



# Operator Manual

Cummins **Onan**

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## Transfer Switch

RSS100 and RSS200

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# Safety Precautions

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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.*

## **ELECTRICAL SHOCK 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 instructions.

Keep the transfer switch cabinet cover secured with the provided mounting hardware. Only authorized personnel are allowed to access the inside of the cabinet.

Due to the serious shock hazard from high voltages within the cabinet, all service and adjustments to

the transfer switch must be performed only by a trained and experienced electrician or an authorized Cummins Onan service representative.

If the cabinet must be opened for any reason:

1. Disconnect the AC utility power from the transfer switch by opening the circuit breaker in the main panel that feeds the transfer switch.
2. Move the operation selector switch on the generator set to Stop/Off.
3. Disconnect the negative (-) cable from the generator set starting batteries.

## **GENERAL PRECAUTIONS**

Place rubber insulative mats or 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.

Jewelry is a good conductor of electricity and should be removed when working on the 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.

### **⚠ WARNING**

**INCORRECT SERVICE OR REPLACEMENT OF PARTS CAN RESULT IN DEATH, SEVERE PERSONAL INJURY, AND/OR EQUIPMENT DAMAGE. SERVICE PERSONNEL MUST BE TRAINED AND EXPERIENCED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE.**



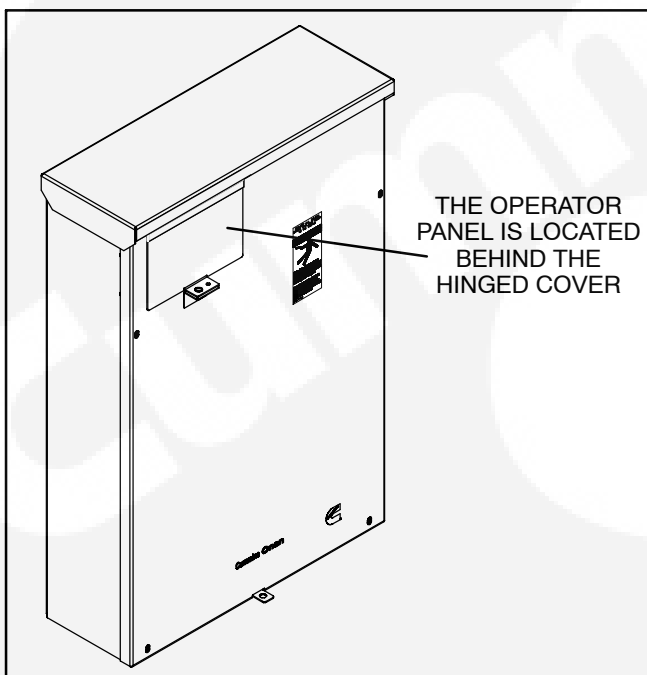
# 1. Introduction

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## ABOUT THIS MANUAL

This manual covers transfer switch models produced under the Cummins® Power Generation brand name. 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 1-1.



**FIGURE 1-1. RSS TRANSFER SWITCH**

## 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.

The 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.



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## 2. Description

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

### TRANSFER SWITCH WITH CONTROL

Figure 2-1 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

#### 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.

#### Membrane Pushbuttons

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.



