



# Installation Manual

**Our energy working for you.™**



**Power  
Generation**

## Transfer Switch

**40–1000 Amps**

**OTPCSE**



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## **⚠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.**

# 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 suggestions.

Keep the transfer switch cabinet closed and locked. Make sure only authorized personnel have the cabinet and operational keys.

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 an electrician or authorized service representative.

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

## UTILITY-TO-GENSET 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 circuit breaker in the Off position, the line side lugs are still energized.*

## GENERAL PRECAUTIONS

Place rubber insulative 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.

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 and 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** *Because the unit is top heavy, there is a risk of equipment damage and severe personal injury or death when it is moved. To prevent it from tipping, be sure to block and brace the transfer switch.*

**⚠ 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.**

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# 1. Introduction

## INSTALLATION MANUAL

This manual covers models produced under the Cummins®/Onan® and Cummins Power Generation brand names.

This manual provides information necessary for installation of an OTPCSE transfer switch. This is a service entrance open transition (OT) service entrance transfer switch with a PowerCommand (PC) control. It is capable of executing Open Transition with Sync Check, and Programmed Transition transfer modes.

An **Open Transition with Sync Check** executes an OT when both sources of power are within specified tolerances of frequency, voltage, and relative phase difference. If both sources meet the tolerances, a fast transfer occurs.

A **Programmed Transition** executes an OT by disconnecting the load from the source of power, pausing in the neutral position of the transfer switch (between switched positions) to allow transient currents from the load to diminish, and then the load is switched to the other source.

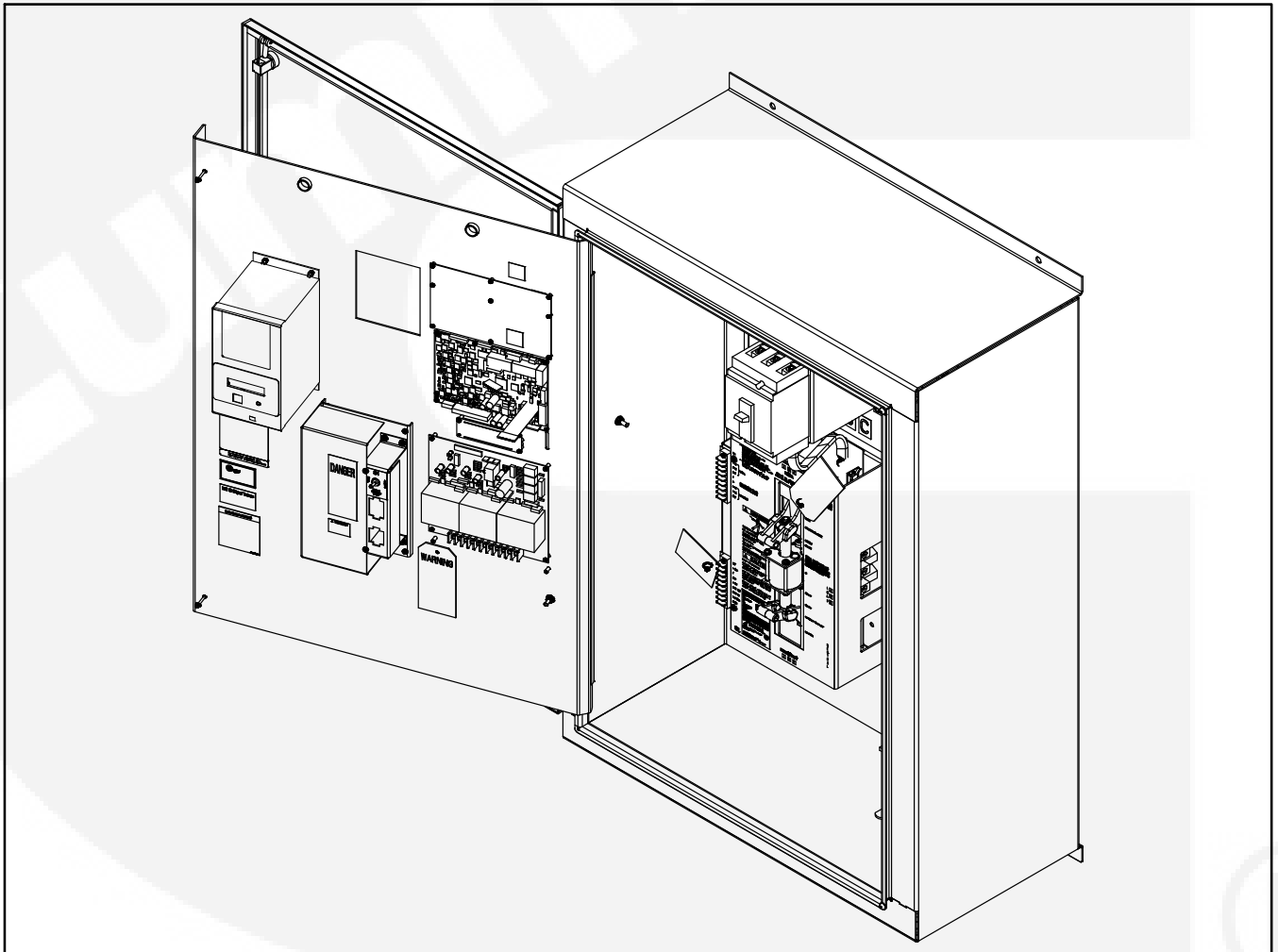
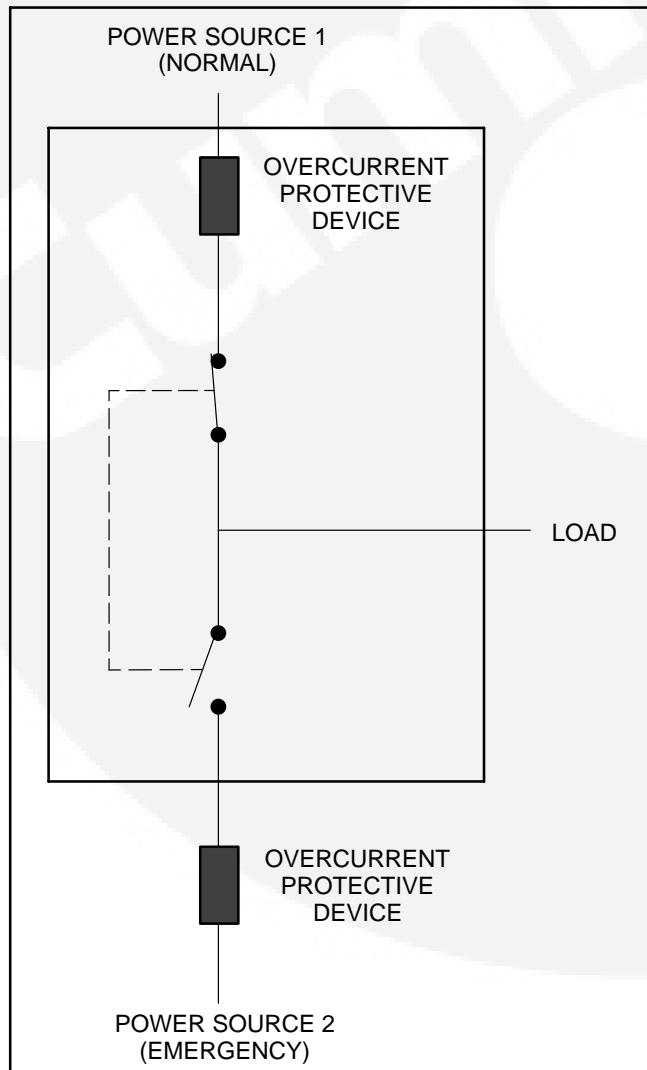


FIGURE 1-1. SERVICE ENTRANCE OTPCSE TRANSFER SWITCH

## TRANSFER SWITCH APPLICATION

Transfer switches are an essential part of a building's standby or emergency power system. Power Source 1 (Normal), commonly the utility line, is backed up by Power Source 2 (Emergency), often a generating set. 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 (Figure 1-2). Under normal conditions, the load is supplied with power from Source 1 (as illustrated). If Source 1 is interrupted, the load is transferred to Source 2. When Source 1 returns, the load is retransferred to Source 1. The transfer and retransfer of the load are the two most basic functions of a transfer switch.



**FIGURE 1-2. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)**

## TRANSFER SWITCH FUNCTION

Automatic transfer switches, capable of automatic operation without operator intervention, perform the basic function of transferring the load to the available source. The controller monitors each source for allowable voltage and frequency range. Transfer switches may interact with any of the LON-MARK™ devices.

- Genset
- Master Controller
- Annunciator Panel
- Circuit Breaker

## UTILITY-TO-GENSET OPERATION

In utility-to-genset applications, the transfer switch performs the following functions:

1. Senses the interruption of the Source 1 power (Utility).
2. Sends a start signal to the generator set (Source 2).
3. Transfers the load to the Source 2.
4. Senses the return of Utility power (Source 1).
5. Retransfers the load to Source 1.
6. Sends a stop signal to the generator set.

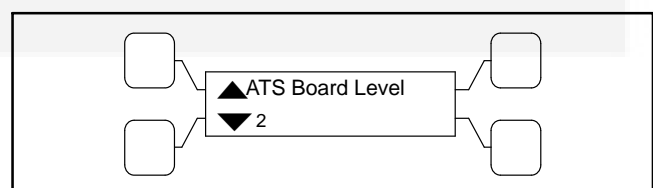
## CONTROL LEVEL 1 AND LEVEL 2

Two controls are available. The type of power source switched and the desired features determine the control levels available. The Table 1-1 lists the applications that are available with each control.

**TABLE 1-1. AVAILABLE CONTROL LEVELS**

Power Sources	Level 1	Level 2
Utility-to-Genset	X	X

The control board level can be viewed, using the digital display (see Figure 1-3). This menu is included in the About submenus described in the Digital Display Menu System section of the Operator Manual (962-0135).



**FIGURE 1-3. CONTROL LEVEL SUBMENU**



## 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/Onan distributor for assistance.

### Application and Installation

Installations must be carefully planned and correctly installed for proper operation. This involves two essential elements: application and installation.

**Application** refers to the design of the complete standby power system that usually includes power distribution equipment, transfer switches, ventilation equipment, mounting pads, cooling exhaust, and fuel systems. Each component must be correctly designed so the complete system functions as intended. Application and design is an engineering function generally done by specifying engineers or other trained specialists. Specifying engineers are normally responsible for the design of the

complete standby system and for selecting the materials and products required.

**Installation** refers to the actual set-up and assembly of the standby power system. The installers set up and connect the various components of the system as specified in the system design plan. The complexity of the standby system normally requires the special skills of qualified electricians, plumbers, sheetmetal workers, etc. to complete the various segments of the installation. This is necessary so all components are assembled using standard methods and practices.

### 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.

## MODEL IDENTIFICATION

Identify your model by referring to the Model and Specification number as shown on the nameplate. Electrical characteristics are shown on the lower portion of the nameplate, which is located on the cabinet door.

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

**OTPCSEA0000000**

**Spec.A**

1	2	3	4

1. OTPCSE - PowerCommand® Control Service Entrance transfer switch model.
2. Ampere Rating:  
A = 40, 70, 125  
B = 150, 225, 250  
C = 300, 400, 600  
D = 800, 1000
3. Assigned spec number – issued for each specific combination of accessories, voltages, frequency and standards codes. This number is only repeated for standard product.
4. Specification letter – advances with production modification.

## 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 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.

For outside North America, call Cummins Power Generation, 1-763-574-5000, 7:30 AM to 4:00 PM, Central Standard Time, Monday through Friday. Or, send a fax to Cummins Power Generation using the fax number 1-763-528-7290.

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

## 2. Mounting

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### LOCATION

The location of the transfer switch in the existing electrical circuit varies with the application and the type of entrance switch. The location and wiring must comply with the contract drawings.

A typical installation is shown in Figure 2-1. Cabinet dimensions and weights are listed in Tables 2-1 and 2-2.

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 a flammable atmosphere, 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.*

### WALL MOUNTING

1. Make sure that the wall where the ATS switch is to be mounted is suitable to hold firmly the weight and size of the transfer switch, within a reasonable safety factor. Use factory recommended minimum Grade 2, 3/8-inch bolts.
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. Install two mounting bolts in the wall for the top cabinet mounting keyholes.
5. With the shipping box standing so that the cabinet is upright, carefully remove the top and sides of the box.

**⚠WARNING** *Improper lifting can cause severe personal injury. Have sufficient manpower for lifting and mounting the cabinet.*

*When lifting Frame D, use the lifting eyes to raise the cabinet, do not use the mounting bracket.*

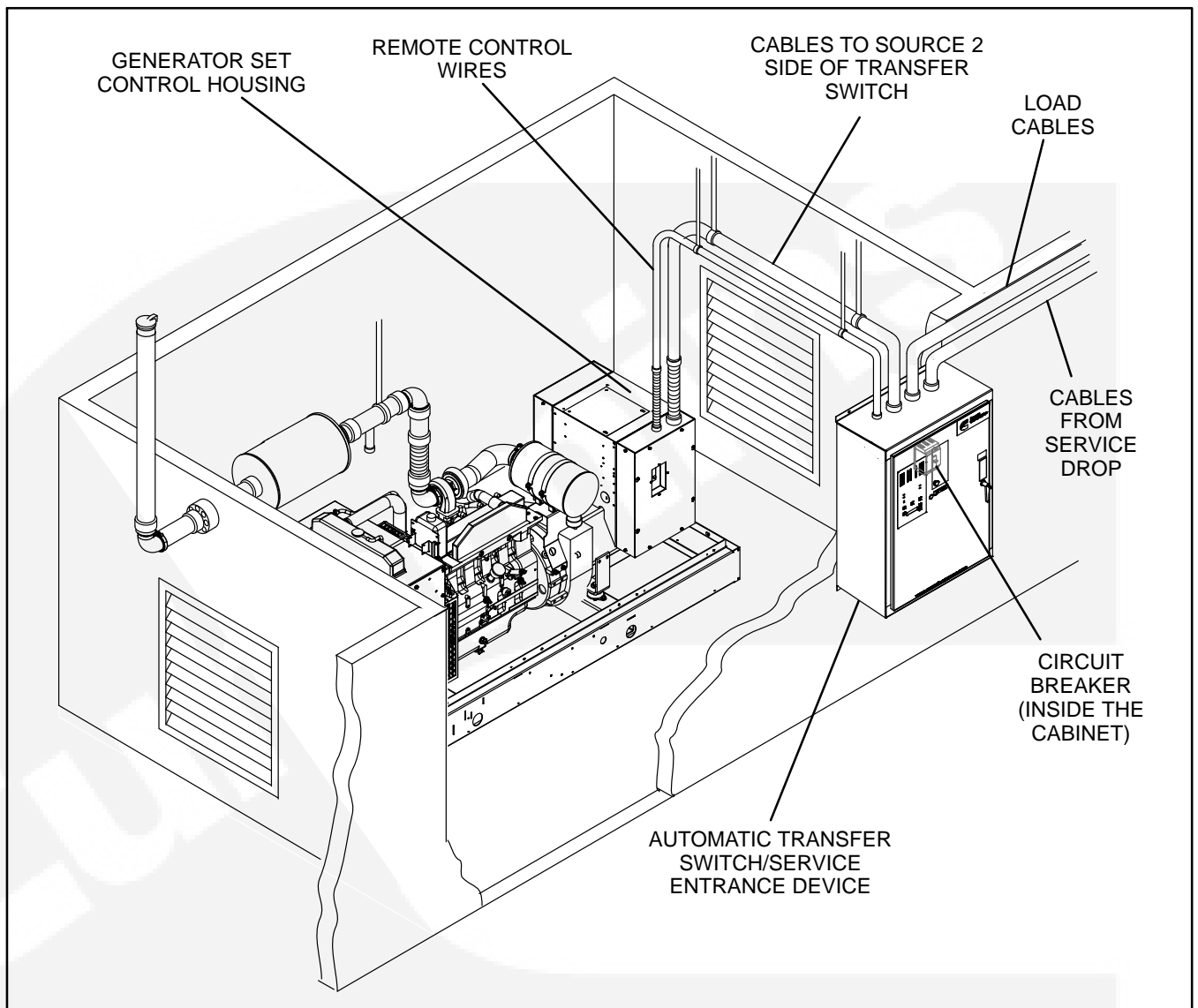
6. Raise the cabinet and mount it on the two mounting bolts in the wall.
7. Install two bottom mounting bolts, but do not tighten them. **(Do not remove the cabinet support until all bolts are installed).**
8. Push the cabinet against the wall. If the cabinet does not align flush against the wall, shim the mounting bosses as required.
9. When the switch is installed on the wall, the switch cabinet should be squared up before final fastener tightening. Make sure the installed ATS is square, level, and plumb upon completion of the installation.
10. Tighten all mounting bolts.

**TABLE 2-1. APPROXIMATE NEMA 1 CABINET DIMENSIONS**

Switch Current Rating	Height	Width	Depth		Weight
			Door Closed	Door Open	
40, 70, 125 3-Pole	45.8 in 1164 mm	32.0 in 814 mm	16.3 in 413 mm	45.9 1165 mm	300 lb 136 kg
150, 225, 250	73.6 in 1868 mm	32.3 in 820 mm	19.7 in 499 mm	49.6 in 1259 mm	500 lb 227 kg
300, 400, 600	74.5 in 1892 mm	34.4 in 873 mm	20.1 in 510.4 mm	50.9 in 1293mm	520 lb 236 kg
800, 1000	90 in 2286 mm	39 in 991 mm	26.3 in 667 mm	63 in 1599 mm	920 lb 417 kg

**TABLE 2-2. APPROXIMATE NEMA 3R AND 12 CABINET DIMENSIONS**

Switch Current Rating	Height	Width	Depth		Weight
			Door Closed	Door Open	
40, 70, 125 3-Pole	45.8 in 1164 mm	32.0 in 814 mm	16.3 in 413 mm	45.9 in 1165 mm	340 lb 154 kg
150, 225, 250	73.6 in 1869 mm	32.3 in 820 mm	19.7 in 499 mm	49.6 in 1259 mm	580 lb 263 kg
300, 400, 600	74.5 in 1892 mm	34.4 in 873 mm	20.1 in 510.5 mm	50.9 in 1293 mm	600 lb 272 kg
800, 1000	90 in 2286 mm	39 in 991 mm	26.3 in 667 mm	63 in 1599 mm	1050 lb 476 kg



**FIGURE 2-1. TYPICAL WALL-MOUNT INSTALLATION**

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# 3. Wiring

Refer to Figures 4-1 through 4-4 for component locations.

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

When installing conduit, observe the following precautions:

1. Before beginning conduit installation, cover the transfer switch and circuit breaker to prevent accidental entry of metal chips.
2. 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. If using non-metallic conduits, be sure to use shielded cable. Cutouts can be made through the top, bottom, or sides of the cabinet. (Refer to the switch outline drawings.)

**⚠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.

## AC CONNECTIONS

Perform wiring in the following sequence:

1. Test the operation of the generator set from its own controls.
2. Stop the generator set and remove the negative lead from the cranking battery to prevent starting.

**⚠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 set battery (negative (-) terminal first) before proceeding.

3. Connect conductors of sufficient size (see contract drawings) to carry rated current from the line, load, and generator set directly to the transfer switch terminals, which are marked A, B, and C (A, B, C, and N on 4-pole switches). A neutral bar with lugs is standard on 3-pole switches.

On transfer switches with a bar graph display, in order to measure the current, the load cables must each pass through a current transformer (Figure 3-1). Transfer switches are shipped with current transformer (CT) wires (white wire = X1, black wire = X2) connected to the terminal block (TB4) with the polarity mark facing the transfer switch. When wiring the power cables to the transfer switch, be sure the cables pass thru the CTs, and **make sure all CTs are facing the same direction with the polarity marks facing the transfer switch.**

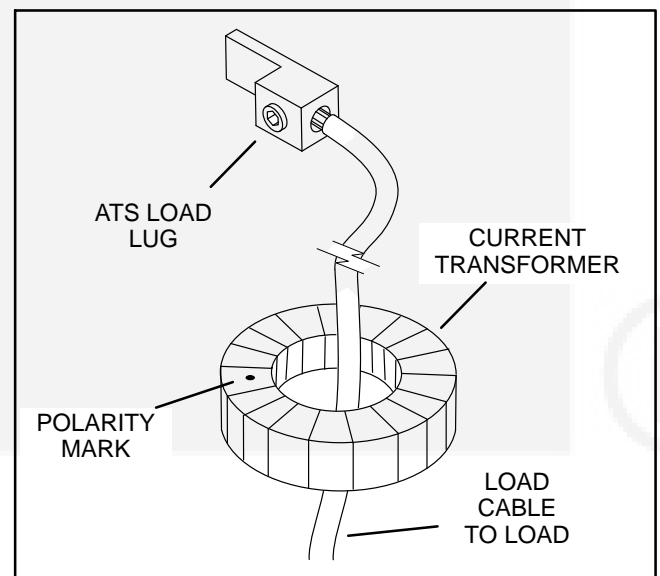


FIGURE 3-1. CURRENT TRANSFORMER WIRING







Table 3-1 gives the type and maximum conductor size the transfer switch accepts. Figure 3-2 shows the transfer switch source and load connections.

- On 120-volt switches, connect the hot side to the (A) lug and the neutral side to the Neutral lug. On 240-volt single phase switches, connect the two hot lines to the A- and C-lugs and the Neutral line to the Neutral lug.
- Connect power cables to the load terminals. Tighten the lugs as indicated in Table 3-1.

**⚠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.

**TABLE 3-1. LUG TORQUES**

Set Screw Socket Size (Across Flats)	Minimum Torque For Proper Operation
3/16 In	80 In-lbs (9 N  )
1/4 In	200 In-lbs (23 N  )
5/16 In	275 In-lbs (31 N  )
3/8 In	375 In-lbs (43 N  )
1/2 In	500 In-lbs (57 N  )
9/16 In	600 In-lbs (68 N  )

## Converting Transfer Switch Phase Setting

Converting a transfer switch from single-phase to three-phase operation or from three-phase to single-phase operation is a three-step procedure:

**⚠CAUTION** *Incorrect placement of transformer jumper wires can cause damage to the control*

**TABLE 3-2. TERMINAL LUG CAPACITY FOR COPPER (CU) OR ALUMINUM (AL) CONDUCTORS**

Current Rating	Utility circuit Breaker		Emergency, Load, and Neutral		Ground	
	Cables Per Phase	Wire Size	Cables Per Phase	Wire Size	Cables Per Lug	Wire Size
40/70/125	1	#14 AWG-3/0	1	#12 AWG-2/0	1	#14 AWG-1/0
150/225/250	1	#2 AWG-600 MCM (CU) #2 AWG-500 MCM (AL)	1	#6 AWG-400 MCM	1	#14 AWG-1/0
300/400/600	3	#3 AWG-500 MCM	2	250–500 MCM	1	#6 AWG-350 MCM
800/1000	4	250–500 MCM	4	250–500 MCM	1	#6 AWG-250 MCM

*when power is applied. To perform this conversion procedure correctly, refer to and comply with the schematics and wiring diagrams that were shipped with the transfer switch.*

- Disconnect both AC power sources.

**⚠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.*

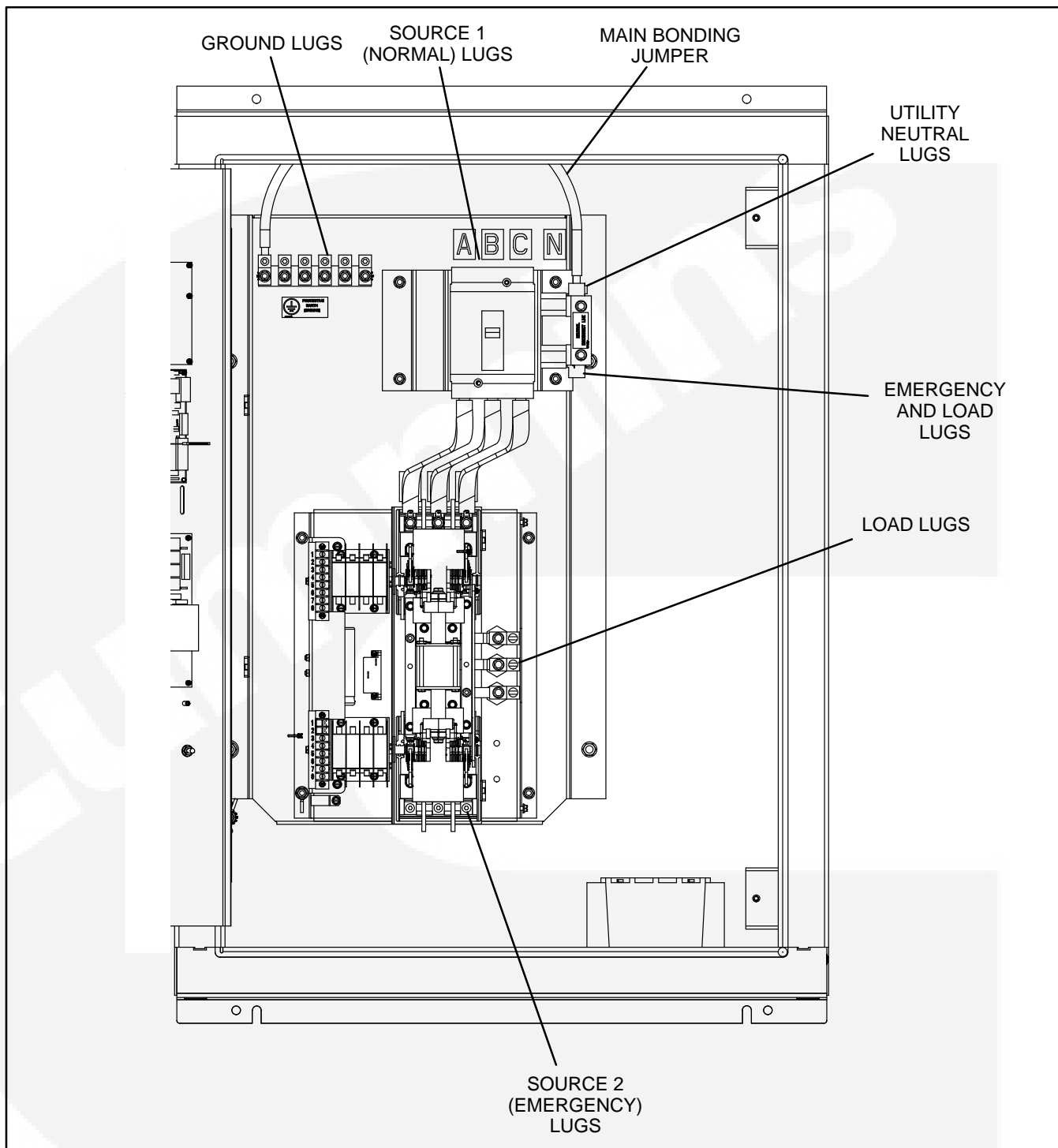
- Stop the generator set and remove the negative lead from the cranking battery to prevent starting.

