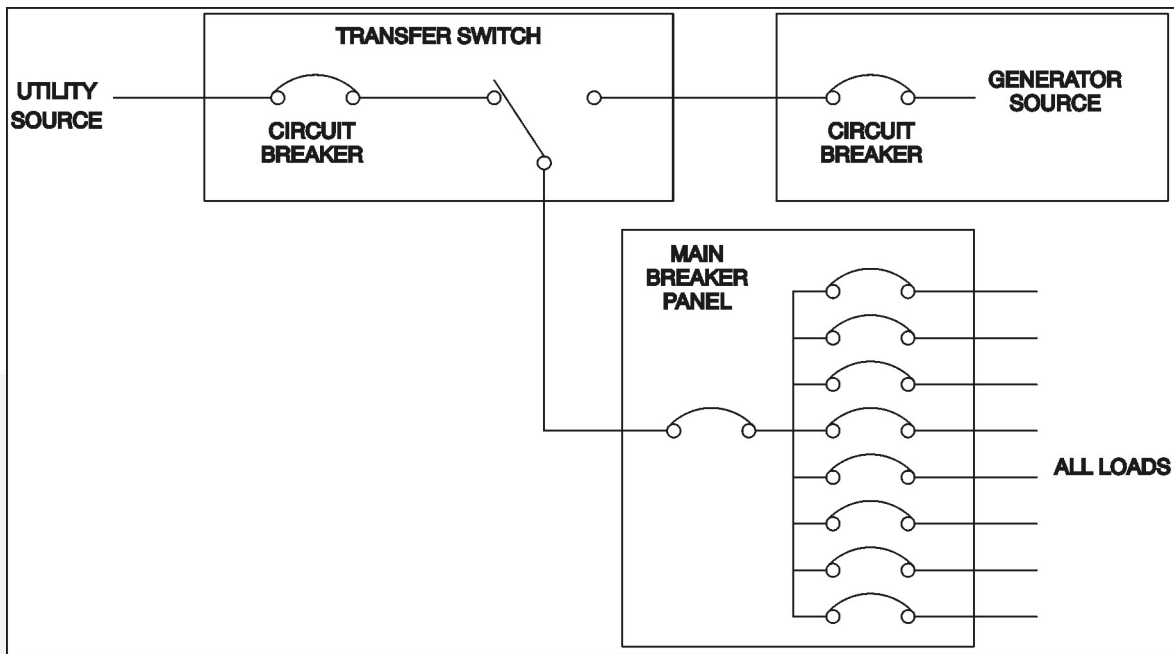


FIGURE 20. TOTAL COVERAGE SYSTEM (TRANSFER SWITCH WITHOUT CONTROLLER, ONE CIRCUIT BREAKER)

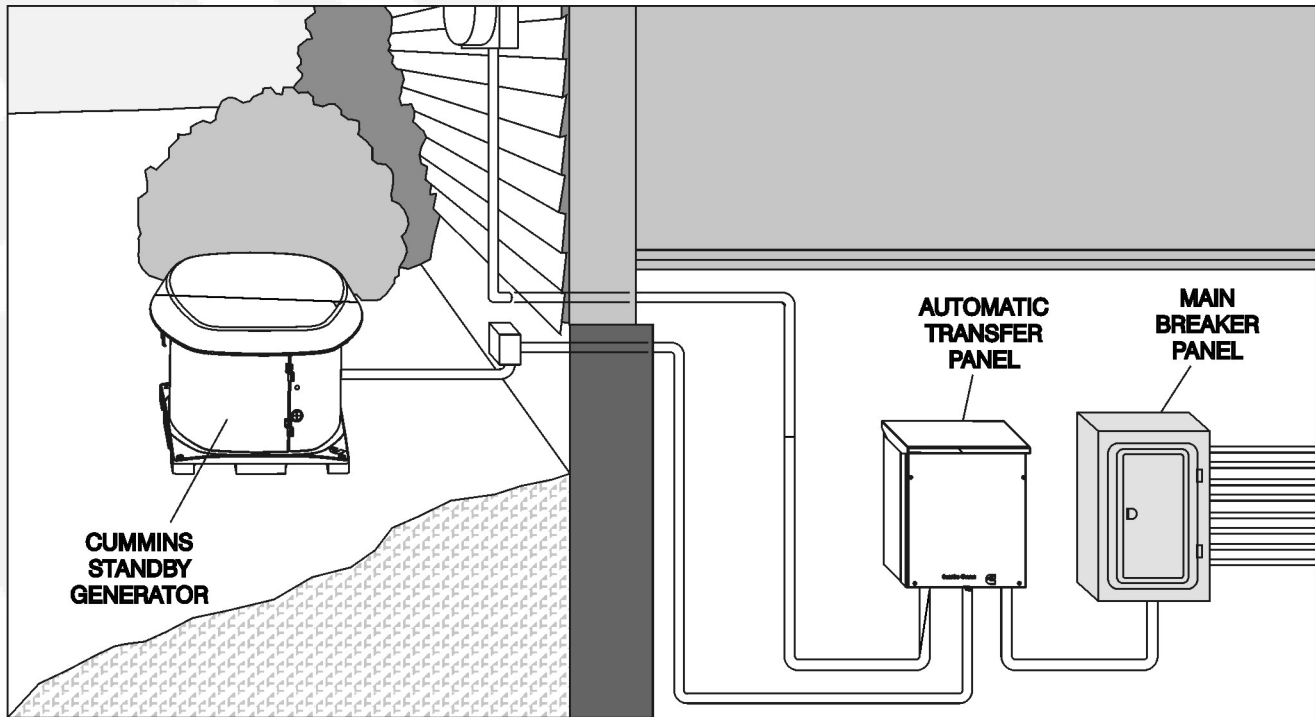


FIGURE 21. TYPICAL WALL-MOUNT INSTALLATION (SHOWN SCHEMATICALLY IN [FIGURE 20](#))

TABLE 1. APPROXIMATE CABINET DIMENSIONS

Switch Current Rating	Height	Width	Depth	Weight
100 Amp with Controller	24.0 in. (619 mm)	17.0 in. (433 mm)	7.4 in. (187 mm)	33 lb (15 kg)
200 Amp with Controller	27.1 in. (688 mm)	18.2 in. (463 mm)	7.4 in. (187 mm)	46 lb (21 kg)
100 and 200 Amp One Circuit Breaker, without Controller	23.3 in. (591.5 mm)	20.2 in. (513 mm)	7.9 in. (200 mm)	58 lb (26 kg)

5.1.5 Installing Transfer Switches without a Controller that Include a Utility Panel

Transfer switches without a controller are rated service entrance equipment. The main bonding jumper is factory installed in the connected position between Neutral and the Ground Bus Bar. By installing a transfer switch without a controller shown in [Figure 17](#), the main bonding jumper (see Figure 3-2) should be removed or moved from a connected position to a disconnected position.

5.1.6 Mounting

RSS transfer switches are mounted to a wall. Follow the mounting instructions listed below and refer to the appropriate outline drawing, [Figure 61](#) through [Figure 63](#), for installation dimensions, specifications, and mounting hole patterns. Enough room must be allowed to remove the door panel for inspection and servicing of the switch, as per NEC and local codes.

1. Make sure that the wall where the transfer switch is to be mounted is suitable to hold firmly the weight and size of the transfer switch, within a reasonable safety factor.
2. Check the location to be sure no wires or plumbing, gas, or exhaust lines run behind the wall.
3. Make sure that all anchorage fasteners used to bolt the switch to wall are strong enough to withstand the switch weight and its vibration during operation, within a reasonable safety factor.
4. Use four 1/4 inch bolts for wall mounting. Measure and mark wall for drilling.
5. Install two mounting bolts in the wall for the top cabinet mounting keyholes.
6. With the shipping box standing so that the cabinet is lying down, carefully remove the top and the foam from the shipping box.

⚠ WARNING

Improper lifting can cause severe personal injury. Have sufficient personnel for lifting and mounting the cabinet.

7. Remove the transfer switch from the box and remove the plastic covering.
8. Raise the cabinet and mount it on the two mounting bolts in the wall. Provide support for the cabinet during installation.
9. Install two bottom mounting bolts, but do not tighten them. **(Do not remove the cabinet support until all bolts are installed.)**

10. Push the cabinet against the wall. If the cabinet will not align flush against the wall, shim the mounting bosses as required, using metal shims.
11. When the switch is installed on the wall, the switch cabinet should be squared up before final fastener tightening. Make sure the installed transfer switch is square and level upon completion of the installation.
12. Tighten all mounting bolts.

5.2 Installation - Wiring

For transfer switches with a controller, refer to Figure 3-1 for component locations. For transfer switches without a controller, refer to Figure 3-2 for component locations.

WARNING

AC voltages and currents present an electrical shock hazard that can cause severe personal injury or death. Only trained and experienced personnel are to perform the following procedures.

When installing conduit, observe the following precautions:

1. The RSS transfer switch includes knockouts on the bottom of the cabinet for wiring. **If you decide to drill your own holes in the top of the cabinet instead of using the knockouts provided, cover the transfer switch to prevent accidental entry of metal chips before beginning conduit installation.**
2. If using solid conduit between the generator set and the transfer switch, install at least 2 feet (610 mm) of flexible conduit between the rigid conduit and generator set to absorb vibration.
3. Run control circuit wiring in separate conduit from the AC wiring; otherwise, induced currents could cause operational problems within the switch. Knockouts are available through the bottom of the cabinet. (Refer to the switch outline drawings included in the back of this manual.)

CAUTION

Installation debris can cause equipment failure and damage. Use extreme care to keep drill chips and filings out of the relays, contacts, and other parts of the automatic transfer switch when mounting or connecting conduit. Screwdrivers should be used carefully to prevent damage to components.

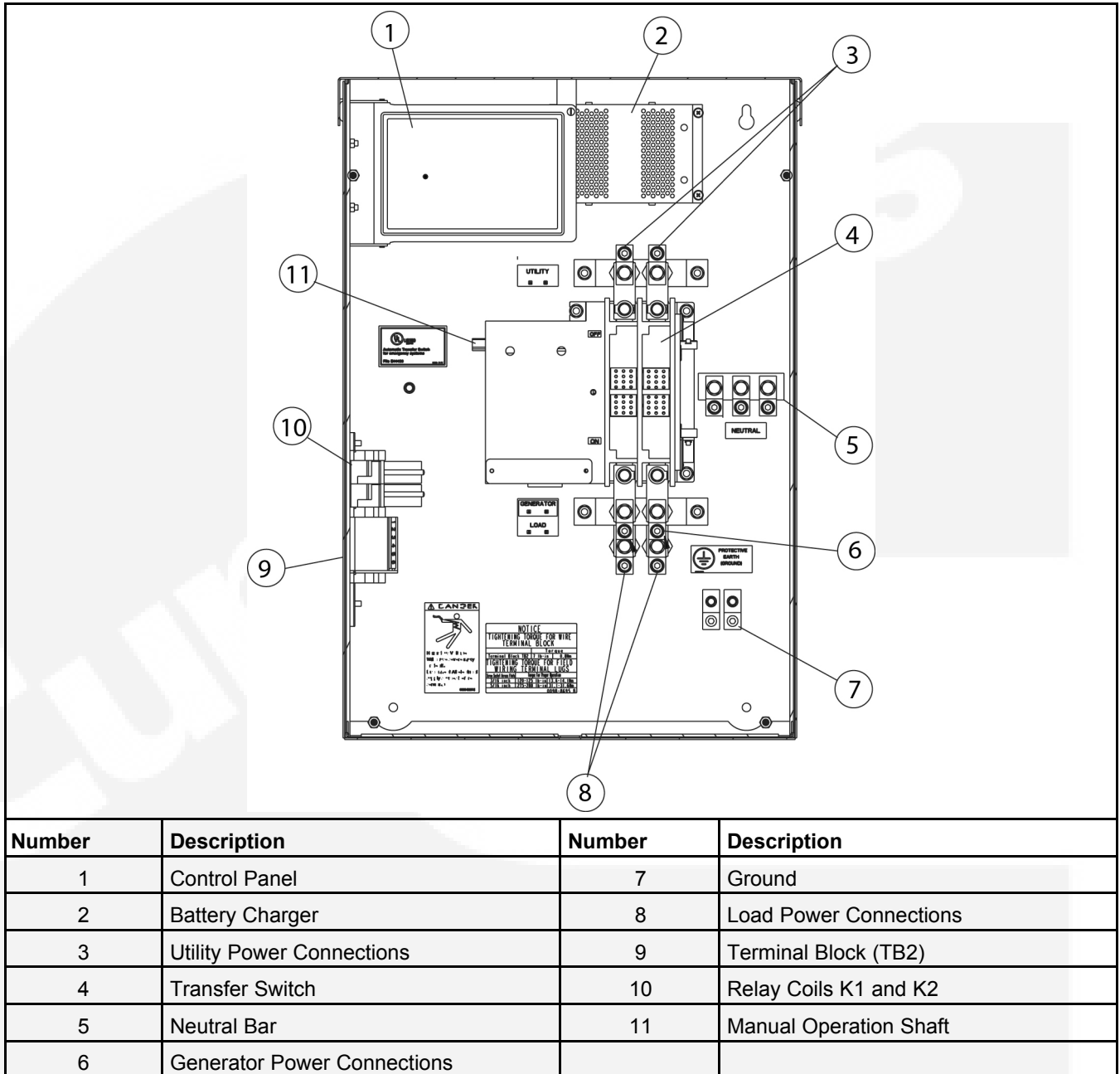


FIGURE 22. INTERIOR COMPONENTS FOR TRANSFER SWITCH WITH A CONTROLLER

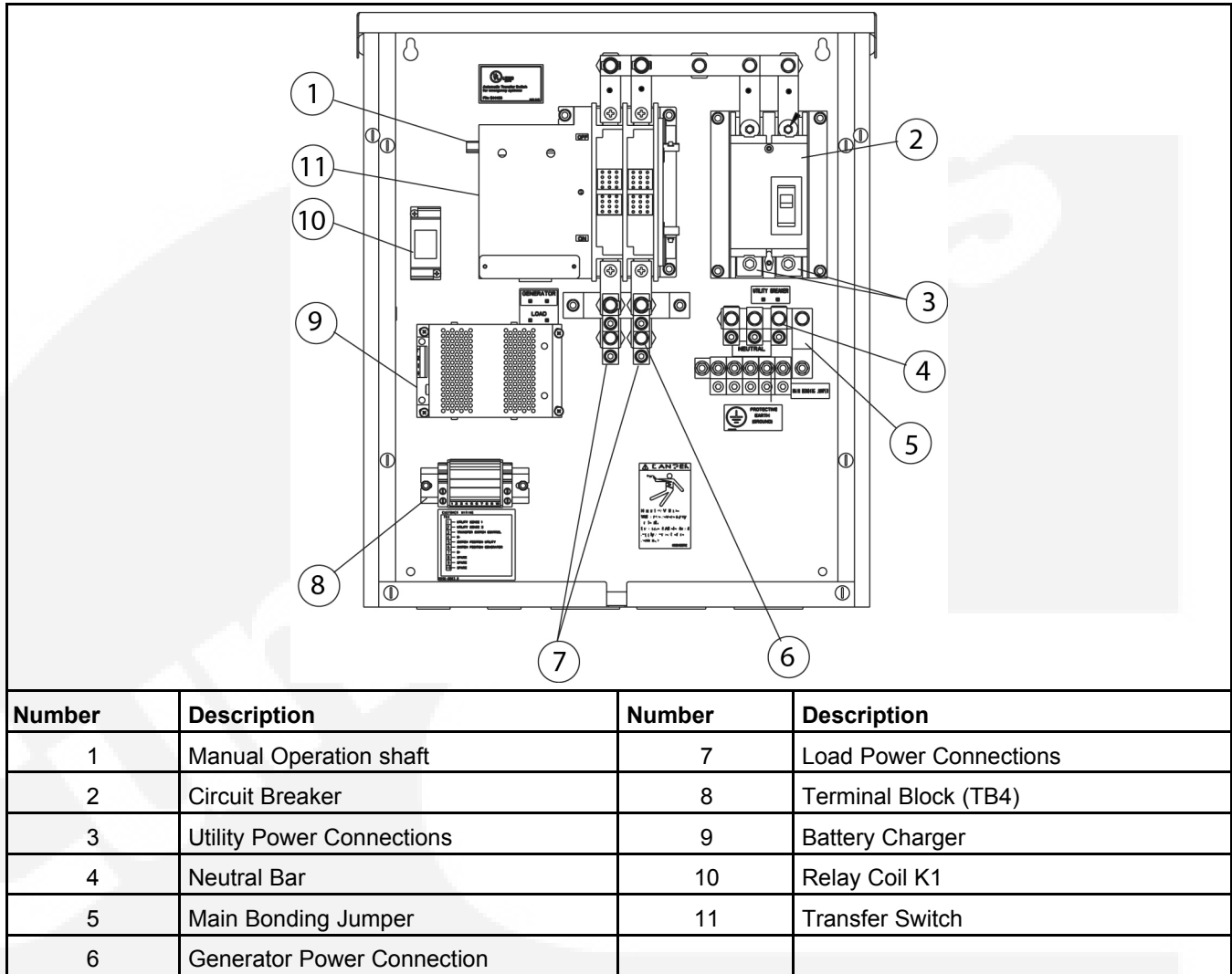


FIGURE 23. INTERIOR COMPONENTS FOR TRANSFER SWITCH WITHOUT A CONTROLLER

5.2.1 AC Connections

RSS transfer switches are supplied with screw type terminals for the Utility, Generator, Load, and Neutral power connections. Either copper or aluminum cables can be used for AC connections.

Connect the Utility, Generator, Load, and Neutral conductors to the clearly-marked terminals on the transfer switch. Use a wire brush to remove any surface oxides from the cables. Verify that all connections are correct before tightening the lugs. All lug connections must be tightened to the proper torque values listed in [Table 2](#) or [Table 3](#).

Perform wiring in the following sequence:

1. Test the operation of the generator set from its own control.

⚠ WARNING

Failure to prevent the generator set from starting before wiring procedures are performed presents a shock hazard that can cause severe personal injury or death. Disconnect generator battery (negative (-) terminal first) before proceeding.

- Stop the generator set and remove the negative lead from the cranking battery to prevent starting.

⚠ WARNING

AC voltages and currents present an electrical shock hazard that can cause severe personal injury or death. Make sure that both AC power sources are disconnected.

- Make sure that both AC power sources are disconnected.
- Connect power cables of sufficient size (for lug size, see [Table 2](#) for transfer switches with a controller or [Table 3](#) for transfer switches without a controller) to carry rated current from the line, load, and generator directly to the transfer switch terminals or circuit breaker(s), which are marked A and B. A neutral bar is standard on the switches. Tighten the terminal lugs as indicated in [Table 2](#) or [Table 3](#).

TABLE 2. SCREW TYPE TERMINALS AND TORQUE VALUES FOR EXTERNAL POWER GENERATION ON TRANSFER SWITCHES WITH A CONTROLLER

Switch Size (Amps)	Terminal Description								
	Utility, Generator, and Load Terminals			Neutral Bar Terminals			Ground Terminals		
	Cables Per Pole	Range of Wire Size	Tightening Torque	No. of Cables	Range of Wire Sizes	Tightening Torque	No. of Cables	Range of Wire Sizes	Tightening Torque
100 Amp	1	#14 to 2/0 AWG	120 In-lbs (14 N·m)	3	#14 to 2/0 AWG	120 In-lbs (14 N·m)	2	#14 to 1/0 AWG	120 In-lbs (14 N·m)
200 Amp	1	#6 AWG to 300 MCM	275 In-lbs (31 N·m)	3	#6 AWG to 300 MCM	275 In-lbs (31 N·m)	2	#14 to 1/0 AWG	120 In-lbs (14 N·m)

TABLE 3. SCREW TYPE TERMINALS AND TORQUE VALUES FOR EXTERNAL POWER GENERATION ON TRANSFER SWITCHES WITHOUT A CONTROLLER

Switch Size (Amps)	Terminal Description					
	Utility Circuit Breaker			Utility and Load Terminals		
	Cables Per Pole	Range of Wire Size	Tightening Torque	No. of Cables	Range of Wire Sizes	Tightening Torque
100 Amp	1	#4 AWG to 300 MCM	250 In-lbs (28 N·m)	1	#14 to 2/0 AWG	120 In-lbs (14 N·m)
200 Amp	1	#4 AWG to 300 MCM	250 In-lbs (28 N·m)	1	#6 AWG to 300 MCM	120 In-lbs (14 N·m)

Switch Size (Amps)	Terminal Description								
	Generator Terminals			Generator Neutral Terminals			Ground Terminals		
	Cables Per Pole	Range of Wire Size	Tightening Torque	No. of Cables	Range of Wire Sizes	Tightening Torque	No. of Cables	Range of Wire Sizes	Tightening Torque
100 Amp	1	#14 to 2/0 AWG	120 In-lbs (14 N·m)	1	#14 to 2/0 AWG	120 In-lbs (14 N·m)	4	#14 to 1/0 AWG	120 In-lbs (14 N·m)
200 Amp	1	#14 to 2/0 AWG	120 In-lbs (14 N·m)	1	#14 to 2/0 AWG	120 In-lbs (14 N·m)	4	#14 to 1/0 AWG	120 In-lbs (14 N·m)

5.2.2 Low Voltage Signal Connections

5.2.2.1 Transfer Switches with a Controller

Control wiring connections are made at terminal block TB2, located on the lower left side of the enclosure for unit with a controller, see [Figure 22](#).

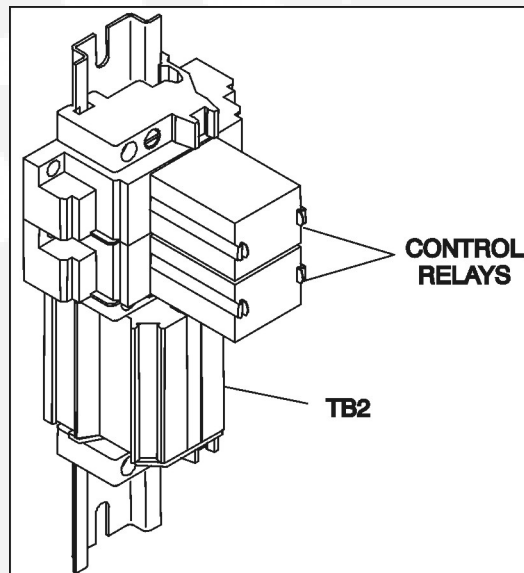


FIGURE 24. CONTROL WIRING CONNECTIONS

5.2.2.2 Connecting the Transfer Switch to the Generator

⚠ WARNING

AC voltages and currents present an electrical shock hazard that can cause severe personal injury or death. Disconnect the AC power source.

Make sure the generator set is not running and cannot be started. Disconnect the batteries and make sure the generator set's control is in the Off position.

A minimum of three wires need to be run from the generator set to the terminal block in the transfer switch cabinet. The connections at the terminal block (TB2) need to be made at B+, Ground, and Remote Generator Start, refer to [Figure 51](#) through [Figure 58](#). Do not exceed the maximum distance (ft) for the wire size chosen from [Table 4](#). Make the following connections:

- Battery Positive (B+) to TB2-3

- Battery Negative (GND) to TB2-1
- Remote Start to TB2-4

NOTICE

For GSAA generators, the terminal block on the generator set is not marked "Remote Start." Use the TB1-5 connection marked "Switch Position Utility" (see [Figure 57](#)).

TABLE 4. WIRE SPECIFICATIONS

Wire Size (AWG)	Distance in Feet (One Way)
16	125
14	200
12	300
10	500

Different generator sets require different start signal connections that may require the installation of a jumper to the TB2 terminal block in the transfer switch. When needed, the jumper is included inside the literature package shipped with the transfer switch. Refer to the generator installation section in this manual and the interconnection wiring diagrams at the end of this manual for information on wiring connections for your generator set.

- If the generator set needs a ground (B-) start signal, connect a jumper from TB2-1 to TB2-2.
- If the generator set needs a positive (B+) start signal, connect a jumper from TB2-2 to TB2-3.

For all other generator sets where a jumper is not used, four wires must be connected between the generator set and the transfer switch. Refer to the interconnection diagrams at the end of this manual to determine what connections apply to your installation.

Wire resistance must not exceed 0.5 ohm per line. Use stranded or solid wire. For connection to the screw terminal, strip the insulation back 3/8 inch (10 mm).

5.2.2.3 Remote Test Input

To add remote test, connect a normally open, dry contact between terminals 1 and 5 of TB2 (see [Figure 25](#)). Closing the contact activates the feature and opening the contact deactivates it.

Use number 22 (0.4 mm²) to number 12 AWG (4 mm²) wire. For connection to the screw terminal, strip the insulation back 3/8 inch (10 mm).

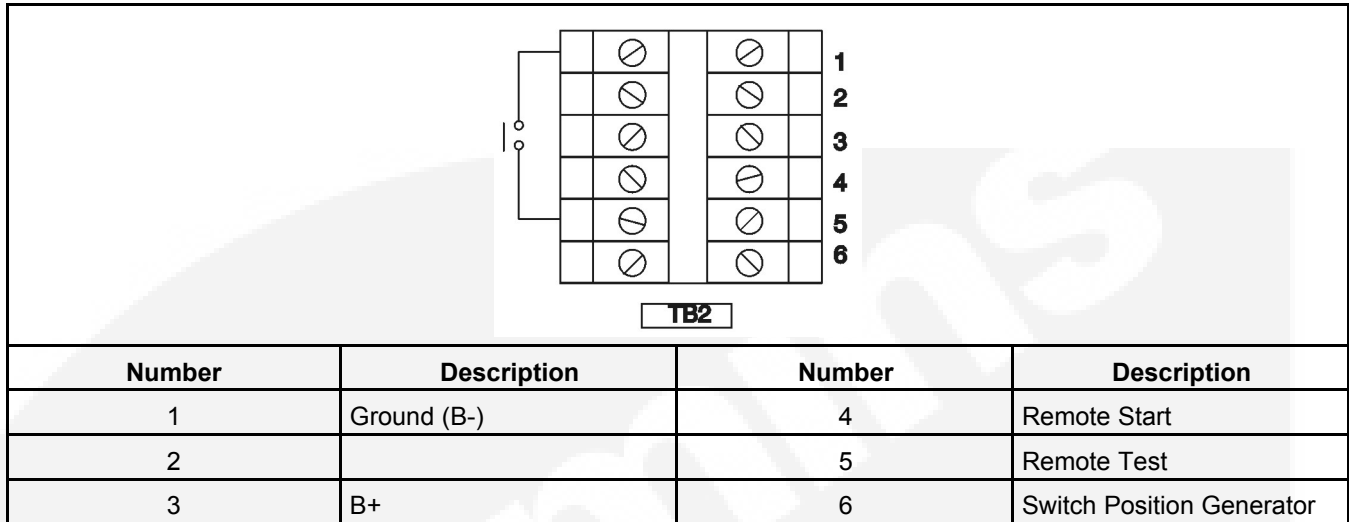


FIGURE 25. TB2 CONNECTIONS FOR REMOTE TEST TRANSFER

5.2.2.4 Transfer Switches without a Controller

Control wiring connections are made at terminal block TB4, located on the back of the enclosure in the lower left-hand corner (see [Figure 26](#)). Refer to [Figure 59](#) for wire connections between transfer switch and generator set terminals. Make sure that the wire selected does not exceed the maximum wire size and length listed in [Table 4](#).

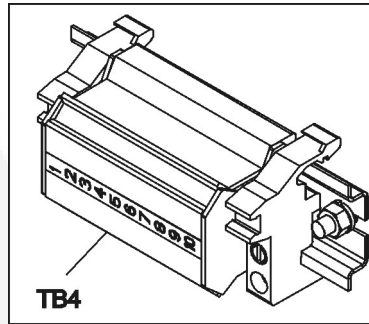


FIGURE 26. CONTROL WIRING CONNECTIONS

5.2.3 Final Inspection and Cleanup

Prior to energizing the transfer switch:

1. Inspect all wiring to be certain that:
 - All cabled connections are correct
 - All generator start low voltage signal connections are correct (refer to [Figure 51](#) through [Figure 58](#) or [Figure 59](#) for transfer switches without a controller).
 - Wiring does not interfere with switch operation
 - Wiring is not damaged as the door opens and closes
 - Wiring does not contact sharp or abrasive surfaces
 - No wiring is left loose and unconnected

⚠ CAUTION

Debris lodged in the electrical and mechanical components may result in equipment damage. Do not use a blower to remove debris.

2. Use a vacuum cleaner to remove any dust, filings, chips, or debris from the cabinet interior and components.
3. Check the lug torque values of the power connections.

NOTICE

Lug torque values are specified on the label inside of the enclosure and in [Table 2](#) and [Table 3](#).

4. Double check the power supply voltages to make sure they match the voltages listed on the nameplate (see [Figure 5](#) and [Figure 6](#) for transfer switches with a controller or [Figure 7](#) and [Figure 8](#) for transfer switches without a controller).
5. Make sure that all covers and barriers are installed and properly fastened.

NOTICE

The mechanism is shipped in the Utility side position. For transfer switches without a controller, the circuit breaker is shipped in the Off position.

6 Transfer Switch Start-Up

This section applies only to transfer switches with a controller. For transfer switches without a controller, refer to the GSAA, GSBA, GSBB generator Operators Manual.

The RSS transfer switch is preset at the factory to operate using default settings. The basic control default settings are shown in [Table 5](#). The control will operate the transfer switch when 12 VDC power is applied to the control.

TABLE 5. PRESET TRANSFER SWITCH SETTINGS

Function	Factory Setting
TDPT (Time Delay Program Transition)	Set to 0 (Disabled)
TDEL (Time Delay Elevator Signal)	Set to 0 (Disabled)
External Exercise	Set to Off
System Nominal Voltage Table	Set to Voltage Table 1
System Nominal Voltage	Set to 240
System Nominal Frequency	Set to 60 Hz
Single Phase/Three Phase	Set to Single Phase
Return to Programmed Transition On/Off	Set to Off
Elevator Post Transfer Delay On/Off	Set to Off

6.1 Start-Up and Test Procedure

⚠ WARNING

The failure to install the front panel on the transfer switch cabinet can result in severe personal injury or death. Always make sure the front panel is installed before applying power to the transfer switch.