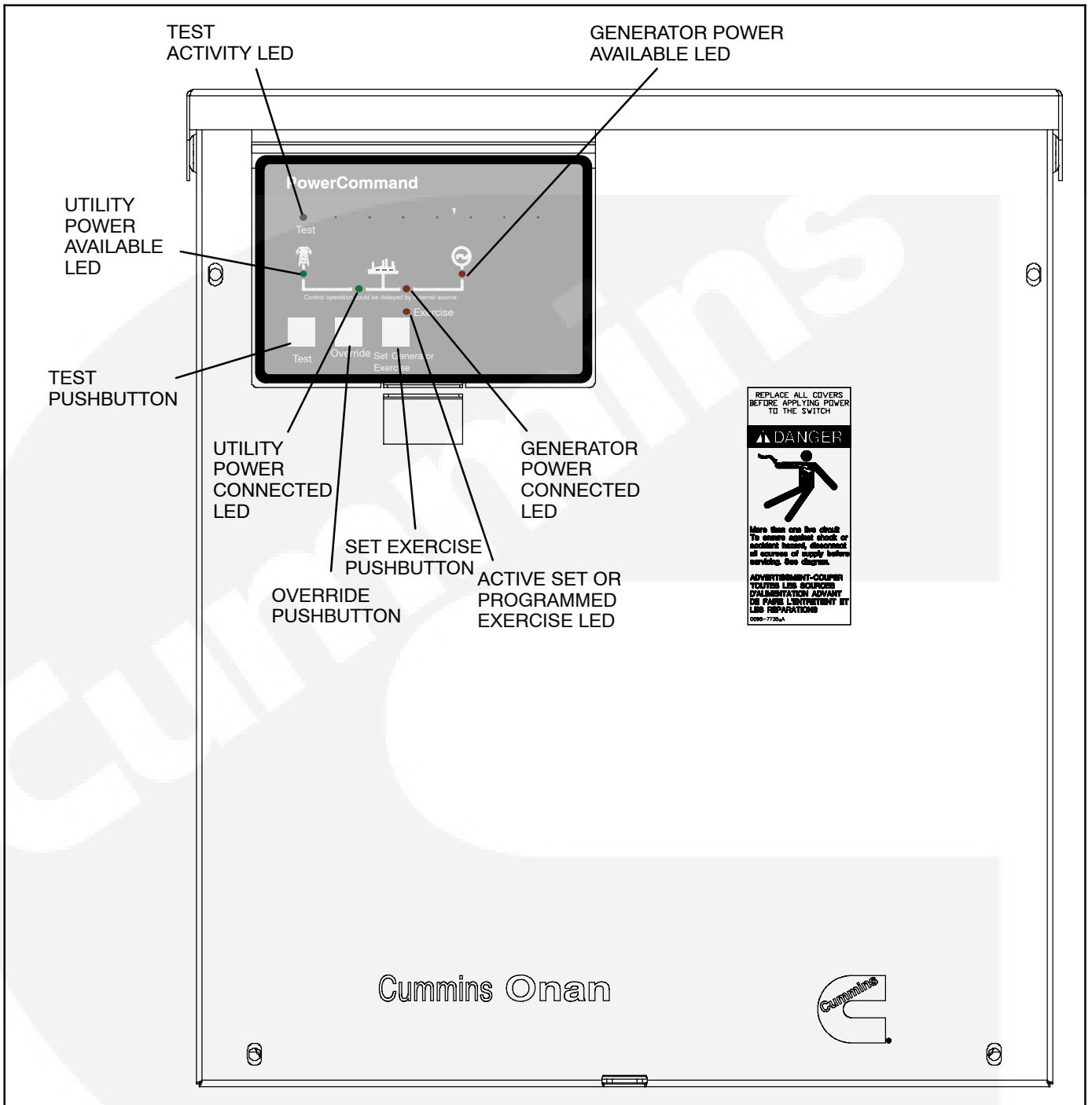


FIGURE 2-1. CABINET DOOR (SHOWN WITHOUT HINGED COVER)