**⚠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 set battery (negative (–) terminal first) before proceeding.*

**⚠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 circuit breaker off, the line side lugs are still energized.*

- Place the transformer jumper wires (on the Power Module board) in the appropriate configuration. Refer to the service manual and to the schematic and wiring diagram package.
- Set the appropriate Phase parameter with the digital menu system when it is available (refer to the Digital Display Menus System section of the OTPCSE Operator Manual (962–0135)) or the PC service tool.





**FIGURE 3-2. TRANSFER SWITCH TERMINAL ACCESS (40-125 AMPERE SHOWN)**

## CONTROL CONNECTIONS

Connections of standard and optional control wiring are made at terminal blocks TB1, TB2, TB3, and the relay module; and directly at the (optional) auxiliary relays (Figure 3-3).

TB1 is located near the top left side on the front of the transfer switch. TB2 is located below TB1, near the bottom left side of the transfer switch. TB3 and auxiliary relays are located inside the cabinet on the DIN rail located on the upper left wall of the cabinet.

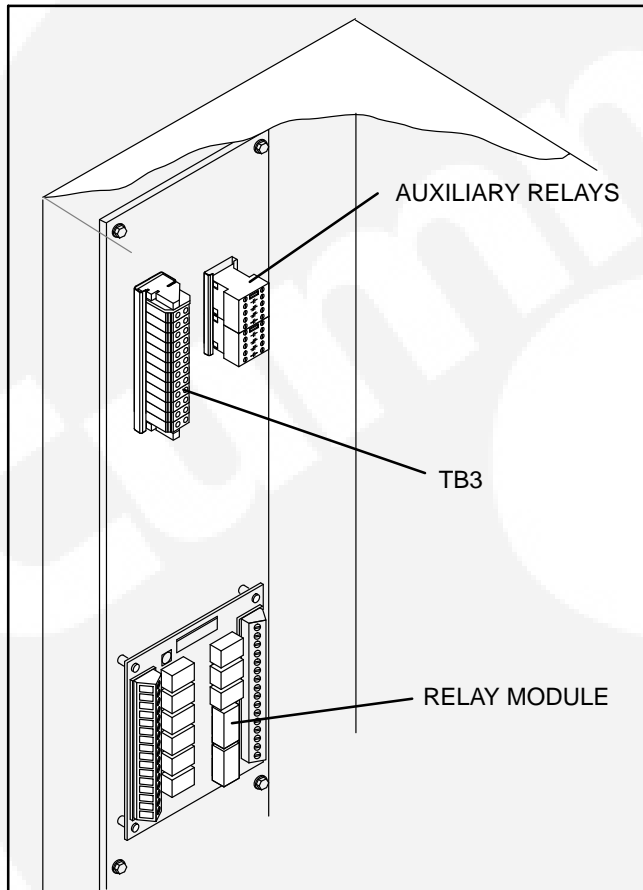


FIGURE 3-3. CONTROL WIRING CONNECTIONS

### Connecting the Transfer Switch to a Generator Set

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

Wire size depends on the distance and the type of battery charger installed. Refer to Table 3-3 to determine the wire size required.

- All leads to TB2 use Column A.

- If the transfer switch is not equipped with a battery charger, use Column A for all wires.
- If the transfer switch is equipped with a 2-Amp charger with a maximum voltage drop of 1.5 volts, use Column B for B+ and GND (leads 1-1 and 1-3). Use Column A for all other wires.
- If the transfer switch is equipped with a 2-Amp charger with a maximum voltage drop of .75 volts, use Column D for B+ and GND (leads 1-1 and 1-3). Use Column A for all other wires.
- If the transfer switch is equipped with a 12/15-Amp charger with a maximum voltage drop of 1.5 volts, use Column C for B+ and GND. Use Column A for all other wires.
- If the transfer switch is equipped with a 12/15-Amp charger with a maximum voltage drop of .75 volts, use Column E for B+ and GND. Use Column A for all other wires. To meet the NFPA requirement to return a fully discharged battery to 100% of its ampere-hour rating within 24 hours, use Column E.
- If the generator set is equipped with an annunciator, use Column A for wires to the annunciator.

TABLE 3-3. WIRE SPECIFICATIONS

Wire Size (AWG)	Distance in Feet, One Way (Multiply by 0.3 for Meters)				
	A	B	C	D	E
16	1000	90	–	50	–
14	1600	150	20	80	5
12	2400	225	30	125	10
10	4000	350	50	200	15
8	–	600	80	300	25
6	–	1000	125	500	40

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

Remote starting (for Cummins Power Generation water-cooled generator sets only) uses terminals B+, GND (ground), and RMT of terminal block TB2 (Figure 3-5). Connect these terminals to like terminals on the generator set. Refer to Interconnect Wiring diagram shipped with the switch. A jumper is shipped with the transfer switch and is in a small envelope attached to TB2.

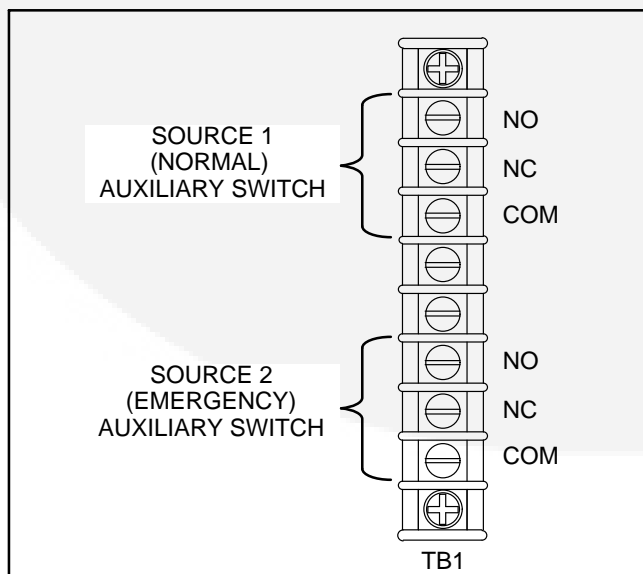
- For PCC 3100 and PCC 2100 generator set controls, install a jumper between TB2-1 and TB2-2 for ground-to-start connection.
- For Detector 12 generator set controls, install a jumper between TB2-2 and TB2-3 for B+ start.
- For PCC 3200, PCC 1301, PCC 1302, PCC 2300, and PCC 3300 generator set controls requiring a dry contact start, do not install a jumper.

Be sure to check the Interconnect Wiring diagram shipped with the transfer switch.

For network wiring instructions, refer to the *PowerCommand Network and Operator's Manual* (PN 900-0366 for TP-78 networks or 900-0529 for FT-10 networks).

### Auxiliary Contacts

Auxiliary contacts, used for external alarm or control circuitry, are available for the Source 1 (Normal) and Source 2 (Emergency) sides of the transfer switch. Connections for the auxiliary contacts can be made on terminal block TB1 (Figure 3-4). The contacts have ratings of 10 amperes at 250 VAC. Figure 3-4 shows the normally open and normally closed positions of the auxiliary contacts with the transfer switch in the neutral position. Moving the transfer switch to Normal or Emergency actuates the corresponding auxiliary contacts.



**FIGURE 3-4. TERMINAL BLOCK TB1**

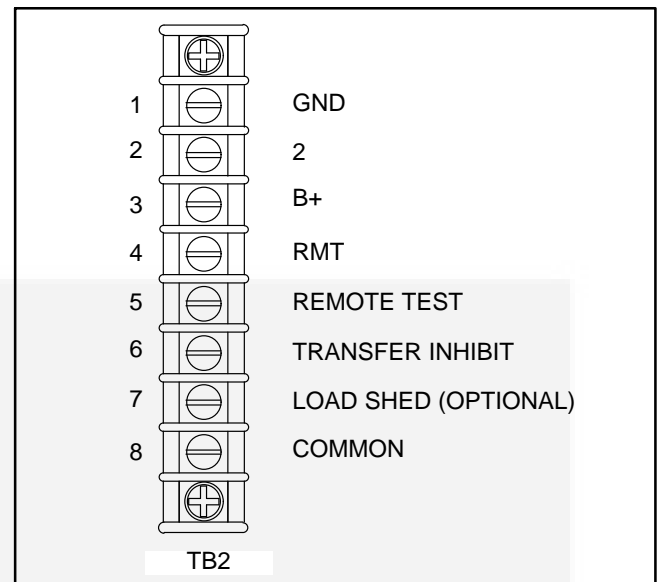
Use number 22 to number 12 AWG stranded wire. For connection to the screw terminal, strip the insulation back 3/8 inch (10 mm).

### Remote Start-Stop Connections

Use number 18 to number 12 AWG stranded wire. Resistance must not exceed 0.5 ohm per line. Stranded wire is recommended. For connection to the screw terminal, strip the insulation back 3/8 inch (10 mm).

Remote starting (for CPG water-cooled generator sets only) uses terminals B+, GND (ground), and RMT of terminal block TB2 (Figure 3-5). Connect these terminals to like terminals on the generator set. Refer to your generator set wiring diagrams.

Connect the supplied jumper between terminals 1 and 2 for PowerCommand control systems. Connect the jumper between terminals 2 and 3 for Detector Control systems. Do not use the jumper for all other systems.



**FIGURE 3-5. TB2: START CONNECTIONS, REMOTE TEST, AND TRANSFER INHIBIT**

## Remote Test Feature

The transfer switch can be remotely activated by using an external switch. Closure of a set of contacts (switch) across the remote test transfer input and common causes the transfer switch to sense a (simulated) utility power failure and send a start/run signal to the generator set. The load is transferred to the generator set when generator set power becomes available. (Refer to the Service manual (962-0523).)

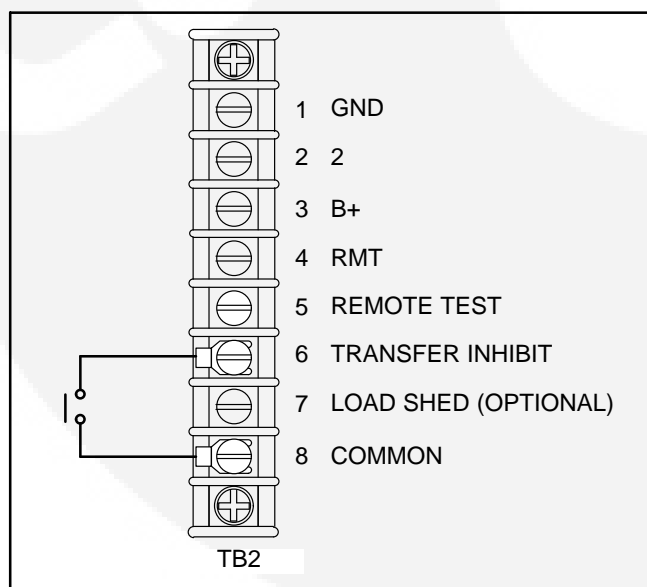
To a remote test switch, connect normally open contacts (from a test switch) to terminals 5 and 8 of TB2 (Figure 3-5).

Use number 22 to number 12 AWG stranded wire (maximum resistance of 4 ohms per line). For connection to the screw terminal, strip the insulation back 3/8 inch (10 mm).

## Transfer Inhibit

To add transfer inhibit, connect normally open contacts to terminals 6 and 8 of TB2 (Figure 3-6).

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

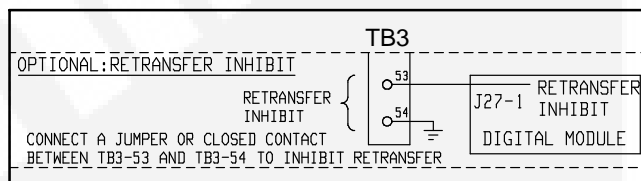


**FIGURE 3-6. TB2 CONNECTIONS FOR TRANSFER INHIBIT**

## Retransfer Inhibit Input

Retransfer Inhibits are set up by connecting a remote contact between TB3-53 and TB3-54 (see Figure 3-7). Closing the contact enables the feature and opening the contact disables it. When enabled, the event is displayed on the front panel. For TB3 location inside the transfer switch cabinet, see Figure 3-3.

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



**FIGURE 3-7. TB3 CONNECTIONS FOR RETRANSFER INHIBIT**

## Load Shed Option

To add a load shed control, connect normally open contacts across terminals 7 and 8 of TB2 (Figure 3-5).

Load shed is initiated by the closing of contacts across terminals 7 and 8 of TB2. When the load shed function is initiated, the switch is moved from the Source 2 position to the neutral position. When load shedding is in effect, a return of Source 1 utility power causes immediate retransfer to Source 1. If the load shed signal is removed before Source 1 returns, the switch transfers back to Source 2 if the Source 2 is available.

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

## Auxiliary Relays Option

Connections to the auxiliary relays are made directly to the relay terminals. Figure 3-3 shows the location of the Auxiliary Relays on the options panel. The terminals accept wire sizes from one number 18 AWG stranded wire to two number 12 AWG stranded wires. For connection to the screw terminal, strip the insulation back 3/8 inch (10 mm).

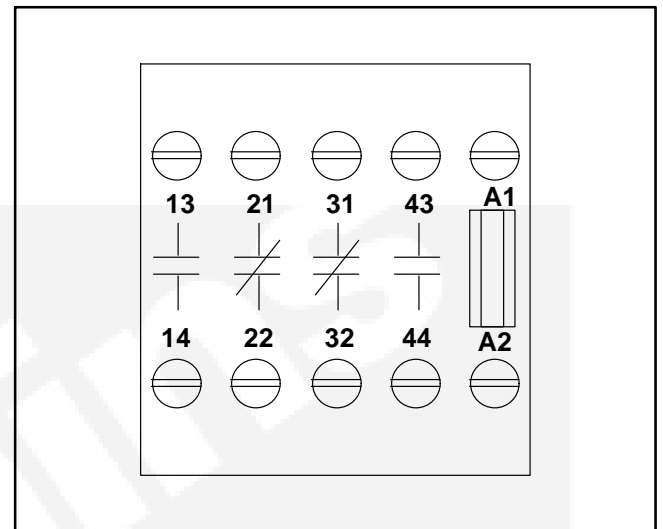
There are two types of auxiliary relay coils (12 VDC and 24 VDC).

Table 3-4 lists several auxiliary relay options.

All relays have two normally open and two normally closed contacts that are rated for 10 amperes at 600 VAC (Figure 3-8).

**TABLE 3-4. AUXILIARY RELAY**

24 VDC COIL	INSTALLED, NOT WIRED
24 VDC COIL	EMERGENCY RELAY
24 VDC COIL	NORMAL RELAY
12 VDC COIL	INSTALLED, NOT WIRED
12 VDC COIL	EMERGENCY RELAY
12 VDC COIL	NORMAL RELAY



**FIGURE 3-8. AUXILIARY RELAY TERMINALS**

## Relay Module Option

The Relay Module provides nine sets of Form-C contacts and two sets of normally open contacts that are rated for 2 Amps at 30 VDC or 0.60 Amps at 120 VAC. Two sets of Form-C contacts and one set of normally open contacts is reserved for future use. Connections to these relays are made at J14 and J15 on the Relay Module. The Relay Module is located on the left inside wall of the transfer switch enclosure. See Figure 3-3 for location in the enclosure and Figure 3-9 for details. See Table 3-5 for relay module connections.

The Source 1 and Source 2 Connected relays are energized when their respective power sources are available, ready to produce power, and connected to the load.

The Source 1 and Source 2 Available relays are energized when their respective power sources are producing power.

The Test/Exercise relay is energized when the system is in test or exercise mode.

The Elevator Pre-Transfer relay is energized during the elevator signal time delay. The relay contacts are used to provide a warning that a transfer or retransfer is about to occur.

The ATS Not-In-Auto relay is energized when any one of the following is active:

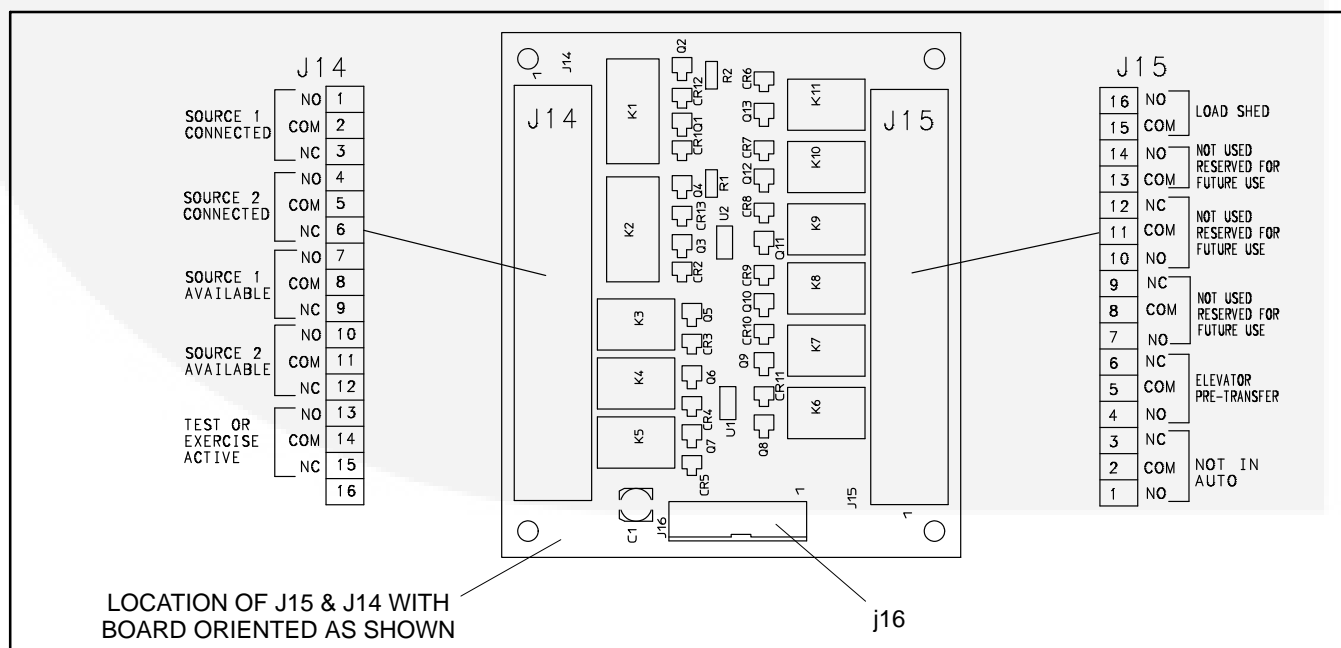
- Motor Disconnect Switch in OFF position
- Transfer Inhibit
- Retransfer Inhibit
- Load Shed
- P12 is disconnected from Power Module

The Load Shed relay is active when the transfer switch has been commanded to disconnect the load from Power Source 2.

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

**TABLE 3-5. RELAY MODULE CONTACTS**

Relay	NO	COM	NC
Source 1 Connected	J14-1	J14-2	J14-3
Source 2 Connected	J14-4	J14-5	J14-6
Source 1 Available	J14-7	J14-8	J14-9
Source 2 Available	J14-10	J14-11	J14-12
Test/Exercise Active	J14-13	J14-14	J14-15
ATS Not-In-Auto	J15-1	J15-2	J15-3
Elevator Pre-Transfer	J15-4	J15-5	J15-6
Not Used	J15-7	J15-8	J15-9
Not Used	J15-10	J15-11	J15-12
Not Used	J15-13	J15-14	X
Load Shed	J15-15	J15-16	X



**FIGURE 3-9. OPTIONAL RELAY MODULE**

## Battery Charger Options

Battery chargers are used with utility-to-genset applications. When so equipped, a battery charger can be used for charging generator set starting and control batteries. These chargers are current limiting and supply automatic constant voltages.

When the battery approaches the full charge preset voltage, the charging current automatically tapers to zero amperes or to a steady-state load on the battery.

A float-charge battery charger regulates its charge voltage to continuously charge without damage to the battery. As the battery approaches full charge, the charging current automatically tapers to zero amperes or to steady-state load on the battery.

Two battery chargers are available (see Figure 3-10). One battery charger is rated for 2 amperes at 12 or 24 VDC. The other battery charger is rated for 15 amperes at 12 VDC or 12 amperes at 24 VDC.

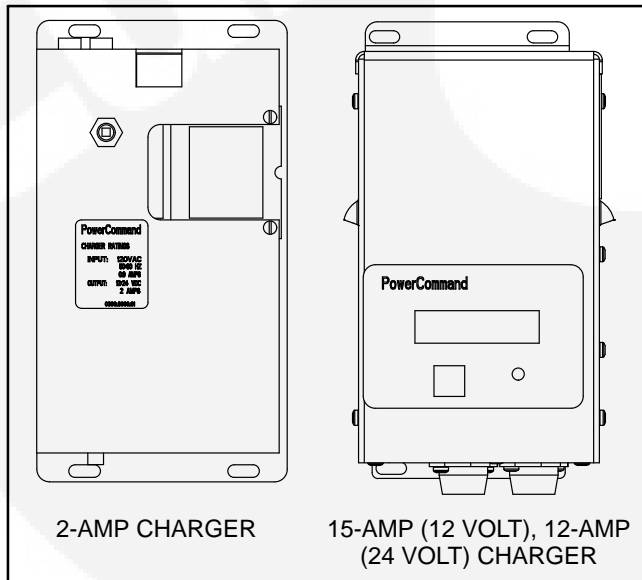


FIGURE 3-10. CURRENT BATTERY CHARGERS

### 2-Amp Battery Charger

The 2-ampere battery charger (see Figure 3-11) has a 5 amp DC output circuit breaker switch on the front of the battery charger. The charger also includes a 5 amp AC fuse to protect the battery charger circuit.

Under normal operating conditions, the Low Bat and AC Fail relays are energized and the High Bat relay is de-energized. In response to a Low Bat or AC Fail condition, the appropriate normally energized relay (Low Bat or AC Fail) drops out. In response to a High Bat condition, the normally de-energized High Bat relay is energized.

**Control Panel** – The 2-amp charger control panel includes a digital display, a RESET button, and an LED status indicator (see Figure 3-12).

- The 2-line x 16-character digital display displays menus and faults.
- The RESET button is used to select menu options and to clear fault messages.
- The status LED displays the appropriate color for the following conditions.
  - **Green** – On solid indicates unit is charging
  - **Red** – On solid indicates a fault condition. The fault number is shown on the digital display.

**Battery Charger Configuration** – The **RESET** button on the control panel (see Figure 3-12) is used to configure the battery charger for the correct battery voltage. (More information on Setup menus is included in the Battery Charger Operator's Manual.)

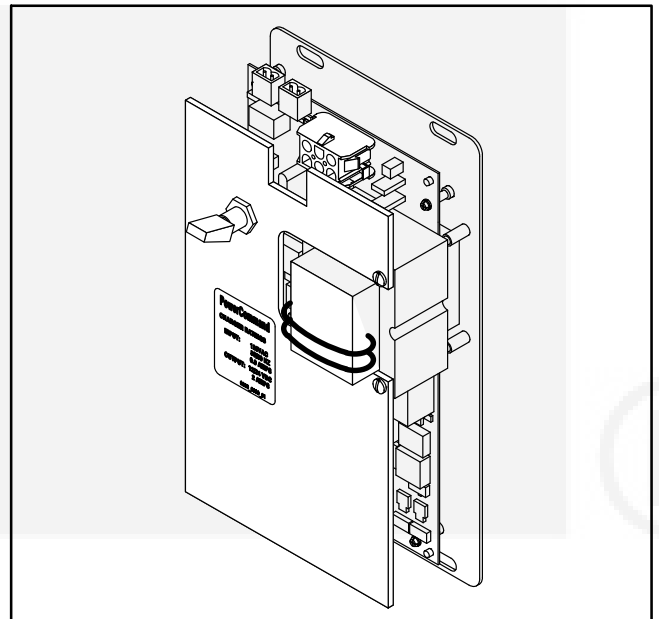
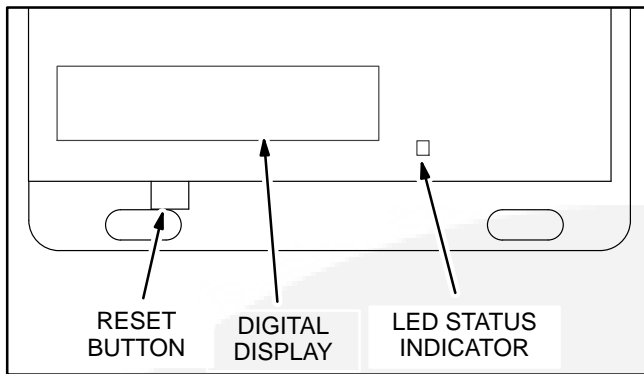


FIGURE 3-11. 2-AMP POWERCOMMAND BATTERY CHARGER



**FIGURE 3-12. 2-AMP CHARGER CONTROL PANEL**

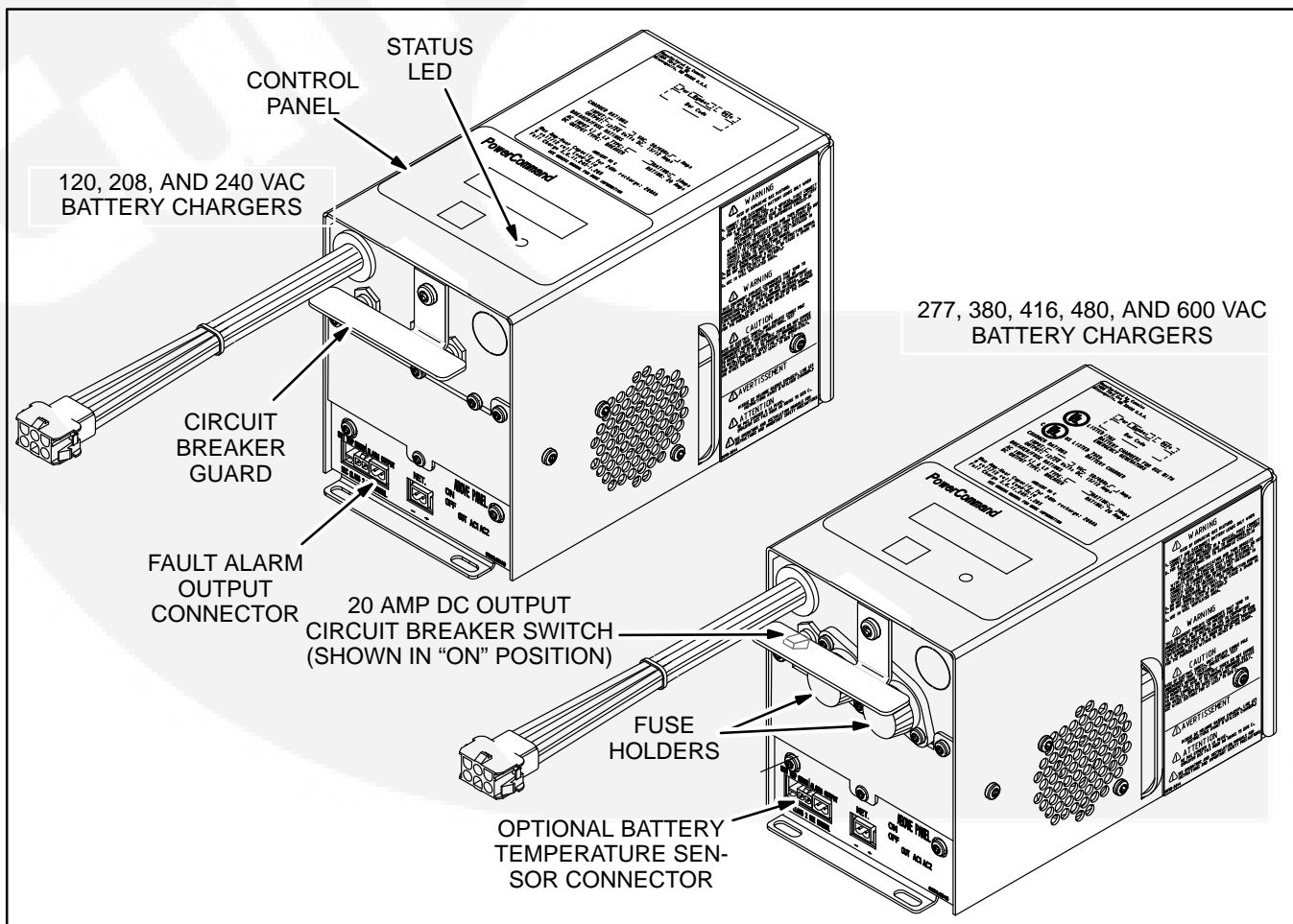
### 15/12-Amp Battery Charger

There are two types of 15/12-amp PowerCommand battery chargers (see Figure 3-13). All 15/12-amp battery chargers have a 20 amp DC circuit breaker switch on the front of the battery charger. The 120, 208, and 240 VAC battery chargers include two 10 amp AC circuit breaker switches

and a circuit breaker guard, while the 277, 380, 416, and 600 VAC battery chargers include two AC fuse holders.