1. Make sure the front cover is installed on the transfer switch.
2. Make sure the generator set is installed as described in the generator's Installation Manual and that the operation selector switch on the generator control panel is in the Remote/Auto position.
3. Turn on the breaker in the utility panel (see [Table 1](#) or [Figure 17](#)) or the service entrance panel (see [Figure 18](#) or [Figure 20](#)) that feeds the utility power connection of the transfer switch.
4. Open the controller security cover on the transfer switch front panel. The Utility Power Available and Utility Power Connected LEDs will be lit.
5. Switch the main circuit breaker from the ON to the OFF position.
6. Make sure the following occurs.
 - a. The generator control receives a signal to start the generator set.
 - b. After the generator set starts and the TDNE expires, the load is transferred from the utility to the generator set.

7. Switch the main circuit breaker from the OFF to the ON position.
8. Make sure the following occurs.
 - a. After a 10-minute TDEN time delay, the load is transferred back to the utility.
 - b. Once the transfer switch is connected to utility power, the generator set receives a signal to cool down the generator set.
 - c. After a 10-minutes TDEC time delay, the generator set stops.

NOTICE

When ending a test, you can bypass the retransfer time delay (TDEN) and cause the immediate load retransfer by pressing the Override button. The generator set stops after the engine cooldown time delay (TDEC).

7 Troubleshooting

This section includes a description of the control LED indicators and provides preliminary troubleshooting checks.

7.1 Operator Panel LED Indicators

The operator panel contains six LED indicators that provide some information about the current control status and may be helpful in troubleshooting the transfer switch (see [Figure 29](#)). Descriptions of these indicators are included in [Table 6](#).

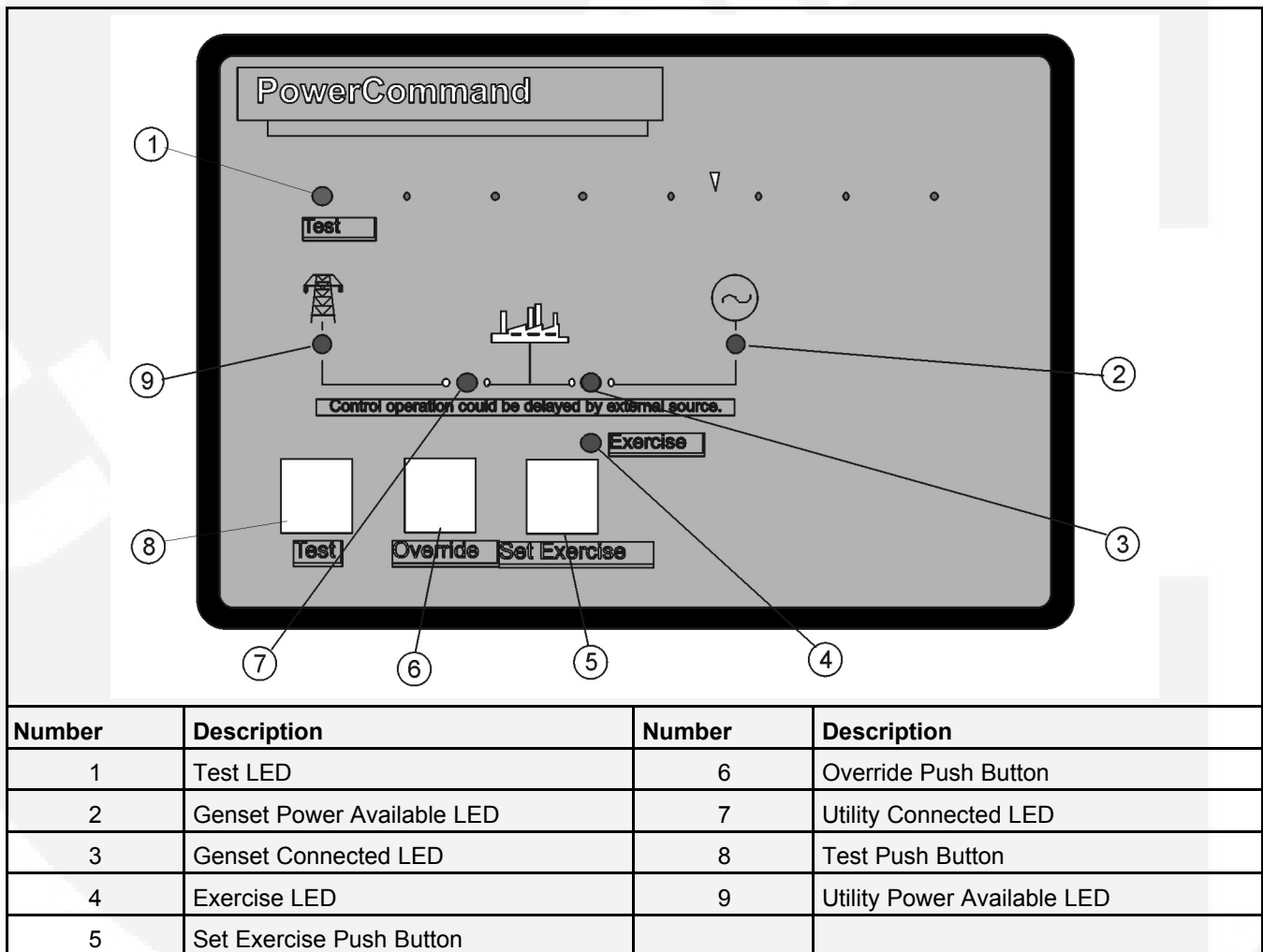


FIGURE 27. CONTROL PANEL

TABLE 6. CONTROL PANEL LED INDICATORS

Indicator	Definition
Utility (Normal) Power Available	This indicator lights when the utility source voltage sensor has determined that Utility power is available and is within acceptable voltage limits.
Utility (Normal) Connected	<ol style="list-style-type: none"> 1. Lights constantly when the transfer switch is connected to the Utility. 2. Blinks once per second when the transfer switch has failed to connect to or disconnect from the Utility when commanded. 3. Is off when the transfer switch is not connected to the generator set.
Genset (Emergency) Power Available	This indicator lights when the generator set source voltage sensor has determined that generator set power is within acceptable voltage and frequency limits.
Genset (Emergency) Connected	<ol style="list-style-type: none"> 1. Lights constantly when the transfer switch is connected to the generator set. 2. Blinks once per second when the transfer switch has failed to connect to or disconnect from the generator set when commanded. 3. Is off when the transfer switch is not connected to the generator set.
Exercise	<p>The following describes the Exercise LED when an exercise is enabled.</p> <ol style="list-style-type: none"> 1. Lights constantly when integrated repeat exercise periods have been set. 2. Blinks twice per second when the Set Exercise pushbutton is pressed and held to set or cancel an integrated exercise period. 3. Blinks once per second when an integrated or external exercise period is active. 4. Is off when no integrated repeat exercise periods are set.
Test	<ol style="list-style-type: none"> 1. This indicator blinks at two times per second rate during the two seconds that the Test pushbutton is pressed to acknowledge that a test has been activated or when the remote test input is grounded. 2. The indicator lights constantly during the test and goes out once the test is terminated or normal power has failed. 3. The indicator blinks at two times per second rate during the two seconds to acknowledge that the Test pushbutton has been pressed to cancel a Test. The light then goes out.

7.2 Troubleshooting the Transfer Switch

Use the troubleshooting guide, [Table 7](#), to help diagnose transfer switch problems with transfer switches that include a control panel. Common problems are listed with their possible causes. Refer to the corrective action column for the appropriate corrective procedure.

⚠ WARNING

AC power within the cabinet presents a shock hazard that can cause severe personal injury or death. Do not remove the front panel under any circumstances.

⚠ WARNING

Improper operation of the generator presents a hazard that can cause severe personal injury or death. Observe all safety precautions in your generator manuals.

TABLE 7. TROUBLESHOOTING TRANSFER SWITCHES WITH AN OPERATOR PANEL

Problem	Possible Cause	Corrective Action
The generator set does not start when the utility fails.	There may be a generator set problem.	<p>Move the generator set's operation selector switch to the Run/On position.</p> <ol style="list-style-type: none"> 1. If the generator set starts and the transfer switch transfers, the generator may not have received the start signal from the controller. Contact your local Cummins distributor for service. 2. If the generator set does not start, contact your local Cummins distributor for service.

Problem	Possible Cause	Corrective Action
The generator set is running but the transfer switch did not transfer the load to the generator set. The Generator Available LED is off.	The generator set circuit breaker has been tripped or is in the Off position.	Reset the circuit breaker on the generator set. If the problem still persists, contact your local Cummins distributor for service.
The generator set is running but the transfer switch did not transfer the load to the generator set. The Generator Available LED is on.	A Time Delay Normal to Emergency (TDNE) may be timing.	Wait until the time delay has expired or press the Override pushbutton on the control panel. If the problem still persists, contact your local Cummins distributor for service.
The generator set is running but the transfer switch did not transfer the load to the generator set. The Utility Connected LED is flashing.	The control was unsuccessful in its attempts to open the Utility side of the transfer switch. After 5 attempts to move the transfer switch, the Utility Connected LED flashes, indicating that it failed to open.	Press the Override pushbutton on the control panel to reset the control so that it will attempt to open the Utility side of the transfer switch. If the problem still persists, contact your local Cummins distributor for service.

Problem	Possible Cause	Corrective Action
Utility power is restored but the transfer switch does not transfer to the utility. The Utility Power Available LED is off.	The main service circuit breaker has been tripped or is in the Off position.	Reset the circuit breaker on the main service panel. If the problem still persists, contact your local Cummins distributor for service.
Utility power is restored but the transfer switch does not transfer to the utility. The Utility Power Available LED is on.	A Time Delay Emergency to Normal (TDEN) may be timing.	Wait until the time delay has expired or press the Override pushbutton on the control panel. If the problem still persists, contact your local Cummins distributor for service.

Problem	Possible Cause	Corrective Action
Utility power is restored but the transfer switch does not transfer to the utility. The Generator Connected LED is flashing.	The control was unsuccessful in its attempts to open the Generator side of the transfer switch. After 5 attempts to move the transfer switch, the Generator Connected LED flashes, indicating that it failed to open.	Press the Override pushbutton on the control panel to reset the control so that it will attempt to open the Generator side of the transfer switch. If the problem still persists, contact your local Cummins distributor for service.

Problem	Possible Cause	Corrective Action
The generator set did not shut down after the transfer switch has transferred the load to the utility.	<ol style="list-style-type: none"> 1. A Time Delay Engine Cooldown (TDEC) may be timing. 2. The selector switch on the generator control panel may not be in the correct position. 	<ol style="list-style-type: none"> 1. Wait for the time delay to expire. The time delay may last up to 30 minutes. 2. Make sure the generator control is set to the Remote position. <p>If the problem persists, move the generator control selector switch to the Off position to shut down the generator. Contact your local Cummins distributor for service.</p>

Problem	Possible Cause	Corrective Action
The generator set is running for no apparent reason.	<ol style="list-style-type: none"> 1. The selector switch on the generator control panel may not be in the correct position. 2. There may be an active test or Exercise period. Check to see if the Test or Exercise LEDs are blinking. 	<ol style="list-style-type: none"> 1. Make sure the generator control is set to the Remote position 2. Wait for exercise or test period to expire or press the Override button to stop and exercise or the test button to stop a test. <p>If the problem persists, move the generator control selector switch to the Off position to shut down the generator set. Contact your local Cummins distributor for service.</p>

Problem	Possible Cause	Corrective Action
The generator set did not exercise when expected to.	<ol style="list-style-type: none"> 1. The selector switch on generator control panel may not be in the correct position. 2. An exercise period may not be set or is set but not yet started. 3. There may be generator problems. 	<ol style="list-style-type: none"> 1. Verify that the operation selector switch on the generator control panel is set to the Remote position. 2. Check the Exercise LED on the control panel to see if it is lit. <ol style="list-style-type: none"> a. If the Exercise LED is not lit, no exercise period has been set. Refer to Section 4.4 for information on setting an exercise. b. If the Exercise LED is lit but not flashing, the exercise period has not yet started. Exercisers do not display exercise start and stop times. 3. Try starting the generator set using its start-stop controls. If it does not crank, check the starting batteries and cable connections. If it cranks but does not start, check the fuel supply. <p>If the problem persists, contact your local Cummins distributor for service.</p>

7.3 Troubleshooting - Transfer Switches with a Controller

This section describes troubleshooting issues for installations that include a controller.

The first part of this section includes a description of the control LED indicators and provides preliminary troubleshooting checks for operators and service personnel.

The second part of this section describes a typical transfer switch sequence of events, and provides detailed troubleshooting procedures for experienced service personnel. The troubleshooting procedures use conditional schematics and symptoms to diagnose possible problems.

7.3.1 Control Panel Functions that should not be Adjusted

The control used with the RSS transfer switch is also used on other models that have additional features. Although [Table 8](#) shows the complete list of functions that can be adjusted through the control panel, please note that several of these functions are set at the factory and should not be adjusted. If some of these functions are modified, the transfer switch may not operate correctly.

⚠ CAUTION

Incorrect settings can result in the transfer switch failing to operate correctly. Only authorized trained personnel should make changes to the control function settings. Control functions marked in [Table 8](#) are made at the factory and should not require any additional adjustments.

7.3.1.1 Time Delay Program Transition

The Time Delay Program Transition (TDPT) feature is designed to have a transfer switch pause in the Neutral position (not connected to either power source) for an adjustable period of time whenever there is a transfer from one power source to another. When the TDPT is set to more than zero, the transfer switch opens the normally closed side, waits for the time delay to expire, and then closes the normally open side of the transfer switch. Since the RSS transfer switch does not include a Neutral position, adjusting this value will have no effect on its operation.

7.3.1.2 Time Delay Elevator Signal

The Time Delay Elevator (TDEL) pretransfer feature is designed for use only with elevator control systems. **This function should never be used in home installations.**

If a TDEL is set and the control is in an active Test or Exercise sequence, the control adds the additional time delay prior to completing the transfer. If there is an active TDEL, pressing the Override will have no effect on this time delay. **Make sure that the TDEL is always set to zero seconds.**

7.3.1.3 External Exercise On (Off)

The RSS transfer switch includes an internal exerciser. Therefore, the External Exercise On (Off) feature is set to Off. No external exerciser is available to be used with this transfer switch.

If the controller External Exercise On (Off) feature is set to On, the internal exerciser will not function. **Make sure that this function is always set to Off.**

7.3.1.4 System Nominal Voltage

The control's system nominal voltage setting is set at the factory and must never be changed.

7.3.1.5 System Nominal Frequency 50/60 Hz

The control's system nominal frequency setting is set at the factory and must never be changed.

7.3.1.6 Single Phase/Three Phase

The control's phase setting is set at the factory and must never be changed.

7.3.1.7 Return to Programmed Transition On/Off

If set to On, the Return to Programmed Transition feature allows a transfer switch to return to Programmed Transition in the event that the switch fails to synchronize when the switch is transferring from one power source to another. Since the RSS transfer switch does not include the synchronizing feature, **this setting must always be set to Off.**

If the Return to Programmed Transition feature is set to On, the control will activate the Time Delay Program Transition but this will have no effect on operation.

7.3.1.8 Elevator Post Transfer Delay On/Off

As with the TDEL function listed above, the Elevator Post Transfer Delay function is designed for use only with elevator control systems. **This function should never be used in home installations.**

If the the Elevator Post Transfer Delay function is set to On, the control adds the TDEL time delay after the transfer switch transfers the load to the new power source. If there is an active TDEL, pressing the Override will have no effect on this time delay. **Make sure that the the Elevator Post Transfer Delay is always set to Off.**

7.3.2 Accessing the Front Panel Configuration Editor

⚠ WARNING

AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts whenever the cabinet door is open.

Battery power (DC power) must be available to configure the control panel functions. AC power may be present but does not have to be present to configure the control panel. To check for DC power, open the transfer switch door and place the ATS in the Normal or Emergency position. The Utility Power Connected or Genset Power Connected LED should light. The Utility Power Connected or Genset Power Connected LED should light.

Configuration Mode is selected by operation of a small slide switch located on the back of the control panel. The switch is located near the bottom edge of the PCB, see [Figure 28](#). The switch is partially hidden to prevent accidental operation.

NOTICE

The Configuration Mode can be entered at any time, but once it is selected, all automatic operation is suspended.

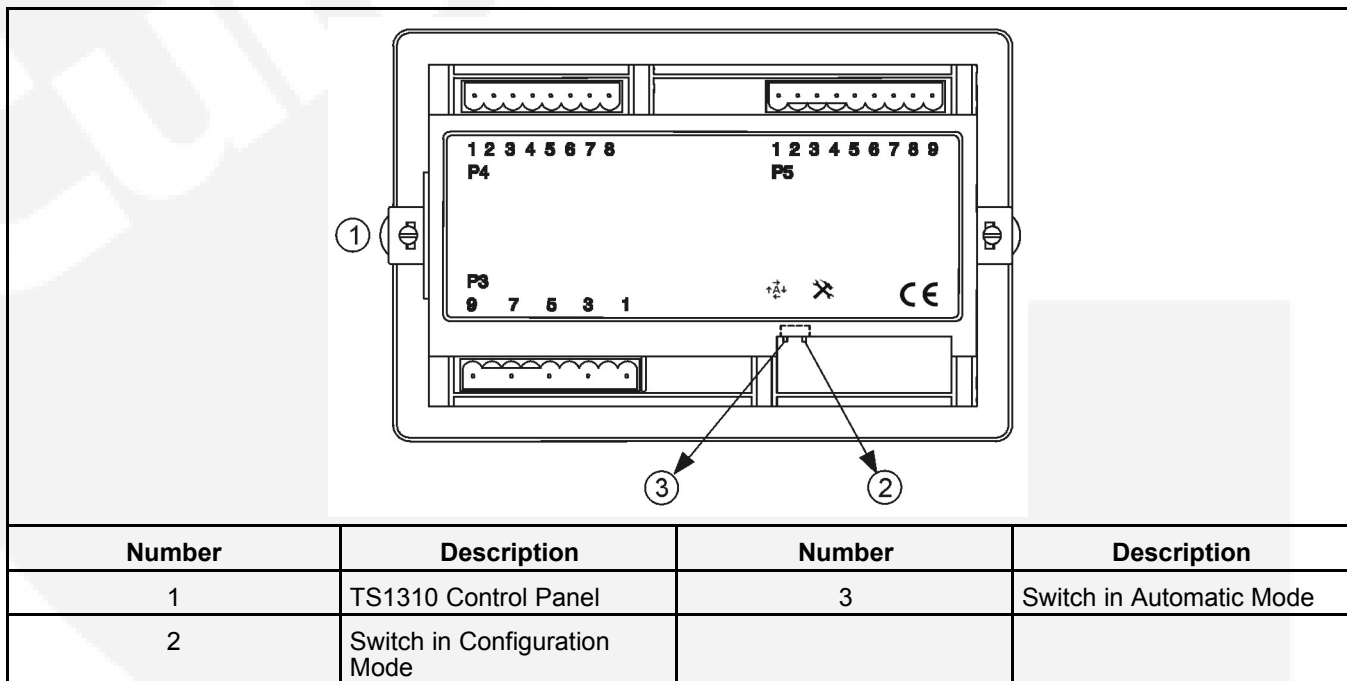


FIGURE 28. NORMAL/CONFIGURATION MODE SELECTOR SWITCH

7.3.2.1 Modifying the Configuration

The control has been configured at the factory and does not require additional adjustments, default settings are shown in bold italics in [Table 8](#). However, if it becomes necessary to adjust settings,

⚠ CAUTION

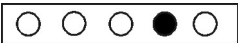
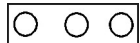







Incorrect settings can result in the transfer switch failing to operate correctly. Only authorized trained personnel should make changes to the control function settings. External Exercise, System Nominal Voltage, System Nominal Frequency, and Single Phase/Three Phase settings are made at the factory and should not require any additional adjustments.

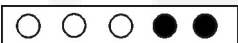
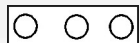
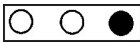



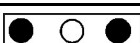


1. Slide the selector switch to the **Configuration Mode** position. TDES is always the first function shown when entering Configuration Mode.
2. Press the **Test** pushbutton to scroll through the various control function codes displayed with the first five LEDs, see [Table 8](#). The black-filled circles indicate which LEDs are lit for the function and value codes listed.
3. Once the desired function is selected, press the **Override** pushbutton to change the associated value code displayed with the last three LEDs.
4. When configuration is completed, return the selector switch back to the **Automatic Mode** position.









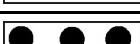
TABLE 8. ADJUSTABLE TRANSFER SWITCH FUNCTIONS


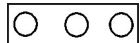







Function	Function Code	Value Code	Value (Default in bold italics)
Not Available	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	NA NA NA	


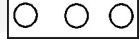






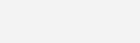
Function	Function Code	Value Code	Value (Default in bold italics)
TDES (Time Delay Engine Start)	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	0 Seconds (Disabled)
	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	0.5 Second
	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	1 Second
	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/>	2 Seconds
	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	3 Seconds
	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	4 Seconds
	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	6 Seconds
	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input checked="" type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/>	10 Seconds


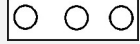

Function	Function Code	Value Code	Value (Default in bold italics)
TDNE (Time Delay Normal to Emergency)			0 Seconds (Disabled)
			1 Second
			2 Seconds
			3 Seconds
			5 Seconds
			30 Seconds
			120 Seconds
			300 Seconds


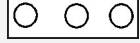

Function	Function Code	Value Code	Value (Default in bold italics)
TDEN (Time Delay Emergency to Normal)			0 Minutes (Disabled)
			0.1 Minutes (For Testing)
			5 Minutes
			10 Minutes
			15 Minutes
			20 Minutes
			25 Minutes
			30 Minutes

Function	Function Code	Value Code	Value (Default in bold italics)
TDEC (Time Delay Engine Cooldown)			0 Minutes (Disabled)
			0.1 Minutes (For Testing)
			5 Minutes
			10 Minutes
			15 Minutes
			20 Minutes
			25 Minutes
			30 Minutes

Function	Function Code	Value Code	Value (Default in bold italics)
TDPT (Time Delay Program Transition) The RSS transfer switch does not use this function. (This control function is set at the factory and should not require adjusting.)			0 Seconds (Disabled)
			0.5 Seconds
			1 Second
			2 Seconds
			3 Seconds
			4 Seconds
			6 Seconds
			10 Seconds

Function	Function Code	Value Code	Value (Default in bold italics)
TDEL (Time Delay Elevator Signal) The RSS transfer switch does not use this function. (This control function is set at the factory and should not require adjusting.)			0 Seconds (Disabled)
			1 Second
			2 Seconds
			3 Seconds
			5 Seconds
			30 Seconds
			120 Seconds
			300 Seconds

Function	Function Code	Value Code	Value (Default in bold italics)
Test With/Without Load			Without Load
			With Load

Function	Function Code	Value Code	Value (Default in bold italics)
External Exercise On/Off (This control function is set at the factory and should not require adjusting.)			Off
			On

Function	Function Code	Value Code	Value (Default in bold italics)
Exercise With/Without Load	○ ● ○ ○ ●	○ ○ ○	<i>Without Load</i>
		○ ○ ●	With Load

Function	Function Code	Value Code	Value (Default in bold italics)
System Nominal Voltage Table Selection (This control function is set at the factory and should not require adjusting.)	○ ● ○ ● ○	○ ○ ○	System Nominal Voltage Table 1 Table 9
		○ ○ ●	System Nominal Voltage Table 2 Table 10

TABLE 9.

Function	Function Code	Value Code	Value (Default in bold italics)
System Nominal Voltage Table 1 (Per customer order) (This control function is set at the factory and should not require adjusting.)	○ ● ○ ● ●	○ ○ ○	115
		○ ○ ●	120
		○ ● ○	190
		○ ● ●	208
		● ○ ○	220
		● ○ ●	230
		● ● ○	240
		● ● ●	380

TABLE 10.

Function	Function Code	Value Code	Value (Default in bold italics)
System Nominal Voltage Table 2 (Per customer order) (This control function is set at the factory and should not require adjusting.)	○ ● ○ ● ●	○ ○ ○	400
		○ ○ ●	415
		○ ● ○	440
		○ ● ●	460
		● ○ ○	480
		● ○ ●	550
		● ● ○	575
		● ● ●	600

Function	Function Code	Value Code	Value (Default in bold italics)
System Nominal Frequency 50/60 Hz (This control function is set at the factory and should not require adjusting.)	<input type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	60 Hz
		<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	50 Hz

Function	Function Code	Value Code	Value (Default in bold italics)
Single Phase/Three Phase (This control function is set at the factory and should not require adjusting.)	<input type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	Three Phase
		<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	Single Phase

Function	Function Code	Value Code	Value (Default in bold italics)
Utility Undervoltage Pickup	<input type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	90%
		<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	95%

Function	Function Code	Value Code	Value (Default in bold italics)
Utility Undervoltage Dropout	<input type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	90%
		<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	85%
		<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	80%
		<input type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/>	70%

Function	Function Code	Value Code	Value (Default in bold italics)
Phase Check On/Off	<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	Off
		<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	On

Function	Function Code	Value Code	Value (Default in bold italics)
Return to Programmed Transition On/Off The RSS transfer switch does not use this function. (This control function is set at the factory and should not require adjusting.)	<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	Off
		<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	On

Function	Function Code	Value Code	Value (Default in bold italics)
Elevator Post Transfer Delay On/Off The RSS transfer switch does not use this function. (This control function is set at the factory and should not require adjusting.)	● ○ ○ ● ○	○ ○ ○	Off
		○ ○ ●	On

Function	Function Code	Value Code	Value (Default in bold italics)
Exercise Repeat Interval	● ○ ○ ● ●	○ ○ ○	Every 7 Days
		○ ○ ●	Every 14 Days
		○ ● ○	Every 21 Days
		○ ● ●	Every 28 Days

7.3.3 Preliminary Troubleshooting Procedures

The following procedures describe preliminary troubleshooting checks. These checks can be used by service personnel. If the trouble persists, call your dealer or distributor.

⚠ WARNING

Some transfer switch service procedures present hazards that can result in severe personal injury or death. Only trained and experienced service personnel with knowledge of electricity and machinery hazards should perform service.

Diagnosis of problems involves observing system operation. If you cannot determine the problem, contact Cummins Service.

⚠ WARNING

AC power within the cabinet presents a shock hazard that can cause severe personal injury or death. Whenever the cabinet door panel is removed, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothes, hair, etc.

Several of the steps listed on the following pages include checking on the control panel settings. To check the control settings, remove the transfer switch door panel, unscrew the retaining screw, swing the control mounting bracket to access the selector switch, and slide the selector switch on the back on the control panel to the Configuration Mode position.

7.3.3.1 Power Outage Occurs, but Generator Set does not Start

⚠ WARNING

AC power within the cabinet presents a shock hazard that can cause severe personal injury or death. Whenever the cabinet door panel is removed, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothes, hair, etc.

⚠ WARNING

1. Verify that the operation selector switch on the generator set control panel is set to the Remote/Auto position. Check for fault indicators on the generator set control.

⚠ WARNING

Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark or flame while servicing batteries.

⚠ WARNING

Ignition of fuel can cause severe personal injury or death by fire or explosion. Do not permit any flame, cigarette, spark, pilot light, arcing equipment, or other possible source of ignition near the fuel system.

2. Start the generator set using its start-stop (Run/Off) controls. If it does not crank, check the starting batteries. If it cranks but does not start, check the fuel supply.
3. Check the controller for the transfer switch start signal to the generator set. The start signal relay remains closed while sending the signal to the generator set. The start signal relay can be measured with a voltmeter at either P5-6 and P5-7 or at TB2-2 and TB2-4. If the start signal relay contact is open, reset the DC power of the controller by disconnecting the battery.

7.3.3.2 Generator Set Starts During Normal Power Service

⚠ WARNING

AC power within the cabinet presents a shock hazard that can cause severe personal injury or death. Whenever the cabinet panel is removed, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothes, hair, etc.

1. Verify that the operation selector switch on the generator set control panel is set to the Remote/Auto position.
2. Check the Utility Power Available LED on the control panel to see if it is lit.

If the Utility Power Available LED is lit,

- a. Check the Active Exercise LED to see if it is in an exercise period. If the Active Exercise LED is flashing, an exercise is enabled. If the Active Exercise LED is Off, no exercise period is set.
- b. Momentary voltage dips might cause voltage sensors to initiate generator starting. Check the utility undervoltage parameter settings on the control panel. Increase the TDES setting

If the Utility Power Available LED is not lit,

- a. Check the control setting to verify that the system nominal voltage matches what is listed on the nameplate.
- b. Check the control setting to verify that the system frequency matches what is listed on the nameplate.
- c. Check the control setting to verify that the system phase setting matches what is listed on the nameplate.

- d. Check the control setting to verify that the utility undervoltage dropout point is set lower than the pickup set point.

7.3.3.3 Generator Set does not Exercise

⚠ WARNING

AC power within the cabinet presents a shock hazard that can cause severe personal injury or death. Whenever the cabinet panel is removed, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothes, hair, etc.

1. Verify that the operation selector switch on the generator set control panel is set to the Remote/Auto position.
2. Check the Exercise LED on the control panel to see if it is lit.
 - a. If the Exercise LED is not lit, no exercise period has been set. Refer to the exerciser programming procedure for information on setting an exercise.
 - b. If the Exercise LED is lit but not flashing, the exercise period has not yet started. The start and stop times are not displayed.
3. Start the generator set using its start-stop (Run/Off) controls. If it does not crank, check the starting batteries. If it cranks but does not start, check the fuel supply.
4. Check the controller for the transfer switch start signal to the generator set. The start signal relay remains closed while sending the signal to the generator set. The start signal relay can be measured with a voltmeter at either P5-6 and P5-7 or at TB2-2 and TB2-4. If the start signal relay contact is open, reset the DC power of the controller by disconnecting the battery.

⚠ WARNING

Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark or flame while servicing batteries.

⚠ WARNING

Ignition of fuel can cause severe personal injury or death by fire or explosion. Do not permit any flame, cigarette, spark, pilot light, arcing switch or equipment, or other possible source of ignition near the fuel system.

7.3.3.4 After a Power Failure, the Generator Set Starts but does not Assume the Load

⚠ WARNING

AC Power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Whenever the cabinet door is open, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothing, hair, and etc.

1. Check to see if the Genset Power Available LED on the control panel is lit.

If the Genset Power Available LED is not lit,


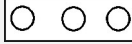
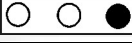


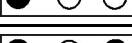

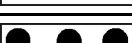

 - a. Check the output voltage of the power source by observing the voltmeter on the generator set.