## 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.

### 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.

### 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.

### 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.

### 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.





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# 3. Operation

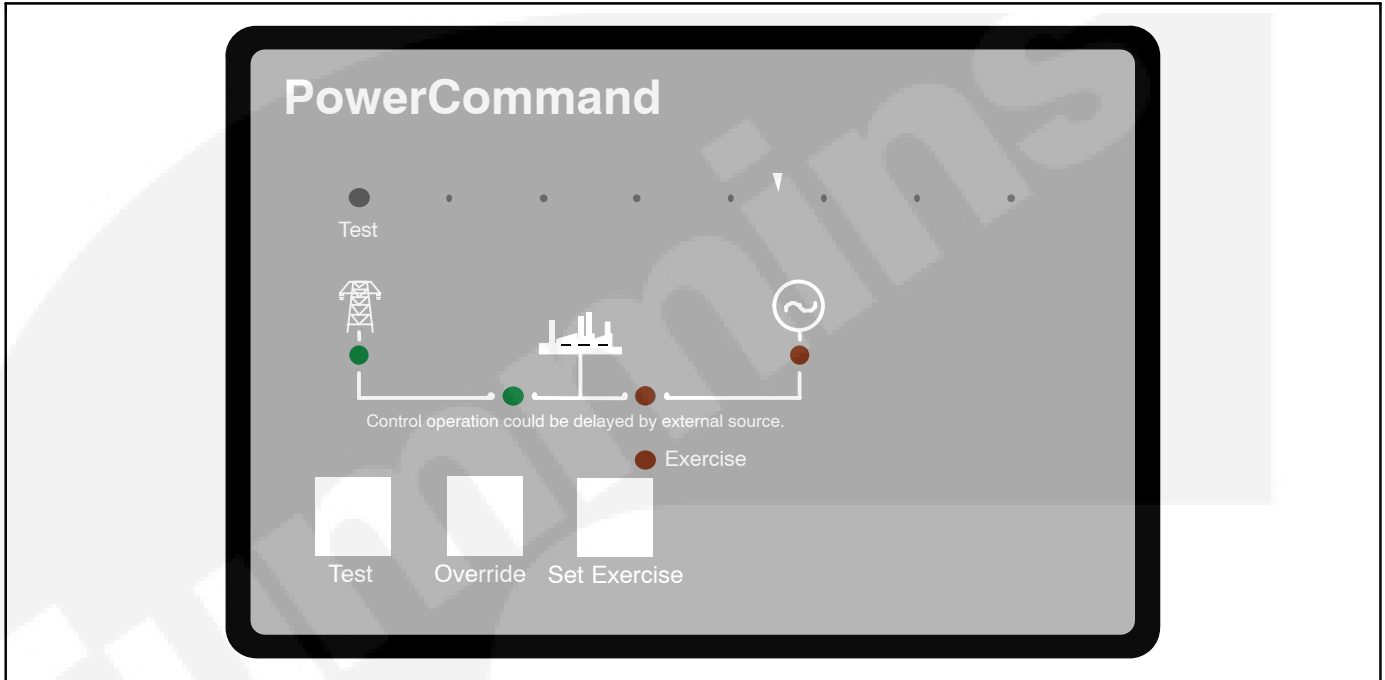


FIGURE 3-1. CONTROL PANEL

## TRANSFER SWITCHES WITH AN OPERATOR PANEL

The transfer switch provides three operator push-buttons 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 3-2).

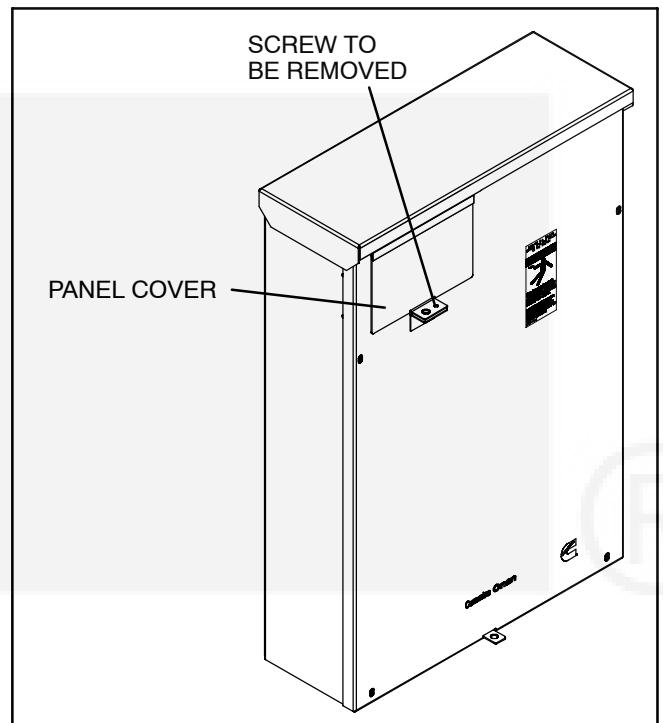


FIGURE 3-2. OPERATOR PANEL COVER

## 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 cooldown (TDEC) time delay is not affected by pressing this pushbutton.

## 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 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.
3. Switch the main circuit breaker from the “OFF” to the “ON” position.
4. 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.

**NOTE:** When ending a test, you can bypass the re-transfer 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).



## GENERATOR 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.

### 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.

### Canceling 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.

### Canceling An Active Exercise Period

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

### 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.





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# 4. Troubleshooting

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

## 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 4-1). Descriptions of these indicators are included in Table 4-1.