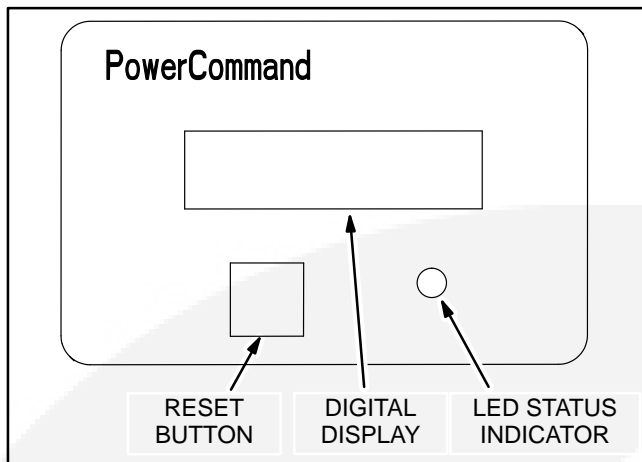
**Control Panel** – The 15/12-amp charger control panel includes a digital display, a Reset button, and an LED status indicator (see Figure 3-14).

- The 2-line x 16-character digital display displays menus and faults.
- The Reset button is used to select menu options and to clear fault messages.
- The status LED displays the appropriate color for the following conditions.
  - **Green** – On solid indicates unit is charging
  - **Amber** – On solid indicates Equalizing
  - **Red** – On solid indicates a fault condition. The fault number is shown on the digital display.



**FIGURE 3-13. 15/12-AMP POWERCOMMAND BATTERY CHARGERS**





**FIGURE 3-14. 15/12-AMP CHARGER CONTROL PANEL**

#### *Optional Battery Temperature Sensor*

**Optional Battery Charger Sensor** – A connector for an optional battery temperature sensor is located on the front of the battery charger. When used to monitor battery temperature, the optional battery temperature sensor is connected from the battery charger to the positive terminal of the battery. A fault message (fault code 2263) is displayed if the battery temperature is too high (reaches 131 degrees F (55 degrees C)).

**Battery Charger Configuration** – The **RESET** button on the control panel (see Figure 3-14) is used to configure the battery charger. (More information on Setup menus is included in the Battery Charger Operator's Manual.)

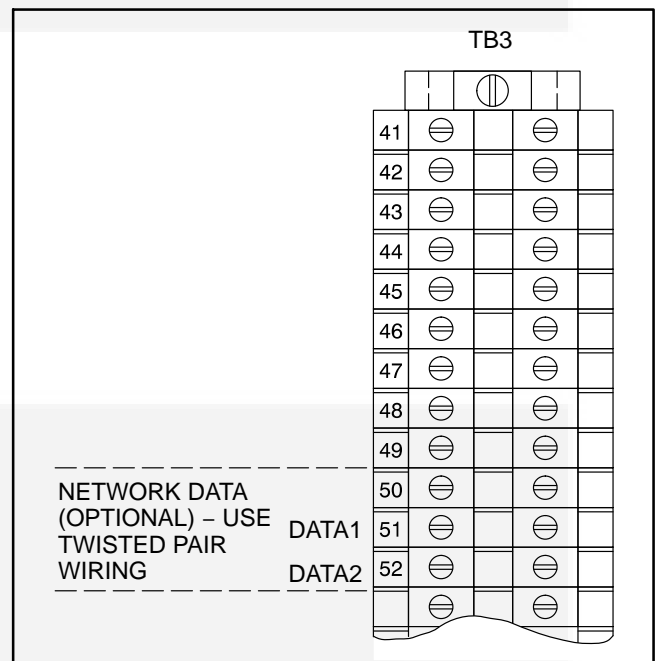
- **Battery Voltage and Type** – The battery charger must be correctly configured, using the Setup menus, for the correct battery voltage and type before it is connected to the battery. The battery voltage can be set for 12 or 24 VDC (default = 12 VDC). The battery type can be set for Lead-Acid, Gel, or AGM batteries (default = Lead-Acid).

**NOTE:** A factory installed battery charger is set up for the proper DC battery voltage requested on the production order, with the Lead-Acid battery type selected as the default.

- **Battery Equalization** – Battery equalization is available for lead-acid batteries that are completely charged, using the Equalize Battery screen in the Setup menus. When battery equalization is in process, the LED status indicator turns amber.

### **Network Connections**

For installations that include a PowerCommand Network Communications Module (NCM), connect stranded twisted pair network cable to the left side of terminals 51 and 52 on TB3 (see Figure 3-15). The NCM is located on the left side of the digital module (see Figure 4-1).



**FIGURE 3-15. BATTERY CHARGER ALARM CONTACTS AND NETWORK CONNECTIONS**

## VOLTAGE SENSING WIRING (LEVEL 2 CONTROL ONLY)

The transfer switch is wired at the factory for a 4-wire, 3-phase Wye configuration with grounded neutral. If this transfer switch is being connected to a Delta power system or a Wye *without* a grounded neutral, modify the wiring as follows:

1. Disconnect the neutral sensing wires marked TB12-7 and TB14-7 (see Figure 3-16).

**NOTE:** Leave the short jumpers as they are.

2. Insulate the terminals and secure them to the harness with a wire tie.

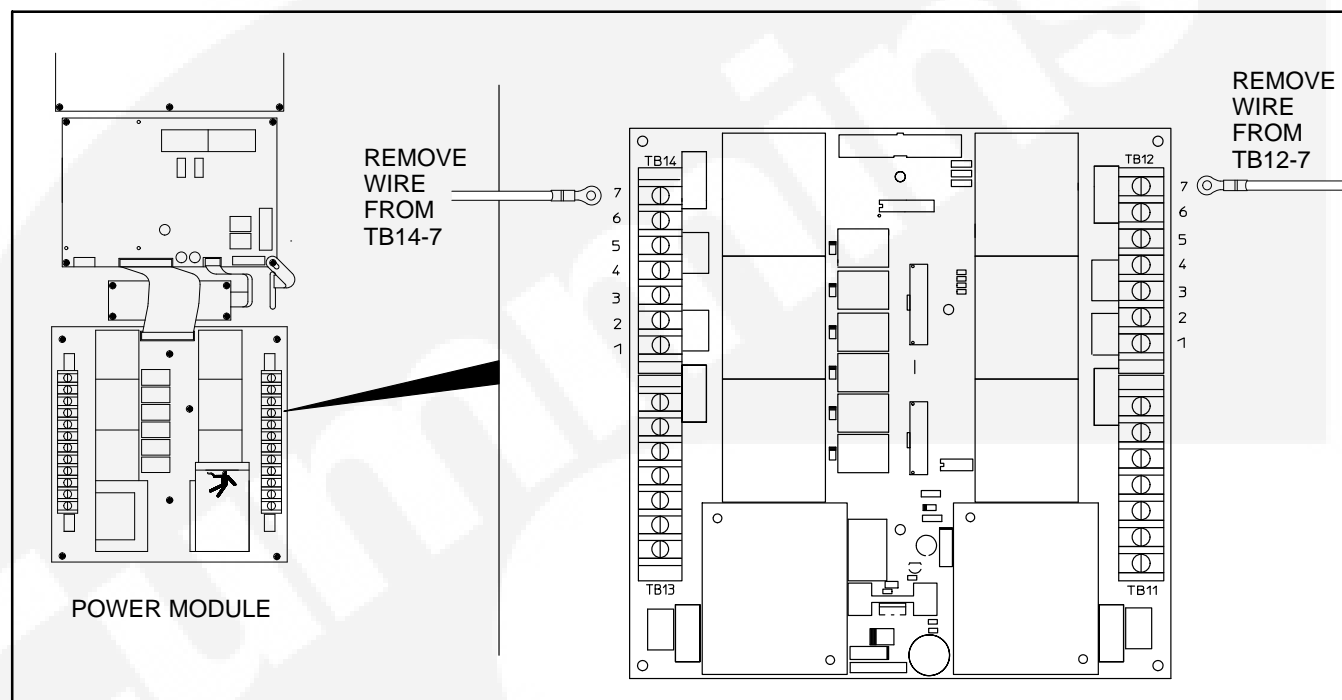


FIGURE 3-16. OPTIONAL DELTA CONFIGURATION JUMPER

## CIRCUIT BREAKER TRIP UNITS

Each circuit breaker on an OTECSE transfer switch includes one of the following trip units. The following pages describe trip units used on 150–1000 amp service entrance transfer switches.

- STR23SP – Used with 150, 225, and 250 amp service entrance transfer switches
- Micrologic <sup>®</sup> 3.0 LI – Used with 300, 400, and 600 amp service entrance transfer switches
- Micrologic 6.0A LSIG – Used with 800 and 1000 amp service entrance transfer switches

The circuit breaker trip units are preset at the facto-

ry. The default settings are listed in the following tables.

### Circuit Breaker STR23SP Trip Unit Settings

Rated Switch Amperage	I <sub>o</sub>	I <sub>r</sub>	I <sub>m</sub>
150A	1	1	6
225A	0.9	1	6
250A	1	1	6

### Circuit Breaker Micrologic 3.0 Trip Unit Settings

Rated Switch Amperage	I <sub>r</sub>	t <sub>r</sub>	I <sub>i</sub>
300A	0.5	0.5	1.5
400A	0.67	0.5	1.5
600A	1	0.5	1.5

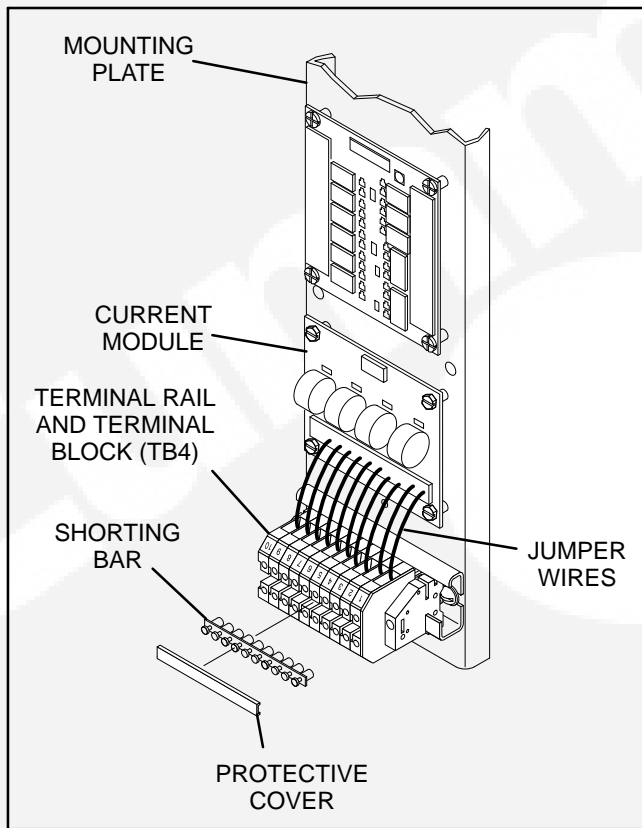
### Circuit Breaker Micrologic 6.0 Trip Unit Settings

Rated Switch Amperage	I <sub>r</sub>	t <sub>r</sub>	I <sub>sd</sub>	t <sub>sd</sub>	I <sub>i</sub>	I <sub>g</sub>	t <sub>g</sub>
800A	0.8	0.5	1.5	0 (Off)	2	A	0.1
1000A	1	0.5	1.5	0 (Off)	2	A	0.1

## SHORTING BAR REMOVAL

The current transformers are shorted during shipment. The shorting bar in terminal block TB4 connects all outputs to ground. The shorting bar must be removed in order for current metering to function. To remove the shorting bar from the center of TB4 (see Figure 3-17):

3. Remove the protective cover.
4. Loosen all the the shorting bar screws and lift it out of the terminal block.
5. Reinstall the protective cover. Save the shorting bar for reuse.



**FIGURE 3-17. SHORTING BAR REMOVAL**

## INSPECTION AND CLEANUP

Inspect all wiring to be certain that:

- Wiring does not interfere with switch operation.
- Wiring is not damaged as door opens and closes.
- Wiring does not contact sharp or abrasive surfaces.
- No wiring is left loose and unconnected.

After mounting and wiring the cabinet, clean the interior with a vacuum cleaner to remove any chips, filings, or dirt from the cabinet interior and components.

The installation is not yet complete.

**Do not energize the transfer switch until instructed to do so in Sections 4 and 5.**

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## 4. Setup and Adjustments

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After the transfer switch is installed, the control settings can be adjusted. Setup and adjustment procedures can be performed using the digital display. If the transfer switch is not equipped with the digital display you must use the PC service tool to view and change parameters. Refer to the InPower™ User's Guide for details on using the PC service tool.

### BEFORE ADJUSTING

Refer to the *OTPCSE Operator Manual* (962-0135) for information on the Digital Display Menu System and control setup.

### Disable the Linear Motor

**⚠WARNING** *Accidental actuation of the linear motor can cause severe personal injury. Disable the motor before making adjustments.*

Place the Motor Disconnect Switch (Figures 4-1 through 4-4) in the Off position before making ad-

justments. Return the switch to the Auto position after adjustments are completed.

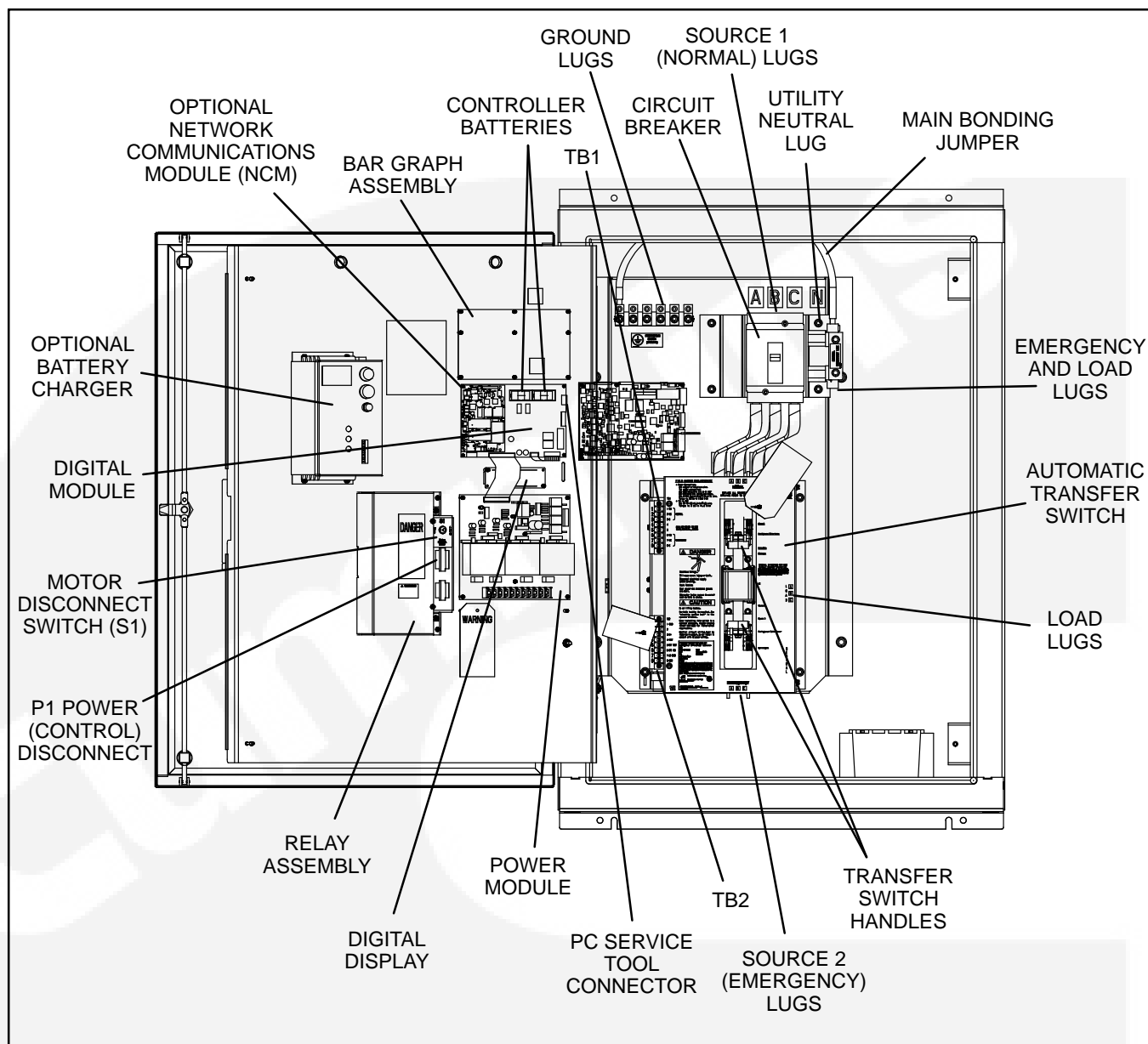
### Install J1 and J2

**⚠WARNING** *AC power in 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 when the cabinet door is open. Do not wear long hair, damp clothing, or jewelry.*

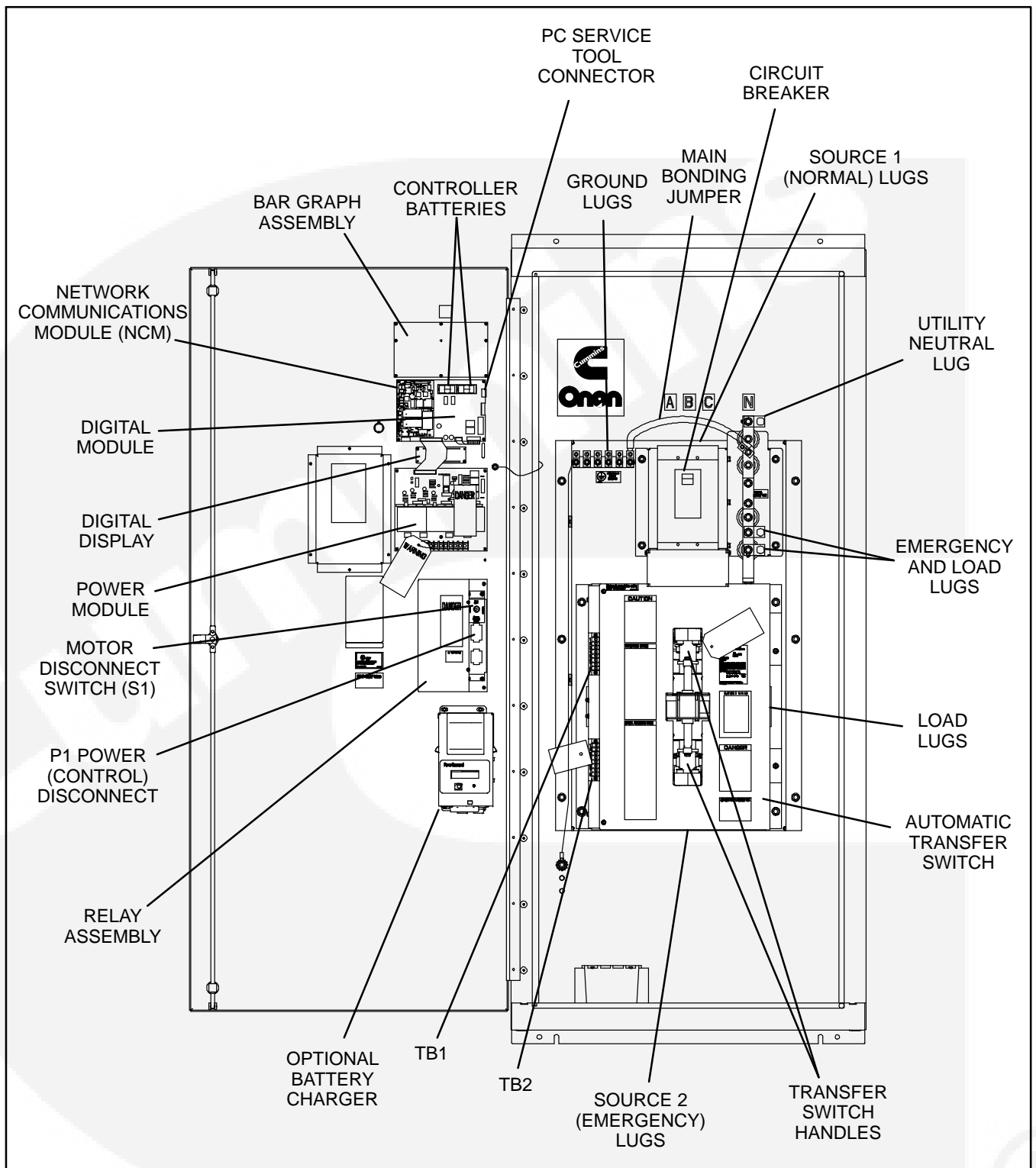
Install connectors J1 and J2 when all wiring is complete.

### Connect AC Line Power

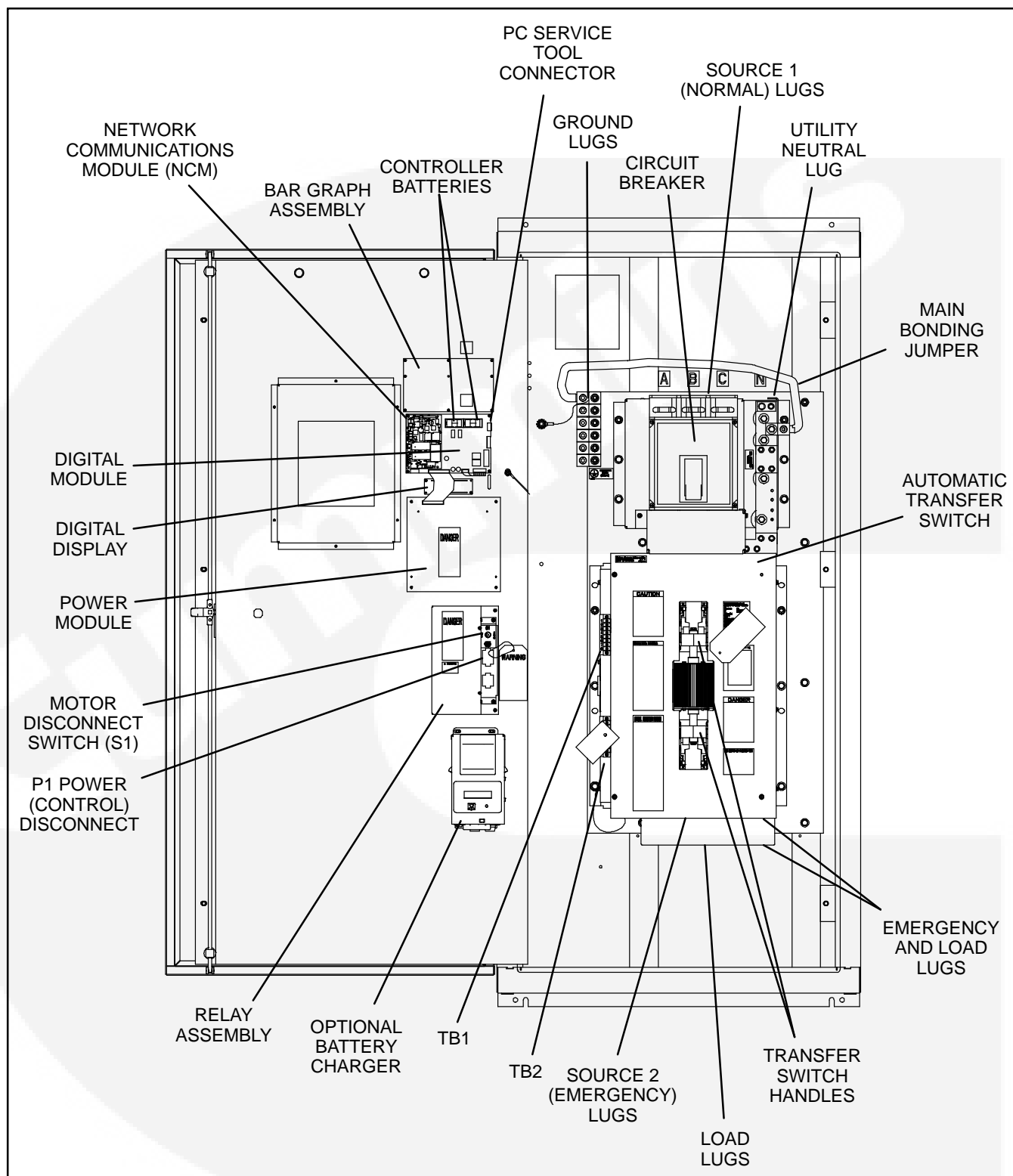
If the transfer switch main contacts are not closed to the Source 1 (Normal) power source side, manually close the transfer switch to the Source 1 side. Then connect AC line power to the automatic transfer switch and turn on the circuit breaker to the "On" position. The Source 1 Available and Source 1 Connected lamps should light.