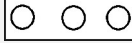
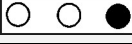


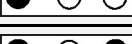



- b. Check the control setting to verify that the system nominal voltage matches what is listed on the nameplate.
- c. Check the control setting to verify that the system frequency matches what is listed on the nameplate.
- d. Check the control setting to verify that the system phase setting matches what is listed on the nameplate.

If the Genset Power Available LED is lit,

- a. The transfer time delay may not have expired. The TDNE can be set for up to 300 seconds. If you do not wish to wait until the time delay expires, press the Override pushbutton.

If the switch does not transfer after pressing the Override pushbutton, a time delay elevator (TDEL) may not have expired due to a misconfiguration. The TDEL can be set up to 300 seconds. Change the TDEL to 0 seconds.

Function Code for TDNE	Value Code	Value (Default in bold italics)
		0 Seconds (Disabled)
		1 Second
		2 Seconds
		3 Seconds
		5 Seconds
		30 Seconds
		120 Seconds
		300 Seconds

Function Code for TDEL	Value Code	Value (Default in bold italics)
		0 Seconds (Disabled)
		1 Second
		2 Seconds
		3 Seconds
		5 Seconds
		30 Seconds
		120 Seconds
		300 Seconds

- b. There may be an active transfer inhibit. If a transfer inhibit is enabled, the load transfer will not take place until the Override push button on the control panel is pressed or the transfer inhibit input is disabled.

NOTICE

If a transfer inhibit is present, the transfer switch is miswired. This feature is not to be used with the RSS transfer switch. On the controller, the transfer inhibit (P4-5) and retransfer inhibit (P4-6) should not be wired.

2. Check to see if the Utility Power Available LED is flashing.

If the Utility Power Connected LED is flashing,

- a. The control was unsuccessful in its attempts to open the Utility side of the transfer switch. After five attempts to move the transfer switch, the Utility Connected LED flashes, indicating that it failed to open.
- b. For information on how to correct this problem, refer to [Table 15](#).

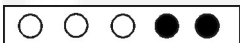

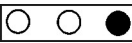






7.3.3.5 After Power Returns, the Transfer Switch does not Return to Normal Position


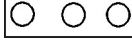



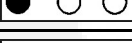



1. Check to see if the Utility Power Available LED is lit.

If the Utility Power Available LED is lit,

- a. The retransfer time delay period may not have expired. The TDEN can be set for up to 30 minutes. If you do not wish to wait until the time delay expires, press the Override pushbutton.

If the switch does not transfer after pressing the Override pushbutton, a time delay elevator (TDEL) may not have expired due to a misconfiguration. The TDEL can be set up to 300 seconds. Change the TDEL to 0 seconds.

Function Code for TDEN	Value Code	Value (Default in bold italics)
		0 Minutes (Disabled)
		0.1 Minutes
		5 Minutes
		10 Minutes
		15 Minutes
		20 Minutes
		25 Minutes
		30 Minutes

Function Code for TDEL	Value Code	Value (Default in bold italics)
		<i>0 Minutes (Disabled)</i>
		0.1 Minutes
		5 Minutes
		10 Minutes
		15 Minutes
		20 Minutes
		25 Minutes
		30 Minutes

- b. There may be an active retransfer inhibit. If a retransfer inhibit is enabled, the load transfer will not take place until the Override pushbutton on the control panel is pressed, the retransfer inhibit input is disabled, or the generator set fails.

NOTICE

If a retransfer inhibit is present, the transfer switch is miswired. This feature is not to be used with the RSS transfer switch. On the controller, the transfer inhibit (P4-5) and retransfer inhibit (P4-6) should not be wired.

- c. Although it is not offered with this transfer switch, a phase check may be enabled. When the phase check function is enabled, the utility does not assume the load until both sources are within acceptable limits of the phase check sensor.

If the Utility Power Available LED is not lit,

- a. Check the control setting to verify that the utility under voltage dropout point is set lower than the pickup set point.
2. Check to see if the Utility Power Available LED is flashing.

If the Generator Power Connected LED is flashing,


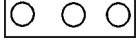



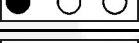


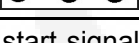
- a. The control was unsuccessful in its attempts to open the Generator side of the transfer switch. After five attempts to move the transfer switch, the Generator Connected LED flashes, indicating that it failed to open.
- b. For information on how to correct this problem, refer to [Table 16](#).

7.3.3.6 Generator Set Continues to Run After Retransfer of Load to Normal Power

⚠ WARNING

AC Power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Whenever the cabinet door is open, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothing, hair, and etc.

1. The engine cooldown time delay may not have expired. The TDEC can be set for up to 30 minutes.

Function Code for TDEC	Value Code	Value (Default in bold italics)
		0 Minutes (Disabled)
		0.1 Minutes
		5 Minutes
		10 Minutes
		15 Minutes
		20 Minutes
		25 Minutes
		30 Minutes

2. After the TDEC expires but the start signal relay remains closed, the signal can be measured with a voltmeter either at P5-6 and P5-7 or at TB2-2 and TB2-4. The generator set is still running.
 - a. Stop the generator set with its Start-Stop (Run/Off) switch.
 - b. Replace the controller.
3. After the TDEC expires but the start signal relay remains open and the generator set continues to run, refer to the generator set Service Manual.

7.3.3.7 System does not Test with Load

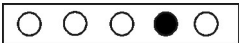
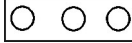




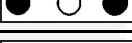


The default setting for the RSS transfer switch is to test without load. This procedure only applies if you expect the unit to test with load.


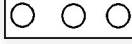
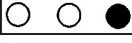


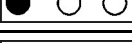
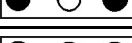


WARNING

AC Power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Whenever the cabinet door is open, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothing, hair, and etc.

1. Check the control setting to verify that the Test With or Without Load function has been set to With Load.
2. Press the Test button. If the switch does not Test With Load,
 - a. The transfer time delay may not have expired. The TDNE can be set for up to 300 seconds. If you do not wish to wait until the time delay expires, press the Override pushbutton.

If the switch does not transfer after pressing the Override pushbutton, a time delay elevator (TDEL) may not have expired due to a misconfiguration. The TDEL can be set up to 300 seconds. Change the TDEL to 0 seconds.

Function Code for TDNE	Value Code	Value (Default in bold italics)
		0 Seconds (Disabled)
		1 Second
		2 Seconds
		3 Seconds
		5 Seconds
		30 Seconds
		120 Seconds
		300 Seconds

Function Code for TDEL	Value Code	Value (Default in bold italics)
		0 Seconds (Disabled)
		1 Second
		2 Seconds
		3 Seconds
		5 Seconds
		30 Seconds
		120 Seconds
		300 Seconds

- b. There may be an active transfer inhibit. If a transfer inhibit is enabled, the load transfer will not take place until the Override pushbutton on the control panel is pressed or the transfer inhibit input is disabled.

NOTICE

If a transfer inhibit is present, the transfer switch is miswired. This feature is not to be used with the RSS transfer switch. On the controller, the transfer inhibit (P4-5) and retransfer inhibit (P4-6) should not be wired.

- c. Although it is not offered with this transfer switch, a phase check may be enabled. When the phase check function is enabled, the generator does not assume the load until both sources are within acceptable limits of the phase check sensor.

7.3.3.8 System does not Exercise with Load


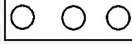
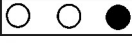



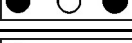


The default setting for the RSS transfer switch is to exercise without load. This procedure only applies if you expect the unit to exercise with load.



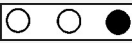


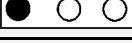



⚠ WARNING

AC Power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Whenever the cabinet door is open, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothing, hair, and etc.

1. Check the control setting to verify that the Exercise With or Without Load function has been set to With Load.
2. If the control has been set to Exercise With Load
 - a. The transfer time delay may not have expired. The TDNE can be set for up to 300 seconds. If you do not wish to wait until the time delay expires, press the Override pushbutton.

If the switch does not transfer after pressing the Override pushbutton, a time delay elevator (TDEL) may not have expired due to a misconfiguration. The TDEL can be set up to 300 seconds. Change the TDEL to 0 seconds.

Function Code for TDNE	Value Code	Value (Default in bold italics)
		0 Seconds (Disabled)
		1 Second
		2 Seconds
		3 Seconds
		5 Seconds
		30 Seconds
		120 Seconds
		300 Seconds

Function Code for TDEL	Value Code	Value (Default in bold italics)
		0 Seconds (Disabled)
		1 Second
		2 Seconds
		3 Seconds
		5 Seconds
		30 Seconds
		120 Seconds
		300 Seconds

- b. There may be an active transfer inhibit. If a transfer inhibit is enabled, the load transfer will not take place until the Override pushbutton on the control panel is pressed or the transfer inhibit input is disabled.

NOTICE

If a transfer inhibit is present, the transfer switch is miswired. This feature is not to be used with the RSS transfer switch. On the controller, the transfer inhibit (P4-5) and retransfer inhibit (P4-6) should not be wired.

- c. Although it is not offered with this transfer switch, a phase check may be enabled. When the phase check function is enabled, the generator does not assume the load until both sources are within acceptable limits of the phase check sensor.

7.3.3.9 Battery Charger Fails to Charge

1. Check the battery charger LED light.
 - a. If the LED is red, the charger is still charging.
 - b. If the LED is green but the battery has not charged, the battery is defective and needs to be replaced.
2. If the voltage between TB2-1 (GND) and TB2-3 (B+) for RSS transfer switches with a controller, or between TB4-4 (GND) and TB4-7 (B+) for RSS transfer switches without a controller, is less than 13.5 VDC, the charger is weak. Check the distance between the charger and the battery to see if it is too far. Wiring distances are listed in [Table 11](#).
3. If the LED is flashing, the charger is defective. Replace the battery charger.

WARNING

Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark or flame while servicing batteries.

TABLE 11. WIRE SPECIFICATIONS

Wire Size (AWG)	Distance in Feet (One Way)
16	125
14	200
12	300
10	500

7.3.3.10 Battery Loses Water

The battery charger may not be turning off when the battery is charged. Refer to battery manufacturer's maintenance recommendations.

7.3.3.11 Battery Loses Charge

There may be loose battery connections. Verify connections are okay. If they are okay, replace the battery.

7.3.4 Detailed Troubleshooting Procedures

This section describes a typical transfer switch sequence of events, and provides detailed troubleshooting procedures for experienced service personnel. The troubleshooting procedures use conditional schematics and symptoms to diagnose all possible problems.

⚠ WARNING

Improper operation of the generator set presents a hazard that can cause severe personal injury or death. Observe all safety precautions in the generator set manuals.

⚠ WARNING

AC Power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Whenever the cabinet door is open, use extreme caution to avoid touching electrical contacts with body, tools, jewelry, clothing, hair, and etc. The following procedures are to be performed only by technically trained and experienced personnel.

7.3.4.1 About Customer Inputs

In applications with remote customer inputs, the generator set may start unexpectedly as a result of these inputs. These symptoms may appear to be caused by the transfer switch control. Verify that the remote input is not causing the symptom or isolate the control from these inputs before troubleshooting the control.

7.3.4.2 Control Panel LED Indicators

The control panel located on the transfer switch enclosure door contains six LED indicators. The indicators provide some information about the current control status and may be helpful in troubleshooting the transfer switch. See [Table 6](#), [Table 12](#), and [Table 13](#).

TABLE 12.

Troubleshooting	Page
Sequence of Events	Section 4.5
Troubleshooting with Symptoms	Section 7.4.1
Utility Power Failure	Section 7.3.6
Utility Power is Restored	Section 7.3.7
Miscellaneous Troubleshooting Issues	Section 7.3.8

TABLE 13. CONTROL PANEL CONNECTIONS

Connector	Pin #	Function	Type	Comments
P3	1	L3 Generator	Voltage Sensor Inputs	75 - 480 Volts AC
	3	L1 Generator		
	5	L3 Utility		
	7	L2 Utility		
	9	L1 Utility		
P4	1	Functional Earth Ground	Inputs	Common for remote inputs
	2	Remote Override		Connect to P4-1 to activate
	3	Remote Test		Connect to P4-1 to activate
	4	External Exerciser Clock*		Connect to P4-1 to activate
	5	Transfer Inhibit*		Connect to P4-1 to activate
	6	Retransfer Inhibit*		Connect to P4-1 to activate
	7	Connected to Utility (Normal)		Connect to P4-1 to activate when connected to utility power
	8	Connected to Genset (Emergency)		Connect to P4-1 to activate when connected to the genset
P5	1	Open Normal (Utility)	Outputs	Not applicable
	2	Close Normal (Utility)		Grounded internally to energize close normal K1 relay
	3	Open Emergency (Genset)		Not applicable
	4	Close Emergency (Genset)		Grounded internally to energize close emergency K2 relay
	5	Elevator Pretransfer		Not applicable
	6	Genset Start Relay		Internal dry contact closes (de-energizes) to start the genset and is held open (energized) to stop the genset
	7	Genset Start Relay		
	8	Ground Input (-)	Battery Connections	8 - 35 Volts DC
	9	B+ Input		

NOTICE**L3 Utility is not available on 2-pole transfer switches.**

* These features are not offered with the RSS transfer switch.

7.3.5 Troubleshooting with Symptoms

Use the troubleshooting guide to help diagnose transfer switch problems. It is divided into sections based on the symptom. Common problems are listed with their possible causes. Refer to the corrective action column for the appropriate test or adjustment procedure.

Conditional schematics are used to highlight the circuit that is energized during the sequence of the events. These conditional schematics are for a typical transfer switch with options. Always refer to the schematic and wiring diagram package that was shipped with the transfer switch for specific information about its configuration.

Make a thorough inspection of the transfer switch wiring to make sure that good wire harness and ground connections are made. Correct wiring problems before performing any test or replacing any components.

7.3.5.1 Transfer Switch Operation

When troubleshooting the RSS transfer switch, it is important to remember the following:

- The control uses limit switches (ASW and BSW) on either side of the switch to determine if the switch has opened or closed. If the ASW limit switch is bad, after the load is transferred to the Utility and the Utility Connected LED is not lit after five attempts, the Utility Connected LED will flash. If the BSW limit switch is bad, after the load is transferred to the generator and the Generator Connected LED is not lit after five attempts, the Generator Connected LED will flash.
- This is a two position transfer switch. It can be connected only to one source. There is no neutral position.
- The control supplies a grounding signal to pick up the control relays (K1 and K2).
- All inputs are activated by applying a ground to the signal input.
- The control operates over a DC voltage range of 8 to 35 volts but the 12 volt control relays are used with the RSS transfer switch because of the generator set start battery.
- If the controller is connected to a DC power source (for example, the generator set start battery) but there is no AC power available, the control panel Connected LED will still be lit.
- The transfer and retransfer relays (K1 and K2) are pulsed and are powered for only one second, or until a limit switches (ASW or BSW) changes state, and then the power is removed (the relays are de-energized). When a relay is being energized, there is an audible "click."
- The software includes a retry function. If the transfer switch fails to transfer within one second, power is removed and the software waits ten seconds before trying again. After five attempts, the software quits trying and either the Utility Connected LED or the Generator Connected LED flashes, depending on which part of the switch circuit has failed. All operations are then locked out until the software is reset by pressing the Override pushbutton on the control panel.

7.3.6 Utility Power Failure

⚠ WARNING

AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts with body, tools, jewelry, hair, clothes, and etc. Prior to working with live circuits, remove all sources of AC power and remove power to the door by removing the fuse from the FB fuse block. The following procedures are to be performed only by technically trained and experienced personnel.

⚠ WARNING

Improper operation of the generator set presents a hazard that can cause severe personal injury or death. Observe all safety precautions in you generator set manuals.

TABLE 14. UTILITY POWER FAILS BUT THE GENERATOR SET DOES NOT START

Problem	Possible Cause	Corrective Action
Generator set cranks but does not start	There may be a generator set problem	Check the fuel system Refer to the generator set service manual
Generator set does not crank	<ol style="list-style-type: none"> 1. A Time Delay Engine Start (TDES) may be timing 2. There may not be a generator set start signal 3. The generator set may be waiting for a remote start command 4. There may be defective or loose wiring 5. There may be a defective battery or cables 6. The generator set control may not be functioning correctly 	<ol style="list-style-type: none"> 1. Wait until the time delay (up to 10 seconds) has expired, or press the Override pushbutton on the control panel, or ground the Override input. 2. Check for a generator start signal (closed contact either between P5-6/P5-7 or TB2-2/TB2-4). 3. Verify that the generator control is set for Remote/Auto Start. 4. <ol style="list-style-type: none"> a. Check, inspect, or replace defective wiring, see Figure 43. b. Check the wiring between the transfer switch and the generator control. 5. Check the batteries and cable connections. 6. Check the generator control for proper operation.

TABLE 15. GENERATOR SET IS RUNNING BUT THE TRANSFER SWITCH DID NOT TRANSFER TO THE GENERATOR SET

Problem	Possible Cause	Corrective Action
Generator Available LED is off	<ol style="list-style-type: none"> 1. There may be improper voltage at the voltage sensor inputs. 2. There may be improper voltage between the transfer switch power terminals. 3. There may be improper voltage at the generator set output terminals. 	<ol style="list-style-type: none"> 1. <ol style="list-style-type: none"> a. Check for proper generator voltage between P3-1 and P3-3 of the controller connector. The voltage must be higher than the generator voltage sensor pickup point. b. Check voltage sensing wiring between the control and the transfer switch. 2. Check for proper generator voltage between transfer switch power terminals EA and EB (line-to-line) or between EA and EN (line-to-neutral). Voltage must be higher than the generator voltage sensor pickup point. Voltage must be higher than the generator set voltage sensor pickup point. 3. <ol style="list-style-type: none"> a. Check for proper voltage at generator output terminals. Voltage must be higher than the generator voltage sensor pickup point. b. Check the power circuit wiring between the transfer switch and the generator.
Generator Available LED is on	<ol style="list-style-type: none"> 1. A Time Delay Normal to Emergency (TDNE) may be timing 2. There may be an active transfer inhibit, resulting from a connected ground on P4-5. The transfer inhibit feature is not offered with the RSS transfer switch 	<ol style="list-style-type: none"> 1. Wait until the time delay (up to 300 seconds) has expired, or press the Override pushbutton on the control panel, or ground the Override input. 2. Check for ground on P4-5. If present, remove the wire or press the Override pushbutton.

Problem	Possible Cause	Corrective Action
Utility Connected LED is flashing	<p>The control was unsuccessful in its attempts to open the Utility side of the transfer switch. After 5 attempts to move the transfer switch, the Utility Connected LED flashes, indicating that it failed to open.</p> <p>To close to the generator, the control grounds P5-1/P5-4 to energize K2 for 1 second and monitors the Utility position input (P4-7) to see if limit switch ASW opens. If ASW doesn't open, the control de-energizes K2, waits 10 seconds, and tries again. If ASW doesn't open after the fifth try, the Utility Connected LED flashes and the control quits trying.</p> <p>If the switch mechanism is stuck or the solenoids are burnt out, the switch will not transfer the load.</p>	<ol style="list-style-type: none"> 1. Check the Close Generator circuit for a bad connection, open wire, or a faulty part. 2. Check K2 or the continuity through B1 and B2 of the transfer switch. 3. Press the Override pushbutton to reset the control so it will try to open the Utility side of the transfer switch. Observe what happens and verify that the relay coils are energizing. <ol style="list-style-type: none"> a. If the coils are energizing, <ul style="list-style-type: none"> • Check the wiring between the relays and the transfer switch. • Check to see if the transfer switch is faulty. b. The coils are not energizing, <ul style="list-style-type: none"> • Check the wiring between the relay and the control. • Check to see if the K2 relay is faulty. 4. Use the manual operation handle to manually operate the transfer switch. <ol style="list-style-type: none"> a. If the switch will not allow manual operation, it must be replaced. b. If the switch will allow manual operation but the solenoids are burnt out, replace the transfer switch.

7.3.7 Utility Power is Restored

⚠ WARNING

AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts with body, tools, jewelry, hair, clothes, and etc. Prior to working with live circuits, remove all sources of AC power and remove power to the door by removing the fuse from the FB fuse block. The following procedures are to be performed only by technically trained and experienced personnel.

⚠ WARNING

Improper operation of the generator set presents a hazard that can cause severe personal injury or death. Observe all safety precautions in you generator set manuals.

TABLE 16. UTILITY POWER IS RESTORED BUT THE SWITCH DOES NOT TRANSFER TO UTILITY

Indicator	Possible Cause	Corrective Action
Utility Power Available LED is off	<ol style="list-style-type: none"> 1. There may be improper voltage at the voltage sensor inputs 2. There may be improper utility voltage between the ATS power terminals 	<ol style="list-style-type: none"> 1. Check for proper utility voltage between P3-5, and P3-9 (line-to-line) of the controller connector. Voltage must be higher than the utility voltage sensor pickup point. <ol style="list-style-type: none"> a. Check voltage sensing wiring between the control and the transfer switch. b. Make sure the utility voltage sensing pickup setting and dropout setting aren't both set at 90%. 2. Check <ol style="list-style-type: none"> a. for proper utility power between transfer switch power terminals NA and NB. Voltage must be higher than the utility voltage sensor pickup point. b. power circuit wiring between the transfer switch and the upstream circuit breaker. If the circuit breaker is tripped, reset the upstream circuit breaker.

Indicator	Possible Cause	Corrective Action
Utility Power Available LED is on	<ol style="list-style-type: none"> 1. A Time Delay Emergency to Normal (TDEN) may be timing 2. There may be an active retransfer inhibit input, resulting from a connected ground at P4-6. The retransfer inhibit feature is not offered with the RSS transfer switch. 3. Although it is not offered with this transfer switch, a Phase Check may be enabled and the sources are not in phase. 	<ol style="list-style-type: none"> 1. Wait until the time delay (up to 30 minutes) has expired, or press the Override pushbutton on the control panel, or ground the Override input. 2. If present, remove the P4-6 and ground wire or press the Override pushbutton. 3. Check <ol style="list-style-type: none"> a. phase rotation b. frequency differences between the two sources. Frequency differences must be 1 Hz or less.

Indicator	Possible Cause	Corrective Action
Generator Connected LED is flashing	<p>The control was unsuccessful in its attempts to open the Generator side of the transfer switch. After 5 attempts to move the transfer switch, the Generator Connected LED flashes, indicating that it failed to open.</p> <p>To close Utility, the control grounds P5-1/P5-3 to energize K1 for 1 second and monitors the Generator position input (P4-8) to see if limit switch BSW opens. If BSW doesn't open, the control de-energizes K1, waits 10 seconds, and tries again. If BSW doesn't open after the fifth try, the Generator Connected LED flashes and the control quits trying.</p> <p>If the switch mechanism is stuck or the solenoids are burnt out, the switch will not transfer the load.</p>	<ol style="list-style-type: none"> 1. Check the Open Generator circuit for a bad connection, open wire, or a faulty part. 2. Check K1 or the continuity through A1 and A2 of the transfer switch. 3. Press the Override pushbutton to reset the control so it will try to open the Generator side of the transfer switch. Observe what happens and verify that the relay coils are energizing. <ol style="list-style-type: none"> a. If the coils are energizing, <ul style="list-style-type: none"> • Check the wiring between the relays and the transfer switch. • Check to see if the transfer switch is faulty. b. If the coils are not energizing, <ul style="list-style-type: none"> • Check the wiring between the relay and the control. • Check to see if the relay is faulty. 4. Use the manual operation handle to manually operate the transfer switch. <ol style="list-style-type: none"> a. If the switch will not allow manual operation, it must be replaced. b. If the switch will allow manual operation but the solenoids are burnt out, replace the transfer switch.

TABLE 17. SWITCH TRANSFERRED TO UTILITY BUT THE GENERATOR SET CONTINUES TO RUN

Problem	Possible Cause	Corrective Action
Generator did not shut down after the transfer switch has transferred to the Utility	<ol style="list-style-type: none"> 1. A Time Delay Engine Cooldown (TDEC) may be timing. 2. The generator set may not have received a stop signal. 3. The selector switch on generator set control panel may not be in the correct position. 4. There may be defective wiring. 5. The generator set control may not be operating correctly. 	<ol style="list-style-type: none"> 1. Wait for the time delay (up to 30 minutes) to expire. 2. Check for a generator stop signal (open contact between P5-6 and P5-7). 3. Check to see if the generator control is set for Remote Start. 4. Check, inspect, or replace defective wiring, see Figure 44. 5. Check the generator control for proper operation.

7.3.8 Miscellaneous Troubleshooting Issues

⚠ WARNING

AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts with body, tools, jewelry, hair, clothes, and etc. Prior to working with live circuits, remove all sources of AC power and remove power to the door by removing the fuse from the FB fuse block. The following procedures are to be performed only by technically trained and experienced personnel.

⚠ WARNING

Improper operation of the generator set presents a hazard that can cause severe personal injury or death. Observe all safety precautions in you generator set manuals.

TABLE 18. MISCELLANEOUS

Problem	Possible Cause	Corrective Action
Generator set running for no apparent reason	<ol style="list-style-type: none"> 1. The generator set may not have received a stop signal. 2. The selector switch on generator set control panel may not be in the correct position. 3. There may be defective wiring. 4. The generator set control may not be operating correctly. 	<ol style="list-style-type: none"> 1. Check for a generator set stop signal (open contact between P5-6 and P5-7). 2. Check to see if the generator set control is set for Remote Start. 3. Check, inspect, or replace defective wiring, see Figure 44. 4. Check the generator set control for proper operation.
Front panel test does not transfer the load	<ol style="list-style-type: none"> 1. The control is not set to Test With Load. 2. The control is set to Test With Load but one of the following has occurred: <ol style="list-style-type: none"> a. The transfer time delay may not have expired. b. Although it is not offered with this transfer switch, a phase check may be enabled. 	<ol style="list-style-type: none"> 1. Check the control setting to verify that the Test With/Without Load function has been set to With Load. 2. If the control has been set to Test With Load, <ol style="list-style-type: none"> a. The TDNE can be set for up to 300 seconds. If you do not wish to wait until the time delay expires, press the Override pushbutton. b. When the phase check function is enabled, the generator does not assume the load until both sources are within acceptable limits of the phase check sensor.
Remote test does not function	<ol style="list-style-type: none"> 1. There is no contact between TB2-5 and TB2-1. 	Close the contact to start a test.

Problem	Possible Cause	Corrective Action
Unit did not exercise.	<ol style="list-style-type: none"> 1. The operation selector switch on the generator may not be in the correct position. 2. An exercise period may not be set or is set but not yet started. 3. There may be generator set problems. 	<ol style="list-style-type: none"> 1. Verify that the operation selector switch on the generator control panel is set to the Remote/Auto position. 2. Check the Exercise LED on the control panel to see if it is lit. <ol style="list-style-type: none"> a. If the Exercise LED is not lit, no exercise period has been set. Refer to the exerciser programming procedure for information on setting an exercise. b. If the Exercise LED is lit but not flashing, the exercise period has not yet started. Exercisers do not display exercise start and stop times. 3. Try starting the generator using its start-stop (Run/Off) controls. If it does not crank, check the starting batteries and cable connections. If it cranks but does not start, check the fuel supply.

7.4 Troubleshooting - Transfer Switches without a Controller

This section describes troubleshooting issues for installations that include a GSAA generator. With this type of installation, the RSS transfer switch does not include a controller and is suitable for use with service equipment.

This section also describes the sequence of events for transfer switch operations that do not include a controller.

7.4.1 Troubleshooting with Symptoms

Use the troubleshooting guide to help diagnose transfer switch problems. It is divided into sections based on the symptom. Common problems are listed with their possible causes. Refer to the corrective action column for the appropriate test or adjustment procedure.

Conditional schematics are used to highlight the circuit that is energized during the sequence of the events. These conditional schematics are for a typical transfer switch with options. Always refer to the schematic and wiring diagram package that was shipped with the transfer switch for specific information about its configuration.

Make a thorough inspection of the transfer switch wiring to make sure that good wire harness and ground connections are made. Correct wiring problems before performing any test or replacing any components.

7.4.1.1 Transfer Switch Operation for Transfer Switches without a Controller

When troubleshooting the RSS transfer switch, it is important to remember the following:

- The generator set control uses limit switches (ASW and BSW) on either side of the transfer switch to determine if the switch has opened or closed. If either the ASW or BSW limit switches are bad, the generator set control displays a transfer switch signal failure.

- This is a two position transfer switch. It can be connected only to either one source. There is no neutral position.
- The control supplies a B+ signal to energize the relay coil (K1)
- All inputs are activated by applying a ground to the signal input.
- The software includes a retry function. If the transfer switch fails to transfer within one second, power is removed and the software waits ten seconds before trying again. After three times, the software quits trying.

7.4.1.2 Troubleshooting for Transfer Switches without a Controller

For information on the controller indicator fault signals, refer to the GSAA, GSBA, or GSBB generator service manual. [Table 19](#) lists troubleshooting issues for transfer switches without a controller.

⚠ WARNING

AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts with body, tools, jewelry, hair, clothes, and etc. Prior to working with live circuits, remove all sources of AC power and remove power to the door by removing the fuse from the FB fuse block. The following procedures are to be performed only by technically trained and experienced personnel.

⚠ WARNING

Improper operation of the generator set presents a hazard that can cause severe personal injury or death. Observe all safety precautions in you generator set manuals.

TABLE 19. TROUBLESHOOTING THE TRANSFER SWITCH

Problem	Possible Cause	Corrective Action
The transfer switch failed to transfer to the generator set	<ol style="list-style-type: none"> 1. The K1 relay coil may not have received a 12 VDC signal from controller. 2. K1 relay may malfunction. 3. There may be a defective wire. 4. The switch mechanism solenoid may be burnt out. 5. There may be loose or broken parts within the switch mechanism. 	<ol style="list-style-type: none"> 1. Check for a relay coil signal (12 VDC) between TB4-3 and TB4-4. 2. Verify the relay coils are energizing. <ol style="list-style-type: none"> a. If the coils are energizing, <ul style="list-style-type: none"> • Check the wiring between the relays and the transfer switch (B1 and B2). It should be 240 VAC. • Check to see if the transfer switch is faulty. b. The coils are not energizing, <ul style="list-style-type: none"> • Check to see if the K1 relay is faulty. • If faulty, replace the K1 relay. 3. Check, inspect, or replace the defective wire. 4. Manually operate the switch by using the operator handle to manually transfer the switch. If the switch manually transfers, the solenoids are burnt out, replace the switch mechanism. 5. Manually operate the switch by using the operator handle to manually transfer the switch. If the switch does not manually transfer, replace the switch mechanism.