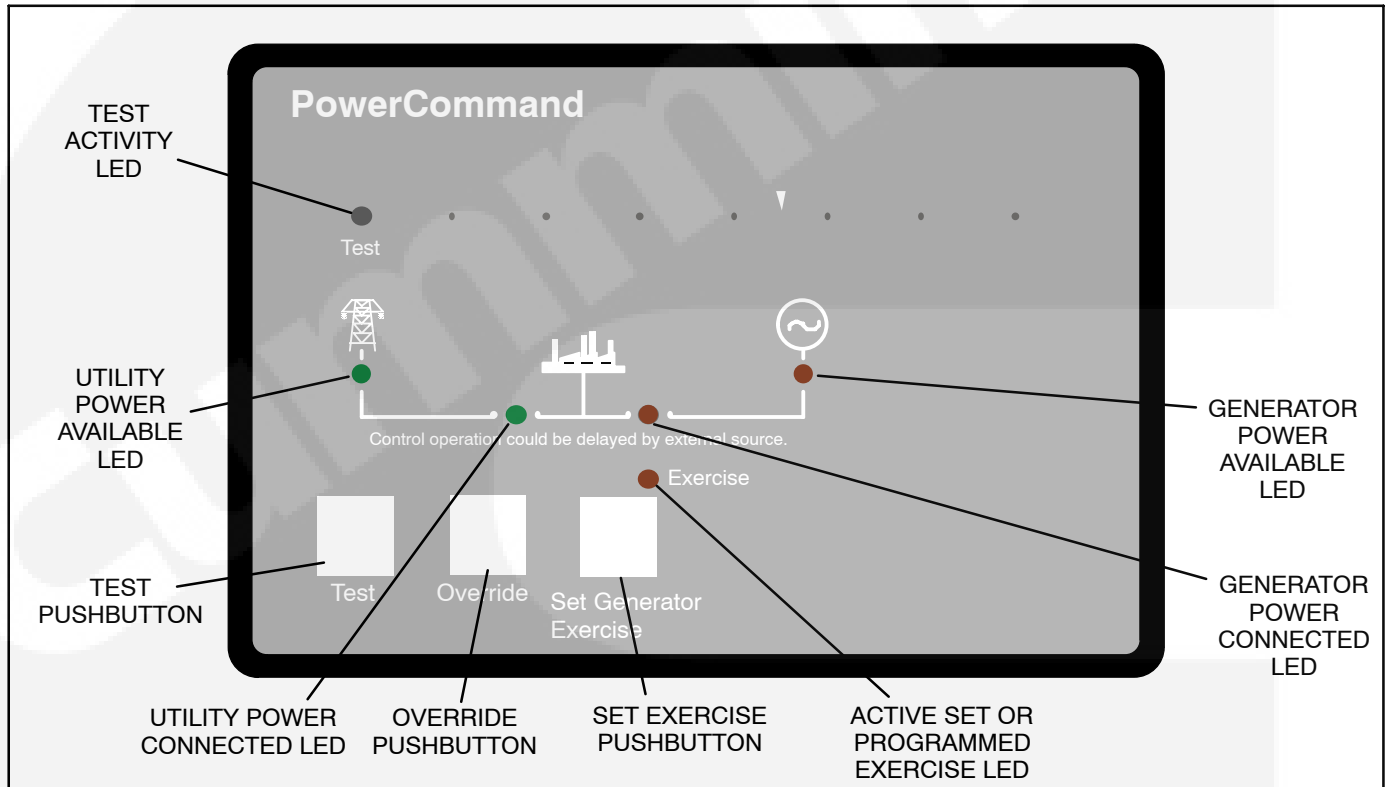


FIGURE 4-1. CONTROL PANEL

**TABLE 4-1. OPERATOR PANEL LED INDICATORS**

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

## TROUBLESHOOTING THE TRANSFER SWITCH

Use the troubleshooting guide (Table 4-2) 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.

**TABLE 4-2. TROUBLESHOOTING TRANSFER SWITCHES WITH AN OPERATOR PANEL**

<b>⚠WARNING</b> <i>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.</i>		
<b>⚠WARNING</b> <i>Improper operation of the generator presents a hazard that can cause severe personal injury or death. Observe all safety precautions in your generator manuals.</i>		
<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
The Generator does not start when the utility fails	There may be a generator problem.	Move the generator's operation selector switch to the Run/On position. <ol style="list-style-type: none"> <li>1. If the generator 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.</li> <li>2. If the generator does not start, contact your local Cummins distributor for service.</li> </ol>
The generator is running but the transfer switch did not transfer the load to the generator. The Generator Available LED is off.	The generator circuit breaker has been tripped or is in the Off position.	Reset the circuit breaker on the generator. If the problem still persists, contact your local Cummins distributor for service.
The generator is running but the transfer switch did not transfer the load to the generator. 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 is running but the transfer switch did not transfer the load to the generator. 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.
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.