**FIGURE 4-1. INTERIOR/COMPONENTS (40-125 AMP, 3 POLE, TYPE 3R AND 12 CABINET)**

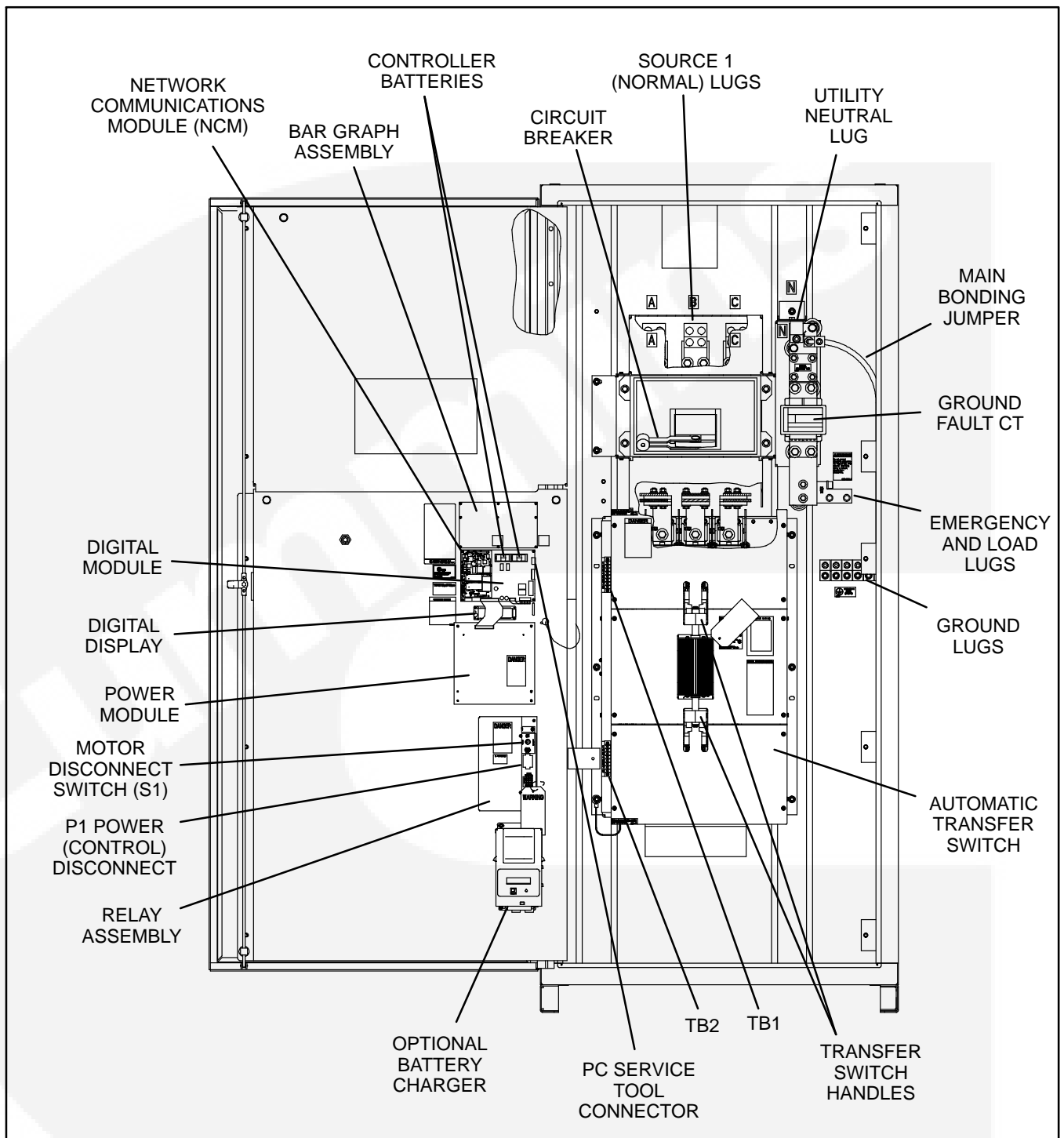


**FIGURE 4-2. INTERIOR/COMPONENTS (150-250 AMP, 3 POLE, TYPE 1 CABINET)**



**FIGURE 4-3. INTERIOR/COMPONENTS (300-600 AMP, 4 POLE, TYPE 3R AND 12 CABINET)**





**FIGURE 4-4. INTERIOR/COMPONENTS (800-1000 AMP, 3 POLE, TYPE 3R AND 12 CABINET)**

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# 5. Checkout

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If the transfer switch is equipped with a Digital Display, use it to checkout the switch. Refer to section 4 of the Operator Manual (962-0135) for setup details. If the switch is not equipped with a Digital Display, use the the LED indicators located on the Digital Module mounted on the inside of the transfer switch enclosure door. See Figure 5-1.

**⚠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.*

**⚠WARNING** *Improper operation of the generator set presents a hazard that can cause severe personal injury or death. Observe all safety precautions in your generator set Operation and Installation manuals.*

## STARTING TEST (UTILITY-TO-GENSET MODE)

1. Move the selector switch on the engine control to Run. The generator set should start and run.
2. Move the selector switch to Remote. The generator set should stop.

## TEST TRANSFER WITH LOAD

1. Set the Test With/Without Load variable to the With Load value. Use the Digital Display Menu System or PC Service Tool.

**NOTE:** The Test With/Without Load variable must be set to the With Load value in order to test with load.

2. Press and hold the Test switch for 2 seconds. With the appropriate time delays, the generator set should start and the load should be transferred to the generator. The Source 2 Available lamp lights when the generator output is sensed. The Source 2 Connected lamp lights to indicate that transfer has occurred.
3. Check the operation of the Bar Graph Meters (if equipped) on the cabinet door.
4. Press the Test switch. The transfer switch should retransfer load to Source 1 and stop the generator set after any time delays. The Source 1 Available lamp lights immediately. The Source 1 Connected lamp lights to indicate that retransfer has occurred.
5. Set the Test With/Without Load variable to the value you want to use for generator set exercising.

## CONTROL LED INDICATORS AND SWITCH

### Exerciser Enable/Disable Switch

#### LED Indicators

The digital module located on the inside of the switch enclosure door contains ten LED indicators. The indicators provide some information about the current control status. These indicators may be helpful in troubleshooting the transfer switch when the digital display is not available. See Figure 5-1 and Table 5-1.

The Exerciser Enable/Disable switch (Figure 5-1) enables the control to exercise the generator set during future scheduled exercise periods and lights the Exerciser Enabled indicator or disables the scheduled exercise period and turns the indicator off. The operator can also enable and disable the exerciser from the digital display, when it is available or from the PC service tool.

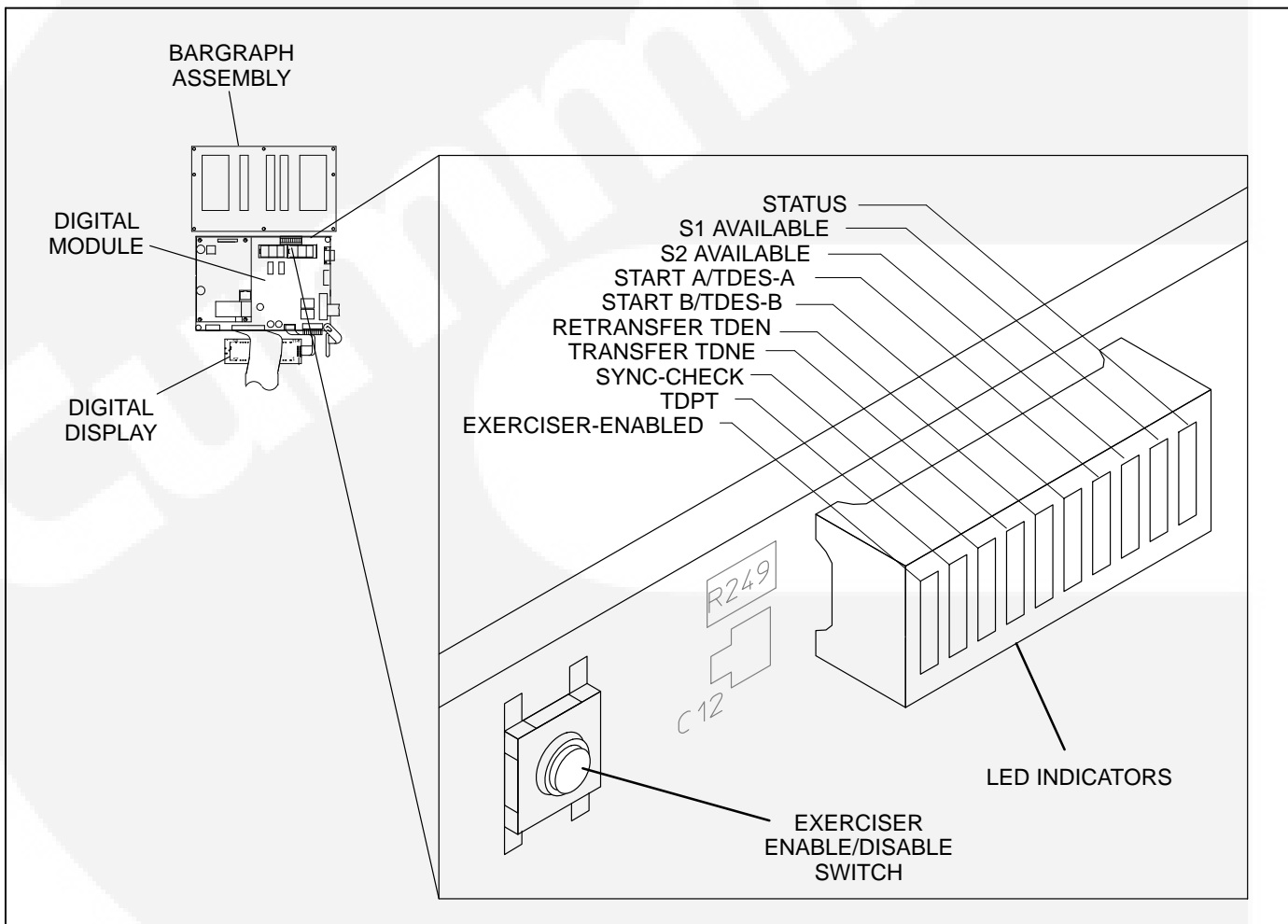


FIGURE 5-1. LED LOCATION ON DIGITAL MODULE (SHOWN ON THE 40 TO 125 AMP SWITCH)

**TABLE 5-1. DIGITAL MODULE LED INDICATORS**

<b>Indicator</b>	<b>Definition</b>
Status	Blinks at 1/2 Hz rate when the controller has power and the program is running without error. This indicator flashes the event code of an active event until the event is acknowledged with the Reset switch on the front panel. This indicator is sometimes referred to as the heart beat because it blinks constantly when the controller does not have an active event.
S1 Available	Lights when Power Source 1 has acceptable voltage and frequency limits. This indicator lights when the Source 1 Available indicator on the control panel lights.
S2 Available	Lights when Power Source 2 has acceptable voltage and frequency limits. This indicator lights when the Source 2 Available indicator on the control panel lights.
Start A/TDES-A	<ol style="list-style-type: none"> <li>1. Lights constantly when the control has commanded Source 2 to start</li> <li>2. Blinks at 1/2 Hz rate during the time delay to engine start (TDESa)</li> </ol>
Start B/TDES-B	<p>This indicator is only used for genset-to-genset applications when Source 1 is a generator not a utility.</p> <ol style="list-style-type: none"> <li>1. Lights constantly when the control has commanded Source 1 to start</li> <li>2. Blinks at 1/2 Hz rate during the time delay to engine start (TDESb)</li> </ol>
Retransfer/TDEN	<ol style="list-style-type: none"> <li>1. Lights when the control energizes the Retransfer relay</li> <li>2. Blinks at 1/2 Hz rate during the time delay to retransfer (TDEN)</li> </ol>
Transfer/TDNE	<ol style="list-style-type: none"> <li>1. Lights when the control energizes the Transfer relay</li> <li>2. Blinks at 1/2 Hz rate during the time delay to transfer (TDNE)</li> </ol>
Sync-Check	Blinks at 1-second rate when the in-phase sensor is active (maximum of 120 seconds).
TDPT	<p>Time Delay Programmed Transition</p> <p>Blinks at 1/2 Hz rate during the programmed transition time delay</p>
Exerciser Enabled	Lights when the Exerciser clock is enabled and blinks during an exercise period. The small switch next to the indicator enables and disables the exerciser. The operator can also enable and disable the exerciser from the Digital Display when it is available.

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# 6. Start-up Checklist

This start-up checklist provides the steps necessary to complete a typical setup. It also includes information on setting up a programmed exercise.

The transfer switch control is programmed at the factory with the voltage, frequency, and options listed on the nameplate. Make sure the application matches the nameplate values. Check the remote start connections before powering up the transfer switch.

Verify that the remote start connections are correct for your application. For more information on jumper placement, determine the control type and refer to the "Wiring" section of this manual.

For Level 2 controls with 3-wire, 3-phase Delta applications, refer to Section 3 for special wiring instructions. 240V Delta configurations must be set to 139 VAC nominal voltage.

The transfer switch is released with the appropriate calibration and settings that allow the unit to function properly without any additional adjustments.

The clock must be set in order to maintain an accurate log of events and exercises. In addition, you may wish to set exercise periods and set the transfer switch to test with or without load (default = Without Load).

A setup can be done using the digital display or InPower™. If InPower is available, use the checklist on the other side of this page.

## SETUP USING THE DIGITAL DISPLAY

Using the digital display, navigate to the the Setup sub-menu and enter the password (574).

### Setting the Date and Time

- ☐ Navigate to the Clock submenu and program the clock:
  - ☐ Set the date – Month (January = 1, December = 12), Date (1–31), and Year (1–9999).
  - ☐ Enter the time – Hours (0–23), Minutes (0–59, and Seconds (0–59).

- ☐ Enable/Disable Daylight Savings time. Adjusts clock setting for daylight savings time. The default is "Disabled."

### Setting Exercise(s)

- ☐ Navigate to the Exercise sub-menus and set exercise(s):
  - ☐ Select "Enabled" to enable the exercise feature.
  - ☐ Select "Enabled" to enable an exercise.
  - ☐ Select a day between Sunday and Saturday.
  - ☐ Enter the time of day the exercise cycle is to begin (hr = 0–23, mn = 0–59).
  - ☐ Set the duration the exercise cycle will run (hr = 0–23, mn = 0–59).
  - ☐ Enter the number of weeks between each exercise (interval) (0 = one time only, 1 = once a week, 2 = once every two weeks, 52 = once every 52 weeks).
  - ☐ Select whether or not you want the exercise to run the generator(s) with or without a load. The default is "Without Load."

**NOTE:** Exercise exceptions are also available through the digital display menus. For more information, see the *Operator's Manual* (962–0135). Exercise exceptions can be cancelled in the "Cancel Active Excppts" sub-menu (change from "Normal" to "Cancel").

### Setting the Unit to Test With or Without Load

- ☐ Navigate to the Test submenu and set the Test Switch to Test With or Without Load:
  - ☐ Select whether or not you want your transfer switch to test "With" or "Without Load." The default is "Without Load."

### Saving the Settings and System Verification

- ☐ Before exiting the Setup submenus, save the changes made to the control settings on the Save/Restore sub-menu.
- ☐ Next, verify that the transfer switch is operating properly.
  - ☐ Check to make sure the correct time is displayed.

- [ ] View the “Next Exercise In” submenu to verify that a time is displayed.
- [ ] Do a complete system check, including simulating a power outage. For more information, see the “Checkout” section of this manual.

## Features

Loss of phase detection and voltage imbalance sensing are disabled at the factory. Before enabling them, see the *Operator’s Manual* to review the feature descriptions.

**⚠ CAUTION** *Level 1 controls do not support three-phase sensing on Source 2. Do not select the three-phase option for the Source 2 Sensing adjustment with Level 1 controls, even if the system is three phase. This setting will prevent Source 2 from becoming available.*

## SETUP USING INPOWER

### Setting the Clock

- ☐ Using InPower, navigate to the Adjustments → Real Time Clock Folder.
- [ ] Set the date – Month (January thru December), Date (1–31), and Year (1–9999).
- [ ] Enter the time – Hours (0–23), and Minutes (0–59).
- [ ] Enable/Disable Daylight Savings time. Adjusts clock setting for daylight savings time. The default is “Disabled.”
- [ ] Select the appropriate date format (North American or International).
- [ ] Select the “Save Adjustments” icon.

### Setting Exercise(s)

- ☐ Navigate to the Adjustments → Feature Enable folder.
- [ ] Select “Enabled” to enable an exercise.
- [ ] Select the “Save Adjustments” icon.
- ☐ Navigate to the Adjustments → Exerciser Clock folder.
- [ ] Enable Program 1.
- [ ] Select a start day between Sunday and Saturday.
- [ ] Set the time the exercise cycle is to begin (hr = 0–23, mn = 0–59).
- [ ] Set the duration of the exercise cycle (hr = 0–23, mn = 0–59).

- [ ] Enter an interval that the exercise cycle will repeat (0 = one time only, 1 = once a week, 2 = once every two weeks, 52 = once every 52 weeks).
- [ ] Select whether or not you want the exercise to run the generator(s) with or without a load. The default is “Without Load.”
- [ ] Select the “Save Adjustments” icon.

**NOTE:** The Reset Exerciser Repeat Count feature, in the Controller Mode folder, can be used to change a repeat interval. Switch the setting from “False” to “True” for the new interval to take effect. The setting will automatically switch back to “False” again.

**NOTE:** Exercise exceptions are available through the Adjustments → Exceptions folder. Refer to the *Inpower User’s Guide* for more information.

### Setting the Unit to Test With or Without Load

- ☐ Navigate to the Test → Setup folder.
- [ ] Set the Test Switch to test “With” or “Without Load.” The default is “Without Load.”
- [ ] Select the “Save Adjustments” icon.

### Saving the Settings and System Verification

- ☐ To store your settings in a capture file, select the “Device” pull-down menu and select “Capture to file.”
- ☐ Next, verify that the transfer switch is operating properly.
- [ ] Do a complete system check, including simulating a power outage. For more information, see the “Checkout” section of this manual.
- [ ] Review settings.

## Features

Loss of phase detection and voltage imbalance sensing are disabled at the factory. Before enabling them, see the *Operator’s Manual* to review the feature descriptions.

**⚠ CAUTION** *Level 1 controls do not support three-phase sensing on Source 2. Do not select the three-phase option for the Source 2 Sensing adjustment with Level 1 controls, even if the system is three phase. This setting will prevent Source 2 from becoming available.*



## About InPower Service Tool

The InPower service tool can be used to test the transfer switch using functions, including Remote Test, Transfer Inhibit, Retransfer Inhibit, etc. InPower, when used improperly, can cause symptoms like warnings and shutdowns that appear to be a defective control. When these problems occur, always verify that a Test feature was not left enabled with InPower. Always disable test features before disconnecting InPower.

## About Network Applications and Customer Inputs

In applications with networks and remote customer inputs, these inputs may cause unexpected generator set or transfer switch operation. 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.

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## 7. Schematics

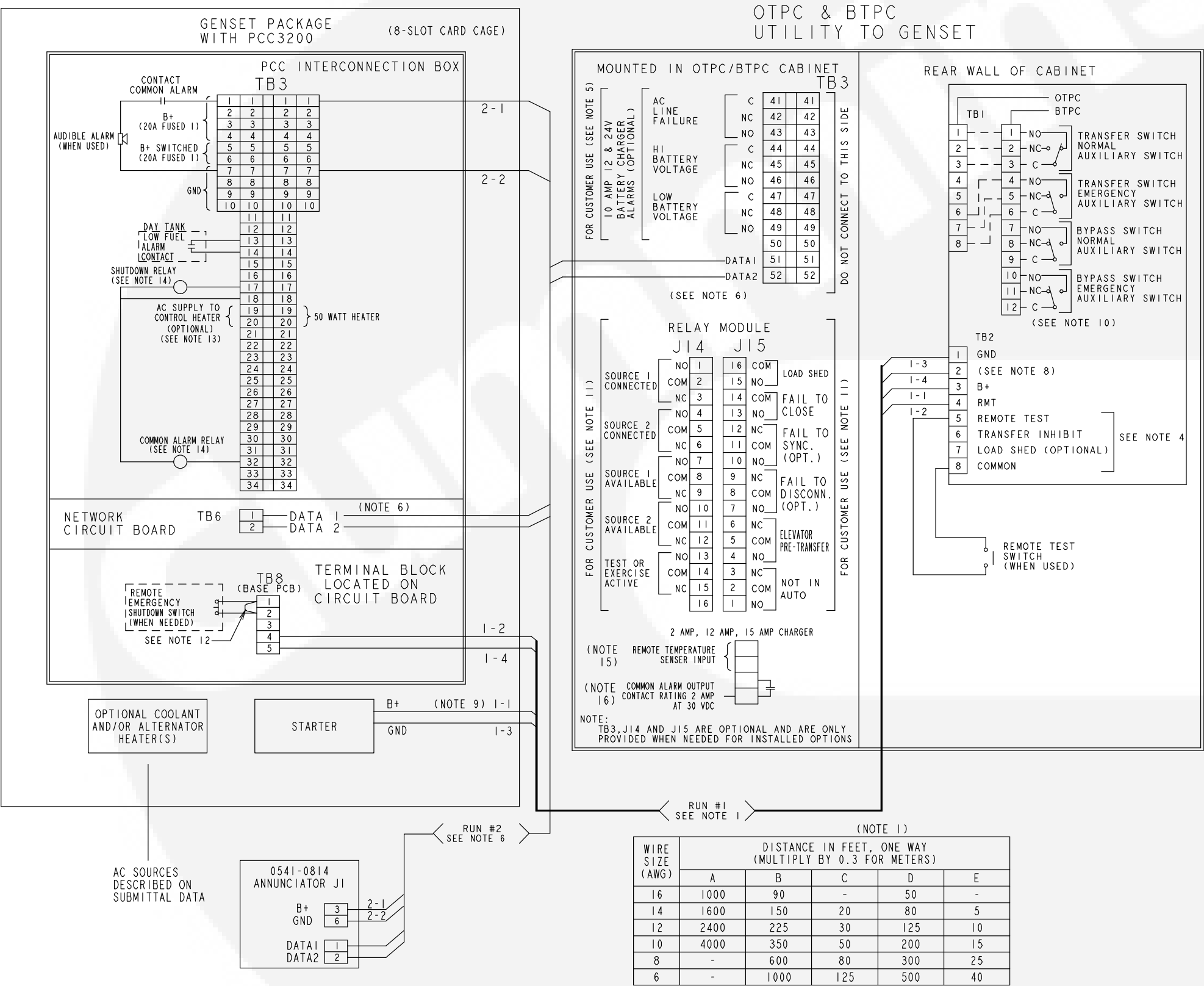
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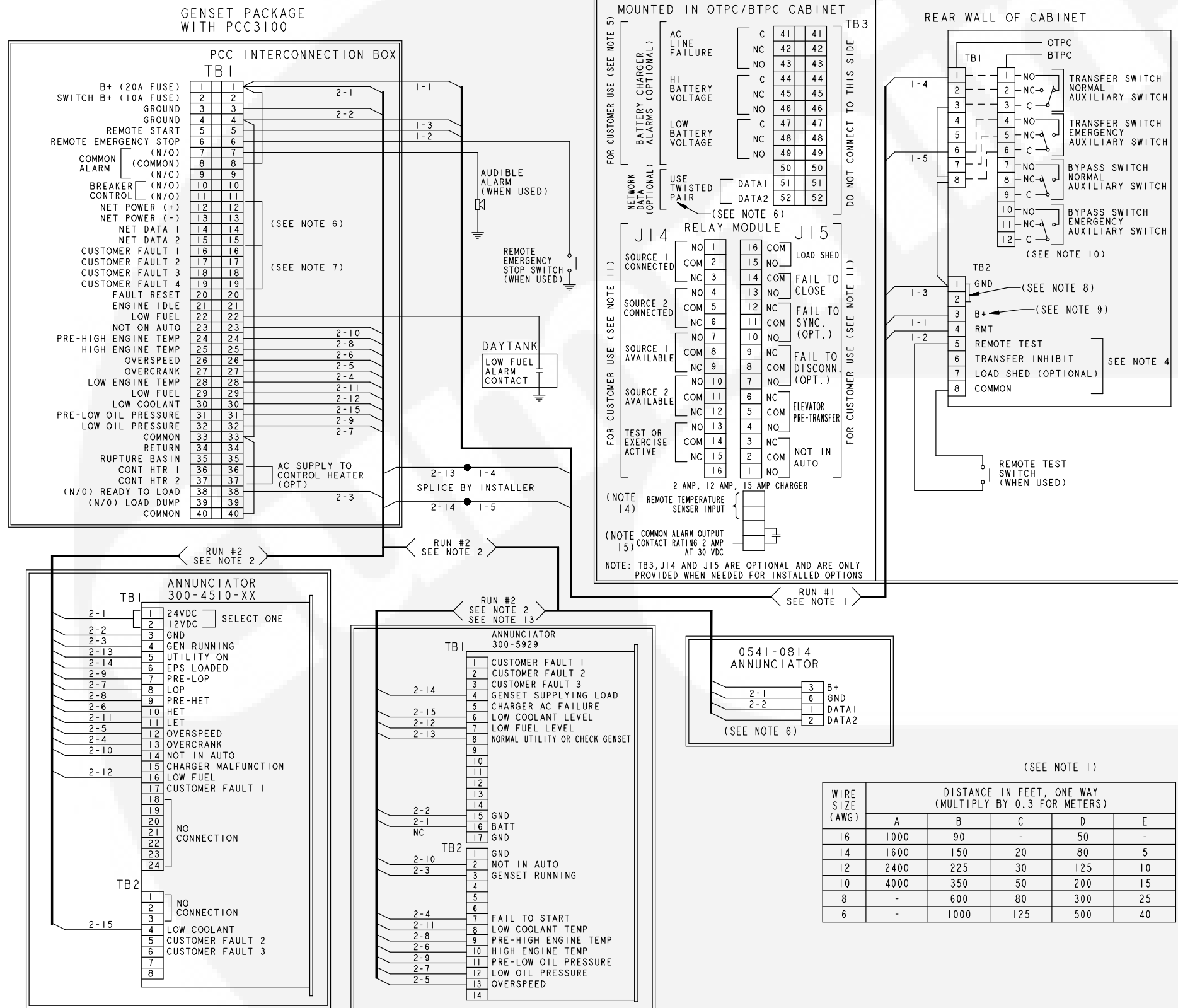
THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC/WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS SHIPPED WITH THE TRANSFER SWITCH.