Problem	Possible Cause	Corrective Action
The transfer switch failed to transfer to the utility	<ol style="list-style-type: none"> 1. The Utility source may not be present. 2. The step-down transformer is faulty (240 VAC to 18 VAC) - used to detect if utility voltage is present. 3. The K1 relay coil may not have received a 12 VDC signal 4. K1 relay may malfunction. 5. There may be a defective wire. 6. The switch mechanism solenoid may be burnt out. 7. There may be loose or broken parts within the switch mechanism. 	<ol style="list-style-type: none"> 1. Check <ol style="list-style-type: none"> a. to see that the Utility service disconnect (circuit breaker) is in the ON position. b. for a transformer signal between TB4-1 and TB4-2. The output reading should be 18 VAC +/- 3%. 2. Replace the transformer. 3. Check for a relay coil signal (12 VDC) between TB4-3 and TB4-4. 4. Verify the relay coils are energizing. <ol style="list-style-type: none"> a. If the coils are energizing, <ul style="list-style-type: none"> • Check the voltage between the relays and the transfer switch (A1 and A2). It should be 240 VAC. • Check to see if the transfer switch is faulty. b. The coils are not energizing, <ul style="list-style-type: none"> • Check to see if the K1 relay is faulty. • If faulty, replace the K1 relay. 5. Check, inspect, or replace the defective wire. 6. Manually operate the switch by using the operator handle to manually transfer the switch. If the switch manually transfers, the solenoids are burnt out, replace the switch mechanism. 7. Manually operate the switch by using the operator handle to manually transfer the switch. If the switch does not manually transfer, replace the switch mechanism.

Problem	Possible Cause	Corrective Action
Transfer switch signal failure	<ol style="list-style-type: none"> 1. No feedback to indicate switch position either on Utility or Generator side. 2. The ASW or BSW limit switch may be faulty. 	<ol style="list-style-type: none"> 1. Check the wiring connection and verify the signal. 2. Replace the limit switch.

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8 Transfer Switch Service

This section covers the removal and replacement procedures for RSS transfer switch components.

8.1 Hardware Torque Specifications

Unless otherwise stated, use the following recommendations when torquing hardware:

TABLE 20. HARDWARE TORQUE SPECIFICATIONS

Description	Recommended Torque
M3 Nut, Screw, or Bolt	0.6 - 0.72 Nm (5 - 6 in-lb)
M4 Nut, Screw, or Bolt	1.5 - 1.9 Nm (13 - 17 in-lb)
M5 Nut, Screw, or Bolt	2.7 - 3.4 Nm (24 - 30 in-lb)
M6 Nut, Screw, or Bolt	4.6 - 5.7 Nm (40 - 50 in-lb)
1/4-20 Nut, Screw, or Bolt	7.9 - 9.0 Nm (70 - 80 in-lb)
Special Cases (100A and 200A Models Only)	
Source A, B, and Load Power Terminal Screws Securing Busbar to Mechanism Housing:	
100A	7.0 - 8.0 Nm (62.0 - 70.8 in-lb)
200A	7.9 - 9.0 Nm (70 - 80 in-lb)
<i>SE Models Only:</i> Stainless Steel Inner and Outer Door Panel Screws	7.0 - 8.7 Nm (62 - 77 in-lb)
<i>SE Models Only:</i> Source A Power Terminal Screws Securing Busbar to Circuit Breaker	7.9 - 9.0 Nm (70 - 80 in-lb)

8.2 Switch Assembly Removal and Replacement Procedure

For servicing purposes, each transfer switch assembly is removed and replaced as a unit. There are no serviceable components.

⚠ WARNING

The transfer switch presents a shock hazard that can cause severe personal injury or death. Before beginning installation, remove all sources of AC power. If a generator provides emergency power, move the generator operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [-] lead first).

1. Remove all sources of power from the transfer switch in the following order.
 - a. Move the operation selector switch on the generator to Stop (Off).

⚠ CAUTION

Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits.

- b. If there is an external battery charger, disconnect the battery charger from its AC power source.

⚠ WARNING

Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark, arc, or flame while servicing batteries.

⚠ WARNING

Accidental starting of the generator can cause severe personal injury or death due to electrocution or contact with moving parts. Disconnect the starting battery cables, before performing service. Batteries emit hydrogen, a highly explosive gas. Thoroughly ventilate the battery compartment before removing battery cables. Remove the negative (-) cable (s) first to reduce the risk of arcing.

- c. Disconnect the generator starting battery (negative [-] lead first).

⚠ WARNING

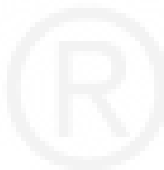
If the cabinet must be opened for any reason, remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

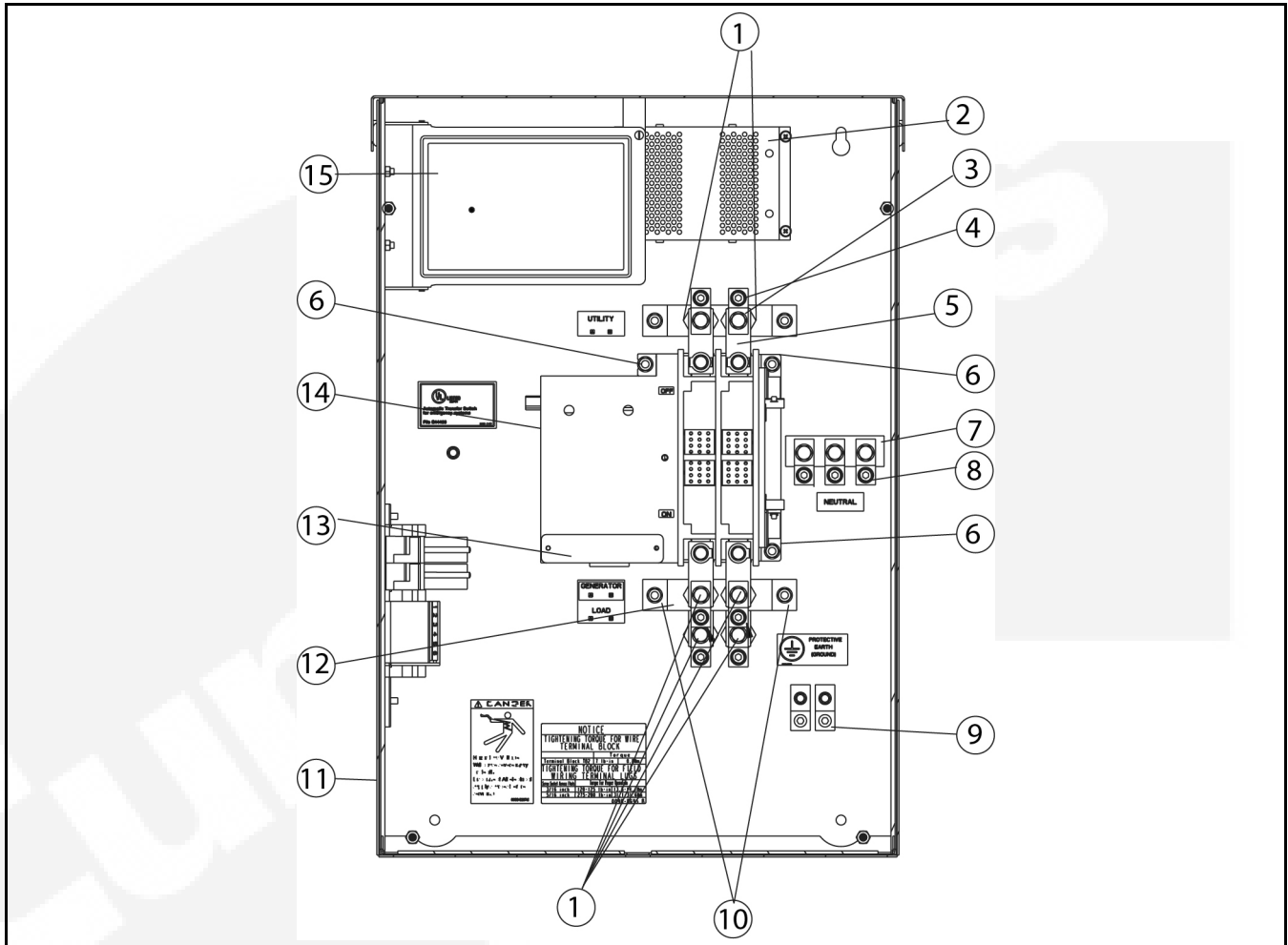
- d. Remove all AC power to the automatic transfer switch.
2. For transfer switches with a controller, remove the transfer switch cabinet door panel. For transfer switches without a controller, remove the outer and inner door panels.
 3. Remove all control and power wiring from the switch terminals.
 4. Loosen the six 1/4-20 bolts (item 1 in [Figure 29](#) or [Figure 30](#)) securing the mechanical lugs.
 5. For transfer switches with a controller or with one circuit breaker, loosen and remove the two screws, nuts, and washers (items 2 in [Figure 29](#) or [Figure 30](#)) securing the bracket at the load and emergency side (bottom) of the switch.
 6. Loosen and remove all M6 nuts and lock washers (item 3 in [Figure 29](#) or [Figure 30](#)) securing the switch to the rear wall of the cabinet.
 7. Remove the switch and bottom bracket from the cabinet.
 8. Mark the bus bar of each phase of the Utility/Generator and Load. Then remove all of the bus bars from the old switch.

⚠ CAUTION

Mounting the bus bar in the wrong direction may increase the risk of a short to ground. Mount the bus bar with the long end toward the breaker.

9. Install the bus bars on the new switch in accordance to the markings. Making sure the long end of the bus bar is connected to the breaker.
10. Use the hardware removed in step 6 to install the new switch in the cabinet. Torque the M6 nuts to 50 in-lbs (5.6 N·m) and torque the 1/2-20 screws to 80 in-lbs (9 N·m).
11. For transfer switches with a controller or with one circuit breaker, use the hardware removed in step 5 to install the bracket at the Load and Emergency side of the switch. Torque the M6 nuts to 50 in-lbs (5.6 N·m).
12. Tighten the 1/4-20 bolts securing the mechanical lugs. Torque the bolts to 80 in-lbs (9 N·m).
13. Reinstall the cabinet door panel(s).
14. Restore power.
 - a. Reconnect the generator starting battery (negative [+] lead first).
 - b. If there is an external battery charger, reconnect the battery charger to its AC power source.
 - c. Restore AC power to the automatic transfer switch.
 - d. Move the operation selector switch on the generator to the Remote (or Auto) position.





Number	Description	Number	Description
1	Insulated Standoff	9	Ground Lugs
2	Battery Charger	10	Neutral Bus Bar
3	Bus/Insulator Mounting Bolt	11	Enclosure
4	Quick Connect Terminal	12	Wire Connector (Sensing)
5	Bus Bar	13	Switch Mechanism Control Wire Connection
6	Mounting Screws	14	Switch Mechanism
7	Neutral Bar Assembly	15	Controller

FIGURE 29. INTERIOR COMPONENTS FOR TRANSFER SWITCH WITH CONTROLLER

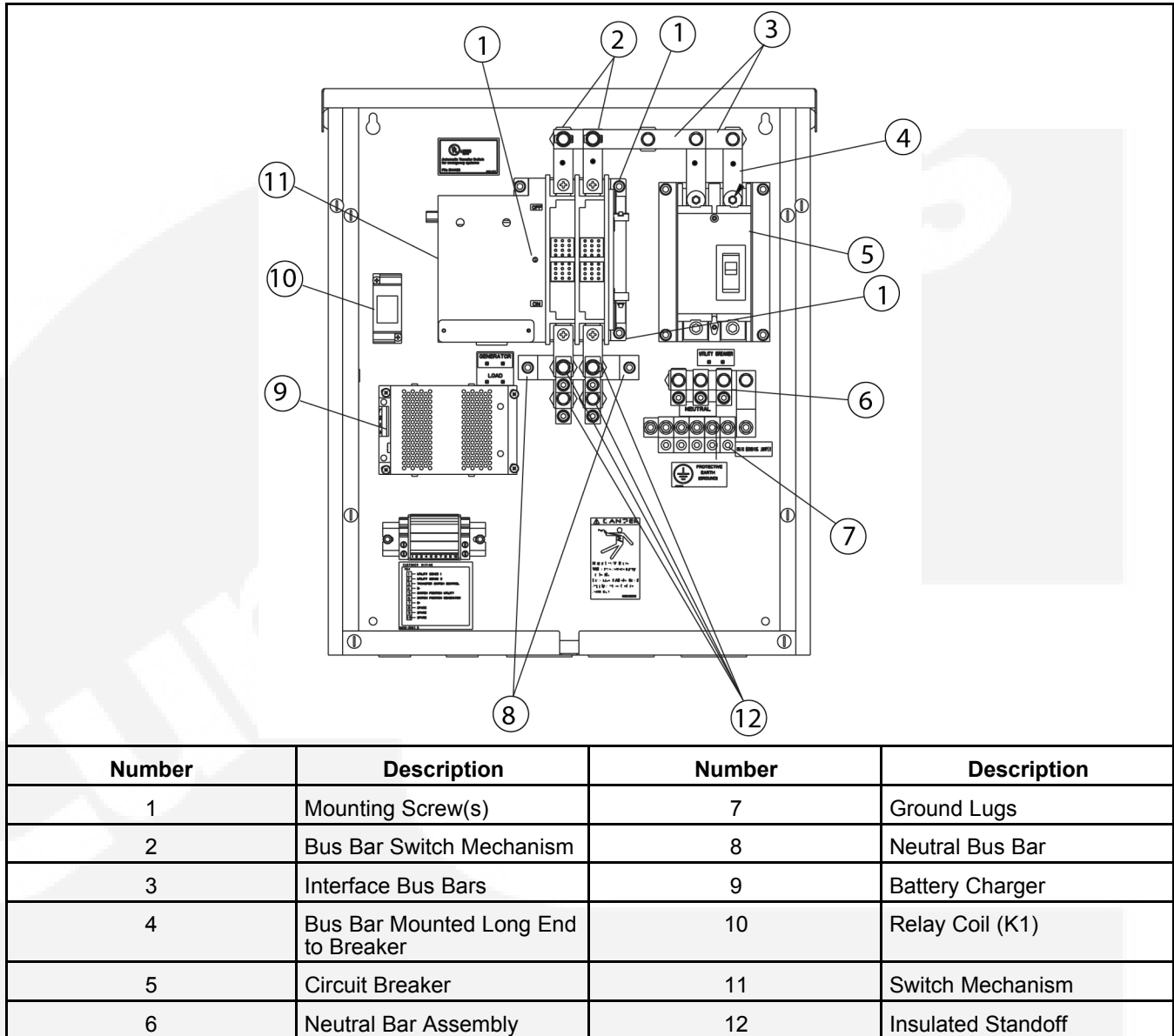


FIGURE 30. INTERIOR COMPONENTS FOR TRANSFER SWITCH WITHOUT CONTROLLER (ONE CIRCUIT BREAKER)

8.3 Limit Switch Replacement Procedure

⚠ WARNING

The transfer switch presents a shock hazard that can cause severe personal injury or death. Before beginning installation, remove all sources of AC power. If a generator provides emergency power, move the generator operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [-] lead first).

⚠ WARNING

1. Remove all sources of power from the transfer switch in the following order.
 - a. Move the operation selector switch on the generator to Stop (Off).

⚠ CAUTION

Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits.

- b. If there is an external battery charger, disconnect the battery charger from its AC power source.

⚠ WARNING

Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark, arc, or flame while servicing batteries.

⚠ WARNING

Accidental starting of the generator can cause severe personal injury or death due to electrocution or contact with moving parts. Disconnect the starting battery cables, before performing service. Batteries emit hydrogen, a highly explosive gas. Thoroughly ventilate the battery compartment before removing battery cables. Remove the negative (-) cable (s) first to reduce the risk of arcing.

- c. Disconnect the generator starting battery (negative [-] lead first).

⚠ WARNING

If the cabinet must be opened for any reason, remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

- d. Remove AC power to the automatic transfer switch.
2. Remove the transfer switch cabinet door panel.
3. Mark and disconnect all wires connected to the limit switches; see [Figure 32](#).
4. Remove the faulty limit switch.
5. Install the new limit switches. Use the manual operation handle; see [Figure 34](#) to rotate the shaft so that the limit switches are installed as shown in [Figure 32](#).
6. Restore power.
 - a. Reconnect the generator starting battery (negative [-] lead first).
 - b. If there is an external battery charger, reconnect the battery charger to its AC power source.
 - c. Restore AC power to the automatic transfer switch.
 - d. Move the operation selector switch on the generator to the Remote (or Auto) position.

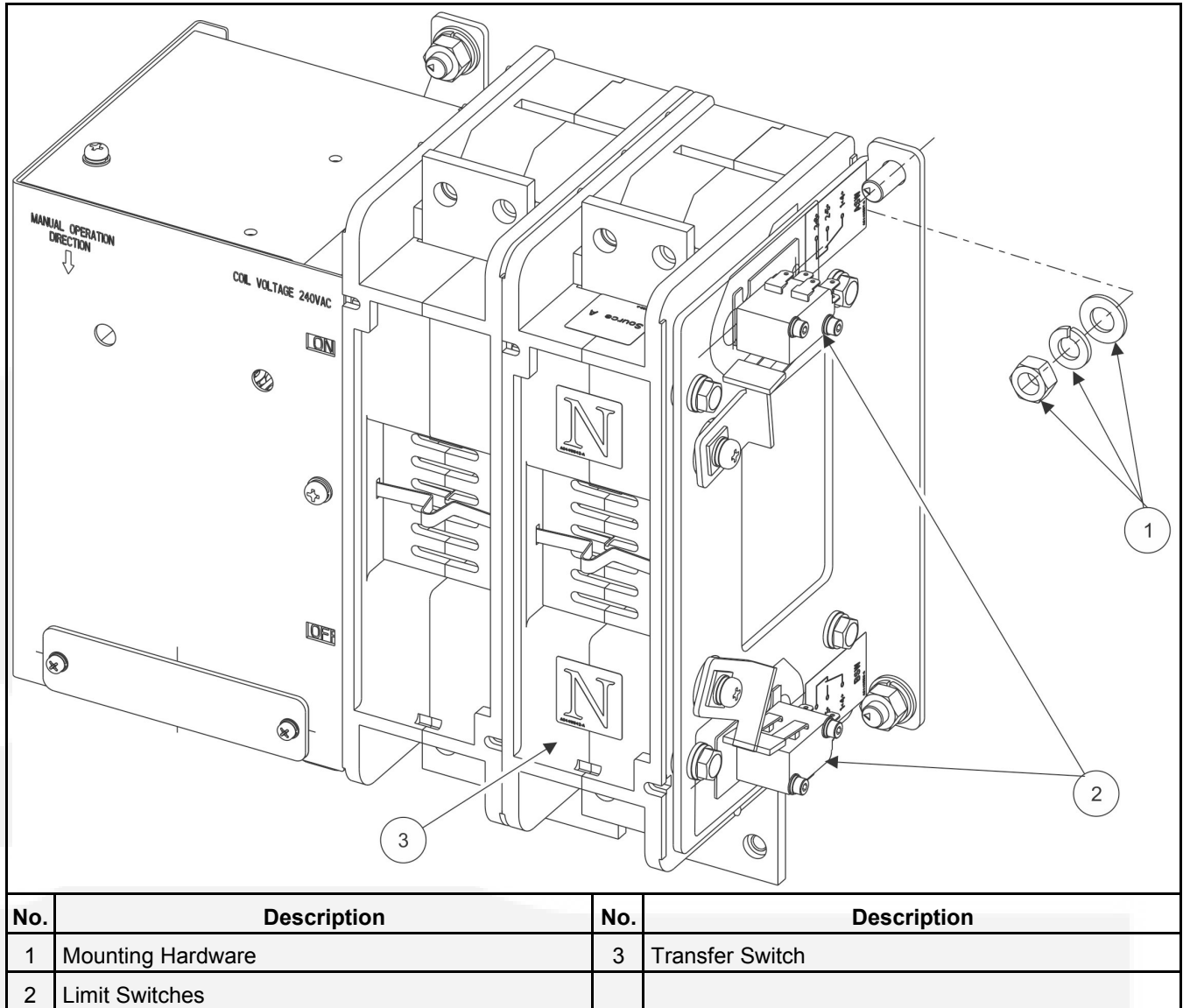
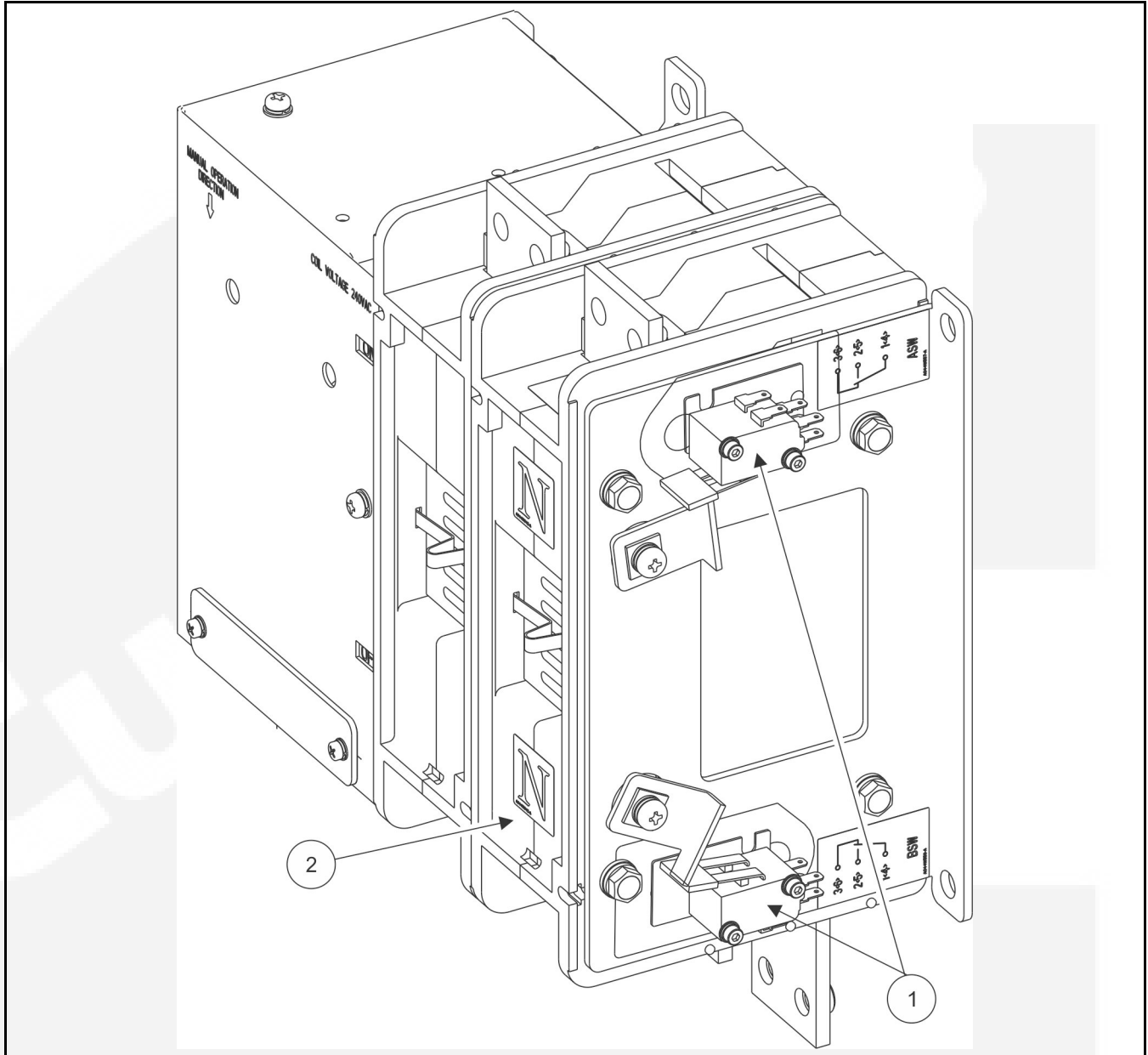
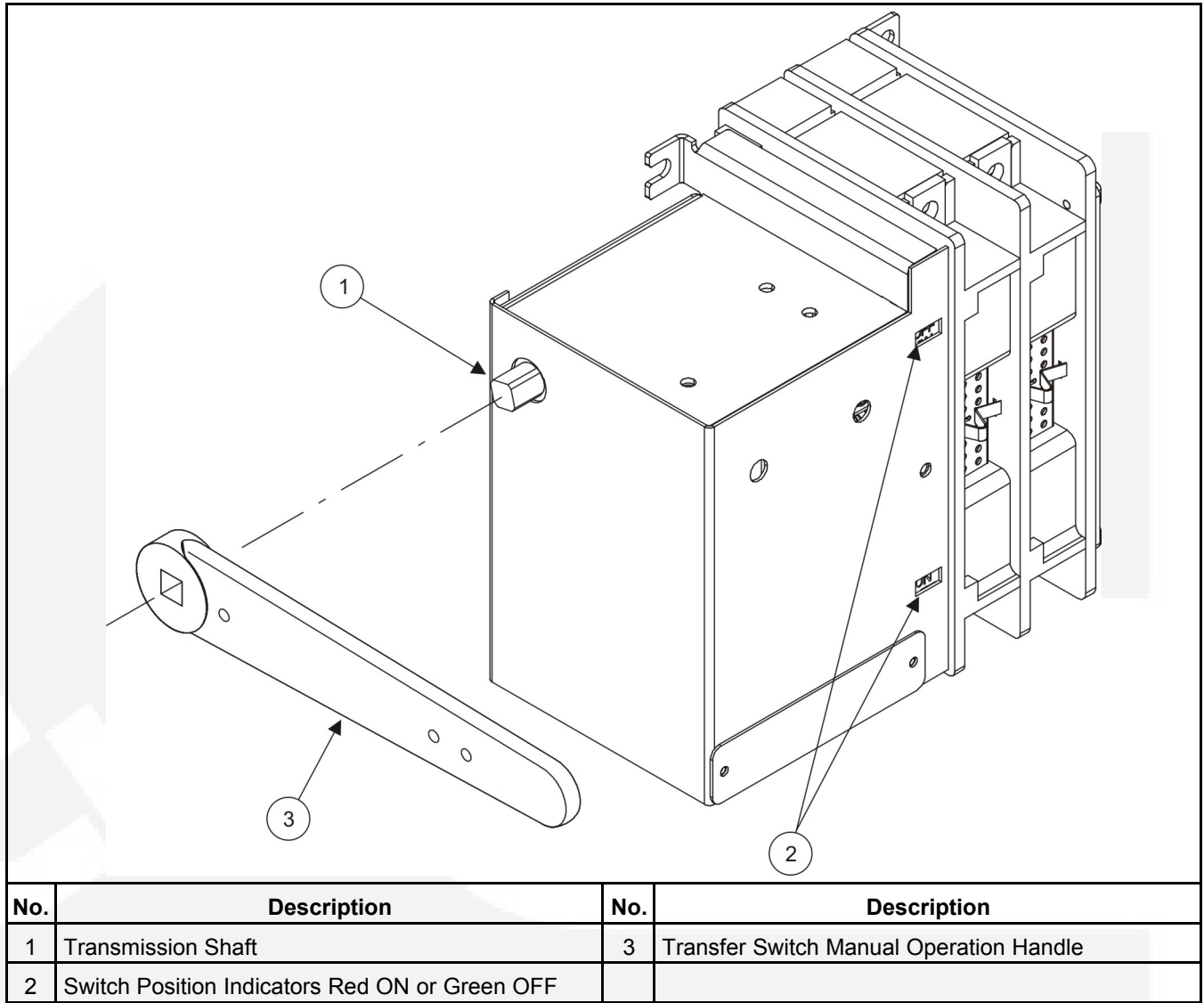


FIGURE 31. RA 100A/200A TRANSFER SWITCH REMOVAL



No.	Description	No.	Description
1	Limit Switches	2	Transfer Switch

FIGURE 32. RA 400A TRANSFER SWITCH REMOVAL



No.	Description	No.	Description
1	Transmission Shaft	3	Transfer Switch Manual Operation Handle
2	Switch Position Indicators Red ON or Green OFF		

FIGURE 33. RA 100A/200A MANUAL OPERATION HANDLE

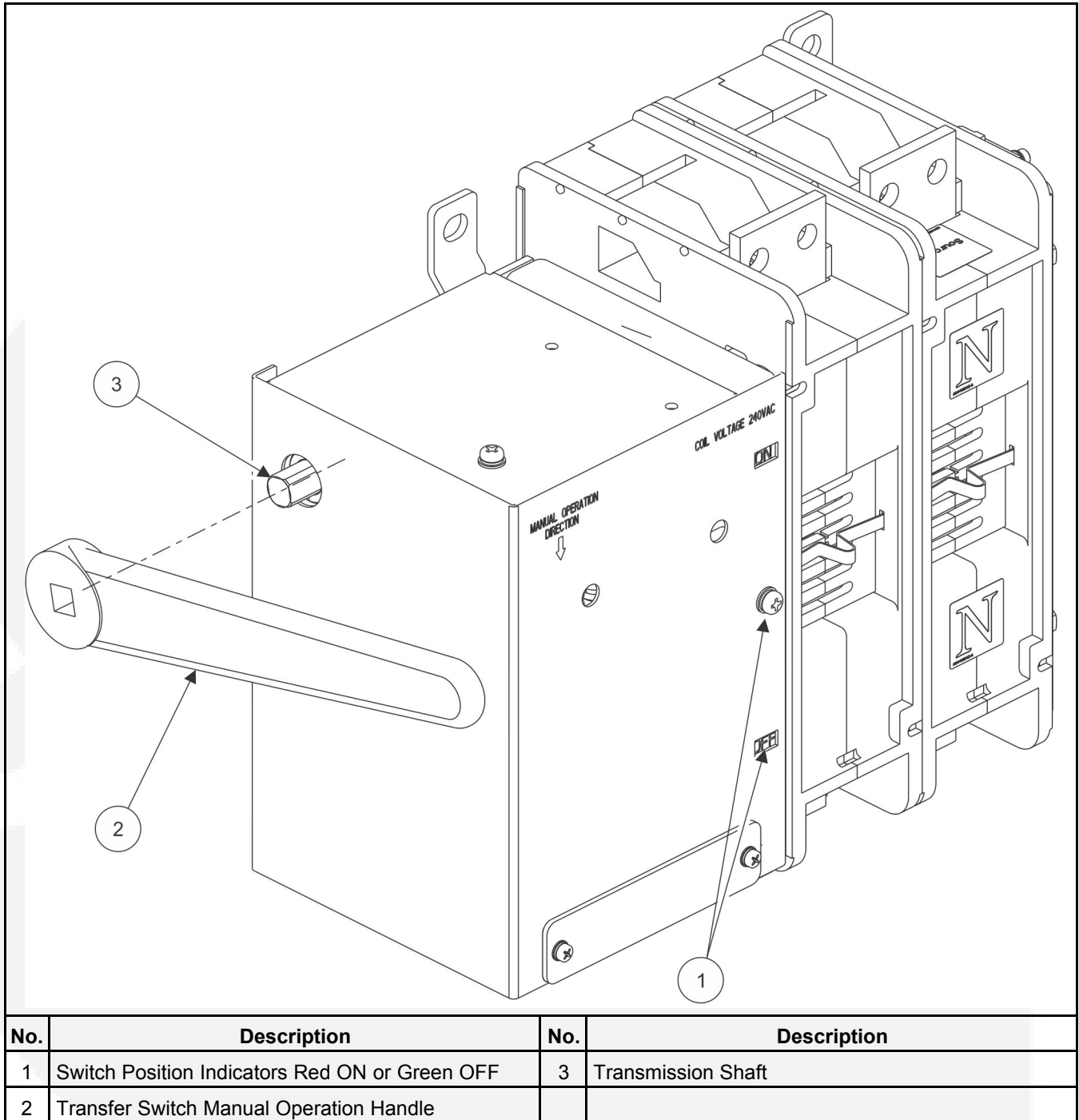


FIGURE 34. RA 400A MANUAL OPERATION HANDLE

8.4 Control Replacement Procedure

This procedure is only for RSS transfer switches that include a controller.