**TABLE 4-2. TROUBLESHOOTING TRANSFER SWITCHES WITH AN OPERATOR PANEL (CONTINUED)**

**⚠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.*

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.
The generator did not shut down after the transfer switch has transferred the load to the utility.	<ol style="list-style-type: none"> <li>1. A time delay engine cooldown (TDEC) may be timing.</li> <li>2. The selector switch on the generator control panel may not be in the correct position.</li> </ol>	<ol style="list-style-type: none"> <li>1. Wait for the time delay to expire. The time delay may last up to 30 minutes.</li> <li>2. Make sure the generator control is set to the Remote position.</li> </ol> <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>
The generator is running for no apparent reason.	<ol style="list-style-type: none"> <li>1. The selector switch on the generator control panel may not be in the correct position.</li> <li>2. There may be an active test or Exercise period. Check to see if the Test or Exercise LEDs are blinking.</li> </ol>	<ol style="list-style-type: none"> <li>1. Make sure the generator control is set to the Remote position.</li> <li>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.</li> </ol> <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>



**TABLE 4-2. TROUBLESHOOTING TRANSFER SWITCHES WITH AN OPERATOR PANEL (CONTINUED)**

**⚠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.*

Problem	Possible Cause	Corrective Action
<p>The generator did not exercise when expected to.</p>	<ol style="list-style-type: none"> <li>1. The selector switch on generator control panel may not be in the correct position.</li> <li>2. An exercise period may not be set or is set but not yet started.</li>   <li>3. There may be generator problems.</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify that the operation selector switch on the generator control panel is set to the Remote position.</li> <li>2. Check the Exercise LED on the control panel to see if it is lit.               <ol style="list-style-type: none"> <li>a. If the Exercise LED is not lit, no exercise period has been set. Refer to the generator exerciser section for information on setting an exercise.</li> <li>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.</li> </ol> </li> <li>3. Try starting the generator 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.</li> </ol> <p>If the problem persists, contact your local Cummins distributor for service.</p>



## HOW TO OBTAIN SERVICE

When the transfer switch requires servicing, contact your nearest Cummins Power Generation distributor. Factory-trained Parts and Service representatives are ready to handle all your service needs.

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 (included on the model and serial number label – see Figure 4-2) is necessary to properly identify your unit among the many types manufactured.

For models with a control, the label is located on the back of the operator panel cover. To view the label (see Figure 4-2), remove the screw securing the operator panel cover and open the cover (see Figure 4-3).

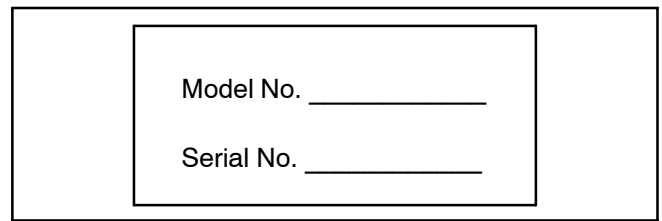


FIGURE 4-2. MODEL AND SERIAL NUMBER LABEL

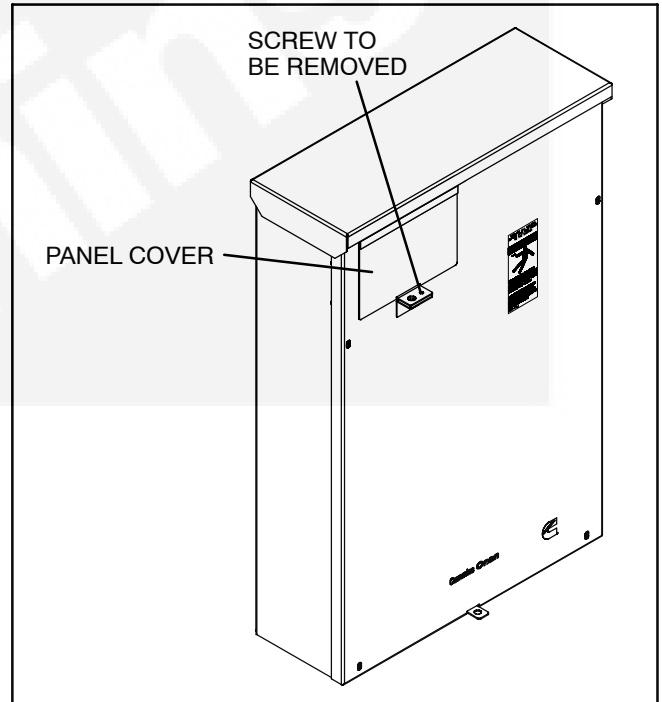


FIGURE 4-3. OPERATOR PANEL COVER

Cummins

## Cummins **Onan**

### **Cummins Power Generation**

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