- NOTES:
1. WIRE SIZES MUST BE AS FOLLOWS:  
RUN #1-GENSET TO TRANSFER SWITCH-LEAD SIZE MUST BE INCREASED IF A BATTERY CHARGER IS INSTALLED IN THE SWITCH.  
WITH NO BATT CHARGER-LEADS 1-1, -2, -3, -4, -5 USE COL A.  
WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 1.5 VOLTS, LEADS 1-1, & 1-3 USE COL B.  
WITH 12/15 AMP CHARGER MAXIMUM VOLTAGE DROP OF 1.5 VOLTS, LEADS 1-1 & 1-3 USE COL C.  
WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1, & 1-3 USE COL D.  
WITH 12/15 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1, & 1-3 USE COL E. TO MEET THE NFPA110 REQUIREMENT TO RETURN A FULLY DISCHARGED BATTERY TO 100% OF IT'S AMPERE-HOUR RATING WITHIN 24 HOURS USE COL E.
  2. IF OTPC NETWORK CARD IS USED, YOU MUST CONNECT B+ OR EXTERNAL BATTERY-BACKED POWER TO OTPC/BTPC DIGITAL BOARD AT P27.21 (B+) AND P27.22 (GND).
  3. FOR MULTIPLE TRANSFER SWITCHES, DUPLICATE RUN #1 FOR EACH SWITCH. DAISY CHAIN CONNECTION IS ACCEPTABLE PROVIDED WIRE SIZE & DISTANCE TO THE LAST SWITCH MEET THE SPECS IN NOTE 1.
  4. CONNECT AN OPEN DRY CONTACT BETWEEN THE APPLICABLE TERMINAL AND COMMON (TB2-8). FOR REMOTE TEST, TRANSFER INHIBIT AND LOAD SHED. CLOSE TO ACTIVATE.
  5. CONTACTS RATED: 4 AMPS AT 30 VDC OR 120V MAX.
  6. REFER TO ONAN 900-0529 POWERCOMMAND NETWORK INSTALLATION & OPERATION MANUAL FOR WIRING INSTRUCTIONS, WIRE SIZE, AND LENGTH. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO NETWORK. PART # 0334-1350 OR EQUAL.
  7. INPUTS FOR CUSTOMER FAULTS. GROUNDED SIGNAL REQUIRED TO ACTIVATE INPUT (MAX 50 MA.)
  8. ON PCC 3200 CONTROLS NO JUMPER IS REQ'D BETWEEN TB1-1 & TB1-2.
  9. CONFIGURATION SHOWN IS FOR ATS-MOUNTED BATTERY CHARGER. IF WALL-MOUNTED CHARGER IS USED, CONNECT B+ AND GND FROM CHARGER DIRECTLY TO BATTERY OR STARTER.
  10. TRANSFER SWITCH SHOWN CLOSED TO NORMAL BYPASS SWITCH SHOWN NEUTRAL POSITION.
  11. CONTACTS RATED: 2 AMPS AT 30 VDC OR 0.60 AMPS AT 120 VAC.
  12. OPEN CONNECTION TO INITIATE EMERGENCY STOP. THESE TERMINALS MUST BE SHORTED TOGETHER IF REMOTE EMERGENCY STOP OPTION NOT USED. JUMPER SHOWN BETWEEN TB8-1 AND TB8-2 NOT SUPPLIED WITH UNIT.
  13. 120VAC OR 240VAC AT 50W.
  14. CUSTOMER SUPPLIED EITHER 12 OR 240VDC RELAYS OUTPUT SIGNAL 20ma @ 24VDC MAX.
  15. USE THE INVENTER REMOTE TEMPERATURE PROBE (0193-0530).
  16. THE FOLLOWING FAILS WILL CAUSE A BATTERY CHARGER ALARM OUTPUT: LOW BATTERY VOLTAGE, HIGH BATTERY VOLTAGE, LOW AC INPUT VOLTAGE, HIGH AC INPUT VOLTAGE OVERCURRENT, HIGH CHARGER TEMPERATURE, BATTERY FAILURE, HIGH BATTERY TEMPERATURE (NOT AVAILABLE ON 2 AMP CHARGER).

No. 630-1974 Sh 1 of 10  
Rev. M  
Modified 2/2007

**THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC/WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS SHIPPED WITH THE TRANSFER SWITCH.**



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**ENGINE CONTROL PANEL**

**DETECTOR 12 ENGINE MONITOR**

**TB1**

10  
9  
8  
7 B+  
6 RMT  
5 GND  
4  
3  
2  
1

**TB2**

2 IN 2 OUT 1 IN 1 OUT  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

2-4  
2-5  
2-6  
2-7  
2-8  
2-9  
2-10  
2-11  
2-12

LAMP TEST/RESET  
OVERCRANK  
OVERSPEED  
HI ENG TEMP  
LOW OIL PRESS  
PRE HET  
PRE LOP  
SWITCH OFF  
LO ENG TEMP  
LO FUEL IN  
LO FUEL OUT  
SHUTDOWN

NO FIELD INSTALLED CONNECTIONS

1-1  
1-2  
1-3  
1-2  
1-4  
1-5  
2-13  
2-14  
SPLICE BY INSTALLER

NO FIELD INSTALLED CONNECTIONS

NO FIELD INSTALLED CONNECTIONS

NO FIELD INSTALLED CONNECTIONS

IF THE GENERATOR CONTROL IS EQUIPPED WITH AN A15 START/PREHEAT MODULE, WIRE 1-2 SHOULD BE CONNECTED TO THE MODULE.

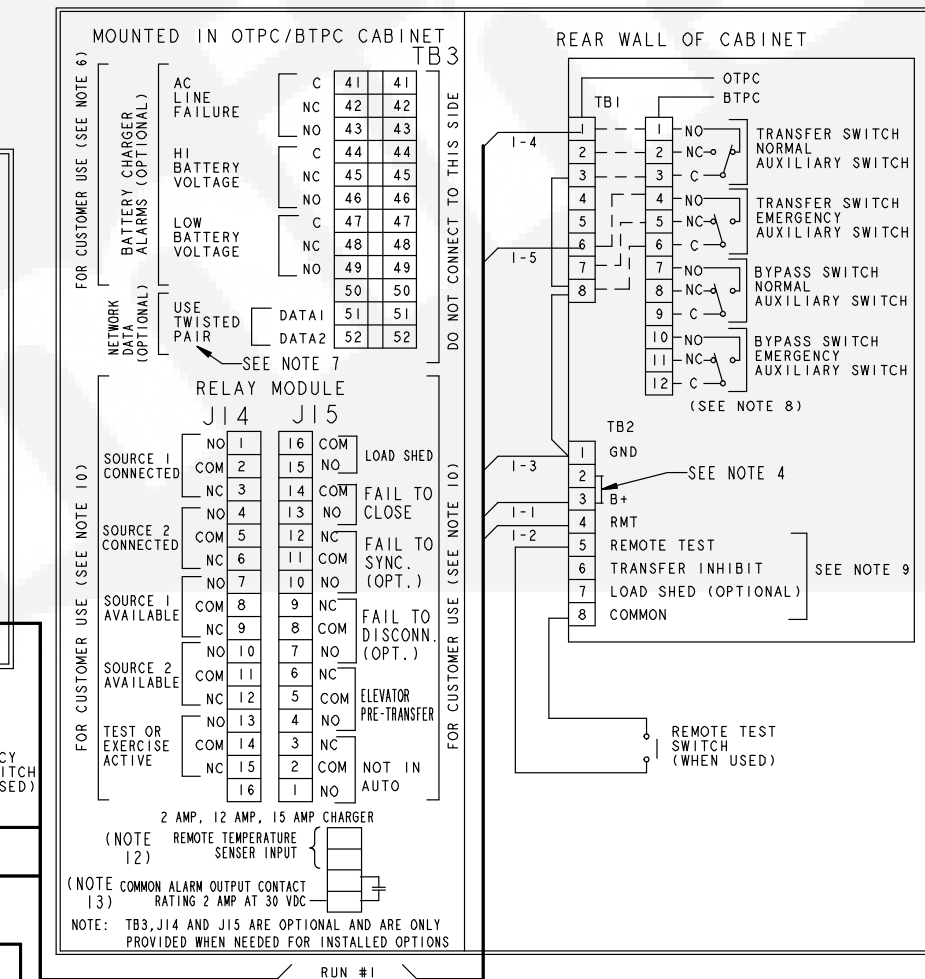
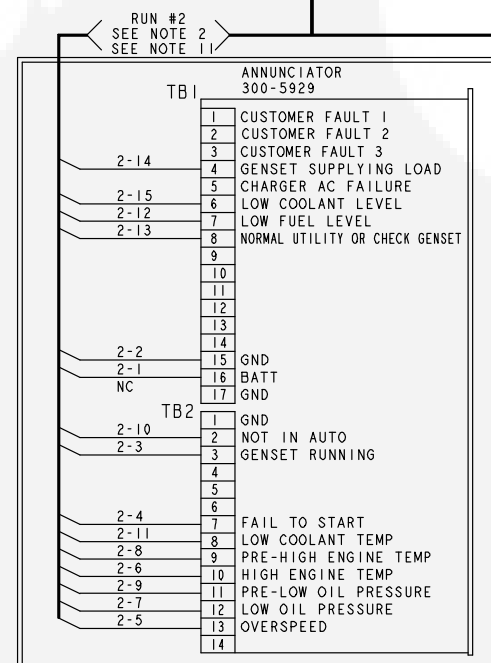
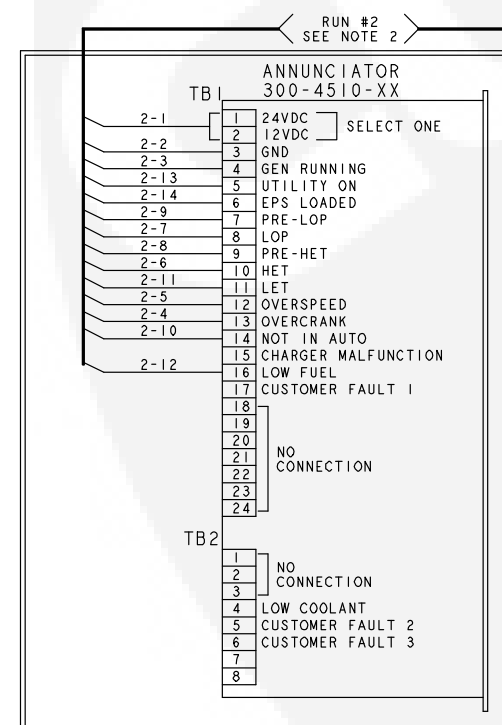
AUDIBLE ALARM (WHEN USED)

DAYTANK

LOW FUEL ALARM CONTACT

REMOTE EMERGENCY STOP SWITCH (WHEN USED)

IF THE GENERATOR CONTROL  
IS EQUIPPED WITH AN A15  
START/PREHEAT MODULE, WIRE  
1-2 SHOULD BE CONNECTED  
TO THE MODULE.

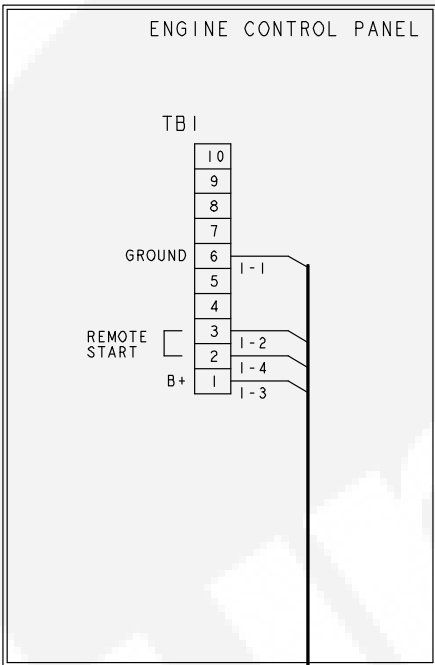


- NOTES:
1. WIRE SIZES MUST BE AS FOLLOWS:  
RUN #1-GENSET TO TRANSFER SWITCH-LEAD SIZE MUST BE INCREASED IF A BATTERY CHARGER IS INSTALLED IN THE SWITCH.  
WITH NO BATT CHARGER-LEADS 1-1, -2, -3, -4, -5 USE COL. A.  
WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 1.5 VOLTS, LEADS 1-1, &1-3 USE COL. B.  
WITH 12/15 AMP CHARGER MAXIMUM VOLTAGE DROP OF 1.5 VOLTS, LEADS 1-1 & 1-3 USE COL. C.  
WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1, &1-3 USE COL. D.  
WITH 12/15 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1 & 1-3 USE COL. E TO MEET THE NFPA118 REQUIREMENT TO RETURN A FULLY DISCHARGED BATTERY TO 100% OF IT'S AMPERE-HOUR RATING WITHIN 24 HOURS USE COL. E.
  2. RUN #2-GENSET TO ANNUNCIATOR-ALL LEADS, USE COL. A
  3. FOR MULTIPLE TRANSFER SWITCHES, DUPLICATE RUN #1 FOR EACH SWITCH. DAISY CHAIN CONNECTION IS ACCEPTABLE PROVIDED WIRE SIZE & DISTANCE TO THE LAST SWITCH MEET THE SPECS IN NOTE 1.
  4. INSTALL Jumper BETWEEN TB2-2 & TB2-3.
  5. 300-4510-XX ANNUNCIATOR MAY BE USED ALSO.  
WIRE TBI AS SHOWN.
  6. CONTACTS RATED: 4 AMPS AT 30 VDC  
OR 120V MAX.
  7. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO THE NETWORK.
  8. TRANSFER SWITCH SHOWN CLOSED TO NORMAL  
BYPASS SWITCH SHOWN IN NEUTRAL POSITION.
  9. CONNECT AN OPEN DRY CONTACT BETWEEN THE APPLICABLE TERMINAL AND COMMON (TB2-8). FOR REMOTE TEST, TRANSFER INHIBIT AND LOAD SHED. CLOSE TO ACTIVATE.
  10. CONTACTS RATED: 2 AMPS AT 30 VDC OR  
0.60 AMPS AT 120 VAC.
  11. REFER TO 0900-0301 FOR INSTALLATION  
OF 0300-5929.
  12. USE THE INVENTOR REMOTE TEMPERATURE  
PROBE (0193-0530).
  13. THE FOLLOWING FAILS WILL CAUSE A BATTERY  
CHARGER ALARM OUTPUT:  
LOW BATTERY VOLTAGE, HIGH BATTERY VOLTAGE,  
LOW AC INPUT VOLTAGE, HIGH AC INPUT VOLTAGE  
OVERCURRENT, HIGH CHARGER TEMPERATURE,  
BATTERY FAILURE, HIGH BATTERY TEMPERATURE (NOT  
AVAILABLE ON 2 AMP CHARGER).

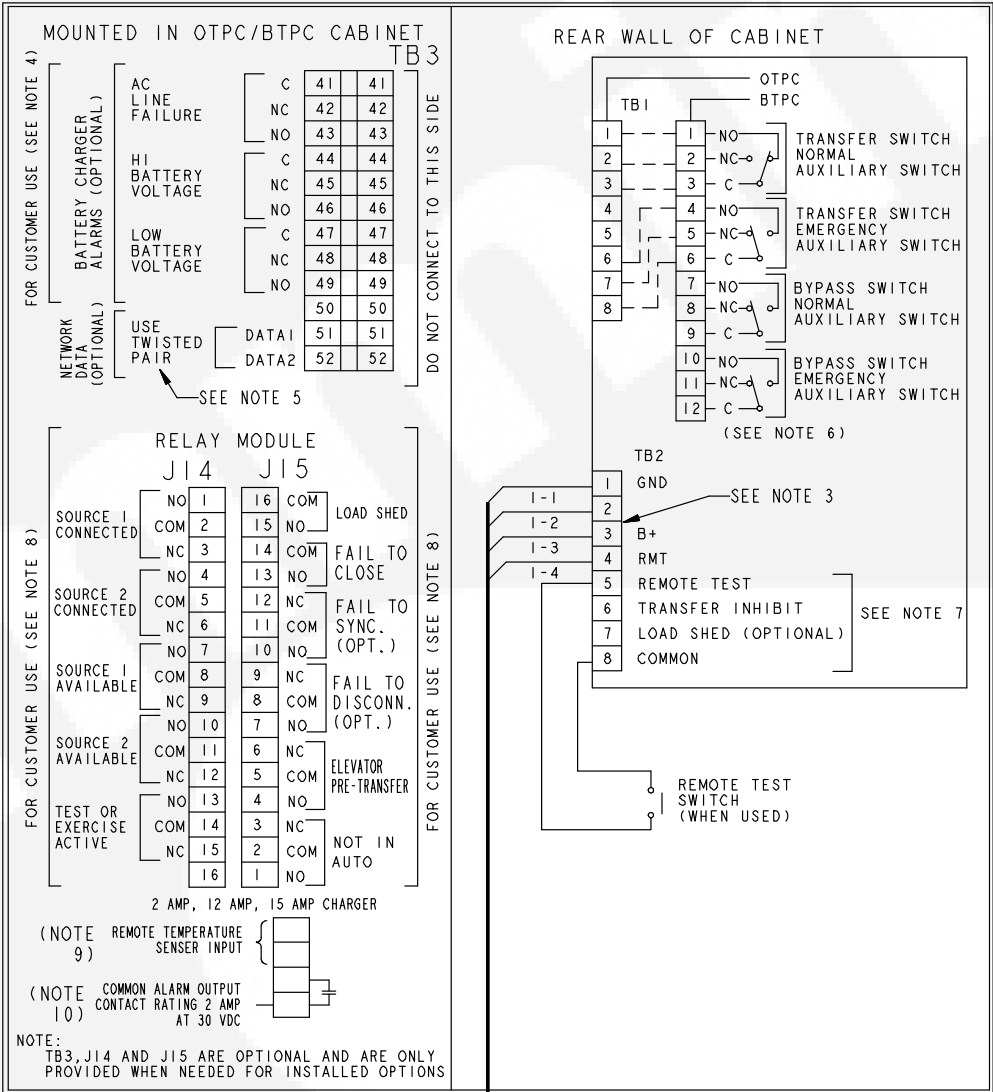
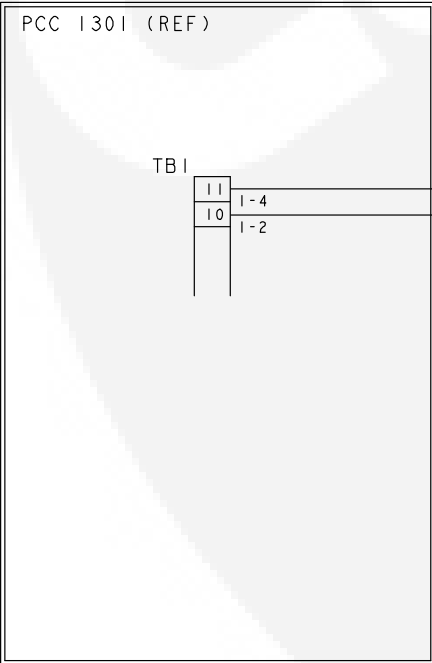
WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)				
	A	B	C	D	E
16	1000	90	-	50	-
14	1600	150	20	80	5
12	2400	225	30	125	10
10	4000	350	50	200	15
8	-	600	80	300	25
6	-	1000	125	500	40

OTPC & BTPC  
UTILITY TO GENSET

CUMMINS POWERGENERATOR SET  
SERIES GGDB SPEC A-E, GN SPEC B,  
DN SPEC B WITH TWO WIRE CONTROL



CUMMINS POWERGENERATOR SET  
SERIES GGDB SPEC F



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)				
	A	B	C	D	E
16	1000	90	-	50	-
14	1600	150	20	80	5
12	2400	225	30	125	10
10	4000	350	50	200	15
8	-	600	80	300	25
6	-	1000	125	500	40

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BLESHOOTING, REFER TO THE SCHEMATIC  
AND WIRING DIAGRAM PACKAGE THAT WAS  
SHIPPED WITH THE TRANSFER SWITCH.

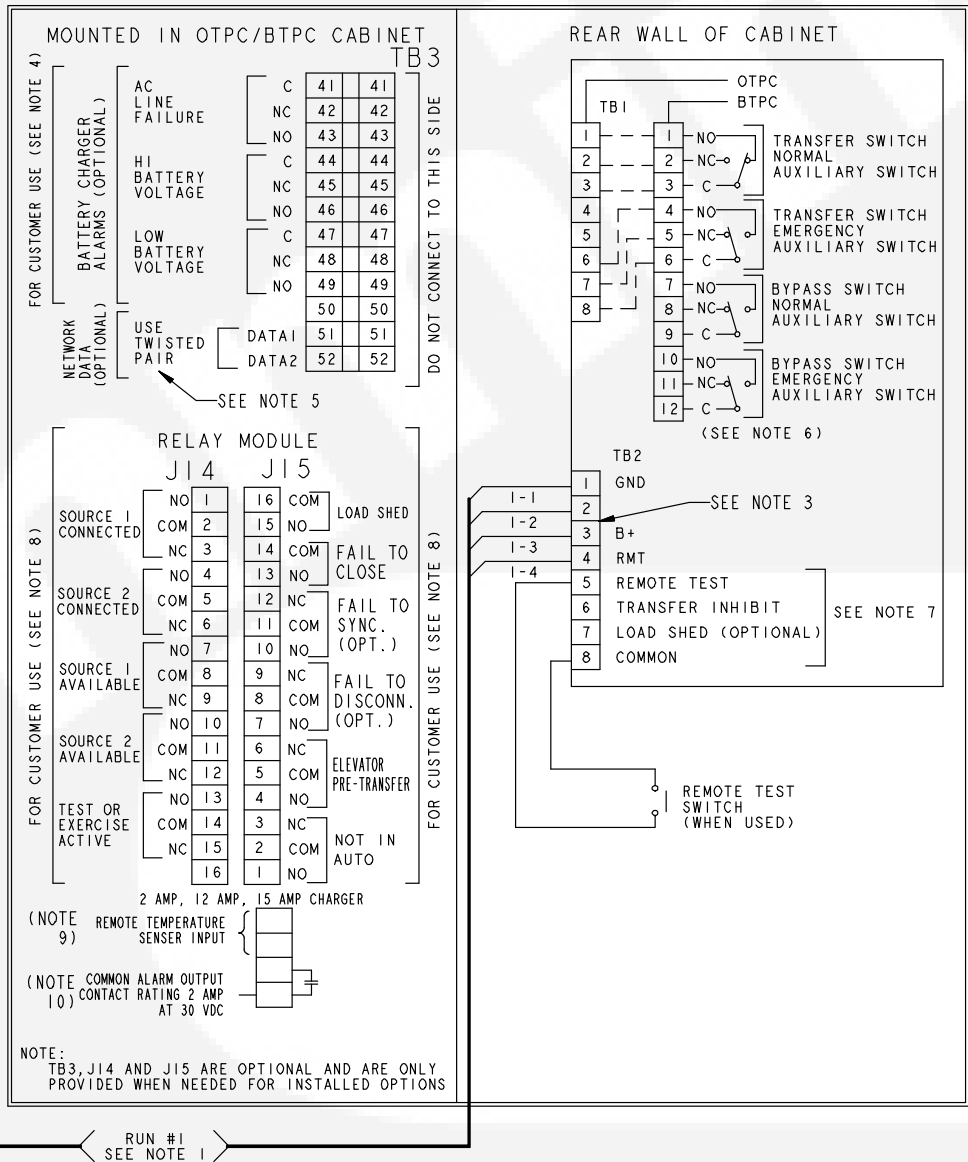
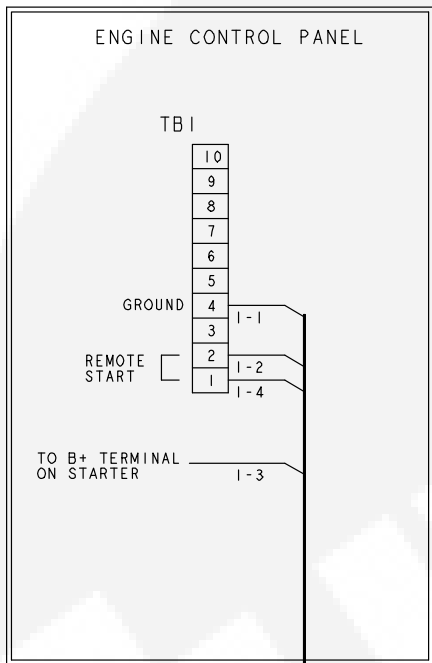
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- WIRE SIZES MUST BE AS FOLLOWS:  
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WITH NO BATT CHARGER-LEADS 1-1, -2, -3, -4, -5 USE COL A.  
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LEADS 1-1, & 1-3 USE COL B.  
WITH 12/15 AMP CHARGER MAXIMUM VOLTAGE DROP OF 1.5 VOLTS,  
LEADS 1-1 & 1-3 USE COL C.  
WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS,  
LEADS 1-1, & 1-3 USE COL D.  
WITH 12/15 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS,  
LEADS 1-1, & 1-3 USE COL E. TO MEET THE NFPA110 REQUIREMENT  
TO RETURN A FULLY DISCHARGED BATTERY TO 100% OF IT'S  
AMPERE-HOUR RATING WITHIN 24 HOURS USE COL. E.
  - FOR MULTIPLE TRANSFER SWITCHES, DUPLICATE RUN #1 FOR EACH  
SWITCH. DAISY CHAIN CONNECTION IS ACCEPTABLE PROVIDED WIRE  
SIZE & DISTANCE TO THE LAST SWITCH MEET THE SPECS IN NOTE 1.
  - DO NOT INSTALL JUMPER BETWEEN TB2-2 & TB2-3 OR  
BETWEEN TB2-2 & TB2-1.
  - CONTACTS RATED: 4 AMPS AT 30 VDC  
OR 120V MAX.
  - USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING  
DATA1 AND DATA2 TO THE NETWORK.
  - TRANSFER SWITCH SHOWN CLOSED TO NORMAL.  
BYPASS SWITCH SHOWN IN NEUTRAL POSITION.
  - CONNECT AN OPEN DRY CONTACT BETWEEN THE APPLICABLE  
TERMINAL AND COMMON (TB2-8). FOR REMOTE TEST,  
TRANSFER INHIBIT AND LOAD SHED. CLOSE TO ACTIVATE.
  - CONTACTS RATED: 2 AMPS AT 30 VDC  
OR 0.60 AMPS AT 120 VAC.
  - USE THE INVENTER REMOTE TEMPERATURE  
PROBE (0193-0530).
  - THE FOLLOWING FAILS WILL CAUSE A BATTERY  
CHARGER ALARM OUTPUT:  
LOW BATTERY VOLTAGE, HIGH BATTERY VOLTAGE,  
LOW AC INPUT VOLTAGE, HIGH AC INPUT VOLTAGE,  
OVERCURRENT, HIGH CHARGER TEMPERATURE,  
BATTERY FAILURE, HIGH BATTERY TEMPERATURE (NOT  
AVAILABLE ON 2 AMP CHARGER).