⚠ WARNING

The transfer switch presents a shock hazard that can cause severe personal injury or death. Before beginning installation, remove all sources of AC power. If a generator provides emergency power, move the generator operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [-] lead first).

1. Remove all sources of power from the transfer switch in the following order.
 - a. Move the operation selector switch on the generator to Stop (Off).

⚠ CAUTION

Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits.

- b. If there is an external battery charger, disconnect the battery charger from its AC power source.

⚠ WARNING

Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark, arc, or flame while servicing batteries.

⚠ WARNING

Accidental starting of the generator can cause severe personal injury or death due to electrocution or contact with moving parts. Disconnect the starting battery cables, before performing service. Batteries emit hydrogen, a highly explosive gas. Thoroughly ventilate the battery compartment before removing battery cables. Remove the negative (-) cable (s) first to reduce the risk of arcing.

- c. Disconnect the generator starting battery (negative [-] lead first).

⚠ WARNING

If the cabinet must be opened for any reason, remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

- d. Remove AC power to the automatic transfer switch.
2. Remove the transfer switch cabinet door panel.
3. Unplug the P3, P4, and P5 connectors from the back of the control, see [Figure 35](#).
4. Loosen and remove the two retaining clips and the control from the control mounting bracket.
5. Insert the new control in the mounting bracket. Make sure the control gasket is installed between the control and the mounting bracket.
6. Use the two retaining clips to secure the control to the mounting bracket. The clips are installed on the sides of the control, see [Figure 35](#).

7. Reconnect the P3, P4, and P5 connectors to the control. Make sure the P3 and P5 connectors are in the correct slots, see [Figure 35](#).
8. Reinstall the transfer switch cabinet door panel.
9. Restore power.
 - a. Reconnect the generator starting battery (negative [+] lead first).
 - b. If there is an external battery charger, reconnect the battery charger to its AC power source.
 - c. Restore AC power to the automatic transfer switch.
 - d. Move the operation selector switch on the generator to the Remote (or Auto) position.

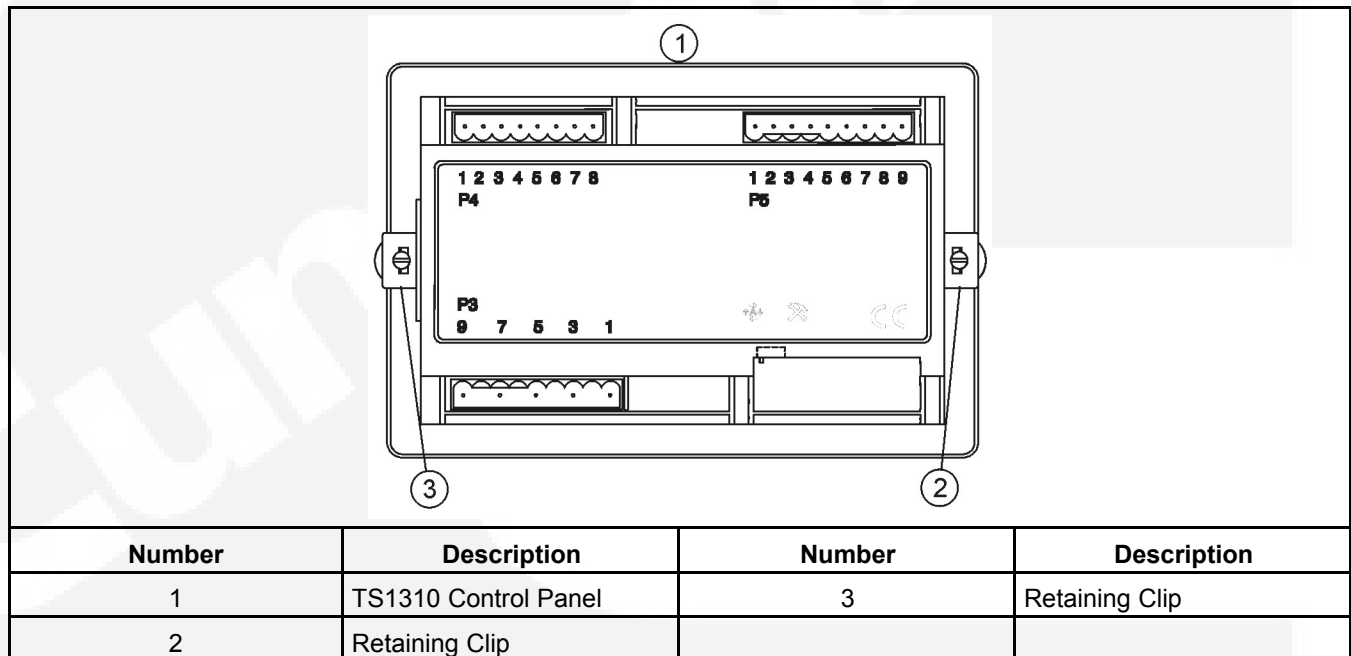


FIGURE 35. CONTROL CONNECTORS

8.5 Battery Charger Replacement Procedure

⚠ WARNING

The transfer switch presents a shock hazard that can cause severe personal injury or death. Before beginning installation, remove all sources of AC power. If a generator provides emergency power, move the generator operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [-] lead first).

1. Remove all sources of power from the transfer switch in the following order.
 - a. Move the operation selector switch on the generator to Stop (Off).

⚠ CAUTION

Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits.

- b. If there is an external battery charger, disconnect the battery charger from its AC power source.

⚠ WARNING

Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark, arc, or flame while servicing batteries.

⚠ WARNING

Accidental starting of the generator can cause severe personal injury or death due to electrocution or contact with moving parts. Disconnect the starting battery cables, before performing service. Batteries emit hydrogen, a highly explosive gas. Thoroughly ventilate the battery compartment before removing battery cables. Remove the negative (-) cable (s) first to reduce the risk of arcing.

- c. Disconnect the generator starting battery (negative [-] lead first).

⚠ WARNING

If the cabinet must be opened for any reason, remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

- d. Remove AC power to the automatic transfer switch.
2. Remove the transfer switch cabinet door panel.
 3. Disconnect the AC power cord from the battery charger.
 4. Disconnect the two wires connecting the battery charger to TB 2 (transfer switches with a controller) or TB 4 (transfer switches without a controller).
 5. Loosen and remove the hardware securing the battery charger mounting brackets.
 6. Remove the brackets and the charger.
 7. Use the hardware remove in step 5 to secure the mounting brackets and new charger to the inside of the transfer switch cabinet, see [Figure 29](#).
 8. Reconnect the two wires connecting either TB2 or TB4 to the battery charger.
 9. Reconnect the AC power cord to the battery charger.
 10. Reinstall the transfer switch cabinet door panel.
 11. Restore power.
 - a. Reconnect the generator starting battery (negative [+] lead first).
 - b. If there is an external battery charger, reconnect the battery charger to its AC power source.
 - c. Restore AC power to the automatic transfer switch.

- d. Move the operation selector switch on the generator to the Remote (or Auto) position.

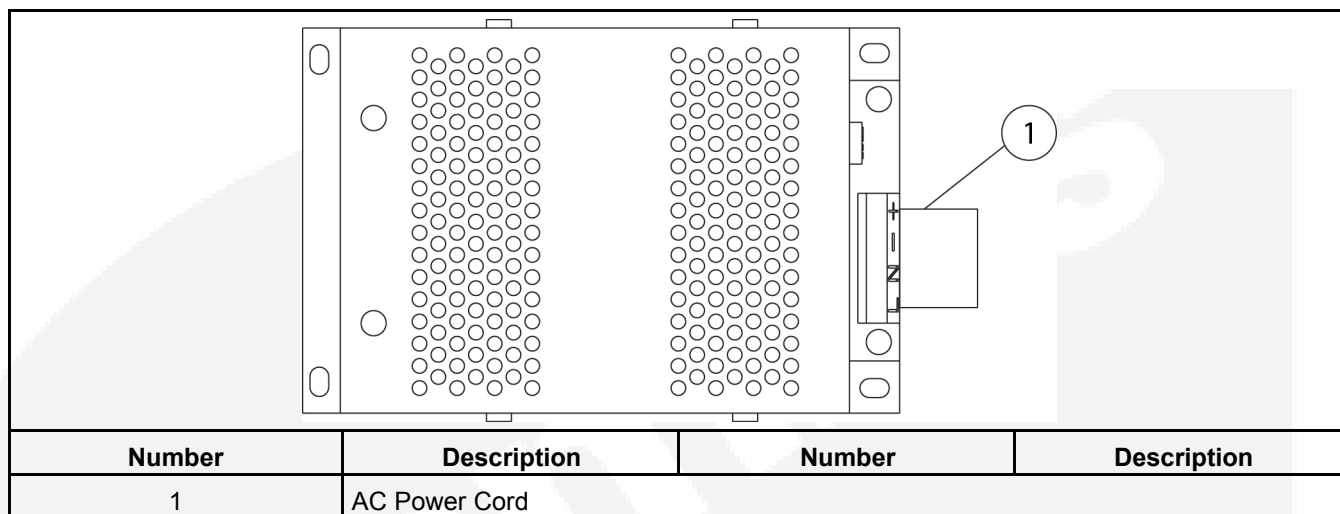


FIGURE 36. BATTERY CHARGER

8.6 Control Relay Replacement Procedure

NOTICE

Transfer switches with a controller include two control relays (K1 and K2). Transfer switches without a controller include only one control relay (K1).

⚠ WARNING

The transfer switch presents a shock hazard that can cause severe personal injury or death. Before beginning installation, remove all sources of AC power. If a generator provides emergency power, move the generator operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [-] lead first).

1. Remove all sources of power from the transfer switch in the following order.
 - a. Move the operation selector switch on the generator to Stop (Off).

⚠ CAUTION

Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits.

- b. If there is an external battery charger, disconnect the battery charger from its AC power source.

⚠ WARNING

Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark, arc, or flame while servicing batteries.

⚠ WARNING

Accidental starting of the generator can cause severe personal injury or death due to electrocution or contact with moving parts. Disconnect the starting battery cables, before performing service. Batteries emit hydrogen, a highly explosive gas. Thoroughly ventilate the battery compartment before removing battery cables. Remove the negative (-) cable (s) first to reduce the risk of arcing.

- c. Disconnect the generator starting battery (negative [-] lead first).

⚠ WARNING

If the cabinet must be opened for any reason, remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

- d. Remove AC power to the automatic transfer switch.
2. Remove the transfer switch cabinet door panel.
 3. Spread the relay clips apart and remove the relay(s) from the relay base(s).
 4. Install the new relay(s) on the relay base(s), making sure the screw head on the bottom of the relay matches up with the hole in the relay base.
 5. Make sure the relay clips are securing the relay(s) to the base(s).
 6. Restore power.

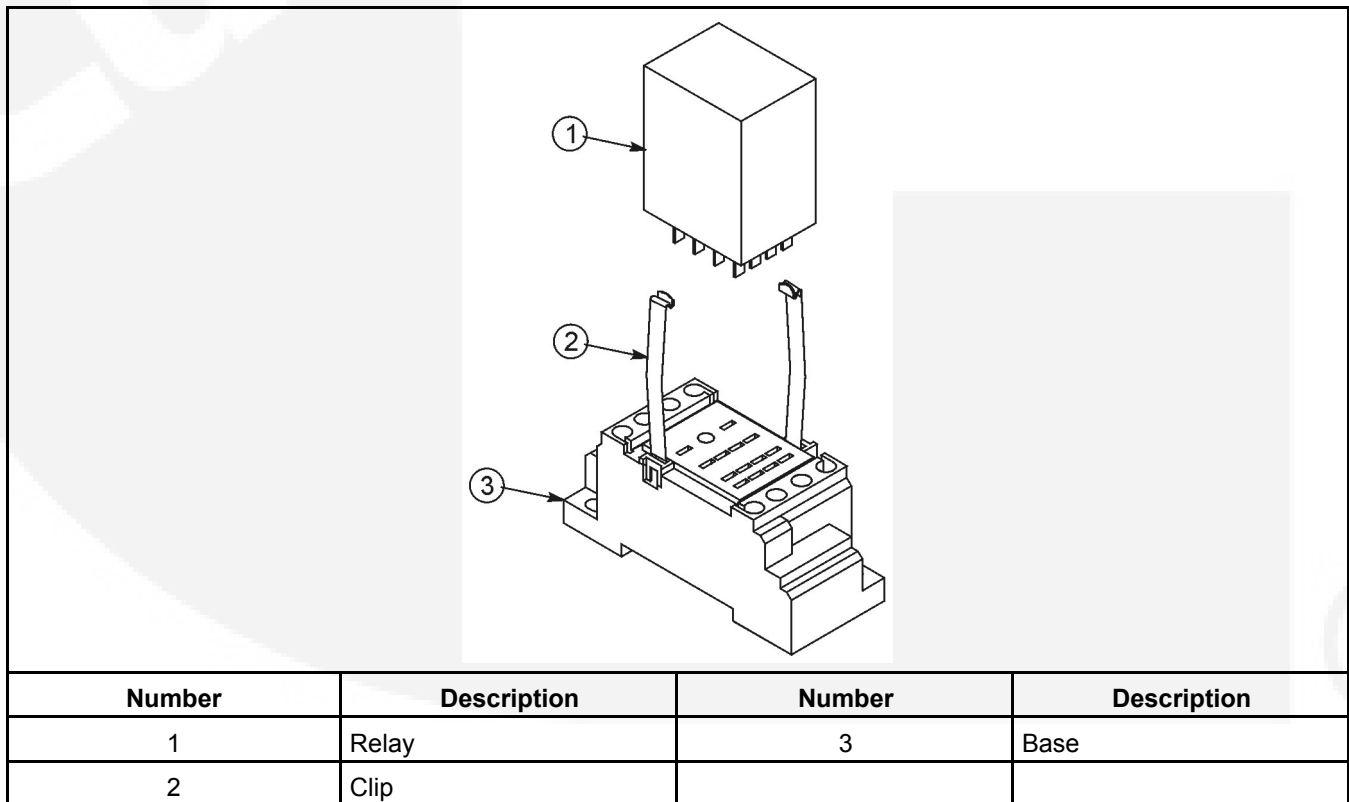


FIGURE 37. CONTROL RELAY INSTALLATION

8.7 Circuit Breaker Replacement Procedure

This procedure is only for RSS transfer switches without a controller.

⚠ WARNING

The transfer switch presents a shock hazard that can cause severe personal injury or death. Before beginning installation, remove all sources of AC power. If a generator provides emergency power, move the generator operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [-] lead first).

1. Remove all sources of power from the transfer switch in the following order.
 - a. Move the operation selector switch on the generator set to Stop (Off).

⚠ CAUTION

Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits.

- b. If there is an external battery charger, disconnect the battery charger from its AC power source.

⚠ WARNING

Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark, arc, or flame while servicing batteries.

⚠ WARNING

Accidental starting of the generator set can cause severe personal injury or death due to electrocution or contact with moving parts. Disconnect the starting battery cables, before performing service. Batteries emit hydrogen, a highly explosive gas. Thoroughly ventilate the battery compartment before removing battery cables. Remove the negative (-) cable (s) first to reduce the risk of arcing.

- c. Disconnect the generator set starting battery (negative [-] lead first).

⚠ WARNING

If the cabinet must be opened for any reason, remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

- d. Remove AC power to the automatic transfer switch.
2. Remove the transfer switch cabinet door panel.
3. Remove the hardware securing the bus bars to the circuit breaker.
4. Remove the two #8-32 screws securing the circuit breaker to the circuit breaker bracket.
5. Remove the circuit breaker.
6. Use the two #8-32 screws removed in step 4 to install the new circuit breaker.

7. Use the hardware removed in step 3 to reinstall the bus bars. Tighten the bolts to 80 in-lbs (9 N·m).
8. Restore power.
 - a. Reconnect the generator set starting battery (negative [+] lead first).
 - b. If there is an external battery charger, reconnect the battery charger to its AC power source.
 - c. Restore AC power to the automatic transfer switch.
 - d. Move the operation selector switch on the generator set to the Remote (or Auto) position.

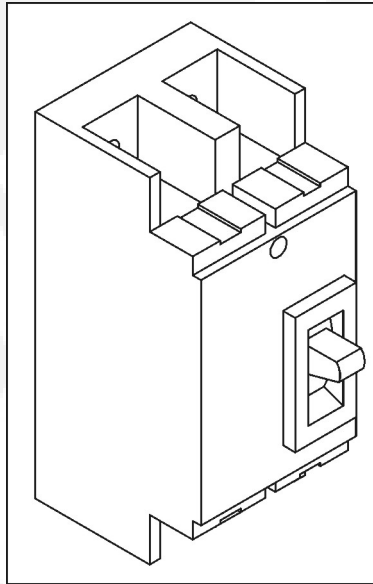


FIGURE 38. CIRCUIT BREAKER

8.8 Signal Transformer Replacement Procedure

This procedure is only for RSS transfer switches without a controller.

⚠ WARNING

The transfer switch presents a shock hazard that can cause severe personal injury or death. Before beginning installation, remove all sources of AC power. If a generator set provides emergency power, move the generator set operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [-] lead first).

1. Remove all sources of power from the transfer switch in the following order.
 - a. Move the operation selector switch on the generator to Stop (Off).

⚠ CAUTION

Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits.

- b. If there is an external battery charger, disconnect the battery charger from its AC power source.

⚠ WARNING

Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark, arc, or flame while servicing batteries.

⚠ WARNING

Accidental starting of the generator set can cause severe personal injury or death due to electrocution or contact with moving parts. Disconnect the starting battery cables, before performing service. Batteries emit hydrogen, a highly explosive gas. Thoroughly ventilate the battery compartment before removing battery cables. Remove the negative (-) cable (s) first to reduce the risk of arcing.

- c. Disconnect the generator starting battery (negative [-] lead first).

⚠ WARNING

If the cabinet must be opened for any reason, remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

- d. Remove AC power to the automatic transfer switch.
2. Remove the transfer switch cabinet door panel.
 3. Unplug the four connectors which connect to the transformer. Take note of how the transformer is installed.
 4. Remove the two M3 nuts securing the transformer to the side of the cabinet.
 5. Remove the transformer.
 6. Use the nuts removed in step 4 to install the new transformer with the same orientation as the old one.
 7. Plug the four connectors which connect to the transformer.
 8. Restore power.
 - a. Reconnect the generator starting battery (negative [+] lead first).
 - b. If there is an external battery charger, reconnect the battery charger to its AC power source.
 - c. Restore AC power to the automatic transfer switch.
 - d. Move the operation selector switch on the generator to the Remote (or Auto) position.

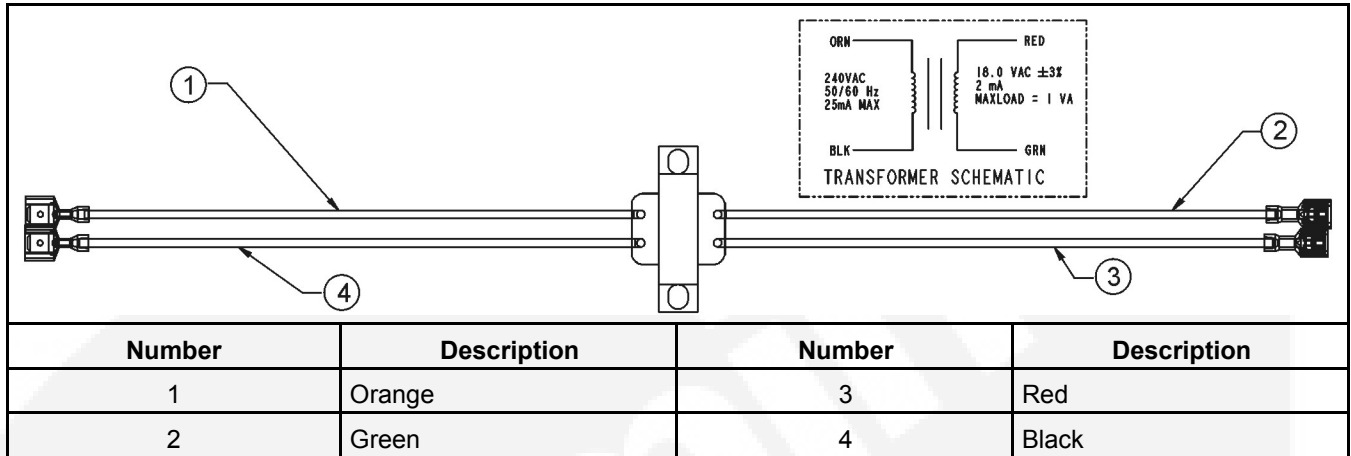


FIGURE 39. SIGNAL TRANSFORMER

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This section includes information on replaceable parts used with RSS transfer switches that include a controller and transfer switches that don't include a controller, see [Figure 40](#).

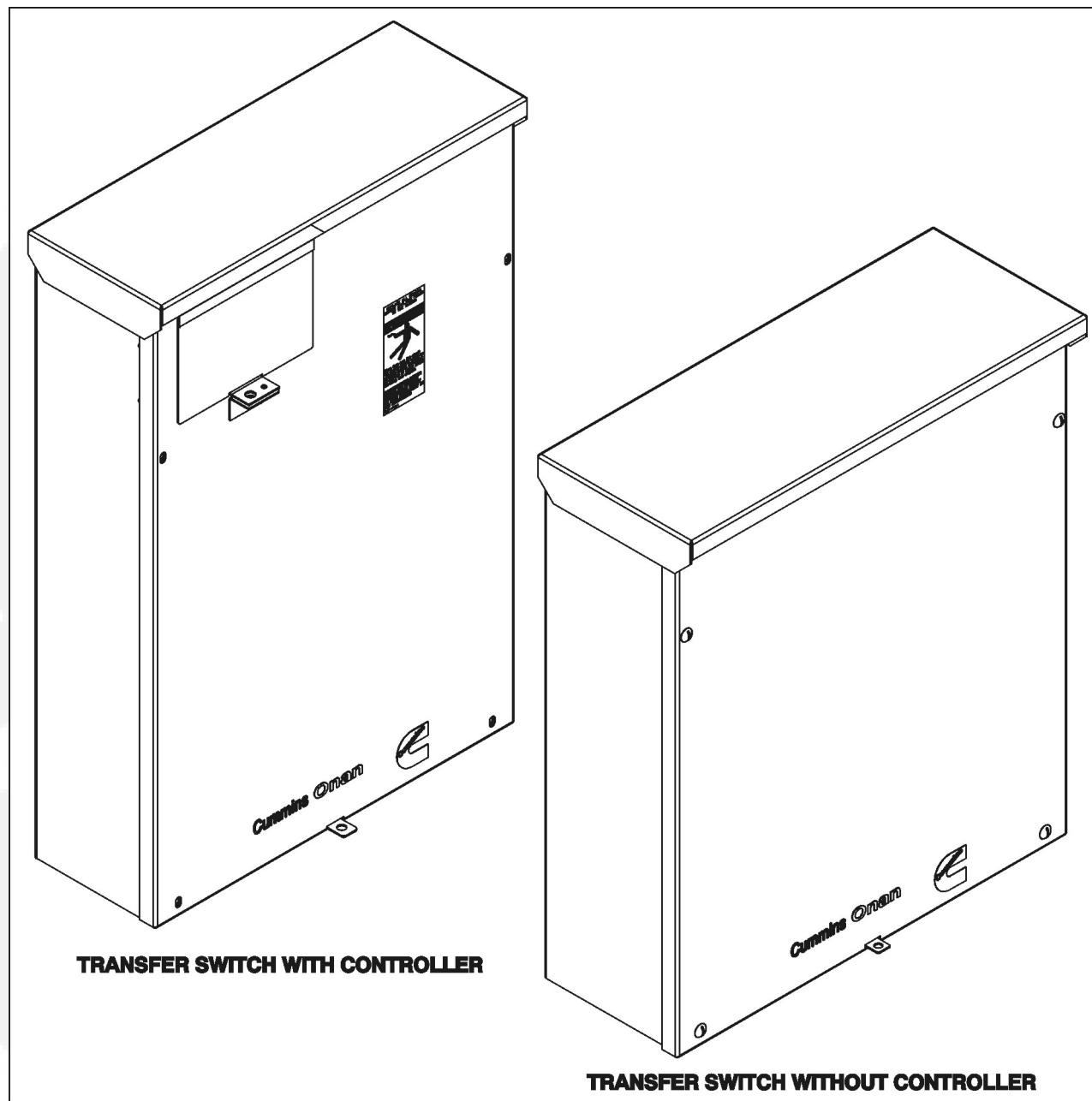


FIGURE 40. RSS TRANSFER SWITCH TYPES

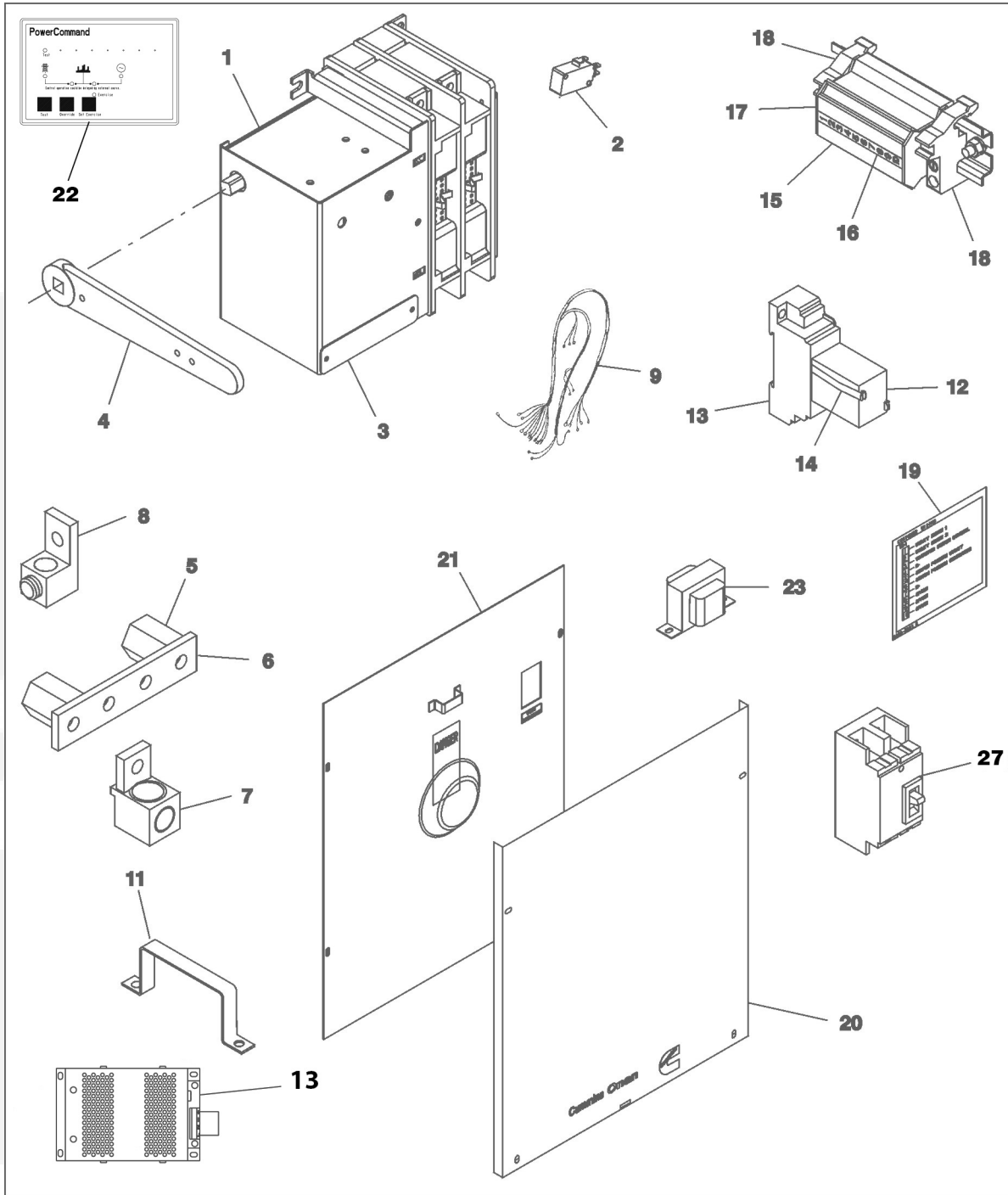


FIGURE 41. RSS TRANSFER SWITCH WITH A CONTROLLER

TABLE 22. RSS TRANSFER SWITCH WITH A CONTROLLER

Ref No.	Part No.	Qty Used	Part Description
1			Transfer Switch Mechanixm (Includes Items 2 and 3)
	306-5191	1	RSS100
	306-5192	1	RSS200
2	308-1235	2	Limit Switch (ASW and BSW) *(Not sold separately - Order item #1)*
3	319-6882	1	Terminal Cover, Switch Mechanism
4	306-5297	1	Handle, Manual Operation
5	332-2370	2	Standoff, Isolated
6			Neutral Bus Bar
	337-3927	1	RSS100
	337-3982	1	RSS200
7			Lug, Mechanical (Neutral and Mechanical)
	332-3084	9	RSS100
	332-3038	9	RSS200
8	332-3647	2	Lug, Ground
9			Harness (Includes Items 10, 11, and 12)
	338-4994	1	RSS100
	338-5007	1	RSS200
10	323-2170-04	1	Controller Connector, 9 Pin (P3)
11	323-1678-08	1	Controller Connector, 8 Pin (P4)
12	323-1678-20	1	Controller Connector, 9 Pin (P5)
13	A046Y535	1	Battery Charger *Adapter kit A048K877 also required for units built before 10/2013
14	319-6431	2	Bracket, Mounting - Battery Charger
15	307-3070	2	Relay, Control
16	307-3076	2	Base, Relay
17	307-3077	4	Bracket, Relay Clip
18	332-4373-02	1	Terminal Block, 6 Pole
19	098-8422-04	1	Label, Terminal Block
20	332-4144	2	End Cap, Terminal Block
21	332-4145	3	End Bracket, Terminal
22	300-5965	1	Control Display - Line-to-Line Voltage Sensing (TS1310)
23	319-6881	1	Bracket, Controller Mounting
24	098-8692	1	Label, Customer Connection
25	319-6880	1	Door Panel - RSS100
26	319-6894	1	Door Panel - RSS200

Ref No.	Part No.	Qty Used	Part Description
27		1	Circuit Breaker
	320-2473-01		RSS100
	320-2473-02		RSS200

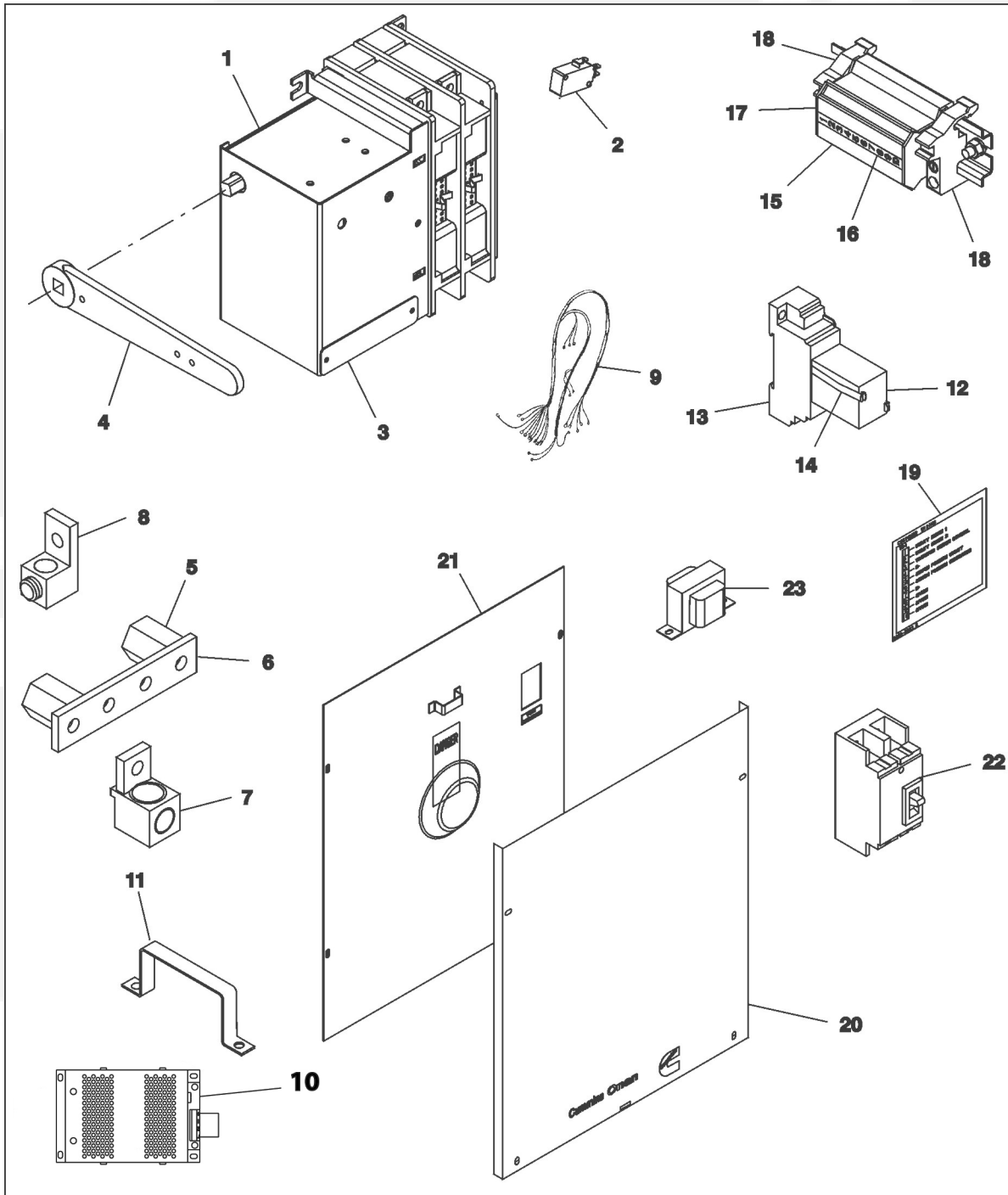


FIGURE 42. RSS TRANSFER SWITCH WITHOUT A CONTROLLER

TABLE 24. RSS TRANSFER SWITCH WITHOUT A CONTROLLER

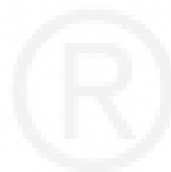
Ref No.	Part No.	Qty Used	Part Description
1			Transfer Switch Mechanism (Includes Items 2 and 3)
	306-5191	1	RSS100
	306-5192	1	RSS200
2	308-1235	2	Limit Switch
3	319-6882	1	Terminal Cover, Switch Mechanism
4	306-5297	1	Handle, Manual Operation
5	332-2370	2	Standoff, Insulated
6			Neutral Bus Bar
	337-3942	1	RSS100
	337-3984	1	RSS200
7			Lug, Mechanical (Neutral and Mechanical)
	332-3084	7	RSS100
	332-3038	4	RSS200
8	332-3647	5	Lug, Ground
9	338-5058	1	Harness
10	A046Y537	1	Battery Charger *Adapter kit A048K877 also required for units built before 10/2013
11	319-6431	2	Bracket, Mounting - Battery Charger
12	307-3146	1	Relay, Control
13	307-3147	1	Base, Relay
14	307-3077	2	Bracket, Relay Clip
15	332-4373-01	1	Terminal Block, 10 Pole
16	098-8422-01	1	Label, Terminal Block
17	332-4144	2	End Cap, Terminal Block
18	332-4145	2	End Bracket, Terminal
19	098-8803	1	Label, Customer Connection
20	319-7055	1	Door Panel, Outer
21	319-7056	1	Door Panel, Inner
22			Circuit Breaker
	320-2473-01	1	RSS100
	320-2473-02	1	RSS200
23	315-1731	1	Transformer

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B.0 Typical Conditional Schematic

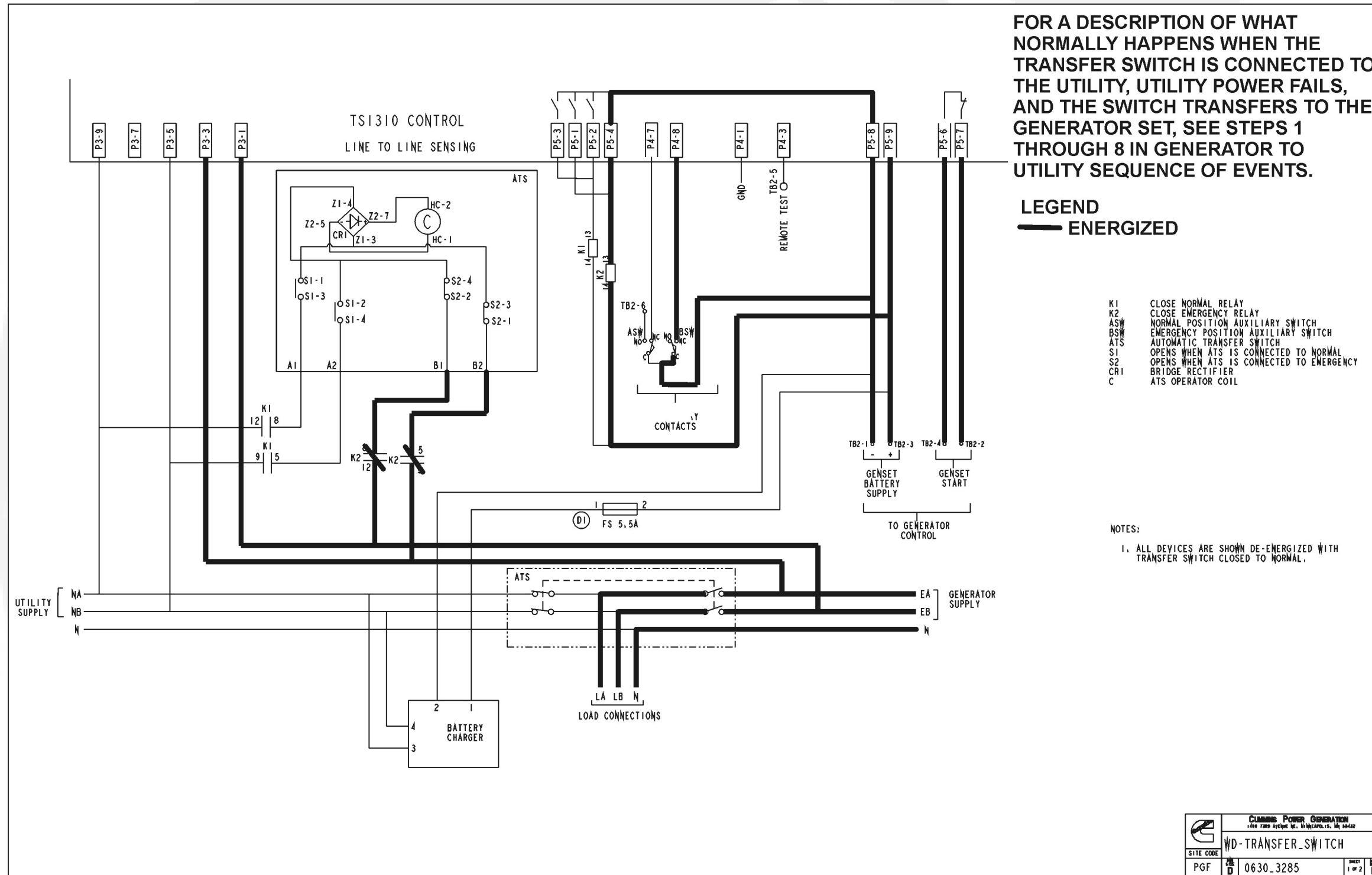


FIGURE 43. LOSS OF UTILITY POWER OCCURS, TRANSFER FROM THE UTILITY TO THE GENERATOR SET

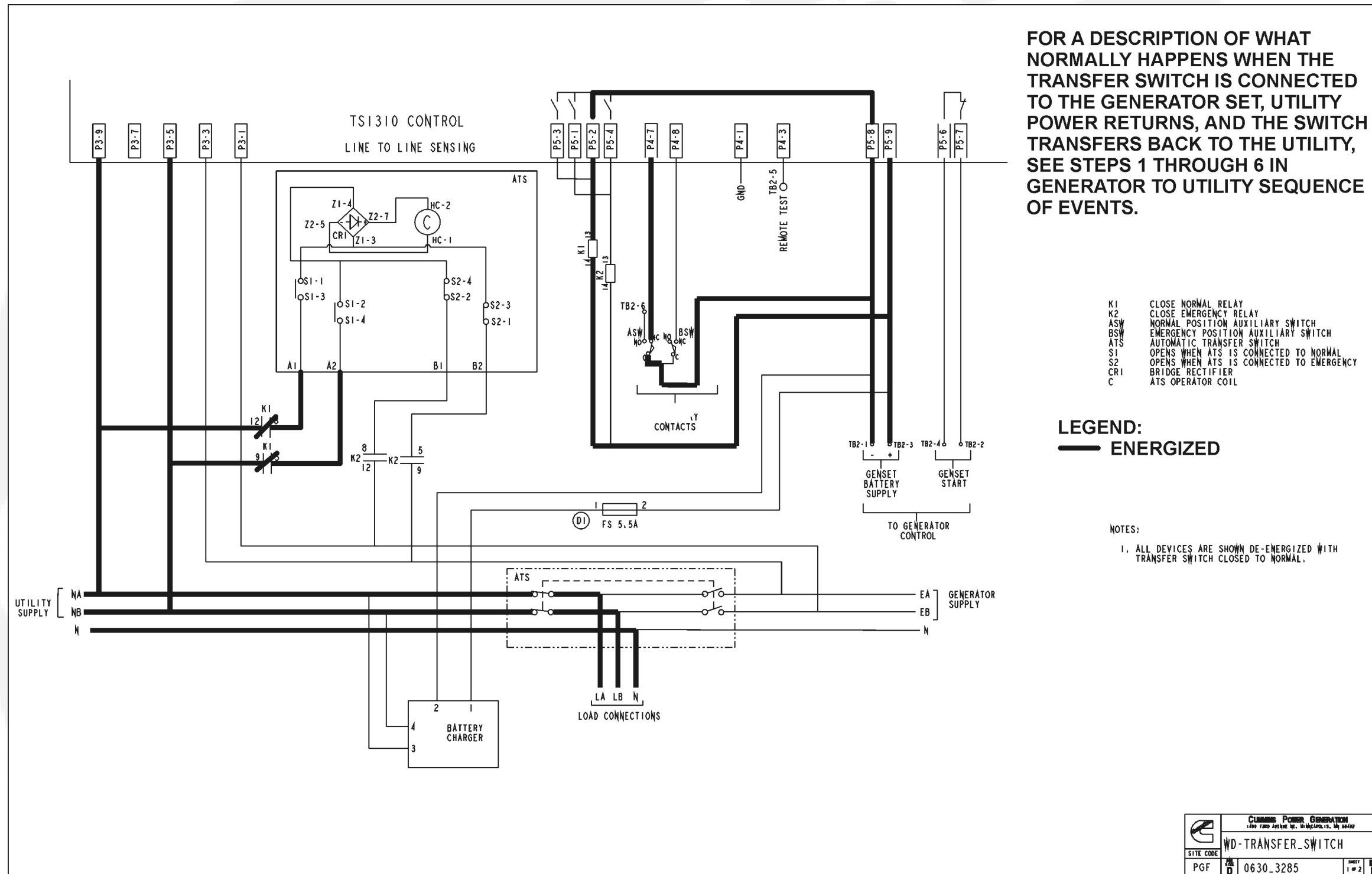


FIGURE 44. UTILITY POWER RETURNS, TRANSFER FROM THE GENERATOR SET TO THE UTILITY

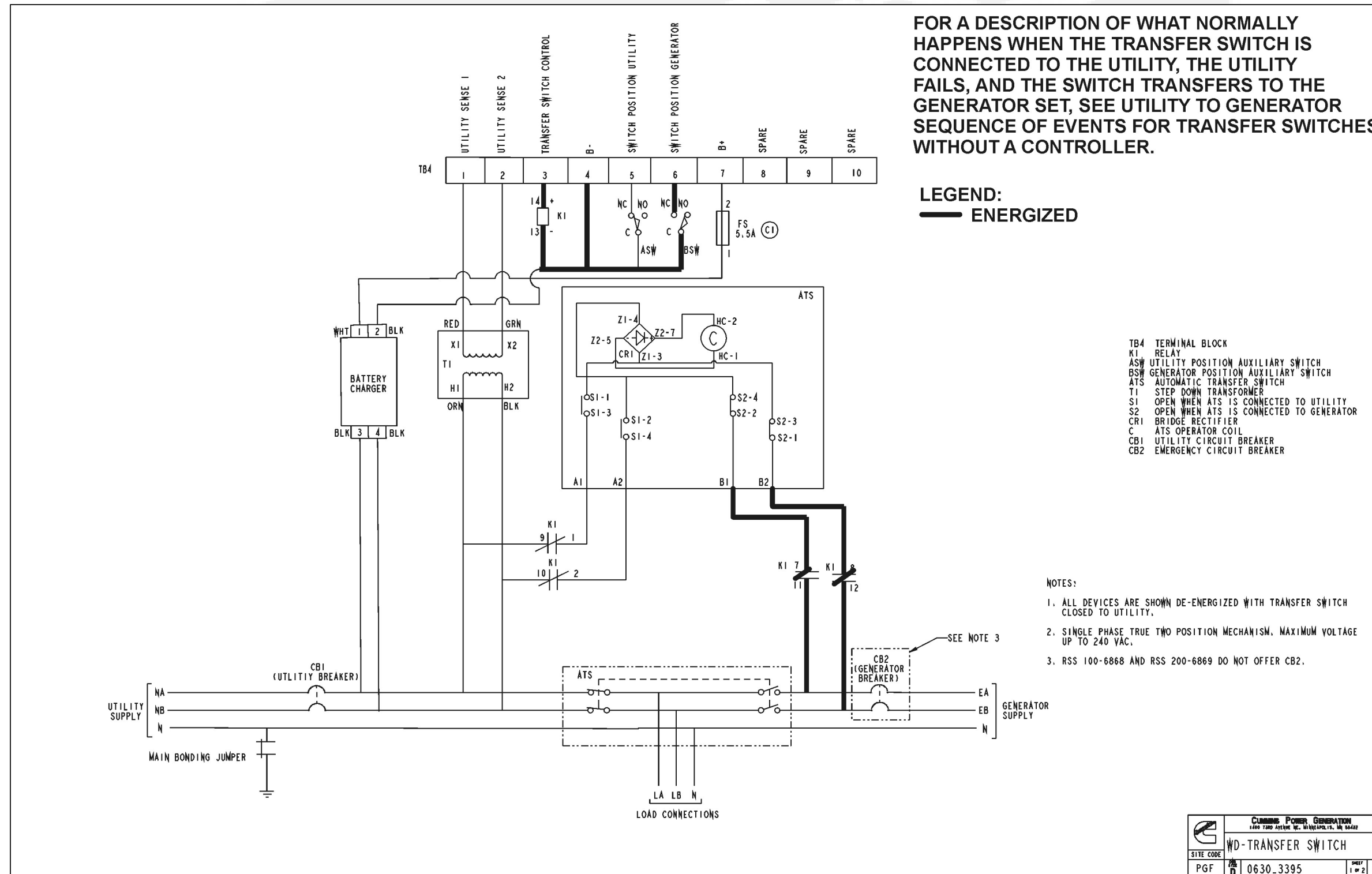


FIGURE 45. LOSS OF UTILITY POWER OCCURS, TRANSFER FROM THE UTILITY TO THE GENERATOR SET

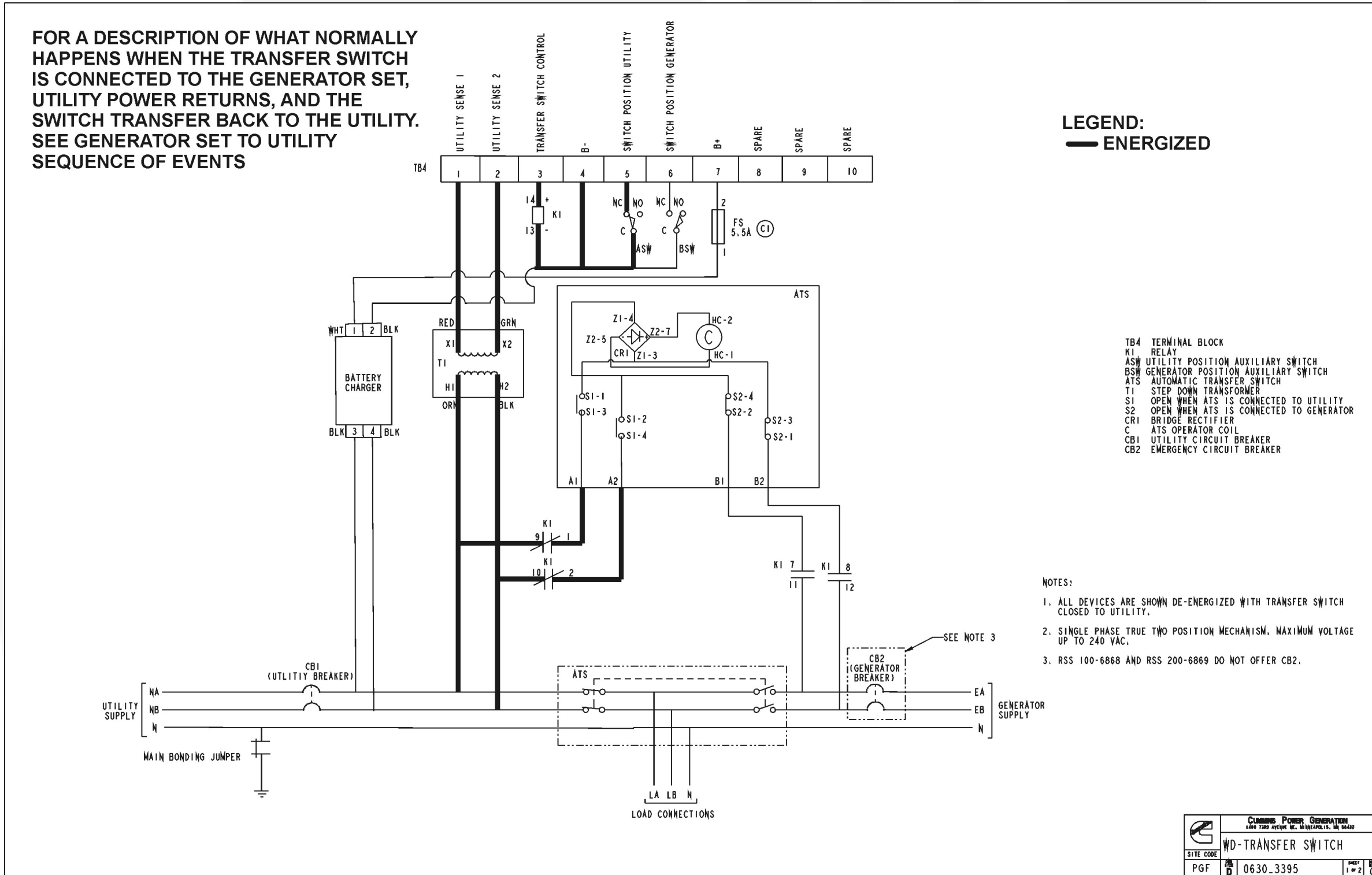


FIGURE 46. UTILITY POWER RETURNS, TRANSFER FROM THE GENERATOR SET TO THE UTILITY

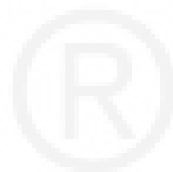
Appendix C. Wiring Diagrams

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C.0 RSS Transfer Switch Wire Diagram

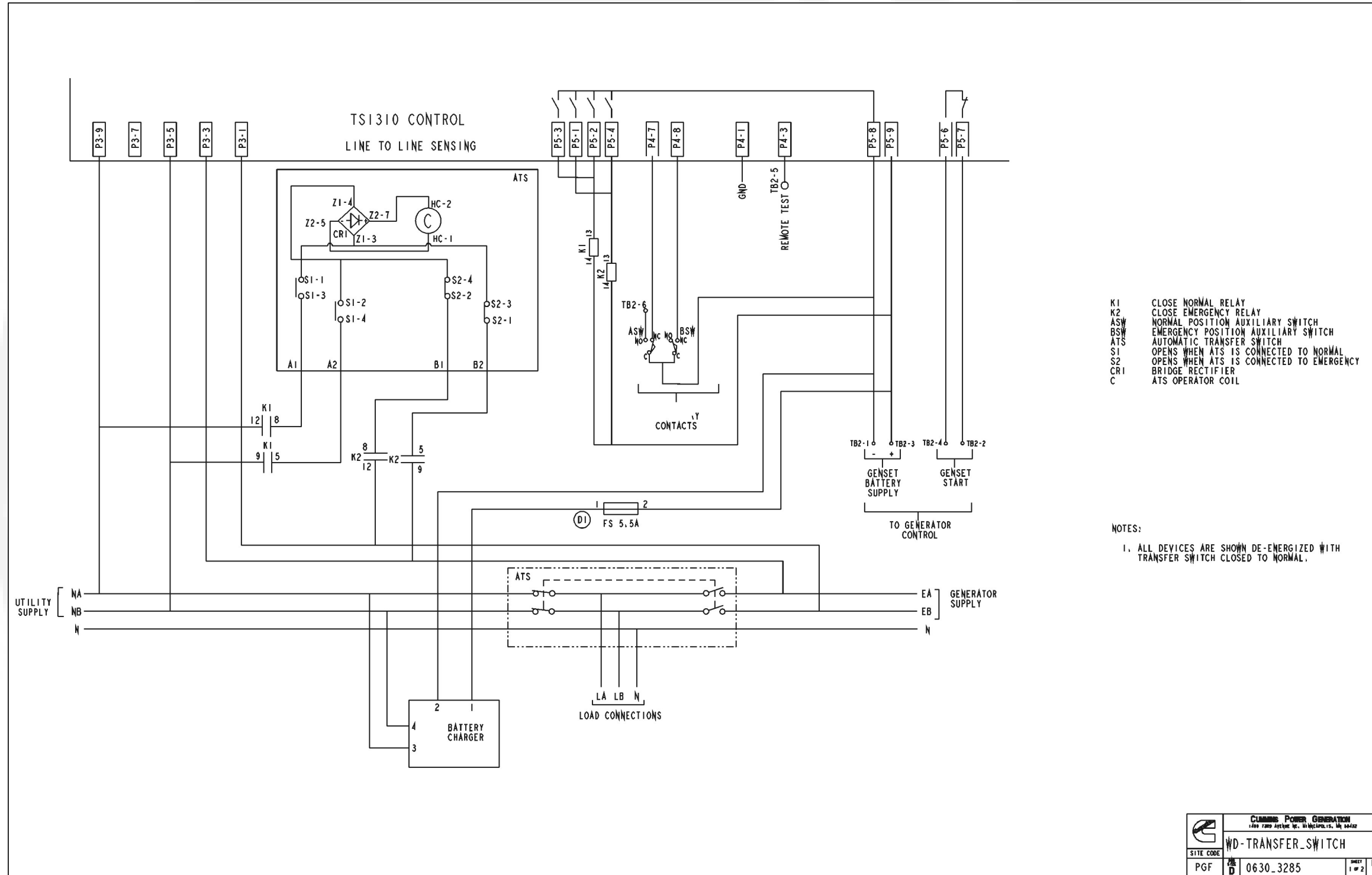
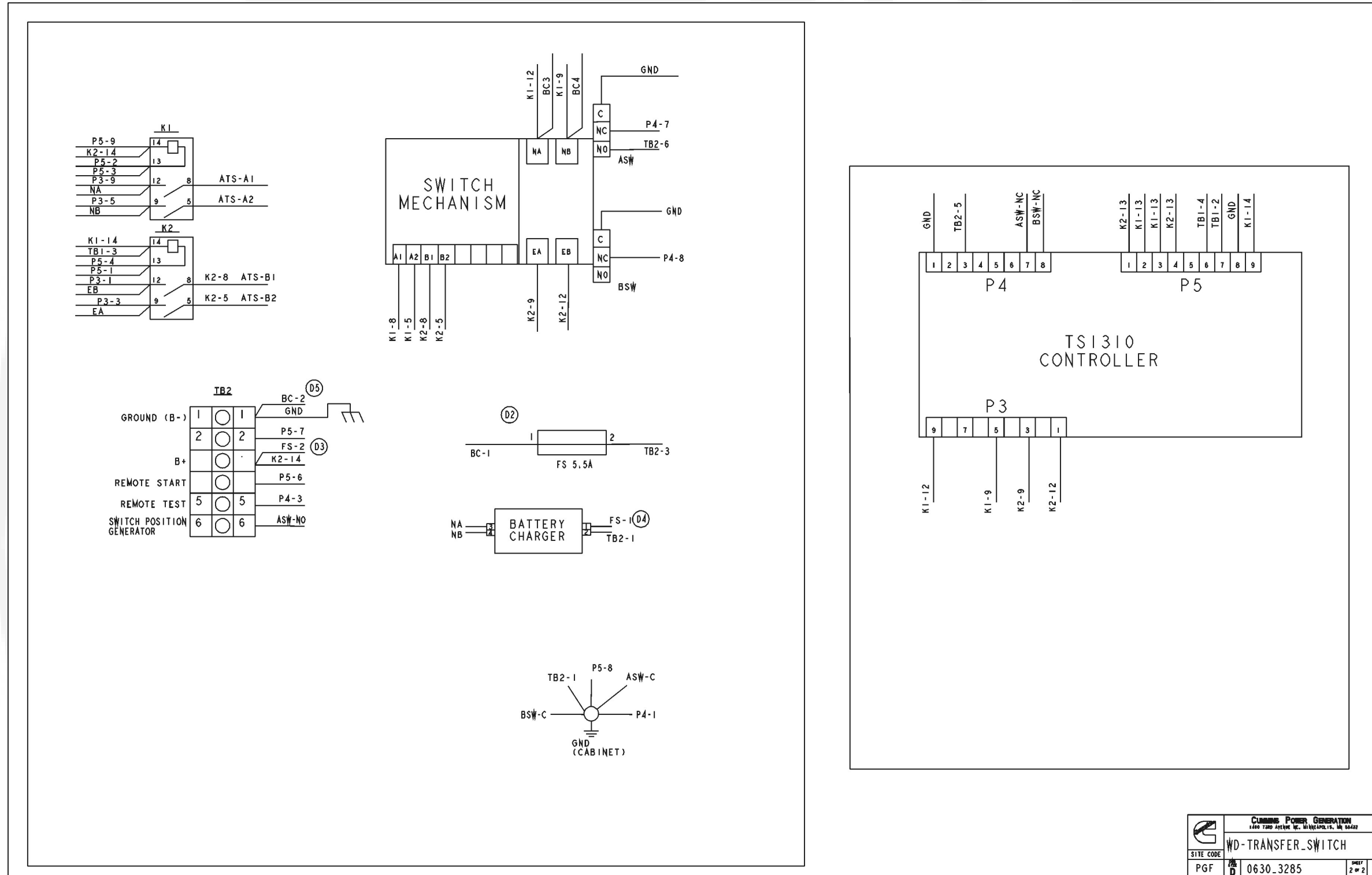