OTPC & BTPC  
UTILITY TO GENSET

CUMMINS POWERGENERATOR SET

SERIES GN SPEC A, DN SPEC A  
WITH TWO WIRE CONTROL



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WITH 12/15 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1, & 1-3 USE COL E. TO MEET THE NFPA110 REQUIREMENT TO RETURN A FULLY DISCHARGED BATTERY TO 100% OF IT'S AMPERE-HOUR RATING WITHIN 24 HOURS USE COL E.
  2. FOR MULTIPLE TRANSFER SWITCHES, DUPLICATE RUN #1 FOR EACH SWITCH. DAISY CHAIN CONNECTION IS ACCEPTABLE PROVIDED WIRE SIZE & DISTANCE TO THE LAST SWITCH MEET THE SPECS IN NOTE 1.
  3. DO NOT INSTALL JUMPER BETWEEN TB2-2 & TB2-3 OR BETWEEN TB2-2 & TB2-1.
  4. CONTACTS RATED: 4 AMPS AT 30 VDC OR 120V MAX.
  5. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO THE NETWORK.
  6. TRANSFER SWITCH SHOWN CLOSED TO NORMAL. BYPASS SWITCH SHOWN IN NEUTRAL POSITION.
  7. CONNECT AN OPEN DRY CONTACT BETWEEN THE APPLICABLE TERMINAL AND COMMON (TB2-8). FOR REMOTE TEST, TRANSFER INHIBIT AND LOAD SHED. CLOSE TO ACTIVATE.
  8. CONTACTS RATED: 2 AMPS AT 30 VDC OR 0.60 AMPS AT 120 VAC.
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  10. THE FOLLOWING FAILS WILL CAUSE A BATTERY CHARGER ALARM OUTPUT:  
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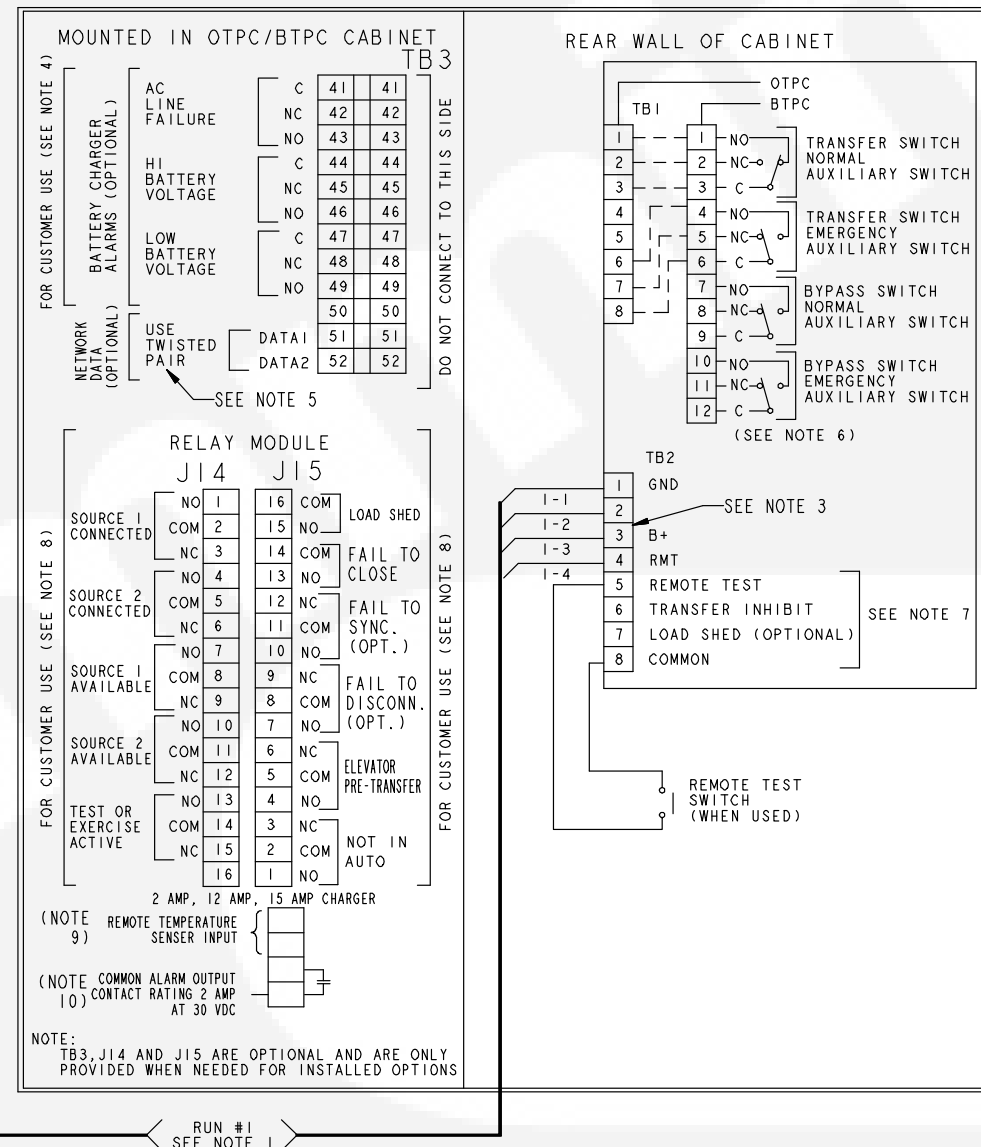
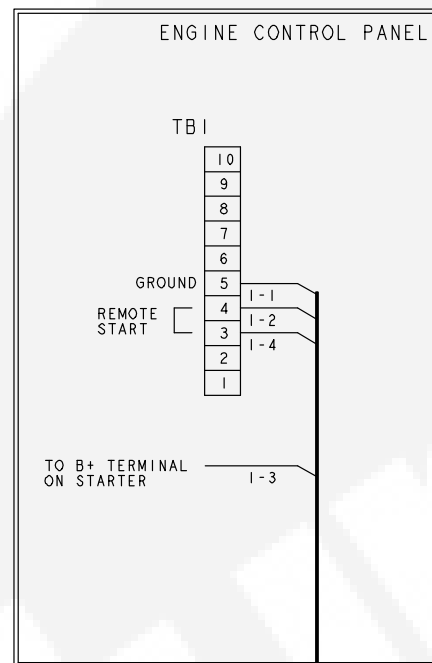
WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)				
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16	1000	90	-	50	-
14	1600	150	20	80	5
12	2400	225	30	125	10
10	4000	350	50	200	15
8	-	600	80	300	25
6	-	1000	125	500	40

No. 630-1974 Sh 5 of 10  
Rev. M  
Modified 2/2007

40-1000 AMP TYPICAL INTERCONNECTION  
DIAGRAM 630-1974 (SHEET 5 OF 10)

OTPC & BTPC  
UTILITY TO GENSET

CUMMINS POWERGENERATOR SET  
SERIES DG, GGFB, GGFC, GGHB,  
GGHC, GGHD WITH TWO WIRE CONTROL



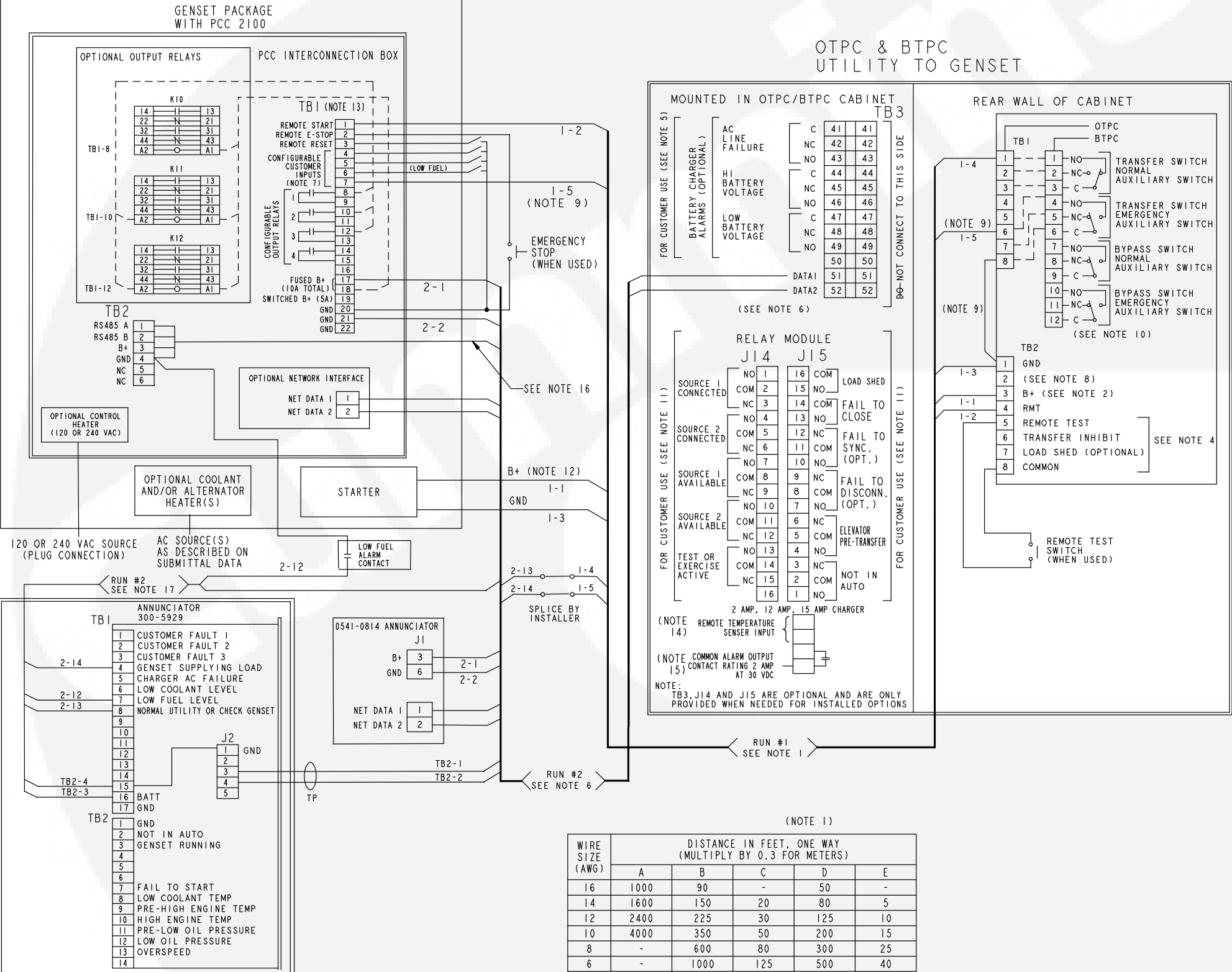
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  2. FOR MULTIPLE TRANSFER SWITCHES, DUPLICATE RUN #1 FOR EACH SWITCH. DAISY CHAIN CONNECTION IS ACCEPTABLE PROVIDED WIRE SIZE & DISTANCE TO THE LAST SWITCH MEET THE SPECS IN NOTE 1.
  3. DO NOT INSTALL JUMPER BETWEEN TB2-2 & TB2-3 OR BETWEEN TB2-2 & TB2-1.
  4. CONTACTS RATED: 4 AMPS AT 30 VDC OR 120V MAX.
  5. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO THE NETWORK.
  6. TRANSFER SWITCH SHOWN CLOSED TO NORMAL BYPASS SWITCH SHOWN IN NEUTRAL POSITION.
  7. CONNECT AN OPEN DRY CONTACT BETWEEN THE APPLICABLE TERMINAL AND COMMON (TB2-8). FOR REMOTE TEST, TRANSFER INHIBIT AND LOAD SHED. CLOSE TO ACTIVATE.
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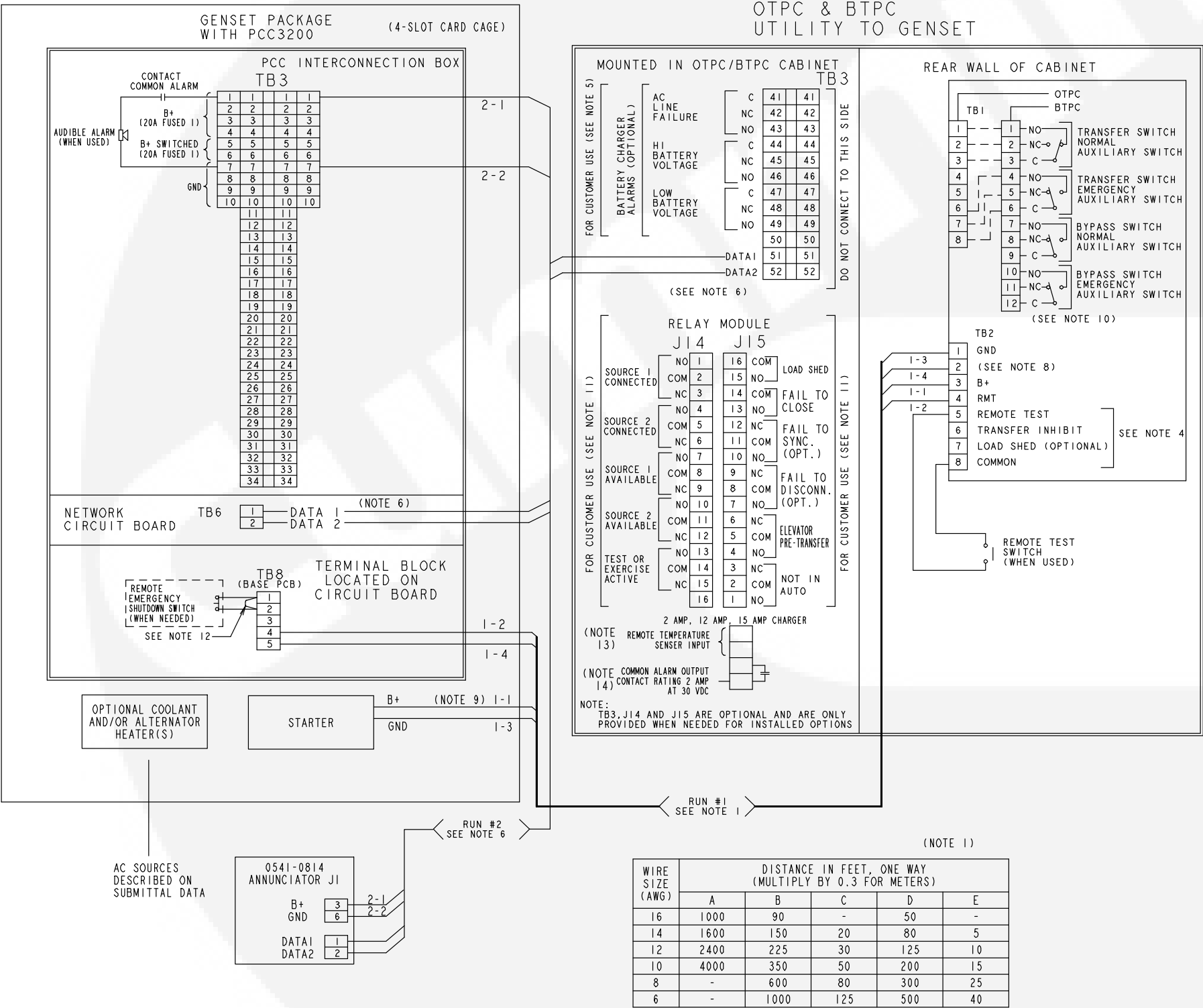
WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)				
	A	B	C	D	E
16	1000	90	-	50	-
14	1600	150	20	80	5
12	2400	225	30	125	10
10	4000	350	50	200	15
8	-	600	80	300	25
6	-	1000	125	500	40

No. 630-1974 Sh 6 of 10  
Rev. M  
Modified 2/2007

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC/WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS SHIPPED WITH THE TRANSFER SWITCH.

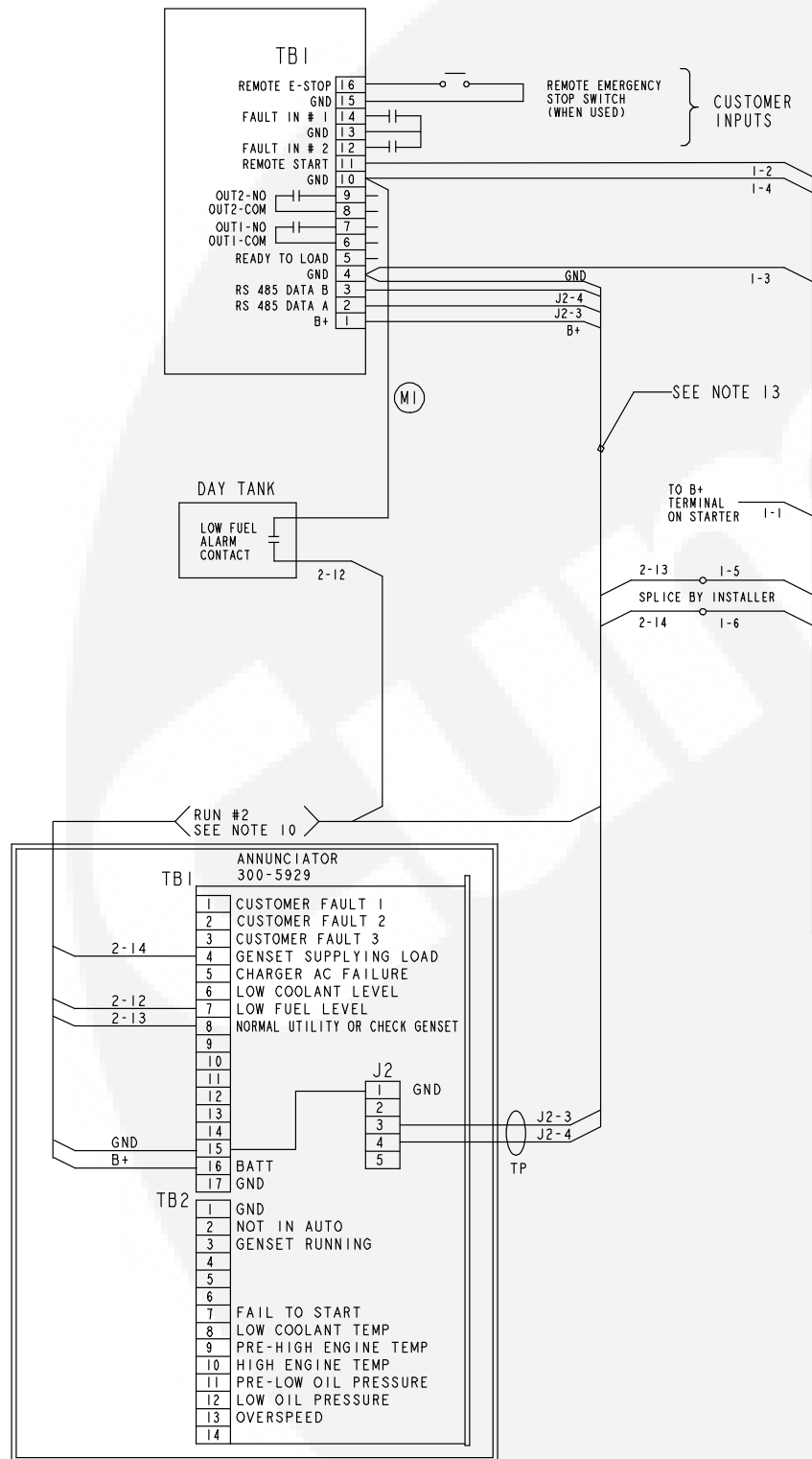


THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC/WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS SHIPPED WITH THE TRANSFER SWITCH.

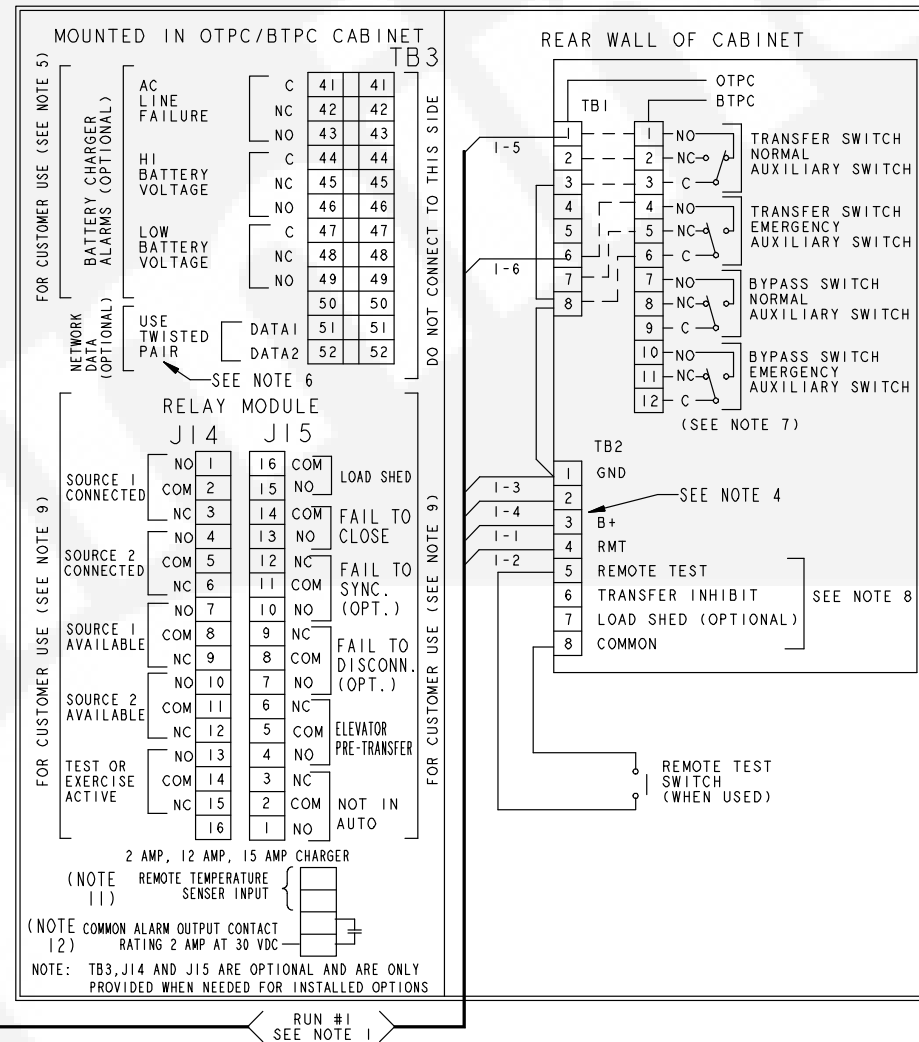


- NOTES:
1. WIRE SIZES MUST BE AS FOLLOWS:  
RUN #1-GENSET TO TRANSFER SWITCH-LEAD SIZE MUST BE INCREASED IF A BATTERY CHARGER IS INSTALLED IN THE SWITCH.  
WITH NO BATT CHARGER-LEADS 1-1, -2, -3, -4, -5 USE COL A.  
WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 1.5 VOLTS, LEADS 1-1, & 1-3 USE COL B.  
WITH 12/15 AMP CHARGER MAXIMUM VOLTAGE DROP OF 1.5 VOLTS, LEADS 1-1 & 1-3 USE COL C.  
WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1, & 1-3 USE COL D.  
WITH 12/15 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1, & 1-3 USE COL E. TO MEET THE NFPA110 REQUIREMENT TO RETURN A FULLY DISCHARGED BATTERY TO 100% OF IT'S AMPERE-HOUR RATING WITHIN 24 HOURS USE COL E.
  2. IF OTPC NETWORK CARD IS USED, YOU MUST CONNECT B+ OR EXTERNAL BATTERY-BACKED POWER TO OTPC/BTPC DIGITAL BOARD AT P27.21 (B+) AND P27.22 (GND).
  3. FOR MULTIPLE TRANSFER SWITCHES, DUPLICATE RUN #1 FOR EACH SWITCH. DAISY CHAIN CONNECTION IS ACCEPTABLE PROVIDED WIRE SIZE & DISTANCE TO THE LAST SWITCH MEET THE SPECS IN NOTE 1.
  4. CONNECT AN OPEN DRY CONTACT BETWEEN THE APPLICABLE TERMINAL AND COMMON (TB2-8). FOR REMOTE TEST, TRANSFER INHIBIT AND LOAD SHED. CLOSE TO ACTIVATE.
  5. CONTACTS RATED: 4 AMPS AT 30 VDC OR 120V MAX.
  6. REFER TO ONAN 900-0529 POWERCOMMAND NETWORK INSTALLATION & OPERATION MANUAL FOR WIRING INSTRUCTIONS, WIRE SIZE, AND LENGTH. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO NETWORK. PART # 0334-1350 OR EQUAL.
  7. INPUTS FOR CUSTOMER FAULTS. GROUNDED SIGNAL REQUIRED TO ACTIVATE INPUT (MAX 50 MA.)
  8. ON PCC 3200 CONTROLS NO JUMPER IS REQ'D BETWEEN TB1-1 & TB1-2.
  9. CONFIGURATION SHOWN IS FOR ATS-MOUNTED BATTERY CHARGER. IF WALL-MOUNTED CHARGER IS USED, CONNECT B+ AND GND FROM CHARGER DIRECTLY TO BATTERY OR STARTER.
  10. TRANSFER SWITCH SHOWN CLOSED TO NORMAL BYPASS SWITCH SHOWN NEUTRAL POSITION.
  11. CONTACTS RATED: 2 AMPS AT 30 VDC OR 0.60 AMPS AT 120 VAC.
  12. OPEN CONNECTION TO INITIATE EMERGENCY STOP. THESE TERMINALS MUST BE SHORTED TOGETHER IF REMOTE EMERGENCY STOP OPTION NOT USED. JUMPER SHOWN BETWEEN TB8-1 AND TB8-2 NOT SUPPLIED WITH UNIT.
  13. 120VAC OR 240VAC AT 50W.
  14. CUSTOMER SUPPLIED EITHER 12 OR 240VDC RELAYS OUTPUT SIGNAL 20ma @ 24VDC MAX.
  15. USE THE INVENTER REMOTE TEMPERATURE PROBE (0193-0530).
  16. THE FOLLOWING FAILS WILL CAUSE A BATTERY CHARGER ALARM OUTPUT:  
LOW BATTERY VOLTAGE, HIGH BATTERY VOLTAGE, LOW AC INPUT VOLTAGE, HIGH AC INPUT VOLTAGE, OVERCURRENT, HIGH CHARGER TEMPERATURE, BATTERY FAILURE, HIGH BATTERY TEMPERATURE (NOT AVAILABLE ON 2 AMP CHARGER).