FIGURE 47. RSS TRANSFER SWITCH WITH CONTROLLER WIRING DIAGRAM (SHEET 1 OF 2)



CUMMINS POWER GENERATION 1400 ZANO AVENUE, WILMINGTON, NC 28403			
WD-TRANSFER SWITCH			
SITE CODE	PGF	0630-3285	SHEET 2 OF 2

FIGURE 48. RSS TRANSFER SWITCH WITH CONTROLLER WIRING DIAGRAM (SHEET 2 OF 2)

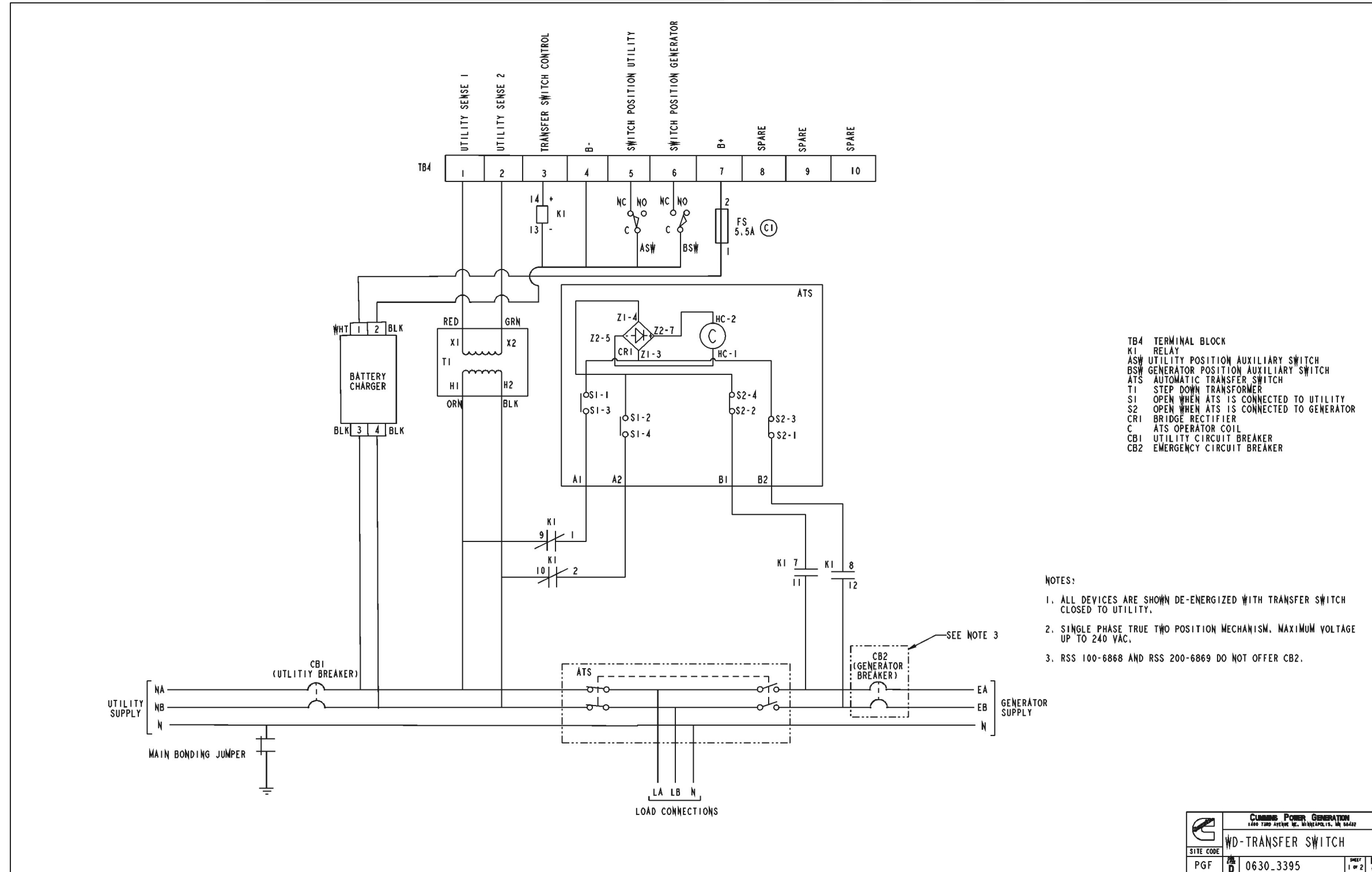
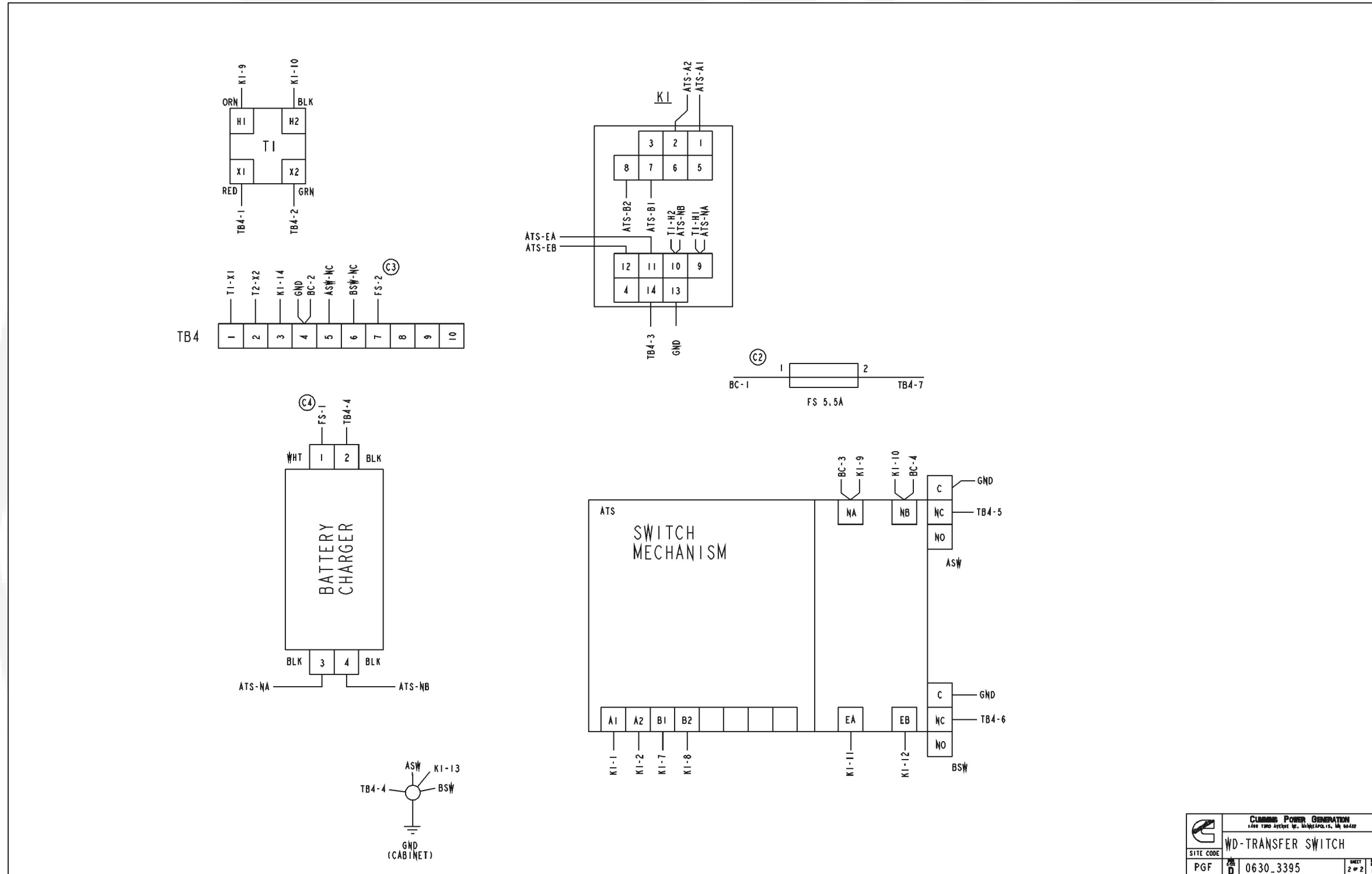


FIGURE 49. RSS TRANSFER SWITCH WITHOUT CONTROLLER WIRING DIAGRAM (SHEET 1 OF 2)



CLIMBING POWER GENERATION 1450 YARD AVENUE SE, MOUNTAIN VIEW, MO 64042			
WD-TRANSFER SWITCH			
SITE CODE	PGF	FILE D	0630_3395
			SHEET 2 OF 2

FIGURE 50. RSS TRANSFER SWITCH WITHOUT CONTROLLER WIRING DIAGRAM (SHEET 2 OF 2)

C.1 RSS Interconnection Wiring Diagram

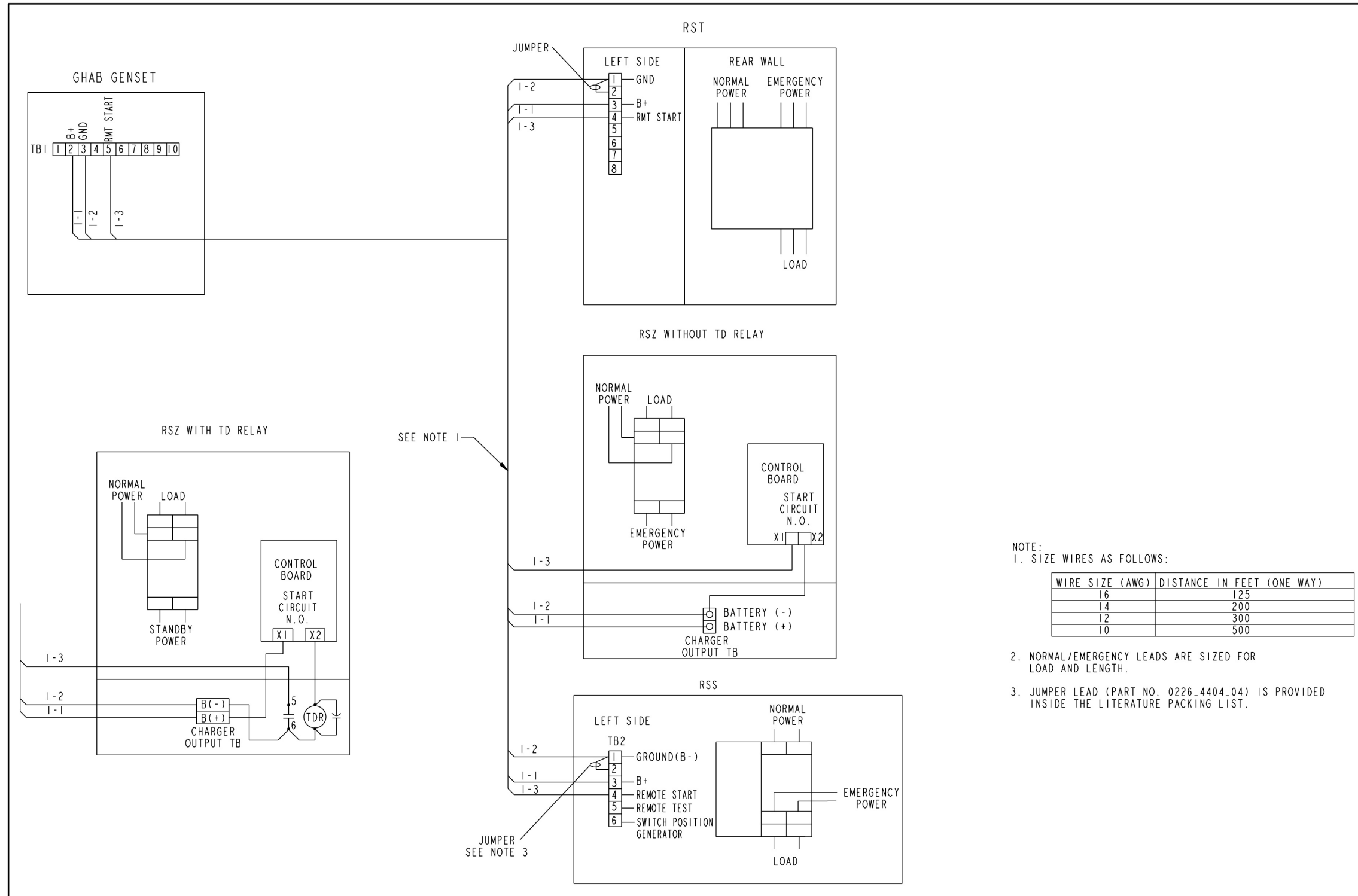


FIGURE 51. INTERCONNECTION WIRING DIAGRAM FOR GGDB (ALL SPECS) GENERATORS (SHEET 1 OF 8)

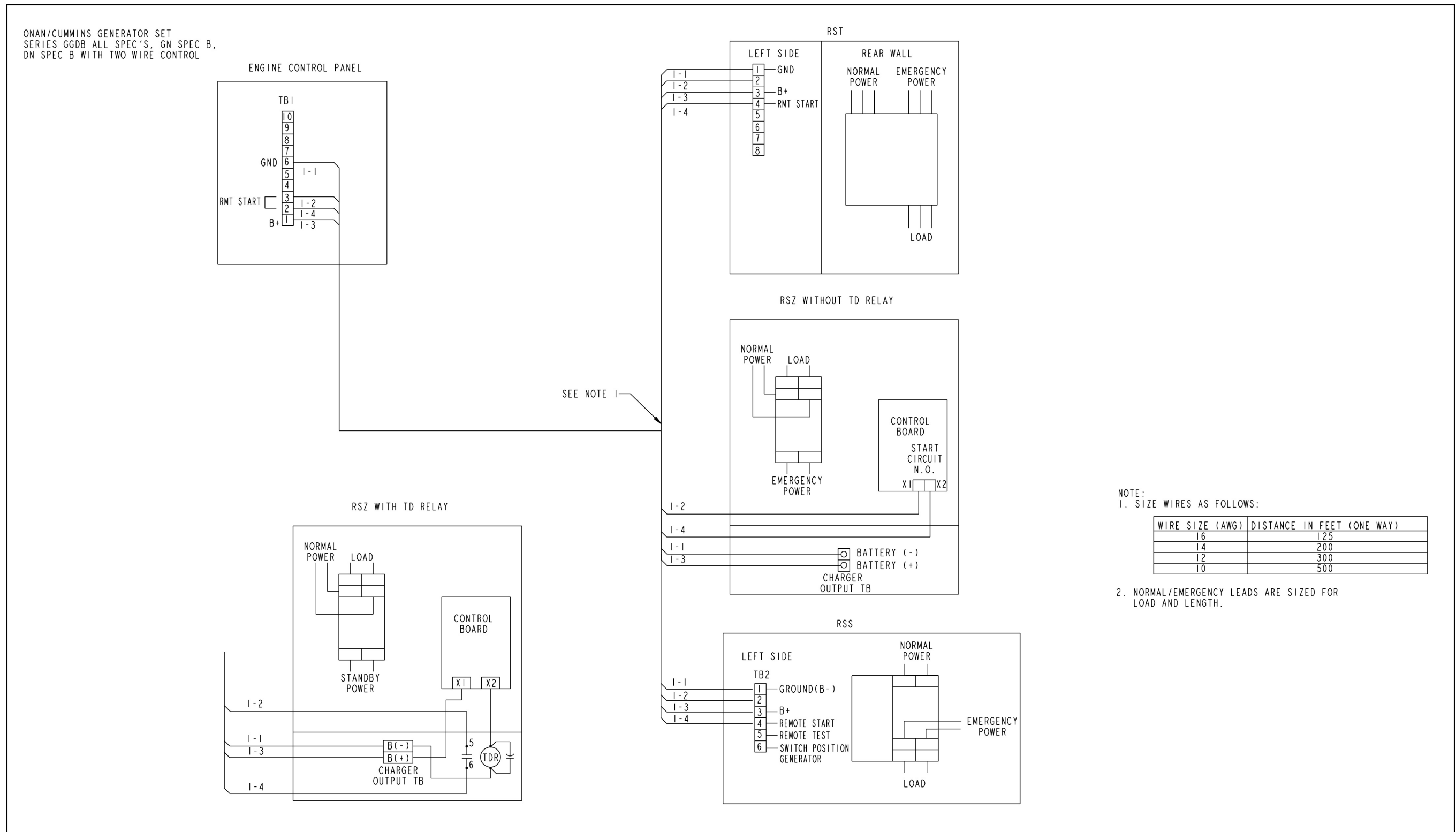


FIGURE 52. INTERCONNECTION WIRING DIAGRAM FOR GENERATORS WITH POWERCOMMAND® 2100 CONTROL (PCC2100) (SHEET 2 OF 8)

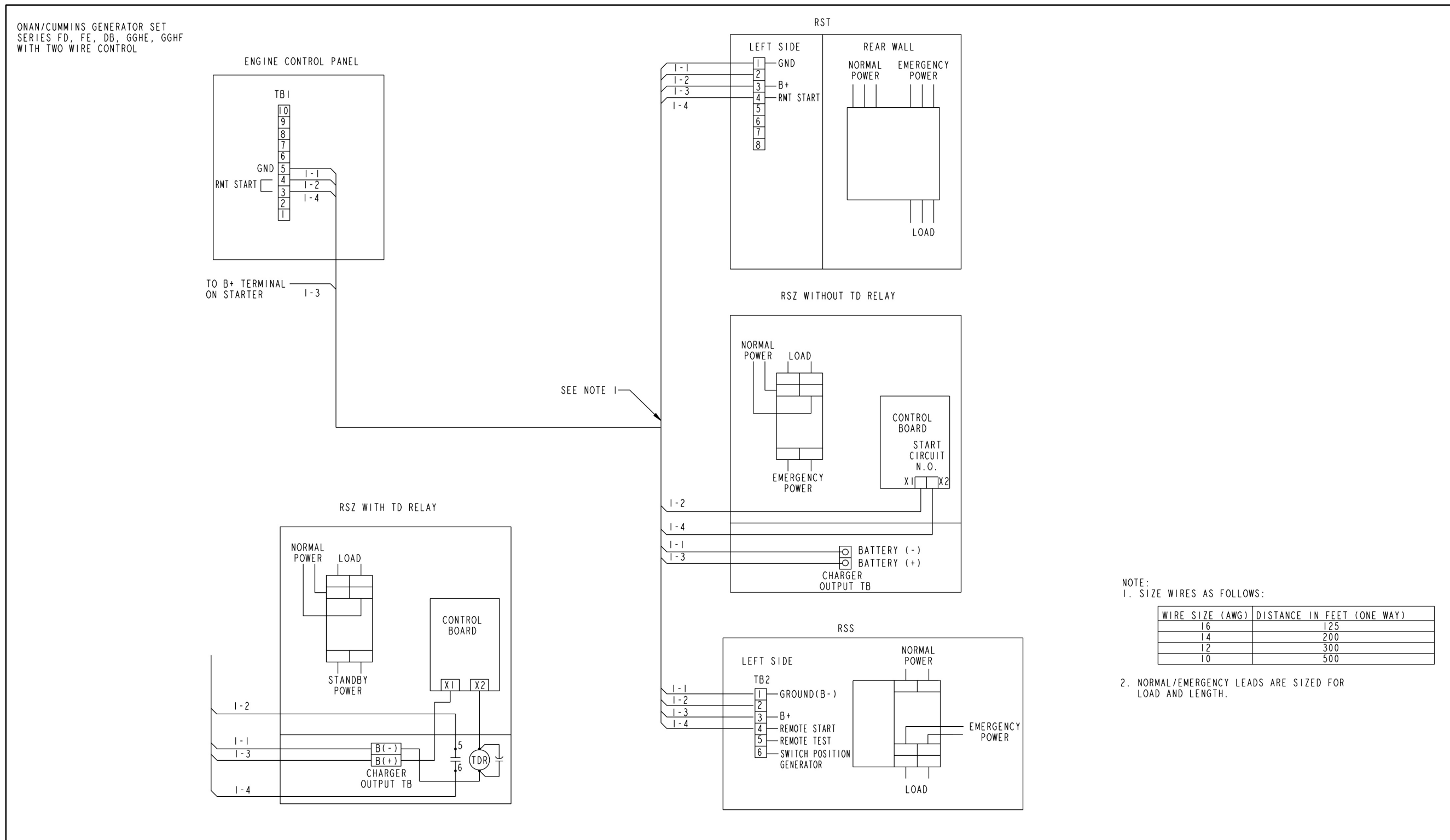


FIGURE 53. INTERCONNECTION WIRING DIAGRAM FOR GENERATORS WITH POWERCOMMAND® 2100 CONTROL (PCC2100) (SHEET 3 OF 8)

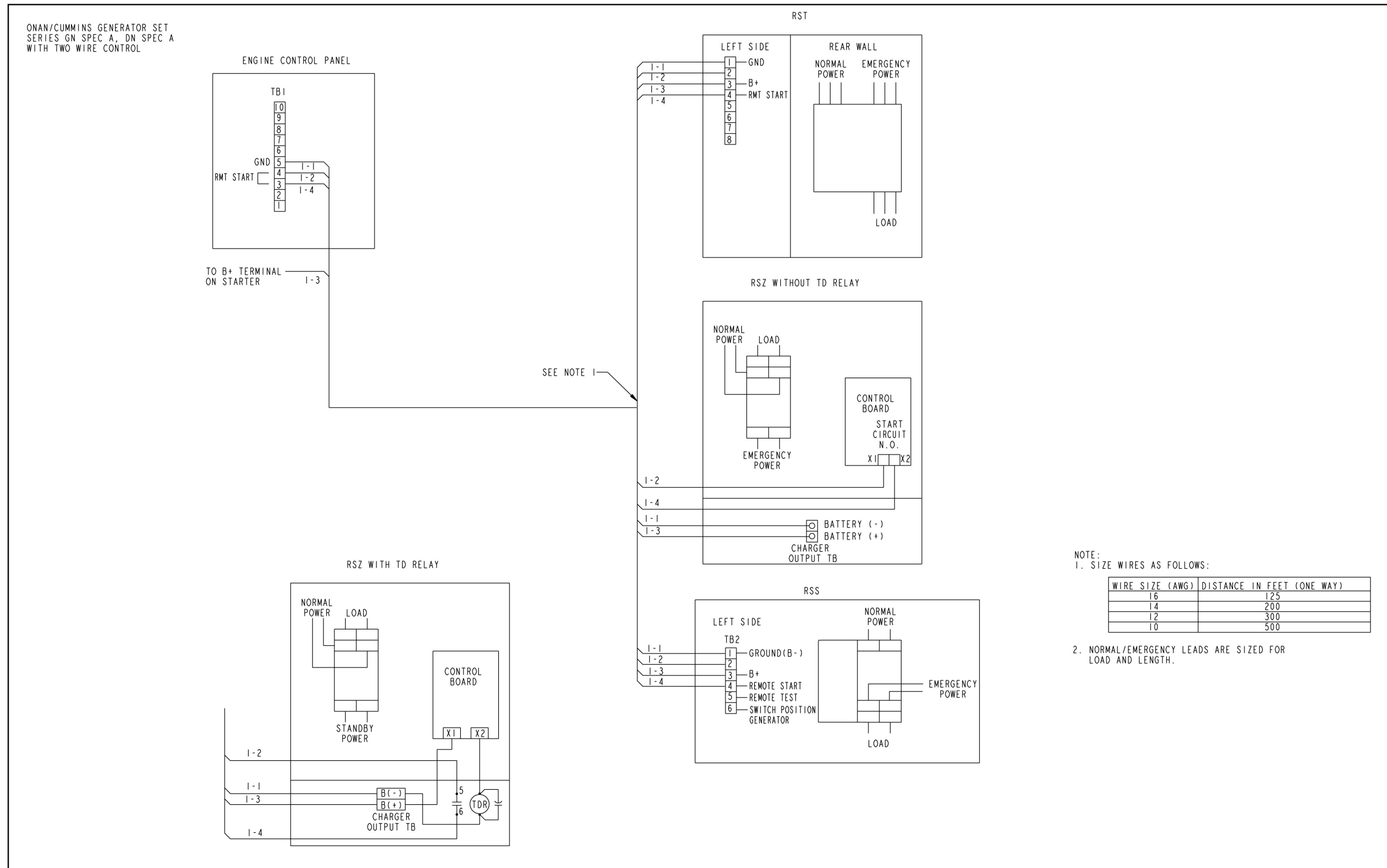


FIGURE 54. INTERCONNECTION WIRING DIAGRAM FOR GENERATORS WITH POWERCOMMAND® 2100 CONTROL (PCC2100) (SHEET 4 OF 8)

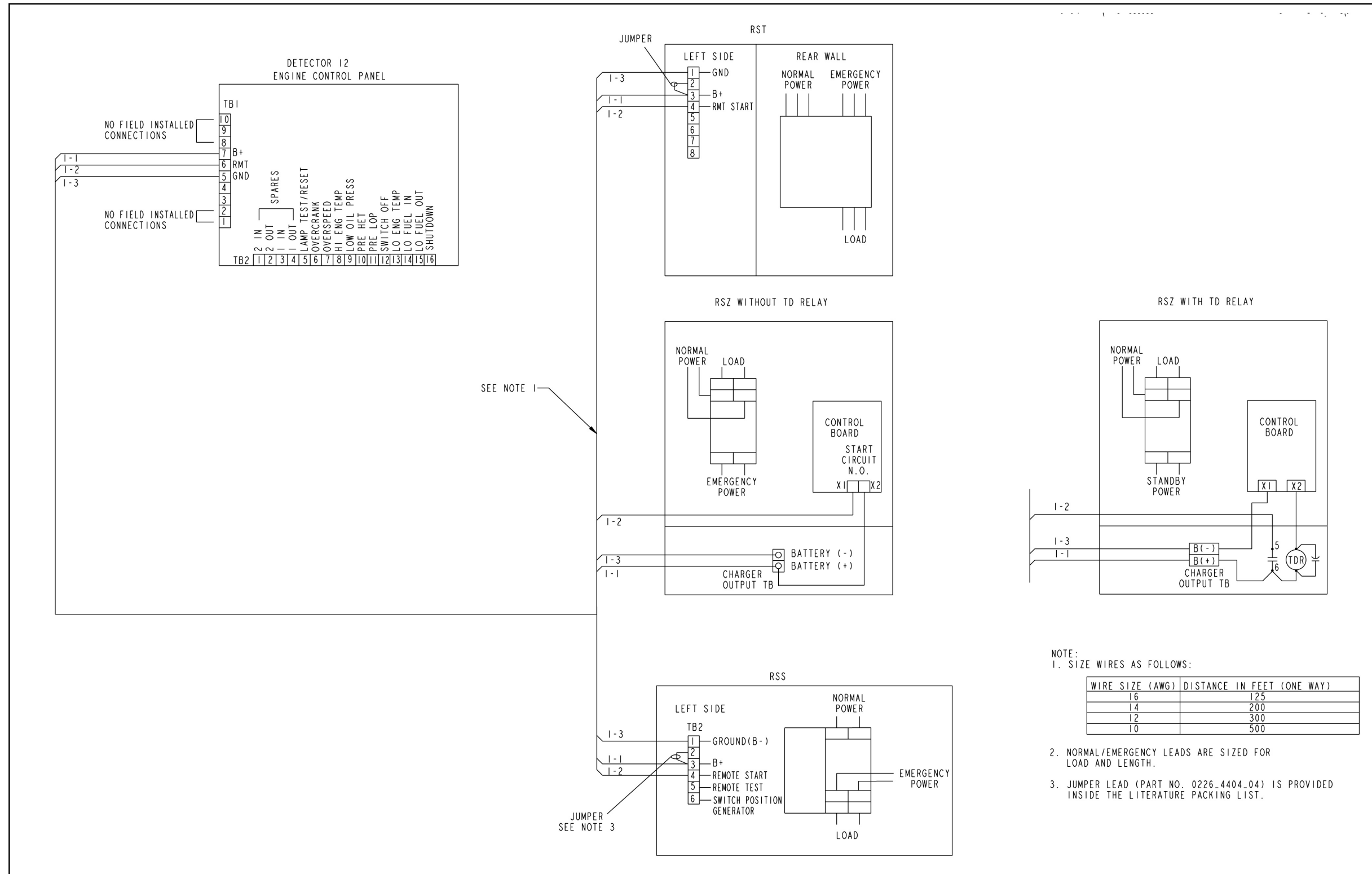


FIGURE 55. INTERCONNECTION WIRING DIAGRAM FOR GENERATORS WITH POWERCOMMAND® 2100 CONTROL (PCC2100) (SHEET 5 OF 8)

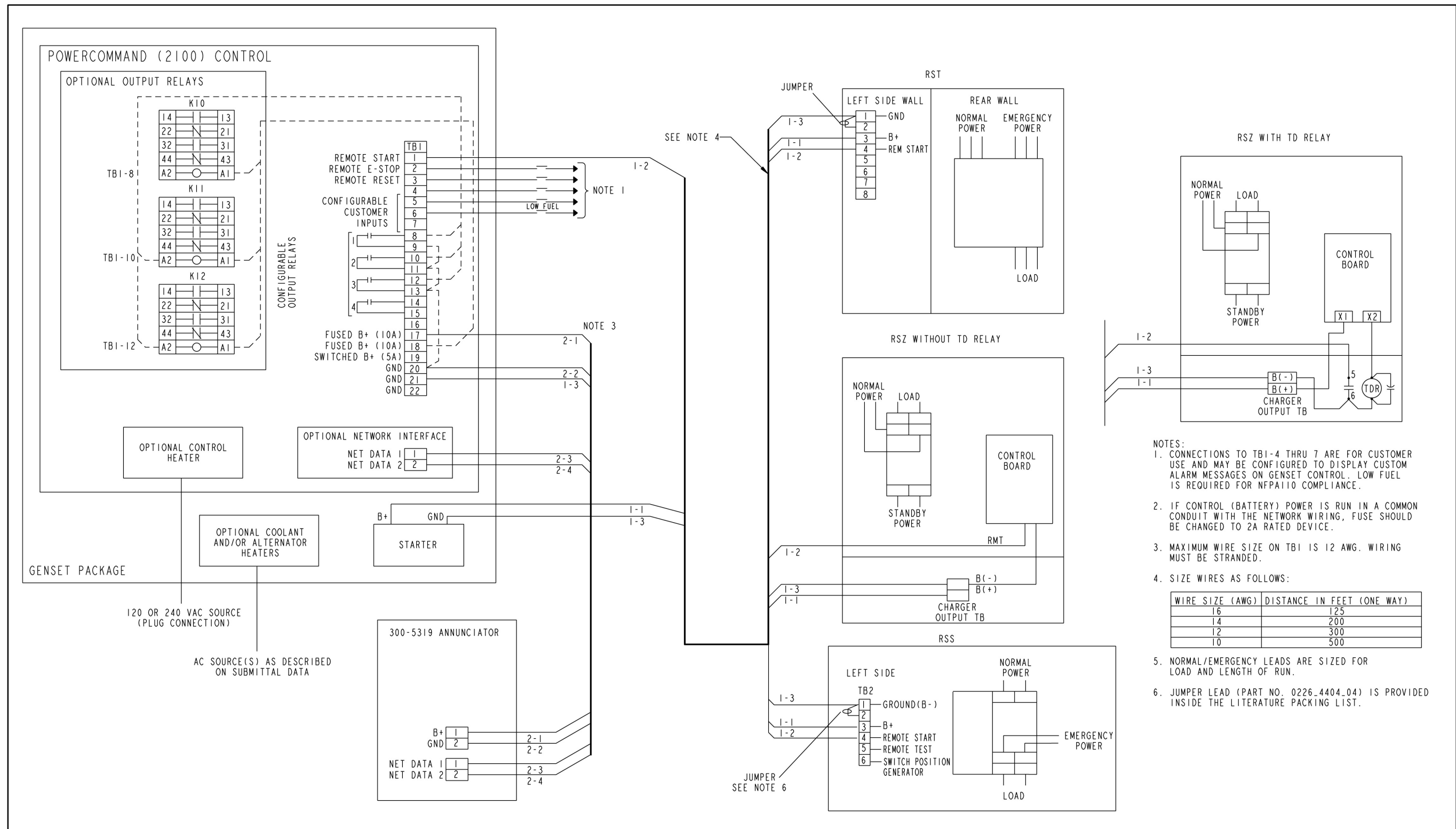


FIGURE 56. INTERCONNECTION WIRING DIAGRAM FOR GENERATORS WITH POWERCOMMAND® 2100 CONTROL (PCC2100) (SHEET 6 OF 8)

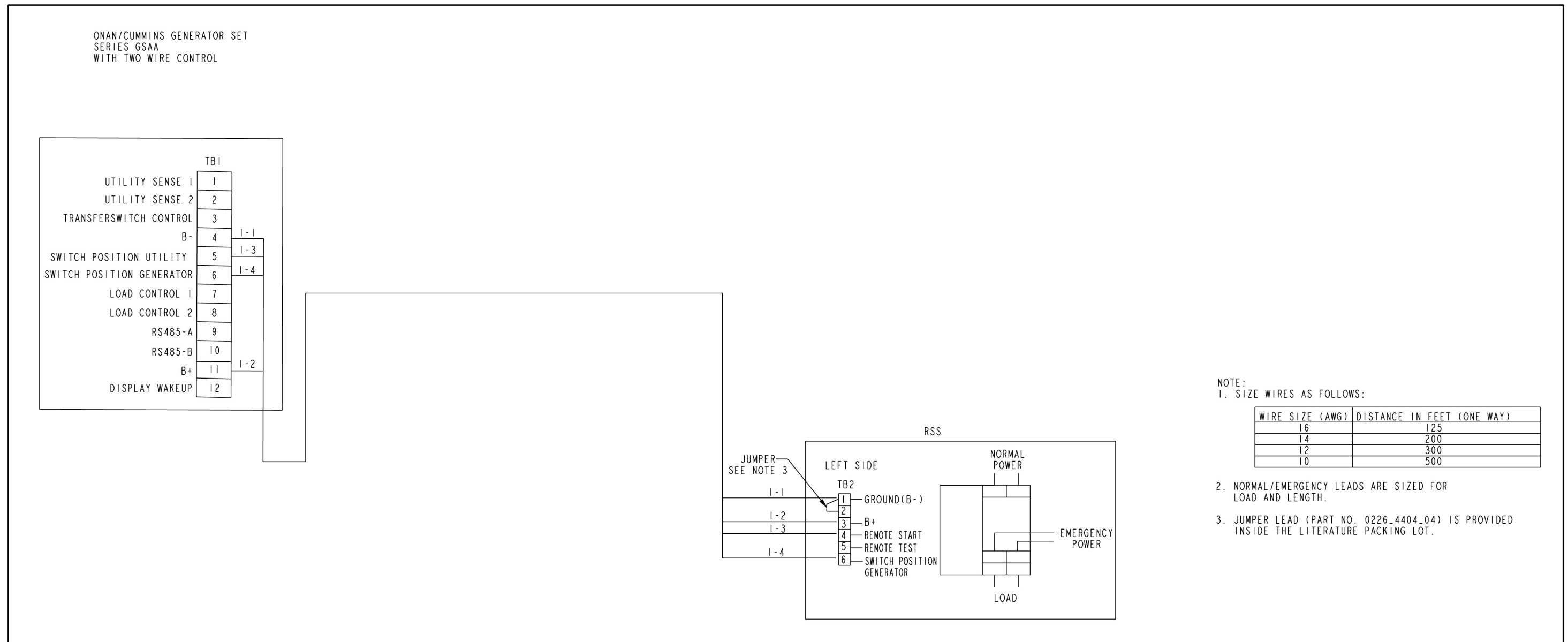


FIGURE 57. INTERCONNECTION WIRING DIAGRAM FOR GENERATORS WITH POWERCOMMAND® 2100 CONTROL (PCC2100) (SHEET 7 OF 8)

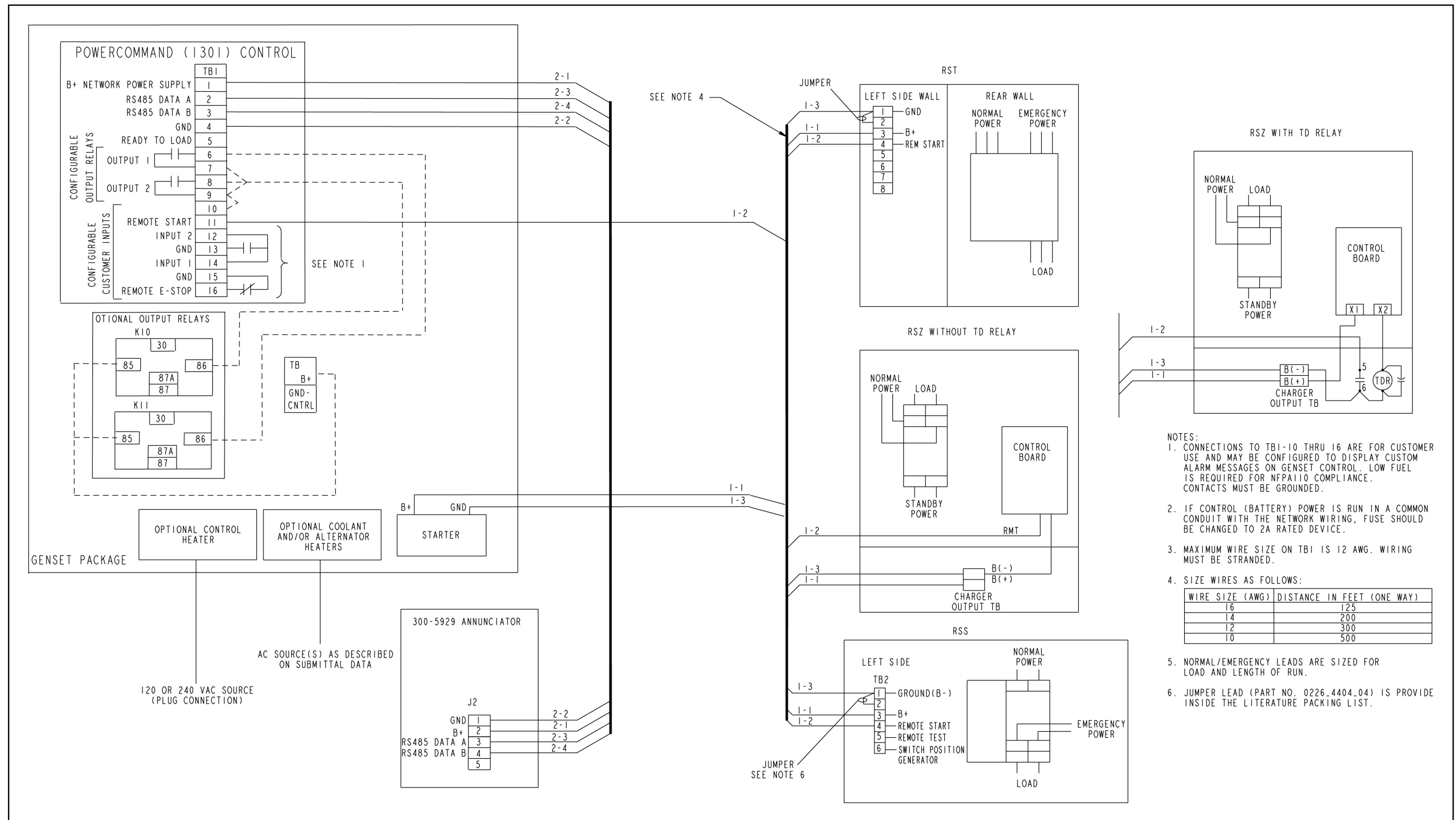


FIGURE 58. INTERCONNECTION WIRING DIAGRAM FOR GENERATORS WITH POWERCOMMAND® 2100 CONTROL (PCC2100) (SHEET 8 OF 8)

C.2 Interconnection Wiring Diagram without Controller

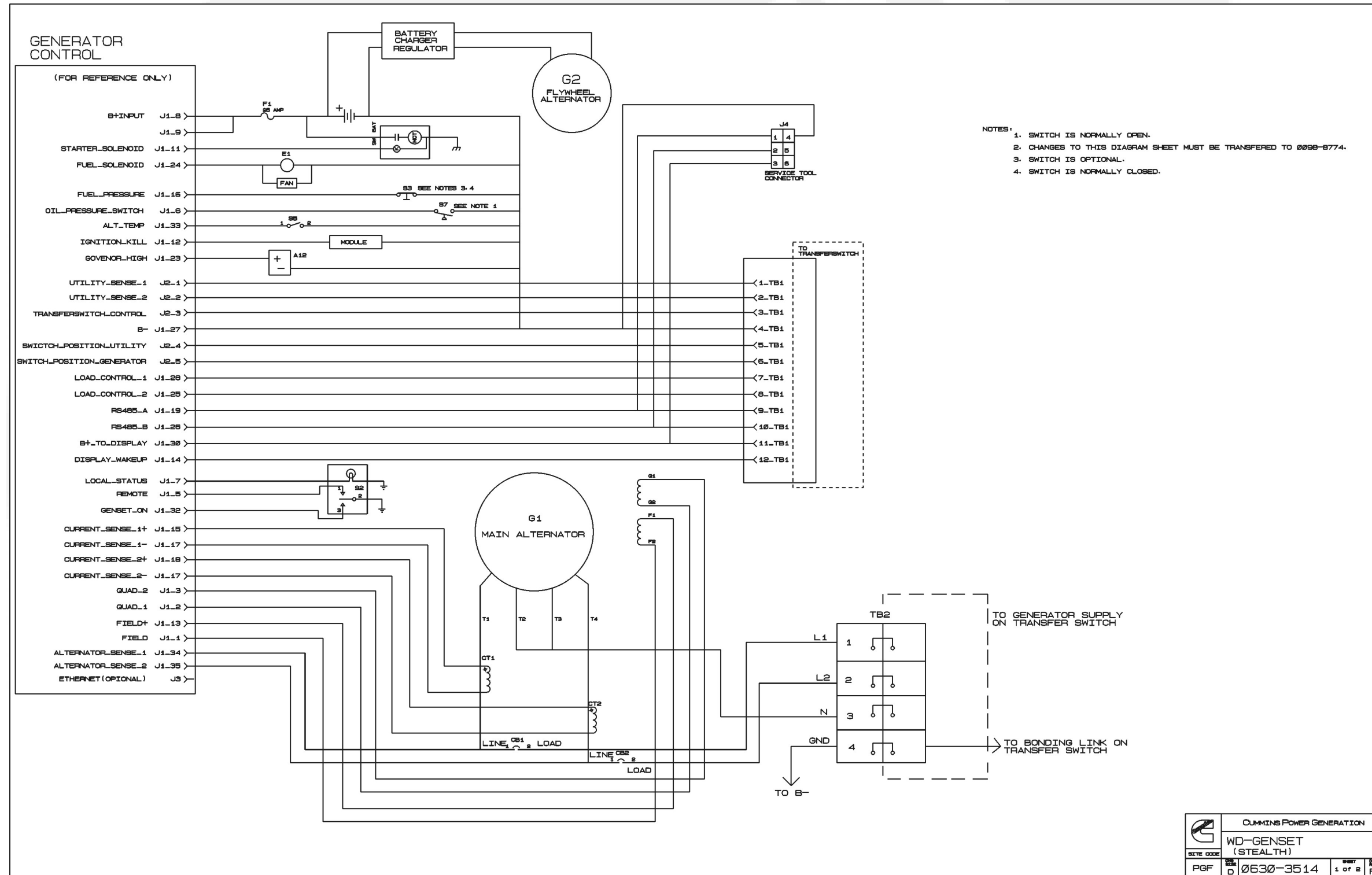


FIGURE 59. INTERCONNECTION WIRING DIAGRAM WITHOUT CONTROLLER FOR GENERATOR SERIES GSAA (SHEET 1 OF 2)

CUMMINS POWER GENERATION	
WD-GENSET (STEALTH)	
SHEET CODE	PGF
0630-3514	1 of 2

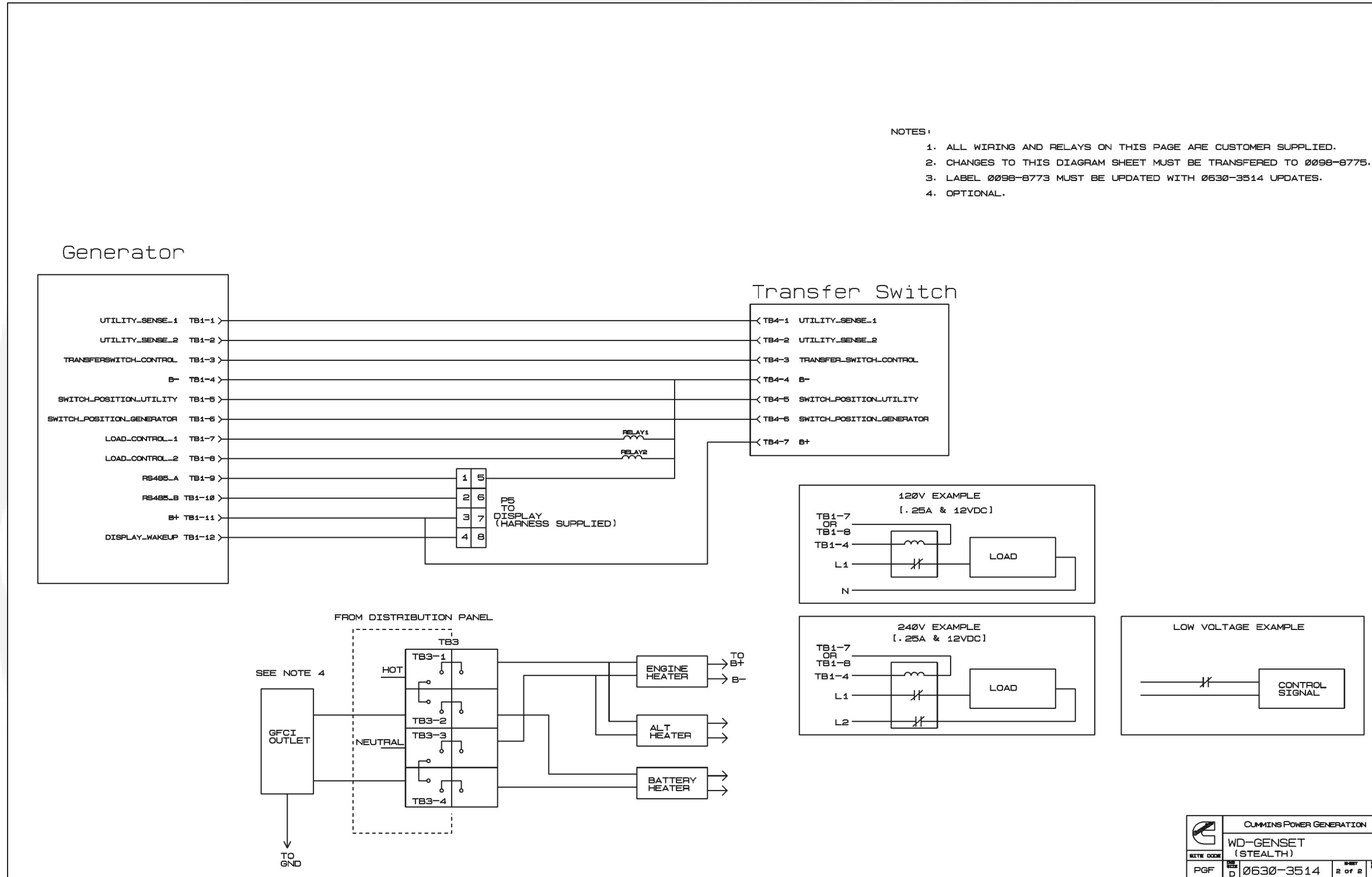


FIGURE 60. INTERCONNECTION WIRING DIAGRAM WITHOUT CONTROLLER FOR GENERATOR SERIES GSAA (SHEET 2 OF 2)

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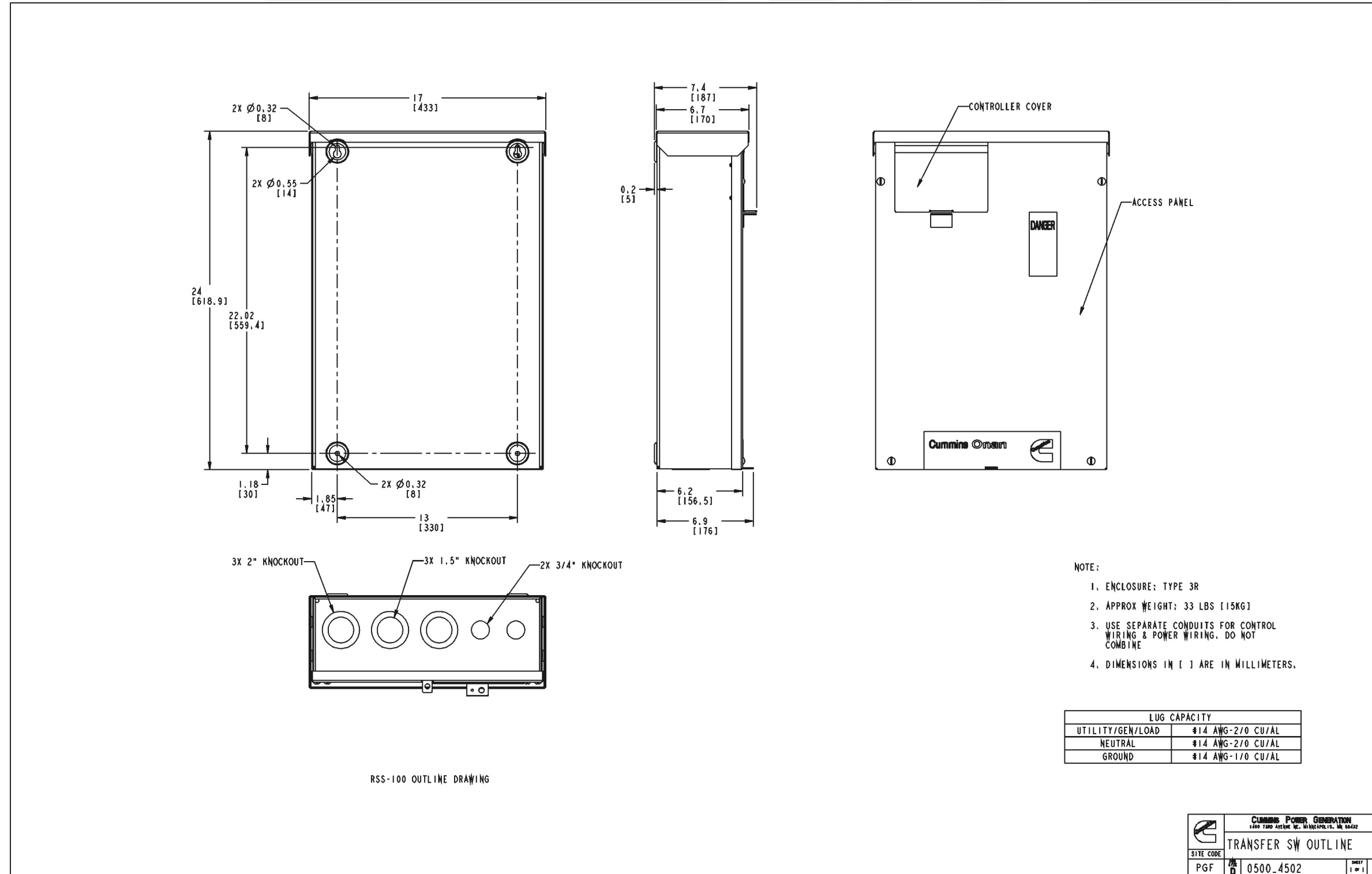


FIGURE 61. RSS100 CONTROL BOX OUTLINE DRAWING WITH CONTROLLER

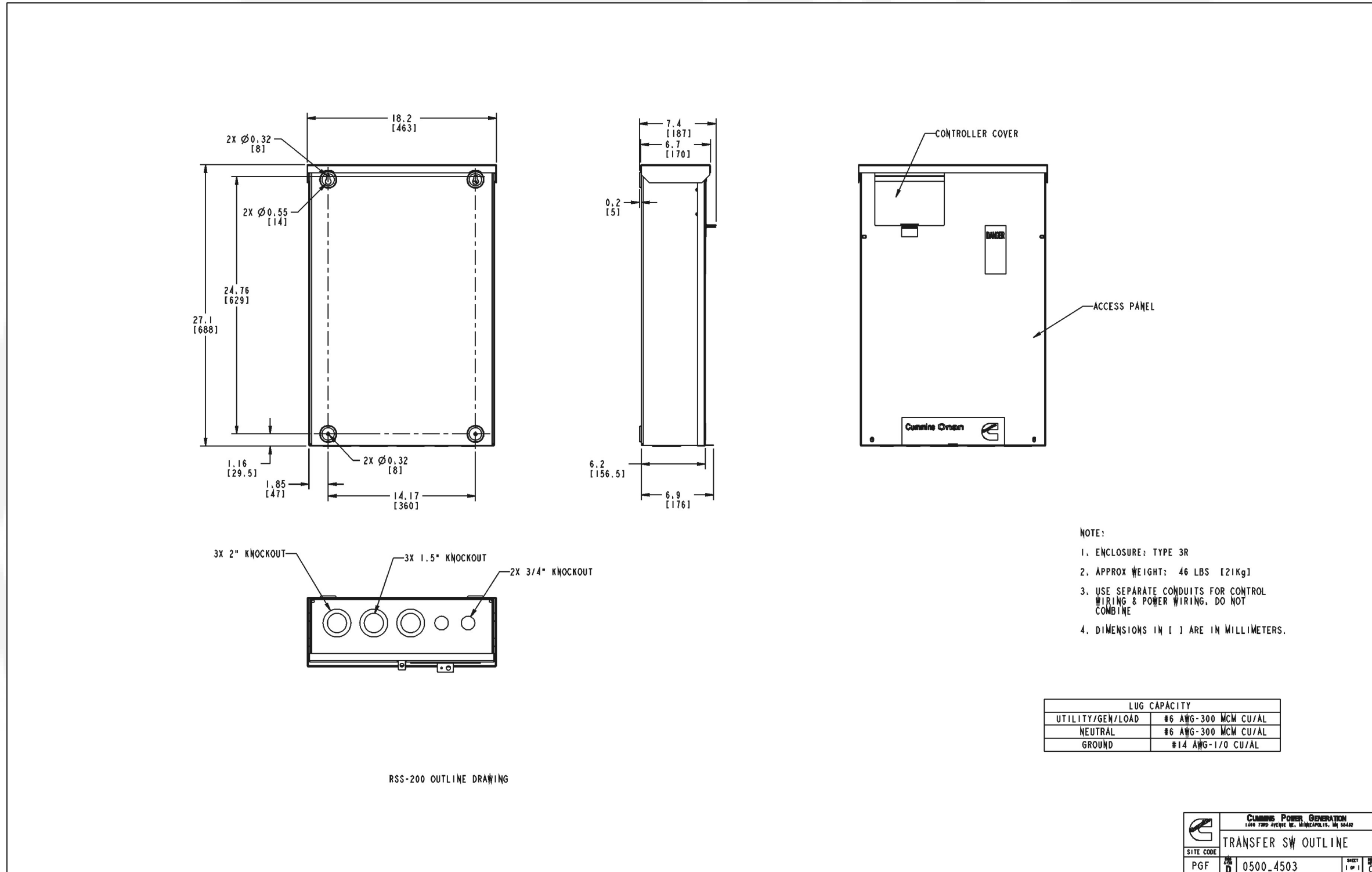


FIGURE 62. CONTROL BOX OUTLINE DRAWING WITH CONTROLLER

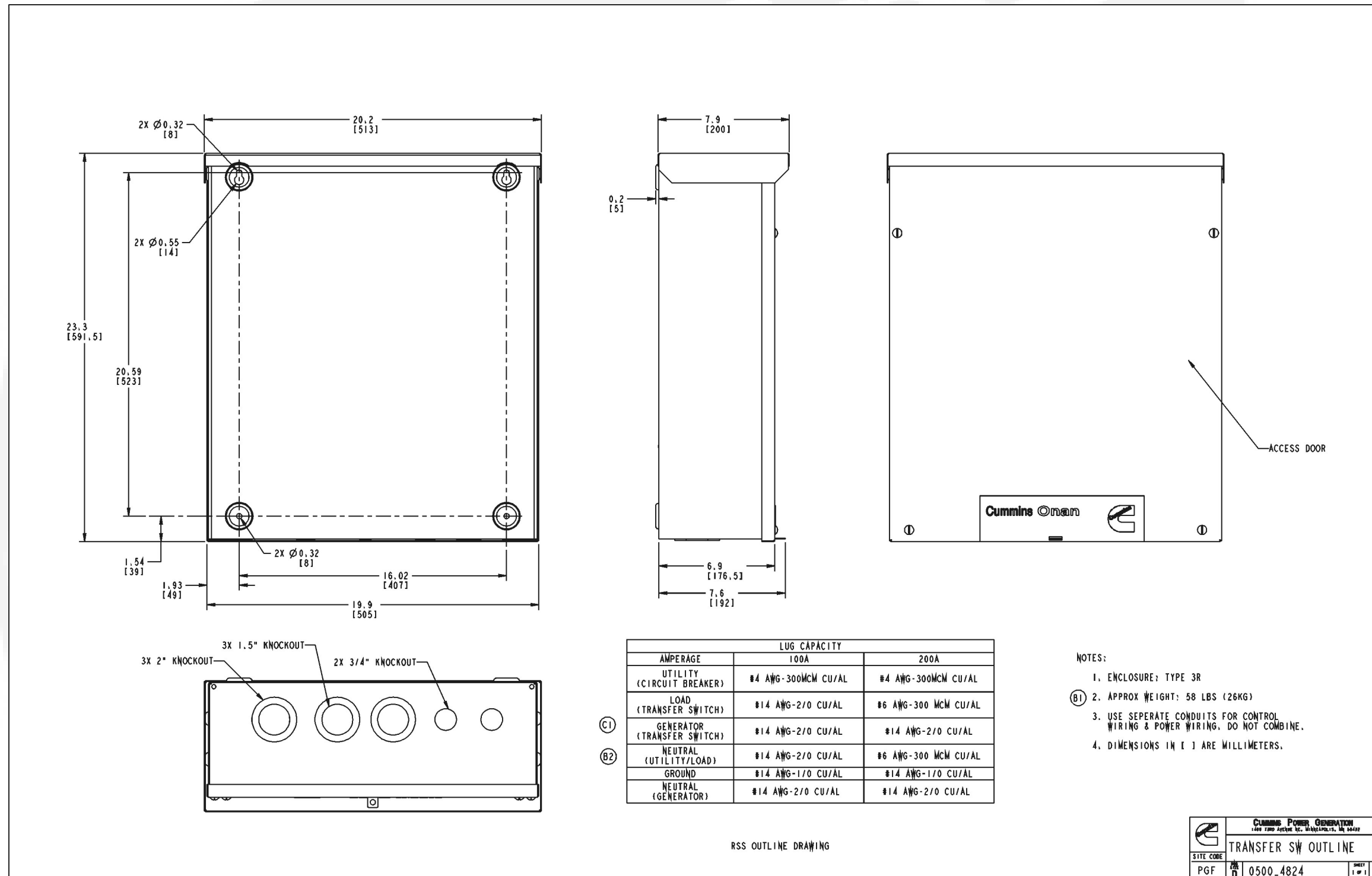
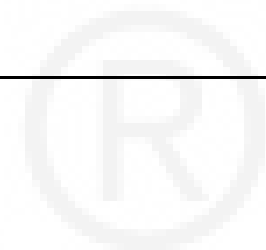


FIGURE 63. RSS100 AND RSS200 OUTLINE DRAWING - WITHOUT CONTROLLER

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