ONAN/CUMMINS GENERATOR SET  
WITH PCC1301 CONTROL



## OTPC & BTPC UTILITY TO GENSET



WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)				
	A	B	C	D	E
16	1000	90	-	50	-
14	1600	150	20	80	5
12	2400	225	30	125	10
10	4000	350	50	200	15
8	-	600	80	300	25
6	-	1000	125	500	40

**THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC/WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS SHIPPED WITH THE TRANSFER SWITCH.**

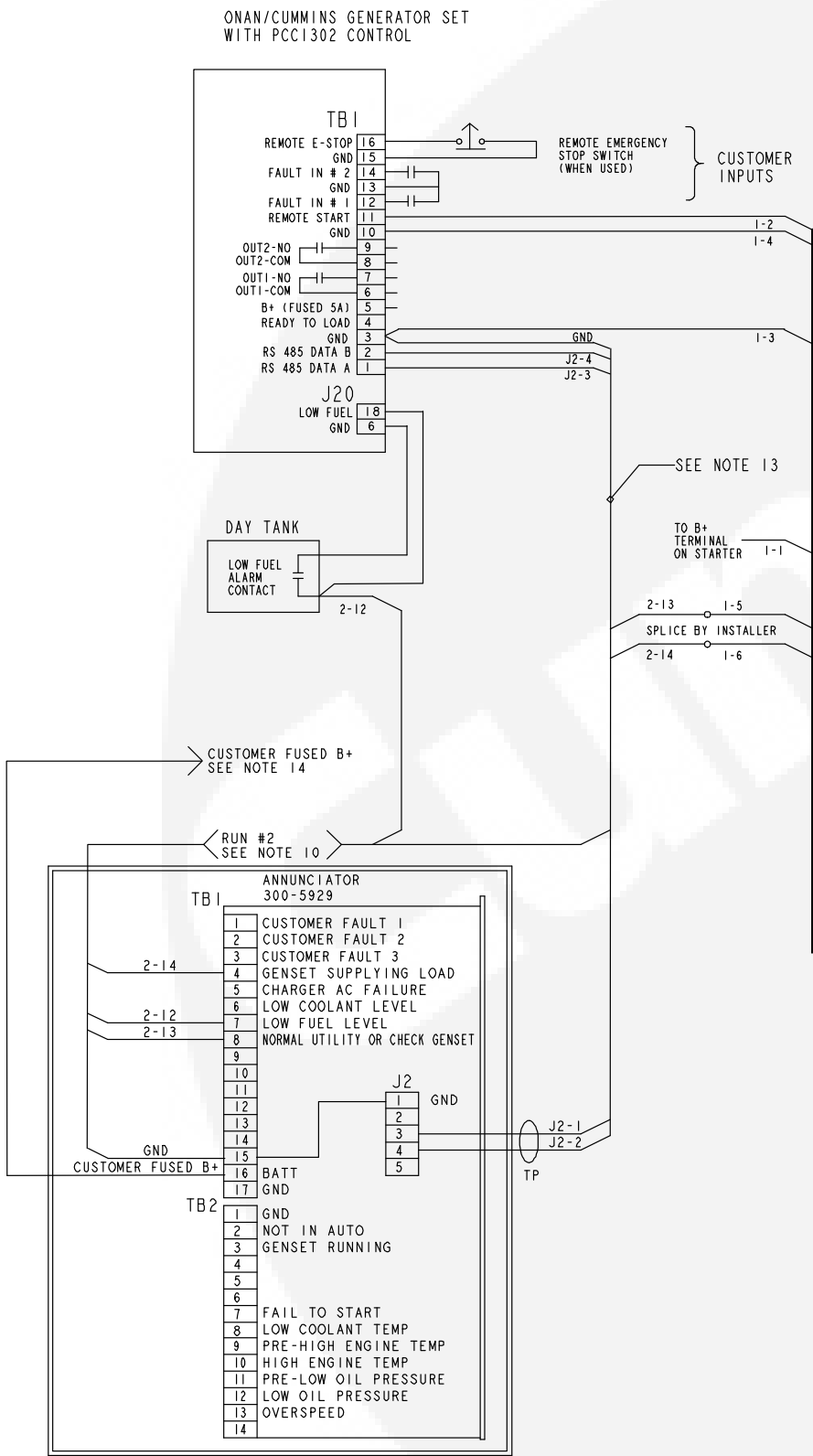
### NOTES:

1. WIRE SIZES MUST BE AS FOLLOWS:  
RUN #1-GENSET TO TRANSFER SWITCH-LEAD SIZE MUST BE INCREASED IF A BATTERY CHARGER IS INSTALLED IN THE SWITCH.  
WITH NO BATT CHARGER-LEADS 1-1, -2, -3, -4, -5 USE COL A.  
WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 1.5 VOLTS, LEADS 1-1, & 1-3 USE COL B.  
WITH 12/15 AMP CHARGER MAXIMUM VOLTAGE DROP OF 1.5 VOLTS, LEADS 1-1 & 1-3 USE COL C.  
WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1, & 1-3 USE COL D.  
WITH 12/15 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1, & 1-3 USE COL E. TO MEET THE NFPA110 REQUIREMENT TO RETURN A FULLY DISCHARGED BATTERY TO 100% OF IT'S AMPERE-HOUR RATING WITHIN 24 HOURS USE COL E.
2. RUN #2-GENSET TO ANNUNCIATOR-ALL LEADS, USE COL A
3. FOR MULTIPLE TRANSFER SWITCHES, DUPLICATE RUN #1 FOR EACH SWITCH. DAISY CHAIN CONNECTION IS ACCEPTABLE PROVIDED WIRE SIZE & DISTANCE TO THE LAST SWITCH MEET THE SPECS IN NOTE 1.
4. DO NOT INSTALL JUMPER BETWEEN TB2-2 & TB2-3 AND TB2-1 & TB2-2.
5. CONTACTS RATED: 4 AMPS AT 30 VDC OR 120V MAX.
6. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO THE NETWORK.
7. TRANSFER SWITCH SHOWN CLOSED TO NORMAL. BYPASS SWITCH SHOWN IN NEUTRAL POSITION.
8. CONNECT AN OPEN DRY CONTACT BETWEEN THE APPLICABLE TERMINAL AND COMMON (TB2-8). FOR REMOTE TEST, TRANSFER INHIBIT AND LOAD SHED. CLOSE TO ACTIVATE.
9. CONTACTS RATED: 2 AMPS AT 30 VDC OR 0.60 AMPS AT 120 VAC.
10. REFER TO 0900-0301 FOR INSTALLATION OF 0300-5929.
11. USE THE INVENTER REMOTE TEMPERATURE PROBE (0193-0530).
12. THE FOLLOWING FAILS WILL CAUSE A BATTERY CHARGER ALARM OUTPUT:  
LOW BATTERY VOLTAGE, HIGH BATTERY VOLTAGE, LOW AC INPUT VOLTAGE, HIGH AC INPUT VOLTAGE, OVERCURRENT, HIGH CHARGER TEMPERATURE, BATTERY FAILURE, HIGH BATTERY TEMPERATURE (NOT AVAILABLE ON 2 AMP CHARGER).
13. NETWORK CONNECTIONS: 18 GA TWISTED PAIR OR CAT 5 CABLE. TOTAL NETWORK LENGTH CANNOT EXCEED 4000 FEET. UP TO 20 NODES CAN BE CONNECTED TO THE NETWORK. (NOTE: ANY COMMUNICATIONS WIRE CONNECTED TO THE GENSET SHOULD BE STRANDED CABLE.)

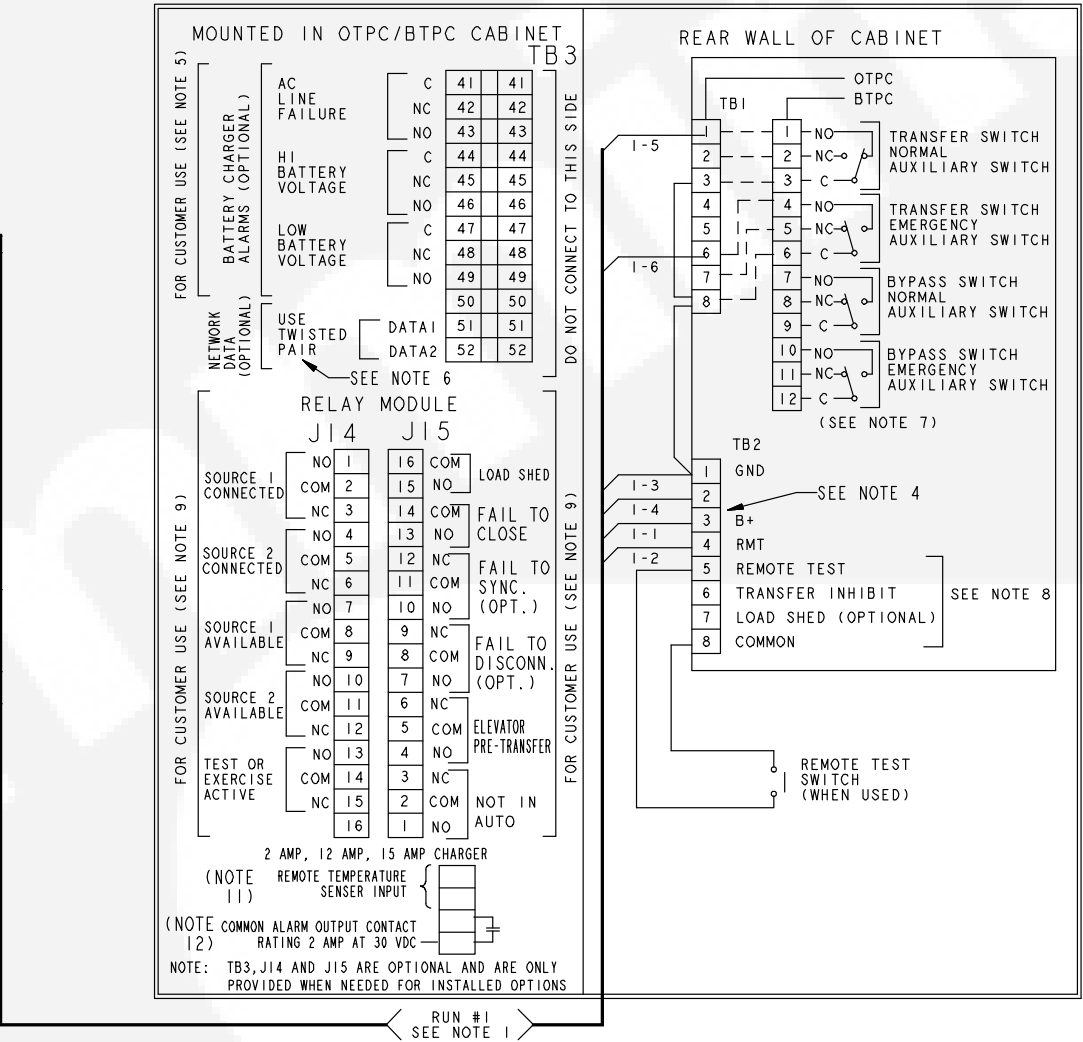
No. 630-1974 Sh 9 of 10  
Rev. M  
Modified 2/2007

**40-1000 AMP TYPICAL INTERCONNECTION  
DIAGRAM 630-1974 (SHEET 9 OF 10)**

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC/WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS SHIPPED WITH THE TRANSFER SWITCH.



OTPC & BTPC UTILITY TO GENSET



1. WIRE SIZES MUST BE AS FOLLOWS:  
RUN #1-GENSET TO TRANSFER SWITCH-LEAD SIZE MUST BE INCREASED IF A BATTERY CHARGER IS INSTALLED IN THE SWITCH.  
WITH NO BATT CHARGER-LEADS 1-1, -2, -3, -4, -5 USE COL A.  
WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 1.5 VOLTS, LEADS 1-1, & 1-3 USE COL B.  
WITH 12/15 AMP CHARGER MAXIMUM VOLTAGE DROP OF 1.5 VOLTS, LEADS 1-1 & 1-3 USE COL C.

NOTES: WITH 2 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1, & 1-3 USE COL D.

WITH 12/15 AMP CHARGER, MAXIMUM VOLTAGE DROP OF 0.75 VOLTS, LEADS 1-1, & 1-3 USE COL E. TO MEET THE NFPA110 REQUIREMENT TO RETURN A FULLY DISCHARGED BATTERY TO 100% OF IT'S AMPERE-HOUR RATING WITHIN 24 HOURS USE COL E.

2. RUN #2-GENSET TO ANNUNCIATOR-ALL LEADS, USE COL. A  
3. FOR MULTIPLE TRANSFER SWITCHES, DUPLICATE RUN #1 FOR EACH SWITCH. DAISY CHAIN CONNECTION IS ACCEPTABLE PROVIDED WIRE SIZE & DISTANCE TO THE LAST SWITCH MEET THE SPECS IN NOTE 1.

4. DO NOT INSTALL JUMPER BETWEEN TB2-2 & TB2-3 AND TB2-1 & TB2-2.

5. CONTACTS RATED: 4 AMPS AT 30 VDC OR 120V MAX.

6. USE STRANDED TWISTED PAIR WIRES WHEN CONNECTING DATA1 AND DATA2 TO THE NETWORK.

7. TRANSFER SWITCH SHOWN CLOSED TO NORMAL BYPASS SWITCH SHOWN IN NEUTRAL POSITION.

8. CONNECT AN OPEN DRY CONTACT BETWEEN THE APPLICABLE TERMINAL AND COMMON (TB2-8). FOR REMOTE TEST, TRANSFER INHIBIT AND LOAD SHED. CLOSE TO ACTIVATE.

9. CONTACTS RATED: 2 AMPS AT 30 VDC OR 0.60 AMPS AT 120 VAC.

10. REFER TO 0900-0301 FOR INSTALLATION OF 0300-5929.

11. USE THE INVENTER REMOTE TEMPERATURE PROBE (0193-0530).

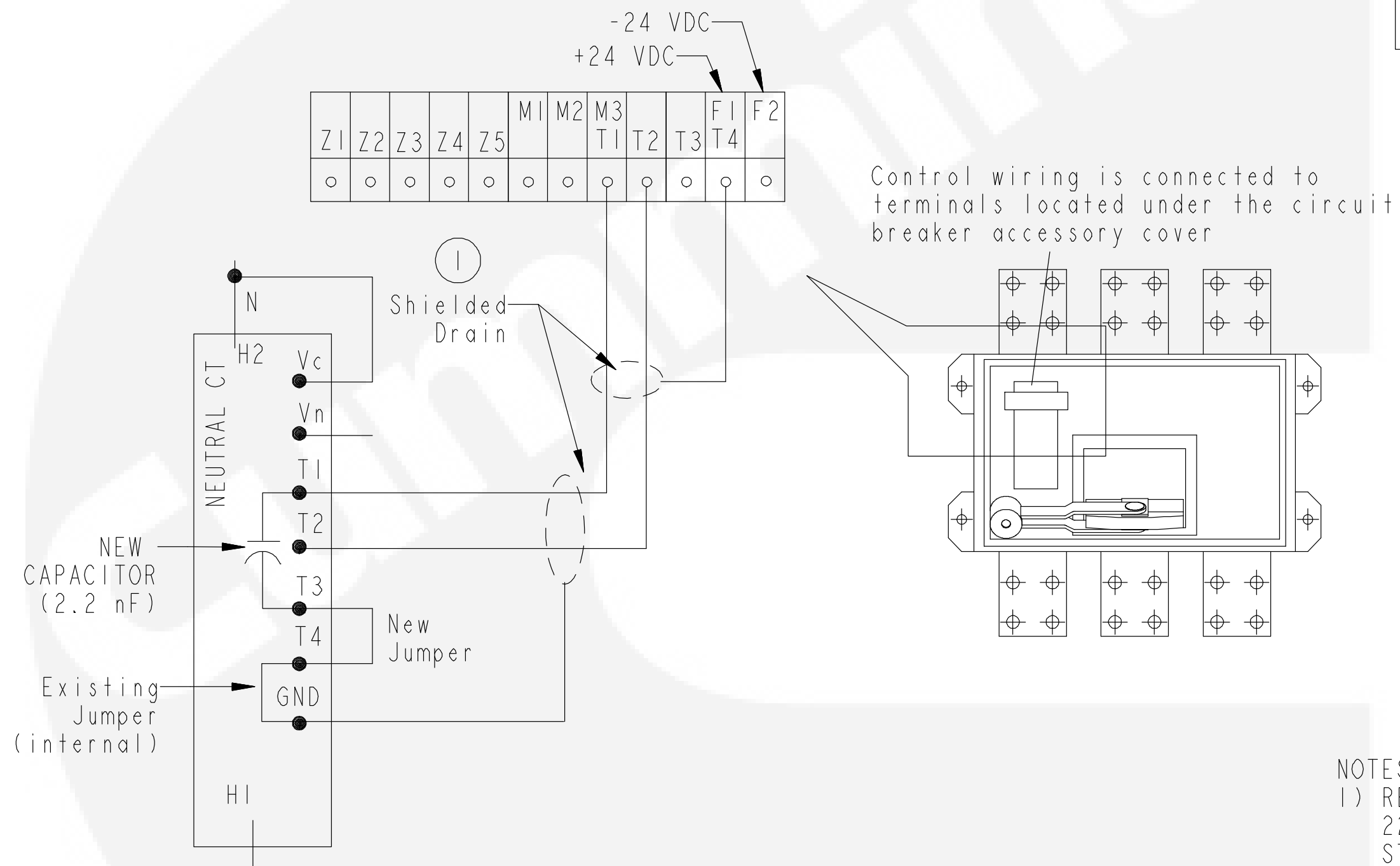
12. THE FOLLOWING FAILS WILL CAUSE A BATTERY CHARGER ALARM OUTPUT:  
LOW BATTERY VOLTAGE, HIGH BATTERY VOLTAGE, LOW AC INPUT VOLTAGE, HIGH AC INPUT VOLTAGE, OVERCURRENT, HIGH CHARGER TEMPERATURE, BATTERY FAILURE, HIGH BATTERY TEMPERATURE (NOT AVAILABLE ON 2 AMP CHARGER).

13. NETWORK CONNECTIONS: 18 GA TWISTED PAIR OR CAT 5 CABLE. TOTAL NETWORK LENGTH CANNOT EXCEED 4000 FEET. UP TO 20 NODES CAN BE CONNECTED TO THE NETWORK. (NOTE: ANY COMMUNICATIONS WIRE CONNECTED TO THE GENSET SHOULD BE STRANDED CABLE.)

14. CUSTOMER SUPPLIED FUSED B+ SOURCE. USE AT LEAST 5 AMP FUSE, WIRE SIZE, USE COL.A.

WIRE SIZE (AWG)	DISTANCE IN FEET, ONE WAY (MULTIPLY BY 0.3 FOR METERS)				
	A	B	C	D	E
16	1000	90	-	50	-
14	1600	150	20	80	5
12	2400	225	30	125	10
10	4000	350	50	200	15
8	-	600	80	300	25
6	-	1000	125	500	40

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC/WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS SHIPPED WITH THE TRANSFER SWITCH.

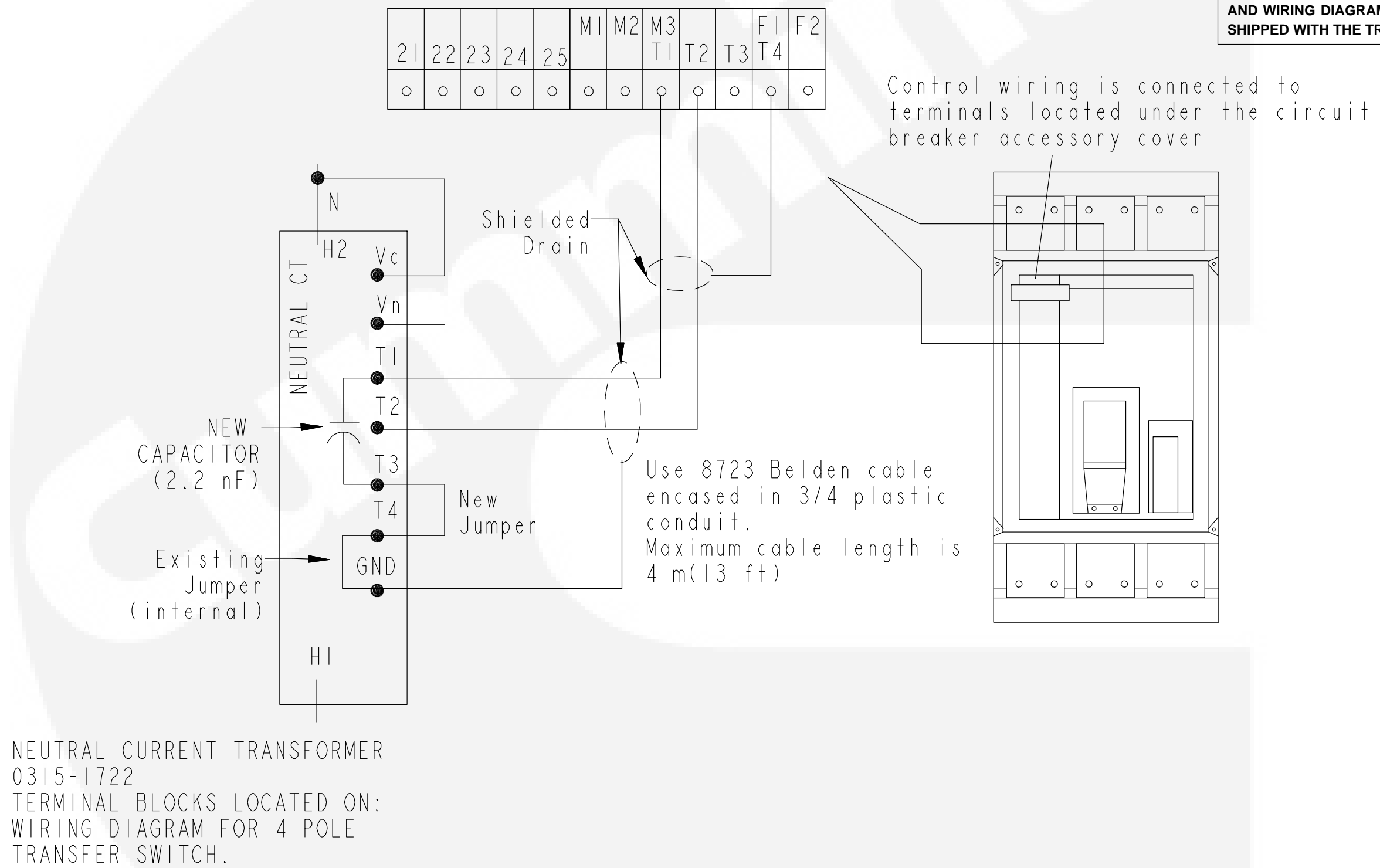


NEUTRAL CURRENT TRANSFORMER  
0315-1722

NOTES:  
1) RECOMMENDED WIRE SIZE:  
22 AWG (0.3 SQUARE MM)  
STRANDED SHIELDED CABLE

No. 630-3641 Sh 1 of 2  
Rev. A  
Modified 3/2008

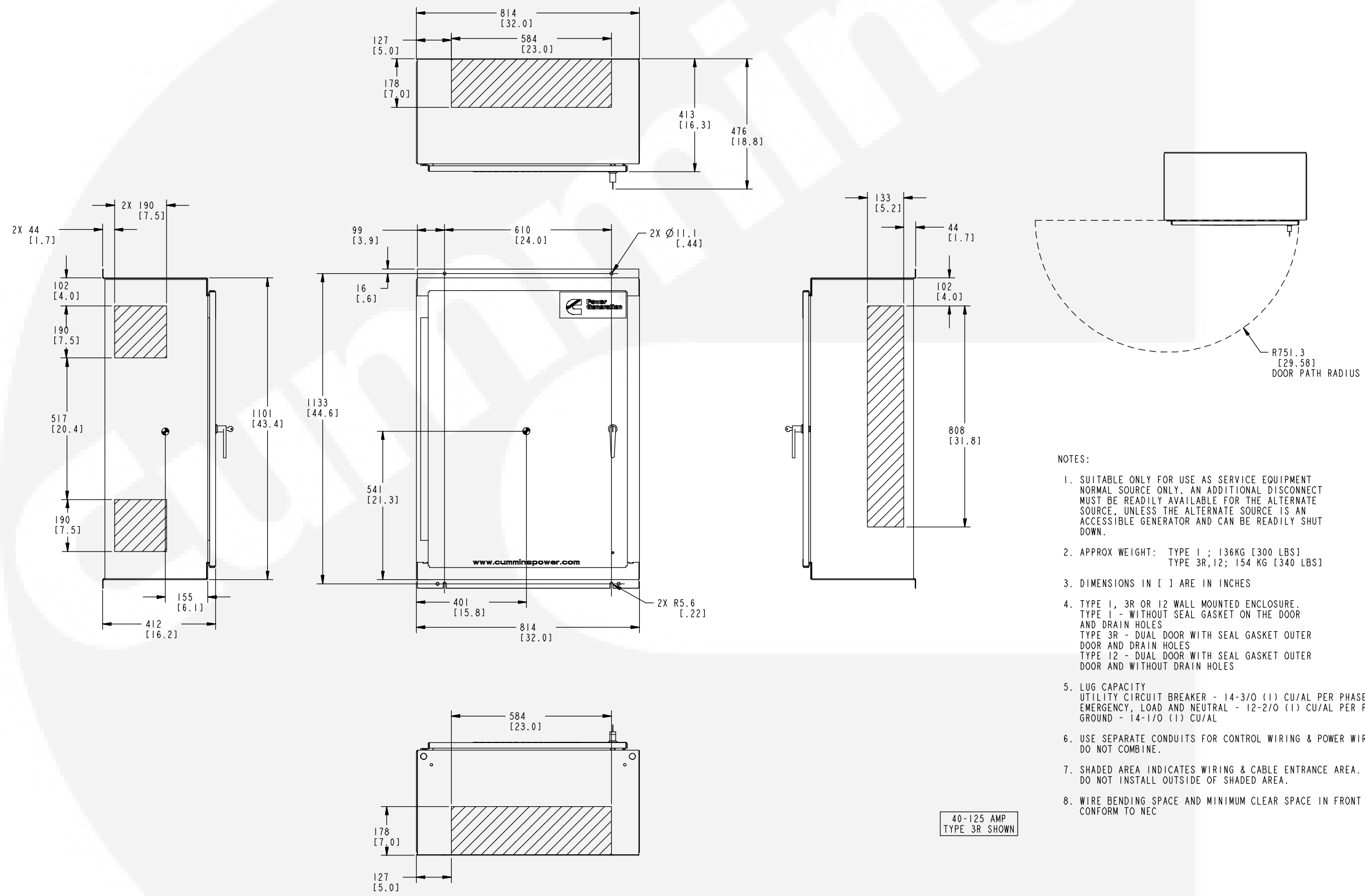
THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC/WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS SHIPPED WITH THE TRANSFER SWITCH.



NEUTRAL CURRENT TRANSFORMER  
0315-1722  
TERMINAL BLOCKS LOCATED ON:  
WIRING DIAGRAM FOR 4 POLE  
TRANSFER SWITCH.

No. 630-3641 Sh 2 of 2  
Rev. A  
Modified 3/2008

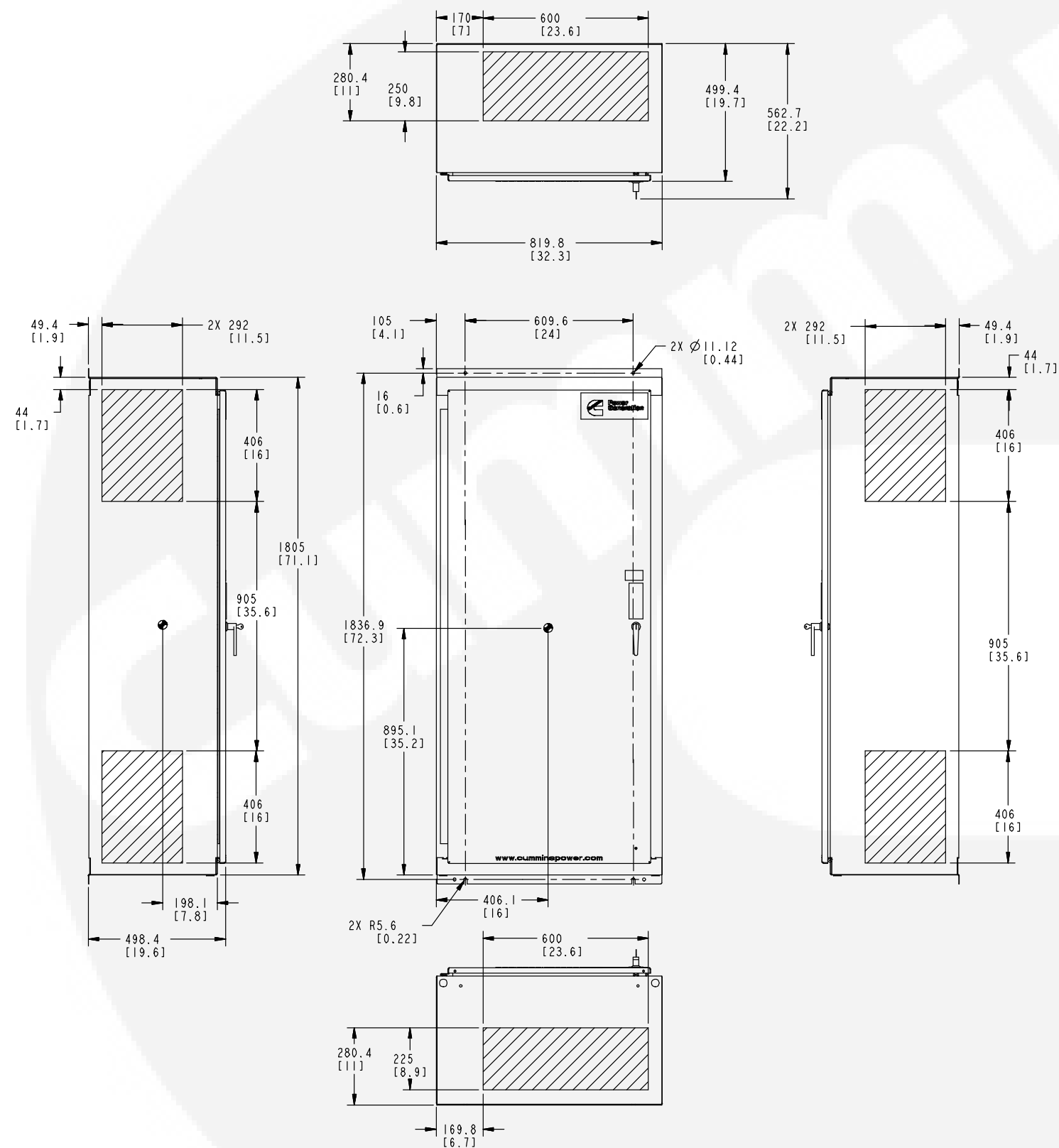




- NOTES:
- SUITABLE ONLY FOR USE AS SERVICE EQUIPMENT NORMAL SOURCE ONLY. AN ADDITIONAL DISCONNECT MUST BE READILY AVAILABLE FOR THE ALTERNATE SOURCE, UNLESS THE ALTERNATE SOURCE IS AN ACCESSIBLE GENERATOR AND CAN BE READILY SHUT DOWN.
  - APPROX WEIGHT: TYPE 1 ; 136KG [300 LBS]  
TYPE 3R,12; 154 KG [340 LBS]
  - DIMENSIONS IN [ ] ARE IN INCHES
  - TYPE 1, 3R OR 12 WALL MOUNTED ENCLOSURE.  
TYPE 1 - WITHOUT SEAL GASKET ON THE DOOR AND DRAIN HOLES  
TYPE 3R - DUAL DOOR WITH SEAL GASKET OUTER DOOR AND DRAIN HOLES  
TYPE 12 - DUAL DOOR WITH SEAL GASKET OUTER DOOR AND WITHOUT DRAIN HOLES
  - LUG CAPACITY  
UTILITY CIRCUIT BREAKER - 14-3/0 (1) CU/AL PER PHASE  
EMERGENCY, LOAD AND NEUTRAL - 12-2/0 (1) CU/AL PER PHASE  
GROUND - 14-1/0 (1) CU/AL
  - USE SEPARATE CONDUITS FOR CONTROL WIRING & POWER WIRING. DO NOT COMBINE.
  - SHADED AREA INDICATES WIRING & CABLE ENTRANCE AREA. DO NOT INSTALL OUTSIDE OF SHADED AREA.
  - WIRE BENDING SPACE AND MINIMUM CLEAR SPACE IN FRONT OF UNIT CONFORM TO NEC

No. 500-4721 Sh 1 of 1  
Rev. A  
Modified 1/2008

OUTLINE DRAWING 500-4721, 40-125 AMP (NEMA CONTROL BOX TYPE 3R SHOWN)



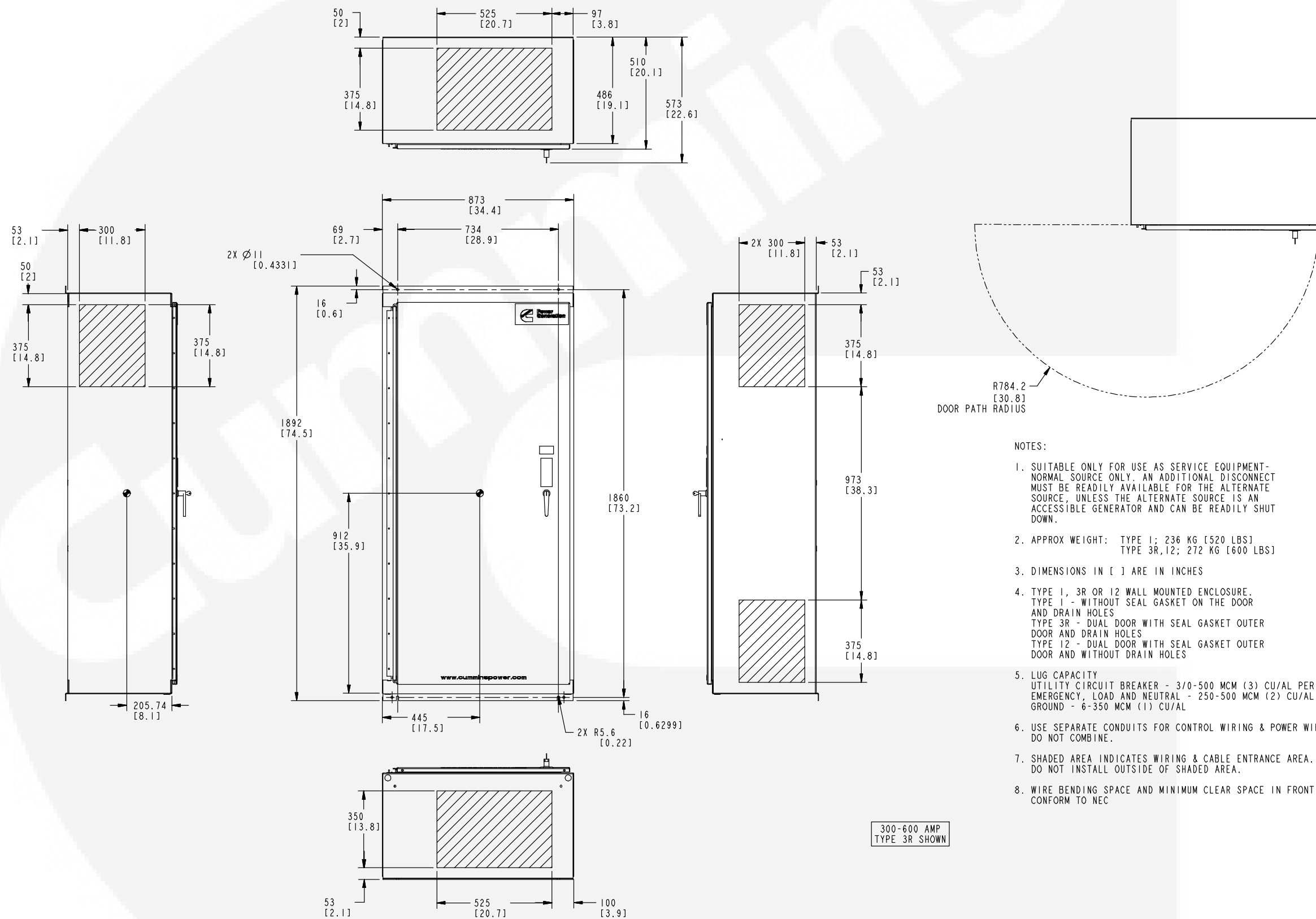
#### NOTES:

- SUITABLE ONLY FOR USE AS SERVICE EQUIPMENT-NORMAL 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.
- APPROX WEIGHT: TYPE 1; 227 KG [500 LBS]  
TYPE 3R, 12; 263 KG [580 LBS]
- DIMENSIONS IN [ ] ARE IN INCHES
- TYPE 1, 3R OR 12 WALL MOUNTED ENCLOSURE.  
TYPE 1 - WITHOUT SEAL GASKET ON THE DOOR AND DRAIN HOLES  
TYPE 3R - DUAL DOOR WITH SEAL GASKET OUTER DOOR AND DRAIN HOLES  
TYPE 12 - DUAL DOOR WITH SEAL GASKET OUTER DOOR AND WITHOUT DRAIN HOLES
- LUG CAPACITY  
UTILITY CIRCUIT BREAKER - 2-600 MCM (1) CU/2-500 MCM (1) AL PER PHASE  
EMERGENCY, LOAD AND NEUTRAL - 6-400 MCM (1) CU/AL PER PHASE  
GROUND - 14-1/0 (1) CU/AL
- USE SEPARATE CONDUITS FOR CONTROL WIRING & POWER WIRING. DO NOT COMBINE.
- SHADED AREA INDICATES WIRING & CABLE ENTRANCE AREA. DO NOT INSTALL OUTSIDE OF SHADED AREA.
- WIRE BENDING SPACE AND MINIMUM CLEAR SPACE IN FRONT OF UNIT CONFORM TO NEC

150-250 AMP  
TYPE 3R SHOWN

No. 500-4606 Sh 1 of 1  
Rev. A  
Modified 1/2008

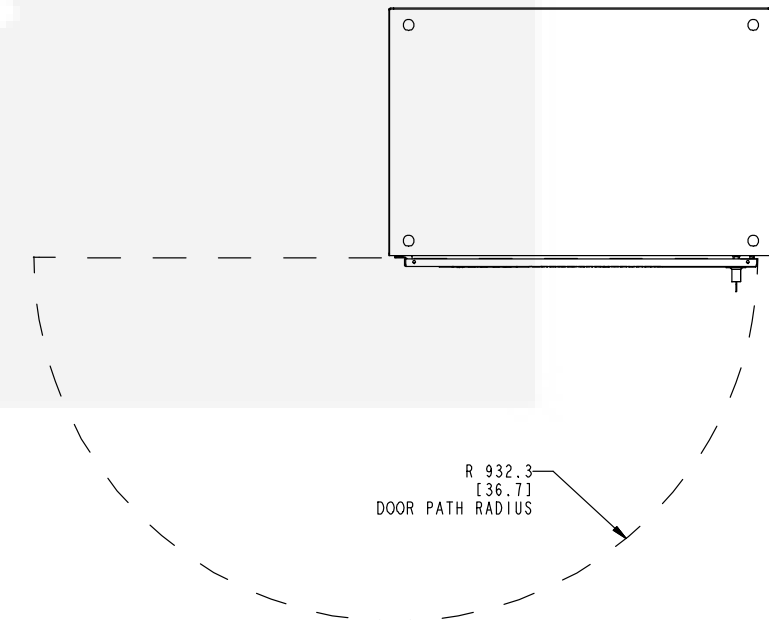
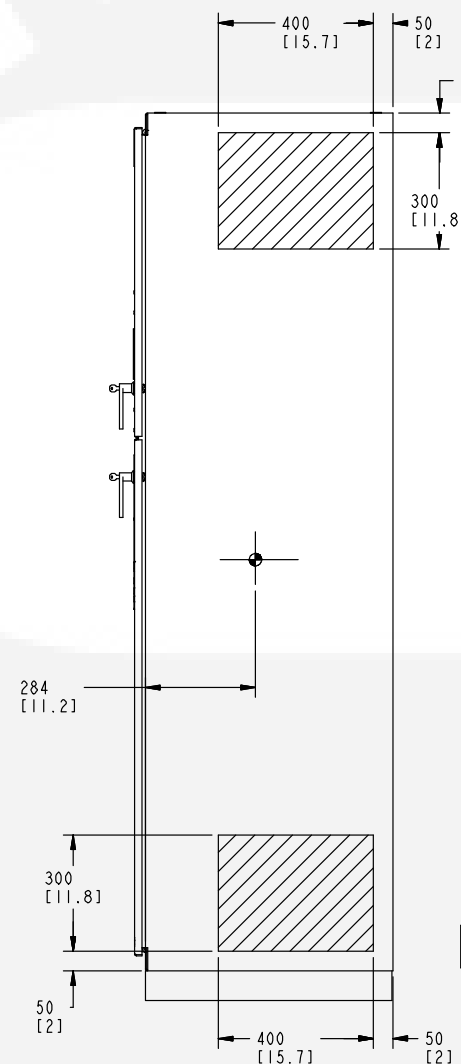
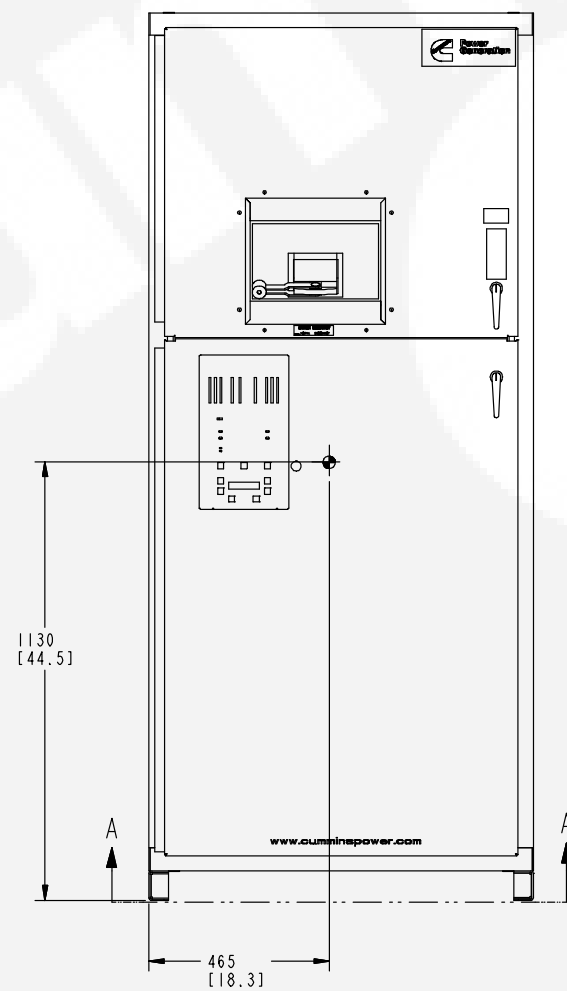
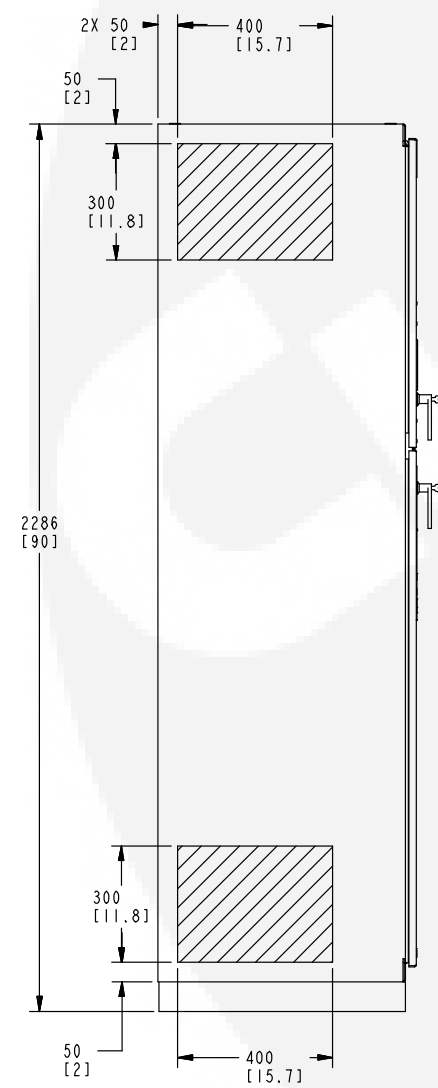
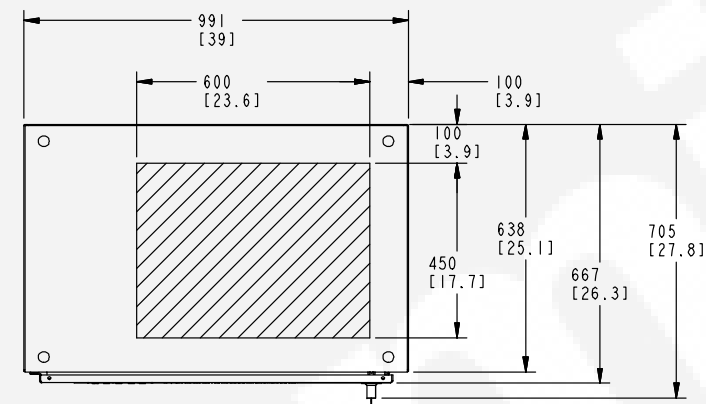
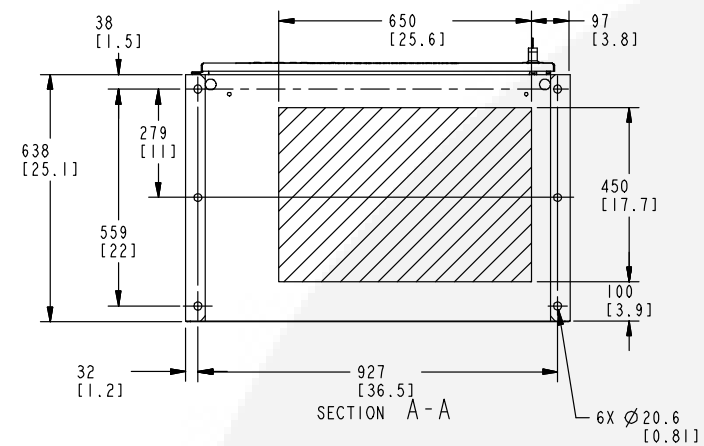
OUTLINE DRAWING 500-4606, 150-250 AMP  
(NEMA CONTROL BOX TYPE 3R SHOWN)



#### NOTES:

- SUITABLE ONLY FOR USE AS SERVICE EQUIPMENT-NORMAL 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.
- APPROX WEIGHT: TYPE 1; 236 KG [520 LBS]  
TYPE 3R, 12; 272 KG [600 LBS]
- DIMENSIONS IN [ ] ARE IN INCHES
- TYPE 1, 3R OR 12 WALL MOUNTED ENCLOSURE.  
TYPE 1 - WITHOUT SEAL GASKET ON THE DOOR AND DRAIN HOLES  
TYPE 3R - DUAL DOOR WITH SEAL GASKET OUTER DOOR AND DRAIN HOLES  
TYPE 12 - DUAL DOOR WITH SEAL GASKET OUTER DOOR AND WITHOUT DRAIN HOLES
- LUG CAPACITY  
UTILITY CIRCUIT BREAKER - 3/0-500 MCM (3) CU/AL PER PHASE  
EMERGENCY, LOAD AND NEUTRAL - 250-500 MCM (2) CU/AL PER PHASE  
GROUND - 6-350 MCM (1) CU/AL
- USE SEPARATE CONDUITS FOR CONTROL WIRING & POWER WIRING. DO NOT COMBINE.
- SHADED AREA INDICATES WIRING & CABLE ENTRANCE AREA. DO NOT INSTALL OUTSIDE OF SHADED AREA.
- WIRE BENDING SPACE AND MINIMUM CLEAR SPACE IN FRONT OF UNIT CONFORM TO NEC

No. 500-4611 Sh 1 of 1  
Rev. A  
Modified 1/2008



- NOTES:

1. SUITABLE ONLY FOR USE AS SERVICE EQUIPMENT - NORMAL 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.
2. APPROX WEIGHT: TYPE 1; 417 KG [920 LBS]  
TYPE 3R, 12; 476 KG [1050 LBS]
3. DIMENSIONS IN [ ] ARE IN INCHES
4. TYPE 1, 3R OR 12 FLOOR MOUNTED ENCLOSURE.  
TYPE 1 - WITHOUT SEAL GASKET ON THE DOOR AND DRAIN HOLES  
TYPE 3R - DUAL DOOR WITH SEAL GASKET OUTER DOOR AND DRAIN HOLES  
TYPE 12 - DUAL DOOR WITH SEAL GASKET OUTER DOOR AND WITHOUT DRAIN HOLES
5. LUG CAPACITY  
UTILITY CIRCUIT BREAKER - 250-500 MCM (4) CU/AL PER PHASE  
EMERGENCY, LOAD AND NEUTRAL - 250-500 MCM (4) CU/AL PER PHASE  
GROUND - #6-250 MCM (1) CU/AL
6. USE SEPARATE CONDUITS FOR CONTROL WIRING & POWER WIRING.  
DO NOT COMBINE.
7. SHADED AREA INDICATES WIRING & CABLE ENTRANCE AREA.  
DO NOT INSTALL OUTSIDE OF SHADED AREA.
8. WIRE BENDING SPACE AND MINIMUM CLEAR SPACE IN FRONT OF UNIT CONFORM TO NEC

No. 500-4608 Sh 1 of 1  
Rev. A  
Modified 1/2008

**OUTLINE DRAWING 500-4608, 800-1000 AMP  
(NEMA CONTROL BOX TYPE 1 SHOWN)**



**Cummins Power Generation**

1400 73rd Ave. NE  
Minneapolis, MN 55432 USA

Phone 1 763 574 5000

Toll-free 1 800 888 6626

Fax 1 763 574 5298

Email [ask.powergen@cummins.com](mailto:ask.powergen@cummins.com)

[www.cumminspower.com](http://www.cumminspower.com)

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